THE ROYAL ENGINEERS JOURNAL

APRIL 1993

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Guidelines for Authors

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

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

Length. Normally approximately 4500 words (five A4 pages single line text plus illustrations. Blockbusters can sometimes be serialized.

Clearance. The author must clear his/her article with his/her commanding officer where applicable.

Copy. Ideally text should be double space typed and include the author's pen picture, photo and captions for artwork.

Computers. For the moment, because of the number of virus programmes in circulation, the decision has been taken to stop accepting articles filed on computer discs.

Photographs should be black and white. Coloured photographs rarely reproduce well unless they are excellent quality with sharp definition. Slides are not acceptable at present.

Line Drawings, if possible should be drawn in proportion with the page size (145mm x 205mm).

Rewards can be generous. The Publications Committee has about £250 in prize money to allot for each issue plus valuable annual prizes. All authors receive £10 to help cover costs.

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

Contributions should reach the Editor by:

15 June for the August 1993 issue
Early October for the December 1993 issue
Early February for the April 1994 issue

Submissions before the deadline will be particularly welcome.

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Contents

Editorial

FOR this edition of the *Journal* we have been fortunate to have received a healthy selection of articles from which to choose covering both our yesteryears and our current activities. It is particularly pleasing to be able to include several articles written by our younger members including the article *Responsibilities of a Young Officer Commanding a Bridge Construction Task in Kenya*, which won an Institution of Civil Engineer award last year, and *Europe's New Green Army*, the author of which has just started her course at Sandhurst.

The Corps is currently heavily involved in United Nations' operations worldwide and has some 600 troops in Bosnia. It is right therefore that such operations feature again with an article by Lieut Colonel Warren on Cambodia. This complements Brigadier Hooper's article in the last edition; it is interesting to note the differing perspective of the two authors.

We hope to include an article on our operations in Bosnia in August. I suspect that reports on the Corps involvement in UN operations will increase in the coming years. As proof of this I can do no better than to quote two extracts from the recent House of Commons Defence Committee Report:

> "Nobody foresaw in 1990 the expansion in the role of the United Nations, and in the public demand for military intervention in unlikely places and for unlikely reasons."

> "Nobody could sensibly suggest that the developments of the past three years have diminished the requirement for armed forces: quite the contrary. Changes in public expectation and in the strategic environment both point to a greater rather than a lesser demand for armed forces capable of interventions over a wide spectrum of activities."

In my last editorial I reported on the decision to extend Associate Membership to our warrant officers. I am pleased to report that the take up is already over ten per cent which is an encouraging start.

Two books are to be published by the Institution this year:

- A new "Short History of the Corps", written by Major Peter Aston, which is due back from the printers by the end of March. It will be distributed free to all regular recruits and be available at a very modest price through Corps Enterprises. This is an excellent small book written largely in Major Aston's spare time. It should be compulsory reading for every Sapper.

- "History of the Corps of Royal Engineers", Volume XI of the Corps History, covering the period 1960-1980, is now in its final stages and hopefully will be sent to the printers within the next couple of months. The Institution is deeply indebted to the many people who have devoted so much of their time free of charge to write sections of the book, contribute photographs and information and check drafts. Our official thanks will be fully recorded at a later date.

Following direction from Council and as part of the transition to a new committee structure the Publication Committee has now become a sub-committee of the Budget and Membership Committee. The committee membership has been slightly adjusted and is shown on the first page of the *Journal*.

In conclusion it would be remiss of me not to convey our salutations and best wishes to the Postal and Courier Services on their departure on the 5 April to the Royal Logistic Corps. An article recording their time with the Corps is planned for the next issue.

Operation Lecturer

UK Participation in UN Operations in Cambodia

LIEUT COLONEL M W M WARREN MA

Mike Warren was commissioned into the Corps in 1966. Three years at Trinity College Cambridge preceded a Troop Commander's tour with 9 Independent Parachute Squadron RE, a 2ICs tour with 64 Amphibious Engineer Squadron and an Adjutant's tour with 75 Engineer Regiment(V). Staff jobs in an infantry brigade headquarters and 3 Armoured Division in Germany came either side of the Army Staff Course. He commanded 2 Field Support Squadron in Germany before returning to the UK for two years on Salisbury Plain at the School of Infantry and then back to Cambridge to do another Long Punting Course but this time in command of the University Officers Training Corps where he found that undergraduates are much younger than they used to be.

He was lifted from the job of Chief Instructor, Tactics Wing, Royal School of Military Engineering to spend six and a half months with the United Nations in Cambodia and is currently at Andover working for Director General Equipment Support.

Background

In October 1991 in Paris, as a result of an initiative from – amongst others – France, Indonesia, Australia and Japan, a cease-fire was negotiated between the four warring factions in Cambodia. By this act the latest war in that country was formally declared over "merely" leaving disarmament and demobilization of the armed forces as well as general battle area clearance to take place.

The war, last in a series stretching back some way into history, followed the infamous period in which the Khmer Rouge (KR) under Pol Pot, exterminated almost all of Cambodia's intelligentsia as part of a policy which killed approximately one million Cambodians out of a population of eight million. This period was only stopped when Vietnam invaded Cambodia in 1979 to prevent further excesses by the KR. However the invasion itself signalled the start of the civil war ended by the Paris cease-fire. With three guerrilla factions opposing the Vietnamese-supported Peoples Republic of Kampuchea (PRK) there was never any hope of a tidy conflict. In addition to the neo-Marxist, Chinese-backed KR there were two non-communist and Western-backed groups, the Khmer People's National Liberation Front (KPNLF) and a group with the extraordinary abbreviation FUNCINPEC. These three fought against, but not necessarily in concert with each other, the PRK.

Although Cambodia saw conflict almost continuously from the late 1960s until 1991, the KR era and civil war saw the greatest exodus of refugees and the most widespread use of mines. It was this situation which faced the United Nations (UN) in 1991 when attempts to formulate a plan to re-establish democracy in Cambodia were made. Brigadier John Hooper in his article in the last issue of the *Journal* eloquently describes the scale of the mine situation in Cambodia in 1991, and there is no need to cover that ground again. However this article will cover UN activities in Cambodia and the UK part in them for the duration of the author's tour from February-August 1992.

The UN Plan

With a very meagre military planning staff in UN Headquarters, New York, which has no hope whatsoever of competing with the political and humanitarian departments, not to mention the

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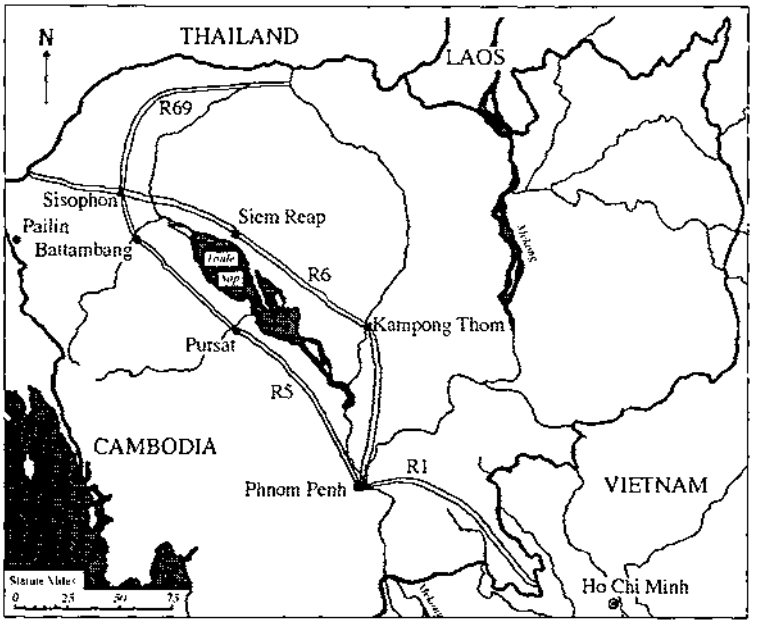

awe-inspiring bureaucracy, military planning itself tends to be less well coordinated and detailed than one is used to. Whilst the broad UN objective of creating true democracy in Cambodia by mid-1993 was established early on, together with the necessary political conditions of a peaceful and demilitarized country with its voting population in place, the military practicalities of achieving all of this were skimpily addressed. Nevertheless it was realized that in order to achieve a proper cease-fire and to disarm and demobilize the faction armies there would have to be a heavy UN military presence. It was further realized that such a UN presence could not be conjured up immediately and that there would have to be an advance party – the UN Advanced Mission in Cambodia (UNAMIC). This would deploy to create liaison with and between the military factions. Further tasks would be to plan for the arrival of the main UN body. Needless to say this was a huge task for the rather "thin" UNAMIC.

Fortunately the designated UN Force Commander, Lieut General John Sanderson, was an Australian sapper who, coincidentally, had instructed in the PRA wing RSME in the late '60s. He recognized that the engineering task to allow the UN to complete its mission was huge. With little functioning infrastructure outside Phnom Pen apart from rudimentary military facilities such as airfields, there was much to do to allow a UN military force of 16,000, together with a UN police force of 3500, and a civilian bureaucracy of 3000 to operate. Roads, bridges, water and food supply, medical facilities, accommodation, communications, and transport, at the end of 1991, were all atrocious and all needed a massive injection of effort to bring them to reasonable standards. In its bankrupt state, Cambodia could not pay for any of this effort and so the funding fell either to the UN or to other aid organizations such as the well-known OXFAM or International Committee of the Red Cross, and many many others. The other major task was the creation of a coherent organization for the command and control of all UN activities, military and civilian. Even the energy generated by the arrival of a 3-star general was dissipated by the totally random abilities of staff taking up jobs and the fact that everyone was starting from scratch. In all of this the presence of mines was just one of the facets of the situation facing UNAMIC when it deployed in December 1991.

The UN Deployment

UNAMIC deployed in December 1991 with a total strength – military and civilian – of approximately 350. The senior military officer was a French brigadier. He was subordinate to the UN permanent staff Head of Mission, but commanded an Australian communications unit of 40, a French aviation squadron of approximately 100 which operated six PUMA MSH and one C-160 TRANSAL fixed wing aircraft, a German army medical team of nine including three doctors, a New Zealand Mine Awareness Training Team of 20, some 50 military liaison officers (MLOs) from about 20 countries and a small headquarters staff. The fact that there were no NCOs of any sort in the headquarters staff, itself made for an interesting life. The balance of UNAMIC personnel was made-up of UN civilian permanent staff who were there to support the overall Mission Headquarters and to administer the mission itself.

An unspecified part of UNAMIC's task was survival since in this agglomeration of different nationalities there was virtually no first or second line support apart from the small German medical team. Geographical dispersion of the groups of MLOs was up to 350km from Phnom Penh towards the northern and western borders with Thailand and so self sufficiency was a key attribute. Indeed the ability of Phnom Penh to provide the daily or even weekly needs of detachments was never very high even as late as mid-1992 when the main UN deployment was in full swing.

Clearly the transition from UNAMIC to the UN Transitional Authority in Cambodia (UNTAC) was never going to take place instantaneously. The original size of UNAMIC itself was hardly enough to carry out all of its liaison tasks without laying the groundwork for UNTAC. Accordingly, although Mr Yasushi Akashi, the head of UNTAC and, Lieut General Sanderson arrived in Phnom Penh in mid-March and declared UNTAC to be in existence, all components of UNTAC were still not complete by August 1992. By that time there were 12 infantry battalions, an equivalent of a signal regiment, an air component which included three TRANSAL C-160s, six PUMAs, 18 MI7 HIP and three MI26 HOOK, three field hospitals, 450 military observers, 300 naval observers, a Mine Clearance Training Unit (MCTU) of 200 and a military headquarters staff of approximately 150 officers and two warrant officers. There was also a large UN permanent staff component. Additional to UNTAC were other UN agencies such as UN High Commission for Refugees (UNHCR) and UN Development Programme (UNDP). All UN agencies like this were autonomous, independently funded and had their own command structure. If ever there was a clear case for coordination this was it. And yet even with some 60 Non-Government Organizations (NGOs) operating in Cambodia as well, there was little obvious effort made to bring all the disparate aid projects together. In truth this would have been a monumental task cutting across national, religious and personal aspirations. Perhaps that is why the name "UNTAC" remained a convenient whipping boy for things that went wrong!

All in all in excess of 60 nations were contributors from all continents. A great number of national military contingents were professional and competent, a number were neither professional nor competent. Many military observers were merely there for the UN allowance; the remainder, therefore, had to carry out the tasks of the whole. A number of the UN permanent staff were clearly outfaced by the task in hand others were perfectly competent. It was a situation very unlike the smooth running of a well practised military formation which has been known to exist in the British army and one soon learned that if you wanted something you went to get it yourself or remained disappointed.

Villager (left) showing results of his own mine clearance technique.

UN Participation in UNAMIC

Three UK officers joined UNAMIC in the first deployment, acting as MLOs. One was part of a team deployed to Pailin, the nominal headquarters of the KR close to the western frontier with Thailand. (It should be noted that the whereabouts of the real headquarters of the KR was never properly established, nor indeed if Pol Pot still took an active part in decision making.) One deployed to the HQ of the KPNLF, again conveniently close to the Thai border. The third deployed to a military district HQ in the town of Siem Reap, which was only some 3km from the edge of the fabled Angkor Wat temple district. Needless to say he became unofficial guide to many visiting dignitaries.

Mine awareness training was the task given to the New Zealand group deployed with UNAMIC. It became apparent soon after, that if the UNHCR plans to repatriate refugees from Thailand in time for elections in Cambodia were to work, active mine clearance would have to take place. UNAMIC's mandate was expanded therefore to take account of this and UN funding for mine clearance training was

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voted in New York. The MCTU was designed, the UK was asked to provide its CO, part of its HQ element, and one training team of ten. In mid-February the author, WO2 Morton from 25 Engineer Regiment and Corporal Cope from 38 (Berlin) Field Squadron travelled to Phnom Penh to take over planning for the mine clearance training programme.

UK Participation in UNTAC

For one reason and another but mainly because the UN could not provide vehicles or radios (and there were certainly no civilian telephones up country) the UK training team, under the command of Captain David Wilkinson, did not arrive in Phnom Penh until 7 April. After a short acclimatization the team started to deploy to the far West of the country on 13 April. The town of Pailin was the destination and a direct deployment route crossed the cease-fire front line between KR and government forces. With the KR not allowing overland movement, an air party with baggage moved in by PUMA. The vehicles made a two-day trip from Phnom Penh via Thailand then back into Cambodia (avoiding the front line) and to Pailin. There, the team set about training the KR soldiers, an activity which had marginal success. When it took place the students were quick to learn and practise. However the KR, being what they are, prevented training after the second four-week course. By doing this they demonstrated both their ability to interfere with UNTAC's plans and a growing desire not to cooperate in the move towards democratization of Cambodia.

Shortly after the general election in the UK it became apparent that the UK would be sending out a significant number of military observers to UNTAC and that the author would remain senior British officer or "COMBRITCON"! In the event two groups of observers arrived. The first was a group of 70 mixed RN/RM observers who arrived with rank range from lieut commander to petty officer. Their task was as part of the naval group who had to ensure demobilization of all Cambodian naval forces. A coastline of 100 miles and in excess of 400 miles of Mekong and Tonle Sap rivers ensured they were always kept busy. The second was a group of 38 officers, including four sappers, who, after an intensely frustrating period of up to a month, were all deployed as members of small groups of observers throughout Cambodia. Tasks varied from manning border check points, to manning demobilization control points, to acting as liaison teams in Hanoi and Vientiane. Conditions, naturally, varied from place to place and it is rumoured that the rainy season prevented so much movement by normal road vehicles that one pair of UK observers purchased a cart and two water buffalo. The latter were quickly named Boutros and Ghali.

MCTU

What then was the MCTU? The resources presented to me during a somewhat rushed briefing at UN HQ New York were nothing if not multinational. My headquarters included a Russian 2IC, French training officer, Pakistani assistant training officer, Indian operations officer, Dutch assistant operations officer, French administration officer, Bangladeshi quartermaster, WO2 Morton and Corporal Cope. My task troops were 18 x 8/10-man Mine Clearance Training Teams and 12 x 3-man Mine Clearance Supervisory Teams. These were drawn from the countries contributing to my headquarters as well as New Zealand, whose Mine Awareness Training Teams were assigned to me as Clearance Training Teams. All told my strength was to have been about 210. However none of the Russians ever turned up so maximum strength was about 190.

My mission was not revealed to me before deployment although in New York I was urged to "... get out there as soon as possible and just do something!" In a way it was fortunate that the UN logistics plan was unable to produce vehicles and radios for any of the teams until the end of March, thus delaying the arrival of teams in theatre. Only in this way could I establish what we were trying to do, and create some sort of plan for reception, deployment and modus operandi of the training and supervisory teams.

It eventually became clear that the long term aim for UNTAC, with regard to mines, was to ensure that Cambodia itself was in a position to deal with the situation. A policy-making body, a controlling headquarters with access to technical information, a training organization and clearance organization all with funds would have to exist. In the eyes of New York there was little immediate urgency for funds beyond setting up the basic training organization since it was firmly believed that funding for all the rest would appear in due

course either from within Cambodia or from outside sources. Unfortunately, whilst this was a reasonable long-term view it avoided the short-term practical requirements.

Part of UNTAC's overall plan for democratization involved the repatriation of the third of a million refugees in Thailand. Much agricultural land had been made unusable by the presence of mines and the pressure on existing mine-free land meant that there was a constant flow of mine casualties even before refugees returned in large numbers. There was a clear need for an immediate mine clearance programme both on practical grounds, to open up routes and farmland, and on humanitarian grounds. Regrettably the budget for UNAMIC did not include any money for this. Furthermore the UN civilian administrators of UNTAC did not admit to having money either. Nevertheless "clearance of selected areas of Cambodia to allow repatriation of refugees" was the mission I gave myself for my tour. Accordingly I planned to deploy groups of training teams and clearance supervisory teams in nine locations from Pailin and Sisophon in the West to Kompong Thom and Phnom Penh in the central part of the country. The general plan was for Cambodian clearance platoons to be trained. These would then undertake clearance operations, supervised by MCTU supervisory teams. All of this I would control from a headquarters in Phnom Penh.

The bones show results of pigs straying into Pom Z-Z minefield.

Training

Training Cambodians to clear mines was the relatively easy part. Without the Russians, there were eventually, 16 Training Teams at my disposal. All were highly motivated, competent and well qualified. Using the available pool of students from the now relatively peaceful armies, a four-week training course produced platoons of trained mine clearers together with their own trained command structure. Clearly these platoons were not immediately capable of independent operations and would only be able to clear mines safely under supervision.

Training courses included the basic techniques well practised during Operation *Salam* in Pakistan, but also included two weeks of practical clearance under training conditions in suitable terrain. It was during these last two weeks that the commanders were given their training both at section or platoon level. As a modification from standard training conditions the French training teams insisted on putting the fourth week exercise onto a real minefield which surrounded their camp. Their logic was that there was no better training than doing it "under fire". Clearly the inherent risk to the trainers was higher than if all training was carried out on the training ground and the UK and other training teams did not go "live".

Clearance

Simple mathematics indicates that with 16 training teams and 12 clearance supervisory teams you end up with more trained platoons than the supervisory teams can handle. Until platoons were capable of operating on their own and until Cambodian supervisors could be found and trained, this situation was always going to remain. Steps, however, were taken to get countries to agree to allow training teams to become supervisory teams and eventually the right ratio was achieved.

Rightly or wrongly mine clearers need money and few if any were prepared to do it for love. On the other hand most Cambodian soldiers were prepared to do it for a square meal a day and $20 a week. The Cambodian Government Ministry of Defence, however, believed that their troops employed on mine clearance should be paid a great deal more. Brigadier Hooper alludes to the extraordinary wage demands and,

HALO Trust mine Clearer in action inside village perimeter.

on reflection, it is vaguely amusing to register that for a time the Cambodian Government troops were ordered not to clear mines unless the UN paid upwards of $1500 a month per man. We had a strike on our hands!

All was not lost, however, since the UN Civil Administration denied that it had any money at all for mine clearance. Furthermore, it refused to contemplate hiring Cambodians to do something as dangerous as that because of the legal liability for injuries. It was thus a fine balance of timing firstly to persuade the UN Civil Administration to accept that it could employ Cambodian mine clearers and also that it had money to pay them, and secondly to persuade the Cambodian Ministry of Defence to accept the $20 wage. It took until early August for all parties to say yes.

UNHCR was faced with the same bureaucratic obstacles to employment of mine clearers. However, HALO Trust (the subject of Brigadier Hooper's article), and two other NGOs – Handicap International and the Catholic Office for the Evacuation of Refugees – started to employ trained teams supervised by MCTU. Even so it took contributions from the pockets of some members of HQ MCTU to start the ball rolling.

Having started the clearance programme off, the other aspects of the mine problem could not be abandoned. Mine awareness training in schools, villages and for the members of UNTAC was carried out. Creation of the overall policy-making body was started as well as creation of the database which would hold all information about all minefields in Cambodia. This information gathering exercise was an extension of the work started by HALO Trust as was a minefield marking programme. Both aspects used the rudimentary HUMINT source as the basis.

It was unfortunate that the UK Mine Clearance Training Team became somewhat beleaguered in Pailin. Having started by allowing training to take place, the KR progressively became ever more difficult. Clearance training was forbidden, mine awareness training was forbidden and finally movement within the area was restricted. Enough contact was made, however, to establish that KR soldiers are the same as soldiers the world over, even though their chain of command has some strange ideas. It was intriguing to see how easily the KR soldiers took part in a British army style pay parade even if the footwear was flip-flops and the head wear somewhat varied. However, no option was left but to redeploy part of the team elsewhere in Cambodia in order to do something constructive. The second half of the team was left in Pailin, along with a small group of observers and signallers, as a political gesture.

Summary

As COMBRITCON, as well as CO MCTU, a great variety of tasks came my way. The saddest was to have to make the repatriation arrangements, following the death from malaria, of one of the UK observers. The most satisfying was to see the happiness on the faces of villagers as their minefield was cleared. When I left, mine clearance training was in full swing, the clearance operation funded by UNTAC was underway, the Cambodian Mine Action Centre – the mine clearance policy and funding body – was beginning to take shape and documentation of the full extent of the mine problem was continuing. The first steps in a 20-year clearance programme had been taken. When full Cambodianization takes place, Cambodia can begin to take control of the programme which it must do when UNTAC leaves in mid-1993. As long as money for the programme can be found, then widescale clearance can take place. If not then the population is dependent on humanitarian help to reduce the flow of casualties.

Good training in itself for Royal Engineers, involvement with the activities of something like MCTU in Cambodia has the added benefit of being a visible and practical humanitarian activity. We should continue to take part in this and other UN operations. By doing so we give ourselves a chance to understand many more of the facets of modern mine warfare. We also see how other nations approach the same challenge. Lastly we give help where help is needed.

Operation Lecturer (p10)

Australian Adventure – Part II

MAJOR S LOVE DSO* MC CROIX DE GUERRE AVEC PALME

1916

THE winter of 1915-16 closed a definite period of the war of trench warfare, just as the Loos operations closed the same period in the way of attack.

In 1915 the front line was strongly manned; rifle fire was the distinguishing feature, and artillery fire was comparatively light. The enemy attack at Verdun, on the 20th of February, inaugurated the new period of concentrated heavy artillery fire calculated to obliterate any defensive system; this resulting in the development of defence in depth and thinly held front lines, and of the increased armament of light and heavy machine guns (MGs).

Never again, until the last phases of the War in 1918, were we to see, as in the spring of 1915, anything akin to the fragrant orchards in full bloom in the front line, with the grass green beneath fruit trees and starred with daisies; or to see support-line troops happily residing in slightly damaged farms and houses.

From this time forward No-Man's-Land became an increasingly desolate waste of shell-holes and torn soil. Never again were we to see, as in summer and autumn of 1915, a stretch of fallow land, high with waving grass and self-sown crops, and gay with wild flowers – great patches of cornflowers, blue like a piece of fallen sky; wide fields of poppies, red like spilt blood.

On the first night after Loos, transport could use any of the roads on our front right up to the front line. Just a year later, after High Wood (15th of September 1916), it was nearly a fortnight before the first single mule track, highly precarious and indescribably muddy and slippery, was got through on our front over the High Wood crest.

During the next period of the company's history, at Vimy Ridge, we were to have our first real taste of this next phase of trench warfare.

On the 13th of March 1916, I rode South to Villers-Au-Bois to see OC 128th Field Company, (23rd Division), whom I was to relieve next day. It was a lovely day of early spring – and what a joy it was to get away from the flat, muddy dreariness of Flanders and Artois to the pleasant, rolling, chalk country of Picardy.

The Company moved in next day – and settled into billets – we were to be in reserve.

The right subsector was on Vimy Ridge – a most unpleasant area; so of course, it was allotted to Blogg. On the 15th, he was being shown round the line by the OC of the Field Company, which he was relieving, when, putting his head over the parapet to look at the German lines, a sniper shot him through the head and he was killed instantly – Blogg, whom I admired and loved "this side of idolatry". His mantle fell on my unworthy shoulders, for from then on the brunt of the Sapper work fell to my Company.

The order for the 4th Company to take over the Vimy Ridge subsector was cancelled and I was instructed to take over. I moved my Company in next day and there we stayed till the 25th of May, doing our own internal reliefs while the other two companies relieved each other in the left subsector and the Company not in the line did the back area work.

Vimy Ridge was most unpleasant with shelling, MG fire, rifle grenades and sniping. Both sides were mining very actively and mines were blown from time to time, which kept my Sappers busy consolidating our tip of the craters.

On the 1st of April at about 3pm, I was busy in my orderly room when the serjeant major, who commanded a view of the entrance gates to the courtyard of our farm, suddenly said "Here's Major Agar!" It is wonderful how quickly one can think in an emergency! I had only about 40 seconds to decide what I would do. As Agar was still on our strength, I knew perfectly well that the moment he entered the company area, he automatically became OC. But I decided I wouldn't give up the company so easily; and as the CRE had put me in command, I would not surrender the command without his instructions. So when Agar entered the room, I did not call the orderly room to attention as I should have done, but went to meet him, shook hands and treated him as an honoured guest.

After he had greeted the staff, I took him into the Mess and we had a drink with the subaltern off duty and the interpreter who I told to find a billet for Major Agar. I returned to the orderly room and signed Company Orders for the day

– having made sure they were made out under my name as Commanding. I then went to see the CRE and told him I had not yet handed over to Agar.

He knew from Division that Agar had returned, he took me out of his office and we walked up and down a track in a field outside. He said "The obvious thing to do is to post you to command the 4th Company as you came out with them, and to leave Agar to command the 2/3rd, but you have had the 2/3rd all through a hard winter and you have done well with them; also you have made some changes Major Agar would not approve." (I had, in fact, got rid of Agar's serjeant major and I had two II corporals promoted serjeants over the heads of the six corporals of the Company – which shook the Company considerably.) "So I'm going to give you the choice. Think it over; I must get Orders out tonight."

I replied "Well, sir, since you have been good enough to give me the choice, I'll give you my answer now. I'll stay with the 2/3rd."

He said "I thought you would. I'll post Major Agar to the 4th Company."

I was deeply grateful to "Crooky". Anyway Agar only stayed for a week before he was evacuated to England – in any case he was already off my strength. The CRE forgot about putting in my promotion at the time and my majority only dated from the 16th of May.

I took some leave in London and none too soon, for I was completely worn out by this long stretch of continuous service in that very active front where something was always happening and during which I had seldom more than a few hours of sleep. On the 20th I went to Buckingham Palace to an investiture to receive my MC.

The Somme Battle opened by a general attack all along that front on the 1st of July 1916 and was continued, at intervals, until October or November. Our casualties were colossal. I think we had over 50,000 on the opening day – but the battle "like a wounded snake drew its slow length along". Sooner or later every division in France was thrown in in the vain hope of making a breakthrough.

In August, our Division was withdrawn from the line and went to a back area to rest, receive reinforcements and to do special training.

Just before we moved out of the line, nine reinforcement officers joined us for the three Field Companies and those allotted to me brought me one subaltern over-strength. Amongst those who joined me then was C F Budenberg, later to become my most trusted Subaltern, my last Captain and lifelong friend.

On 15 September a general attack was launched at 0620hrs. The 47th Division was the right Division of the III Corps, which was the left Corps of the attack. Our Division attacking on a two Brigade front against High Wood and to the right and left of it, had a particularly tough nut to crack. When the right Brigade had fought its way through High Wood, with very heavy losses, and advanced down the forward slope, it was met not only by accurate artillery fire (for it was now in open view of the enemy gunners), but also by heavy MG fire from a concealed enemy post, which finally held up the attack and prevented it from reaching the objectives.

At the commencement of the battle, the 3rd Company was with the right Brigade, the 4th, with the left Brigade, while my Company was in reserve. During the afternoon of the 15th, Birch, going forward to make a daylight reconnaissance, was very badly wounded in the foot and I was given orders to take over work on this front with my Company while the 3rd became Company in reserve.

As my Company was in dug outs three miles behind our old front, it was already dark before I could get them on to the work allotted on a cold, wet night, with continued shelling.

Our work on the nights of the 16th, 17th, 18th and 19th was in connection with a partly dug strong point known as "the Starfish" because it looked rather like a starfish on the maps prepared from aeroplane photographs. It was of importance because it defended the right of our line, which was on its objective, from possible attack by the enemy, who still held a MG strong point and the trenches on their immediate left.

Early on the night of the 16th of September, I set out to find "the Starfish" and to see what work was required. My only way of finding it was to march steadily on a compass bearing from a fixed point at a corner of High Wood.

My Guardian Angel must have been guiding me that night for, about half way to "the Starfish", I came on an extremely deep shell hole with a trench mortar (TM) bedded down at the bottom. I paused to investigate and found there was another similar shell hole only a few yards away, also with a TM bedded down. My sapper mind applauded the skill and cunning of the layout; for

the two shell holes had been joined by a trench, which had been covered by boards with earth on top. As these TM emplacements were not near any trench, there was nothing to draw attention to them. Off the trench joining the shell holes were the beginnings of the stairways to a mined dug out. Each was down about 20 steps, but the *Boche* had not time to join them by a lateral tunnel and so complete the dug out. The TMs were of a very much improved type, with a range of over 1000 yards. I spent some time in examining them, and also made a careful mental note of their position, with a view to retrieving them later.

On the next night, the 17th, on my way to "the Starfish", I saw Faber, the senior Subaltern of the 3rd Company who, with Birch wounded, was temporarily in command. He was a quiet, competent and efficient officer, whom I knew fairly well.

I had only left him a few minutes when the *Boche* put down a really terrific barrage of 5.9in and 10.5in howitzers all along the forward slope of the High Wood ridge. Remembering what my Guardian Angel had shown me the previous night and having noted its position accurately, I said to my Orderly "Come on! Follow me." and ran for the shelter of those two dug out mined stairways. Fortunately neither of us was hit; we slid into the first of the two deep shell holes and from there to the stairways. There we rode out the storm – though one or two heavies in our immediate vicinity shook and rocked our shelter and took me back to my first experience of an earthquake in Madrid seven years before.

When I returned to my normal rendezvous next morning I found the MO (the same dear old Captain Rowlands, who had strapped up my ribs for me 18 months before) on the lookout for me. "Had I seen Faber last night?" I told him I had and that I had had a brief "plod" with him. "Did I know where he was then?" I knew within yards exactly where he was. He then told me that Faber had two Orderlies with him (why two, I wondered; for I never had more than one and, very often, none at all) and there had been a very heavy barrage. I interjected there certainly had been a hell of a barrage and I had been caught by it too. He continued that all three took refuge in separate shell holes and after heavy bursts in their vicinity, Faber would hail his Orderlies to know if they were alright, but after one very heavy burst of shelling, he did not hail them.

After the shelling had died down, they sought him in vain. Would I take him to the spot where I had spoken to Faber and help him look for him?"

I was most reluctant to do this – I was dog tired. It was beginning to grow light and we would be in full view of the enemy and would be certain to be sniped by field guns and cursed by our Infantry for drawing fire on them. However, I couldn't refuse his plea; and so we went. What I expected to happen, happened – we were sniped by field guns and cursed very justifiably by the Infantry. We could find no trace of Faber – and no trace of him was ever found afterwards.

When we got back to my Headquarters, Rowlands said I looked tired out and he would prescribe for me – and he did, for he came back with a large enamel mug of neat rum.

I wrote my report for the CRE, drank the rum, wrapped myself in my overcoat and went to sleep at once in my cubbyhole.

It was my practice to keep one subaltern and his section with me in case of an emergency, the other sections and their officers going back three miles to the Fricourt dug outs, where they would get an undisturbed sleep and hot meals.

On this particular day Budenberg and his Section were on duty, he was sharing my cubbyhole. During the morning a runner from Brigade wakened him to say the Brigadier had an urgent call from his troops in "the Starfish", saying they were in danger of being bombed out and they had almost exhausted their supply of bombs, and would I please detail two sappers to act as guides to "the Starfish" for a carrying party.

Being tired out and relaxing with the MO's rum, Budenberg had the greatest difficulty in waking me. Ultimately he got me to sit up and passed the message. I must have been more than half asleep for the only answer he could get was – "Tell General Lewis that, if his men can't hold "the Starfish" after I have dug it for them, they are unworthy of the name of British soldiers", and with that, I wrapped myself in my overcoat, and lay down to sleep again. So Budenberg, very sensibly detailed two of his section to act as guides and all was well!

On the night of the 17/18th of September, Lieut Williams of 4 Royal Welch Fusiliers (RWF), a young and very stouthearted officer, was in charge of the covering party supplied by his Battalion. As I had little to do once I had got

my troops – about 75 sappers and 100 pioneers – safely on the job, I went with Williams to locate the MG strongpoint which had inflicted such heavy casualties on the Division and was still unconquered. Working cautiously to our left we were lucky enough to detect and to observe a carrying party going up to this strongpoint, which enabled us to fix its position fairly accurately.

After talking it over with Williams, we decided it could be taken by storm from the rear by a party of determined men: and so, on return to my cubbyhole Headquarters, I reported this to the CRE. I said if I could have Williams and a party of 4 RWF Lewis Gunners and Bombers, I was certain we could take this strongpoint by surprise that evening. Division were all for this, but Corps, ordered instead the digging of a retrenchment round it to join up with the 50th Division on our left. I was very regretful about this. The odds were all in our favour and, even if we failed, the risk was only that of two officers and a handful of men – and how many hundreds of officers and men had been killed or wounded in frontal attacks on that strongpoint and in rain. One sad result of the fact our Division had not reached its objectives on the left was that our Divisional Commander, Sir Charles St Leger Barter, was – most unjustly – relieved of his command and succeeded by Sir Frederick Gorringe – a martinet of martinets – who commanded us for the rest of the War.

On the 21st of September the Division was relieved and went to a back area to rest, refit and absorb fresh drafts: but by the 29th it was in the line again for a fresh attack and in constant battle till the 9th of October. The Official History of the Division records that our casualties on the Somme amounted to "296 Officers and 7475 Other Ranks killed, wounded or missing".

From the Somme the Division was transferred to the Ypres front and on the 20th of October 1916, I took over forward billets in the cellars of the GPO, Ypres, from Norman Harris, a younger school fellow of mine at Scotch, commanding the 6th Field Company of the 2nd Australian Division. My Company remained in the line in this subsector till the 2nd of February 1917, a matter of three months and 13 days, a very long spell. As usual the other two field companies relieved one another in the other subsector and did the back area work.

1917

WHEN Birch was wounded on the Somme, I became the Senior Field Company Commander; and so, from the beginning of 1917 till the end of the War, whenever the CRE was on leave or there was an interregnum between Commanders RE (and we had six in all) I went to Division as Acting CRE, an interesting and good experience which enabled me to know the Division staff very well.

(Early in the year the 3rd, 4th and 2/3rd Companies were renumbered respectively as the 517th, 518th, and 520th).

After only eight days out of the line, the Company took over the other subsector on the 12th of February and remained in the line without relief till the eve of the battle of Messines, which opened on the 7th of June.

The Company had a great deal of work of various sorts to carry out in preparation for the battle; but by far the most important and the most interesting to all ranks, since everyone, from myself to the latest joined sapper, had a background of civilian technical training, was the construction of a shellproof dressing station within the shell-wrecked walls of Woodcote Farm.

The farm consisted of four long buildings, surrounding a particularly unsavoury midden; so although under observation by the enemy, work could be carried on by day within the farm without being noticed. The work itself was the construction of shellproof accommodation in the farm buildings for a dressing station, consisting of a reception room, operating room, and stretcher space for 48 stretchers; also an officers' ward, stores, and billets for RAMC personnel. The rooms when completed consisted almost entirely of cupola shelters (both Elephant and Large British) standing longitudinally within the buildings on low brick walls, and covered with 18in of concrete. Above this came an air space, and then 2ft of concrete carried by girders let into the side walls of the buildings; over this again was 9in of earth, and finally a bursting course of concrete blocks.

Stores – cement, sand, gravel and girders were brought up by night and stored inside the farm.

The situation of the farm was admirably adapted to its purpose of collecting, dressing and clearing the wounded. Centrally placed in the southern half of the Ypres salient, it stood at a light railway junction, and close to Shrapnel Corner, from

which roads radiated East and South towards the line to Verbrandenmolen and St Eloi, West to the back areas, and North to Ypres itself. The light railway from Brisbane Dump branched here East to Jackson Dump and the Ravine, and South of the Bluff and Spoil Bank.

Work on Woodcote Farm had been started on the 24th of February and was carried on for three months when we handed it over to the RAMC.

I became completely worn out with all the preparatory work for the battle, of which Woodcote Farm was only one part, plus the normal line work and, of course, the unending "paper war". Although I did not realize it at the time I was sick with malaria carried in my bloodstream from the Gold Coast, and so with great reluctance I missed Messines.

Late in September, by God's Good Grace, we moved out of that most depressing and spirit-killing Ypres Salient and went South to Oppy Wood in front of Arras, which was indeed a most happy release.

I was on leave in the early part of November and returned to the Company to find the Division out of the line awaiting orders to entrain for Italy, whither an advance party had already proceeded to arrange for billeting on its arrival.

And then came Cambrai to change all that!

It was a misfortune for the British Armies in France that Haig was our GOCinC – a man of limited intelligence, wholly without imagination, with little or no understanding of strategy and pig-headedly obstinate in his preconceived opinions. He didn't believe in tanks because the early primitive type of tank had been a failure.

Under pressure he agreed to a tank attack on the front opposite Cambrai, and this took place on the 20th November of 1917, but he made no preparations whatsoever to exploit a successful breakthrough.

The attack was carefully planned in every detail. The tanks were brought up to the front by night, lying up each day in woods which screened them from aerial observation. On the last night, when they moved up to their battle positions, aeroplanes flew up and down the enemy front dropping bombs thus masking the noise of the tank engines; Sappers laid white tape lines from each tank to the front line. As there had been no preliminary bombardment to warn the enemy of an impending attack, he was taken completely by surprise and the tanks "swept through all the belts of wire and over trenches 12ft deep, so that at the end of four days we had formed a great salient four miles in depth stretching northwards along one ridge and southwards along another. Obviously such a long corridor of a salient was extremely vulnerable to pinching attacks from the North and from the South.

1918

THE winter of 1917/18 had been VERY severe with six weeks of hard frost; frozen snow lay all over the ground. The winter of 1917/18 was also extremely cold. The frozen period was shorter – only about three weeks, – but the cold even more intense than the previous winter.

However, it heralded an early spring and by March we began to have clear, frosty nights and warm, sunny days.

Somewhat earlier than this, Haig had been instructed to take over a considerable length of front from the French and he did this by extending the front held by the 5th Army, the most southerly British Army. In consequence the 5th Army was holding a very long front with insufficient troops to repel a determined attack.

We were now in the V Corps, the right flank Corps of the 3rd Army, with the pitifully attenuated 5th Army on our right.

Intelligence made it perfectly clear the *Boche* were preparing for an all out attack on the 5th Army and certainly on the right of the 3rd Army. We knew all about it by the concentration of troops and artillery on these fronts: the only thing we didn't know was the day.

Haig was supremely indifferent to the grave danger to which he was exposing the whole British Army. The 3rd Army and the V Corps, on the other hand, were very much alive to the danger and were quite aware the 5th Army would almost certainly be driven in. There was feverish activity in the digging of switch lines on the right flank of our Corps – that is to say, lines facing South, which could be manned to prevent the Division on the right of the Corps being outflanked if the 5th Army was driven back.

A number of defensive lines, facing our front, were also dug – lines to which Infantry could be withdrawn, if need be, to hold up the enemy advance.

Owing to the lack of manpower most of these trenches could not be dug to depth.

Our Division relieved the 2nd Division as right flank Division of the V Corps on the

nights of the 19th and 20th of March, with the 63rd (Naval) Division on our left and the 9th Division of the 5th Army on our right.

On the morning of the 21st we were awakened at about 0430hrs by the most terrific bombardment I had ever heard, not only on our Divisional front but as far North and as far South as eye and ear could see and hear. This was followed by an all-in attack over a very wide front at 0600hrs, the enemy concentrating particularly on the weak 5th Army front.

Our Division and the 63rd both held their front line, though the Corps to the North of us lost ground, imperilling the left of the 63rd Division while the 5th Army were rapidly driven in, exposing our right flank. The situation was such that both the 63rd and 47th Divisions were withdrawn, after dark on the 21st, from their front line positions to prepared positions on Highland Ridge, a withdrawal of about a mile and a half.

Early on the 21st I had relieved the 226th Field Company, 2nd Division – three of my Sections having moved up to forward shelters during the night. Two of these Sections were withdrawn and joined me at my Headquarters called Betty Camp, which actually consisted of an open field which was being heavily shelled by high velocity guns, the only shelter was in some old trenches.

On the 22nd things were going very badly on the right of our Division, and our Pioneer Battalion, the 4th RWF, was brought forward to man the Metz switch on the right of the 142nd Brigade to protect our flank.

The continued withdrawal of the 5th Army made the position of our Infantry on the Highland Ridge untenable. Orders were therefore issued for withdrawal to the second system.

Detachments of Sappers had the usual demolitions in preparation for this withdrawal and these were duly carried out before the Infantry withdrew.

Early on the 23rd of March, all three Companies were placed under my direct command and I, in turn, under that of GOC 141st Brigade.

Dawn broke clear and bright after a very sharp frosty night. At about 0700hrs I received instructions for the three Companies to join the 18th Battalion, and with them to occupy forthwith the Dessart Ridge Switch, from its junction with the third system, for about 5/600yds in a southwesterly direction.

By this time the position of our Infantry in the second system had become untenable and they were being withdrawn through the third system, which was being held by the 141st Brigade. Following them, the 4th RWF and the 140th Brigade holding the Metz switch, would be withdrawn – all falling back on the Green Line, nearly a mile behind the third system and seven miles behind our front line of the 21st.

I got in touch with Neely, Commanding the remnants of the 18th Battalion. I knew him fairly well, as I knew all the Battalion Commanders; I didn't like him very much, but respected him as a hard fighting soldier and brave to the point of recklessness. We were going to be in a VERY tight corner and I was content to share the command in it with Neely.

It was perfectly clear to me with our right flank in the air, the *Boche* would not make a direct attack on the Dessart Ridge Switch, but keeping it under fire, would feel along the line till he found our exposed flank, envelope it and proceed to roll up our defensive line.

One point about this portion of the Dessart Ridge Switch was that, owing to lack of manpower and time to dig all the defensive trenches which had been planned, this line had been very carefully sited and laid out; but all there had been time to do was to spitlock it – that is, to take off the 6in or so of grass and soil and expose the underlying chalk to a width of 6ft.

This was quite sound for Infantry, who could rapidly dig themselves cover in rifle pits with their entrenching tools: but an entrenching tool was not part of a sapper's equipment and it was not much consolation that the Infantry would lend the Sappers their entrenching tools after they had dug their own rifle pits.

I was certain the best place in a very desperate situation was on the left, but I couldn't give any preference to my own Company; I could only line up the three Companies behind a hedge, where the 18th were already assembling – from the left (that is, resting on the third system) in the order in which they reported to me. Fortunately Johnny Walker, my senior Subaltern, now temporarily in command of the 520th, reported first and was instructed to fall in the Company on the left in a single line behind the 18th falling in two lines. Captain Legge, Commanding the 517th, in the absence of his OC on leave, reported only a few minutes later

and fell in his Company in a single line on the right of the 520th.

The 518th had spent the night a little further off and I could see them in the distance. I told Neely I would have to wait to give this Company instructions, but my other two Companies were ready to go over with his troops and I would join him as soon as my third Company had gone over. However Neely waited for me.

So they went over at 0800hrs and occupied the switch line in the face of fairly heavy MG and rifle fire.

Major Francis Patrick Bray, Commanding the 518th, was a great personal friend of mine. He was a very powerful man in his forties, 6ft 4in in height and weighing 18 stone. I explained the position to him, told him he would have to march his troops nearly half-right and extend them to the right from the right of the 517th and the 18th. I have never given an order with such a heavy heart, for I knew that I was sending Bray and his Company to almost certain death – and I knew that Francis Bray knew that, too. Extending his men in open order he marched off as directed, turning to give me a farewell wave with his riding whip and smoking the inevitable cigarette at the end of an incredibly long cigarette holder. A man of Bray's size and build would have no cover in a spit-locked trench and I think that we both realized it was *ave atque vale*.

When the 518th had reached their position, Neely and I walked up to the middle of our line and immediately behind it and took up a strategic position in a shell hole.

We had hardly taken up position when a runner from the 518th reported Major Bray was badly wounded; and close on his heels came another to tell me that he was dead. So passed a very gallant man – and a very great friend.

Very soon after, the changed direction of bullets whistling just over our heads showed the enemy had located our exposed flank. There was only one thing to be done and that was to throw back the right of our line (the 518th Company) at right angles to the switch line and shooting to the rear. It would delay, but it could not hold up the steady envelopment of our Dessart Switch Line for long. It was quite obvious to Neely and to myself that, unless we were extricated very soon, we were all dead men.

At about 1300hrs our main body was withdrawn to the right of the third system and a defensive flank was thrown out and held in the open on a low crest; shortly afterwards this flank was reinforced and extended westwards by a detachment of the 4th RWF. The left of the third system was held at this time by the 15th Battalion, under the command of a very distinguished soldier, whom I liked greatly and admired very much, Lieut Colonel W H E Segrave, who already had a DSO and bar and who was to add a second bar to it after this long drawn out battle. I had several brief parleys with him during the anxious period before a general withdrawal to the Green Line, a mile and a quarter to our rear, was ordered. The 15th Battalion went across first, and the 18th Battalion and the Sappers followed along the third system, crouching for shelter in the half-dug trench. There was heavy rifle and MG fire and sharp shooters were watching for targets. Neely and I, walking in the open behind the rearmost of our men in the trench, commanded a good deal of attention; and when we were about halfway back to the point where the troops were to cross the open to the Green Line under partial cover from sight behind some hedges, Neely was shot through the shoulder. Before leaving to make his way back to a dressing station, he told me to take command of his Battalion and called to one of his officers in the trench near him that he had done so.

So I went on alone; and when I had seen the last of my troops back to the Green Line, I followed, accompanied by one of my stoutest Serjeants, Serjeant W B Churchman DCM MM, whom I had called to stand by.

We were the last two on our Divisional front to evacuate the third system. We were sniped at with unpleasant accuracy and from time to time, I halted Serjeant Churchman and told him to see if he couldn't "silence these bastards" – I of course, carried only a revolver. I don't know that he really did any good, but it did at least relieve our feelings.

Once behind the Green Line I had the double job of assembling not only my own Sappers, but also the remnants of the 18th Battalion.

The confusion of a great and long drawn out battle is something to be experienced to be understood.

The three Companies went into action that morning with ten officers and a little over 200 other ranks. When we withdrew, we had lost six officers and about 145 other ranks. I should

therefore, have had about 50 sappers still under my command. In fact, I numbered under my command: three officers, one company serjeant major, seven NCOs, 18 sappers and one driver; a total of only 26 other ranks – and two of those did not belong to us.

As I was still under the command of GOC 141st Brigade and also temporarily commanding the 18th Battalion, my first duty was to report with such troops as I had to 141st Brigade Headquarters. After a longish march, with some intervals of heavy back area shelling which temporarily scattered my flock, I located Brigade Headquarters at 1800hrs and reported to the GOC. Here I handed over what remained of the 18th Battalion, from then on I was marching and counter-marching my weary troops under a series of contradictory orders until, at midnight, I was able to billet them in a Nissen hut. Here at 0100hrs, to his intense relief, my Mounted Serjeant ran me to earth with a limber of rations. I took the opportunity to send my senior Subaltern, Johnny Walker, back to the horse lines by the limber as he was very lame from an old war wound.

I moved next day to Le Transloy, where I got further orders to march on through Les Boeufs and report to the Major General, who received me with a quite unusual cordiality and friendliness. He instructed me on to Ginchy to reinforce a detachment of the 4th RWF, who were covering the retreat of the Divisional Transport through Longueval to Albert. We reached Ginchy at about 1030hrs and made contact with the 4th RWF, who were under the command of Major Langton, the 2IC of the Battalion. Most fortunately, I was senior to him and naturally took command of the combined force. Major Langton was using Lieut Williams as an Acting Adjutant, my comrade of "the Starfish" days on the Somme in September 1916, of whose stoutheartedness I had no doubt.

Parties of the enemy advanced over a crest about 7/800yds southwest of my right flank and having ascertained that all transport was clear, at any rate to Longueval, I fell back to a very strong position in front of Longueval. I threw back my left to rest on the shattered remnant of Delville Wood, which protected them from any serious danger of being outflanked; I covered the Ginchy-Longueval road and swung my right to cover the Guillemont-Longueval road – Guillemont being already in the hands of the enemy. On my right I made contact with some remnants of the 9th Division, who extended my right and who, being Highlanders, though weary and battle-worn, were still full of fight.

We almost immediately got in touch with the enemy, who occupied Ginchy Ridge with machine-guns. He was promptly driven off the Ridge by concentrated rifle fire.

At about 1500hrs, four limber-loads of Small Arms Ammunition (SAA) were brought up and I got the limbers up to my troops. Better still, six motor machine-guns came up from Corps in charge of a delightfully light-hearted and belligerent subaltern, who came into action immediately. He was a very engaging young man, desperately keen to get on to "a good target".

Major Langton, having reconnoitred to the rear, sent an order for the RWF to fall back – an order, which I immediately countermanded: and when he came up "full of sound and fury", he was most annoyed when I told him bluntly I was going to stand and fight where I was. Nothing short of a full-scale attack with Artillery support had any chance of dislodging me: and at this stage of the battle, we would not have to withstand any such heavy attack.

However, I got an Order from Division to take up a defensive flank from High Wood to the Longueval-Bazentin road, and to hold this to cover the withdrawal of the Infantry; which we did, in considerable discomfort, for the night of the 24th/25th of March.

For all practical purposes this ended the active participation of the Sappers in this long drawn out battle. The Division was relieved during the night of the 25th by the 12th Division and on the morning of the 26th of March I reached my horse lines. My report to the CRE concludes:

"The party with me on my return had been with me throughout the whole period and consisted of:

Lieut Wakefield RE, of 520th Company
CSM Drury DCM RE, of the 517th and

From the 517th Coy	1 NCO and	5 Sappers
From the 518th Coy		1 Sapper
From the 520th Coy	4 NCOs and	8 Sappers
	5 NCOs and	14 Sappers"

The casualty list of the division was heavy.

	Officers	Other Ranks
Killed1	61	166
Wounded	759	985
Missing	70	1079
Total	161	2230

On the 6th of May 1918 I was awarded a bar to the DSO and I got, by the same *Gazette*, a bar to his DCM for Serjeant Major S C Drury of the 517th Company and a DCM for Lance Corporal Simkins MM of my own Company.

This action also got me my fifth, and last, Mention in Despatches and later in 1919 in a final Honours List, a French *Croix de Guerre avec Palme* – a really beautiful medal.

It must have been about this time that the CRE being on leave, I was at Division as Acting CRE, when the General sent for me.

Major General Sir George Gorringe was a Kitchener-trained man and no member of his staff could see him (with the possible exception of his GSO II) unless he was sent for. When he had answered whatever questions the General wished to ask, the officer took advantage of the opportunity to bring up any matters on which he wanted the General's ruling.

On this occasion, however, the General had called me for a very kindly and friendly talk. To my great surprise he said he wanted to send me to England to a Senior Officers' Course. When I returned, he would put me as second in command of an infantry battalion to let me find my feet in the Infantry and that, at the first vacancy, he would give me command of a battalion. At that time neither he nor I foresaw how soon the War would finish; he held out, as an additional bait, the possibility of the red and gold cap of a Brigadier General. He told me to think it out carefully and tell him my decision within two days.

I went out from "the Presence" in very deep thought. Then I made my decision and told the General at Mess I had made my considered decision and when he had time to see me, I would give my answer.

He sent for me next day. I thanked him for his very flattering suggestion, but said that all I had learned from the War was as a Sapper. As he knew, I had been Acting CRE on numerous occasions and, up to that grade, I knew all my work. To switch over to the Infantry at this late stage of the War, would be a waste of my active service experience as a Sapper; and if any promotion were to come, I should like it to be in the Corps.

I am glad to say the General took this very calmly and understandingly – he was a Sapper himself – and I realized I had not "lost any marks".

In thinking the problem over, I could not help wondering what the staff of a Senior Officers' School would think of an officer with a DSO and bar and a MC, who had served in France for more than three years, who had not even the most elementary ideas of Parade Ground drill! When I was demobilizing him, one of my very best Corporals remarked – "We all knew, Sir, you only knew enough drill to move the Company off in Column of Route – but you were always with us in the line", – which after all, is where an Officer Commanding should be.

As to my concluding remarks to the General. I had been commanding a field company for two and a half years and I doubt whether any other field company commander had held his command as long as that! It was reasonable for me to think it would not be long before I got my next step to Lieut Colonel and posted as CRE to some division.

The last battle operation of the Division was on the Somme from the 8th of August to the 7th of September. However, I missed all the active part of this through no fault of mine. Having been on active service in France for more than three years, I was entitled to three weeks leave. All seemed to be quiet on our front, so I went to the GSO1. I explained my reason and asked him if he thought there was any battle in the offing. If there was I did not want to leave my Company but if not I wished to apply for three weeks' leave. He assured me that as far as he knew there was nothing brewing for the Division. So I passed from him to the CRE, asked for three weeks' leave and was granted it immediately.

So I missed the whole of this operation and only rejoined the Company a few days before it marched out.

However, "all things work together for good" and Ferguson, my friend and Captain, handled the Company excellently, got a MC, and shortly afterwards the command of a company and his

majority. At that same time Johnny Walker, my senior subaltern, was posted as captain of another company and my friend Budenberg, was promoted Captain of the 520th in succession to Ferguson.

On the 3rd of October, the Division was in position opposite Lille. As Lille and the other large industrial towns to the East of it were undamaged, Foch's wise strategy was that the Division should exert continual pressure on the enemy without actually bringing him to battle, while to the North and to the South of us the enemy were being kept under continual attack and being driven back rapidly. As a natural result, these important industrial cities were evacuated without damage.

On the 23rd of October our CRE (Lieut Colonel A B Carey CMG DSO) left the Division to become CE VIII Corps, and I took over as Acting CRE. He told me that he fully expected me to succeed him; our General had asked for me and he had recommended me strongly. It would have pleased me immensely, having come out with the Division three years and seven months before as a completely untrained subaltern, to have finished the War as CRE of the Division. However, it wasn't to be. And yet, much as I should have liked this promotion, I wasn't at heart really as sorry as I might have been, for my Mess and my Field Company had been my home for nearly three years – the longest time that I had had a permanent home since I was 20. I knew personally every man in the Company. They were my friends and my comrades-in-arms and it would have been a wrench to have left them while the War lasted. The Corps still had one more regular officer for promotion and on the 1st of November; Major H J Couchman DSO MC, arrived to take over as CRE.

My consolation prize was this: each of the three companies had dragged two pontoon wagons and a trestle wagon up and down France and Flanders, each drawn by a team of six heavy draught horses, – ever since they came to France. The only occasions when we had used them was during the rare intervals when we were at rest and near a river and could use them for practice. Now I was given the entire bridging train of the three Companies to bridge the Scheldt just downstream from Tournai which we duly accomplished on the 9th of November. What with a deep and fast-flowing dyke on the West side of the Scheldt, which took two trestles to bridge; the river itself, which required all our pontoons; and a blown up culvert on a causeway on the East side, we had only just sufficient equipment for the work.

Next day the Sappers and the Pioneers were busy improving the approaches to the bridge – and the next day came the Armistice.

A Little Forgotten History from the Corps Library

"TREASURE Trove

On Friday 15 November while a party of men were throwing up a Battery on the outer lines between the Sally Port and Brompton Barrier, Sapper Goodall found a Celtic torque of pure gold. It weighs 22ozs.4dwts troy. and as nearly as can be ascertained without an assay is intrinsically worth £85. Its value as a curiosity is probably much greater.

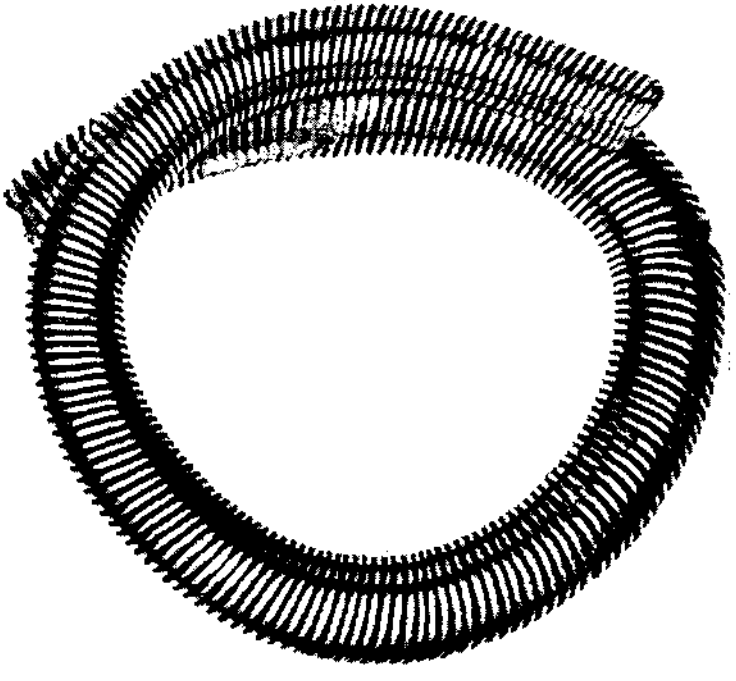
It is hoped that it may be deposited in the British Museum."

This report appeared in the *Royal Engineers Journal* for December 1872. The find was reported to the Kent Archaeological Society with which the Corps had ties. In their proceedings, published under the title *Archaeologia Cantiaria*, Lieutenant Valentine Gardner Clayton is shown as a member, in 1860 and 1861 from Dover, and from 1862 to 1872 from Brompton, Chatham. Lieut General Williams was a member in 1864-5 and from 1874-6 the RE Library is shown as a member.

At various times, Lieutenant Clayton had presented Roman pottery to the Society Museum in Maidstone and Lieutenant Hogg presented a Roman earthenware vessel found in Gillingham.

The torque was such a remarkable piece that Lieutenant Clayton and the Commandant of the School of Military Engineering, Colonel Gallwey, presented it to Queen Victoria through the office of the Secretary of State for War, the Right Hon E Cardwell MP and it was exhibited at a meeting of the Royal Archaeological Institute by Colonel Browne where it caused quite a stir. In their proceedings, volume 30, the point is made that torques were not an unusual find in Kent. They are invariably symmetrical and were worn as personal jewellery, possibly indicating status, around the neck, arm, wrist or waist, depending on their size.

This piece is unique in several respects. It resembles "a small finely twisted rope, ½in in diameter in its thickest part, and five-twelths of an inch at the smallest end. If spread out lengthwise, it would be 12½in long. It was now imperfect, and had obviously been larger."



Golden gothic armilla or bracelet dug up on the Chatham Lines
(Printed by permission of the Trustees of the British Museum)

The Society considered that, rather than personal jewellery, the piece was used as a medium for barter, pieces being cut off as required. It appears to have been incised as if to mark the place for another division. Thus is was probably used in commerce as a monetary medium.

It is now in the British Museum. They describe it as a solid gold neckring with spirally grooved decoration, dating from between 1200 and 900BC. It is particularly interesting as its nearest parallels lie not in Britain but in Brittany and if not a Continential piece itself was certainly inspired by Continental fashions.

The final comment from the British Museum – no, we cannot have it back!

Construction for Change

COLONEL M G LE G BRIDGES OBE

Since returning from the 1992 Everest expedition, Colonel Meryon Bridges has worked with the UKLF Transitional Works' Team from the time when it was set up last summer. This article describes the evolution of the major construction projects currently being set up to meet the infrastructure needs generated by Options for Change, *which are about to start in many barracks up and down the country, and the RE involvement in this programme. Colonel Bridges has in the meantime moved on to Defence Works Services to work on projects in coordination with the RAF.*

Introduction

To most people *Options for Change* is, to a greater or lesser extent, a painful process of reorganization of the Armed Forces. This is not unnaturally viewed with some misgivings in the context of the changes to ORBATS, reductions in capabilities if not of commitments, increases in turbulence, variance of career prospects, redundancies, and a whole gamut of personnel related matters. Not many have had reason to consider the really quite substantial redevelopment that is taking place in the real estate of the MOD in the UK to accommodate these changes at unit level.

The Army's share of the MOD's budget for *Options* – generated projects is approximately £480 million, and at the time of writing, there were some 69 major and 29 minor identified projects collectively valued at around £590 million in the programme. This is a lot of anybody's money, and due to the eccentricities of the British Army's way of doing things, it is being spent under the supervision of a team of serving and retired personnel, in which the representation of the Sappers, PQE or otherwise, is disconcertingly small. All of this huge sum of money is to be spent by 1 April 1995 or it will revert to the Treasury, and this is in itself a daunting prospect.

Project Definition

The first two years of the programme to rearrange the Army in the UK were absorbed in a fairly frenetic process of planning within the staffs of the MOD. Because so many changes were taking place at the same time, and so many decisions were dependent on the outcome of other decisions, identification of the final solution was a long, convoluted and extremely complex process, but the main outlines of the plan were becoming clearer by early 1992. Without reviewing the ORBAT of the UK Army and the Individual Training Organization (ITO), suffice it to say that various brigades were to be centred on the main garrisons, ie Tidworth, Aldershot, Colchester, and Catterick, including the first widespread deployment of heavy armour in the UK for many years, while the Training Base was to be restructured and rationalized to reduce the numbers of centres at which common training took place. Thus, for example, Phase 2 Infantry training was all to be moved to one location, driver training was to be centred on one location, each technical Corps was in general to have only one centre of excellence, and so on.

Implicit in this process was a major exercise in project identification and costing to enable evaluation of the relocation plan. Gone are the days when the Army was free to relocate itself on the basis of military logic alone, and therefore every proposed move had to be costed, and shown to be an economically sound measure before any blessing to proceed could be obtained. To throw out some further figures, the relocation of a mechanized brigade to Catterick Garrison will cost around £80 million in infrastructure terms alone. To close up all Royal Signals training on Blandford carries a price tag of over £50 million. The denizens of the Treasury need to be persuaded there is a good reason for such moves before they can be parted from that sort of money, and to them good reasons can only be defined and expressed in terms of cash savings.

The form this project identification took was the production of a very large number of so-called *Option* Studies. In almost all cases these were produced by consultant engineering firms at the behest of G4 Quartering (G4 Qtg), HQ UKLF, via the medium of Defence Works Services (DWS) who tasked their Term Commission consultants with the work. Anything up to seven studies were commissioned on any one barracks, to cost the implications of adapting it for use by that number of different units, or combinations of units.

Using the Accommodation Scale JSP 315 as the basis of entitlement, in combination with the establishment of the unit concerned, the consultants assessed the amendments necessary to the living-in accommodation, offices, stores, MT garaging and parking, workshops, and mains services in the barracks, in order to permit the subject unit to be fitted into it. Each study proposed a range of works, usually consisting of a combination of refurbishment and new build, and to each line item was attributed a very rough estimate of cost. Based on these figures the staff then went through discounted cash flow calculations to try to evaluate the whole life cost of the proposals, and they based their arguments for the selection of a particular combination of moves on the value for money that could be achieved.

Inevitably this was an iterative and exhausting process since all moves were inter-dependent, and what was not a cost effective option at one location might give rise to a much more cost effective option at another, justifying selection of that combination. Intermeshed in this was the requirement to finish up with a disposition of units that recognised formation integrity and made military sense. That the whole thing was achieved within the time that it was is a credit to the staffs concerned, but all the while they were so involved, the sand was running out. The Treasury had agreed only to a limited time window in which the money should be spent, ending on 1 April 1995, and every day taken in drawing up the framework of the dispositions was a day not available for the detailed project planning, design, and construction.

Some Obstacles

Throughout this period life was complicated by the changes that were taking place within the structure itself. The PSA was untied and then privatised more rapidly than had been foreseen; DWS was formed and put to work with a disparate team drawn together from a variety of backgrounds to fill a part of the void so created; all studies and works had to be put out to contract with commercial firms. The Directorate of Army Quartering (DAQ) transferred its functions to G4 Qtg, HQ UKLF and ceased to exist; and new teams and expertises had to be created to manage the practicalities of the changes in the shape of the Army in the UK. These included the *Options* Implementation Team (OIT) and Transitional Works (TW) Branch, both within HQ UKLF, and they were obliged to write their own terms of reference as they did the job. As the Chief of Staff, HQ UKLF, put it, "There is no learning curve on this job. You are expected to be effective from Day One. And if I hear anyone using the phrase 'Mission Impossible', I will make them wash their mouths out with soap and water!"

Since there was no time to establish, much less prove, a Modus Operandi before starting out on the programme, procedures were developed as things progressed. Some of the earlier efforts were predictably pretty untidy, but everyone involved got better at it as things went along. Despite the declaration of CinC UKLF that, after ongoing operations, the *Options* construction programme was to be given the highest priority, there was a tendency to regard personnel involved in the programme as prime candidates for redundancy – a policy which did little to assist in the maintenance of continuity. As much of the evolution of the programme existed as folklore in the minds of the participants, this "left hand and right hand" approach to the situation was particularly trying. Additionally, the insistence that, despite the steady approach of the '95 deadline, no curtailing of Treasury procedures or the rules for obtaining approvals would be permitted further added to the burden on those involved in trying to get projects implemented. However the almost universal "will to get the job done" has so far overcome all these obstacles, even if it took a little bit longer to reach where we are today, or the getting there could have been done a little bit better.

A Procedure Emerges

After initial experiments, a procedure emerged which permitted both control of the projects and the observance of the rules. OIT developed and managed the Barrack Accommodation Plan which identified what units would move to where, and when, and all the related coordination activities that arose from that. As the problems of relocating the Field Army were resolved, planning for the Restructuring of the Training Base (RTB) came to the fore, and OIT worked in close cooperation with IGDT on those aspects of the plan. Meanwhile project identification and definition was the responsibility of G4 Qtg at HQ UKLF, and project implementation was handled by TW Branch.

In practice the way it worked was that in line with the schemes of OIT, G4 Qtg would request DWS to commission an *Option* Study into housing unit X in barracks Y. This would be carried out with a greater or lesser amount of guidance from Military personnel in terms of the definition of the requirement, and when a satisfactory document had been produced, this would be submitted to an Acceptance Meeting. This meeting would decide on the scope of work which could legitimately be charged to *Options* funds, and that agreed itemised cost, which included VAT and an element for Project Management and design fees, then formed the basis for further planning.

At this point the project passed to TW Branch, and their first action was to submit a request for authority to proceed to the next stage, which was provided by the *Options* Deployment Action Steering Group (ODASG). This in effect provided financial approval to appoint a Project Manager (PM) and for his firm to take the project to final sketch plan design stage. At the same time a Sponsor was appointed by G4 Qtg on completion of the Acceptance Meeting, and he was responsible for the handling of the project once ODASG approval had been given. In general the project Sponsors were on the staff of Col TW Branch, though a significant number of projects that didn't fall into convenient geographical groupings were sponsored by G4 Qtg personnel.

Project Execution

The first main task of the Sponsor was the production of the Project Brief. In practice this was almost invariably produced by those same Term Commission consultants that had written the *Option* Studies. The purpose of the Brief was to provide prospective PMs with information about the scope and content of the project for whose management they were being invited to tender, and it formed the basis of the tender documentation. To it were added the PM's Terms of Reference which were produced by DWS, who then appointed a PM by way of competitive tender.

On appointment, the PM (ie the firm contracted to carry out the management of the project throughout design and construction), set about producing sketch plan designs, and the Sponsor was responsible for supplying to him all the detailed information necessary to do this. The development of these sketch plans was evolutionary, and draft proposals were progressively refined, taking into account the inputs of all users and advisors so as to get the best result within the agreed funding limit, until the Sponsor declared the "no further changes" point had been reached. From then on the PM developed pre-tender estimates, a Construction Brief, tender documentation for the next stage, and recommended tender lists.

The next step depended on the contract strategy selected: for traditional procurement, a design contract was let through DWS for the detailed design of the project; for a design and build approach, a contract was let for the whole package. However while Top Level Budget Holder's (TLBH) authority was sufficient to commit more of the fees element of the project funds for further design, a higher level of authority was required before committing the funds for the construction works. The level of approval needed reflected the sum involved, but in general anything over £5 million involved the Treasury directly. Thus for design and build contracts this authority was required on completion of sketch plans, while with traditional contracting it was obtained once detailed designs had been produced.

Thereafter the PM and his team were responsible for running the construction of the project. Limited financial delegations from a contingency fund were given to the Sponsor and thence to the PM to allow immediate changes in response to minor unforeseen difficulties arising during construction, but serious money remained under the control of the TLBH – CinC UKLF, and routine monthly payments were paid on the signature of the Sponsor. By this stage change control was a key function, and no changes were permitted to be introduced by the users. Only those arising from unforeseen site problems or in response to high level changes of policy were approved since the cost of changes was likely to be prohibitive. In the prevailing economic climate, any contractor would have immediately responded to frequent changes by embarking on a spree of claims.

Responsibilities of Sponsors

While the outline of the Sponsor's part in the process had been given above, the Sponsor has major responsibilities during the project Brief Development phase for establishing the detailed definition of the requirement. Inevitably, the

agreed scope was couched in very general terms, and the Sponsor was responsible for trying to get the best quality of build within that scope for the money allocated. Thus for every part of the work there was room for interpretation of what should actually be provided, and for limited adjustment of the sub-allocation of funds between different elements of the project.

For example, if by minimising on the Officers' Mess extension, the refurbishment of the Barrack Blocks could include double glazing, that was a decision available to the sponsor. Into this category fell a wide range of evaluations and decisions, and the Sponsor has to understand his user's needs, and to work very closely with his PM in order to get what he saw as the best result for the money.

Since he was obviously subsequently accountable for his decisions, he had to identify and make use of a host of technical advisors with relevant expertise to assist him. These included special-to-arm advisors such as RA personnel familiar with the needs of MLRS, or REME or Catering personnel; they included those versed in specialist regulations such as fire, the storage of Ammunition or detention of prisoners; and they included representatives of the units themselves. The Sponsor had to translate all of their requirements into a form that could be assimilated by the PM and incorporated into the agreed scope of work.

From the completion of the sketch plan designs, the management of the project fell much more on the PM, but the Sponsor had to make all decisions related to variations which inevitably arise in any building contract, and approve the actions of the PM. The unqualified Sponsor was then entirely in the hands of his PM, while a construction experienced Sponsor could bring his own judgement to bear and perhaps find better alternative solutions to problems as they arose.

Typical Costs

So what do you get for £1 million? While it represents a lot of beer, it represents surprisingly little in the way of barracks. To refurbish a large three floored, H plan, Sandhurst type block capable of housing 400 soldiers, can be expected to cost around £5½ million; demolition and rebuild of an Infantry battalion Sergeants' Mess is likely to be well over £1 million; new build garaging for the tanks of a Type 50 MBT RAC regiment on a green field site will probably set the Treasury back significantly over £3 million, while their LAD can be had for the best part of a further £3 million; an armoured workshop REME is likely to come in somewhere under £6 million. Since VAT is chargeable on most of this work at 17½ per cent, there isn't much change to be had out of £10 million when it comes to *Options* projects.

By contrast the appointment of a PM is relatively cheap. For management of work such as that itemised above amounting to a £24 million project, the PM would be likely to charge a lump sum in the order of £½ million. Additional charges under the fees heading would also be incurred for the detailed design elements, and hidden charges exist for the production of the *Option* Study, Project Brief, DWS contracting expenses and so on, but when all is added up it is inconceivable that the departmental rates charged by the PSA of up to 35 per cent are likely to be even approached. On a value for money basis, the system has therefore got to be an improvement on what existed before.

Manning

The manning of the TW branch has yet to be tested to the full. The HQ UKLF element has done most of its task successfully in processing the projects through ODASG. Their next magnum opus will be to prepare and steer the submissions through Treasury for authority to proceed with the main contracts. In the field are four main Sponsor teams. These cover respectively:

- The Catterick area, which includes the Garrison Area plus major projects at Ripon, Topcliffe, Harrogate, York and Leconfield.
- The South East. Based at Old Sarum, this team has sub offices in Colchester and Aldershot, and also covers most of the outlying locations in between such as London, Bordon and Thorney Island.
- RAF Wattisham, including all aspects of this major £50 million conversion of the station to house two AAC regiments.
- The Tidworth/Bulford area.

Projects not falling within these geographical areas are in general retained under the Sponsorship of G4 Qtg staff.

For twelve major projects valued at £110 million, the Catterick office has one Sponsor, one SO2, and one Project Liaison Officer (PLO). The

Wattisham office has a Sponsor, an SO2 and two PLOs. Old Sarum has a Sponsor and an SO2, with a PLO bedded out at both Aldershot and Colchester, to cover a total of 19 projects with a value of around £100 million. At Tidworth there is a Sponsor, an SO2 and a PLO for nine projects with a similar total value. The official guidance on sponsorship lays down that one sponsor should be responsible for no more than five major projects, and that the level of sponsorship should be related to project value. Thus up to £10 million the Sponsor should be a Lieutenant Colonel, £10-£20 million justifies a Colonel, while above this the Sponsor should be a Brigadier. At Catterick there are two projects of over £24 million, and one of £15 million and the Sponsor is a Lieutenant Colonel – as he is in the other areas. It is evident that the principle of over stretch still rules OK, but it remains to be seen whether these teams can actually cope when all their projects are under construction. If they do, they will be entitled to a very large slice of credit.

It is worth recording that the Sponsors' appointments are regarded as E2 posts, and that there is no inherent requirement for previous experience either of the construction business or of quartering matters, though it is of course recognised as desirable. At present the Sappers' representation on the TW team numbers two: one PQE RE Sponsor, and one (soon to leave on redundancy) RE SO2. While non PQE officers are likely to survive in these posts, a good background knowledge of the trade is an enormous asset to both the individual and the job, and it seems a pity that the Corps was unable to establish a stronger presence in this very significant area of the Army's activities over the next two years at least. If CinC UKLF declares it his second priority after ongoing operations, it cannot legitimately be regarded as low profile or unimportant.

The Future

At the time of writing (January 1993), the current situation was that the majority of the Field Army related projects had reached the stage where PMs had been appointed, but a large number of the RTB related projects were still in the definition stage. The appointment of a PM brings a change of gear for the Sponsor in that up to that point, the project is very much in a "setting up" phase, whereas from then on the Sponsors are kept extremely busy providing the detailed information necessary for sketch plan designs.

The crude implications of the situation in terms of overall implementation of the *Options* programme are that with good luck and no delays, the majority of the construction work of the Field Army projects should be completed by the April '95 deadline, whereas a significant proportion of the RTB projects are likely to overrun. Whether an extension of the April '95 deadline can be negotiated with Treasury is a moot point. The present position is that all overruns must thereafter be funded from Core Programme funding, and that all unspent *Options* money will return to Treasury. This would have a devastating effect on the ongoing Core Programme, but it is unlikely that a resolution to this problem will be achieved for some time.

What is certain is that the next two years will see frenetic construction activity in all Garrison areas, and what is built today will be what the Army will have to live with for the next 20 years at least. It is inconceivable that these quantities of money will be forthcoming in the future to make good omissions in the *Options* programme, which is why every effort is being made to get the best standard of accommodation built this time round despite restrictions imposed from above. The Sponsor's responsibility for getting it right is therefore very great.

Conclusions

The area of *Options* projects is one of intense activity, total commitment, and wide interest. It provides a great opportunity to become intimately involved in the evolution and execution of major construction projects, and to gain first hand experience of working with contractors on a day-to-day basis. Due to the thinness of the manning, a great amount of responsibility is devolved to the Sponsors since, as the men on the ground, they are responsible for interpreting what can or cannot be justified for inclusion within the broad scope of the project; they guide the PM in the development of the sketch designs; and they will have to make the decisions on site during construction when technical or other problems arise which require changes in the plan. It seems unlikely that there will ever be such an opportunity in the future to deploy so much money on the alteration or improvement of our barracks in the UK, so that what they build now will dictate the living conditions of the British Army for the next 20 years. What more could an Engineer ask for?

Sapper Geology: Part 1

Lessons Learnt From World War

COLONEL E P F ROSE TD MA DPHIL MIWEM CGEOL FGS
AND COLONEL N F HUGHES TD ERD MA ScD FGS

Apart from members of the Engineer and Transport Staff Corps, the authors are the only two officers to have achieved the rank of colonel by serving as geologists in the British armed forces: Norman Hughes (left lower) was appointed brevet colonel on retirement from the Territorial and Army Volunteer Reserve in 1970, Ted Rose was promoted colonel to serve as Commander RE Specialist and Specialist Advisory Teams(V) from 1987 to 1990. As geologist lieut colonels they enjoyed the longest tenure of any of the six British engineer officers ever to have held appointment as such, Hughes from 1965 to 1970, Rose from 1978 to 1987. Both served as military geologists for over 21 years, Hughes from foundation of the Pool of Geologists in the Territorial Army in 1948, through its transfer into the Army Emergency Reserve in 1953, and later into the Engineer Specialist Pool of the TAVR 1967-1970; Rose from joining the TAVR Engineer Specialist Pool in February 1969 until his transfer from its successor, the RE Specialist Advisory Team(V), to RARO in April 1990. Both had served previously as subalterns in the Royal Artillery, Hughes through the 1939-45 War, Rose in the Territorial Army. In their civilian careers, quite coincidentally, both have lectured in palaeontology at Bedford College (University of London), Hughes from 1947 to 1953, Rose from 1966 to 1985. Both have served as vice-president of the Palaeontological Association, Hughes on its foundation 1957-1959, and again 1972-1974, Rose from 1978-1980. Both are Oxbridge graduates, Hughes of Cambridge (Queens' College), Rose of Oxford (St Edmund Hall). Hughes has now retired as a university lecturer in geology and Fellow of Queens' College, University of Cambridge; Rose continues as a senior lecturer in geology at Royal Holloway and Bedford New College, University of London.

Introduction

READERS of the *Journal*, especially of volumes published within recent years, will perhaps be only too aware that the Corps has geologists amongst its specialists in the Territorial Army. Yet whilst researching material for comprehensive articles on British military geologists to be published elsewhere (Rose & Rosenbaum, 1993a, b), it became clear that there were as yet no published records of the origin of the unit providing this source of expertise, and that unpublished records were remarkably scarce and very dispersed.

Col Rose TD & Col Hughes TD
Sapper Geology Part 1 (p27)

Photo 1. William Bernard Robinson King, the first British military geologist to be appointed as such; as a second lieutenant Royal Welsh Fusiliers (TA), at the start of World War One.
(Photo courtesy of his daughter, Professor C A M King.)

None of the geologists who had served as such in the First World War was still alive, and very few of those who had served in the Second were, and death was now beginning to thin the ranks even of the first reserve army geologists to be appointed postwar.

This is a two-part account to help complete the record whilst some facts can still be verified from living memory. Part one summarizes the increased use of military geologists from World War One to World War Two that demonstrated the need for geologists to be established within the reserve army. Part two will describe how that need was met, by formation of a Pool of Geologists in the Territorial Army in 1948, a unit later transferred to the Army Emergency Reserve and in 1967 incorporated within the Engineer Specialist Pool of the Territorial and Army Volunteer Reserve. The *Journal* already contains a summary of geologist service in the first ten years of the TAVR (Rose, 1978a) and an outline of the transformation of the Engineer Specialist Pool into the present RE Specialist Advisory Team(V) of the Territorial Army (Rose, 1988), so these details need not be repeated.

The First Military Geologists: World War One

As already briefly indicated in the *Journal* (Rose, 1978b), events in the First and Second World Wars established the need for geologist expertise to be available under operational conditions.

In the First World War, that expertise was provided for the Western Front largely by two men, of different ages and cap badges, who occupied separate but nearby offices at General Headquarters. Two geologist subalterns assisted them in the later stages of the war, and other geologist subalterns supervised test-boring for dugouts or served in the mining companies, but British military geology was initiated and sustained by these two: W B R King and T W E David.

Bill King, a Yorkshireman, was appointed to the War Office in April 1915, and later, in June, at the age of 25, sent to serve in France as a staff officer to the Chief Engineer (later retitled Engineer-in-Chief (EinC)), British Expeditionary Force (BEF). King had graduated from Jesus College Cambridge in 1912 with 1st Class Honours in Geology and joined the Geological Survey of Great Britain, but on the outbreak of war he was, on 21 September 1914, commissioned second lieutenant (*Photo 1*) in the Seventh (Merioneth & Montgomery) Battalion (Territorial) of the Royal Welsh Fusiliers (with Welsh spelt thus rather than Welch at that time). When the Director of the Geological Survey was asked to nominate a geologist to provide expert advice to the Chief Engineer in regard to water supply, he both recommended and quickly trained Bill King. King then served throughout the war in a "special appointment", largely as a staff lieutenant 1st Class. Promoted lieutenant on 1 June 1916 (following temporary rank from 4 May 1915), captain on 27 April 1918 (after temporary rank from 24 July 1917), he was twice Mentioned in Despatches and appointed OBE.

Edgeworth David, a Welshman, arrived in France in May 1916, a white-haired grandfather at the age of 58, as a major on the strength of the engineers of the Australian Forces and with the Australian mining battalion he had himself helped to raise. David had graduated from New College Oxford in 1880, and emigrated to join the New South Wales Geological Survey. Later, in 1891, he was appointed Professor of Geology and Physical Geography in the University of Sydney. By 1900 he was a Fellow of the Royal Society of London; in 1910 he was appointed a Companion of St Michael and St George (CMG) following participation in the

Sapper Geology Part 1 (p28)

1907-1909 British Antarctic Expedition led by (Sir) Ernest Shackleton; postwar he was appointed KBE in 1920; and following his death in 1934, he was granted a state funeral and commemorated by a motion of condolence and eulogy in the Australian Parliament. David was to serve initially as Geological Adviser to the Controller of Mines of the First, Second and Third Armies, but later in 1916 he was posted to the Inspector of Mines' office at BEF General Headquarters, close to Bill King, to guide siting of mines and dugouts. After transfer to a General List commission, he was promoted lieut colonel on 1 November 1918, twice Mentioned in Despatches and awarded the DSO.

David published nothing of substance on military geology under his own name, although an obituary memoir in the *Journal* is fittingly generous in his praise (Harvey, 1934). However, he and King together contributed the data in the Corps publication "Geological Work on the Western Front" (anon, 1922). Their work has recently been summarized by Rose & Rosenbaum (1993a), so need not be further discussed here. Just two points are apposite: the lesson learnt from wartime experience that "should the British Empire in the future become involved in another war there can be no question but that the existence of an adequate Geological Staff *from the commencement* (original italics) would be the means of much saving of expense, labour and life" (anon, 1922, p68); and the recommendation that "The experiences of these men should be passed on to the next generation, and whatever and whenever the next war may be, let us not be unprepared, either in the training or organization of a geological staff" (Sir Aubrey Strahan, in discussion of King, 1919, p220). The suggestion was for "A small staff for this special work", to be trained during Territorial service. But seemingly the suggestion then fell on deaf ears.

Expanding Roles for Military Geology: World War Two

In the Second World War, military geological expertise was provided for the British Army in Northwest Europe, North Africa and the Italian Campaign largely by three staff officers: W B R King, F W Shotton and J V Stephens. But there were other sapper geologists serving as such, notably W A Macfadyen in well-boring, J L Farrington and D R A Ponsford with the Inter-Service Topographic Department for terrain assessment, and W T Pickard for water supply in East Africa. F W Anderson served as an infantry officer, but as a geologist assessing the effects of aerial bombardment. Even the Intelligence Corps made use of geologist training, in the interpretation of aerial photographs. As described more fully elsewhere (Rose & Rosenbaum, 1993b), British military geologists thus showed a significant increase in number and in diversity of roles relative to the First World War.

Bill King, by then Yates-Goldsmid Professor of Geology at University College London after some years as a lecturer at Cambridge, was called up from the Army Officers Emergency Reserve and at last appointed to the Royal Engineers, with a Regular Army Emergency Commission as a second lieutenant from 13 September 1939, but promotion to war substantive captain from 13 December. Promotion to temporary major came next year, on 26 August 1940 and to temporary lieut colonel on 22 October 1943. During the winter and spring of 1939/1940 he worked on a variety of problems such as the siting of airfields, the provision of stone and gravel as construction materials and, of course, water supply, until he became involved in the Dunkirk evacuation, having been sent to serve as a geologist under the EinC of the BEF in France. There he earned a MC for bravery in convoying high explosives from Boulogne to Bailleul and Cassel. Back in England, he was attached to Northern Command for a year, then from 1941 to 1943 to GHQ Home Forces, which was to become for invasion purposes 21 Army Group. He worked with the advisers for Operation *Overlord*, the invasion of Normandy, and was influential in routing the invasion through Normandy rather than Cherbourg and the Cotentin peninsula because the geological conditions were there more favourable for rapid construction of airfields to support the fighter air cover deemed necessary for success.

Fred Shotton, then a Cambridge university lecturer, was one of Bill King's former students earmarked by him to provide assistance should war ever come. Accordingly, he joined the Army Officers Emergency Reserve in 1938, but was not called up for active service until 21 September 1940, when he was granted a Regular Army Emergency Commission as a second lieutenant in the Royal Engineers. Promoted war substantive lieutenant and a temporary captain on 1 November 1941, he was promoted major in 1944. At first Shotton accompanied King undertaking ground investigations for anti-aircraft gun sites in England, but in the spring of 1941 he embarked for the Mediterranean, to take responsibility under

the Director of Works, Cairo, (Major General E C Tickell), for all geological activities in North Africa and the Middle East, mainly dealing with the provision of water supplies so crucial to major troop movements. In 1943 he returned to the UK to assist, and later to succeed, Bill King who transferred to the Unemployed List when appointed Woodwardian Professor of Geology in the University of Cambridge. As noted in his obituary memoir in the *Journal* (Rosenbaum, 1990), it was Shotton, therefore, who provided advice on trafficability across beaches and subsequent terrain assessment. His duties did not include responsibility for geological control of quarrying for the massive quantities of aggregates needed for road and airfield construction and repair as the invasion progressed, but nevertheless he was appointed MBE for his services in Europe, having already been Mentioned in Despatches three times for his work in the Middle East.

"Steve" Stephens moved to the Mediterranean on Shotton's recall to London. A geologist with the Geological Survey of Great Britain, he had military experience dating from the First World War, when he had initially enlisted in the Royal Engineers, but later been granted a temporary commission as a second lieutenant (later lieutenant) in the Royal Garrison Artillery. With this to his credit, and degrees in both geology and engineering, he was perhaps an obvious choice when the Director of the Geological Survey was asked by Colonel M Luby RE to recommend a willing volunteer for appointment as a "Staff Officer for water supply". Stephens enrolled in the Army Officers Emergency Reserve in May 1940 with a view to service in the proposed Second Army, but the BEF collapsed and his call up papers were withdrawn soon after issue. He remained at the Survey until 1 June 1943, when he was appointed from the Emergency Reserve to a Regular Army Emergency Commission as a second lieutenant on the General List, promoted acting captain that same day, and posted to British Increment Headquarters No 1 Canadian Division to assume appointment as a Staff Officer (Geologist). Promotion to war substantive lieutenant came on 1 December 1943, and to war substantive captain/temporary major on 29 October 1944. He served in the Italian Campaigns of 1943 and 1944, incurring an infection at the time of the Anzio landings which destroyed the hearing in one ear.

Bill Macfadyen had seen action in World War One as an infantry subaltern, with "The Buffs" in Iraq, where he was awarded a MC and received machine gun wounds that rendered him unfit for further active service in that war. After the war he graduated from Cambridge as a geologist, and later obtained a PhD degree, working first as a petroleum geologist and later on the geological aspects of water supply in Somaliland and Iraq. It was therefore as a sapper hydrogeologist that "Mac" rejoined the army in World War Two. He was granted a Regular Army Emergency Commission as a second lieutenant/war substantive lieutenant on 17 May 1941, and promoted war substantive captain/temporary major on 30 December 1943. He served first in England and then in North Africa and elsewhere in the Mediterranean area with well-boring units, which themselves generated more, junior military geologists. One was W T Pickard, a graduate of Imperial College London. Commissioned second lieutenant on 9 April 1943, promoted war substantive lieutenant on 9 October 1943, temporary captain 1 July 1944, and major at the end of the war, Pickard put his geological expertise to effective if little-known use in the East Africa command, primarily for water supply, and documented the contribution of 42 Geological Section of the South African Engineer Corps to the Ethiopian and Eritrean campaigns earlier in the war (Pickard, 1946).

Macfadyen contributed to a wartime paper in the *Journal* (Henry, Odell & Macfadyen, 1944) which argued that the British Army was still not making the best use of the geological expertise available to it – a cry first raised in World War One, echoed in World War Two by the editor of arguably the world's leading scientific periodical *Nature* (anon, 1943), and repeated less publicly in more recent times – but without significant effect. Of his co-authors, Dr N F M Henry, so far as we are aware, had no commissioned service to his credit. A pre-war graduate of St John's College, he went on to a distinguished academic career postwar as a lecturer in mineralogy at Cambridge until about 1980, and died relatively recently. Dr N E Odell, however, was a sapper. A graduate of Clare College, Cambridge, and "one of the outstanding mountaineers of his generation" (RM, 1987), he served in the Corps throughout the First World War and was wounded three times. During the Second World War he joined up again and saw service in the Bengal Sappers and Miners. Appointed to a Regular Army Emergency Commission as lieutenant from 24 June 1940, he was "specially employed" at the School of Military Engineering through 1941 and 1942.

Promoted temporary captain in 1941, he seemingly achieved acting or local rank as a major before transfer to the Unemployed List by January 1943, for he is shown as "late Major RE" in authorship of the 1944 paper. In civilian life he held a number of academic posts, finally as Professor at Peshawar University in Pakistan, before retiring to settle in Cambridge. What motivated these men jointly to write what and when they did is not known, although it may be more than coincidence that they all had Cambridge associations, and the article was published soon after Bill King's move from the Army to become Professor of Geology at Cambridge in late 1943.

By 1944, however, a geological section had been formed within the new Inter-Service Topographical Department (ISTD). Its geologists were drawn from other Services as well as the Corps, but sappers known to have served there include J L Farrington, T C Phemister, and D R A Ponsford. John Farrington, a 1st class honours graduate of the University of British Colombia, was a metal-mining geologist with African experience. Appointed to a Regular Army Emergency Commission as a second lieutenant from 30 October 1942, he was promoted war substantive lieutenant on 30 April 1943, war substantive captain/temporary major 18 December 1944. Tom Phemister served only as a subaltern, as second lieutenant from 9 July 1943, lieutenant 9 January 1944. David Ponsford, a graduate of the University College of Swansea, in South Wales, was to serve postwar as a geologist, later a District Geologist, with the British Geological Survey. Commissioned second lieutenant on 5 December 1942, he was promoted war substantive lieutenant/temporary captain on 5 June 1943, war substantive captain/temporary major 21 April 1945. Sent on first joining the ISTD to the Azores, Ponsford was later to serve in Belgium and Germany, joining Fred Shotton in preparations for the final thrust across the Meuse and Rhine to Berlin.

Some military geologists were used outside the Corps. Thus F W Anderson had joined the TA (5th/7th Battalion of the Royal Hampshire Regiment) in 1930 whilst a lecturer in Southampton University, essentially to found a local Officers' Training Corps. He began war service with the Hampshires, and it was as an infantry officer that he was seconded on 4 July 1941 to the Ministry of Home Security, to join a team of scientists led by Professor (later Lord) Zuckerman in order to carry out geological work in the Research and Experiments Department of the British Bombing Research Mission. A temporary captain from 4 October 1940, he was promoted local major 8 December 1942, and local lieut colonel 19 March 1945, having participated in active service in Sicily, Italy, France and Germany, sometimes in the very front line, to study the effects of aerial bombardment. After the war he returned to a career in the British Geological Survey, in which he finally became Chief Palaeontologist. N L Falcon was a distinguished geologist with the Anglo-Iranian Oil Company and later British Petroleum, who achieved the rank of temporary lieut colonel in the Intelligence Corps, but his primary role was in the interpretation of aerial photographs, and was not specifically geological. Specific uses of British geologists in military intelligence have been reported by an American, Louis Simon (1957). Four geologists were used in the Industry Section of the British Intelligence Centre located at RAF Medmenham, Buckinghamshire, which later became the Allied Central Intelligence Unit. Also, at least one geologist was a member of the Combined Strategic Target Committee whose function was to select bombing targets. Simon concluded that "geology is especially useful in the field of intelligence. Experience suggests that the British appreciate this more than we did."

Many other geologists of course served in the armed forces, but not specifically as military geologists, and many geologists were engaged on work which contributed to the war effort, but as civilians rather than serving officers, so their roles though significant are not reviewed here. So far as we know, the only military geologist to serve as such without a commission was Sapper A L Greig, whose work on Gibraltar has already been described in the *Journal* (Rose & Rosenbaum, 1989; 1992). Additional expertise was contributed by geologists serving with Allied forces, notably the South Africans in both East and North Africa (Pickard, 1946) and the Americans in Europe (Kaye, 1957; Snyder, 1957) and the Far East (Hunt, 1950), as the operational significance of geology became widely established.

Conclusion

At the end of the war, the Geological Museum in London (now part of the Natural History Museum)

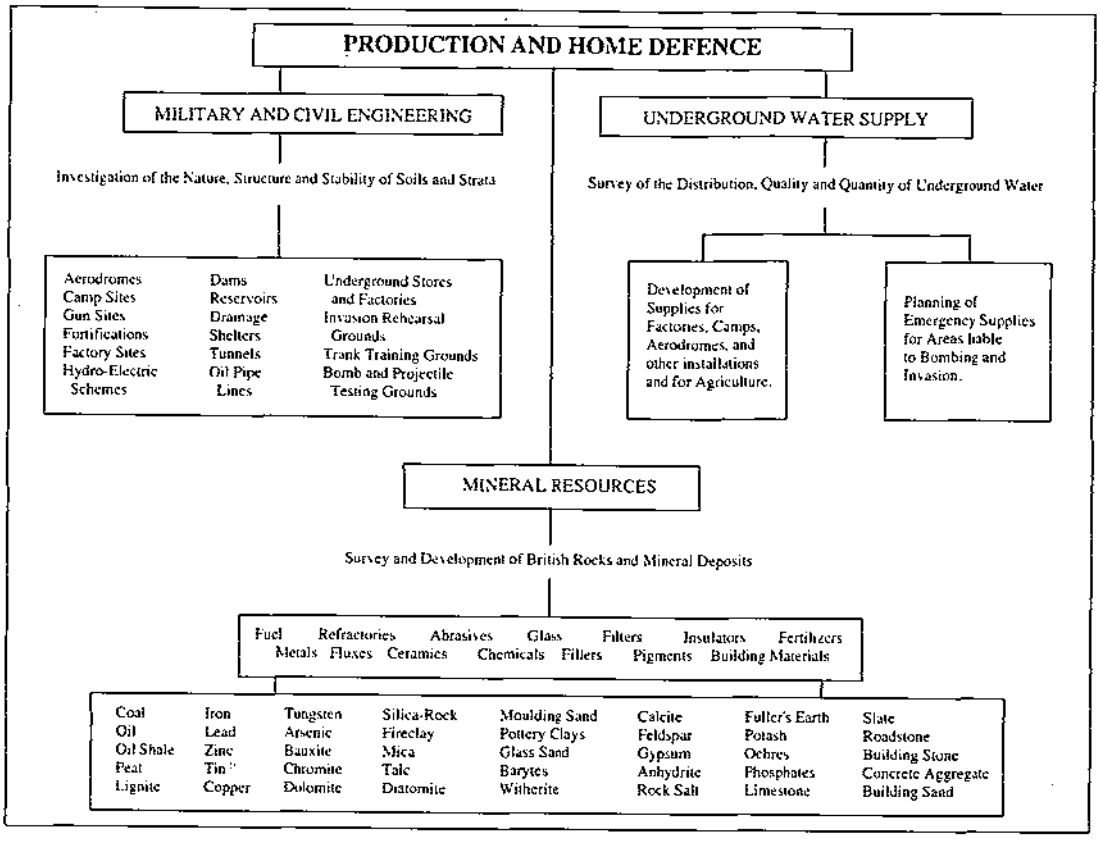


Figure 1. Fields of wartime application of geology within Britain during World War Two. (From Butler (1947), courtesy of *The Museums Journal*).

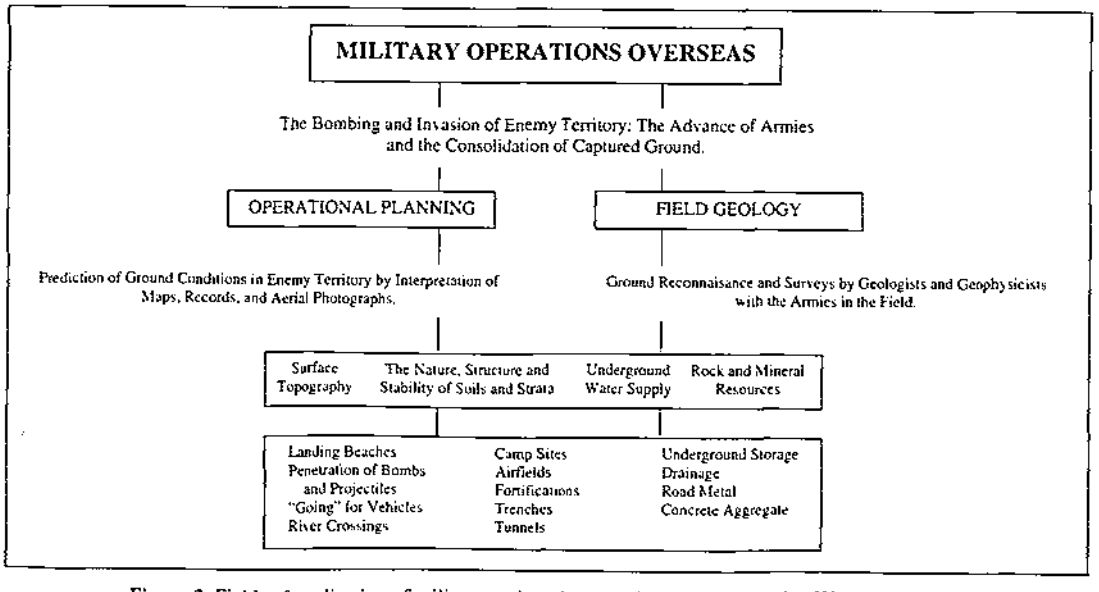


Figure 2. Fields of application of military geology in campaigns overseas during World War Two. (From Butler (1947), courtesy of *The Museums Journal*).

arranged a temporary exhibit to illustrate some of the contributions of British geologists to the war effort (Butler, 1947). This publicized the role of the Geological Survey in Home Defence, through projects associated with underground water supply; mining of iron, non-ferrous minerals such as lead and zinc, and coal; and underground construction to provide bomb-proof accommodation for factories, control rooms, and storehouses (*Figure 1*). It also revealed the use of military geologists in operations overseas, by examples of geological maps used during the war (in Italy, Albania, Austria, Indo-China, Thailand, and Borneo); 1:5000 "going" maps prepared in advance for the Normandy beachhead; cross-country movement maps for parts of Italy, France, Holland and Germany; "airfield suitability" maps for northwestern France and also North Africa; and underground water supply maps for Italy, France, and Germany. Experience had shown that there were roles for military geologists both in operational planning and in field geology (*Figure 2*).

But all the British military geologists returned to civilian life: King was already in post as Woodwardian Professor of Geology in the University of Cambridge; Shotton was appointed Sorby Professor of Geology at Sheffield University before transferring in 1949 to become professor at Birmingham; Stevens, Ponsford and Anderson returned to many years of work as senior geologists with the British Geological Survey; Greig returned to a post with V C Illing & Partners, consulting petroleum geologists. Yet this time the military lesson had been learnt. The need for geologist expertise under operational conditions, and therefore for a reserve of military geologists, had been confirmed.

ACKNOWLEDGEMENTS

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REFERENCES

Anon 1922. *Work of the Royal Engineers in the European War 1914-19. Work in the Field under the EinC, BEF. Geological Work on the Western Front.* Institution of Royal Engineers, Chatham. 71pp, 19 figs, 7 pls.

Anon 1943. Geology, geologists and the war effort. *Nature*, **151**, p 118-120.

Butler, A J 1947. Wartime geology: special exhibits in the Geological Museum , South Kensington. *Museums Journal*, **46**, p 233-238.

H(arvey), R N 1934. Lieut Colonel Sir Tannatt William Edgeworth David (memoir). *RE Journal*, **48**, p 616-9.

Henry, N F M, Odell, N E, & Macfadyen, W A 1944. The use of geology in the war effort. *RE Journal*, **58**, p 85-88.

Hunt, C B 1950. Military geology. In: Paige, S(ed.) *Application of Geology to Engineering Practice* (Berkey Volume). Geological Society of America, p 295-327.

Kaye, C A 1957. Military geology in the United States sector of the European Theater of Operations during World War II. *Bulletin of the Geological Society of America*, **68**, p 47-54.

King, W B R 1919. Geological work on the Western Front. *Geographical Journal*, **54**, p 201-215 (discussion p 215-221).

M, R 1987. Professor N E Odell (memoir). *RE Journal*, **101**, p 146-7.

Pickard, W T 1946. Geological work in the East Africa Command. *East African Engineer*, July 1946, p 17-19.

Rose, E P F 1978a. Engineering geology and the Royal Engineers. *RE Journal*, **92**, p 38-44.

Rose, E P F 1978b. Geology in war. *RE Journal*, **92**, p 182-190.

Rose, E P F 1988. The Royal Engineers Specialist Advisory Team(V). *RE Journal*, **102**, p 291-292.

Rose, E P F & Rosenbaum, M S 1989. Royal Engineer geologists and the geology of Gibraltar. Part I – Tunnelling through the Rock. *RE Journal*, **103**, p 142-151.

Rose, E P F & Rosenbaum, M S 1992. Geology of Gibraltar: School of Military Survey Miscellaneous Map 45 (published 1991) and its historical background. *RE Journal*, **106**, p 168-173.

Rose, E P F & Rosenbaum, M S 1993a. British military geologists: the formative years to the end of the First World War. *Proceedings of the Geologists' Association*, **104**.

Rose, E P F & Rosenbaum, M S 1993b. British military geologists: through the Second World War to the end of the Cold War. *Proceedings of the Geologists' Association*, **104**.

Rosenbaum, M S 1990. Professor F W Shotton MBE FRS (memoir). *RE Journal*, **104**, p 289-290.

Simon, L J 1957. Additional notes on use of geologists in the European Theater of Operations during World War II. *Bulletin of the Geological Society of America*, **68**, p 1567.

Snyder, C T 1957. Use of geology in planning the Normandy invasion. *Bulletin of the Geological Society of America*, **68**, p 1565.

The First Arakan Campaign and the Brief Life of DAIFORCE

COLONEL D C S DAVID MC MA

After The Shop, YO courses and Cambridge, the author joined King George V's Own Bengal Sappers and Miners at Roorkee in 1938. In October 1939 he went with 4 Field Company Sappers and Miners to the Middle East where, as part of 4 Indian Division the Company took part in the early battles in the Western Desert and in Eritrea. In 1942, back in India, he formed 74 Field Company Indian Engineers which he commanded for two years mainly in the Arakan. Having returned to the UK in September 1944, he marked Victory in Europe Day in command of 618 Field Company in the relief of the Channel Islands, after which he returned to India and the Engineer in Chief's Branch at Delhi. This was followed by a short spell in Iraq after which came the Staff College, Quetta, on the 1947 course which was brought to a premature end by the partition of India. Having volunteered to serve in Pakistan he spent the next 16 months at Sialkot starting up the training of officers and other ranks of the Royal Pakistan Engineers (as they then were) and forming the School of Military Engineering (Pakistan). Later postings included the War Office, HQ Training Brigade RE, Gibraltar, Malaya and Singapore. He retired in 1961.

Introduction

DAIFORCE was born on 12 March 1943 and ceased to operate as a force little more than forty-eight hours later. Operational developments had led to the tasks for which it had been formed being cancelled before they were started. Instead, it took part in a brisk little battle which resulted in a signal defeat for a Japanese detachment that had gained a foothold in an Indian brigade's defensive position. The story of that episode and other incidents in the early life of a Sapper and Miner field company in the first Arakan campaign is perhaps worth telling, fifty years on. Sadly, it records the deaths of five young Royal Engineer officers.

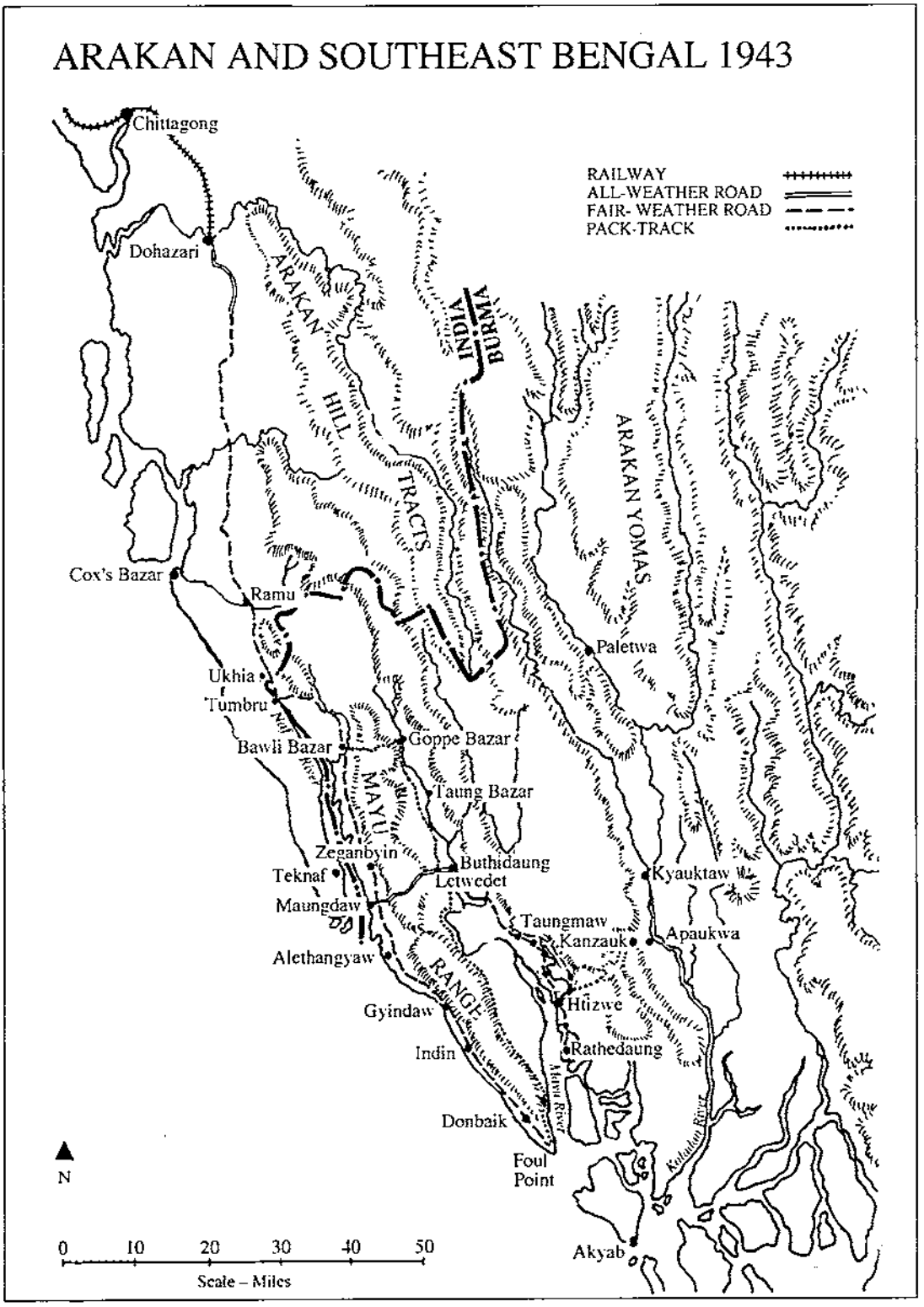
Background

During the monsoon season that followed the retreat from Burma in 1942 General Wavell, then Commander in Chief India, had plans made for an offensive to be carried out in the 1942/43 dry weather. At first a major seaborne attack to recapture Rangoon was intended; however that plan was replaced by a more modest one for the reoccupation of Akyab. That island lies roughly one-third of the way between Chittagong in East Bengal (now Bangladesh) and Rangoon; it had the principal port and the only airfield in the Arakan district of Burma, which would be of strategic value in any campaign to recover the country. Akyab had been evacuated by the RAF and its garrison of one Indian battalion in May 1942. The reoccupation was to be effected by a seaborne assault combined with an advance along the coast from the North. For the latter, 14 Indian Division, with an additional brigade from 7 Indian Division then on the North-West Frontier of India, was assembled in the Chittagong area in September/October 1942. 74 Field Company King George V's Own Bengal Sappers and Miners Group IE, raised earlier in the year, also came from 7 Indian Division. Unlike some other units of 14 Indian Division it was on animal transport scales, designed for mountain or jungle warfare, and had its own 22 first-line mules to carry fieldworks tools and equipment.

Physical Features of North Arakan

Arakan in the 1940s was remarkably undeveloped. The railway from Chittagong ended at Dohazari,

Col D C David MC
The first Arakan Campaign (p34)


ARAKAN AND SOUTHEAST BENGAL 1943
RAILWAY
ALL-WEATHER ROAD
FAIR- WEATHER ROAD
PACK-TRACK
Chittagong
Dohazari
ARAKAN HILL TRACTS
INDIA
BURMA
ARAKAN YOMAS
Cox's Bazar
Ramu
Paletwa
Ukhia
Tumbru
Bawli Bazar
Goppe Bazar
Taung Bazar
MAYU RANGE
Zeganbyin
Buthidaung
Letwedet
Teknaf
Maungdaw
Kyauktaw
Taungmaw
Kanzauk
Apaukwa
Alethangyaw
Htizwe
Gyindaw
Indin
Rathedaung
Donbaik
Foul Point
Akyab
N
0 10 20 30 40 50
Scale – Miles

20 miles to the South, and the metalled road 10 miles further on. Beyond that point there were only a few fair-weather tracks which after rain were impassable until repaired. Rice was the universal crop on the plains and the bunds between paddy fields were used as single-file footpaths, but the movement of goods between villages was mainly by sampans rowed on the tidal rivers, known as chaungs, which intersect the plains.

Behind the plains are heavily forested hill ranges running roughly North and South. Three rivers, the Naf, the Kalapanzin/Mayu and the Kaladan, all flowing South into the Bay of Bengal, split these hills to form three peninsulas, the Teknaf peninsula, which is the southernmost part of East Bengal, the Mayu peninsula, rising to 2000ft, and the Arakan hill tracts. A network of smaller streams and chaungs drains into these rivers. As well as the paddy fields there are areas of scrub and of mangrove swamp. Some 45 miles to the North of Foul Point, the tip of the Mayu peninsula, the Mayu range was crossed by a metalled road from the small port of Maungdaw on the Naf River to Buthidaung, an even smaller town on the Kalapanzin River (as the Mayu River is known from this point northwards). This road, approximately 16 miles long, was once a railway and ran through two tunnels. It was to be an important link in the supply line for our forces in the Mayu and Kaladan valleys.

Approach to Contact

By 20 November 1942 the divisional engineers, three Sapper and Miner field companies, had made a fair-weather road from Ramu, where the metalled road ended, to Bawli Bazar, the first sizeable village in Burma 30 miles further South. Timber bridges on piles cut from the jungle nearby spanned the smaller chaungs. At Bawli Bazar a ferry was operated until replaced by a 400ft timber bridge. Where the road crossed flat paddy fields an existing bund would be widened with wet mud dug nearby and made good until traffic had squeezed it dry. Later in the year when the paddy had dried out gaps were knocked in the bunds and the road could run across the flat fields. Earthwork was done by local coolies, both male and female, coaxed from their villages by the prospect of payment in newly-minted one-rupee notes, and working in gangs of 20, each supervised by a sapper.

From Bawli Bazar a pack track was made across the Mayu Range to Goppe Bazar on the Kalapanzin River, in order that troops might advance down that valley towards Buthidaung. This town, like Maungdaw, had been occupied by the Japs towards the end of October.

The British Offensive

In mid-November delays in assault shipping becoming available, together with doubts about relative air strengths, led the CinC to revise his plan. Instead of a direct seaborne attack on Akyab, that island was now to be captured by an advance along the coast and a short-range assault from the tip of the Mayu peninsula. To secure that jumping off place 14 Indian Division advanced on a two-brigade front, 47 Indian Infantry Brigade moving down the coastal plain to Maungdaw and then down both sides of the Mayu Range to Foul Point, while 123 Indian Infantry Brigade, on pack, advanced down the eastern side of the range to Letwedet and then from Buthidaung down the East side of the Mayu River to capture Rathedaung.

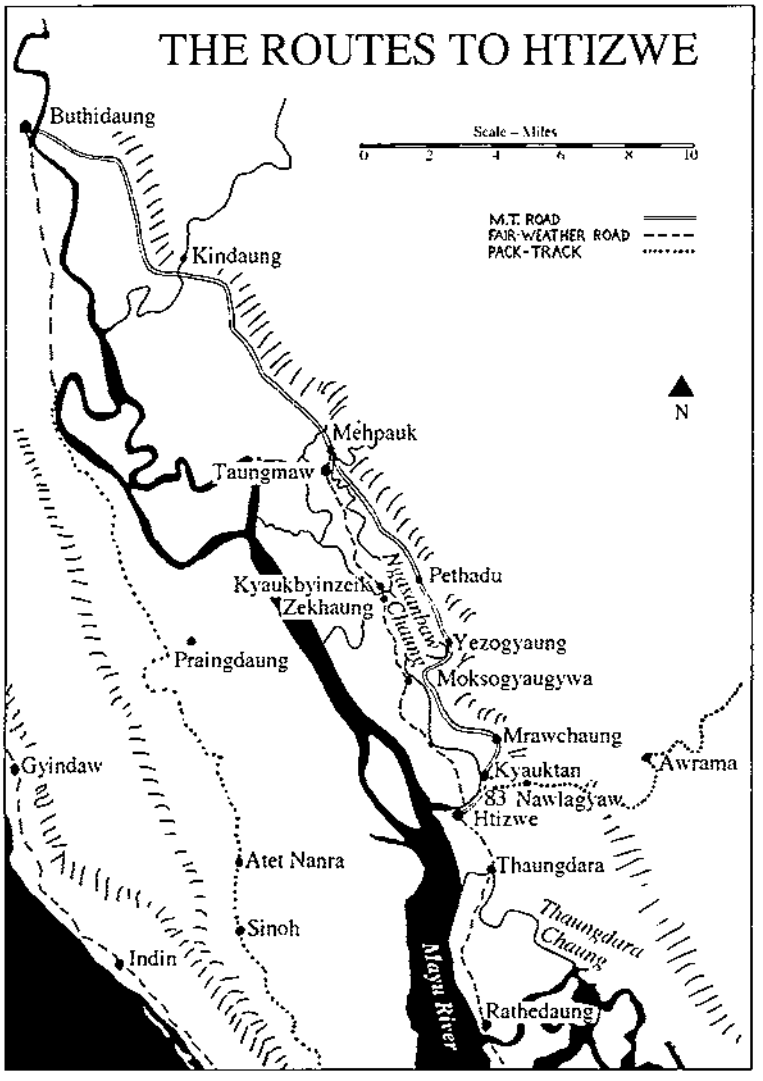
At first all went well. Maungdaw and Buthidaung were both occupied on 17 December, the Japanese garrison having withdrawn the previous day. 47 Brigade, supported by 26 Field Company IE, pushed on down the peninsula and on New Year's Day a carrier patrol reached Foul Point unopposed. On the left, South of Buthidaung there was no road or even a pack track so after the occupation of that town one battalion set off by boat, leaving carriers and mules behind, and established itself at a village named Htizwe from where Rathedaung could be approached overland. On Christmas Day a patrol found Rathedaung deserted. However two days later a company arriving by boat to take possession was received with machine gun and mortar fire. A two-company attack failed to dislodge the opposition, as did a setpiece attack by the whole battalion supported by a mountain battery. A succession of attacks during January and February by the whole Brigade, with strong artillery and air support, failed to drive the enemy from their positions in the low hills to the North of the town.

On the peninsula the story was similar. A few days after the carrier patrol had reached Foul Point, infantry trying to return there were held up a mile North of Donbaik and were unable to break through. During the next two months no fewer than five attempts were made to penetrate the Donbaik defences and reach Foul

Point, the jumping off place for the assault on Akyab, but all failed.

Sapper Tasks

After the occupation of Buthidaung one section of 74 Field Company got on with making a track down the East side of the river to Taungmaw and eventually on to Htizwe and Thaungdara, the last village before Rathedaung. After it had been completed for pack traffic it was improved to take carriers and occasional MT. The sum total of equipment bridging available was one Small Box Girder set though the CRE (Lieut Colonel R H Muirhead) also managed to secure stores for two small suspension bridges. Minor chaungs were bridged with locally-cut timber. Much of the route lay across paddy fields and once the rains started it would be impassable. A higher alignment, following the foothills, was therefore reconnoitred and early in February work started on an MT road along that line. The chaungs were narrower here and all were eventually bridged.



As long as the pack track was in use ferries were required for the crossings of five or six of the rivers, including the Mayu at Buthidaung and the 300ft wide Ngasanbaw Chaung at Htizwe. One section was employed building jetties and operating these ferries. The big tidal range caused problems, which led Cyril Gordon to devise a "slither ramp", a wedge-shaped platform with a vertical face, which was pulled up or lowered down a ramp by means of a block and tackle.

In February we were joined by a company of 10 Engineer Battalion IE which was to make a pack track from Kyauktan to Kanzauk and the Kaladan Valley, where a battalion (8/10 Baluch), known as Soutcol, was guarding the left flank of the Division.

While we were at Htizwe, supporting 123 Brigade, the Company had a visit from Peter Fleming, the well-known traveller and writer, who came as an expert in deception. We made up small charges with time pencils for him to float down the river, timed to go off behind the Jap positions. There were no reports that enemy morale was affected. A rather more substantial diversion was made when Gordon and a small party of sappers took part (with a detachment of 10 Lancashire Fusiliers) in a commando-type raid 4 miles South of Rathedaung. After transferring

from a Royal Naval Motor Launch to assault boats they landed, placed charges on two small bridges and laid antitank mines on the track. The charges were heard to go off as they re-embarked.

The End of the British Offensive

On 18 February a new attack was mounted on the Donbaik position by 55 Indian Infantry Brigade, with four battalions, but it was no more successful than earlier attacks. The GOC (Major General W L Lloyd) judged that it was then too late for Akyab to be captured before the monsoon and, in the light of a growing threat of enemy attempts to turn the left flank of the division, he proposed to adopt a defensive role. This however was not accepted by the CinC who ordered another attack to be made.

At the end of February Commander 123 Brigade (Brigadier A V Hammond) told unit commanders that the offensive was at an end and that the initiative was passing to the enemy. The three battalions were to be withdrawn from close contact with the enemy positions and 74 Field Company was required to lay booby traps in the area vacated. The switches and trap mechanisms recently produced in the UK for booby traps had not reached the Arakan and devices had to be improvised from pieces of bamboo and ration tins to trigger shrapnel and pineapple mines. By great ill fortune the two 74 Field Company subalterns who were setting booby traps, Frank Hartshorne and Jimmy Allan (a recently arrived reinforcement), were both killed when mines went off while being set. Both were buried near Thaungdara. The Company had already lost John Crush, of C Section, killed (together with the mule *havildar* (sergeant) and a sapper) by enemy bombing at Maungdaw; his place had been taken by Randall from HQRE.

The Japanese Counter-Offensive

It was known that Japanese reinforcements had reached Akyab and that an offensive was to be expected; British Intelligence had not however learnt the details of the enemy plan and commanders could only react to it as it unfolded. When Soutcol at Kyauktaw and Kanzauk came under heavy attack on 8 March they were withdrawn through the hills to Buthidaung and Htizwe. Simultaneously Japanese forces landed behind 10 Lancashire Fusiliers' position North of Rathedaung, and other elements attacked the two battalions on the East and northeast of the brigade position. Gordon's section of 74 Field Company, which had been erecting a Small Box Girder bridge at Nawlagyaw and building jetties for a new ferry at Kyauktan, was caught up in the latter attacks and took part with 1/15 Punjab Regiment in the defence of a feature known as "Sausage", southwest of Nawlagyaw. Soon after this 2/1 Punjab Regiment of 55 Brigade arrived to relieve 1/15 Punjab Regiment, and Brigadier J M Hunt, Commander of 55 Brigade, with his own headquarters, took over command of the Brigade position.

The Birth of DAIFORCE

On the morning of 12 March the GOC came to HQ 55 Brigade and made it clear that there was to be no withdrawal from Htizwe. The Brigade was to stay where it was even if surrounded and cut off. He then called me in and gave orders that 74 Field Company, less one section which would be under command 55 Brigade but with two companies of 10 Engineer Battalion and one company of 1/15 Punjab Regiment under command, all to be known as *DAIFORCE,* was to continue work on the new MT road, which was to be used for maintenance of the Brigade, and at the same time to oppose any enemy advance northwards along the foothills or westwards through the hills to Mrawchaung. If forced to withdraw we were to defend the new bridge at Yezogyaung to the last round and last man. These orders were confirmed in a signal received at 0100hrs on 13 March (see Appendix).

During the morning I saw Capt Nicoll, commanding C Company 1/15 Punjab Regiment, and Capt MacFarlane, commanding the two companies of 10 Engineer Battalion, and arranged for *DAIFORCE* to move to the area Mrawchaung/Yezogyaung that evening. However it became known that enemy forces from the Kaladan Valley had already occupied Mrawchaung and were in the hills on either side of the Kanzauk track, and at 1430hrs the Brigade Commander told me that the move of *DAIFORCE* was countermanded; it was instead to remain in the area East of Htizwe as brigade reserve. The sub-units of the force, except for C Section of 74 Field Company which was 5 miles away to the North, assembled there and dug in.

The Battle of the "Pimple"

Shortly before 0600hrs next morning a great fusillade was heard from the direction of Kyauktan. The

Brigade Commander summoned me and greeted me with the words "Kyauktan is being attacked from the North. The situation is obscure. Take your force there, report to Colonel Lowther (CO 2/1 Punjab Regiment) if you can find him, otherwise act as you think best." A few minutes later he added that the Japs were in Kyauktan Wood. D*AIFORCE* was to turn them out.

We reached Kyauktan bridge (over a minor chaung) through some mortar and long range machine gun fire, and left A Section of 74 Field Company, under Neilson, to hold the bridge. MacFarlane with the two Engineer companies was ordered to move through the woods alongside the Ngasanbaw Chaung, to turn out any enemy found and to take up positions at the far end of the wood where the new ferry site was, held as far as we knew by Gordon's section of 74 Field Company. I then made my way to Battalion Headquarters, taking C Company 1/15 Punjab Regiment. There I learnt that the enemy had overrun and occupied a wooded knoll known as the "Pimple" (Point 83) within the perimeter, where a mule company had been camped. From that position the Japs were bringing medium machine gun fire to bear on Battalion Headquarters and 2/1 Punjab Regiment was replying with 3in mortar fire. Colonel Lowther suggested that the Engineer companies should work their way further along the river bank then turn East and try to get behind the "Pimple" to force the enemy out. He was in touch by telephone with Gordon at the ferry site and told him to pass these orders to MacFarlane.

Shortly afterwards Captain Hollwey of C Company 10 Engineer Battalion gallantly led some of his men in a charge from Kyauktan Wood across open ground against the Jap position on the "Pimple". They came under heavy fire and Hollwey and eight IORs were killed, with several others wounded. I joined MacFarlane and his company near the ferry and we tried to work round behind the enemy position, but had casualties and gave up the attempt. Gordon and his section from their trenches were exchanging light machine gun (LMG) fire with the Japs on the "Pimple", with considerable effect but suffering some casualties themselves.

About 1200hrs Lieut Colonel Lowther launched a new attack on the "Pimple" with part of his own D Company and C Company 1/15 Punjab Regiment which I had placed under his command. B Section 74 Field Company from the ferry area gave effective supporting fire. The attack was successful: the Japs were turned out, pursued by mortar and LMG fire, and were caught in the open by 3.7in artillery fire. 73 dead Japs were counted among the many dead mules. Three medium machine guns and a truckload of miscellaneous equipment were collected. One prisoner was taken whose identity confirmed that the enemy had come from the Kaladan Valley. Captain Nicoll and several Indian ranks were wounded in the attack.

At about 0800hrs on the same day 5 miles to the North, at Yezogyaung, a party of C Section, completing the bridge there, was attacked by another enemy detachment that had come through the hills. A *naik* (corporal) was wounded and a lance *havildar* captured but later escaped. Another party of C Section, guarding Taungmaw bridge, drove off a Japanese patrol that approached them.

In the evening the Engineer companies were ordered to revert to their own battalion and moved out. C Company 1/15 Punjab Regiment remained under command 2/1 Punjab Regiment until able to rejoin its own battalion, so 74 Field Company resumed its own identity and no more was heard of *DAIFORCE*.

Withdrawal From Htizwe

On the afternoon of 15 March I was called to a meeting with the Brigade Commander (Brigadier Hunt), the Brigade Major (Major Suther) and CO 23 Mountain Regiment (Lieut Colonel Barford) to discuss a withdrawal. At first it was intended that the withdrawal would take place over two nights, but then it was decided that all troops and as much equipment as possible would be evacuated that night, 15/16 March, taking only personal arms, as much ammunition as could be carried and a blanket or mosquito net per man. Other equipment was to be destroyed, avoiding fires which might reveal what was afoot. All mules had unfortunately to be left behind, as it was judged that any attempt to swim them across the river would create confusion and might give the show away. We laid on the two ferries required, one at Kyauktan under Gordon and the other at Htizwe under Neilson, each with a Folding Boat Equipment (FBE) raft, two or three single folding boats and ten assault boats. In order to preserve secrecy propulsion units were not to be

used at Kyauktan. Traffic Control Posts (TCPs) were to be provided by the infantry.

At 1850hrs, when final arrangements were being made for ferrying to start, some shots landed in the Kyauktan forming-up area and jetty. This caused panic among the mixed details waiting to cross, which the TCP and Sapper officers were unable to control. Men rushed the jetties, jumped into the water or swarmed on the raft and boats and pushed off. The boats drifted downstream and were abandoned on the far bank; the FBE raft disappeared. During the next half-hour the 74 Field Company officers and NCOs managed to cross and collect enough boats to make up three strings of assault boats, each towed by a folding boat rowed by sappers, and ferrying was resumed. Thereafter crossing went smoothly and was completed at 2330hrs, when Gordon, after a final check of the deserted river bank – where there was no sign that the enemy had followed up – sank the assault boats and set out to row the folding boats up the Mayu River to Buthidaung as ordered.

After seeing ferrying at Kyauktan under way I paddled downstream in an assault boat, accompanied by a Gunner officer, making for the Htizwe ferry and looking for the missing FBE raft. We found it on the mud just above Htizwe. Someone got the engine running, I took the wheel and we joined in the ferrying.

About midnight there came a new shock, when the Brigade Major appeared with news that Divisional Headquarters had intervened to say that the battalions were not to withdraw but were to remain in position. He crossed in the ferry and set off in pursuit of 2/1 Punjab Regiment, which had crossed at Kyauktan and were now well on their way North. During the rest of the night we used the spare capacity to ferry out some of the valuable mountain artillery mules and equipment, and at 0530hrs began to ferry 2/1 Punjab Regiment back into the perimeter. First light revealed to the Japanese in the hills that reinforcements were apparently pouring in, so they opened up with artillery and machine gun fire. For good measure one of our Hurricanes joined in the attack on the crossing. Intermittent firing continued all day. 2/1 Punjab Regiment took up positions guarding the left flank of the Brigade, while 10 Lancashire Fusiliers were covering the right flank.

After daylight no more mules were to be ferried so the rafts were dismantled and strings of folding boats made up, each with a propulsion unit in the leading boat. At about 0930hrs one company of 2/1 Punjab Regiment was again ferried to the North bank to secure the bridgehead. Thereafter ferrying was stopped, but some unauthorized crossing by stragglers attempting to swim the river or using assault boats that had been issued to the infantry continued all day. The Sapper boats had to be closely guarded to prevent their being taken.

During the day two RE officers arrived separately and must have been surprised at what they found. Davies, OC 11 Bridging Section, had come to pay his men. Whether he managed to do so is not known, but he immediately lent a hand with ferrying out the company of 2/1 Punjab Regiment: anyone who could operate a propulsion unit was welcome. Later Tinsley of 73 Field Company appeared with a load of picks and shovels, sent forward by the CRE when the watchword was "dig in". (See next article this *Journal*, called "Boating in the Arakan".

About 1600hrs orders were issued for the withdrawal of all remaining troops to take place that night (16/17 March). Four ferry crossings were established, two manned by Sappers and Miners and two by the Royal Navy. Each of the former used a string of folding boats with a propulsion unit in the leading boat; one, manned by 74 Field Company (with Tinsley helping) was at the Htizwe site, the second, manned by 11 Bridging Section under Davies, was further downstream at the Forward Supplies Depot. The Navy, using two Assault Landing Craft with folding boats lashed alongside, were near the mouth of the Ngasanbaw Chaung.

Ferrying started at 1900hrs and went smoothly apart from a little shelling; the troops crossing were well-disciplined and the TCPs maintained good order. Towards the end one of the propulsion units broke down and that ferry had to resort to rowing, but there was no shortage of oarsmen. The operation was completed at 2230hrs and once more the enemy did not follow up. The Assault Landing Craft came upstream and took in tow all the folding boats and as many assault boats as could be collected. Davies and Tinsley went along with the Navy for a ride back to Buthidaung but had to part company before reaching port. We heard later that Davies was fatally wounded when caught in some shelling near Taungmaw.

Next day, 71 Indian Infantry Brigade moved up to cover the withdrawal of 55 Brigade to Buthidaung. Gordon with his folding boats reached Taungmaw where the CRE ordered him to prepare Mehpauk bridge for demolition; it was blown on the morning of 18 March on orders from the CO of 1/17 Dogras. Sirmoor Field Company of 26 Indian Division took over the ferry at Kyaukbyinzeik and 74 Field Company, 10 Engineer Battalion and 11 Bridging Section were ordered back to Buthidaung to reorganize and refit.

Morale in the Company and in most units of the Division remained intact but all units were badly under strength due to malaria as well as casualties, and troops were frustrated at not having found a way of dealing with the formidable Japanese bunker defences. Perhaps the methods used at Ghazni and the Kashmir Gate in the last century would have to be relearnt and brought up to date.

Epilogue

14 Indian Division was to be relieved by 26 Indian Division and on 26 March 74 Field Company was at Maungdaw about to embark en route to India. All automatic weapons had been handed in when another surprise was sprung. I was called to Divisional HQ to be told that a Japanese force from Htizwe had crossed the river and was on the peninsula, expected to cross the range and attempt to cut off the two brigades that were further South. 74 Field Company was to move at once by MT to Gyindaw, some 18 miles South of Maungdaw, where a track through the hills came out, take up positions and hold up any enemy which appeared. By evening the Company was in position, with a section of 73 Field Company and a platoon of 1 Inniskillings under command, ready for the worst, with or without automatic weapons. We stayed there for ten days until relieved by the newly arrived 4 Infantry Brigade. On 3 April a Japanese force did appear 8 miles further South, near Indin, and set up a road block which effectively cut communications with 6 Infantry Brigade and 47 Indian Infantry Brigade. 6 Brigade eventually withdrew along the beach but not before the Brigade HQ had been overrun and the Brigade Commander (Brigadier Cavendish) lost, later reported killed. 47 Brigade, on the East of the range, was split into small parties, most of which eventually made their way out but it was no longer a fighting formation. 74 Field Company, after being relieved at Gyindaw, took up positions in two other areas further South, before continuing their interrupted journey to India where they spent the summer re-equipping and and retraining before, in company with 123 Brigade, joining 5 Indian Division and returning to the Arakan for another round.

APPENDIX

COPY OF OPERATIONAL MESSAGE NO 148/22 OF 12 MAR 43
FROM: ADV HQ 14 IND DIV
TO: 55 IND INF BDE, 74 IND FD COY, CRE
RPTD: REAR HQ 14 IND DIV, CURTFORCE

Following troops under command Major DAVID RE will be known as DAIFORCE(.) 74 Fd Coy less one sec(.) two coys 10 Ind Eng Bn(.) one Coy 1/15 PUNJAB(.) tasks(.) first(.) Engineer work under orders CRE(.) second(.) oppose any enemy advancing NORTHWARDS by track incl MRAWCHAUNG 758114 – YEZOGYAUNG 732169 – MEHPAUK 670271(.) third(.) oppose any enemy advance WESTWARDS by track through 797089 – LAINGGWINGYI 7812 – MRAWCHAUNG 7611(.) fourth(.) if forced to withdraw by superior enemy forces to fall back and fight to last round and last man for protection of bridge at YEZOGYAUNG 732172(.) fifth(.) to be responsible for own protection(.) 55 Bde will release tps composing this force by 1900 hrs 13 Mar(.) one sec 74 Fd Coy remains under comd 55 Bde(.) all informed(.) ACK
TOO 2230
12 Mar 43

BIBLIOGRAPHY

1. "History of the Second World War – The War against Japan II". S Woodburn Kirby. HMSO 1958.
2. "Official History of the Indian Armed Forces in the Second World War 1939-45".
"Campaigns in the Eastern Theatre. The Arakan Operations 1942-45".
Historical Section (India and Pakistan). Lt Col N N Madan. Editor Bisheshwar Prasad.
3. "The Indian Engineers 1939-47". Lt Col E W C Sandes DSO MC. The Institution of Military Engineers Kirkee (India) 1956.
4. "Brief History of the KGV's Own Bengal Sappers and Miners Group RIE". (August 1939 – July 1946). G Pearson Roorkee 1947.
5. "Battle of the Box". Patrick Turnbull. Ian Allan Ltd London 1979.
6. "War Diary 1943 74 Field Company IE". (PRO Kew).
7. "War Diary 1943 2nd Battalion 1st Punjab Regiment". (PRO Kew).
8. Author's contemporary record.

Boating in the Arakan (March 1943)

Experiences of Second Lieutenant T W Tinsley,
B Section, 73 Field Company King George V's Own Bengal Sappers & Miners

I EXPECT that I got this special assignment because my unit, 73 Field Company, had almost completed its stint in the Arakan and was in the process of handing over its tasks. I lived to tell the tale, but it had its sticky moments.

The assignment started, quite quietly, with a message to report to the CRE. I was told that the Brigade which was in action at a place called Htizwe (pronounced "Teesway", about 30 miles south of Buthidaung) had been ordered to dig in and become the "Tobruk" of the Arakan. They were short of entrenching tools, but this was now to be remedied as I was to collect 200 picks and 200 shovels from the Engineer Stores Depot, deliver them to a naval motor launch at the Buthidaung Ferry Site, and then accompany them down to Htizwe to hand them over to the Brigade.

It seemed a simple job. I collected the picks and shovels and got them taken down to the jetty, where the navy was ready and waiting. Off we went with the implements stowed neatly amidships, and it was fun to be sitting up on deck in the sun chatting to the two Royal Naval Reserve officers who operated the motor launch. The launch was part of a formation called the Sunderbund Flotilla, and these two intrepid mariners had been sailing up and down the rivers and chaungs of the Arakan for some time. They said that it got a bit hairy when they wanted to get from one river into another at their joint estuaries, opposite the Island of Akyab, but they had managed (so far) to come and go at will. They had a vicious-looking Oerlikon heavy machine gun mounted at the bow and they were in good heart.

The trip took some time. I had a small mouth organ in my pocket which I had bought while on leave as a means of passing the time (once I had learned how to play it). I took it out, gave a tentative burst and one of the navy types siezed it with glee! He really could play and very kindly tried to show me how he got those thrumming sounds with the tongue which make the playing full of rhythm.

I was very grateful for my music lesson and was even beginning to get the hang of it, with an almost recognisable version of "Polly-wolly Doodle", when a Jap plane interrupted the proceedings. The navy steered for cover under some trees by the river bank and let fly with their Oerlikon. The Jap flew on, unperturbed, and we continued our journey.

Our arrival at Htizwe was greeted with a series of crumps and bangs which I discovered was mortar fire. I saw a tall figure wearing red tabs emerge from a slit trench as the noise abated, and I had almost reached him when whistling in the air suggested the arrival of another salvo of mortar shells. I dived into the same trench and reported my arrival with the stores. The Brigadier was not interested in picks and shovels. In fact, the Brigade was not going to be a "Tobruk" at all, and was finally pulling out of Htizwe that very night. The bulk of the Brigade had already been ferried across the Ngasanbaw Chaung, a large tributary of the Mayu River, during the previous night or two. This operation had been carried out by 74 Field Company, commanded by Major Dai David, using some Folding Boat Equipment (FBE) and assault boats produced by 11 Bridging Section, which had newly arrived in the area.

A sudden change of plan had resulted in one unit, (2/1 Punjab Regiment) being recalled and ferried back across the Chaung to take up a position once more on the enemy side of the water at Htizwe. This crossing had been made under hazardous conditions in broad daylight. Now the whole rearguard of the Brigade was to be got across the Ngasanbaw Chaung after dark. The Brigadier thought that Major David might be glad of a little extra help with this task.

The situation seemed rather grim. There were dead mules lying around the paddy fields surrounding the small group of huts and trees marked as Htizwe on the map, with live mules running loose in panic as mortar shells whistled in and exploded.

My first task was to dump those picks and shovels out of reach of the Japs. There was nothing for it but to go back to my new-found naval friends. "You know those picks and shovels we brought down with us?" I said, in conciliatory tones,

"Well, would you mind, awfully, taking them some place down river and dumping them?"

The Navy has a reputation for pithy language. They looked at me and asked, "Do you mean all of them?"

When I nodded, they just said "Pongos!" and went off to do it. There was a whole world of meaning conveyed in that single word.

I went to find Major David, whose small force of engineers at Htizwe consisted of a detachment of sappers under the command of Bill Nielson. They had four assault boats and four folding boats, in one of which there was a Petter's Propulsion Unit. This engine was capable of being used in a number of ways, such as for pumping water or generating electricity. In this case the engine sat on the flat bottom of the boat at the stern. It was connected by two lengths of flexible drive curving gently over the side to join up with the propeller shaft which was fixed to a mounting in the bow. The direction of the propeller could be changed and this was how the boat was steered. A corporal of the bridging section had arrived with the equipment, and was available to help to man the boats.

Major David decided to put all extra hands to good use, Bill Nielson and his sappers (about half a dozen of them) would operate one string of two folding boats tied in line with two assault boats. They would row the string across assisted by the troops they were ferrying who would use paddles; then the Sappers would row the string of boats back, empty. Major David, myself, and two others (one of whom was the bridging corporal) would operate the other string. The Ngasanbaw Chaung flowed with a strong current, but we thought we could manage. The four of us were available to help in embarking the troops – two chaps to bustle about and two officers to be in charge. Thank goodness there were four of us when we had to man the oars on the return trips.

The first troops arrived soon after dark, got into the boats in a very quiet and orderly manner, and off we went with considerable help from their paddles. It was easy going across, but tricky managing the long line of boats coming back. However, you can make the current work for you if you can keep aslant the stream. This is the principle of what is called the "Flying Ferry". While the current pushes you sideways, you also go downstream; but then you pull up in the slack water by the far bank.

After several trips across we had got nearly everyone over without incident and without interruption from the enemy. Then disaster struck. I was steering at the bow, with the Petter's engine running quietly in the stern of the leading boat, when I felt a sudden jarring. We had hit something which had come floating, half submerged, in the stream. I had not seen it coming in the dark, although we had been keeping a sharp look-out for debris. Whatever it was, it had a catastrophic effect. The engine began to race and had to be shut down. A shear pin had obviously snapped and there was nothing we could do about it. Shear pins are designed to do this in the way that an electrical fuse blows on overload, but it was a very awkward moment for it to happen. All we could do was to carry on, using oars, and wishing we were more than four. We went a lot further downstream on each trip, and since I was in the bows, I jumped overboard with the painter when we finally got near to the bank and then pulled the boats back to the start point by walking along the bank like a bargee's horse.

At last, the operation was over. Major David and the rest of us sappers were left on the now silent and deserted riverbank, looking at our eight boats and wondering what to do with them. They were "On charge" to the bridging section, but we all recognized them as rare and valuable equipment the like of which had not been seen in the Arakan. It was unthinkable to leave them there for the Japs, yet we had no easy means of demolishing them. I did not even know where my 200 picks and shovels had been dumped so that we could hammer holes and sink them. The stillness was uncanny after the bustle of the evacuation and, frankly, none of us was keen to hang around. Just as I was about to voice my own anxiety we heard the familiar "chug-chug-chug" of the Navy cruising round the far bend of the river, barely visible against the light reflected in the water.

I hailed them and they called out "Well? What is it this time?"

"What about a tow?" I asked. "Are you going our way?"

"We are not stopping," one said, "but if you want a tow, get a line out to us and you are on."

I kicked off my boots, threw them into the bows of the leading boat and had the painter out to the motor launch almost before the words were out of his mouth. Major David and the rest of 74 Field Company, now that the salvaging of

the boats was in hand, left to catch up with the rearguard. That left just a couple of us with the Navy. We wasted no time in getting the two strings of boats hitched up and were soon being towed downstream and away.

The Navy were amused and hospitable; it was quite a procession of boats and it tickled their fancy – pongos were a funny lot. They produced hot drinks for us and hung my clothes out to dry in a most un-naval manner as the sun came up. Some time later they landed us on the banks of a chaung in what seemed to be the middle of nowhere. They were in touch with their base by radio and had to go somewhere else without us. They passed on instructions for the corporal of the bridging section and myself: we were to try to get our boats up the river to Buthidaung on our own. A second message arrived while we were unfastening the towline, "Would we please give a lift to the remnants of a field hospital who were stranded somewhere nearby? They could help us to paddle the boats."

While we waited for the medics to turn up, and with no idea of what was involved, the corporal and I had a good look at the propulsion unit. It had a tool kit, which was fortunate, and we tested the two lengths of flexible drive. One was intact and it was a shear pin on the other which had snapped. We had no spare pin and probably would not have been able to fit it even if we had, so we tried to see if we could operate the set with only one length of flexible drive. We shifted the engine to the middle of the boat and bent the drive in almost a semi-circle to reach the propeller. It looked quite unlike the pictures in the instruction manual. While we were doing this, a *jemadar* of the Medical Corps arrived, followed by several orderlies humping tentage and medical stores. They had been left high and dry, without mules to carry their kit, and were mighty glad to see us. They even had some fuel for the Petter's engine, if it would work.

We applied grease to every grease nipple we could find and to all the moving parts we could reach. Then we started up the engine with considerable trepidation. It seemed to work, so we loaded the stores, climbed aboard and were off!

We chugged easily downstream with the current, cooling the outer casing of the flexible drive with water and applying grease liberally. The navy had told us to "Turn to starboard (I mean: right) when you get to the main river. Head upstream and even you pongos can't miss Buthidaung."

Once we turned into the current we could only make slow progress. Any Jap worth his salt would easily have been able to overtake us, but all was quiet. It took all day to cover some 20 miles, until we rounded a bend and saw the ferry site at Buthidaung in the distance. It was late in the afternoon when we reached the jetty. The place was a hive of activity with two country-boat rafts busily ferrying troops across the river. They were a new formation going forward to halt the Japanese advance. Somehow it did not surprise me to see that the rafts were operating under the watchful eyes of Scrimgeour and Gus Gillman, the other two Section Commanders in 73 Field Company. They seemed pleased to see me, but I soon realized that it was the remarkable string of equipment boats which had gladdened their eyes. The FBE with its Petter's Engine and one single length of flexible drive was immediately pressed into service as a ferry once more.

Editorial Note: A review of the author's book *Stick and String* appears in the Review Section of this issue of the *RE Journal*.

Campaign and General Service Medals

COLONEL J C H MOORHOUSE CGIA

Since his last article in August 1989, Colonel Charles Moorhouse has spent nearly three years as an SO1 in the Directorate of Personnel, seven months as an SO1(W) in the Directorate of Defence Systems, ran the 1991 London Marathon and reduced his golf handicap by 11 shots. He is now Deputy Director of Defence Personnel (General and Operations) in the Defence Staff.

Introduction

The subject of medals, decorations, honours and awards can be emotive and surrounded in mystery, precedent and hearsay. In my job as an SO1 in the Directorate of Personnel in the Central Staff, one of my responsibilities was the staffing of new campaign medals and clasps for the 1962 General Service Medal. I had no responsibilities for honours and awards including those for gallantry medals. My predecessor told me that he had just finalized the General Service Medal 1962 (GSM 1962) with Clasp: Gulf of Suez, and that apart from the proposed Accumulated Campaign Service Medal it was unlikely that I would have much to do with medals during my tour. How wrong can you be! During the period 1990-92 the following medals, all of which British servicemen and women may wear, have been introduced: two new British medals, two new clasps to the GSM 1962, the GSM 1962 with Clasp Northern Ireland has been extended to cover regular staff serving with reserve forces and to uniformed members of the voluntary services, and five United Nations (UN) medals.

Aim

The aim of this article is to explain some of the alleged "black art" behind campaign medals and clasps to General Service Medals. In this context "campaign medal" is used as a generic term for medals specific to one campaign – for example the South Atlantic Medal 1982, and General Service Medals.

Rules and Precedents

Firstly some ground rules. Being on active service has absolutely nothing to do with the criteria for the award of campaign medals. Declaration of "active service" is a legal device which allows commanders to direct civilians and give greater punishments at courts martial. Active service in the Gulf was not declared until the autumn yet the Gulf Medal 1990-91 dates from August 1990. Staff serving at diplomatic and consular posts in operational areas do not qualify for campaign medals. I first came across this apparent anomaly when I was a troop commander in Singapore in 1968. A sapper of mine was working in our embassy in Saigon, during the Tet Offensive, maintaining the air conditioning and refrigerators. He knew that the Australians were getting a medal, the Australian Vietnam Medal, so why should he not have a medal? The reason behind this non-award is that the staff of diplomatic and consular posts are not serving with the armed forces – they are under the control of HM ambassador, not the

Col Moorehouse
Campaign and General Service Medals (p45)

commander in chief. People do not have to be wounded or killed before a campaign medal is awarded. Conversely being on operations when people are killed and wounded does not necessarily guarantee that a campaign medal will be awarded. An illustration of the former case is the award of the GSM 1962 with Clasp Gulf for the Armilla Patrol 1986-89 and of the latter the non-award of a campaign medal for action in Eritrea 1946-52 against the Shiftas.

I do not intend to give a history of campaign medals. Suffice to say that it was not until 1942-3 when Monty pressed for a medal for his Eighth Army that it was decided to award separate campaign medals for World War Two. Up until then it had been thought that as in World War One there would only be a War Star, a General War Medal and hopefully a Victory Medal. By the time of the introduction of the Africa Star in 1943, Dunkirk, the Battle of Britain, Narvik and Crete were history. If of course one had not previously qualified for the 1939-45 Star, one day involved with any of these battles was enough to qualify for a medal. Fighter pilots can wear the Battle of Britain bar on the 1939-45 War Medal. In 1965 a review of the medals awarded in World Wars One and Two was conducted and at that time it was recommended that no changes or additions should be made. This is the standard answer given to all those who wish to have a new medal struck for such campaigns as Gallipoli, Dunkirk or Crete. Recently there has been much publicity about a lack of a medal for Bomber Command but bomber aircrew were entitled to the Aircrew Europe Star, so in a way Bomber Command's role in the war was recognized.

Criteria

When wishing to have a campaign medal introduced for a current campaign there are three choices; the current GSM with appropriate Clasp, a new campaign medal, or resurrect an old service medal which relates to the particular geographic area, as happened when the African General Service Medal was awarded for Kenya in 1955, having last been used in 1920. When a medal for the Gulf War was being discussed it was mooted that we should have a Middle East General Service Medal as it was likely that we might fight in this area again. Perhaps a Middle East General Service Medal should have been introduced in 1918? Since then the 1918-62 Army and Air Force General Service Medal has been issued with Clasps for Iraq, Kurdistan, North West Persia, South Persia, Northern Kurdistan, Palestine, Near East, Cyprus and the Arabian Peninsula and the GSM 1962 has Clasps for Radfan, South Arabia, Dhofar, Lebanon, Mine Clearance – The Gulf of Suez, Gulf, Kuwait, and South Turkey & North Iraq. There have of course been clasps for both of these medals for other areas of the world. The Americans did not issue a separate medal for *Desert Storm*, they issued their South West Asia Medal.

The basic criteria for the award of a medal is in three parts; the geographical area covered, time – which is further broken down into the overall period the award is extant – and the qualifying time for the award, and lastly the defining of those eligible. At first sight one might think that this is not too difficult a task. Let me assure you that it is a fraught process. Difficult enough in a national operation like the Falklands, compounded many times over when operating in a coalition spread over many countries.

Geographical area is easy to define once one has established the area to be covered. Where the major operation takes place is well-known, but what about the small packets of people, or even individuals, who are carrying out some vital work in another country – getting that information takes time. Aircrew flying in and out of and ships transiting an area also cause problems.

The period for the award should be clear, but there is often pressure to make an announcement about a medal before a campaign is finished, this is not helpful as it can lead to decisions being made which are very difficult if not impossible to change. It is not an excuse for idle staff work, but it is far better to take time over these things so that they are correct first time. The cut-off time for an award must take into consideration the qualifying period for the award. If the qualifying period for the award of the medal is, for instance 30 days' continuous service, one must consider how many people might be disbarred from receiving the medal who deployed into the qualifying area in the final 29 days. That is why the qualifying period for the South Atlantic Medal 1982 was extended beyond 14 June 1982 to cater for people deploying to Ascension Island! There is no set period for the qualifying time: one day, seven days, 14 days, 30 days and 120 days have all

been used since World War Two. In some cases continuous service – the Gulf Medal 1990-91, and in others cumulative – GSM 1962 with Clasp Northern Ireland. Whether or not the service should be continuous will very much depend on the nature and intensity of the campaign. Apart from time, numbers of air sorties in the qualifying area are used as qualifying criteria. This, as you can imagine, raises the blood pressure in some khaki circles. During staffing, the intensity of operations, the overall sortie rate and the likely ground time qualification have to be examined to arrive at a compatible sortie qualifying total.

So having decided on the qualifying area and times, all that remains is to produce a list of those groups of personnel eligible. This again takes time as one has to find out such things as which Britons are on exchange and fighting for coalition units. Which non-Britons are fighting in our units and are they getting a medal from their own Government? If they are, we do not award them our medal. Is the Romanian field hospital eligible and what about the Dutchman in the Swedish field hospital? Of course do not forget the Chinese laundryman on HM ships. The Gulf was further complicated by expatriates and the fact that non-military Britons helped coalition forces. Those of you who have read Defence Council Instructions (DCI) General 185/91 The Gulf Medal 1990-91 might think that the list of those eligible was pretty comprehensive, but I had over 100 letters from people who thought they should be included, ranging from the wife of the captain of a British merchant ship on charter to the Americans, to a hotel manager who arranged for our gallant boys in light blue to live in air-conditioned luxury.

Two and a half years in my last job convinced me that the criteria for any medal will not satisfy everyone, but you will not ever get thanks from anybody who does qualify.

Staffing the Proposal

Getting bored? There is still a long way to go. Once the chiefs of staff agree the proposal for the medal it is passed to the Secretary of State. Once agreed by him it is forwarded to the ceremonial officer in the Cabinet Office. During the staffing in the Ministry of Defence (MOD), the ceremonial officer and the protocol department of the Foreign and Commonwealth Office (FCO) will have been consulted. The ceremonial officer may have some points on which he wants clarification before he sends the proposal to the Committee on the Grant of Honours, Decorations and Medals of which he is the secretary. If this committee agrees, the proposal is then forwarded to the Queen. Once the Queen is content a Command or White Paper is prepared. This is put before Parliament and an announcement is made. Once that has happened a DCI announcing the medal to the services can be published. It is important to note that until the Command Paper is published no one can state categorically what the award will be, and who will be eligible. This makes life particularly difficult when ministers get letters from the public about their relatives or there is press speculation fuelled by disgruntled sailors.

There is another complication and that is the design of the medal. If it is to be a GSM 1962 with Clasp, that is straight forward and in our proposal we offer wording for the clasp. If however it is to be an individual campaign medal as in the case of the South Atlantic Medal 1982 and Gulf Medal 1990-91, MOD offers a suggested design for the ribbon and the reverse of the medal. Our suggested design along with others is considered by the Royal Mint Advisory Committee on the Design of Coins, Medals, Seals and Decorations, which is chaired by the Duke of Edinburgh. In the case of the Gulf Medal the design was approved before the criteria were finalized. Design of course includes type of metal used. For reasons that I am not privy to, individual campaign medals since World War Two have been cupro nickel and GSMs silver.

Once the DCI is issued, medal rolls descend on the Army Medal Office (AMO). This is a small organisation which is stretched to meet the normal day-to-day demands on it for medals for all three services. Therefore to meet a sudden demand for some 70,000 medals all of which have to be stamped with the individual's name, required extra resources and training of new staff. It is to their great credit that the issue of the Gulf Medal 1990-91 was carried out so quickly.

Foreign Campaign Medals

Having dealt with British medals a few words on foreign medals would not go amiss. No-one in the British forces can accept or wear a foreign medal or decoration without the sovereign's

permission. This has been the case since Elizabeth I's reign. The sovereign receives her advice from the FCO. In no case will unrestricted permission to wear a medal be given if the award is not on behalf of the monarch or government of a state. Restricted permission may be given for special occasions (see below). For the purpose of medals, the UN is recognised as a state. The Multi Force Observer (MFO) Group in Sinai is not a UN peacekeeping force and the MFO Sinai Medal is awarded by the director general of the force. Therefore British servicemen are allowed to accept the award but may not wear it. Other Commonwealth states do allow the wearing of the MFO Sinai Medal, but of course in agreeing to this the Queen was receiving advice from ministers of those particular countries. In 1975 about 100 members of 26 Armoured Engineer Squadron, of which I was second in command, were awarded a medal by the Lüneberg *landkreis* for their work in stemming the fires on Lüneberg heath. They are not allowed to wear the medal unless attending an official function given by the *landkreis*. Imagine my surprise when visiting the AMO to see that they have an example of this medal.

In the case of the Saudi Campaign Medal awarded for the Gulf War it was decided that it could be accepted but not worn. The normal rule is that one cannot wear two medals for the same period of service. The exception to this occurred at the time of the Korean War when a British Korea Medal was awarded, as well as the first UN medal. I suspect, although I have no evidence of this, that having authorized a British medal, when the approach came from the UN the government of the day thought it would be too embarrassing to turn down the UN medal. Nowadays if we are involved in UN operations we accept the UN medal and do not produce a British medal. This is why UN medals have precedence when worn with British medals in the order of their award, whereas foreign honours and medals follow all British honours and medals including long service and commemorative medals, except when worn on occasions specifically connected with the donor country.

Commemorative Medals

Turning now to commemorative medals. This will mainly interest the older reader. There are three types of commemorative medal. British commemorative medals, such as coronation medals and the Jubilee Medal, foreign commemorative medals given by governments, and commemorative medals produced by associations or similar bodies. In the final case these can never be worn in uniform and have no standing in our medals system. If you are lucky enough to be awarded a British commemorative medal you may of course wear it. Incidentally some 35,000 Jubilee Medals were minted of which the allocation to the defence services was 9000.

In recent years there has been a spate of commemorative medals. The first significant one was the Soviet Commemorative 40th Anniversary of Victory Medal, known in Britain as the Russian Convoy Medal. After long negotiations with the Soviet Union it was agreed that the medal could be accepted by Britons who were eligible but on no account could it be worn. What is more the box containing the medal was to have in it a piece of paper saying that it could not be worn. Mysteriously this piece of paper did not materialize! When negotiating it was thought that at most three or four hundred people would apply, and it was therefore agreed that the eligibility of those applying would be checked by the relevant MOD authority. In fact about 400 medals were awarded in 1986 with attendant publicity. Since then the Royal Navy staff at *HMS Centurion* have had over 15,000 applications. When I tell you that it can take the AMO up to nine months to check one application for a World War Two medal, you will understand the problem.

Before you damn the AMO a word of explanation is required. At the end of World War Two medals were not issued, individuals had to apply for them. Over the last five years some 900 sets of World War Two medals have been issued each month. The process takes nine months because inevitably when the individual applies the AMO has to ask for more details. Then the individual's file is called for from the archives. The archives contain 33 linear miles of files and recovery of an individual's file can take up to six months. The file then has to be studied carefully to ascertain which of the two medals and eight campaign stars the individual is entitled to. These are then made up and despatched. World War Two stars and medals are not stamped. If the individual was in the Territorial Army his

documents are passed to the relevant section to see if he is entitled to the Efficiency Award or Efficiency Medal. My father who applied for his star and medals in 1990 was gazetted for his Efficiency Decoration (TD) in 1991, he left the Army in 1946!

Because of the staff effort involved in ascertaining an individual's eligibility to a medal, when other governments have approached us wishing to award a commemorative medal, or in the case of the Greek Government the Greek War Medal, we have refused to agree to running eligibility checks. It is estimated that some 150,000 survivors, widows or next of kin of those who fought in Greece and Crete during the war, are still alive.

If a foreign commemorative or war medal is offered within five years of the event permission may be given to wear the medal. That was the case this year with the Maltese Government's 50th Anniversary Commemorative Medal of the awarding of the George Cross to the Island.

SUMMARY

I HOPE that in this article I have been able to set out the whys and wherefores behind the introduction and award of campaign medals and explain some of the causes for delay between applying and receiving awards/medals. Whatever one does there will always be some people who will feel that they have missed out, but I hope that any of the 'disgruntled' who have read this article will realize that the instituting of medals is a difficult process, which is given a great deal of consideration at the highest level, and that decisions are not taken lightly.

December 1992 *Journal* Awards

The Publications Committee announces the following awards for articles of special merit published in the December 1992 *Journal*

A Goat Between Two Lions: Afghanistan and the Super Powers by Colonel M J Payne ... **£75**
50 Years On – The Gorgopotamos Operation by Brigadier E C W Myers CBE DSO ... **£50**
Cambodian Mine Clearing by Brigadier J H Hooper OBE... **£25**
The British Services Everest Expedition 1992 by Lieut Colonel M G le G Bridges OBE ... **£25**
Parties, Prairies and Parachuting by Second Lieut H T Ricketts ... **£25**
Lord Kitchener's Coach by Colonel A H W Sandes ...**£25**

Further awards to articles of special merit published in 1992 are as follows:

Montgomerie Prize
The Sapper's Biggest Construction Job? by Sapper C Meacher ... **£75 or a Set of Corps History**

Arthur Ffolliott Garrett Prize
No 1 and No 2 Military Ports by Major S P Murphy ... **£100**

Best Article of the Year Award
No 1 and No 2 Military Ports by Major S P Murphy ... **£100**

Best Junior Officer
Parties, Prairies and Parachuting by Second Lieut H T Ricketts ... **£50**

72 Engineer Regiment TA Prize
Motivation and the TA Sapper by Major A J Willis ... **£60**

Europe's New Green Army

SECOND LIEUTENANT V F H ORRELL-JONES BEng

Second Lieutenant Verity Orrell-Jones is a TA officer who arrived at Chilwell at the beginning of February 1992 to serve with the Military Works Force on a Short Service Voluntary Commission. Having come from a purely civil engineering background via a brief period of employment with an Environmental Consultancy, she was designated the Military Works Force "Environmental Expert", and spent 1992 working with the Materials Laboratory, addressing the problem of detection of pollution by petroleum, oil, and lubricant products. Having had a highly enjoyable year, she is now on the Commissioning Course at the Royal Military Academy Sandhurst.

Introduction

Over the past five years our society has become more and more environmentally aware, with green issues playing an increasingly important role on the political stage. This awareness has spread rapidly into the industrial sector with new European legislation coming into effect almost daily, and the phased implementation of the British 1990 Environmental Protection Act well under way.

It may surprise some readers to hear that the armed services are at the forefront of this environmental bandwagon, and that over the past twelve months a team of Construction Materials Technicians (CMTs) from the Materials Laboratory, Military Works Force (MWF), headed by the author, have been travelling around the world investigating the problem of fuel and solvent pollution on military bases.

However, before going into the nature of the pollution, how it is detected and ways of tackling it in more detail, the first thing to clarify is the reasons why it is so important for every officer and senior NCO in the British Army to be aware of the problem and to define what their personal responsibilities are.

Legal Background

So why are we, the army, at the front of this environmental initiative? A cynic could probably justifiably say that the army has been polluting the environment for years without anybody taking very much notice, however recent changes in legislation have forced a rapid rethink of attitude. Most readers will be aware that over the past two years legislation has resulted in the loss of Crown Immunity in many areas, including the environment.

In 1991 the MOD Joint Service Publication 418, the MOD Environmental Manual, clearly states MOD environmental policy. Although at present the MOD still has Crown Immunity from the application of all existing environmental legislation, the Government has recently decided that this shall cease to apply to new legislation unless a specific exemption is granted, most commonly on the grounds of national security. It is also MOD policy to act as though bound by all environmental legislation unless so doing would conflict with operational necessity. This applies overseas as well as in the UK; the standards applied in the UK are to be taken as the minimum applied wherever British troops are stationed, and are only to be altered where the host nation is found to have higher standards.

So what does all this actually mean?

First, the MOD is liable to prosecution as a corporate body in the name of the secretary of state, though it cannot be penalized if found guilty.

Second Lieutenant Orrell-Jones
Europe's New Green Army (p50)

Second, and probably most importantly to people on the ground, individuals can also be prosecuted, and in this case are liable to the full range of penalties specified by law such as fines and imprisonment. For example, camp commandants can be held fully responsible for any pollution within their bases.

Third, individuals can also bring private prosecutions against the MOD under common law. For example if the MOD inadvertently poisoned some fish in a trout stream, but without actually breaking the law under The Water Act 1989, the owners of the trout stream can take the MOD to court and sue for compensation.

So who is going to prosecute the MOD? There are several bodies monitoring water pollution: The Drinking Water Inspectorate, Her Majesty's Inspectorate of Pollution (HMIP) and, most importantly, The National Rivers Authority (NRA). The NRA is a powerful institution responsible for monitoring surface and ground water quality, issuing discharge consents for any discharges into sewers, drains and waterways, and taking enforcement action where necessary. As well as taking people to court, the NRA also has the power to instigate and carry out remedial work and then to charge the company or body concerned the full cost for this work. Although the NRA are a fairly new institution they are taking their role very seriously.

Having established that we have to abide by environmental legislation, the next step is to clarify what this legislation is. There are two aspects which need to be considered: one is the actual discharge of prohibited substances into the soil and ground water, and the other is the levels of contamination within the soil and ground water which exceeds what are called trigger levels.

Discharge of contaminants is covered by several items of legislation, including The Environmental Protection Act of 1990, The Water Act of 1989 and The European Community Ground Water Directive. The most applicable of these to MOD personnel is the last, from which there is no Crown Exemption, and under which it is illegal to discharge mineral oils and hydrocarbons into ground water. This covers all petroleum, oil and lubricant (POL) products, and also what are called chlorinated solvents (de-icing fluids, degreasants, antifreeze etc). Therefore if you spill any of these substances in sufficient quantity to reach the water table, or the soldiers you are responsible for do, you are breaking the law.

When it comes to assessing the extent of existing pollution and determining whether it is hazardous to health or needs cleaning up, the situation is more difficult. There are several different published sets of values, called trigger concentrations or trigger values, which give the maximum allowable levels for the different compounds in both soil and ground water, but as yet there is no single list that applies to soil and ground water contamination, and should you require guidance on this the answer is to contact MWF at Chilwell for advice. However as an indication of the quantities involved, the EC Maximum Admissible Concentration for dissolved or emulsified petroleum hydrocarbons in drinking water is 10mg per litre. This means that the fuel tank of an average car holding 40kg of petrol for example, can render undrinkable 40 million cubic metres of water.

Causes and Effects of POL Pollution

The services are involved in the storage, movement and use of large quantities of POL products, often in field conditions, to provide fuel for aircraft, vehicles, heating etc. As well as the POL points on virtually every military base, many bases have packed and bulk fuel storage areas (compounds and tanks). Airfields pose a particular problem with their large bulk fuel installations and use of large quantities of de-icing fluids and antifreeze. Many of these storage facilities are old and do not conform to current standards so, as well as isolated spillages, there are many cases where continuous leakage is occurring. Fire fighting training, carried out on many airfields and at training establishments, is also a major contributor. The effects can be to pollute the soil and more importantly the ground water beneath and around these installations.

But what exactly happens when a pollution incident occurs? This depends on what is being spilt, but there are two broad patterns of behaviour depending on the type of product spilt.

First, consider a fuel spillage, (*Figure 1* over the page). Petroleum products are less dense than water and mainly immiscible, meaning that when they reach the water table they float on the surface and do not dissolve (apart from a

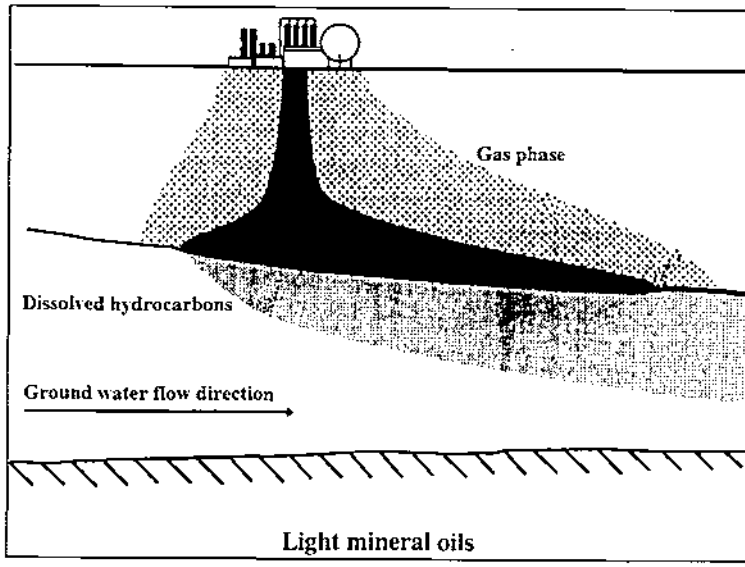


Figure 1. Subsurface behaviour of spilt fuel.

very small fraction). The fuel is then present in the ground and ground water in three phases:

- As a neat product within the soil mass and forming a floating layer on the ground water surface.
- As soil vapour coming off the neat product.
- As a small dissolved fraction within the ground water.

The fuel on and within the ground water will then move in the direction of the ground water flow, spreading the pollution laterally and vertically with the rise and fall of the water table.

Second, consider the behaviour of, say, a pool of de-icing fluid which has collected beneath an aircraft apron, (*Figure 2* opposite). This fluid is a member of the chlorinated solvent family, which is also generally immiscible but is more dense than water. Therefore when the fluid reaches the water table it keeps moving downwards and will continue to do so until it reaches an impermeable layer. The solvent is also present in the same three phases of neat product, gas and dissolved fraction, but the neat product is now resting on the impermeable layer not the ground water surface and will move in the direction of gravity, whilst the dissolved fraction moves in the direction of the ground water flow, therefore polluting a bigger area.

Projects and Site Investigations

MWF have been involved in carrying out surveys of pollution in soil and ground water at military establishments because of our site investigation capability here in the Materials Laboratory. During 1992 detailed investigations have been carried out in the United Kingdom and the Falkland Islands, and initial reconnaissances within the UK and Germany have taken place.

The first stage of the investigation is always to carry out a thorough audit of all the fuel installations on the site to identify where fuel is being lost and why. The second stage is the site investigation itself, which is carried out in four phases:

- Establish the site hydrology and hydrogeology, ie determine the pattern and direction of the surface water flow, and the depth and direction of the ground water flow.
- Establish the soil type by standard site investigation methods, concentrating on the permeability, porosity and any naturally occurring metallic or chemical content; for example the presence of iron compounds or naturally occurring organic hydrocarbons.
- Establish the extent of any subsurface plumes of contamination by a soil vapour survey, should the ground conditions be suitable.
- Abstract soil and ground water samples for chemical analysis by a commercial laboratory.

The site hydrology is established by using standard survey techniques to plot the position and level of all watercourses and thus work out drainage directions. By installing nested piezometers adjacent to larger streams it is possible to work out whether the streams are gaining or losing, ie whether the ground water is flowing into them, or whether they are losing water to the water table. This tells you if contamination is being picked up by the stream and carried away, or if the contamination is flowing underneath the stream. The

hydrogeological picture is built up by sinking boreholes over the site to establish ground water levels and hence plot ground water contours.

The physical characteristics of the soil are an important aid to predicting the behaviour of the contaminants underground. It is important to ascertain the porosity and permeability parameters in order to deduce how fast the contamination is moving, and to establish the position of any preferential flow paths. It is also important to discover the chemical characteristics of the soil because these can have an effect on the degradation of the fuel or solvent within the soil mass.

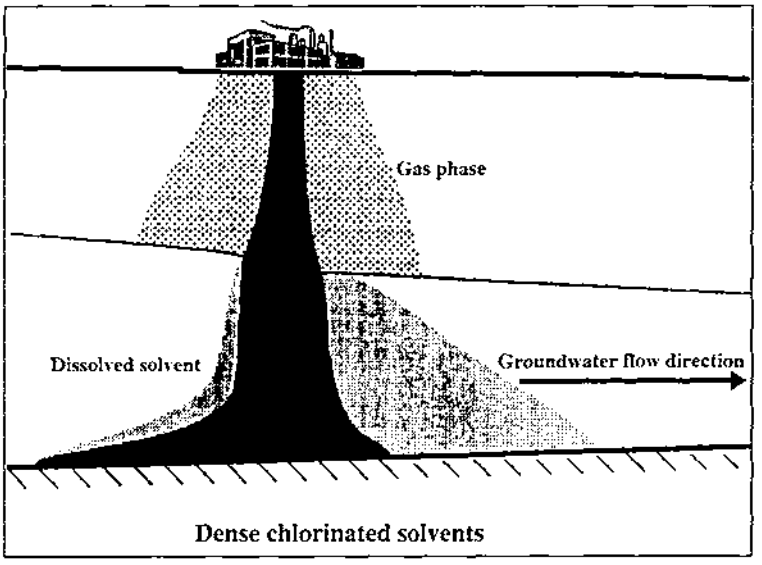


Figure 2. Subsurface behaviour of spilt solvent.

Soil vapour surveys are extremely useful for building up a picture of the subsurface contamination without time-consuming and expensive sampling. MWF have purchased two new pieces of equipment to do this work (with a total value of approximately £25,000); a photoionisation portable Gas Chromatograph (GC) and a soil probe which is driven in using a compressed air-powered hammer drill. (*Figure 3*). The probe is driven into the ground and the GC is connected to the top. Using its integral pump, a sample of soil vapour is drawn from within the soil mass into the GC which contains a heated column with a photoionisation detector at the end of it. During the sample's journey through the column the different constituents of the vapour sample separate out, due to their different speeds of travel, and each is detected at the end by the detector. By comparing the arrival time with the calibration values in its library, the GC is able to recognize and quantify the compounds.

By establishing a network of probe points over a site it is possible to build up a plume plot which shows the extent and flow direction of the underground contamination.

There are limitations in the use of the equipment however, for instance; the probe cannot penetrate greater than a maximum of about 4m in ideal ground conditions, and in dense gravels or boulder clays cannot penetrate at all. Similarly this method is dependent on soil vapour being present; old contamination will have lost all its volatile components and will not be detectable and, similarly, pools of heavy fuels and oils will not have a very great volatile component even when

Figure 3. The Gas Chromatograph is connected to the top of the soil probe to take a vapour sample.

fresh. The method works best therefore in areas where there is shallow, fresh, light fuel contamination in easily penetrable ground conditions.

Having established the presence and location of the underground contamination, soil and ground water samples have to be taken to quantify it. Soil samples can be extracted using split spoon samplers or U38 tubes with standard drilling equipment, or by using the split spoon sample attachment on the probe, which allows extremely high integrity samples to be taken. To take ground water samples it is usually necessary to install monitoring wells, the design of which is another new technique that has had to be learnt, though it is possible to extract water samples through the probe if it can reach the water table. One advantage of installing monitoring wells is that a long-term sampling regime can be established to monitor contamination beneath a site, although again this is expensive, with current prices for a single total petroleum hydrocarbons test on soil and water, running at about £45 and £35 respectively!

Treatment of Polluted Soil and Ground Water

There are a great many different treatment methods for dealing with contaminated soil and ground water, and the number grows all the time as new technologies are developed and more firms jump on the bandwagon. Discussing them all is another article in itself, but the following basic principles are common to many.

The first decision to be made is whether to remove the contaminated soil, or ground water, or to treat it *in situ*. I shall mention some of the treatment methods available for each approach.

"Pump and Treat" is the most common approach to polluted ground water, with the following techniques used to remove the pollution once it is out of the ground:

- Carbon filter
- air stripping
- catalytic convertor
- portable biological treatment unit

The pollution can be treated *in situ* though, and this is most commonly done by installing a biological treatment system which treats the soil at the same time.

Some of the excavation and *in situ* treatment methods for soil contamination are as follows:

- dump on landfill (excavation)
- treat biologically (excavation and *in situ*)
- soil farming (excavation and *in situ*)
- soil washing (with detergent; excavation)
- incineration (excavation)
- vacuum extraction (*in situ*)

The most common basic procedures used in these methods are to air-strip the volatile fraction of the contamination, wash it out, burn it off, or degrade it biologically. Biological degradation involves stimulating the growth and multiplication of the natural microbes within the soil mass by watering, fertilizing and oxygenating, so that the rate at which they consume the contamination and degrade it to harmless by-products is increased.

The Way Forward

This article is really only an overview of the nature of the problem that exists, and why and how it is being tackled. It would undoubtedly be more interesting to use the projects we have done over the past year to illustrate more clearly the problems faced, however for obvious reasons it is not deemed possible to do that, though I have to say (should a member of the NRA be reading this!) that we have found no evidence of aquifer pollution from military bases so far.

Two topics I have not touched upon at all. First the Health and Safety implications of fuel and solvent contamination, both to the personnel living and working in the contaminated areas and to the site investigation team. Second the exacting and time-consuming decontamination techniques required when carrying out the site investigation and sampling, in order to ensure that the samples taken are not contaminated by any outside source such as Sapper Bloggins' oily hands. These again are both articles in themselves and shall have to wait for another time.

If I could make any single recommendation though as to the best way of reducing pollution on all military installations, it would be for all base commanders to examine their housekeeping. The attitude that "pollution doesn't matter because we can get away with it" is still rife in the services, but **it does**, and **we can't** any longer. All personnel who operate fuel installations and handle POL products need to be made aware of their environmental responsibilities before we follow the path taken by the United States and Canada, both of which have seen military commanders charged in civilian courts for breaking environmental law.

A Walk With Heroes

Isambard Kingdom Brunel 1806-1859

ISAMBARD Kingdom Brunel, as every schoolboy knows, built the Great Western Railway. As a Bristol schoolboy, I knew he built the Clifton Suspension Bridge as well. Only later did I encounter those other remarkable feats of marine and military engineering which, even in an age of heroes, distinguished his unique creative genius from that of his peers.

Not until I came to work in the Ministry of Defence did I realize that the wellspring of this incandescent torrent of innovation rose in the very heart of Whitehall. No 18 Duke Street, Brunel's home and office until his death in 1859, pulsated with the white heat of technological revolution. Although the street itself disappeared in the 1860s when Gilbert Scott built the new Foreign Office on the corner of Parliament Square, its site was clearly visible from my office window on the 7th floor of Main Building and reminded me that, despite his family's French origins, I K Brunel was a Londoner at heart. How fitting, then, that he should be commemorated by two monuments in the great Metropolis. The one at Paddington Station is disappointing; but the second, close to the Temple on Victoria Embankment, is well worth the walk.

Leaving the North Door in cool autumn sunshine, I pass the emerald lawns and lofty monuments of Victoria Embankment Gardens as I wend my way towards the City. At the bottom of sunless Northumberland Avenue (1878), I cross the road and pause beneath the spreading plane trees beside the river which is, curiously, spanned here by two bridges. Both lead to Charing Cross Station, built on the site of Hungerford Market which dates from 1692. In 1841 I K Brunel, not yet 40 but already a household name, was commissioned by the Metropolitan Board of Works to provide access to the market from the South Bank. The task never interested him much, but he created, with slender wrought iron chains, a graceful suspension bridge which took the name "Hungerford Bridge". Some years later, when Charing Cross Station was being built during the "railway mania" of the mid-19th century, Brunel's bridge was converted (in 1864) by John Hawkshaw and renamed "Charing Cross Railway Bridge". Outraged Londoners protested so vehemently that a new footbridge, retaining the original name, had to be added alongside. Observing them today, I find Brunel's elegant red brick piers (which can still be seen most clearly at the Whitehall end) far more pleasing than the modernist monotony of grey concrete crowding the South Bank.

At much the same time, that great Victorian sanitary reformer, Sir Joseph Bazalgette (1819-91), transformed this reach of the Thames by building the Victoria Embankment from Chelsea to Blackfriars in 1870 and constructing his famous interceptor drain within it. An avenue of plane trees was planted on top and graceful gardens laid out with the help of W H Smith who also donated the ornamental benches between Hungerford and Blackfriars Bridges. Passing Embankment Tube Station, I am able to

catch a glimpse of York Watergate (1626) where the Thames once lapped grimy coal wharfs and stinking, putrid mudflats at high tide. Samuel Pepys lived nearby from 1679 to 1688, and the ancient obelisk of Cleopatra's Needle, erected in 1878, rises mysteriously on the waterfront. A few hundred yards further on I pass the Savoy estate where Richard D'Oyly Carte staged Gilbert and Sullivan's operas between 1875 and 1896, and where he built his famous hotel in 1889 on land given to Peter of Savoy by Henry III in 1246.

The five white Portland stone arches of Waterloo Bridge (1945, G G Scott) are the next landmark on this walk. During its construction, a temporary steel structure spanned the river here until 1942. It was then procured by the War Office for Sapper use and taken across the Channel shortly after D-Day where it was held on rail flats ready for action in the advance. Later that year the investment paid off when the one-and-only Allied crossing on the Rhine at Remagen collapsed under shellfire and "Waterloo Bridge" had to be rushed forward by American Engineers to fill the gap and sustain the final assault into Germany. Back on the Thames, just beyond Waterloo Bridge and beneath the massive Palladian facade of Somerset House (1776, Sir William Chambers), bobs London's oldest police station from which the River Police have patrolled since 1798.

Next to Somerset House, on the corner of Temple Place, flanked by a pale stone screen and the vivid green fronds of a honey locust tree, stands the imposing statue of Britain's greatest engineer and the object of this walk: Isambard Kingdom Brunel (1806-59). Cast in bronze by sculptor Baron Carlo Marochetti in 1877, with pedestal and surround by Norman Shaw, the statue depicts this bold and original genius as a young man at the height of his powers. Its pose is borrowed from a portrait by his brother-in-law, the artist John Horsley, and shows a relaxed and confident Brunel gazing thoughtfully towards Hungerford Bridge with a pair of dividers in his right hand.

For me, Brunel is the personification of engineering itself. The scope of his work transcends every sphere of engineering science. His career began in 1825 when, at the age of 19 and under the direction of his distinguished father, Sir Marc Isambard Brunel (1769-1849), he launched the construction of the first Thames Tunnel. The project, however, was a hazardous one which very nearly claimed his life in a serious tunnel collapse. Nevertheless, he used his convalescence to design the Clifton Suspension bridge and, despite the lifelong effects of these injuries, went on to build docks at Bristol, Monkwearmouth, Chatham, Milford Haven and Plymouth. In 1833, on the strength of his personality as much as for his engineering skill, he was appointed Chief Engineer to the Great Western Railway for which he surveyed and built more than 1000 miles of track. At this time he was still only 27 years old.

In 1837 he turned his fertile mind to ship building and produced *The Great Western*, the first steamship to provide a regular trans-atlantic service. *The Great Britain* followed in 1843 as the world's first iron-hulled and screw-driven ship. His ultimate nautical achievement, however, was the 22,927 ton leviathan, *The Great Eastern*, which he built in 1858 on the Thames at Millwall with a double-skinned iron hull with propulsion by both paddles and screws. Although commercial success may have eluded them, the long-term technological impact of Brunel's ships on both trade and warfare would be impossible to exaggerate. Within 15 years, the Royal Navy's entire battle fleet had been converted to screws.

Unable to confine his restless energy to civil affairs, I am not at all surprised to find that Brunel became active in the military sphere on the outbreak of the Crimean War. Nor does his disdain for the reactionary incompetence of the Admiralty and other Government departments astonish me! For example, in 1855 after many innovative ideas had been rejected, he wrote of the Admiralty: "They have an extraordinary supply of cold water ... and an unlimited supply of some negative principle which seems to absorb and eliminate everything that approaches them ...". Nevertheless, he was soon in correspondence with James Nasmyth about improvements to heavy guns, and he drew up his own designs for large-calibre, breech-loading artillery. He also designed (but never produced) an octagonal barrelled rifle with an increasing pitch in the rifling, and in 1854 he built a concept model of a semi-submersible, steam-jet propelled armoured barge for the attack on the Baltic port of Kronshtadt. In February 1855, however, he eventually came into his own at the urgent

request of Sir Benjamin Hawes, Permanent Under-Secretary at the War Office and Brunel's brother-in-law, when he was asked to design and build, at extremely short notice, a pre-fabricated military hospital with advanced sanitary facilities to alleviate the army's medical crisis in the Crimea. Every detail of the design was subjected to his utmost personal attention. In May 1855 the structure was ready for shipping and 23 steamers bore the timber sections, each complete in itself, to their appointed site at Renkioi. The first patients were admitted in July and, by December, just ten months after Brunel took on the job, the hospital's full quota of 1000 beds was in use. His revolutionary design, with its emphasis on sanitation and ventilation, has remained the model for field hospitals and accommodation ever since.

It is not Brunel's outstanding originality alone, however, that marks him out for history. Reading contemporary accounts, I am struck by the force of his vigorous personal leadership, his humility and his kindness. Everything he did, he did with all his strength and he did it well. Throughout the generations that followed, no single engineer has ever equalled the scale of his achievements. His astonishing imagination and versatility imparted such impetus to the 19th Century that no one could surpass him. More-over, he amassed so vast and so complex an accumulation of scientific knowledge that no other single mind could grasp it all. What a magnificent Sapper officer he would have made!

But at the age of 54, dogged by ill health, blighted by financial misfortune, and worn out by overwork, Brunel died at Duke Street on 15 September 1859. Within 12 months, members of the Institute of Civil Engineers had banded together to complete the Clifton Suspension Bridge, using chains from his original Hungerford Bridge, "as a monument to their late friend and colleague, Isambard Kingdom Brunel."

Although the man has gone his works remain. Reviewing Brunel's achievements as I wander quietly back to Whitehall, I cannot help but wonder why such an eminent Victorian was never honoured with a knighthood. Nevertheless, his legacy endures throughout the kingdom: the bridges at Saltash, Clifton and Maidenhead; the tunnel at Box; the station at Paddington; the Great Western Railway itself; each an eloquent memorial to a hero of his age.

Isambard Kingdom Brunel, relaxed and confident, gazes towards Hungerford Bridge.

The boldness and originality of Brunel's works brought him fame in his time and remain an inspiration to engineers everywhere; but in the end they consumed his life. Of such a man one can truly say:

"Great was the glory, but greater the strife."

This is the fourth of the series written and photographed by Col T H E Foulkes, featuring great 19th Century personalities.

A walk with heroes (p57)

A One Horse Railway

REVEREND J P HALDANE-STEVENSON TD BA MA

WHERE else but Cornwall could villages be called Bugle and Indian Queens? It was the white china clay from their pits that I watched, at age four, being hauled by a horse with feathered fetlocks along the railway that connected Newquay station with the harbour, and that meandered through the town crossing the main street twice. It passed between the Victoria Hotel and the cliff's edge, and to pretend it wasn't there the hotel lift descended deep, deep down through rock to a tunnel whence the guests – like Mithraic initiates reborn from symbolic death – passed out into sunlight on the beach.

Somewhere behind the Commercial Hotel (a homelier inn, strictly for locals) the railway reached a winding house with two steam engines whence the truck – always just one – was winched down under Fore Street through a tunnel with a gradient of one in four and a half to the harbour, where the railway divided, one track going to the broad top of the sea wall, the other to a pier, half wood, half stone. How the trucks were manoeuvred at that level I have forgotten, but somehow they were shunted alongside coastal vessels – *Mary Barrow, Amanda, Katie, Lady Jane* – that carried the clay to Wales, Bristol, the Mersey and even further and returned with cargoes of coal, manure, machinery or whatever.

These little ships, mainly ketch-rigged, were brown-sailed and had figureheads appropriate to their names and brightly painted, with a skill gaudy without being crude. They haunted me, these ladies of the sea, dauntlessly up there in front to take the first buffet of each oncoming wave in the stormiest weather. When we happened on *Philomène*, abandoned at Porth in 1920, her figurehead was gone, her soul had fled to join the seals, leaving her body a prey to vulturine beachcombers.

She had foundered off Tolcarne on 20 April, and the Newquay lifeboat had rescued her crew of five. This was the last of 19 actual rescues from the old boathouse on Towan Head, but on 30 other occasions the crew had stood-to. In World War Two a lifeboat operated from the harbour. It is a dangerous coast for sailors. In a single week during March 1891 from Bude round to Dartmouth 26 craft were lost.

For trouble inshore where the best lifeboat could not venture, there was a rocket apparatus. Its most spectacular rescue was on an evening in 1912 when *Bessie*, a three-masted schooner out of Cork carrying oats to Penryn, was dashed onto shore rocks and the crew of four were hauled up a 120ft cliff.

At Watergate Bay, two high water island rocks, Zachary's and Black Humphry's, recalled the days of deliberate wrecking (familiar from "Jamaica Inn") by false direction fires at night. Locally this contemptible trade ended the building, by Jacob and Oliver of Falmouth, of the Trevose lighthouse in 1847.

Kea (Cornish for Quay) had long been a fishing village – and, with the building in 1770 of the South Quay Hard, a minor port – when in 1838 Squire Treffrey of Fowey bought the place, and proceeded to get a Private Bill through Parliament authorizing about a dozen miles of mineral tramway. There was nothing new about this: there is said to have been such a horse-drawn tram up North in Charles I's time, and in South Wales – just across the Bristol Channel – there was already a 150 mile network of line in 1811.

However, Treffrey was a man of business acumen and far-sighted vision. Newquay is now, of course, the headquarters of British surfing, and looking westward (which is so often windward) from Watergate Bay, one looks across the open Atlantic to America; but the old town itself nestles in a protecting elbow formed by Towan Head and offering an obvious site for a harbour. The town slopes up to a long ridge, which then drops steeply down to an estuary called the Gannel. On the far (South) side of the Gannel was a stone pier where trading was carried out between shipping and the packhorse trains from Truro and the iron mines at Perran, navigation royalties going to the Bishops of Exeter and Lords of the Manor of Cargoll.

From 1841 onwards Treffrey repaired the North and South piers of the harbour, constructed the tunnel and laid horse tramlines along ten miles of his permitted line, with a branch to a mine at East Wheal. Of particular interest was the viaduct, of wood on stone columns, over the little Trenance Valley near the present Newquay station. Unveiled – the word seems appropriate to the ceremony as recorded – in 1849, it had a span of 210yds and a height of 98ft. In 1874 it was replaced with wrought-iron, and in 1939 by the present fine double-rail structure of stone arches.

More memorable is Treffrey's other viaduct, long disused but fortunately still standing, which crosses

the Luxulyan Valley over the present line from Par to Newquay. This line, for its last 11 miles, follows Treffrey's tramway course, which was converted to steam rail on being acquired by the Cornwall Mineral Railway in 1874. The Great Western worked the line from 1877, but the two companies were not amalgamated till 1896.

We used packhorse, or rather mule, transport in the 52nd (Mountain) Division in World War Two, and there are probably terrains where pack animals will for long continue to have (so to speak) the last word. The ancient packhorse of England got its quietus, not for the macadamized turnpike roads – which hardly affected long distance heavy transport – but from the canals and then the railways. Squire Treffrey must have dealt a nasty blow to the finances of the diocese of Exeter.

By the time of Treffrey's death in 1850, Newquay (as it was by this time called) was able to handle lead, silver and tin for the Stanneries of South Cornwall, from mines in Newquay and down the coast; china clay from pits to the South, saving the long sea haul round the Lizard from Par; and an increasing trade in salted pilchards from the Mediterranean.

Shipping peaked in 1879, when the harbour handled 184 arrivals apart from local fishing. Five years earlier a central pier of wood and stone had been constructed. In 1950 the wooden part was dismantled, and now visitors wonder what on earth a stone "island" is doing in the middle of the harbour – not noticing its alignment with the bricked-up tunnel mouth! In my childhood the Great Western Railway (GWR) ran the whole thing; now it comes under the Mayor in his mediaeval castle at Restormel 20 miles away.

From 1849 till 1881 Newquay not only handled but built sailing craft. The first, a schooner, bearing the name of *Squire Treffrey*. A more enduring but unfortunate little monument was left by Treffrey, an ugly piece of black stonework on the foreshore beyond the headland – the aborted start on a second and surely pointless harbour.

Among the loads wound up through the tunnel were pilchards, which (in season) were plentiful in the bay. When the lookout man, or huer, from his stone hut on the headland spotted discolouration of the water he cried *heva* (Cornish for shoal) through his horn, and the fisher folk, passing the word on loudly, hurried to their boats and put to sea, guided by observers on the cliffs.

Pilchards are tasty little fish fried straight out of the water, but most of the great catches were salted in cellars in the town – with quaint names like Speculation, Spy, Good Intent, Toby and Rose – for export. In January 1874 the schooner *Fame* sailed with 130 tons for Genoa; but the greatest ever catch on the North Cornish coast had been in 1863, when £20,000 worth were landed. However large the shoal they never fished on Sunday. It was an impressive industry, and risky: seines cost £200, and if shot in too deep water they could be lost, or near rocks badly damaged. In the heyday up to 50 craft could gather in the bay, from Newquay and further afield, but gradually the fish moved down the coast, and seine fishing ended in 1893.

The GWR reached Bristol in 1841, Exeter three years later and Plymouth in 1849; but it was not till 1859 that it crossed the Tamar (on the completion of Brunel's famous bridge), into Cornwall. In 1876 its first passenger train, from Par, running on the permanent way of the Cornwall Mineral Railway (which the GWR acquired the following year), reached Newquay, on 20 June, to hearty cheers and the playing of the "National Anthem" as the train entered the station, all wearing uniform who were entitled to do so.

The arrival of that train was the morning star of the tourist business which was to change, and eventually obliterate, the personality of the town; and indeed that year, as we have seen, pretty well marked the zenith of Old Newquay. From then on it would be increasingly a matter of looking back on what used to be.

And the what-used-to-be was important, because it was a microcosm of what was happening in the industrial world of Britain: the immemorial and unbelievably inefficient packhorse transport being superseded by canals, (but not in Cornwall), then rail, the importance of which for goods was considerably greater than for passengers: the consequent greatly-increased need for ports and sea transport; transport's enabling of industry, industry's demand for transport.

Strange, to talk of Old Newquay and the Industrial Revolution in one breath; but "Vanishing Cornwall" – in Daphne du Maurier's phrase – was a land unlike any other. The derelict mineheads towards Perranporth, for example, were not (as one would expect) an eyesore: like a Walter de la Mare poem that leaves an uneasy feeling about something unsaid, among the unfrequented dunes they stand. Unfriended and unfriendly, monuments to men whose lives unhealthy and usually short, an age of *laissez faire* disgracefully exploited. The most prominent minehead, visible from afar, and spectral in the sunset, used to crown the high brow of

Newquay Harbour – The port of despatch for most of the clay traffic from the western area in the middle of the 19th century, conveyed by rail link from Hendra Downs (St Dennis). In 1874 the railway across the Goss Moor was built, making the more sheltered South coast ports accessible. This brought about the steady demise of Newquay as a mineral port and in 1921 the last cargo left the harbour.

Penhale Point, and I recalled it in lines I wrote about soldiering in the Apennines in 1944:

> But the carious head of an old tin mine
> Cut, like a gibbet, the skyline
> Unnoticed till, as the sun died,
> We heard the menace in the tide
> And now like jackals round a lonely hut the
> gulls cried.

Well, it haunts no longer, because the War Department replaced it with an ammunition hut for the Anti-Aircraft.

Nature too has taken its toll. The natural pillar at Bedruthan Steps, called the Queen Bess Rock, is now a heap of stones, and so is one of the wreckers' rocks, which I remember as crowned with thrift and marram and nests of the great herring gulls that catch an eye used to the smaller sea fowl of further East; and in the elbow of Trevelgue there was a cave where they used to have concerts – there was one in 1914 where I can dimly recall the candle light on the violinist's face, against the sunlight outside. Now there is only a great heap of boulders, and the collapse took with it some of the neolithic fortification from the coast up above.

High up on the adjoining cliff however are twin barrows: for ancient burial, of course, but a bearing that I took in 1977 suggests that they were for fixing dates also. Their alignment gives two sunrise dates to the South of East, and two sunset dates to the North of West: in all, the four ancient quarter days still legal in Scotland and appearing – a little out of sidereal accuracy – as Martinmas, Candlemas, May Day and Lammas. The actual May date, sun-wise, is the 6th, which is virtually that of the Helston Dance (May 8), which is arguably Britain's oldest folk ceremony – certainly pre-Christian.

Tourist Newquay got its accolade when two future Kings, Edward VIII and George VI, came as little boys with their tutor to convalesce after measles, at the Headland Hotel. The GWR also recognized the new holiday capital of North Cornwall by opening, in 1905, a branch line down the coast to Chasewater (for Truro). The princely visit is forgotten now, and so is the branch line (closed 1964). So, too, is the one-horse "tram" – undeservedly, for it was the blood stream of Old Newquay: railhead and harbour were essential to one another, and those plodding dobbins were the artery that joined them.

ACKOWLEDGEMENT

I AM indebted to the Research Officer of the Railway and Canal Historical Society for his valuable information.

A one horse railway (p60)

Young Officer Training in the Canadian Military Engineers

CAPTAIN A W PHILLIPS BA

Captain Andy Phillips was commissioned into the Corps in 1985 and after completing 86 YO Course, was posted to 39 Engineer Regiment in Waterbeach. Two years as a troop commander in 53 Field Squadron (Construction), including a tour to the Falklands and numerous visits to RAF Wildenrath, was followed by a return trip to the Royal School of Military Engineering, this time as an assistant instructor in the Field Engineer Wing. A tour as Adjutant of 25 Engineer Regiment followed, which included the frustration of seeing the regiment cannibalized for Operation Granby. *In November 1991 he was posted as the Royal Engineer Exchange Officer to the Canadian Forces School of Military Engineering. He instructs tactics to all military engineering courses and has also been the course officer for a phase of young officer training.*

Introduction

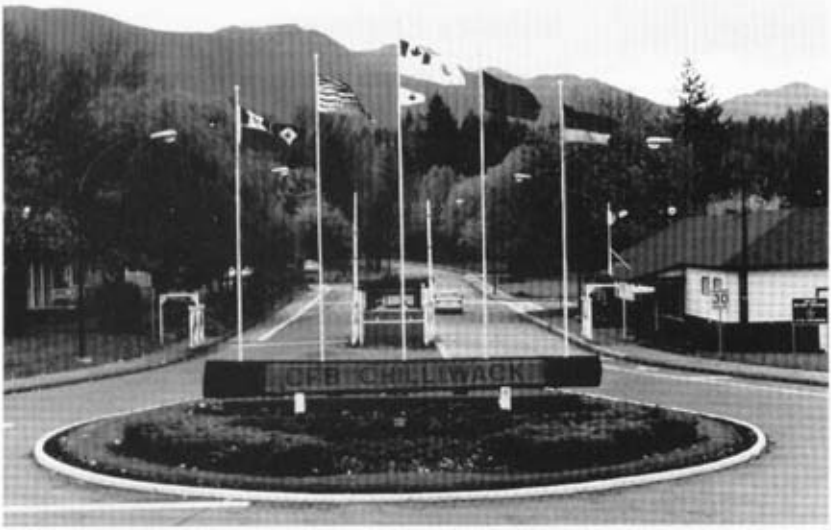
HISTORICALLY, there have always been close links between the Royal Engineers and the Canadian Military Engineers (formerly the Royal Canadian Engineers). Today, the Corps still has several exchange posts in Canada and most regiments in BAOR have a Canadian officer on strength. Despite the decision to close Canada's two remaining bases in Europe and recent cutbacks in the exchange programme (the warrant officer posts at the Royal School of Military Engineering and the Canadian Forces School of Military Engineering (CFSME) went last year), it is hoped that these close links will continue. Nevertheless, despite having worked with Canadians on numerous occasions, I was surprised at how little I knew about the Canadian system of officer training before arriving at CFSME. I was also surprised to discover that my current position as Royal Engineer Exchange Officer automatically qualified me as a corresponding member of *The Royal Engineers Journal*, and having been in post for a year I thought the time was right to justify my title and write an article! I have now seen a complete cycle of Military Engineer (MILE) officers pass through the school and my aim in this article is to describe the Canadian system of training young officers (YOs) and, in doing so, offer some observations as to how it differs from our own.

Training Structure

BEFORE looking at the training itself, I shall begin by touching on two areas which have a significant bearing on the way in which MILE officer training is structured. Unlike RE officers, all regular entry MILE officers have to have an engineering degree, or equivalent, before they can complete commissioning. Most obtain this by attending one of the three Canadian military colleges, which are more akin in organization and character to equivalent US institutions than to the Royal Military College of Science. The bulk of young officer training is carried out during summer vacations and as a result training is divided into four phases, one of which is normally undertaken at the end of the corresponding university year.

A second important factor which influences the structure of MILE officer training is the role and organization of the Canadian Military Engineer (CME) Branch itself. The Canadian Forces were officially unified in the late 1960s and while the branch provides combat engineer support to the

Capt A W Phillips
Young Officer training in the Canadian Engineers (p61)



Canadian Forces Base Chilliwack, set in the foothills of the Rocky Mountains, is the home of both the Canadian Forces School of Military Engineering and the Canadian Forces Officer Candidate School.

army, it also fulfils a peacetime construction engineering (CE) role on bases for all three Services. This role can be most closely equated to that of the Property Services Agency in the UK and a typical CE section, although commanded by a MILE officer, will employ mostly civilians. It is worth noting that those soldiers who do work in the CE organizations (which also includes a unit similar to the Military Works Force) are trained only as tradesmen and cannot be employed as combat engineers; likewise, field units do not have integral tradesmen on strength, although a programme of trades' helper courses for field engineers has recently been developed in light of the tasks which they are now having to undertake on United Nations operations.

In the late 1980s it was decided that MILE officers serving in field engineer units or in CE units on army bases would continue to be trained as army officers, whilst those serving in CE units on air force bases would wear blue and be trained as air force officers. This "blue/brown" split has had a significant effect on the structure and content of young officer training. The result has been the division of training into those courses which all MILE young officers take (known as 'common' courses) and those which are exclusively undertaken by Land or Air officers. Once trained, the career paths of the two elements are totally different and it is unlikely that they will cross again, unless it is to return as an instructor to CFSME. The split has also had a profound effect on the identity and cohesion of the Branch as a whole, but although these issues are currently causing some concern they are outside the scope of this article.

Officer Training Cycle

As I have mentioned, young officer training is divided into four phases, some of which are further subdivided. The sequence and content of some elements of the training are currently being restructured but at present the phases are organized as follows:

Phase 1	–	Basic officer training.
Phase 2 (Common)	–	Infantry and engineer training at the section level.

Young Officer training in the Canadian Engineers (p62)

Phase 3 (Common) – Roads and airfields.
Phase 4 (Common) – Construction engineering.
Phase 4 – Field engineer troop commander course.
Phase 4 – Tactics.
Phase 4 – Air Operations.

I shall now look at each of these in more detail.

Phase 1. Basic officer training is a seven week course carried out at the Canadian Forces Officer Candidate School (CFOCS) in Chilliwack, British Columbia. All officers joining the Canadian forces attend CFOCS and as a result the course covers only those aspects of officer training which are applicable to all three services.

Phase 2 (Common). For MILE officers, Phases 2 to 4 take place at the CFSME, also located at the Canadian Forces Base (CFB) Chilliwack, while special-to-arm training for infantry, armoured and artillery officers is carried out at CFB Gagetown in New Brunswick. CFSME is organized along broadly similar functional lines to the RSME and consists of a Field Engineering Training Squadron (FETS), a Construction Engineering Training Squadron (CETS) and a Military Engineering Training Squadron (METS). However, unlike Chatham, where the responsibility for coordinating all young officer training rests with the Training Adjutant, each phase of YO training has its own course officer (normally from METS) who fulfils this function. The MILE Phase 2 course is nine weeks long and concentrates on command at the section level. It is a common course and it culminates in a month long exercise on which all students are assessed as section commanders on infantry and basic field engineer tasks.

Phase 3 and 4 (Common). Phases 3 and 4 are nine and thirteen weeks long respectively and can be closely equated with the Plant, Roads and Airfields Wing and Civil Engineer Wing phases of the RE YO course. The sequence in which these courses are taken in relation to the land elements of Phases 3 and 4 can vary, depending on course programming and individual circumstances.

Phase 4 Troop Commander. The Phase 4 Troop Commander Course is nine weeks long and is very similar in content to the Field Engineer Wing portion of the RE YO course. However, it is the first time that the students will have operated above section level and so there is also time devoted to platoon level infantry tactics. The course is only attended by the land officers and, as with Phase 2, it concludes with a month-long assessment exercise.

Phase 4 Tactics/Air Operations. The Phase 4 Tactics Course is also nine weeks long and covers all arms tactics at combat team and battle group level. It puts the engineering skills learned on the Troop Commander Course into context and prepares the young officer to support a Battle Group. The Air Operations Course performs a similar function for the air force officers and covers all the operational aspects of supporting an air base.

A Comparison Between RE and MILE Young Officer Training

As can be seen, there are many elements of MILE officer training that equate quite closely to the RE YO course. Nevertheless there are also some significant differences, some of which I have already alluded to.

To begin with, the phased training system is, by nature, both longer and more fragmented than our YO training. Young officers are under training for over four years before they complete commissioning and the gap between phases can sometimes be as long as two years. As a result, continuity of training is not always easy to achieve and this problem is often exacerbated by the fact that there is currently no set sequence in which individuals attend the various Phase 3 and 4 courses.

A second, and more significant difference, is the variation in the content and amount of training a young officer will receive depending on whether he is air or land. At present, an air force officer receives combat engineer and leadership training only up to the section level, while his army counterpart has to take an additional leadership course – the Troop Commander Course – on which he is assessed on his ability to command a field troop. This disparity has been causing some resentment and is currently being addressed; it is planned to introduce a Flight Commander Course for air force officers which will equate to the Troop Commander Course but will also include much

of the material currently covered on the Air Operations Course. The exact structure and content of the course are being formulated as I write. However, the intention is that it will become (along with the Troop Commander Course) Phase 3 whilst the current Phase 3 and 4 (Common) courses will be combined into a single Phase 4 package.

Another difference is the way in which officers who are commissioned from the ranks (CFR) are trained. Unlike the British system, NCOs can apply for commissioning at any rank level or age and once they are commissioned they join the same career stream as the regular entry officers. They participate in the phase training and although many are given certain exemptions – depending on their experience – they are still assessed alongside their regular counterparts. This gives an interesting flavour to some of the courses and it certainly allows CFR officers to be fully integrated into the Branch early on in their officer careers.

A final difference I want to mention is the employment of young officers once they complete training. Whereas the vast majority of RE officers can expect to command a troop shortly after leaving training, a significant number of MILE (Land) officers will never command a troop. The reasons for this are two-fold; first, there are only four regular combat engineer units in Canada, equating in size to a strong RE field squadron. As a result there are only a relatively small number of field troops available and even with the additional BAOR posts, the opportunities are still limited. Second, the CE role is a substantial one and requires a large number of young officers to command CE sections on bases throughout Canada. The ideal career path is for MILE (Land) officers to alternate between field and CE tours but this does not always happen.

Conclusion

In this article I hope that I have been able to provide an insight into the way in which the Canadian forces train their engineer officers and how the system differs from our own. Although basic officer training is relatively short, MILE officers receive extensive special-to-arm training – almost 50 weeks in total – and this includes much of the leadership assessment and basic infantry skills which we undertake at the Royal Military Academy Sandhurst. On balance, the training which a MILE (Land) officer receives is comparable to that of his British counterpart, although it is spread out over a four year period and the opportunity to command soldiers at the end of it is far more limited. The training which a MILE (Air) officer receives, however, differs considerably; he is currently not trained to command above the section level and he is only trained in those aspects of military engineering which are deemed necessary to support an air base.

50th Anniversary Articles

The Editor of the *Journal* would be pleased to receive further articles from anyone who took part in World War Two, with a view to their publication on or near to the 50th Anniversary of the event. Now being considered are articles about late 1943, but accounts of later events are always welcome as they can be kept for publication in the appropriate issue.

Seventy Men.
A Troop of Sappers with the Eighth Army in Early 1943

NITEBAR

THE capture of Tripoli on 23 January 1943 brought the Eighth Army to the end of its administrative tether: no big operation could be mounted until the port was reopened and stocks put on the ground. Nearly all the accounts of this period are about the triumphal entry into the city or of Mr Churchill and the Victory Parade. But for the 7th Armoured Division it was a different story. Comprising an armoured brigade, a lorried infantry brigade and supporting arms, its task was to push the enemy rearguards back into Tunisia and open the route for the attack on the much-vaunted Mareth Line. The enemy forces were light but their engineers used every device to delay us, making use of the vast salt marshes West of Tripoli, which were crossed only by one worn bitumen road and a single-track railway. After El Alamein our field squadron had been detached from its armoured division and in January had been called forward from carrying out "works" tasks on the harbour at Tobruk, to Tripoli where the squadron expected to do similar work. Instead it was diverted round the city and put under command of 131 Lorried Infantry Brigade (of 7th Armoured Division) to help clear the road.

So suddenly, I found myself in the leading vehicle of the Eighth Army faced with endless craters and mines. The OC's orders were quick and simple – 1 Troop (mine) to lead and do the minimum to get vehicles forward: 2 Troop to improve the work: 3 Troop to maintain the route and do any other jobs. We had been warned by the Chief Engineer of the Corps on the way up about this new kind of warfare – road denial using craters and mines – and, despite being keen to get back to field engineering, naturally we were a little apprehensive.

On 27 January we "deloused" and filled our first craters, enabling the brigade to move forward a few miles. We swept or prodded the verges. On the night 28/29 January the advance was switched to the railway and, as soon as the moon came up giving us enough light to work by we filled in the only crater on this stretch, previously checked for mines. (I remember recognizing the senior under officer from my term at The Shop as he passed by in his squad shouting "Well done you Sappers!") This route was never tried again – the traffic management was almost impossible.

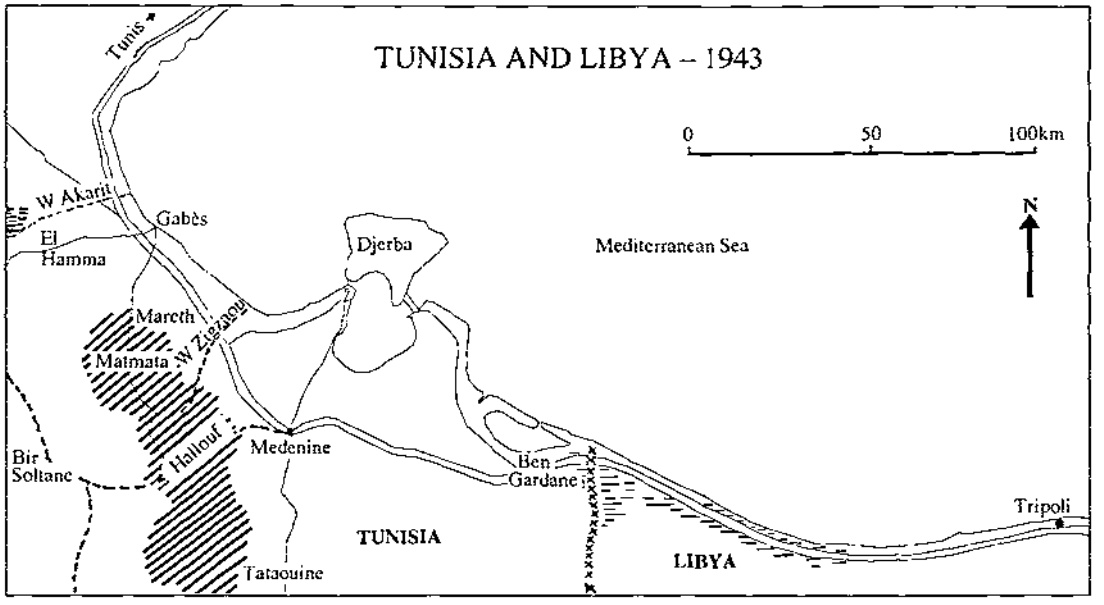
The casualties in my troop were surprisingly light – almost negligible to start with – although behind us there were quite a few mine accidents off the road. The road became our life and we thought and talked of nothing else.

Unfortunately we had no mail for two months. It had gone to our old division in Syria and no-one seemed capable of retrieving it. For once the Army Post Office, said by many to be the most efficient branch of the Corps, had let us down.

Every evening I held my "O" Group for the following day's work – actually it was more of a discussion – with the four section commanders, troop sergeant and recce lance-sergeant. A troop in those days was quite large – about 70 men and 17 vehicles.

The real danger was the German "S" mine, which jumped a few seconds after being set off, exploding at chest height. The shrapnel from one mine could bring down half an infantry section in the attack, which is what it was designed to do. Fortunately for us the Germans usually laid them with their prongs showing. Once found they were practically harmless – a one inch nail made them safe – and being made of something like bronze or gunmetal they registered clearly on a mine-detector.

Slowly the brigade edged towards the Tunisian border, its progress depending on the speed with which the road was cleared. We averaged about four miles a day. There was no danger from any ambush – the country was open and the infantry looked after the flanks. Explosions during the night signalled that the enemy was probably withdrawing and walking up to the craters was always an anxious moment – a smooth crater was usually safe: footsteps in it almost certainly meant mines. The water in some craters made it impossible to compact the fill, there being no hard



core available. My recce lance-sergeant (J Parks) suggested pumping first, so out came our Petters engine with its centrifugal pumps – and it worked! Unfortunately, when we tried again a few days later we found the pumps jammed with salt. The OC (Major Clive Tandy) happened to be visiting at the time and was not amused. He thought an engineer officer should have known better. On the few occasions that we used them again the pumps had to be flushed with drinking water before being put away.

It was about this time that the establishment of a field squadron was changed from two officers to one per troop so that when my troop officer left in January he was not replaced. On 4 February I was told that an officer from another squadron would be "loaned" to my troop to help with the work. To my great surprise and joy he turned out to be John Harrison who had shared a room with me at The Shop in 1939. What a piece of luck! He was very keen and eased the burden considerably. John Harrison was later killed by an "S" mine after returning to his unit, six days before the enemy surrendered in Tunisia.

7th Armoured Division crossed the frontier by mounting a "left-hook" operation across the salt marshes on a causeway that used every piece of timber, excluding telegraph poles, within 50 miles but the enemy slipped away intact. On the same night Sergeant Lyle (who begged to come) and I, joined a fighting patrol of the Queen's to search out the enemy on the road. I went with the final recce patrol which walked straight into the enemy positions on the other side of the wire. We got back unscathed but I lost my pistol scrambling back over the wide barbed-wire fence, avoiding the Italian bar mines laid under the wire.

The first town inside Tunisia was approached with much interest and I remember the "intention" paragraph of the operation order: "131 Lorried Infantry Brigade will capture Ben Gardane" but again the enemy pulled back. I also remember a Valentine tank blowing up on a mine off the road as I was talking to Brigadier Whistler. We entered Medenine on 17 February.

On 20 February the 2IC, Hugh Graham, called on the troop and after some time gently broke the news that Corporal Porter had been killed disarming an antitank mine. I went to see his section, which had been detached for the day, and will always remember their reaction. Shaken, yes, but not frightened and more determined than ever to get the job done. Bill Porter was the old man of the troop – he was 27 – and quite fearless. He and five others from his section had "walked the plank" with me during the big attack at El Alamein and, with his experience, had literally kept me on the straight and narrow. I always think of Corporal Bill Porter on Remembrance Sunday.

Five days later we were having a break at the side of the road when I heard what sounded like a shell exploding behind us but without any sound of a gun. About 10 to 15 minutes later the OC's Dingo (scout car) came tearing up, Driver Lomax

shouting "Come quick. The OC and Captain Leese. They've had it!" He took me back to a small, fenced minefield, clear of the road, which we had left alone. In it were Major Clive Tandy and Captain Ronnie Leese, killed by an "S" mine which one of them must have set off. Something I can never explain is the urge we all felt to go into any fenced enemy minefield. We buried those two fine officers at the side of the road, reciting the "Lord's Prayer", and next day put up properly inscribed crosses on the graves. Hugh Graham was away at the time and was wounded (I think by a shell splinter) on his way back so I moved into squadron headquarters. The CRE, Lieutenant Colonel A D Hunter, was a great help and the Chief Engineer of the Eighth Army, Brigadier F H Kisch, came and spoke to the men. Sitting in the office truck it occurred to me that of the eight officers (plus one attached) in the squadron at the start of the El Alamein attack there were now only two left – myself and one other. That evening the Royal Signals' corporal brought in a message saying "From 7 Armoured Division to 3 Field Squadron. Splice the mainbrace." I had no idea what it meant. The squadron quartermaster sergeant eventually explained. He had two jars of rum in his stores truck "to be issued only on orders of division."

The advance halted just North of Medenine where we were told the enemy would make a full-scale counterattack. Several divisions arrived and took up positions just in time. We marvelled at the genius of Monty (as everyone called the Army Commander) being able to read Rommel's mind. In fact, as we now know, he was reading the Ultra transcripts. Medenine is said to have been the most successful defensive battle of the whole war. The enemy was stopped by artillery and anti-tank fire before it reached our forward defence lines. (How unlike the battles of the previous year!) Our Queen's Brigade repelled the full force of the German attack without yielding a yard.

On 9 March our new OC, Major David Purser, arrived followed soon after by the new 2IC, Captain Teddy Hadow, so I returned to my troop. While we were "resting" doing odd jobs on water supply, 201 Guards Brigade made their disastrous attack on Horseshoe Hill, quite near to us. We had watched them arrive in fine order – their vehicles clean, the men properly dressed and the convoy discipline perfect. Hundreds of guardsmen were killed or wounded in the attack, mainly by antipersonnel mines, and the success signal fired by those who reached the objective only served to bring up the supporting carriers onto the antitank mines.

On 20 March the big attack on the Mareth Line started amid great excitement, although we were only "in reserve". The New Zealand Division was already on its long journey round the Matmata Hills and we expected a quick victory. Two days later we heard, through word of mouth, that the attack had failed and that 1st Armoured Division and 8th Armoured Brigade were to reinforce the New Zealanders. My troop was ordered to leave the squadron and join the outflanking force, though what good we should have been at the tail of such a column I could not imagine. Hastily we loaded up with five days' supply of rations, petrol and water, only to have the order cancelled at the last minute. Instead I was told to go to the entrance of the Hallouf Pass in the Matmata Hills for a "special task". The OC came with me and there we learned that my troop was to lead a brigade of the 4th Indian Division through the hills to provide a short cut to the New Zealanders.

This was more like it and the Sappers' faces showed how they felt. 551 Army Troops Company, of Tobruk '41 fame, worked all through the night with their compressors repairing the demolished entrance to the Pass – a good example of technical morale: doing the job well for the sake of the job – and next morning, 26 March, we were off. I led, sitting on sandbags on the bonnet of my jeep, bayonet in hand, with more sandbags on the bumper and round Driver Waters' feet. (Who, in 1939, would have imagined that sappers would go to war like that?) Next came the leading sapper section (led by Corporal Brooks) followed by a company of Rajputana Rifles, the other three sapper sections and the rest of the battalion. We had been told to "expect little resistance from the enemy, certainly to start with." I was confident that I could spot any signs of mine-laying in the dry track and we made good progress. After about an hour we met a solitary Tunisian, gesticulating wildly. No, he said, partly in French and partly in sign-language, there were no mines here but he would show us where they were. So he got in the jeep, waving us forward until he stopped us and with great pride showed where he had watched the mines being laid. He was rewarded with tea and in less than an hour the mines had been lifted and we moved on again. The hills were now getting steeper and we approached the junction

where the main track turned North. I decided to play safe, stopped the column and walked forward to look round the corner. I could not believe my eyes! There was the enemy, Italians in green uniform, half dug-in on the hillside overlooking the track junction. I ran back to the infantry company commander who called up his battalion headquarters. The CO came up, made a quick recce and very calmly gave orders for an attack. Within minutes a company deployed to the right, all correctly dressed in battle order – steel helmets, small packs and rifles at the port – and advanced on the Italians. It was like watching a demonstration at Warminster! As the infantry swooped down before making their final run up, white flags appeared from every other trench as if on a pre-arranged signal. Those Italians had no intention of fighting. (It was a different matter the next day when the division was ambushed further North by Germans.)

The plan now (all arranged by Brigadier Kisch, I gathered) was for the Indian Division to turn North into the hills while my troop, escorted by a patrol of the Long Range Desert Group (LRDG), which came up from the rear, was to continue westward and join the New Zealand axis. Enemy resistance was not expected. The LRDG had better armament than ours and, more important, efficient wireless communications. (We sappers could not even get the BBC on the sets we had.) So on we went until it grew too dark to look for mines and as we leaguered someone spotted a vehicle just as it disappeared into the distance. That night the sentries really did keep a lookout and for once we all willingly "stood to" before dawn but nothing appeared. "Standing to" was something we normally hated. We sappers had our own principle of war – a good night's sleep and you can face any day. Later that morning we reached our objective, Bir Soltane, meeting a British armoured car manned by some Free French. The LRDG put up their aerial and reported to Army Headquarters that the East-West route through the Matmata Hills was clear. We felt very satisfied. On the way back I left the troop to check the area where the mines had been lifted and to improve the marking while I, out of curiosity, went North to see how the Indian Division was getting on – and saw the unpleasant results of their ambush. Returning to the troop I realized something was wrong and the sergeant told me that Sapper Smith, a new reinforcement, had been killed by an "S" mine a yard off the track while putting in a picket. Up until then we had been very pleased with events but this spoiled everything and it was days before I could bring myself to write to his parents.

In the event our route was not needed to maintain the outflanking force. The attack at El Hamma had gone so well that the enemy pulled out of the Mareth Line and the Eighth Army was able to resume its advance astride the main coast road. We did have the satisfaction, however, of seeing about 30 ambulances using it to bring back wounded from El Hamma, thus saving the occupants about a hundred miles of bumpy journey. We also rescued the crew of a crashed bomber. On 29 March we were asked to guard prisoners, an unusual job for sappers, until they could be taken back. And so we had become a spare field squadron again with no parent formation. On 1 April my troop was detached and sent to Gabès to make fascines whose worth had been discovered too late when the Mareth attack got bogged down in the Wadi Zigzaou. A French officer arranged the supply of materials. We soon tired of this job but were cheered by the wonderful news on 6 April that the surprise attack on the Wadi Akarit position had been a complete success and that the enemy was withdrawing fast towards Tunis.

According to Field Marshal Montgomery the fighting on the Wadi Akarit was the hardest experienced by any troops under his command during the whole war. Everyone was elated and there were even rumours that men with two years' service abroad would be going home! We had done our stuff and at least we could look forward to a rest and a change. But it was not to be.

Late in the evening of 6 April a liaison officer came direct from army headquarters and told me to go to the Wadi Akarit, where the main road and railway bridges had been demolished, to clear the area of mines in preparation for work on the crossing by the South Africans (who had a high reputation as military engineers). The order said "clear" and not "check for" mines and I sensed what we were in for. I arrived at the demolished road bridge early on 7 April. All was quiet: the war had moved on. One South African officer was already there and told me he thought there were mines on the other side. I prodded my way down the steep bank, with an NCO, and up the other side. The area between the road and railway was heavily mined, the wire fence still intact, and I carefully climbed in to have a look. I could see

the prongs of several "S" mines and trip wires leading to the fence. This was going to be a snorter even if there were no mines outside! The troop had now arrived and I went back to talk the problem over with Sergeant Lyle and Lance Sergeant Parks. There were to be no heroics, I said, and it did not matter if we took two, four or six days over the job. There was no hurry – the new bridge would not be needed until the autumn – the crossings further up the wadi being good enough in the meantime – and all that mattered was clearing the area thoroughly and safely. Our tentative plan was to tape the whole area in eight foot strips – the width of a mine detector sweep. Suddenly a sapper announced that a staff car had arrived "full of senior officers." Out jumped Brigadier Kisch, Colonel Shannon (his South African deputy) and a staff officer (probably Captain Voight, a South African). The Brigadier was in great form, congratulating us on the Hallouf operation and praising all the Eighth Army sappers for defeating their opposite numbers in the Afrika Korps. The war in North Africa would soon be over, he said.

When I told the Brigadier about the minefield on the other side he immediately said "Let's have a look," and I had to take all three officers back across the wadi. I warned them twice about the "S" mines but could not stop them climbing up the low bank into the minefield while I turned to speak to my sergeant. What I did not know was that my OC had arrived, crossed the wadi further up and entered the minefield near the trip wires. I remember the Brigadier saying "keep spread out" just before a mine exploded. One of them must have set off an "S" mine – there was no other explanation – and all four officers were killed almost immediately. Five of us, including Lance Corporal Shiels, our medical orderly, went in but there was nothing we could do. While we were talking another mine went off, how and why we never found out, wounding everyone in the rescue party but with nothing like the power of an "S" mine. It could have been a booby-trapped Italian hand grenade judging from the smallness of the pieces of shrapnel. We lay there dazed and horrified, not daring to move, until the second rescue party, organized by Lance Sergeant Anderson, got us all out without further trouble. Once outside the minefield I realized I was more frightened than hurt and after having a tiny piece of metal removed from my backside by the medical officer at an advanced dressing station was able to drive to Corps Headquarters and report to the chief engineer, Brigadier Rae. He had just heard about the mine accident and was furious at 3 Field Squadron being put onto mine-clearance again without his knowledge. He suspended work on the crossing and told me to take the squadron to Sousse where we would be given work on the harbour. This I did with some relief and was glad to hand over to Teddy Hadow, who had been away.

On 10 April our new OC arrived, Major Bob France, who had been transferred from a field company. To our astonishment he ordered a kit inspection on 11 April followed by a thorough inspection of every vehicle. Squadron messing was started (instead of vehicle cooking), games were organized, church services held and work started on Sousse harbour. Gradually it dawned on us that here was someone who knew more than we did about running a unit and it was just what was needed. Bob France commanded the squadron for most of the remainder of the war, including service in Syria and Italy.

Of course the Akarit affair was criticized – how wrong it was for a chief engineer to insist on entering a dangerous minefield that was about to be cleared by experienced sappers. But one has to understand that a man like Brigadier Kisch could not give orders from his office caravan. He was always up with the forward units, learning for himself and encouraging those on the job. Brigadier Kisch was a Zionist and had a brilliant mind. He had left the Army to pursue that cause and after rejoining soon became Chief Engineer of the Eighth Army. I am sure we would have heard a lot about Frederick Kisch in the new state of Israel had he survived the war.

The Corps commander's words make a fitting end to this account. When writing about these operations (East and West of Tripoli) he said: "Every day there were casualties somewhere along the road and it was most nerve-racking. It was such a cold-blooded business. That the job was finally accomplished in good time is to the everlasting credit of the gallant men of all nations who formed our engineer units. I have seen the Royal Engineers do many magnificent jobs but seldom a finer one that this. Never once in many hours up and down the road did I find the men anything but cheerful, confident and efficient. It was very inspiring."

Editorial note: Members of this troop were awarded a Military Cross and four Military Medals for their part in the campaign.

The Brennan Torpedo: Part I

Invention, Development and Purchase 1875-1887

MICHAEL KITSON MCSD NDD FSG

In 1979 while reading reports on Australian coastal defences written in the 1880s the author was intrigued by references to the Brennan torpedo. This led to a study of the torpedo in archives and sites in Britain, Australia, Malta and Hong Kong.

Gradually this research built up an understanding and appreciation of this portion of the work of the Corps of Royal Engineers in the nineteenth century, and of the inventive mind of Louis Brennan.

Michael Kitson works as a senior lecturer in the Centre for Industrial Design at Monash University in Australia and is writing a doctoral thesis on the Brennan torpedo. He served as an infantry NCO in Korea (1953-4), where he dug his way to a fundamental understanding of fortification and formed an interest which has survived the years.

He was a founder member, and sometime chairman, of the Australian Coastal Defences Study Group and editor of its journal. He has written a number of articles and conservation/management studies concerning nineteenth century Imperial coastal defence. Recent research has included studies of the coastal defences and fortifications of India and Pakistan.

Introduction

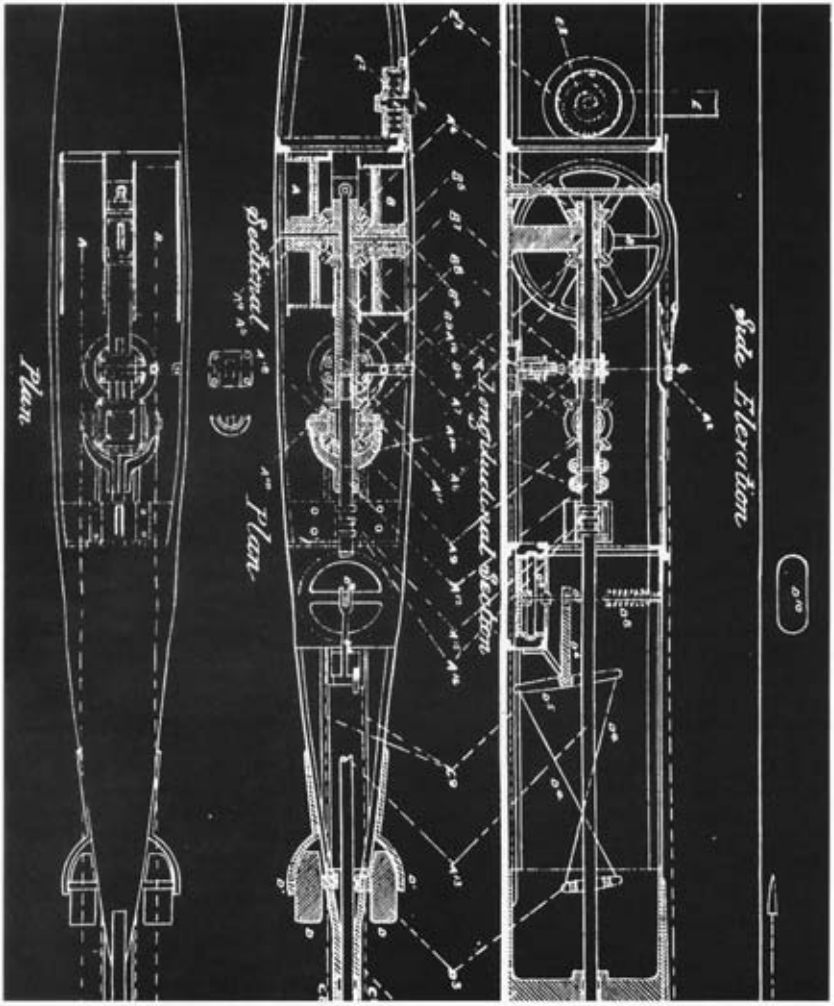
Until recently very few military historians knew of the Brennan torpedo and fewer still were aware that in the late nineteenth century several Brennan torpedo stations played a significant part in Imperial coastal defence. However the proposal, announced last year, to restore a Brennan torpedo station in Hong Kong, and open it to the public as a major attraction in the Lyemun Military Museum and Park has focussed interest on this highly effective, but little known weapon.

This article, which will be published in three serial parts, draws on the author's research for a doctoral thesis still in preparation. The first part sets out the background to the Brennan torpedo's development in Australia and Britain, and the reasons for its purchase. The second part outlines what can be discovered of the working mechanism of the torpedo at the time of its purchase in 1887, based on archival records and an examination of the torpedo which has survived. The third describes the continuous process of developing the Brennan torpedo stations from which it was launched and powered; discusses other alternatives to the torpedo, and the circumstances in which it was withdrawn from service.

Two torpedoes are known to have survived and both are displayed in the Museum of the Corps of Royal Engineers at Brompton Barracks, one has a steel hull, is 24ft long and was constructed at the Brennan Torpedo Factory (BTF), Gillingham, probably between 1887 and 1891.(1) The other has a wooden boat-shaped hull and conforms so closely to Brennan's third patent of 1877 that it is possibly the torpedo built and tested in Australia in 1876.(2) Unfortunately both of them are incomplete, in the case of the later torpedo the mechanism substantially remains, but the earlier model has been entirely stripped of its internal mechanism.

There are two major reasons to account for the neglect of the Brennan torpedo by historians: the first is that the details of the weapon's operation were secret, and this secret was most successfully maintained from the time the torpedo's development was undertaken by the Royal Engineer Committee in 1882 until it

The Brennan Torpedo Part 1 (p70)

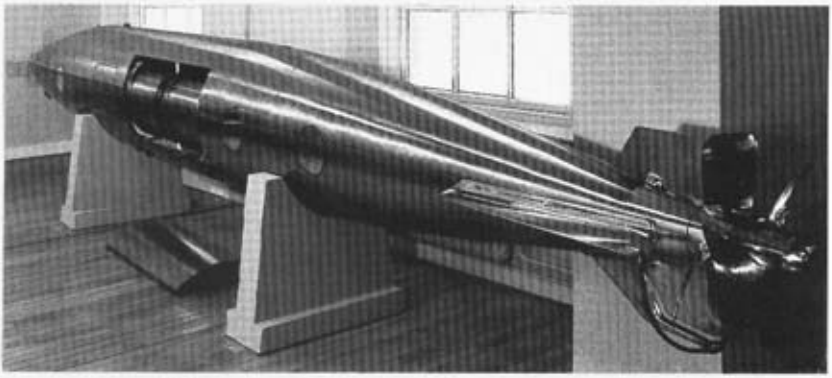


Part of a detailed plan of the Brennan torpedo drawn in 1877, a copy of which is held in the RE Museum.

was withdrawn from service sometime shortly after 1906.(3)

The strict enforcement of secrecy about its mechanism was necessarily extended to include general information about the torpedo as well as the location and function of the Brennan torpedo stations from which it was launched. In fact knowledge of it was not only withheld from the public, it was also restricted within the Services as well.

The Brennan Torpedo Part 1 (p71)



Mk II, Brennan torpedo (built c1890) displayed at the Royal Engineers Museum.

It is remarkable that the secret was maintained for so long because in the 1880s, prior to the introduction of the Official Secrets Act of 1889, secrecy as far as weapons were concerned was a novelty and rarely successfully maintained.

Despite elaborate precautions, in time the secret of the operation of the Whitehead torpedo's depth mechanism became generally known. The Whitehead was purchased in 1871, and the operation of its depth mechanism, was considered an "open" secret by 1885, and had been widely published in French and American journals by 1890.(4)

The second reason for the neglect of the torpedo by historians is because of the limited, and scattered nature, of surviving archival material. This is most probably due less to archival culling, and culling under the Secrets Act, than to the fact that considerable quantities of War Office records were collected together for transfer to the Public Record Office in 1939 and destroyed in the London Blitz the following year. And it is very likely that the bulk of the correspondence, estimates and records of expenditure concerning the Brennan torpedo were amongst them.(5)

One effect obtained by the tight security was that public and parliamentary criticism of the high price paid for the Brennan's purchase remained unchallenged, a situation which allowed its detractors to suggest the torpedo was both bizarre and ineffective. Thus, it was described variously; one of its most outspoken, continual and influential critics, the magazine *Engineering*, regarded it as "a veritable pet" of the Royal Engineers, an inaccurate weapon and over-expensive.(6) Conversely it was described by one officer of the Corps as "a wonderful weapon ... within its limit of range it proved remarkably efficient, ... and it was quite invulnerable during its run, no satisfactory means of meeting its attack could be designed."(7) Yet another commented that "... judged as a mechanical success, the Brennan torpedo stands unrivalled ... the steering is excellent, the immersion exact. The weapon as a machine is effective and complete."(8)

By the 1890s this torpedo, which was launched from the shore, could be guided to its target with great accuracy by day, or night. Running out to a maximum range of about 2000yds it travelled underwater at a level, predetermined depth (up to 12ft) at speeds between 22 and 30 knots, to deliver 220lb of wet guncotton below the water line of its target, where the impact of the charge was maximized. With such great destructive power only one torpedo needed to strike home to sink even the largest of armoured warships.

Between 1904 and 1906 three Brennan torpedo stations in Britain competed annually, under Service conditions, for a challenge cup, and the results were printed in the *Sapper*, the Corps magazine of the Royal Engineers. From them we can see how formidable a weapon the perfected Brennan became.(9)

The Brennan Torpedo Part 1 (p72)

The target was a 50yd gap between two buoys, which were towed past the torpedo stations at a range of a 1000yds and a speed of about 30 knots. Each station was to fire 12 shots, 3 of them at night. In 1906 Cliffe Fort installation on the River Thames, won the competition for the third year running, scoring 4 hits out of 9 by day, and 2 out of 3 by night. In fact many of the installations were sited where the navigable channel ran close to them, and at Lyemun Pass for instance, which is only 500yds wide between the headlands, there is little doubt that at that range there would have been few, if any, misses.

During the years when the torpedo was being developed numerous trials were made and the estimates and reports of its performance vary widely. Because of the stringent secrecy surrounding the weapon, some are evidently conjectural, and others are inaccurately based on earlier public trials. Although trials carried out prior to the effective enforcement of secrecy (in the mid-1880s) were public and were reported by the press, at that time it must be borne in mind that the torpedo was perhaps half-scale and certainly undeveloped. The process by which information known about earlier models, such as the patent of 1877, was carried over and applied in explanation of the mechanism and performance of the same weapon after ten, or more, years of development, has bedevilled and confused authors writing on the Brennan torpedo.(10)

The most pervasive inaccuracies were those describing its mechanism which were published by *Engineering* magazine in three long articles in June and July 1887. The first two provided information based on the patent of 1877, coupled with eyewitness accounts of trials and peripheral but detailed information, which should certainly not have become public knowledge. These details included descriptions of the winding engine, the wire, and methods of handling and coiling it. But although they did not accurately describe the interior mechanism of the improved torpedo of 1887, *Engineering's* illustration of the winding engine and the exterior of the torpedo were exact. The winding engine described in *Engineering* can be seen from contemporary plans for the torpedo station to be the one installed in Garrison Point Fort, Sheerness, in late 1884, (11) and the torpedo shown is not the final version but an accurate sketch of the model prior to it, when the wire was led back above the props.(12)

Not surprisingly these articles caused questions to be raised in the House of Commons about the nature and cost to the nation of the "secret", with the result that in its third article *Engineering* admitted the descriptions were not based "... on working drawings" and the method of working the bow rudders was "... not that actually used in the Brennan". Nevertheless despite this retraction *Engineering's* accounts seem to have been widely believed.

Even amongst official descriptions of the torpedo, such as those by the United States Office of Naval Intelligence, this guesswork is perpetuated and *Engineering's* description of the mechanism is repeated. Whilst, at first, it is made clear that such descriptions are suppositions and based on the 1877 patent, gradually, as time passes, the abandoned mechanism of 1877 becomes accepted in books and articles as being the mechanism actually used in the operational torpedo.(13)

The Early Models and Trials in Australia

The torpedo was invented by Louis Brennan in 1874, in Melbourne, Australia, where, in the following year, he took out the first patent. At this date Brennan's intention was to propel the torpedo by pulling off cable, which had been wound onto two drums, each keyed to the shafts of two propellers placed side by side, the cables passing from the drums over pulleys and aft to a winding engine ashore. The torpedo was intended to be steered by differing the speed at which the two drums were unwound, thereby driving one screw faster than the other.

So as to obtain the required level of submergence the torpedo was to carry weights, and was intended to maintain this level during the run by admitting water through valves, thus compensating for the loss of weight caused by the wires being unwound from the drums.(14)

But during 1876 with the help of William Kernot, a lecturer in engineering at Melbourne University, Brennan made significant, practical improvements to both the steering and depth keeping mechanisms. By 1877 he had built a 9ft, half-scale, working model, which he demonstrated to two Royal Engineer officers (Colonel Sir William F D Jervois and Colonel Peter H Scratchley) who were in Australia to advise on Australian defence. Although the trial

showed that, in principle, the invention could be steered to the target, in practice it was clear that much work remained to be done to develop effective depth keeping.(15) Nevertheless, despite this, it was clear to the Engineer officers that the invention had the potential to become an inexpensive, yet powerful weapon, and they recommended the Victorian Government to make further trials. The torpedo weighed 3cwt and ran for 600yds at a speed of about 6 knots. It appears that it was the simplicity of this piece of mechanical engineering that caught their interest, and coupled with this was the fact that the winding gear and the expensive steam engine could be placed ashore and protected from enemy fire, whilst the torpedo, capable of being developed to carry enough explosive to sink the largest ironclad, could be steered to its target underwater.

The critical aspect of the defence of Melbourne centred on whether the narrow Heads to Port Phillip could be closed by either submarine mines, or gunfire. At this date the channel between them was both too deep and too turbulent for mines, gunfire was hampered at night and in bad weather by poor defence electric lighting, which was still in its infancy. Therefore to close the Heads effectively, a large number of guns were required and there is no doubt that to the government of a self-funding colony, economy in defence was a major consideration. Thus the development of the Brennan torpedo was a worthwhile option.

The following September a third patent, with a full description of this half-scale torpedo was filed in London (16) and in it the mechanism is fully described. The hull of the torpedo was square in section, and tapered in plan to a sharp bow and stern, looking, as the Engineer officers had observed, somewhat "... like a child's coffin;".(17) At the stern was a single propeller with the rudder placed behind it. The wires were led aft from the drums and carried above the propeller and rudder by an arm over the stern.

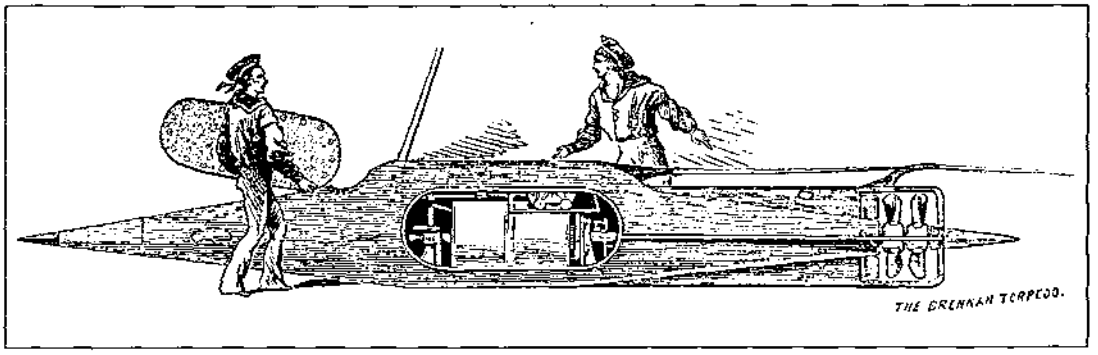
Depth keeping was now obtained by a "hydrostatic valve", comprising a spring-loaded, leather pad which was forced inwards by water pressure as the depth increased. The tension on the spring could be adjusted to set the fins level at a specified depth, so that the pad activated the horizontal fins to raise the torpedo if it ran below the preset level, or to dive if it ran too high. This method appears to have operated reasonably well at the slow speed achieved in the early trials, and they were necessarily slow because a hand winch was used for driving power.(18) But during later trials in Australia when steam-driven winding engines were employed and speeds up to 14 knots achieved, the valve was to produce an entirely unsatisfactory "dolphining" effect, as progressively increasing under-and-over levels were compensated for.(19)

In this patent, lateral steering is still described as being derived from the difference of speed gained by hauling wire from two drums in the torpedo onto two drums ashore which could be run at different speeds to each other. In this model the axles of the drums in the torpedo are placed transversely across it, and geared to drive two shafts, one solid shaft placed within the other hollow one. Thus one drum drove the inner shaft and the other the outer and as the wire was unwound both drums revolved in the same direction, as did the shafts. Therefore, as long as both drums revolved at the same speed the shafts would revolve together, but if the speed of the drums of the winding engine differed, for instance if one was slowed, so as to pull wire from one torpedo drum more slowly than from the other, the shafts would consequently rotate in the same direction but at different speeds.

This difference in the speed of rotation was ingeniously used to steer the torpedo. A collar ran free on the outer shaft, but was formed and threaded so that it engaged with threading on the inner shaft through a slot in the outer one. Any alteration of speed between the two shafts caused the collar to run along the outer shaft as a nut, if held, is forced to run along a rotating bolt. A simple linkage transferred this movement to the rudder.

The drums of the driving engine ashore were mounted side by side and differential gearing, through mitre cogwheels, allowed one drum, if slowed by applying the brake, to speed up the other in relation to it. A mast with a flag attached served to show the submerged torpedo's position and enabled it to be directed to the target by the observer and engine driver ashore.

On the evening of the trial Colonel Scratchley asked for sets of plans of the torpedo to be taken to the military headquarters at St Kilda Road Barracks so that he could consider the invention more carefully. Certainly it interested him, and Brennan and William Calvert his



Brennan torpedo in 1878.
(*Illustrated Australian News*, 31 October 1878, p 184, The Library of Australia, Canberra).

financial partner set about gaining Victorian parliamentary interest so as to obtain funds to build a full-scale prototype. By February 1878 funds had been set aside by the Treasurer to build and test the torpedo and a Board set up to administer them, and by August 1878 a second, improved, 15ft long, fusiform shaped, torpedo had been built.(20)

The hull was constructed of ⅛in Lowmoor iron, "... the best boiler-plate", (21) weighed about 15cwt, and ran reasonably successfully in trials during February and March 1879.

The best results were obtained in the sheltered water of the Williamstown Graving Dock, and gave good steering, but good depth keeping for only half the run, and Brennan certainly was still considering ways of improving this and suggested it might be solved by employing two hydrostatic valves, working differentially, one placed forward and one aft.(22)

This model featured two major changes in design, first in the positioning of the drums for wire, which were now placed one behind the other, with their axes lying along the length of the torpedo. And secondly two counter-revolving propellers were used, a feature derived from the 1876 Mk 1 Royal Laboratory Whitehead torpedo, which had been found to reduce torque to such negligible proportions in the case of the Whitehead that fins could be dispensed with.(23)

Newspaper reports of the two public trials show that the performance of the torpedo, although promising, was frequently erratic – particularly in the first, witnessed by the Governor of Victoria, when the torpedo was said to have behaved less satisfactorily than in other previous trials, and "... instead of remaining underwater, every few yards it rose to the surface and then made a fresh plunge looking for all the world like a large porpoise. Then again when an attempt was made to steer it by turning it slightly to the right, it shot off at right angles to its original course, and by the time it had run out of the full length of wire attached to it and was brought to a stop, (after a run of 350yds) it was 100yds, or more to the right of the object at which it had been launched."(24)

In early April Colonel Scratchley reported to the Colonial Treasurer the findings of the Board on the Brennan Torpedo, and summed up the torpedo's performance and potential. The best trials, he wrote, had demonstrated it could be propelled at up to 14 knots for 350yds and steered fairly accurately to the target. The depth keeping mechanism gave "... promise of success when more thoroughly adjusted and tested." But although he considered the invention was ingenious "... and bears promise of being rendered perfect and therefore valuable as an offensive torpedo for the defence of channels – if the speed of 20 knots anticipated by the inventor should be attained – its further development can only be worked out by a series of trials and experiments, for which the necessary appliances are not to be found in Melbourne."(25)

This was indeed the case, and although there were numerous engineers and foundries in the city of Melbourne, the engineering industry was still embryonic and mainly served the railways, gold mining and agriculture. Even to obtain suitable steel wire to drive the torpedo was impossible in the colony, and when it arrived from England, was found to have been shipped in short lengths. To make a run of 375yds, 1125yds of wire needed to be wound onto each drum, with the result that for all trials in Australia the range

was limited to about 350yds by the amount of wire available. But as this was achieved by joining shorter pieces Brennan was forced to explain that the torpedo could only travel at a low speed for fear of the joints parting, or the wire, which was also too brittle, snapping.(26)

The torpedo's speed was also limited because a 20hp winding engine had been hired for the trial and gave a performance well below the theoretical speed of 25 knots which could have been made with good wire, a speed calculated and confirmed for the Board by Professor Kernot.(27)

In May Brennan and Calvert pressed the Board for an indication of the Government's intentions and applied to the Treasurer for a further £300 to take the Brennan torpedo to England as: "Your report leaves only one course open and that is to take the torpedo to England without delay and which is undoubtedly the only means for the country to profit by the expenditure already incurred ...."(28)

At the end of the month the Treasurer in an interview with Brennan and Calvert made it quite clear that he could not see his way to finding the money.(29) Whether, or not, there were adequate facilities to develop the invention in the colony, certainly in 1879 there were fewer funds available, and less willingness to allocate them for defence purposes, than there had been in 1876. Colonel Scratchley, who had remained in Australia to oversee the construction of the defences, was himself fighting an uphill battle in several Australian colonies to obtain sufficient funds to implement the defence schemes approved during the "war scare" of 1877 – a situation which was not to be resolved until the next "scare" of 1885.(30)

As a result, within two weeks of the Treasurer's decision, the partnership of Louis Brennan and William Calvert was enlarged by forming a new company to raise sufficient funds to send the latest model of the torpedo, and Louis Brennan with one business partner, John R Temperley(31) to England with the intention of selling it to the Admiralty, or to some other country if interest could not be found in England.(32)

Then in November 1880, quite independently from the Victorian Government Board, officers of *HMS Cormorant* and *HMS Wolverine* (both Royal Naval ships on the Australian Station) acting under instructions from the Admiralty in Britain, inspected the torpedo. It could no longer be run as the wire was finally unusable, but the confidential report they forwarded was favourable and also recommended further tests and development in Britain.(33)

Development in Collaboration with the Royal Engineers

Brennan and Temperley sailed for England on the 28 December 1880 and in London the inventor was put in touch with the Admiralty through Colonel Charles Pasley RE the Agent General for Victoria. The Admiralty at first arranged to make some shipboard trials, but then decided it was not worth incurring the cost. But eventually formed a committee to inspect the torpedo and although they rejected its use from ships their report suggested that "... further trial of it might possibly be desirable for use from Forts", with the result that the Secretary of State forwarded the matter to the Inspector General of Fortifications.(34)

In fact, Brennan and Temperley had already been in touch with the War Office(35) and as a result the Royal Engineers' Committee had also drawn the invention to the Inspector General of Fortifications' attention. Initial trials were made in the Medway and they reported favourably on "... the great merit of the invention, and strongly recommended an improved pattern of the torpedo should be made at the expense of the government, and a further series of trials begun."(36)

Gradually between 1882 and 1887 the torpedo was developed by Louis Brennan and John Temperley, working with the Royal Engineers at Brompton Barracks and Garrison Point Fort, Sheerness. At one of the early trials whilst the depth mechanism was being tested the torpedo suddenly dived and collapsed under the weight of 110ft of water, which caused a delay of three months until it was reconstructed. And acting on advice from officers of the Royal Engineers' Committee, Brennan decided to iron out the problems of steering on the surface before tackling depth keeping. This was done by October 1885(37) and Brennan wrote to Kernot in Australia that the torpedo was now capable of being accurately enough steered to hit a rowing boat at 2000yds range. He added that an important modification to the steering gear meant the results were now "... simply perfect" and the "... torpedo can now be got easily in the direction of the mark and then be made to run in a beeline for it instead of travelling in a slightly serpentine

course as she had hitherto." He also commented on the rough water and strong tides off the Fort at the mouth of the Medway, but that the torpedo "... makes nothing of them and cleaves ahead in a most businesslike manner."(38)

Trials of depth keeping then began with a new depth mechanism and in the following March the "Improved Brennan Torpedo" was reported complete, efficient and ready for trial. These final trials were exhaustive, and because discussions about its purchase were taking place were made by both the Royal Engineers' Committee and another formed by the War Office and Treasury, which also included members from the Admiralty. Certainly the weapon began to fulfil its promise, and at one of these trials made from Garrison Point Fort in October 1886 the torpedo was reported to have successfully hit a small target towed past by a torpedo boat at 16 knots.(39) Finally the following year agreement was reached on a purchase price of £110,000, a sum considerably greater than the £15,000 paid to Robert Whitehead in 1871.

Secrecy

THE British Government had purchased the patent of 1876 and the torpedo with all its improvements and with exclusive rights of manufacture became the absolute property of Her Majesty's Government. But as we have seen, the patent described a primitive model of the torpedo, including an inefficient depth mechanism, all of which was public knowledge. Thus what now comprised the purchase and "the secret" was the complex weapon that had been developed since 1880 including its steering and depth mechanism.

A leak to the press in July 1882 had underlined the need for security and a bomb-proof building in Brompton Barracks was reportedly fitted with three-inch steel doors and safes as a store for all drawings, documents and torpedo parts.(40) But there is a little doubt that since their arrival in England, Brennan and Temperley had taken every precaution to ensure that nothing became known except what was already available from the patent.

Because much that has been written on the Brennan has been to a great extent conjectural it is worth considering how few people knew the secret of the "developed" weapon. In 1886 there were probably no more than eight people who knew how the depth and steering mechanism functioned; four Royal Engineer officers who were directly responsible for its trial and development; two workmen who were building it at the School of Military Engineering; as well as Brennan and Temperley.(41)

Later when the weapon was installed in the defences the personnel of the eight Brennan torpedo stations, comprising one officer and ten men at each station, and the instructors of the Brennan School were sufficiently familiar with the torpedo's operation and capability to maintain and use the weapon. But they were not acquainted with the detailed operation of the depth mechanism, despite having signed a declaration of secrecy.

This was possible because Brennan designed the depth and steering mechanisms to fit into metal cases, which were sealed, and were delivered sealed, and remained so, "... at out stations." In addition to this, the depth mechanism was arranged to be easily removed from the torpedoes, and at each torpedo station they were kept in safes, to which there were two different keys. Standing Orders required the safe to be opened only when both key holders (the Station Torpedo Officer and Senior Storekeeper) were present. An arrangement which in a sudden emergency could perhaps have produced a farcical situation, but one indicative of the emphasis placed on secrecy and the elaborate care taken to maintain it.

So as to make secrecy effective the purchase agreement placed Louis Brennan, John Temperley, and the Foreman of Works, G Argent, under very substantial bonds to keep the secret and also to ensure that their workmen kept it. And this was extended to include shareholders of the Brennan Torpedo Company and others in Australia who had a knowledge of the earlier models' construction.(42) Furthermore, Brennan, Temperley and Argent became War Department employees, and a number of elaborate steps were taken to ensure that during design and manufacture secrecy could be maintained. For instance, although a government factory, (the BTF of which Louis Brennan was the first superintendent) undertook the construction, parts which could not be manufactured at the BTF were parcelled out to various contractors, but in such a way that no one person could understand the function of the whole.

It seems likely that the depth mechanism was built and assembled at the BTF, and although the

number of workmen employed is uncertain, the factory was small and probably there were no more than 15 of them.

Given the public interest in the large purchase sum, the novelty of the weapon, and the location of the torpedo stations at the entrances to major ports, it is remarkable that there are so few descriptions of the torpedo running. Possibly this resulted from the introduction of the Official Secrets Act in 1889, (43) and the experience of a journalist reporting the trial at Fort Albert in the Isle of Wight during July 1889 makes it clear that every effort was made to keep both journalists and the public at a distance.

To demonstrate the weapon on which so much had been spent a hulk was towed past the fort and successfully, and spectacularly, demolished by the torpedo for the benefit of the Secretary of State for War, a large party of members of parliament and staff officers. The journalist, who was from Chatham, had followed up a rumour that a trial would take place, but found himself, in company with other journalists, directed to the wrong location. He then spent two hours finding the right one, and was prevented from gaining anything but a distant view of the trial by artillerymen picketing all the high ground.

Afterwards the journalist did manage to speak to Louis Brennan but he politely evaded his questions, as "... the particulars of the experiment were considered confidential, and he was therefore unable to give any information to the Press."(44)

BIBLIOGRAPHY

1. The Brennan Torpedo Factory began production in January 1887. *Army & Navy Gazette*, 26 November 1887, p 974.

2. Patent No 3359, 4 Sept 1877, Specification of John Haddan, "Propelling Vessels", The Patent Office, London 1878.

3. The last defence schemes to mention the Brennan are those of 1 January 1906.

The Thames & Medway Defence Scheme, Public Record Office, London (PRO), WO33/395. "Ireland, Cork Coast Defence Scheme", PRO WO33/399.

4. John M Ellicott, "Automobile Torpedoes, the Whitehead and Howell with a detailed description of each", *General Information Series*, No XI, USA Office of Naval Intelligence, Washington 1890, pp 381-408.

5. Correspondence, etc, relating to the Brennan Torpedo Factory lay within the responsibility of the DIGF (Fortifications) after 1888. – see Brigadier General W Baker Brown RE, History of the Corps of Royal Engineers, Vol IV, The Institution of Royal Engineers 1952, p 203.

6. Engineering, 24 June 1887, p 601 & 20 January 1888 p 60.

7. Lieut Colonel W Baker Brown RE, "History of Submarine Mining in the British Army", The Royal Engineers Institute, Chatham 1910, p 263.

8. Major Sir G S Clarke RE, "Adjuncts of Coastal Defence", Proceedings of the Royal Artillery Institute, Vol 20, London 1893, pp 463-465.

9. The Sapper, October 1906, p 50 & 57.

10. For an example see Lieut C Sleeman's criticism of the capability and slow speed of the Brennan in his talk on the Lay torpedo to the RUSI in 1883. Basing them on the patent of 1877, he was unaware this was a half-scale model and considered that a 9ft torpedo had insufficient capacity for the explosive required.

Lieut C Sleeman, late RN, "The Lay and Other Locomotive Torpedoes Considered for the Purpose of Coast Defence, etc" *Proceedings of the Royal United Services Institution*, 19 Jan 1883, London 1884, p 42.

11. Brennan to Kernot, 14 Jan 1885, Kernot Papers 979/7, State Library of Victoria. Garrison PortFort, Torpedo Engines etc, PRO, WO78/4430.

12. This method of leading the wire above the propellers is mentioned in a report to the Director of Artillery, as in the Engine, see: "Report of a Trial of Brennan Torpedo at Sheerness, 19 June 1885", *Abstracts of Proceedings of the Director of Artillery*, quarter ending 30 Sept 1885, p 216, PRO, WO/3345.

13. Lieut Seaton Schroeder USN, "The Development of Modern Torpedoes", *General Information Series*, United States Office of Naval Intelligence, Vol VI, June 1887, pp 43-44. Lieut G E Armstrong Torpedoes and Torpedo Vessels, George Bell & Sons, London 1896, pp 78-83. G J Kirby,"A History of the Torpedo", *Journal of the Royal Naval Scientific Society*, Vol 27, No 1, Jan 1972, p 40.

14. Patent No 2105, 8 Sep 1875, Patents & Patentees, Vol 10, State Library of Victoria.

15. *Argus* (Summary) 9 July 1877, p 2.

16. Patent No 3359, 4 Sep 1877, Specification of John Haddan, "Propelling Vessels", The Patent Office, London 1878.

17. Australasian Supplement, 30 June 1877, p 2.

18. The winch was powered by sailors of the crew of *HMVS Cerberus*, *Australasian Supplement*, 30 June 1877, p 2.

19. *Argus*, 22 Mar 1879 (cutting) Kernot Papers 979/7, State Library of Victoria.

20. The committee comprised Lieut Colonel P H Scratchley RE, Major R L J Ellery VE (Commanding the Torpedo & Signal Corps) and Captain C Mandeville, (Commanding Victorian Naval Forces). Major Ellery was also Director of the Government Observatory. In total the Victorian government provided £700. this year 1877-8 was one of constitutional crisis in Victoria in which the Upper House rejected the Appropriation Bill including the sums for defence purposes, as well as the Defence Bill. The torpedo was built at the foundry owned by Alexander K Smith MLA in Leicester St, Carlton, Melbourne.

Brennan & Calvert to Commandant Local Forces (letter no 78R/2047W), 5 Mar 1878, Australian Archives, Victoria (AA: CRS), MP 160, item 85/200. Calvert to R L J Ellery (78R/6399), 9 August 1878, AA:CRS, MP 160, 85/200.

21. *Illustrated Australian News*, 31 Oct 1878, p 184 & 186.

22. Anketill M Henderson CE to the Board (79R/3979), 16 April 1879, AA: CRS, MP160, 85/200.

23. Edwin Gray, *The Devil's Device*, Seeley, Service & Co Ltd, London 1975, p 88.

24. *Argus*, 22 Mar 1879, (cutting) Kemot Papers 979/7, State Library of Victoria.

25. Colonel Scratchley to the Under Treasurer (79R/3979), 30 May 1879, AA: CRS, MP160, 85/200.

26. *Argus*, 22 Mar 1879, (cutting) Kemot Papers 979/7, State Library of Victoria.

27. The best speed obtained in the Graving Dock, but not during a trial was 14 knots for 375yds. Kemot calculated a speed of 25 knots could be maintained for half a mile by a larger (20ft) torpedo if driven by a 100hp engine using best quality steel wire. L Brennan to Board on the Brennan Torpedo (79R/2279), 8 April 1879. W C Kemot to Board (79R/3979), 17 April 1879, AA: CRS, MP160, 85/200.

28. Brennan & Calvert to the Board on the Brennan Torpedo (79R/3979), 14 May 1879, AA: CRS, MP 160, 85/200.

29. Memo to the Hon Chief Secretary from Calvert & Brennan (Q 4024), 1 May 1879, Chief Secretary's Correspondence (In), State Public Record Office, Victoria (VPRS) 3391, Box 139.

30. Michael Kitson, "South Channel Fort", Journal of the Australian War Memorial, No 11, October 1987, pp 25-

36. Michael Kitson, "Australia: The South Channel defences at Port Phillip: Factors in the design, 1876-1909", *Fort: The International Journal of Fortification and Military History*, Fortress Study Group, Vol 15, 1987, pp 105-134.

31. John Ridley Temperley was a consulting Civil & Mechanical Engineer.

32. William Kemot recalled that Louis Brennan took the larger 20ft torpedo to England. However, although he had made calculations for torpedoes of 9ft and 20ft, newspaper reports of the trials invariably give the length of the larger torpedo as 15ft. It is possible that he misremembered the length, but if only the larger torpedo was taken to England, the presence of the smaller torpedo at the Museum of the Corps of Royal Engineers remains unexplained. Biographical notes, p 12, Kemot Papers, 977/3, State Library of Victoria.

33. It is likely that the torpedo was brought to the attention of the Admiralty by the Treasurer, Graham Berry, who was at this time in England. W Calvert to (Under ?) Treasurer (79R/2633), 7 April 1879, AA: CRS, MP 160, 85/200. Report on Brennan's Fish Torpedo (81R/1509), from James Bruce (Commander *HMS Cormorant*), 15 Nov 1880, AA:CRS MP 160, 85/200.

34. The Brennan Torpedo (Consolidated Print) 1881-1887, PRO W032/6065 p 1.

35. In London the network of politicians and officers who had served in Victoria was extensive. For instance, serving Royal Engineer officers who held, or had held, Victorian government positions included Colonel Charles Pasley, Colonel Andrew Clarke, Colonel Sir William Jervois and Lieut Colonel Peter Scratchley. Both Clarke and Pasley had been members of the cabinet of the Victorian Legislative Assembly in which Hugh Erskine Childers had held the position of Collector of Customs. Childers had served as First Lord of the Admiralty 1868-1871, and was to become Secretary of State for War in 1880 when he recommended the promotion of Colonel Andrew Clarke to Inspector General of Fortifications over the head of three senior officers.

36. The Brennan Torpedo (Consolidated Print) 1881-1887, PRO, W032/6065, p 1.

37. The Brennan Torpedo (Consolidated Print) 1881-1887, PRO, W032/6065, p 9.

38. Brennan to Kemot, 13 July 1885, Kemot Papers, 979/7, State Library of Victoria.

39. *United Service Gazette*, 30 Oct 1886, p 697.

40. *Army & Navy Gazette*, 26 November 1887, p 974.

41. Assuming that the IGF, Colonel Sir Andrew Clarke, who took a close personal interest in torpedo, followed its development in detail, the three others were Captain M T Sale, Captain R M Ruck, Captain A T Preston. Brennan Torpedo (Consolidated Print) 1881-1887, PRO, WO 32/6065, p 14.

42. Brennan and Temperley were placed under a £20,000 bond to be exacted if G Argent (Foreman of Works) did not keep the secret.

43. An article in *Brassey's Naval Annual* may have been an early casualty of the parliamentary debate prior to the passing of the Secrets Act. Although "Brennan Torpedo, pp 497-500" remains listed in the contents these pages were removed before binding and not published. Lord Brassey, *The Naval Annual*, Portsmouth 1887.

44. The Chatham & Rochester News, 6 July 1889, p 6.

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Training an Army to Navigate – Experiences from the Gulf War

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Major James Prain is the senior instructor in topographic surveying at the School of Military Survey. Amongst other commitments, his department is responsible for providing navigation and map reading instructor training for all arms. He was directly involved in establishing Military Survey's training teams to meet the urgent desert navigation training requirements of the troops deploying to the Gulf in the autumn of 1990.

Abstract

This paper examines the issue of navigation training, highlighting some of the difficulties encountered by British units bound for the Gulf and some of the lessons learnt. The hastily formed Desert Navigation Training Teams found soldiers whose concept of navigation was to use well-known man-made features of the European landscape; they were not prepared for the desert which has no fixed detail, even on the horizon! The training teams encountered a range of problems not always obvious to professional navigators: new mapping, minimal detail, different referencing systems and new terrain terms as well as a grid zone change. Then there was the question of how to maintain direction in featureless terrain. Troops had to deal with the magnetic influence of vehicles on compasses and the local magnetic variation. The sun compass was therefore resurrected.

The advent of hand-held Global Positioning System (GPS) receivers introduced new problems relating to map datum and satellite geometry. Nonetheless GPS was a great confidence builder and enabled operations to continue around the clock. Future NATO formations will call on troops to be deployed from the Arctic to prairie or jungle and lessons learnt from the desert will be adapted for such potential theatres of operation.

Introduction

This article is based on a paper presented at EURNAV '92 in November, the annual conference of the Royal Institute of Navigation and its German counterpart, and is pertinent today to Sappers and the army as a whole as we consider British troops deployed to the former Yugoslavia, West Sahara and Cambodia.

Topics covered here were first mentioned by Brigadier Elder in his article on Military Survey's activities during Operation *Granby* in the August 1991 edition of the *Journal*.

To set the article in context, the reader must remember that to professional navigators, (including members of the RE Yacht Club), some of the issues may seem fairly straightforward, however for troops stationed in Europe the skills discussed were not routine.

The Need for Navigation Training

As a result of the army having been pre-positioned for the next European war, the concept of navigation

Maj J F Prain
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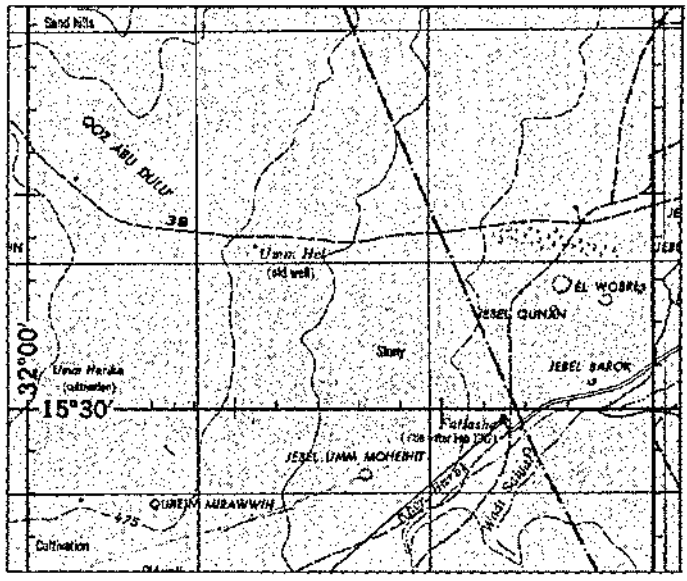
held by the majority of soldiers has been to use well-known features such as picturesque villages with church spires and key landmarks such as pubs and fast food outlets! Thus navigation is not a problem. Most exercises take place over well used training areas of limited size where every rut is known. When resorting to his map a soldier finds it is crammed with natural and man-made features which aid navigation.

So it was with some trepidation that British troops viewed the prospect of deploying and fighting in the featureless desert terrain of the Gulf Region with its lack of features, the lack of cover to hide under and the lack of reference points on the horizon to aim at. Maps were equally void of topographic and man-made detail. Compounding this sense of an alien environment was the fact that troops were expecting baking temperatures, not cold desert nights and lots of rain. Advice to take thermal underwear was treated as a joke!



Joint Operations Graphic Series at 1/250,000 scale.

Against this background Military Survey was tasked with setting up several 2-man teams to provide training for units preparing to deploy to the Gulf at short notice. Our instructors had the benefit of having served in a variety of exotic and inhospitable places around the world and many had first-hand experience of desert regions. They had "street cred" to use the jargon.

Orientation

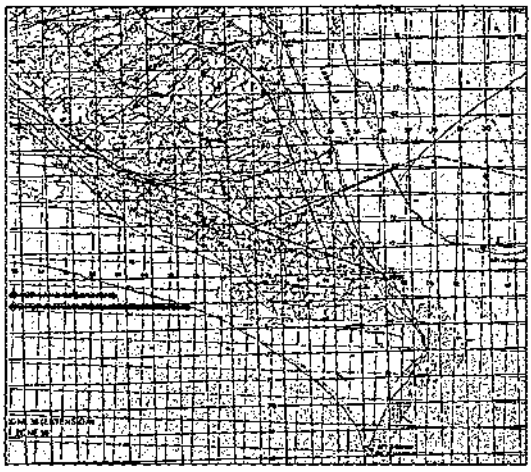
On arrival at a nominated barracks, the training team's first task was to set the scene; this was done by showing a video of the film made by the services Trans-Sahara expedition, which gave all the troops a flavour of the terrain they would be expected to operate on. Section and platoon commanders were then targeted for more detailed navigation training. Many regimental commanders were keen to take the lead but admitted that a brush up would be essential!

Mapping

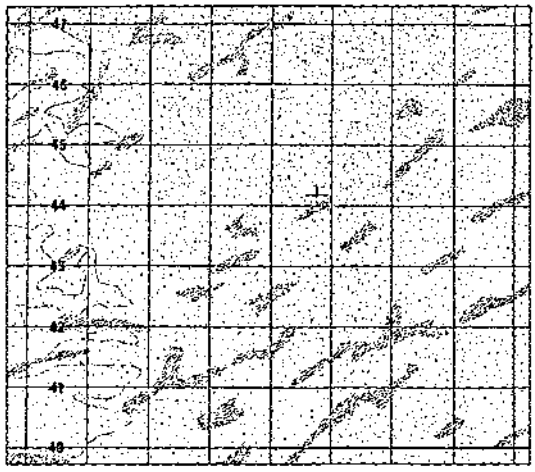
The mapping initially supplied was scaled at 1/250,000 as this was the only scale at which full coverage of the Gulf area existed and was used extensively by air and sea navigators. However it was not what the ground troops were used to. Apart from showing minimal map detail it was referenced using lines of latitude and longitude, known as the graticule, in addition to the more familiar grid giving easting and northing and hence there was the possibility of confusion. Air and sea navigators move hundreds of kilometres of course and therefore tend to work in latitude and longitude; soldiers however think in terms of tens of kilometres and meet their navigation requirements from working off the grid, usually with kilometre squares. A 6-figure grid reference on a 1/50,000 map is accurate to 100m.

Though the 1/250,000 scale is a NATO standard and the Joint Operations Graphic (JOG) series, worldwide in its coverage, it is not regularly used. There is therefore a training lesson here.

When it came to actually teaching about latitude and longitude, training teams found that the concept of degrees, minutes and seconds was alien to soldiers groomed in the military angular measuring system of mils (there being 6400 mils in a circle). It was therefore difficult to rush through the basics of latitude and longitude with soldiers who were having their brains crammed with vital life-saving skills, such as chemical warfare drills and



Double Grid.



A Bare Map.

advanced first aid while preparing to go to full-scale war. The instructors therefore took the decision not to teach the use of the geographical referencing system and to concentrate on the grid system despite the problem of grid zone change.

On the Universal Transverse Mercator system (UTM) there is a change of grid zone on the 48 degree East meridian (which goes right through the British Embassy in Kuwait City) and the Coalition Forces had to conduct a battle across this. Dealing with a change of grid zone is not a common problem for the British Army as there are none in the UK or Germany. It was therefore necessary to put over the subtleties of working on such map sheets near the zone change. Veterans of the Falklands War will know that military mapping of West Falkland was given two overlapping grids for this reason.

With mapping covering such a large area it was necessary to give more than the customary 6-figure grid reference associated with 1/50,000 scale mapping. Grid reference 654 321 is only unique within a 100km by 100km square. To avoid ambiguity, the military grid referencing system requires a 2-letter prefix such as "PR". To satisfy the GPS receiver the Grid Zone designation such as 3OU is also needed. These letters are normally printed on the map face itself; however some mapping issued in the Gulf did not have this information. Another lesson learned.

The bareness of the mapping gave rise to a query from one wag, "Have your cartographers gone on strike? They have missed off all the detail." Comedy apart, there was obvious concern about operating in such barren terrain. Where would units harbour up as there would be no cosy woods to hide in, and where would commanders actually choose to meet? It would not be possible to say "meet at the road junction at grid XYZ", as there were no junctions, no lone trees, nothing.

Moving on, new words entered the vocabulary such as wadi and *sabkha*.

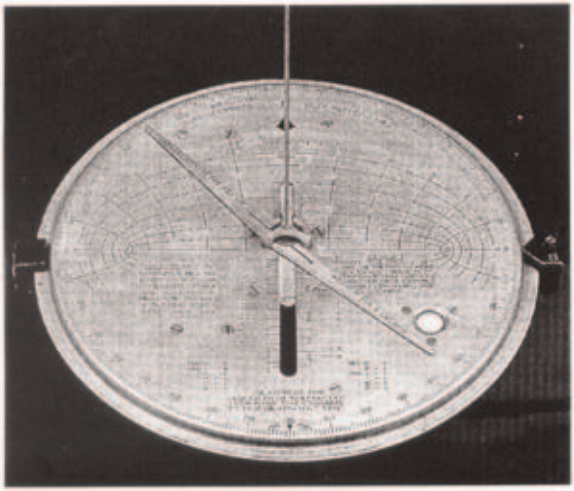
These words appear in the legend on the edge of the map. However the soldier does one of two things: either he folds the map to fit his map case and in the process folds the legend inwards, or he cuts off the legend so that he can butt join two maps together. The net result is that the meaning of the symbology is lost as well as the useful geodetic data such as datum and magnetic variation.

Direction

Turning to navigation issues the question of how one maintains direction in featureless terrain arose. The standard tool for the soldier is the prismatic compass, (little changed from the 1914 pattern), or the lightweight, slim compass widely used in orienteering. The military land user also works to the grid and applies the grid-magnetic angle ie the angle between grid North and magnetic North. The angle between magnetic and true North is known as declination or variation.

The first problem to consider when using such magnetic compasses in the Gulf is the

fact that the angle between grid North and magnetic North is in the opposite direction to that in North West Europe. The simple rhyme "grid to mag add; mag to grid get rid" is fine for those working in North West Europe, however it has to be un-learnt in the Gulf Region, where the grid-magnetic angle is in the opposite direction. Also at a change of grid zone, such as along the 48 degree East meridian, the grid-magnetic angle changes, by twice the convergence, the angle between true North and grid North. Such changes are not difficult to apply, however the military land navigator is often working in the cramped confines of a tank turret, possibly under fire – not an ideal situation in which to consider the subtleties of navigation and whether to add or subtract a correction – under these conditions one needs almost automatic response – a military drill.



The Coles Sun Compass.

Another factor to be considered is that the in-service lightweight compasses have needles balanced for the dip angle caused by the vertical component of the Earth's magnetic field, as experienced in North West Europe. In the Gulf the dip angle is different, and hence these compasses had to be tilted so that the needle floated free.

So much for compass theory, in reality tank commanders faced the prospect of having to jump down from their turrets and walk 50-75m away from their vehicles to avoid the magnetic influence of the tank in order to get an accurate bearing. This is not funny in the heat of the day wearing full nuclear, biological and chemical protective clothing. As an aside, I must warn ladies that underwired bras also affect compasses!

A tool developed to assist the vehicle-borne navigator is the sun compass, which is free from ferrous interference. Stocks of such compasses were hastily identified, dusted off and dispatched to the Gulf.

The army has two types of compass: the Coles model with an engraved dial, and the Howard pattern which is simpler in terms of construction though more complex to set up. Realizing the army would need many hundreds of such devices, Warrant Officer Jim Starbuck and I set about making this tool simpler to manufacture and easier to use. Our first thoughts were to improve the design to speed up manufacture and reduce cost. I went on to suggest that Military Survey draw up the shadow disk using the appropriate sun tables, and then print the dials calibrated in local zone time thus removing the need for the user to draw up his own disks from tables and then having to work in Local Apparent Time (which is up to 16 minutes different from local mean time). Jim Starbuck took this latter idea a stage further by developing a computer routine for a simple plotter, so that the user merely tapped in the date and location and out would come the disk – valid for two weeks in a selected 1 degree x 1 degree area. Thus the sun compass became a user-friendly tool.

The MOD has recognized the value of this "bright idea" and has given the two of us a financial award. Unfortunately, having gone to all this effort we were thwarted on two counts. First, there was heavy rainfall in the Gulf during 1990/91 and so little sun was seen. Second, Saddam Hussein set the Kuwaiti oilfields

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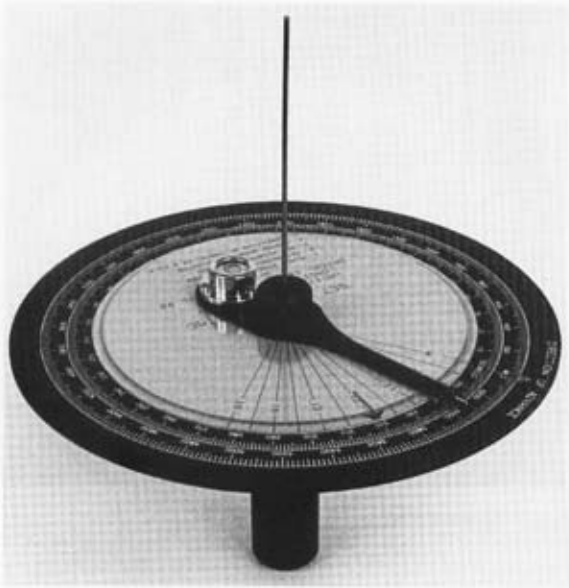

Howard Mark III Sun Compass.

ablaze and as a consequence, the sun was blacked out by the smoke.

Even other basics such as the night sky caused problems. The old faithful Plough would not be visible throughout the year, as is the case in North West Europe, and other basic pointers such as Cassiopia would be needed.

Position

Now turning to the topic of position. When the first troops deployed to the Gulf, GPS was a dream, (though hasty procurement action was in hand) and so traditional navigation techniques had to be taught. Lacking time for extensive training and without sufficient hardware to take sun and star fixes using a theodolite, the only practical way for all troops to determine their position was by "dead reckoning" using the compass and the vehicle's odometer. On arrival at the destination using this system, a square search pattern has to be instigated to find the rendezvous point.

Fortunately, by the time battle commenced we had taken delivery of some 1500 GPS sets. In spite of this quantity though, GPS sets were in such demand that some soldiers resorted to buying their own (at the then price of £3000 or so). One medical corporal even sent his Barclay Card number to one manufacturer but unfortunately for him, all their sets were going direct to the military. However he now has his own set – free, courtesy of this manufacturer.

The advent of GPS receivers introduced new problems. What datum should be set? The concept of datums is alien to most soldiers. In essence a datum is a particular mathematical model of the world chosen with optimum size, shape and location to best suit the surveying and mapping accuracy needs of an area. There are numerous datums around the world covering local, regional and global needs. The same point on the ground can have different latitude and longitude values depending which datum is being used. Though World Geodetic System 1984 was the adopted operational datum in the Gulf region, much of the original mapping was on European Datum 1950 and many receivers came direct from the USA and were, by default, set on North American Datum 1927! This explains why certain users still missed their rendezvous by up to 800m!

Having provided initial navigation training in Germany and the UK, Military Survey's Desert Navigation Training Teams were required to deploy to the Gulf to provide specific training on the Trimble TRIMPACK and Magellan Nav 1000 Military hand-held GPS receivers.

With training, soldiers soon learned to use these tools. However some then failed to use them in conjunction with maps – a problem when the batteries went flat or the PDOP (a geometric factor associated with position of the GPS satellites) is too large and only the

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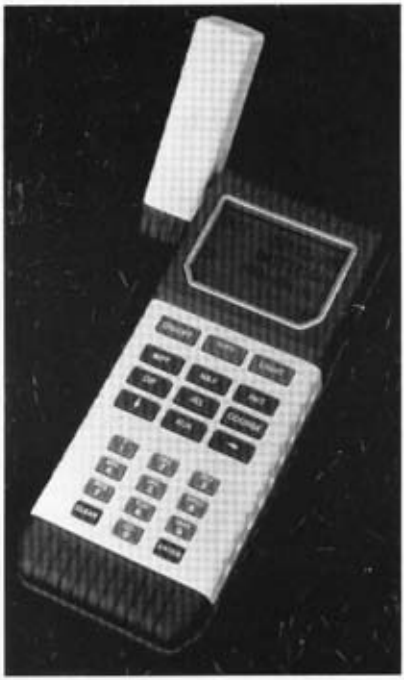
Trimpack.

words "GPS BAD" were displayed on the receivers information display face. Other basic military principles were also forgotten – one soldier programmed all the key installations such as headquarters, ammunition dumps and regimental locations into his Magellan as way-points with names and position! Fortunately a friendly navigation instructor got to him before the enemy and cleared all the memory!

To enable troops to gain enough confidence to move out into the empty quarters using traditional navigation techniques and hand-held GPS receivers, a so-called "confidence matrix" was established in the training area set aside for the British forces in Saudi Arabia. This consisted of an area where a series of 40 gallon oil drums were partially buried as permanent monuments with their coordinates painted on the side. Military Surveyors using geodetic GPS receivers were responsible for coordinating these points in the first place.

Conclusion

To conclude, this article should not be seen as a catalogue of military weaknesses; it reflects the fact that taking an army from Germany to the Gulf was not without its problems, not all of them obvious. The requirement for new navigation skills, identified early on in the planning phase, was met by the provision of specialist training provided by Military Survey



Magellan Nav 1000.

instructors. The success of this training was shown by the professionalism of the soldiers of the 1st (UK) Division and the UK successes in the war. The Desert Navigation Training Teams provided an invaluable service which gave much needed confidence to the Gulf troops moving around the desert.

With the end of the Cold War, we must now be ready for troops to be deployed from Arctic to prairie or jungle. Lessons learned from the desert are currently being adapted for other potential theatres of operation. Military Survey is now promoting more thorough map reading training and broadening the navigation practitioner base. More recently navigation instructors have been in Brunei, Cyprus and Oman, while in the UK we have trained troops going to West Sahara, Croatia, Bosnia and Cambodia under the auspices of the UN.

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The Responsibilities of a Junior Engineer in the Army, Commanding a Bridge Construction Task in Kenya

CAPTAIN L T QUINN BEng

The following is a copy (minus the initial summary) of the winning essay written by the author and submitted for the Institution of Civil Engineers' Medal and Premium (Local Associations) Competition 1992. It is reproduced in the hope that other members of the Corps might be encouraged to enter.

Introduction

Construction tasks undertaken by the British Army are generally smaller in scale than those undertaken by civilian contractors. As a consequence a young military engineer is expected to take responsibility for a whole project rather than just the engineering aspects. This paper gives an example of one such project carried out by a newly graduated officer in the Royal Engineers. It shows the breadth of responsibility placed on junior engineer officers within the Army and underlines the need for flexibility and adaptability required on such tasks, particularly when working in a developing country.

To understand the significance of the project it is important first to understand a little about the structure of the Corps of Royal Engineers and how it trains. The smallest unit commanded by an officer is the "troop". A troop consists of between 30 and 40 men. Almost all of these men are trained in both combat engineering and artisan skills. A troop must be prepared to undertake a wide variety of tasks at short notice almost anywhere. It therefore holds a large range of tools and equipment and has its own small fleet of vehicles. A troop commander is generally a lieutenant who may or may not be a graduate. Three or four troops are grouped together to form a squadron of about 150 to 200 men. In war, however, troops are detached to battalions of infantry which, along with artillery, helicopters and tanks, form an "all arms" grouping known as a "battle group". The battle group is the key element in war, and in peace often comes together to train. One popular training ground for battle groups is in Kenya. In July 1988 Sapper Troop Commander Lieutenant Quinn, was warned that the battle group to which his troop was affiliated was to deploy to Kenya for a six-week training exercise in January 1989. The battle group would carry out mainly infantry based training but wanted the troop to deploy with it to undertake community relations projects and assist with the training. The troop commander would therefore be the senior engineer in the battle group in Kenya.

Project Background

A reconnaissance was conducted in July 1988. Once in Kenya, the troop commander was given the vague instruction to "go to the Aberdare National Park and find some worthwhile task." An estimated three weeks could be spared for the project, but no funds whatsoever were available from the battle group. Only half of the troop would be free to participate in the project, the remainder assisting with the battle group training elsewhere.

The Aberdare National Park is a high mountain range, heavily wooded, unpopulated and is a wildlife reserve. Indeed it was set up to protect the last herd of white rhinoceros. The Park's 900km^2 was served by two un-surfaced tracks, built by the British Army in the early 1950s as part of the counter-insurgency campaign to stop the Mau Mau rebellion. The many highland rivers and streams were spanned by timber-decked bridges. All the bridges were single lane and most were single span. Some of them showed signs of disrepair. Each bridge had a ford next to it but these were unusable in the rainy season. The project therefore would be to replace one such bridge. The bridge over the Gikururu River was failing because one abutment was collapsing. This promised to be a project of suitable size.

Consultancy Work

Unfortunately, as the client, the National Park, was unable to specify exactly what it wanted in engineering terms, the troop commander had to act as both consultant and contractor. The first consideration in designing the replacement bridge was to ascertain what traffic volume and loads could be expected. From experience of travelling the tracks in the National Park, it became obvious that very little motor traffic used the bridges. National Park records showed a peak of 50 vehicles a day could be expected to use the bridge. Almost all the vehicles were 4-wheel drive Landrovers or vehicles of a similar nature. The National Park rangers had an ageing ex-army Bedford RL truck which was used only occasionally when they could afford the fuel. They also had an ex-army grader which was used once a year to regrade the tracks. Both vehicles were classified in military publications as "Military Load Class 8W and 12W". This corresponds roughly to allup weights of 8 and 12 tonnes respectively. Consideration was also given to the uniformly distributed loads and point loads generated by a herd of African elephants. However local rangers pointed out that the elephants invariably refuse to cross man-made bridges and prefer to cross at the adjacent fords. When regrading the road the park driver always took his grader over the fords so as not to damage the bridges. It was decided therefore that the Bedford RL (8W) would be the heaviest load that the bridge would have to carry.

The site investigation was similarly empirically carried out. The soil was a red silty muram which has a high ground-bearing capacity when dry but badly deteriorates when wet. This was evident as many bare slopes above 20 degrees were failing. Flash floods had washed much of the North bank of the Gikururu bridge away. The slopes of the abutments had then started to fail. The South bank however was protected by a timber piled and planked wall. There were a few stones in the river bed but there were no obvious borrow pits from which gabions could be filled. Accurate rainfall figures were not available but the rangers were able to give an estimate of the depth of water during the rainy season. The rivers could rise up to 1.2m during storms. This had to be taken into account in deciding the clearance under the deck of the bridge and the distance between abutments.

The other bridges in the park were all made of hardwood and were over 20 years old. If hardwood could be used in the Gikururu bridge it might also last as long. The availability of construction materials was however in doubt. There were several local lumber yards but the National Park rangers advised against many of them as they often promised more than they could deliver on time. It was illegal in Kenya to fell indigenous trees so almost all the available timber was softwood. However, the Aberdare Timber and Dangerous Tree Felling Company dealt in hardwood from felled dangerous trees, the company also supplied other construction material and regularly dealt with the National Park authorities. It was felt that they could be relied upon to produce the materials in time on what would be a tight programme. The type of timber supplied was likely to be gum (panniculata) as they had a large stock in the yard. When asked what grade of timber it was, the troop commander was told "very hard". The Aberdare National Park authorities also gave the troop commander special permission to fell cedar road-bearers for the bridge. They would select the trees and the troop could fell and transport them. Cedar (mlanje) is extremely resistant to decay, especially in water. It is also resistant to attack from termites and white ants. What is more, it does not warp as it dries out. This meant that it could be used shortly after felling. Nails, wire and steel wire rope were in short supply in Kenya and the timber company advised that they be brought from the UK.

Project Planning and Design

The bridge was designed on the troop commander's return to the UK. Careful consideration was given to construction methods which had to be both practical and within the troop's capability to complete on time. To give sufficient clearance under the bridge for flood water, it was felt that the span should remain at 7m and that the abutments should give a clear 1.5m to the underside of the bridge deck. Due to the mountainous nature of the park tracks it was considered impractical to move timber members much longer than this. Gabions had been ruled out due to the lack of suitable fill material so a timber piled wall with planking was selected. Many of the design parameters were only approximate so a conservative design was chosen. All design work was

Before.

carried out using military design publications, in particular "Military Engineering Volume III, Bridging, Part 1". A final reconnaissance report with design calculations was prepared by the troop commander.

A costing estimate was made based on a price list prepared by the timber company. It came to about £2000. Nails and other ironmongery would be obtained from military sources without cost. The labour and transport costs were not counted as the task would be of good training value. The true cost of military manpower is often hidden, as wages are paid by the Ministry of Defence. Troops and squadrons are self-sufficient bodies that have an organization and size which is not determined solely by the construction task requirement. Their larger size provides them with flexibility albeit at the expense of efficiency in manpower. This has a direct bearing on the methods of construction employed, as manpower is more readily available than in a contractors organization. As the National Park authorities were unable to pay for the materials for the bridge, the troop commander sought funding from the Headquarters of Engineering Support in Salisbury, Wiltshire. They made £1500 available from an artisan training vote and insisted that there be no overspend. The troop commander had to keep detailed financial accounts which were presented at the end of the project.

Although the troop was 27 men strong it did not have the right tradesmen for the task so extra carpenters were attached to it from other troops. As the other camp maintenance and community relations tasks that were likely to be encountered were not known, plumbers, electricians, bricklayers and plant operators were also taken to ensure that the troop had sufficient skills available to it to cope with any task it may be given. The troop would have to live in the Park for the duration of the project so it had to be self-sufficient. A cook and vehicle fitter were attached specifically for the tour. This brought the troop size up to 34. The troop commander also ensured that the troop had medically trained personnel and that they received some refresher training. Familiarization lectures were given to the troop on medical aspects and on the project itself. During its stay in the Park the troop would have to purify its own water from the highland streams. Water purification is often practised by Royal Engineers on exercise but the water is seldom drunk. The thought of having to drink the water filled the troop commander with some trepidation, so all the water purification apparatus was checked fully and tested before it was moved to Kenya. Throughout this period the squadron commander merely asked to be kept informed of the progress in the troop's preparations.

All the equipment needed, from tool kits to tents, was to be flown by the Royal Air Force to Nairobi, therefore an early estimate of how much freight was needed had to be made. This proved to be quite difficult as there was little experience upon which to draw. Senior NCOs

The responsibilities of a junior engineer in the army (p88)

within the squadron all gave varying estimates. The average of these estimates was taken and then doubled to obtain a final figure. This proved to be a fairly accurate assessment. All customs documentation, passenger and freight manifests had to be prepared under the troop commander's direction.

After.

A Change of Plan

Immediately after new year the advance party, consisting of the troop commander and two men, flew to Kenya. It arrived seven days before the main body. The advance party's task was to ensure the smooth arrival of the rest of the troop and confirm arrangements for the start of the project. On arrival in the National Park, much to their surprise, the advance party found that a party from Operation *Raleigh* had replaced the bridge on the Gikururu River. Rather than abandon work in the Park the troop commander decided to replace an alternative bridge instead.

The next most damaged bridge was over the Magura River some 10km South of the planned bridge. This was to prove just as interesting a problem. The Magura bridge had two spans and was at the bottom of a steep hill. The bridge had a hump in the middle over a pier. The main road bearer members had failed in the middle of the deck and the others were showing signs of distress. Whilst looking at the underside of the bridge the reason for the failure became obvious. A Landrover full of tourists came down the hill at speed, passed over the bridge and became partially airborne over the pier. It then landed heavily on the other span before driving off. Clearly the replacement bridge had to have a level deck and a means of controlling vehicle speeds on the bridge approaches. The pier was of gum and showed no signs of decay. The two bridge abutments were battered back at 45 degrees, armoured with large rocks and had thick vegetation in them. They showed no signs of erosion. The two spans were approximately both the same length as the planned bridge had been. It would have been impractical to redesign the bridge as continuous. Thus by making both spans simply supported, the old design could be used and would not have to be significantly altered.

Safety

A troop commander's primary responsibility on any task is for the safety of his men. Working in the National Park posed some novel but nonetheless real risks to life. The dangers were compounded by the isolation of the site. The troop camp was close to the site where a tourist had been mauled by lions some months before. Although all of the troop's weapons were taken to Kenya they were not allowed into the Park. Thus for the safety of the men working there, an armed ranger was attached to the troop for the duration of the project. Men travelling away from the site were given thunder-flash grenades to scare animals away should the need arise. It took around 15 seconds for these grenades to detonate after being

The responsibilities of a junior engineer in the army (p89)

initiated so soldiers were warned to be prepared to lion-wrestle for up to 15 seconds! The risk of bush fires had been greatly reduced by unseasonal heavy rains that occurred just before and during the project. The next greatest threat to life was travel on the roads. Driving at night was forbidden by the battle group commander, as was driving alone. The entire fleet allocated to the troop consisted of one Landrover and one Bedford truck. This was significantly less than had been requested. The troop commander insisted that the truck be fitted with a winch for vehicle recovery. This proved extremely useful later in the project when recovering tourists stuck in the temporary ford detour. The small size of the vehicle fleet caused some considerable logistic problems, all journeys had to be carefully controlled to ensure that effort was not wasted. This was particularly important as a resupply round trip to battle group headquarters took a full day. The troop commander gave a safety brief to all men entering the Park. A safety radio net was set up using military high frequency radios. Troop signallers operated this at set times during the day and were able to call for an air ambulance at any time. Helicopters took 50 minutes to get to the site although they had to fly close to their operational ceiling as the Aberdare Mountains were between 10,000 and 13,000ft above sea level. The troop commander marked out an emergency landing site and ensured that a helicopter landed there to test it before the camp was occupied and work started.

Bridge Construction

Control of the bridge build was given to the troop sergeant who, fortunately, was a carpenter. This freed the troop commander from the control of the construction and allowed him to "stand back" and concentrate on managing the project as a whole. Once work started there were few occasions when the troop commander's comments on the construction were required. Unsurprisingly no-one had experience of building structures in hardwood. Initially there were some problems working with the hardwood as it tended to blunt tools very quickly and could not be nailed without first being augered. Some of the cedar main members were smaller than the specified diameter and were extremely irregular in shape. The Park authorities would not allow any others to be cut so they had to be used. The worst ones were placed on the outside of the deck and all had their ends windlassed with mild steel wire to retard splitting. As other local bridges showed signs of rutting on the approaches immediately adjacent to the bridge decks, the troop commander decided to use compacted soil cement aprons on the Magura bridge. Cement and river aggregate were mixed with the silty muram soil and compacted in three layers each 100mm deep. The final on-site adaptation was to re-use the old road-bearers as sleeping policemen on the approaches to the bridge. It was hoped that by slowing traffic before it reached the bridge it would not impact the bridge with as much force as had previously caused the damage to the road-bearers.

Conclusion

The Magura bridge was successfully built within the time and budget allotted. It was tested by the troop's own loaded Bedford truck and a completion certificate was presented to the troop commander by the head warden. The bridge project was only one part of the troop's Kenya tour. In addition, the troop was also involved in demolition work, jungle warfare training, camp maintenance and other smaller construction tasks, all of which the troop commander had a responsibility to manage and control. The replacement of the Magura bridge was an archetypal small construction task, one of many planned and undertaken by junior officers within the Royal Engineers. Once the bridge construction was underway, the troop commander spent very little time dealing with technical engineering problems, rather most of his energies were absorbed in his managerial role. Any problems which arose had to be solved on site with scarce resources and within a tight time schedule. Most difficulties had, however, been foreseen and catered for before they arose by detailed planning and Bluetack. The construction of the Magura bridge provided the troop commander with the opportunity to use his engineering skills but more significantly with an administrative and organization challenge, an opportunity which few junior civilian engineers receive. The troop commander fulfilled the roles of site investigator, site agent, designer and resident engineer and on a small but very professionally rewarding project.

Memoirs

COLONEL H W WAGSTAFF CSI MC FCIT

Born 19 July 1890, died 13 September 1992, aged 102

HENRY Wagstaff spent more than half his career in Indian railways. He long outlived all his contemporaries, but luckily wrote some fascinating autobiographical notes from which this memoir has been compiled.

His father, a civil engineer who worked on the Burma railways, returned to England with his wife (after the earlier death of a son, due to inadequate medical attention in the Shan States) for the birth of their second child, Henry. Almost immediately his father had to return to Burma, and was soon reported missing during a native uprising. Henry was just a few months old when his mother also left to try to discover whether her husband was alive or dead – luckily he was released unharmed by those who had taken him prisoner.

Henry's parents could not afford frequent visits to England, and therefore he did not see them again until he was eight. During this period he was put in the care of a great aunt and educated at Woodbridge Grammar School.

Having observed that RE officers did well in India, Henry's father told his son that he (the son) was to become one. By dint of hard work Henry was accepted for The Shop at his second attempt, passing out in 1910 amongst the first 20 of the order of merit, high enough to become a Sapper. Whilst at Woolwich he helped to line the street in Whitehall for the funeral of Edward VII. As a matter of interest, Henry's uncle, General Cyril Wagstaff was also a Sapper and was Commandant of The Shop from 1930 to 1934.

At Chatham, where he found work less arduous than at The Shop, he recalled seeing Kitchener, rather monumental and aloof, at a Guest Night.

In 1913, he went out to India and was sent straight to the Frontier, to Kohat as Assistant Garrison Engineer, where, within a fortnight, he took part in a punitive expedition into the hills. Subsequently Garrison Engineer at Hangu, Parachinar and Miranshah, he enjoyed the Frontier, travelling extensively on an early Triumph motorcycle, or by horse or camel. When war broke out in 1914 he was in hospital recovering from paratyphoid which was fortunate as most of his contemporaries, ordered immediately to France, were killed. Once fit again, he remained on the Frontier, taking part in minor operations in the Tochi Valley.

During 1916, he was ordered to Karachi to join a Sapper and Miner company en route to Mesopotamia. Arriving at Basra the company set to work building piers and jetties. In the autumn they marched to Kut and took part in its recapture from the Turks. The Sappers were out most nights constructing strong points towards enemy lines. He was Mentioned in Despatches and, to his surprise, was awarded a Military Cross whilst working with his platoon on a redoubt under fire. After Kut, the company took part in the pursuit to Baghdad against little

Col H W Wagstaff

opposition. Next employed as a Grade 3 Staff Officer, first in a divisional HQ and then in 1st Corps HQ, in the spring of 1918 he was ordered back to India to take command of a newly raised Sapper company at Quetta. The company had a small detachment on the Afghan border, and half the company 150 miles away working on the Nuski extension railway through Baluchistan to the Persian border.

Whilst based at Quetta, he met Jean, who had been brought up in India and who was a doctor in charge of a Zanana hospital; they married in Dehra Dun.

After a short spell with the Chief Engineer Northern Command in Rawalpindi, the 3rd Afghan War broke out and Henry was posted as Adjutant RE of 2nd Division, which was working on the lines of communication between Peshawar and the Kyber Pass. Afterwards came a posting to Chaklala to build lines for a mechanized transport unit whilst having to spend the winter there under tentage with his wife and infant son.

During the autumn of 1920, he was posted to work on the Eastern Bengal Railway under a Sapper general manager (Hearn) and a Sikh chief engineer. He was sent to Saidput in the Rangpur District where the family had a house linked to the railway station by half a mile of track, which he traversed on an inspection trolley, propelled by four coolies. An exceptionally heavy monsoon in 1921 cut many of the lines, providing a stimulating challenge.

At last in 1923, after ten years in the East, he went on leave to England.

Returning to India in 1924, to work on the North Western Railway in Multan as an executive engineer, he later transferred to Lahore to compile operating statistics using a battery of primitive tabulating machines. Industry in India was beginning to have labour problems, and he was put on special duty to devise appropriate legislation, working directly under the Railway Board in Delhi. For ten years from 1927 he continued this work, being involved on a Government of India Commission and a Judicial Inquiry. He was now a lieutenant colonel, having attended the Senior Officers' School at Belguam, a daunting experience for someone who had been detached from soldiering for so long.

He was lent to the Labour Department in 1937 as a "Conciliation Officer" to help straighten out the relationship between the railways and the unions. By the outbreak of the Second World War he was a colonel and a member of the Railway Board; he was not recalled to active service as there was no appropriate military post for which he could claim recent experience. But the railways in India were vital to the prosecution of the war, and he did much to keep the rank and file of railway employees at work despite the ravages of malnutrition and disease. During this time there was anxiety over his elder son, Peter, a subaltern in the Queen's Royal Regiment, who was reported missing early in the war, but who was subsequently discovered to be a POW.

He left India for good in 1946, having been made a Companion of the Star of India.

Having a great deal of accumulated leave to his credit he did not actually retire until 1948. He settled initially in Guildford but his wife's illness led them to seek the sun and they moved to Spain. They enjoyed travel and lived in various locations on the Costa del Sol, interspersed with lengthy trips elsewhere in Europe and to the Middle East to visit their sons (their second son Malise was by now a Sapper). Sadly, Jean died in Malaga in 1965.

The following year, Henry returned to England for a prostate operation where he was visited by Margaret, whom he later married in the Cathedral in Gibraltar. They continued to live in Spain until returning to England in 1980, to be near his two sons who had now settled there.

For the last ten years of his life Henry was afflicted with blindness, but his mind remained clear and he took a close interest in his family and in world affairs. He would always come to life in company and was drinking champagne with visitors the day before he died in his sleep. He is survived by Margaret, Peter and Malise, five grandchildren and three great grandchildren. A man of humble origins, he led a long life, imbued with integrity and goodness.

CPRB

BRIGADIER G L GALLOWAY DSO OBE GM

Born 12 November 1908, died 3 November 1992 aged 83

GEOFFREY Lewis Galloway was born into a military family and was educated at Sherborne and Imperial College, London. He was commissioned into The Royal Engineers in 1932 and, after YO training at Chatham, joined 5 Field Company at Aldershot, in 2 Infantry Division, supporting 4 Guards Brigade. At a time when tank production in Germany was getting into top gear, 5 Field Company were being equipped with bicycles on an experimental basis, and spent the summer of 1935 practising their drills and cycling to training areas and exercises. In May they cycled from Aldershot to Weymouth for the annual bridging camp at Wyke Regis, a three-day expedition each way.

After a period at the Training Battalion at Chatham, he was posted to Gibraltar as Adjutant and then as OC of one of the Fortress Companies, and served there until 1941. He was awarded a George Medal for conspicuous gallantry, on 29 July 1940, after an antitank mine had exploded in an ammunitions store in Gibraltar, rendering the mines around it unstable and the roof in danger of collapse. The citation stressed that the operation was fraught with constant danger. His action made the area safe and prevented further damage – "Showing great courage and coolness, Galloway entered the buildings and removed explosives. With another officer he then disarmed the antitank mines nearest the explosion."

After a time at the Staff College as student and instructor, he joined 11 Armoured Division as OC of 13 Field Squadron in training for the landings at Normandy. Soon after D-Day he was promoted to acting lieut colonel and became CRE of the Division a week before the start of Operation *Goodwood* and the advance across Europe. During this advance the Divisional Engineers played a major role, which included many bridging operations. The last of these was across the River Weser on 6/7 April 1945, when he was awarded a DSO. Quoting from the citation: "The bridge site was continuously shelled, bombed and mortared throughout the day of 6 April and during the night of 6/7 April, and the bridgehead was counterattacked three times, and the Sappers suffered heavy casualties. Lieut Colonel Galloway was present throughout the whole of this bridging operation and displayed the greatest gallantry and devotion to duty. On every occasion when work had been stopped he was the first man to leave cover and rally his men to start work again. His cheerfulness and complete disregard for his own safety, and gallant leadership were the inspiration of his men. During the operations from the Rhine to the Elbe, bridges had to be built over the Dortmund-Emms Canal at Riesenbeck on the 1st April and the River Aller at Essel on the 10th April, and on each occasion Lieut Colonel Galloway was amongst the first on the site for reconnaissance and whenever enemy reaction had been severe he has been present to rally and encourage his men by his own personal example. Throughout the operation he has been a fine example, not only to his men, but to all other troops in the area of the bridging operations."

In the euphoria of postwar Germany he became CRE of 7 Armoured Division, and was one of the founder members of the British Kiel Yacht Club, continuing a sport he had become very proficient in while serving at Chatham before the war. He also became a 1st class Rugby

Brig G L Galloway DSO OBE GM

referee. It is of this period that one of his squadron commanders has written: "he worked hard and played hard and I sometimes wondered which was more exacting."

In 1947 he became GSO2 of the Battlefield Tour Team in G3 Training at HQ BAOR, and subsequently a GSO1. He was made an OBE in 1948.

In 1949 he was posted to Scotland as CO of 8 Training Regiment in Elgin, a tour he enjoyed to the full. After this "home posting" it was back overseas, and in 1952 he became Colonel (Admin Plans) at GHQ, Middle East. In 1955 he attended the NATO Defence College in Paris, and went on to become Colonel Logistics at HQ Allied Forces Central Europe at Fontainbleau. Then in 1957 he was promoted brigadier and took command of the Royal Engineers' Training Brigade in Aldershot. At this time, changes were taking place in the army which were to have a major impact on regiments in the Brigade. National Service, the main source of manpower since the war, was to be phased out over the next five years; emphasis was placed on recruiting regulars, but on a much smaller scale. Complex plans were in place for reducing the number of training regiments by disbandment and amalgamation and reroling those that were to remain in the long-term.

In implementing these plans, Brigadier Galloway, with his customary enthusiasm, determination and leadership, ensured that all the issues were comprehensively addressed and resolved. These were many and varied, covering the formulation of new training directives, the structure of units, the utilization and, where necessary, disposal of barracks and other facilities. Above all, his objective was the maintenance of the highest standards during the transitionary period. He therefore paid great attention to the morale and welfare of his officers and men and fought hard to have in his team the quality of people best suited for the complicated task, especially those in command.

Once again, as in his earlier life, he worked hard and played hard. He thoroughly enjoyed the thrill of refereeing a good rugby match and he encouraged many others to follow suit.

Commanding the Training Brigade was the pinnacle of his army career, and it bore the hallmark of his personality and achievement. He was held in high regard throughout the Brigade and his personal staff had the great pleasure to work for a man who was not only mentor and counsellor but also a good friend.

He retired from the army in 1960, settled in Wallington in Surrey and spent the next ten years working in London as Manager of the Premises Department of the Royal Exchange, later the Guardian Royal Exchange Assurance Company. He then became a partner in a small architectural and engineering company and in 1976, to his great delight, he became Chairman of The Advertising Agency Register, a company founded by his daughter.

During his time in London he became a Liveryman of the Merchant Taylors' Company and switched his extra mural activities from rugby and offshore sailing to the more sedentary, but no less active, pursuit of Freemasonry where his experience of leadership and administration were put to extremely good use. He became an eminent and distinguished Freemason. He was held in highest affection and esteem throughout the world, as witnessed by the enormous attendance at his memorial service in London.

His family life was another fine example to follow as it was such a happy home where all ages seemed to work as a team. Indeed, he and Jocelyn were wonderful hosts – many will long remember their jolly and varied entertaining. He married Jocelyn Powell-Kettle in 1941 and they have two sons and two daughters. His eldest son is serving in the Corps.

Behind his military bearing, perhaps austere to some, there was always a twinkle in his eye and a very kind heart. As the *Daily Telegraph* obituary said: "He was a man of infectious enthusiasm, whose wisdom, courage and sense of duty were an inspiration to others."

CCG CPC RLT

MAJOR WILLIAM TEMPLE MC

Born 5 March 1921, died 5 November 1992, aged 71

MAJOR William Vere Temple who has died aged 71, was awarded a Military Cross in Greece in April 1941 for gallantry while destroying tactical bridges on the route of the advancing German armoured columns.

Between demolitions he and his troops took part in the fighting withdrawal. At one stage they were defending the ground at Thermopylae (the gateway to southern Greece, where Leonidas and his 300 Spartans had fought in 480 BC) against a vastly superior invading force.

Even at the time Temple wondered what the Spartans would have made of the Ju-87 dive-bombers – *Sturzkampflugzeug* (Stukas) – which made constant, screaming, near-vertical bombing runs on their positions. The six remaining Hurricanes of the RAF (including one flown by Roald Dahl) had already been knocked out, and the enemy had complete operational freedom of the skies.

Temple had several railway wagons, loaded with guncotton, under his charge. Any one of these could have been detonated by enemy fire. He used them for 18-hour and 52-hour delayed-action charges, buried in the abutments of bridges (which he had already "blown"). They would thus cause maximum devastation to the advancing Germans as they attempted to repair the original destruction.

On one occasion Temple's troop was surrounded by a heavily-armed group of Greek patriots, who hoped to save a bridge near Thermopylae. He persuaded them that the bridge was quite safe before nonchalantly leading his men away. Just after they had left the scene the bridge went up, sending debris whirling above their heads.

On April 27, Temple and his troop were landed in Crete, where they were soon involved in a bloody fight against the German parachutists and glider forces.

Temple recalled that he owed his life to an officer in the Welch Regiment who stayed behind to cover his withdrawal. Of the 21 officers and 830 other ranks of the Welch Regiment who fought in Crete, only seven officers and 161 men escaped back to Egypt.

Temple's next appointment was to reorganize water supplies at base camps in the Canal Zone.

He applied to join the fledgling SAS but instead was suddenly rushed up the coast road to join Auchinleck's November offensive, Operation *Crusader*.

His troop marked out two advance landing grounds for fighter aircraft near Fort Madalena, although these were dangerously close to German-held positions. They then worked closely with the attacking armour.

When Rommel turned the tables in a surprise counterattack early in 1942, Temple had to retreat with the 4th Indian Division's armoured fighting vehicles. On January 29, as he was making ready to crater the roadway near Benghazi, he was suddenly confronted by tanks supported by mechanized Panzer Grenadiers.

Severely wounded in the brisk action which followed, he was pinned down by heavy machine-gun fire on the "wrong" side of a sand dune, and captured. But by this time his troop had blown up vital supplies of fuel, ammunition and vehicles, to prevent them falling into Axis hands.

Maj W Temple MC

A scion of a County Monaghan medical and military dynasty, William Vere Temple was born on March 5, 1921. His father was Lt Gen R C Temple, formerly of the Royal Marines, and his grandfather, Col William Temple, won the VC at Rangiriri as a surgeon-lieutenant in 1863.

Young William was educated at Wellington and Woolwich. On the outbreak of war Woolwich was closed and its cadets transferred to 141 Officer Cadet Training Unit for a course shortened to six months (the General Staff then thought that the war would last three months).

Commissioned into the Royal Engineers in 1940, Temple went on to Colchester to instruct newly-enlisted Sappers in minefield clearance. His next assignment was to fortify RAF radar stations against the threat of German invasion.

This was followed by a posting to the staff of 2 Division, and then to be Troop Officer 3 Troop 3rd Cheshire Field Squadron, a TA unit which he said appeared to have been raised from the members of the Birkenhead Rugby Club.

In 1941, after a brief period in Egypt, the troop landed at Piraeus and joined the British 1st Armoured Brigade on the Yugoslav frontier, where they were soon in action along the River Axios.

The serious injuries he suffered in the desert, turned septic, he was given massive blood transfusions and intensive care by the German army medical staff, who refused to hand him over to the POW organization until his wounds were healed.

Temple was repatriated in 1943 and after further hospital treatment (including skin grafts) returned to duty. He was posted to Washington to work with Military Intelligence, assessing what military technology the Germans might have given the Japanese.

On his return to Britain, Temple attended a technical staff course at the Royal Military College of Science, Shrivenham, and took a degree in engineering. He then joined the Weapons Development Executive.

He worked first at Teddington and then at Woomera in Australia, where he was engaged in the proving and development of British rocket weapons, specializing in guidance and control, including the "Blue Streak".

Invalided out of the Army in 1956 Temple began a new career in civilian engineering and rose to be director and head of research and development with Mather & Platt.

He was active with SSAFA and the British Legion, and was chairman of the Macclesfield Conservative Association and the Manchester Advisory Committee of the Lord Chancellor's Department. He was a church sidesman and a lector.

Although Bill Temple walked with a limp and wore a monocle, he was an excellent shot and an experienced sailor, often chartering a catamaran to take his family to the Scillies and across the Channel. He was captain of the RE Yacht Club and was a member of the Royal Ocean Racing Club.

He married, in 1947, Barbara Mason; they had one son and three daughters.

HMH WRITES. After his repatriation from Germany during the Second World War, Bill Temple was first employed as an instructor at the School of Military Engineering. One knee had been shattered and rigidly reset so that he could not bend his leg. He was popular with everyone but the only form of social transport at the school at the time was the bicycle.

Always undaunted, he used to place his damaged leg on the handlebar and pedal with the other. Effective on the level and downhill, he was gravely disadvantaged up gradients: so his friends developed a technique of coming up behind him and giving him a push.

He spoke kindly of his medical treatment by his captors. He was placed in a ward with young wounded German officers and, he said, was treated equally with them.

BRIGADIER J R BLOMFIELD OBE MC

Born 10 January 1916, died 11 November 1992, aged 76

JOHN Blomfield was very much an all-round sapper, capable of going anywhere and tackling anything. He was a good leader, a fighting soldier, a capable engineer and a good staff officer. His modesty and lack of ostentation tended to conceal his qualities from those who had not worked with him, but those who knew him admired greatly his ability to get things done without fuss.

He was born in Calcutta to a family that had served in India for two generations, his father being a civil engineer. He was sent to England to Clifton, and after obtaining a scholarship went to the Shop and was commissioned into the Corps in 1936 (35 YO Batch).

After Peterhouse, Cambridge, and the YO Course, he joined 23 Field Company at Aldershot, which was then in the process of becoming fully mechanized. On mobilization in 1939, the company was made up to strength by reservists, many of whom were not too pleased at being called up. However, Blomfield's firm and friendly leadership soon turned 2 Section (Troop) into a happy and efficient sub-unit.

23 Field Company went to France in September 1939, and spent the winter constructing defences on the Belgium frontier, where Blomfield's ability to speak French was very helpful, especially to his brother officers. During his home leave in December 1939, he and Patricia were married. The withdrawal to Dunkirk was a testing time involving extensive demolitions, holding defensive positions as infantry, and finally assisting the embarkation: 23 Field Company was one of the last units to leave.

The next three years were spent in the UK, preparing for operations and with training units. In 1943 he was appointed to Command 284 Field Company, which, in the autumn of that year, was converted to an assault squadron. This meant a complete change of role, involving the sappers in learning to operate Churchill AVRE and many other new skills.

The company went to France in 1944, and after several minor operations they took part in the breaching of the defences of Le Havre, and the capture of the other Channel Ports. Later that year, 284 Squadron suffered a tragic accident when a tank of so-called stabilized nitroglycerin, used for pumping into a rocket-fired hose for mine clearance, exploded causing heavy casualties. Blomfield's competent leadership succeeded in rebuilding the unit, and they went on to take part in the Rhine crossing and subsequent advance through Germany, ending up at Kiel, where they undertook an interesting task destroying air raid shelters with captured 500kg *Luftwaffe* bombs.

At the end of the campaign, Blomfield was awarded the MC, and again Mentioned in Despatches. After the war he continued in Germany with the Army of Occupation as 2IC of 32 Assault Regiment at Hameln and was joined by Patricia and the family. This was a turbulent period for the unit settling down into a peacetime role, including National Service, and the Blomfield family did a lot to build up a happy unit. Later he was appointed DCRE Kiel, which, as well as the works tasks, involved the management of the "windfall" yachts, for which he was particularly well suited.

In 1950 he went to the Staff College and this was followed by two years at the War Office and a period as a company commander at Sandhurst. Blomfield was then sent as a lieut colonel to the

Brig J R Bloomfield OBE MC

UK Ministry of Supply staff in Australia. This was a most demanding appointment, overseeing the building of the base for the atomic trials at Maralinga. It involved the construction of an airfield for V-bombers and the building of accommodation for 400 scientists and support staff in the middle of Australia (with no fresh water supply) all to a very tight schedule.

To visit the site from Adelaide involved a one and a half day train journey, followed by a 100 mile trip by Land Rover, so Blomfield managed to persuade the Ministry of Supply to let him purchase a De Havilland Dove, which had just been flown to Australia by Kingsford Smith! Blomfield's firmness, tact and quick brain enabled the project to be completed on time and he was appointed OBE, on his return to England in 1957.

He then went to the Administrative Staff College at Henley for three months (the only soldier on the course) before taking over as CRE 3 Division and CO 22 Field Engineer Regiment in 1959, which was stationed in Wiltshire, and was part of the newly formed Strategic Reserve.

At the end of 1960 he went to MEXE as Superintendent, and then, after a spell with NATO in France as Assistant Chief of Staff Logistics, he returned to MEXE as Deputy Director until his retirement in 1969. During this period, MEXE was most productive and new and effective equipments were produced all the time. Many of these were to prove their worth later in the Falklands War, and much credit must be given to Blomfield's sound engineering approach and practical judgement.

After retirement, Blomfield became Manager of the New Towns Commission at Hemel Hempstead until 1979, when he left and moved to Brockenhurst in the New Forest – joining the colony of retired sappers in SW Hampshire! He was Chairman of the local British Legion branch and he and Patricia played a full part in local activites.

Blomfield had been a keen sailor since his YO days, taking part in many ocean races and being elected to the RORC in 1938. During the 1939 Fastnet Race, *Ilex* parted a galvanized-iron rope runner and was unable to tack until John had completed the splice, fortunately before the Scilly Isles hove in sight! However *Ilex* got back from the subsequent La Rochelle race just in time for the crew to join their units at the start of the war!

After final retirement, John kept his 27ft Sabre *Trefoil* at Keyhaven, from where he and Patricia cruised annually to West Brittany. He is survived by her, their two daughters and five grandchildren.

JCW PJMP RWD JC RHS

BRIGADIER H E HOPTHROW CBE CEng FIMechE

Born 13 November 1896, died 16 December 1992, aged 96

BRIGADIER Harry Hopthrow's most signal military achievement was, as Director of Fortifications and Works during World War Two, to accommodate the influx into Britain of one and a half million American troops with all their administrative facilities, as well as over a million home-based British soldiers. Such a significant contribution by a Reserve Army officer, who between the wars had a successful civilian career, reflects an extraordinary commitment to military professionalism.

Harry Ewart Hopthrow was born in Gainsborough in Lincolnshire into a family of engineers, and it was only natural that he should become apprenticed to a firm of mechanical engineers. His training was interrupted in 1915 when, at the age of 18, he answered an advertisement for grammar and public school boys to train as operators of the new, untried wireless telegraphy. Equipment was primitive; in his words "... spark transmission and crystal reception plus valve amplification sometimes. With a jackknife, a pair of pliers and a knowledge of Ohm's Law one could often improve on the issued equipment." So armed, he experienced life in the trenches for the rest of the war seeing action with 30th Division in the battle of Arras in 1917, in and out of the line in the Chauny and Savy areas, taking part in 3rd Ypres, 2nd Somme (where he was briefly captured and escaped), the 1918 retreat, and the final attack and pursuit. He remarked on how under-used wireless was in static conditions, but how it came into its own in mobile operations. He finished the war as a second corporal, a rank peculiar to the Corps at that time.

In 1925 Harry Hopthrow, having qualified as a professional engineer at Loughborough College, pursued his career with the firm that became ICI, at their great new chemical factory at Billingham. He also obtained a commission in the RARO Supplementary Reserve and joined 107 Army Troops Company at Middlesborough. Here he was in his element building up the strength of the unit. Being able to pick and choose in a time of severe depression he took only men with war medals. He commanded the unit from 1931 to 1935 and his original company standing orders, largely in his own hand, still survive. Throughout this period he attended courses at Chatham and passed regular army promotion exams, almost unheard of for a Supplementary Reserve officer.

Mobilized in 1939, he went to France with the British Expeditionary Force on the Engineer-in-Chief's staff. After evacuation from Dunkirk he was appointed Deputy Chief Engineer Home Forces and in 1941 he moved to London to reorganize Works Services under Major General C J S King, who in due course became the first Engineer-in-Chief at the War Office. In 1942 Brigadier Harry Hopthrow became Deputy Director of Fortifications and Works, and then Director in 1943. In addition to the gigantic UK accommodation commitment the Directorate was responsible for works services in non-operational theatres worldwide, from the Falklands to the Faeroes, and from Madagascar to the Caribbean. His extraordinary achievements were recognized by his appointment as CBE and the award of the United States Legion of Merit in 1946.

After the war he returned to ICI to become one of the two assistant company secretaries. He retired in 1958 and settled in Cowes where he was able to pursue his long-life interest in

Brig H E Hopthrow CBE

sailing. Nevertheless he served as honorary secretary and a vice president of the Royal Institution of Great Britain from 1960 to 1968, where he played a very active role in rationalizing the administration and improving the Royal Institution's finances. With his incisive mind and formidable memory he served on national enquiries and advisory bodies, and remained extremely active late in life in local and Corps affairs. He made strenuous efforts to help the RE Museum build up its collection of early wireless equipment and as a stern critic of the content of the World War One displays, was able to help from his sharp memories of his years in the trenches. At the age of 93 he recorded over 30 tapes of events of his long life, on the initiative of the Imperial War Museum.

In 1925 he married Audrey Kassel, who died in 1975. They are survived by their son and daughter.

GWAN, OMR

Memoir in Brief

A brief memoir is published below on a distinguished man whose death has been notified recently in the national press and who served in the Royal Engineers during World War Two.

SIDNEY SCHOFIELD, a former vice-president of the National Union of Miners and, briefly, the Labour MP for Barnsley has died recently. A miner's son, he was born at Barnsley in 1911 and was educated locally. He spent most of his working life on the coal-face at Glass Houghton Colliery near Castleford. During the Second World War he served with the Royal Engineers, and was commended for work on the salvaging of an American ship in the Mediterranean; after the war he represented the Yorkshire Miners on a tour of the Ruhr coalfields. He was elected MP for Barnsley in 1951 by a majority of 28,227, but a year later, for strong personal reasons, applied for the Chiltern Hundreds and returned to the pit. In 1964 he was elected Yorkshire area secretary of the NUM and 1969 was nominated national vice-president, a post he held until 1973 when he was succeeded by Mr Arthur Scargill. Schofield married and had two sons; his wife predeceased him.

Correspondence

STORM COMMAND

From Colonel A A Wilson

Sir, – Many of your members who read Brigadier MacDonald's glowing review of General Sir Peter de la Billière's book of the Gulf War "Storm Command" and were persuaded to buy a copy may be puzzled that the Corps is not referred to in the Index.

This is an editorial mistake and we are either confused with REME, or the Indexer did not know what Sappers are.

Printed at the end of my letter is part of the text of a letter I wrote to the publishers, which members of the Institution may care to use to amend their copies of the book.

All General de la Billière's references show the Corps in a good light. The one exception is not really aimed at us, but is on page 131 and refers to new staff being sent to his headquarters without his knowledge. I quote: "Everyone in the United Kingdom wanted to join in on the act, often with the best intentions. Someone in London would say, 'oh, he's bound to need support in this or that branch of engineering. So, without my being consulted an engineer Lieutenant Colonel would appear, together with a Captain and a bevy of clerks to run his department – and suddenly I found I had another staff branch. After a while I became so annoyed by these excesses that I began putting people on the next plane home, just to make the point."

I would like it realized that no Sappers were sent home to make any point. On the contrary, the incident he refers to was the deployment of Lieutenant Colonel Nick Fickling and his survey team, without whom the whole coalition would have gone to war without any maps. As it is, the delay in deploying them meant that 1st Armoured Division never did get maps at the scale it wanted.

Rate capping meant limiting the size of cells such that staff officers were often under unacceptably high pressure. Major Jim Kinghan, was not only the forces fuels officer, with a full time job in Riyadh, but also commanding his STRE building the pipeline over the desert (PLOD). Having to drive himself two or three times a week over 500km back and forth to the pipeline, exposed him to much more risk than was acceptable and ended in his tragic death in a road traffic accident. The same can be said of the Operational Requirements (OR) cell which was set up too late. It consisted of one man who had to be supported by visits from UK and again required vast distances to be travelled in unsuitable hire cars often driven by the officer concerned. Alec Wright was killed on such a visit and the OR staff officer, Lieutenant Colonel James Short, and my corporal clerk were both badly injured in the same accident. Is this the first war in which casualties to the Corps were greater amongst the staff than the fighting units? The reason was because the Joint Headquarters in Riyadh was never properly established and lurched from crisis to crisis with insufficient staff in the right jobs. The lack of a first class Chief of Staff from day one was the main reason for this, with General de la Billière being wrongly advised by many of his existing staff, that they did not need reinforcing.

At the end of the war a brigadier from Joint Headquarters was overheard saying, "This headquarters is full of overtired and ineffective staff officers and needs completely replacing." I had to agree with him. My plea is that this point is not lost, and despite the MOD's desire to keep numbers down, the best service to the fighting troops can only be provided by a properly manned and structured in-theatre headquarters with all staff functions properly covered. Yours aye – Alasdair .

Harpers Collins/Publishers
London, W6 8JB

Dear Sir

I write with reference to General Sir Peter de la Billière's book "Storm Command". As his Chief Engineer I was disappointed not to find any reference to the Corps of Royal Engineers in the Index. Having read the book, and thoroughly enjoyed it, I noted a number of references to the Royal Engineers and cross checking found that some of them had been incorrectly attributed to the Royal Electrical and Mechanical Engineers; an equally important but totally different Corps. Other references would confuse the non-military reader as the General refers to "Sappers" or "engineers" which are commonly used alternative forms of referring to Royal Engineers.

May I suggest that in any future edition the Index is amended by inserting below Royal Electrical and Mechanical Engineers the following:

Royal Engineers (Sappers, engineers) 63, 94, 131, 157, 183, 215, 289, 292.

Under Royal Electrical and Mechanical Engineers the following incorrect page references should be deleted:

63, 183, 288, 292.

Yours sincerely, Alasdair Wilson

THE WEE, WEM, WEC AND EVEN A WEP!

From Major R L D Robinson

Sir, – I believe the time has come, some would say long past, when the Corps' traditional use of the title "Military Clerk of Works" and "Military Plant Foreman" for its Technician and Incorporated Engineers should be reviewed. Some military

"customers" and almost all the civilian Institutes and employers have difficulty in identifying the role and capabilities of the individuals employed under these titles. The civilian role of the Clerk of Works is different from its military counterpart, and the military requirements of the past 20 years have reinforced the different development of that employment.

A title should explain the function of the employment, ideally it should continue its traditional links and hopefully it will fit neatly into other associated employments.

In the mid-19th Century the Corps developed an employment to assist and indeed to diminish the then all-powerful influence of the civilian Royal Engineer Clerk of Works. The title of this employment was the "Military Foreman of Works" and its holders were drawn from the Corps' artisan tradesmen who were given 12 months' training at Chatham. Subsequently this employment specialized to take account of developments in the electrical and mechanical engineering fields. The title remained unchanged for the Civils (for E&M was called Military Mechanist) until in 1947 when the first Military Clerk of Works courses commenced at Chatham, specializing in either Electrical, Mechanical or Construction Engineering. With the demise of the RE Works Service in 1959, the trained manpower requirement reduced considerably but the activities and functions were kept alive in Regiments, Military Engineer Services and the Military Works Force.

The abilities remain intact today but with a different emphasis on the function, today the Military Clerk of Works has to work much more as a part of a design and management team as well as being able to produce specifications and to direct contractors. Having served his six year "apprenticeship" as a staff sergeant, the military Clerk of Works becomes an individual capable of responsibilities higher than that of a civilian Engineer Technician and in some cases is then qualified to become an Incorporated Engineer.

How then should the Corps title these employments, to not only ensure that the requirements outlined previously are met but also to give a recognized status which is attractive enough to encourage recruitment of the right calibre of individual. After much debate, primarily in the coffee rooms of Brompton, with a little prodding from those on high, and having drawn the short straw, I submit the title of "The Military Works Engineer" as one which meets most, if not all, of the criteria outlined above. It is a title which could comfortably precede the specialist qualifications of Electrical, Mechanical, Construction and indeed Plant to successfully group the Corps' technical non-specialist management employments. It adequately describes the function, links well with the previous and traditional titles and forms a good Corps' basis with the Garrison and Chartered Engineers. It also provides a good modern description for the Corps Technicians and Incorporated Engineers, who would then no doubt become the WEEs, WEMs, WECs and indeed the WEPs of the 21st Century! Yours sincerely – Roger Robinson

Editor: This is obviously a personal view which appears to have some support in the RSME. No doubt it will spark a lively debate.

THE BAILEY BRIDGE ACROSS THE RIVER DON AT ROTHERHAM

From Major D R Vernon

Sir, – Almost fifty years after the first ever operational Bailey Bridge, a 100ft triple single built across the River Medjerda at Medjez el Bab in Tunisia on the night of 26 November 1942, a 100ft single single footbridge was rebuilt across the River Don at Rotherham, the town where the late Sir Donald Bailey was born and educated.

The replacement bridge had itself replaced an old wooden one in 1947, the result of a joint enterprise between Rotherham Corporation and Rawmarsh UDC. The cost then of the ex-WD equipment was £300, and the erection was supervised by the late Mr Matt Melia, a former CSM of 122 Road Construction Company and later Clerk of Works to the Corporation.

In June 1991 a chance remark to Mr Don Scott, the Curator of the York and Lancaster Regimental Museum, but also concerned with the military history of Rotherham, resulted in an enquiry to Colonel Gerald Napier, as to whether the very dilapidated bridge was worth preserving. Colonel Napier, aware of Sir Donald's connection with Rotherham, advised it would be appropriate to ensure the Eastwood footbridge was preserved and in turn requested the writer to assist the project by whatever means possible.

I visited the bridge and observed the sorry state of the steelwork, decking and abutments, at some date a single chord had been added to the top chord of the panels, but otherwise it appeared to have had little or no maintenance since it had been erected.

In July 1991, I wrote to the Mayor of Rotherham, Councillor Oscar Hartley, suggesting the bridge be preserved as a local memorial to Rotherham's great inventor, and that some of the work involved might provide a useful TA exercise. There followed some discussion with the Commander of 29 Engineer

Brigade and, through his interest, 106 Field Squadron (V), under command of Major S Gowen, dismantled the bridge on 4/5 July 1992. Rotherham Metropolitan Borough Engineer Department cleaned and repainted the bridge green, using epoxy resin, and repaired and strengthened the abutments. Two end transoms were replaced with handmade pieces and 20 sets of sway bracing from wide Bailey equipment were cut down to size.

The rebuilding of the bridge, on new abutments, was undertaken on 18/19 July by 106 Field Squadron, at an estimated cost of £30,000. It will remain a useful memorial to one of Rotherham's most distinguished sons, who made such "an immense contribution towards final victory in World War Two."

The ceremony to rededicate the bridge took place on Saturday 26 September 1992, which dawned grey and damp, the ground sodden from overnight rain – typical bridging weather, but spirits were raised by lively music played by the Silkstone Brass Band, and the bridge was adorned with flowers; I wondered if this might be the first time there were flowers on a Bailey!

The Mayor of Rotherham, Councillor Jack Carr, took the salute as a detachment of 106 Field Squadron and some hundred veteran Sappers with their standards from eight RE Associations, marched past to "Wings". The Leader of Rotherham Council, Councillor Sir John Layden JP, in a felicitous speech, welcomed the guests and invited Lady Bailey to present to the Mayor, Brian Harpur's book "A Bridge to Victory", for which the Mayor, an ex-Sapper himself, made suitable reply. Lady Bailey then unveiled a memorial plaque on the bridge.

The ceremony concluded with a short service of rededication and a vote of thanks to the guests and all concerned with the project, after which the "National Anthem" was played.

A civic reception was held in the Bailey Suite, Bailey House, and Lady Bailey invited her granddaughter, Christina, to unveil a second plaque in the entrance lobby. The plaque reads "Erected by The Yorkshire Society and Rotherham Borough Council, Sir Donald Bailey OBE, Inventor of the Bailey Bridge, Born Rotherham 1901."

During the reception, Colonel R S Eyre ADC TD, Commander 29 Engineer Brigade, presented the Mayor with a framed copy of Cuneo's famous painting of the assault crossing of the River Rapido at Monte Cassino, Italy, by the 7th and 225th Field Companies RE on 12/13 May 1944, a painting which truly captures the hazards faced by Sappers in action. The painting, provided by the Barnsley REA, will hang in the Town Hall for posterity. Responding to the gift, the Mayor

Lady Bailey with her granddaughter, Christina, unveiling the memorial plaque.

referred to the sad loss of many young lives in the interests of saving thousands in pursuit of victory. The Mayor then presented Lady Bailey with a cut glass rose bowl which she accepted as a gift she would treasure all her life. I believe Lady Bailey was quite overcome by the manner in which her husband has been commemorated in Rotherham.

And dear readers, you will not be astonished to know that this happy occasion was finally concluded by a veteran Sapper inviting the Mayor to lead the singing – with some varied words – of the "CRE", and for this the Silkstone Band had not needed a score!

Rotherham Metropolitan Borough Council did Sir Donald proud and 106 Field Squadron were delighted to have been involved in such a worthwhile project. – D R Vernon.

SEA MINE TABLE LIGHTER

From Major L M Smith

Sir, – I was most interested to read the article in the December edition of the *Journal* regarding the Sea Mine Table Lighter from the Clyde Submarine Miners. This Squadron is the present day descendant of the Clyde Division and still holds as a prize possession, the "Glasgow Cup" referred to in the article.

The Glasgow Cup was presented to the Clyde Division Royal Engineers by the City of Glasgow in 1891 in appreciation of their efforts in providing the defence of the Clyde and its approaches.

On 25 November 1859 a meeting of Civil Engineers, Architects and Surveyors was held in Glasgow with a view to the formation of a Military Engineer Volunteer Corps.

The 1st Lanark Volunteers Engineer Company was established on 27 February 1860 and increased rapidly in strength so that by 1884 the 9th (Submarine Mining) Company was formed for the defence of the Clyde. A further submarine mining company was formed on the Clyde on 1 February 1888 and both companies were formed into, "The Clyde Division, Engineer Volunteers, Submarine Miners, Royal Engineers", with its headquarters at Fort Matilda in Greenock. At its peak in 1900 the Clyde Division consisted of four companies with forts at Fort Matilda and Port Kil (Kilgreggan) and two vessels, the steam minelayer *Napier of Magdala*, and the steam launch, *Sir Donald*.

The area between Fort Matilda and Port Kil Bay was completely mined with ground mines in shallow water, electric contact mines barely awash with the surface and buoyant mines 47ft below the high tide mark providing passage. The mines were detonated by remote control, the plan being that any disabled vessel would then be sunk by the Garrison Artillery.

On 31 March 1908 the responsibility for coastal defence was passed to the Royal Navy and the units reroled. The present-day descendant of the Clyde Division was formed from 102 (Renfrewshire) Corps Engineer Regiment on 1 April 1967 as a Field Squadron and reroled 102 (Clyde) Field Support Squadron on 1 April 1992. This latter unit is part of 71 (Scottish) Engineer Regiment Volunteers which is in turn part of 1 UK Armoured Division (ARRC).

The centenary of the Glasgow Cup was celebrated at a dinner on Saturday 11 January 1992 at which the officers of 102 (Clyde) Field Squadron were joined by naval officers; COMCLYDE from the Clyde Submarine Base Faslane and the COs of *HMS Graham* (RNVR) and *HMS Dalriada* (RNAuxR).

The Glasgow Cup is a fine piece of silver and the naval officers at the centenary dinner remarked that the dolphin motif on the cup indicated that the Corps had this symbol before the Royal Naval Submarine Service. I have enclosed a photograph of the Clyde Cup that I hope will be of interest to you. Yours Aye – Major L Smith

IN MEMORIUM

From Lieutenant Colonel G E P Mulhern OBE

Sir, – An "In Memorium" notice regarding the death of *Picture Post's* founder, Sir (Henry) Thomas Hopkinson Kt in June 1990, took me back to early 1941 and a prisoner of war camp at Fayid on the shores of the Great Bitter Lake in the Suez Canal zone.

It was from General Wavell's brilliantly planned and executed attack on Marshal Graziani's Army at Sidi Barrani on 11 December 1940 that this camp was filled with many thousands of captured Italian soldiers – later to be shipped to South Africa and elsewhere.

The Camp Commandant was Lieutenant Colonel Tommy Lang, a prewar friend of mine and he had invited me over from Cairo to have a look at the camp.

The artistry and sculpting talent exhibited by the prisoners was astounding. For example, at the entrance gate was a life-size figure of a *carabiniere* in colourful uniform with his right arm at the salute.

Outside many tents were reclining female figures, nude of course, and one tent was guarded by two absolutely lovely statues of mermaids standing upright on their fish tails. All these were in appropriate bright colours.

The *pièce de résistance* was an upright panel some 10ft by 4ft of Leonardo da Vinci's "The Last Supper" with all the figures and table standing out in embossed relief.

Tommy Lang said that this amazing work was sculpted in wet sand covered by a paper thickness of cement, the latter obtained by working parties of prisoners each grabbing a handful of dry cement as they passed by a heap alongside the RE Works' yard.

The pigments were crushed pieces of rock from the hills beyond the camp which was puzzling since the terrain was just

Correspondence (p104)

desert-type sand. The only colour seemingly unobtainable was terre-verte (green).

I recall thinking that whatever these Italians lacked as fighting soldiers they more than made up for as talented artists.

The advance of the Eighth Army from El Alamein nearly two years later brought us to a brief stay at Mersa Matruh.

In nosing around with a few others we came across a cosy dugout near Smuggler's Cove made by officers of a British unit prior to the last German advance. A notice outside "instructed" the new tenants to leave the place in good order in readiness for our imminent reoccupation. The Germans had endorsed the notice with a polite response.

On the bench seat inside the dugout was a pile of Dortmunder and Berliner *zeitungs* and German magazines but, lo and behold, also a copy of *Picture Post*, the latter obviously left behind by the British unit. Inside the centre piece was a plate of "The Last Supper", the picture having been taken at Fayid by *Picture Post's* Middle East correspondent's photographer! How I wish I'd kept it! Yours sincerely – G Mulhern

Reviews

BADGE BACKINGS AND SPECIAL EMBELLISHMENTS OF THE BRITISH ARMY

C E AUDAX

Available from Regimental Headquarters, The Royal Irish Regiment, St Patrick's Barracks, BFPO 808 – Price £10.95 + £1.50 p&p
ISBN 0 9514342 0 9

GENERAL Sir Robert Pascoe, lately General Officer Commanding Northern Ireland and then Adjutant General, wrote in the foreword to this book:

"I must confess that until I was introduced to this project early in 1986, I had never thought much about badge backings and embellishments of the British Army! But when I saw an early draft and exchanged a few letters with the author I readily agreed to write this short foreword. I did so for two reasons: first to help an ex-rifleman achieve his ambition of publishing such a wealth of information for the interest of those who specialize in military badges and backings. Second and more important, because he deserves great credit and full support for his enterprise and extreme generosity in donating all proceeds arising from sales of his work to the Ulster Defence Regiment Benevolent Fund.

As General Officer Commanding Northern Ireland I am only too well aware of the continuing sacrifice of the men and women of this, the youngest, and largest Infantry Regiment of the Army.

I commend the compendium of detailed information not only to serious collectors but also to those who wish to recognize the invaluable service of the Ulster Defence Regiment."

This book of some 300 pages contains a mass of detail on Corps and regiments, some of which are still in existence and others long disbanded. The author spent over six years researching his material and endeavoured to ensure that his work was as comprehensive as he could possibly make it. Whilst the history of cap badges is well documented elsewhere, this book provides much detail on some of the lesser known features of army dress. The black and white illustrations are very clear and the book is liberally sprinkled with anecdotes and accounts of heroism.

I strongly recommend it both as a reference book for specialists in this field and for those who have a passing interest in the finer detail of military dress.

RJDR

SWORDS OF LIGHTNING

Special Forces and the Changing Face of Warfare

TERRY WHITE

Published by Brassey's (UK) Ltd, 165 Great Dover Street, London, SE1 4YA – Price £15.95
ISBN 0 08 040976 8

BARELY a year passes without some dramatic demonstration of the ability of Special Forces to deliver spectacular military results at a fraction of the cost of conventional forces: 22 SAS claims to cost the same as a mechanized company in BAOR but its list of successes ranges from destroying SCUD missiles in Iraq to the Pebble Island raid in the Falklands War to the Iranian Embassy rescue. This book sets out to describe how Special Forces are selected and trained, and how they are used.

The author, an academic turned freelance writer with some TA experience, draws mainly on US sources although he makes some use of British, Australian, German, Soviet Union and other material. The book is in three parts, the first being about selection and

training, the second about past operations and the third about possible future developments. The British reader will find the coverage of the United States' Special Force experience in South East Asia of the greatest interest. The description of the arming and training of the Montagnard peoples in the Central Highlands of Vietnam is excellent, as is that of the battle for the Ho Chi Minh Trail down through Laos and Cambodia. In the latter, it is fascinating to read of the conflicts between the USAF and the CIA, each of which was operating to their own, separate agenda, even to the extent of spying on each other. The relative performances of the United States and the Israelis in Combat Rescue is well covered: the failure of the US to rescue POW from North Vietnam and Embassy personnel from Teheran is ascribed largely to overly complex and ponderous command and control arrangements whereas the success of the Israeli rescue of its hijacked nationals from Entebbe is ascribed to simplicity in this area.

The lack of material on the operations of the Soviet Union or indeed the more recent exploits of 22 SAS is attributable to the fact that the book draws almost exclusively on open sources that have already been published in some other form. For this reason also, the hastily assembled postscript on the war to liberate Kuwait has no new revelations on what General Schwarzkopf described as a "Special Forces theme park". However, this use of open sources does lead to one of the strengths of the book in its five page bibliography for those wishing to pursue the subject further. It is also surprising to see so little mention of the founder of much of modern Special Force concepts, Colonel David Stirling; it was he, not the Americans who "developed the deep reconnaissance into an art form", in the Western desert, 25 years before Vietnam (p 152).

Overall, this is a very readable book that provides a broad description of a wide range of Special Force operations and is a good introduction for the non-specialist.

MJP

STICK AND STRING

TERENCE TINSLEY

Published by Buckland Publications Ltd, 125 High Holborn, London, WC1V 6QA – Price £9.95
ISBN 0 7212 0897 5

THIS is a light-hearted and very entertaining account of the author's experiences when under training in the UK in 1940-41 and serving with King George V's Own Bengal Sappers and Miners in India and the Arakan in 1942-46. It will appeal to the general reader as well as to those with a particular interest in the Indian Army, the Arakan campaign or conditions in India in wartime. It is well written in an easily flowing style and there is a good deal of humour. As might be expected, the story reflects the outlook and interests of a young subaltern rather than studying the strategy or the logistical problems of the campaign.

Terence Tinsley was one of the generation that at the start of the war was still at school intending to try in due course for entry to the Royal Military Academy Woolwich and a commission in the Corps. On the outbreak of war the Shop was closed and in 1940 Tinsley, having obtained a place at Christ's College Cambridge, was accepted under a special scheme for the training of potential officers for the technical arms. This involved going through No 3 Training Battalion RE at Ripon in a special party followed by six months at Cambridge and a further six months at 142 OCTU Aldershot, after which he was commissioned and sent to India where he had been born. After the long and evidently very enjoyable voyage round the Cape he found himself – like his father in World War One – joining the Bengal Sappers and Miners at Roorkee, where he was soon posted to a new field company in process of being raised. At that time, early in 1942, each newly formed unit was sent eastwards to take some part in meeting the Japanese advance through Burma and the growing threat to India. Tinsley was immediately sent on detachment with one section (troop) of the company on a secret mission to Assam, to be ready to destroy a certain oil installation should the need arise. For four months his sleeping quarter and shelter from the monsoon rain was the garage housing the many boxes of gelignite held for the demolition.

73 Field Company and Tinsley with it spent the next three dry seasons (October 1942 – April 1945) in the Arakan, first as divisional engineers and then as Corps troops. In both roles they were mainly engaged on roadmaking and bridge building in that undeveloped country, where before the arrival of the Army movement had been almost entirely by water. The heavy monsoon rains in the summer months, and occasional heavy storms out of season, brought movement to a halt until damage to the road had been repaired. At first there was little equipment: earthwork was done by local coolie labour and most of the bridges were built of locally cut timber. One timber piled bridge built by the company (and rebuilt the following year after being demolished in the 1943 retreat) is said to have been six hundred feet long.

With the onset of the monsoon in April/May 1943, and again in 1944, the company was withdrawn from

the Arakan to the Ranchi area in India for rest and retraining and this gave opportunities for leave. Tinsley took advantage of these, and also of attendance on courses, to visit and make friends in other parts of India. Soon after his arrival someone would usually get up a party to go to a dance and the gay life that survived in some parts of wartime India is described with zest. Before the war was over he had become engaged and at the end of 1945 he and his fiancée were married, and the peacetime rule that any young officer getting married would be posted away from the Bengal Sappers no longer being enforced. He had by this time been promoted to major to command a field company in a training division near Roorkee, which gave an opportunity to pass on some of the lessons learnt in the Arakan. After his marriage he was posted to command a parachute squadron at Quetta and when that came to a sudden end he returned to Roorkee for his third command, the distinguished 4 Field Company of 4 Indian Division. The narrative ends with his return to the UK to begin a two-year supplementary course, followed some time later by his wife who, it emerged when the time came for disembarkation, had never owned a passport. However a well-disposed immigration officer stamped her vaccination certificate and the couple were reunited.

Tinsley appears to have total recall of the details of his adventures 50 years and more ago, though he disarmingly apologises in advance for the many errors which he says abound in his account. Be that as it may, readers will allow the author of such a lively, amusing and informative story a degree of licence if required.

DCSD

ILLUSTRATED HISTORY OF 20TH CENTURY CONFLICT

NEIL GRANT

Published by Hamlyn, Michelin House, 81 Fulham Road, London SW3 6RB – Price £18.99
ISBN 0 600 57464 4

A HEFTY book which attempts to present a year by year account of this Century's conflicts, illustrated with black and white photographs. The events are "described in a vivid journalistic way", which no doubt explains the superficiality of the coverage. But at least, with the benefit of hindsight, the articles lack the traditional journalistic disregard for accuracy, although it might have been more interesting if the book had included facsimiles of contemporary newspaper articles.

Some of the quieter years are dismissed in a single page (eg, 1957, which has three short articles entitled "Hussein defies opponents", "Khrushchev disperses opponents", and "Stand-off at Little Rock"). The years of the two World Wars naturally receive fuller coverage, with up to 14 pages per year.

The book contains no maps with which to locate the places mentioned. There is an index of about 3000 items, which fails to mention engineers, let alone Royal Engineers. The best features of the book are the collection of sometimes quite interesting photographs, and the brief articles on many forgotten minor campaigns.

Every expense has been spared on the production; many of the photographs are grainy, and the book is printed in China on what appears to be recycled paper.

CPRB

GLUBB PASHA

(The life and times of Sir John Bagot Glubb, Commander of the Arab Legion)

TREVOR ROYLE

Published by Little, Brown & Co, 165 Great Dover Street, London, SE1 4YA – Price £20.00
ISBN 0 356 176 79 7

THE author tells us that his father was a Sapper Officer with the Indian Army in the Middle East during the (Forties) War; this circumstance may contribute to the fact that Trevor Royle has undoubtedly taken an immense amount of trouble to research his subject, using the lifetime of the Pasha as the background for this *tour de force* on the history of that area.

Royle's appreciation may have been enhanced by his visit to the Coalition Forces in Saudi Arabia just before the recent Gulf War, quite apart from which he has much experience of writing about military and political history.

In the preface to this book, the author goes out of his way to explain that:

> "it is neither an official biography of a man, who lived an exciting life among the Beduin peoples of the desert, nor is it an account of a Christian Soldier's time in the service of empire ... although both elements play their part. Rather it is a political biography of a man, who is rightly respected as a key player in British diplomatic initiatives in the Middle East between the 1920s and the mid-1950s."

Judging the book by that standard, Trevor Royle has succeeded brilliantly in his coverage of the period, in so far as Glubb was directly involved; however, one might have reservations on two counts.

In spite of references to the Pasha's spirituality, especially in the chapter describing the latter years

of his long life, the author does not appear to be aware of the Pasha's evident "saintliness" perceived by many Arabs, and indeed by some Westerners, even in his earlier years. Not by any means "holier than thou", but his deep faith was evident, and was admired especially by many Muslims, who retain such fire in their hearts. It was this quality, in particular, which hindered for so long the efforts of ill-intentioned "bearers of false witness" – a reference well known to readers of the "Bible" – and, even in his last few years in Jordan, it took a massive onslaught by Nasser, and his expensive radio propaganda, to reduce the goodwill felt by the general populace of that country towards Glubb personally.

The other aspect of the book, which may draw some criticism, is the lack of precision both in the proofreading and in the author's choice of words. The latter hits one squarely in the eye when the cover is even cursorily perused, with its subtitle "Commander of the Arab Legion." Whatever may have been the case in the early days, Glubb always made it clear in the postwar years that the King was the Commander, and that he, the Pasha, was the Chief of Staff, and, like the Minister of Defence, essentially a servant of the King in this respect.

Perhaps Trevor Royle is hoping to sell the book in America, and has consciously played down, and even avoided mentioning, some of the unhelpful activities of US citizens, both private and official, in 1948 and thereafter. At that time, the US Government appeared to subordinate Jordan's interests to those of its fledgling "colony" Israel, and thereby played directly into the hands of Nasser and those dedicated to undermining the Hashemites, to whom the Pasha was giving his full support.

In spite of the circumstances in Jordan leading to Glubb's precipitate dismissal in spring 1956, it does seem that, by the time of his death 30 years later, King Hussein really did appreciate that the Pasha had truly been a devoted servant to Jordan and the House of Hashem.

Having aired these opinions, I must emphasize what good reading there is in Trevor Royle's book and I am confident that all, whose careers have included service in the Arab world, will find much to relate to their own perceptions. The book will also appeal to those who enjoy tales about the romantic figures of the Middle East, where Glubb Pasha holds much greater significance – OUT THERE – than does T E Lawrence, much publicised in the West as he has been.

Do read it!

JC

HITLER'S COMMANDERS

SAMUEL W MITCHAM
GENE MUELLER

Published by Leo Cooper, 190 Shaftesbury Avenue, London WC2H 8JL – Price £18.95
ISBN 0 85052 308 7

THE authors of this book have good track records of writing on the subject of the German Armed Forces between and during the Wars. Mitcham is a graduate of the US Army Command and General Staff College. His books include "Rommel's Desert War", "Rommel's Last Battle" and "Hitler's Field Marshals and their Battles". Mueller is Professor and Associate Dean of Arts and Sciences at Henderson State University and is the author of "The Forgotten Field Marshal – a Biography of Wilhelm Keitel".

On first picking up the book, the reader might feel that a series of pen pictures could become a repetitive and boring read. But the authors have cleverly woven the pen pictures into the campaigns in which their subjects take part and this retains the interest. In addition, details of the family backgrounds and personal lives of the commanders help to bring the stories to life. But perhaps too many commanders have been included and the information given on some is scanty.

A wide diversity of commanders is included and not only those who reached the highest ranks are mentioned. The writer of this review had never heard of Captain Hans-Joachim Marseille of the *Luftwaffe* though he suspects some readers of the *Journal* will know of him. In his early days we read of him "His personal file bulged with negative reports concerning his unmilitary behaviour, his long hair, and/or his overly casual bad attitude. Indeed, Marseille was more a lover than fighter during this period." But later away from the fleshpots in North Africa we read, "Marseille reached his peak in September 1942 when he shot down the incredible total of 61 British airplanes in a single month. He had shot down more British aircraft than anyone else in history including Baron von Richthofen." Marseille died near El Alamein on 30 September 1942 two months short of his 23rd birthday.

The book covers officers of the Army, Navy and the *Luftwaffe*. It is fascinating to read of the diversity of men who came to power in the German Armed Forces in the 1930s and their reactions to Hitler and the Nazi regime. Field Marshal Wilhelm Keitel was a prime example of those officers whose loyalty to Hitler went too far. His unquestioning loyalty to the *Fuhrer* earned him the

nickname *La Kaitel* – "the lackey" among his brother officers.

Inevitably in a book of this nature clichés creep in: of General Burgdorf we read concerning his appointment as Chief of Armaments of the Army "nevertheless, he gave it his best effort." There are some spelling errors. For example on p149 referring to von Luettwitz we read "His squad performed credibly in the Autumn (Olympic) games and won several medals." Surely the authors mean "creditably"?

But these are small blemishes, and despite the suspicion that the authors sometime waver from the aim of writing a coherent story and resort to brief sketches, potential buyers should not be deterred from obtaining this excellent book. It can be dipped into, laid down and returned to with great enjoyment.

FRB

BERLIN THEN AND NOW

TONY LE TISSIER MBE

Published by After the Battle, Church House, Church Street, London, E15 3JA – Price £39.95
ISBN 090091372X

THIS book is about the fascinating story of Berlin. It is highly recommended for anyone who knows Berlin, and makes valuable reading for those intending to visit this wonderful city.

The book was published to mark the collapse of the Berlin Wall and the subsequent unification of Germany. The author has a simple *raison d'être*: to depict the battlefields of World War Two as they are today. Their principle method is to compare archive photographs of part of a battlefield then with a picture of the same area as it looks today. Add good narrative and the book on Berlin makes a splendid read.

The book looks at Berlin in it's different phases. The early days leading to World War One; the Weimar republic when Communist and Nazi fought each other for control of the streets. It is sobering to appreciate how much violence ensued in this struggle. Indeed it helps explain the "no quarter given" on the Eastern Front in the Second World War. Throughout the book a wealth of then and now pictures almost allows the reader to live the events that happened.

The chapter on the Third Reich provides a clear picture of the transition to a totalitarian regime.

The book has a nice touch of looking at several side issues – the Berlin Olympics of 1936 are well covered and those who have served in Berlin will recognize many of the buildings in British use today. The Maifeld, place of the annual British polo tournament, and the Deutschland Halle, where the British Tattoos were staged, are shown in the time of the Nazis; the excellent aerial views of the stadium show how much of the original structure has survived.

The book then examines how Germans became more totalitarian and how Hitler wanted to reshape Berlin with his vision of grand buildings complimenting those of the previous century. As the book shows, Berlin's many postwar buildings are bland "carbuncles" compared to their predecessors which were destroyed in the war.

The main part of the book covers Berlin at war. The coverage of the battles between the Allied Air Forces and the Germans over Berlin describes the struggle on both sides. "We can wreck Berlin from end to end if the USAAF come in on it. It will cost us between 400-500 aircraft. It will cost Germany the War." So Bomber Harris claimed. A nice mix of photographs, sketches, maps and captions bring the horror of the battle for Berlin to life. Whilst the value of the bombing campaign remains a moot point, the destruction was terrible.

Goebbels says: "How beautiful Berlin was at one time and how run down and woebegone it now looks." Indeed a look at the old pictures shows that much of this beautiful city has disappeared.

The Soviet assault on Berlin is covered by a clear and instructive account of the final offensive over the River Oder onto the Seelowe heights and then on to Berlin. The Soviet problem was to cross several waterways which had been developed for defence. Combined with good positional defences on the reverse slopes around the Seelowe heights the Germans inflicted enormous casualties on the Soviets. No less than 21 bridges maintained the Kustrim bridgehead until the eventual break out.

The book's description of the street fighting is excellent. The description of the tactics used show that we have forgotten much in the FIBUA business. Your reviewer cannot help but feel the loss of the British 165mm demolition gun is a major drawback when compared with the Soviet experience of fighting in Berlin. The rivalry between Chuikovs and Koniev, exploited and abetted by Stalin, shows that the Soviets were not without their differences amongst the high command.

The waterways of Berlin, the second largest in Europe, have their story too. The Soviets sent several destroyers to take part in the battle although no detail or pictures of Soviet engineer work are featured.

What is not commonly known is that some 130,000 German prisoners were shipped to the Soviet Union and remained there long after those in the West had been repatriated. For example only 5000 of the

250,000 captive men who were sent to Stalingrad survived to return in 1955!

The story continues with the occupation and postwar period. One officer, Richard Brett Smith, tells how the Berliners welcomed the British – seen as saviours from the brutal Russians.

Anyone who is contemplating reorganizing a city in ruins could well study the British experience in Berlin. The Germans felt that we were the most efficient in getting order re-established.

The book provides a useful and concise account of the Berlin Blockade, Berlin's part in the Cold War, the creation of the DDR with the rise of the Berlin Wall. Unification is well covered too and provides an interesting account of how the Allies have started to hand over many aspects of control and depart. The discovery of Hitler's bunker in 1990 is also well covered and makes a good read. In all this book is well worth the money.

MWW

THE SHIELD AND THE SABRE

NIGEL PEARCE

HMSO Publications Centre, PO Box 276, London SW8 5DT – Price £19.95
ISBN 0 11 701637 3

NIGEL Pearce has given us an illustrated record of the Gulf War in which excellent photographs confirm a story of unparalleled success. The foreword by the Prince of Wales sets the tone – success by best efforts, the fruit of past excellence and present devotion, in the battle line and on the home front. The yardstick is the enduring memory of the Desert Rats, and their successors are not found wanting.

Setting the book in historical context, the author provides a balanced history of the region. Many will find this a depressing repetition of how short memories are in the realms of foreign policy. The British deployment of 1961 might have brought home the Iraqi perception of the territorial sovereignty of Kuwait; borders long disputed in an area of such oil bearing wealth remained sown with the seeds of conflict in the post colonial era. We gain no further insight into how the political plane ignored or failed to cull the warnings and this, as ever, is where the soldier's tale starts.

A review of the meeting of American President and British Prime Minister sets us on the road to war – Nigel Pearce only lets us glance at the American pressure which is exerted on the UK at various stages in the campaign. There is no search for political or strategic objectives, events have moved too fast. Reaction, the overcoming of caution and a leap into the unknown are the order of the day: and we see the British Army leap from Cold War into the new age. Confidence, success, adaptation and courage breathe out from this excellent assembly of bright photographs. We see it with the benefit of hindsight: no hint is given of the spring from Germany garrison culture to Desert Rat, the cultivation of new values swift and imaginative innovation, a rediscovering of the strengths of family, regimental and communal life. But the author has balanced his tale: the sacrifice and goodwill of those who did not go to the Gulf but instead gave men, equipment and care to those remaining does not go unnoticed, despite a very quick brush over the adventurous and uncertain nature of the early deployment.

A mixture of chronological and subject chapters makes the book an easy and interesting read. Chapter 3 *The Long Wait* is an unfortunate heading with which to cover a period when the hours and days were not long enough in which to train, to support, to supply, and to repair. However, this gives us the chance to see more of the unsung heroes than other Gulf books which tend to set a narrow focus on the glamourous. So we have the opportunity to examine something of the lifestyle, the risks, the celebrations, glimpses of post, pets and *pissoirs*, before returning to the international context in which the operation is to be fitted.

As the days for action draw near, most Arms and Services in training and support are covered. Many Sappers will still be disappointed that the breadth of their activity is not reflected in the text, but there is a reasonable spread of photographs of their art, from combat to works, and (as far as fading memory will allow of it), accuracy has been well achieved.

Truth begins to falter when battle starts, and the short, crisp account of the war offers us no new surprises; with hindsight it is all quite clear, a series of snapshots, easily pieced together. Perhaps the clean metallic names of the objectives conspire to confirm the modernity of this war, for it takes the description of the destruction of the two Warriors of the 3rd Royal Regiment of Fusiliers to remind us that this campaign is no different from others. Confusion and uncertainty deserve more place as actors in war or we fall prey to our own delusions of technical superiority. The unleashed power of multiple launch rocket systems, of Challenger TOGS, or of heavy artillery, ultimately relies on humans not to hit their own in battle, and such incidents, while mercifully few, were not confined to the A10 tragedy.

Throughout, Nigel Pearce captures the sense of purpose of all of those involved; press and media

are bound into the great endeavour, the objective finally reached at the Kuwait cease-fire line, the Iraqis ejected from Kuwait. Was that the aim? We are left wondering and the aftermath of a burning battlefield, the relief of victory, withdrawal at speed and the joy of homecoming, with private and state celebrations, again mask any gainful search for the student of regional policy or strategic aim. To the question, "was it worth it?", Nigel Pearce leaves us in no doubt. The soldier's tale is one of unqualified success, which John Keegan in congratulatory tone, reinforces in his afterword.

He may yet regret his last words to the effect that "regional power seekers now know that naked aggression will be met with effective response by the guardians of international order." The whys and wherefores are not analyzed nor does the author reflect on the cathartic experience for the Army which closed the Cold War chapters and set it on its new course. Nevertheless, Nigel Pearce does a fine job in documenting the campaign, and in portraying the soldier at his best, he has written a very readable addition to the family library. Those who were involved will find this a fairer account of their contribution than other authors have captured. It will remain a popular work and a vivid document of the British Army passing its first milestone after the Cold War.

JDMB

THE SAPPERS WAR

With Ninth Australian Division Engineers
1939-1945
KEN WARD-HARVEY

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FEW divisional engineers of any nationality had experiences to compare with those encountered by the Engineers of the 9th Australian Division in the 1939-45 war.

Their travels took them to England, North Africa, Palestine, Lebanon, back to North Africa, Palestine, Australia, New Guinea, Australia, Borneo, Brunei and Sarawak. Their tasks ranged from tactical demolitions retreating from Agedabia to Tobruk; mines and defensive works in Tobruk; minefield clearance in the hard fought battles of El Alamein; camp construction; jungle warfare; assault landings; railway repair and operating and fighting oil well fires. Their motto might have been *Ubique et Omnia*!

Ken Ward-Harvey's book starts with the formation of the individual units in Australia and follows the headquarters and two companies to join Australforce in Southern England. These elements then moved to Palestine to join two other companies and form the Engineers of the 9th Australian Division in January 1941. From here they moved to the Western Desert soon to become involved in the hectic withdrawal from Agedabia through Cyrenaica to Tobruk. They carried out a series of tactical demolitions with the CRE and his headquarters at times acting as firing parties. The whole operation being conducted without the Sappers having the benefit of radio communications! The 9th Australian Division formed the major part of the Tobruk garrison from April to October 1941 and the Sappers had a very varied and busy time in both defensive and offensive tasks. From Tobruk the Divisional Engineers moved out by destroyer and were withdrawn to Palestine. A period of rest, refit and retraining was spent in Palestine and Lebanon where they had to construct camps and prepare defences in case of any enemy move from the North.

July 1942 saw them back in the Western Desert at the seaward end of the Alamein position. Here they took part in the defensive battle of Alam Halfa and later were involved in some of the toughest fighting of the Battle of El Alamein. By this time the units had been equipped with wireless which was evidently much appreciated.

The news from the Pacific was now a disturbing element, and so it was with no surprise and some relief that in late November 1942 the division was pulled out of the battle back to Palestine to embark in January for Australia.

In April 1943 the Division concentrated in North Queensland where once again the Sappers had to construct their own camps. Then followed intensive training particularly for combined operations and the assault in early August on the coast of New Guinea near Lae. Once again the variety of tasks for the Sappers, including assault bridging and rapid road construction through jungle, all in tropical conditions was impressive. Further assault landings followed in the drive up the coast to Finschhafen and Sattelberg before the Division was withdrawn to Queensland in January 1944, for refit and retraining. At this point they were introduced to the bailey bridge for the first time. There then followed what turned out to be a long, and at times frustrating, period before the Division was committed again to operations. Politics and personalities played their part in a period of uncertainty for the Australian forces and the role they should take.

In April 1945 however the 9th Australian Division Engineers were once again launched into

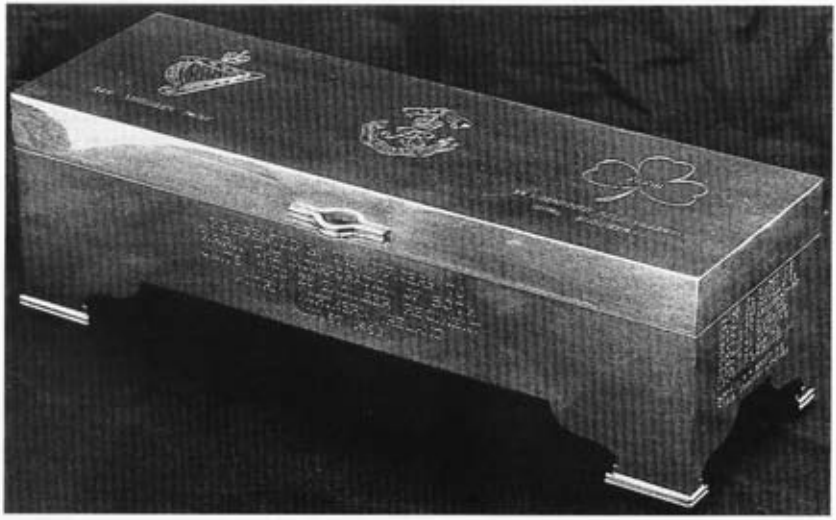
a series of assault landings on Tarakan in Borneo, Labuan, Brunei and Sarawak.

This time their tasks included the removal of beach obstacles, bomb disposal, railway repair and operation. At the end they were faced with extinguishing the many fires among the oil rigs at Seria. The description of the latter is of particular interest in view of recent events in Kuwait.

The author has taken personal accounts by junior officers and sappers to describe all stages of each campaign and woven them into his history. These include the experiences of several who were taken prisoner in the Western Desert and held captive in Italy. He has made successful efforts to present the events through the eyes of those who took part and so give the readers an excellent taste of sappering at the soldiers level. The book is well illustrated with excellent photographs and maps and makes good reading for the old, who are reminded of their own experiences, and for the young who can see the versatility of the engineers in war.

SEMG

The Massereene Cigar Box



THE Massereene Cigar Box was commissioned by the officers of 33 Independent Field Squadron and 325 Engineer Park who were serving in Massereene Barracks, Antrim, Northern Ireland in August 1992. It was presented to 25 Engineer Regiment to mark the incorporation of both units into the Regiment on its arrival from Germany.

The box features the Corps cipher in the centre, flanked on either side by the motifs of the two units; the harp of 325 Engineer Park and the shamrock of 33 Independent Field Squadron. The names of the officers who were serving with the units on 1 August 1992 are engraved on the ends of the box adjacent to their unit's motif.

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