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Guidelines for Authors

The Editor is always pleased 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, especially if an article is well written and interesting.

Length. Approximately 4500 words plus illustrations.

Copy. Ideally one copy of the text should be submitted, together with a head and shoulders photograph of the author plus a short pen picture.

Clearance. Articles must be cleared by an author's CO where applicable.

Computers. Articles submitted on 3½in discs are very welcome. Please ensure that text is typed with no formatting, ie LH justified only, and please NO caps-only headings – all upper and lower case.

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Early June for the August 1997 issue
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Submissions before the deadline are particularly welcome.

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Editorial

ARTICLES from Bosnia still occupy many of the pages of our *Journal*, not surprisingly since most of the sappers in the field army have been there during the past year. One should not have to read between the lines to realize that "building the peace" and contributing to the reconstruction of a war-torn country is predominantly an engineer-led operation. How fortunate the army and IFOR have been to be able to call upon the multidisciplined, highly trained sapper who has the adaptability and flexibility which only a sensible investment in training has achieved. We risk all if we weaken and undermine the trinity of soldier, military engineer and tradesman of which the whole greatly exceeds the sum of the individual parts.

Operation Resolute – Observations from a Summer Tour in Bosnia sets the scene for several other articles about Bosnia with some good lessons to be learnt, not only by those who follow in the authors' footsteps but also by those in the corridors of power who direct policy in an era of value for money, competing for quality and private finance initiatives. If you want to learn more about this esoteric subject then *Shaping the Future of Training With VFM Through CFQ and PFI* explains all.

"If you want to get a job done, then give it to a busy man" rings true within the Corps. If by job you mean climbing to the top of Gasherbrum I, an 8067m peak in the Karakoram mountains, then who better to give it to than the Sappers? The article *A Twentieth Anniversary Celebration* epitomizes the great breadth and depth of challenge and interest in sport and adventurous training which the Corps promotes and succeeds in so well.

To many who are involved in the TA, their increasing participation in every facet of the work and life of the Corps is unremarkable, but others may be a little surprised. Not only does RE TA provide almost the full range of engineer support required by all three Services but it retains some of the skills and expertise which the regular Corps no longer has, for example Harrier and geological support. Not surprisingly, with the inter-tour interval of regular engineer units shorter by far than any other arm or corps, the RE TA has been evolving a strategy to make more and better use of its capability and talents to cover situations short of all-out war. It is not as straightforward as it might seem. *The Three Rs* is a provocative and interesting dissertation on the subject.

A gem amongst the historical-based articles is *"Black as Hell and Thick as Grass" – Reflections on Rorke's Drift and Isandhlwana.* You will not be disappointed in the others either but perhaps I might single out just one more: *A Searchlight on the Phoney War,* taken from an account written by Colonel Gabriel (deceased). It was found in an old exercise book which was amongst some of his papers passed to the Corps together with a most generous bequest from his estate to the Institution and Corps benevolence. The article adds further insight to this interesting if not unusual capability, which the Corps still retains within the TA.

Recently, three warrant officers of the Corps received their BA Honours degrees, the first no doubt of many to be awarded to clerks-of-work-trained engineers in the Corps. One of them has even gone on to achieve chartered status. It underlines the opportunities now afforded to our soldiers and confirms the academic strength of their training. Three years ago the Council of the Institution wisely introduced warrant officers as associate members. A further widening of the membership is perhaps timely and is to be examined in conjunction with a fundamental review of the objects of the Institution, first set out in its Charter over 120 years ago.

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Operation Resolute – Observations From a Summer Tour in Bosnia 1996

COMMANDING OFFICER AND OFFICERS OF 36 ENGINEER REGIMENT

The Commanding Officer and officers of 36 Engineer Regiment have individually produced observations following a most fulfilling and enjoyable tour on Operation Resolute *in the summer of 1996. Lieutenant Colonel Bob Hendicott had been in command for seven months at the start of the tour in April 1996, having previously been Military Assistant to Commander in Chief, Allied Forces Northwestern Europe, Chief of Staff 1st Mechanised Brigade, and Officer Commanding 59 Independent Commando Squadron. Majors Simon Gimson and Martin Fenn left the Procurement Executive to assume command of 20 Field Squadron and 61 Field Support Squadron respectively at the start of pre-tour training, and Major Tim Treanor concluded his time in command of 69 Gurkha Field Squadron in Bosnia, before moving to his current post as SO2 Engineer Operations in Directorate of Military Operations. Captain Doug Johnson-Poensgen had been Intelligence Officer in 36 Engineer Regiment for a year at the start of the tour, having previously been a troop commander in 22 Engineer Regiment.*

Left to right: Captain D H T C-G Johnson-Poensgen, Major S G S Gimson, Lieutenant Colonel R C Hendicott MBE, Major T L V Treanor, Major M A Fenn

Introduction

Lieutenant Colonel R C Hendicott MBE

36 Engineer Regiment's 1996 Bosnia tour had been programmed since the summer of 1994, although at that stage it was expected that the regiment would deploy as the British engineer battalion (BRITENGBAT) on Operation *Grapple 8*. That the regiment eventually deployed in the expected time frame but as Divisional General Support Engineer Regiment for Multinational Division Southwest (MND SW), and on Operation *Resolute*, is a story in its own right. It will be known to many, but will not be covered here. Suffice to say that we relieved 38 Engineer Regiment in late April 1996 and handed over to 39 Engineer Regiment in late October. We thus had the benefit of a summer construction season, our normal role as divisional engineers and an order of battle which had not changed from our peacetime structure in the UK.[1] We also had the advantage of compliance by the former warring factions (FWF), widespread freedom of movement and a reasonably secure environment in which to indulge in all manner of military engineering tasks in support of both the force and the local population.

[1] Except that 9 Parachute Squadron remained in support of 5 Airborne Brigade which had just completed a six-month tour in Northern Ireland as we deployed.

Commanding Officer & Officers of 36 Engr Regt
Op Resolute - Observations from a summer tour p196.

By any comparative yardstick the regiment had a thoroughly successful tour and was fully employed in productive engineering from start to finish. During the period a number of issues became apparent which merited placing on record and I invited those in key appointments within the regiment to expand their own views and thoughts on aspects which particularly interested them. Major Simon Gimson focuses on so-called G5 operations, using his experience of those tasks undertaken with the specific aim of shaping the opinion and support of the local populace towards IFOR (the NATO Implementation Force). Captain Doug Johnson-Poensgen, recounts the excellent work he did analysing mines data in order to develop risk assessment techniques and produce worthwhile information for those who eventually will be faced with long-term demining operations. Major Martin Fenn had a particular interest in quarrying operations as the supplier of the majority of the stone used in construction work within the divisional area, and he examines this work. Finally Major Tim Treanor, who by dint of his Gurkha squadron's experience of a wide variety of construction tasks is in an excellent position to comment, offers some thought-provoking views on the application of Construction (Design and Management) Regulations (CDM Regs) to an operational environment in the era of mission command.

First, I would like to summarize my own major impressions of the tour and there are just two which bear on the Corps itself. This is probably the first time that a sapper force of such strength, balance and capability has deployed in support of a wider peace-keeping operation. The flexibility of our overall structure to adapt to new circumstances is frequently remarked upon from both within and beyond the Corps. By the same token, the Balkan experience has yet again exposed the vulnerabilities of a tailored order of battle, exemplified by the difficulties experienced by 38 Engineer Regiment, deployed to the limited requirements of BRITENGBAT when they had to reconfigure to the divisional general support role. The flexibility of our standard squadron and regimental organizations has been proven on so many occasions in the past, in war and on peace-keeping operations, that we must recognize the need to avoid tailoring our forces to specific circumstances. Our standard organization really does work and we must have the confidence in our structures to deploy units and subunits as they stand, rather than piecemeal. As to relationships between various parts of the Corps deployed on Operation *Resolute*, Major Tim Treanor relates his own views.

The second impression which hit me strongly very early in the tour is that we suffer a real risk, on wider peace-keeping operations, of being subjugated to a combat service support role. We become focused more on support to the G4[2] aspects of the operation, by building camps and infrastructure, than on G3[3] aspects. For similar reasons we, arguably the combined arms commander's most potent force in the field of G5[4]operations, are in danger of being left to pick up the mess left behind by other arms attempting to advise locals on G5-related construction work, for which they are ill-equipped and untrained. Major Simon Gimson expands on the G5 aspect in his item. I simply seek to identify why we have become so G4 orientated, and I believe the answer is straightforward. As an army we have no proper military expeditionary force camp stores. The urgent operational requirement (UOR) camp stores procured for Operation *Resolute* – the Corimec camps – required such dedicated sapper effort to construct that we were able to do little else until the midyear point. On a one-year operation it must be unacceptable for camps to be unavailable for occupation until halfway through that period. It must be equally unacceptable to have the force's sapper component totally committed to something which does not directly relate to achieving the combined arms commander's mission. Expeditionary force camp stores based on high quality tentage, configured and held in unit packs, and erected by the occupier with minimal technical input, provide a very attractive alternative. Power, water, cooking and sewage units could all be containerized or trailer-mounted and battalions and company equivalents could expect to erect their own camps on green field sites in hours and days, rather than wait for weeks and months for us to do it. An additional attraction is the flexibility such stores would give to the manoeuvre commander to redeploy to suit his plan, instead of having to shape a plan which fits his bases, as is happening now in Bosnia. As a Corps we are ideally placed to drive an expeditionary camp project forward, learning from current mistakes as we do so. The alternative may be to accept logistic corps status.

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2 G4 Quartering/Logistics.
3 G3 Operations.
4 G5 Civil Affairs.

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G5 – Civil Affairs – How Should This Area of Operations Be Approached?

Major S G S Gimson

Shortly after my squadron deployed to Vitez, the SNCO, who had just attended an evening brief held by the infantry company, returned to inform me: "They are stopping all their G3 patrolling and from now on are only going to do G5 patrols."

This set me thinking: "why do some people believe that 'We can now do a bit of G5'?" I think the answer to this is that G5 staff work and operations are not taught in the army and the complexities of the subject are therefore not understood. As sappers we see the proposition to "do a bit of G5" as ridiculous but we should hesitate before becoming too critical of brethren wearing other cap-badges. How many of us understand the complexities of in-depth repair of a computer system or even specialist operations such as Joint Air Attack Team Missions (See Staff Officers Handbook, part 8). It is clear that we need to educate ourselves and the army as to what is meant by G5 activities and how tasks for these should be approached and carried out. I have been unable to find a definition in the limited number of reference books I have in Bosnia but *ADP Operations* and *Army Field Manual* Volume 5, give an overview if the reader wants to explore the subject[5] further. In this article I refer only to those tasks undertaken in support of local infrastructure, or to aid the local community in some way, and based on my own experiences in Bosnia. We must market the idea that G5 is at least as complex as G3 and that in operations other than war, such as those IFOR are undertaking, it should have equal prominence. We all know that in war-fighting there are three operations and a number of transitional phases. We are taught to consider the spectrum of conflict, from civil unrest to major war, and this idea of a spectrum could equally be applied to G5. It might be seen as minor repairs to public buildings at the low end, through road and bridge repair in the middle, to the replacement of major utilities and the maintenance or control of nuclear power stations after complete civil collapse, at the high end. Of course G5 and G3 overlap in many areas and in some ways we are reinventing the wheel. We became used to relying on good local infrastructure in the days of BAOR and have gradually lost those capabilities which were considered essential in World War Two (port repair, railways etc). Maybe we should study how it was done then?

To answer the question in my own sub-title, we should perhaps aim to create a G5 chain similar to the other organizations in our formation HQs, although lack of resources will probably prevent this. More logically, we should perhaps create a G3 (Civil Affairs) Branch within the G3 Staff Division, which would facilitate direct reporting to the Chief of Staff on all G5 matters. We should then consider which units have most to offer. I would suggest that it is the engineer, medical and, to a lesser extent, logistic and equipment support units and staffs. In some circumstances it might be the sappers who take the lead, but other arms would, of course, also need to be included in the team to ensure balance and to cover all disciplines. Also many of the organizations mentioned are normally employed full-time supporting the force, and it is probably only the medical area where there is regularly excess capacity for G5 work because their infrastructure is created at a level to cope with the worst case scenario. I believe that areas of responsibility (AOR) should be created to provide efficient control of G5 operations. Military G5 boundaries should conform to formation, municipal, political and geographical (eg water catchment areas) boundaries as far as possible. However, I recognize that this is probably an unachievable ideal given that few of the existing boundaries are themselves coincident. Each AOR could have a multidisciplined team with a minimum of engineer and medical representation. It is possible that the G5 cell at brigade HQ could be the focal point for the brigade AOR or, alternatively, CIMIC centres could be used. The CIMIC Centre at Vitez has acted as a very useful focal point for information transfer between the military, civil and non-governmental organizations (NGOs). Once there is an organization to run G5 tasks, data could be collected and collated. Local government and NGOs could provide much of this. For example the International Management Group (IMG) had, by the end of 1995, collected data about the infrastructure of Bosnia well before IFOR began to address the problem. The data included damage assessment reports, information about utilities, water catchments, local political nuances, and work planned or in progress by other organizations including the World Bank and other big players. It is easy for the recently-arrived soldier to begin the process all over again and thus waste time and effort. The six-month tour syndrome can

[5] See also *Army Doctrine and Training News*, November 1995, article by Lieut Colonel T G Williams, Adjutant General's Corps (Educational and Training Services Branch) on G5 operations.

result in nugatory work and also potential political pitfalls can arise from lack of knowledge. For example, water supply problems in the Vitez pocket have more to do with which faction controls the valves than with equipment deficiencies. It is also essential that data is controlled and not misused and, because this has been a problem, for example when given to media with faction links, a degree of trust must be established with NGOs.

To ensure that this new organization works efficiently local units will appoint G5 LOs to interface with relevant AOR G5 staff. G5 LOs would have limited autonomy and would act as a point of contact only. Funding and other decisions would be determined at a higher level.

In Vitez, 20 Field Squadron took on two major projects which were identified by the G5 LO, who liaised with the CIMIC Centre and IMG to check that these were not tasks others were about to carry out. IMG were able to confirm that Bukve School, one of the tasks, was not on the list of rebuilds planned by the World Bank which has considerable sums of money to spend over the next three years. Similarly, there was no work planned at Travnik Old People's Home until 20 Field Squadron arrived.

This introduces my next point which is that projects must be worthwhile and of long-term use. There is no point in painting the inside of a school if the roof leaks or even patching the roof if a new school will be built in six months' time. Tasks must be prioritized. Normally political factors will influence this process heavily and, particularly in a divided society, "neutral" projects such as those related to public utilities and health, are likely to prove least contentious. Certainly the Overseas Development Administration (ODA) used this system and sanitation, health and schools projects were all close to the top of their list. This resulted in the squadron rebuilding the primary school at Bukve and refurbishing part of the old peoples' home.

Funding is clearly a big issue. In Bosnia, the Foreign and Commonwealth Office has provided over £5m via the ODA, with delegated spending powers for their representative at divisional HQ. We should also look to NGOs or local government for funding. For instance, we assisted a charity with the installation of a washing and drying facility in Travnik Hospital, funded by Humanitarian Aid Medical Development (HAMD). It is essential that financial probity is maintained. Normal local purchase order (LPO) rules should apply if possible and cash should not be distributed by those who have played a role in negotiating the task. In countries where there are no banks it is easy for temptation to be placed in the path of those paying local suppliers.

A primary school in the Muslim village of Bukve, on the outer edge of the Vitez pocket, used as an ARBiH barracks during the war and rebuilt by 20 Field Squadron. Before (above) and after (below).

Finally we must consider the "End State" ie what will happen when our "crutch" of support is removed at the end of operations. Because the closure of CIMIC centres and the departure of engineering specialists may cause problems, the ultimate aim of G5 staff should be to "help them help themselves". Training and other aid must be provided which will survive long after we have departed.

In summary, G5 is a growth area, especially for sappers. Properly targeted assistance can make a huge difference to the local population at little cost and have a major impact on G3 aspects of an operation by creating goodwill. To achieve best results, proper training and control of the process is required. All arms must understand the complexity and difficulty of the problem, and doctrine and procedures need to be developed which must then be practised. The recently established G5 posts at Assistant Chief of Staff level at HQ Land Command, and at Central Volunteer HQ, will help this process and should ensure that next time we do not reinvent the wheel.

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Mined Area Analysis

Captain D H T C-G Johnson-Poensgen

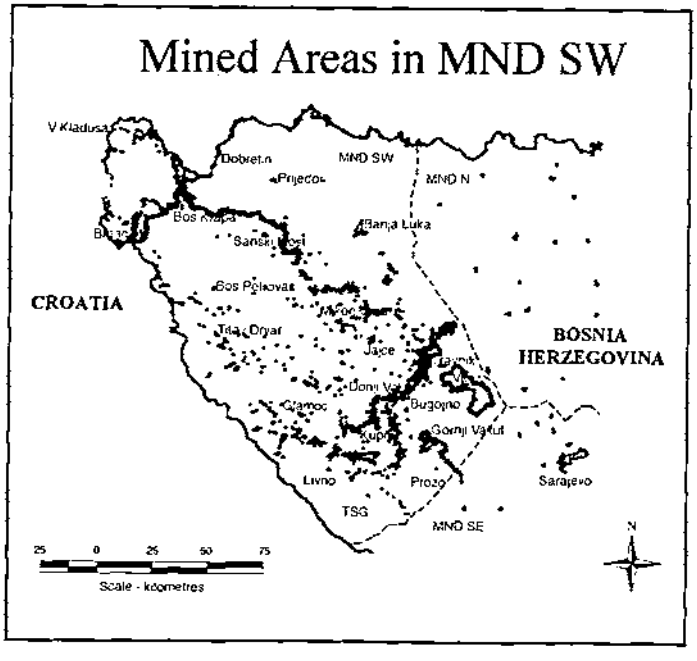
Following the UN Protection Forces' transfer of authority to IFOR in December 1995, the FWF were required, under the terms of the General Framework Agreement for Peace, to pass their minefield records to IFOR for collation in order that, amongst other things, the Zone of Separation could be cleared of mines. We now know that there are approximately 70,000 mines recorded in the MND SW (Multinational Division (Southwest)) area of Bosnia Herzegovina. The mine-polluted areas are concentrated around the former confrontation lines and are therefore generally known. The map below gives an indication of the distribution of mined areas in the MND SW area, with each square representing a recorded minefield.

As the minefield records collected from the FWF were collated, it became clear that conclusions would need to be drawn from the vast amount of information in them. 36 Engineer Regiment, as the divisional general support engineer regiment, was tasked with analysing the information and drawing practical conclusions from it. We already knew that there was no method for assessing the accuracy or reliability of the 3500 or so records that had been collected and, to complicate matters, it was widely accepted that there was a considerable number of mined areas for which no records were available; records were either destroyed during the conflict or minefields were never recorded, especially when laid by non-engineers.

The aim of the analysis was to examine minefield records and related mines information gleaned from other sources, in order to provide information and determine appropriate demining techniques relevant to agencies which might be tasked with long-term clearance. To achieve this aim required the collation and analysis of minefield records and clearance certificates, the professional opinions of those agencies who had monitored the clearance effort so far, and a study of the mine warfare tactics of the various factions.

The objectives developed from this aim were:

- **Preparatory Work**. Establish a general method for the analysis of mined areas.
- **Objective 1**. Establish the doctrine, if any, as well as the tactics used in siting the types of minefields by various factions.
- **Objective 2**. Establish the laying, marking, recording and clearing methods for the various types of minefields laid.
- **Objective 3**. Establish a predictive method of determining the likely accuracy of a minefield record.
- **Objective 4**. Establish a method of classifying the risk of minefields in a particular area.
- **Objective 5**. Establish techniques to assist with the supervision and conduct of long-term mine clearance operations.



Having had the aim and objectives of the analysis approved at divisional level, there was a need to develop a method by which the work could be carried out – the preparatory work. The first, and arguably most important, stage is to establish, with a degree of confidence, the location and extent of a mined area. It is therefore important to ascertain the accuracy of records produced by a particular faction.

Copies of former Jugoslav National Army field engineering handbooks were translated to establish the likely origins of the factions' mine warfare tactics. From these we gleaned information which was compared with the findings of the study of minefield records. Engineer commanders at all levels in each faction were repeatedly approached to discover their mine warfare tactics and

how these had developed throughout the conflict, and to seek their opinions on likely locations of unmarked mined areas. A questionnaire was also circulated to agencies monitoring the clearance effort, the responses from which were used to validate some of the study's findings. Next, actual minefield records were studied in detail. By relating discernible features on minefield record sketches to 1:50,000 scale mapping, and comparing mined area locations on a geographic information system (GIS) with 1:5000 scale imagery, we were able to check the accuracy of grid references. Study of the minefield records and, when available, clearance certificates, also allowed conclusions to be drawn on the type of minefields laid by each faction, and their marking and recording practices.

Information from each minefield record was incorporated in a standard database used by all the multinational divisions and the Mine Action Centre in Sarajevo. For the purposes of mined area analysis, the locations of each individual faction's mined areas were plotted on both Vector and Raster mapping on a GIS (ArcView version 2.1b). This showed at a glance which factions laid minefields where and in what density. We then linked this information to the study of confrontation lines, described later. This approach quickly highlighted mine data anomalies (of which there were many). Inconsistencies were then usually resolved by contacting faction personnel to discuss and correct the conflicting data and to locate missing records.

For mined areas where no records were available, establishing the probable locations and likely extent of mined areas was harder. Military judgement, combined with knowledge of the factions' mine warfare practices, lead to conclusions on where mined areas were most likely to be found, and these findings will eventually help with the prioritizing of clearance operations for the great swathes of terrain currently classified as potential mined areas by virtue of their proximity to the former confrontation lines or withdrawal routes. Considerable efforts were made by engineers throughout the division to locate demobilized soldiers who laid mines during the conflict; given the inaccuracies in many minefield coordinates, facts gleaned from these individuals were vital in helping to pin down many recorded and unrecorded minefields.

All this information was eventually linked to the positions of former confrontation lines. Our aim was to analyse the correlation between the locations of mined areas and defensive positions as well as to study the use of mines and booby traps by each of the factions in various operations of war, especially in withdrawal. This information was then linked to the search for individuals who had laid mines on certain sections of the confrontation line. This process continued beyond 36 Engineer Regiment's time in theatre and was handed over to the Mine Action Centre.

One of the main aims of the mined area analysis was to develop techniques useful to the long-term clearance effort. We felt that the ability to predict the likelihood of mines in a given area was useful not only for prioritizing areas for clearance but also for establishing the risk from mines if an operational imperative required movement off high-confidence routes. The information from the study was used to develop an algorithm to assess the risk of mines. This algorithm was designed explicitly for use by engineers or EOD trained personnel with a sound appreciation of the mine threat and related matters in theatre, who would be able to apply it intelligently.

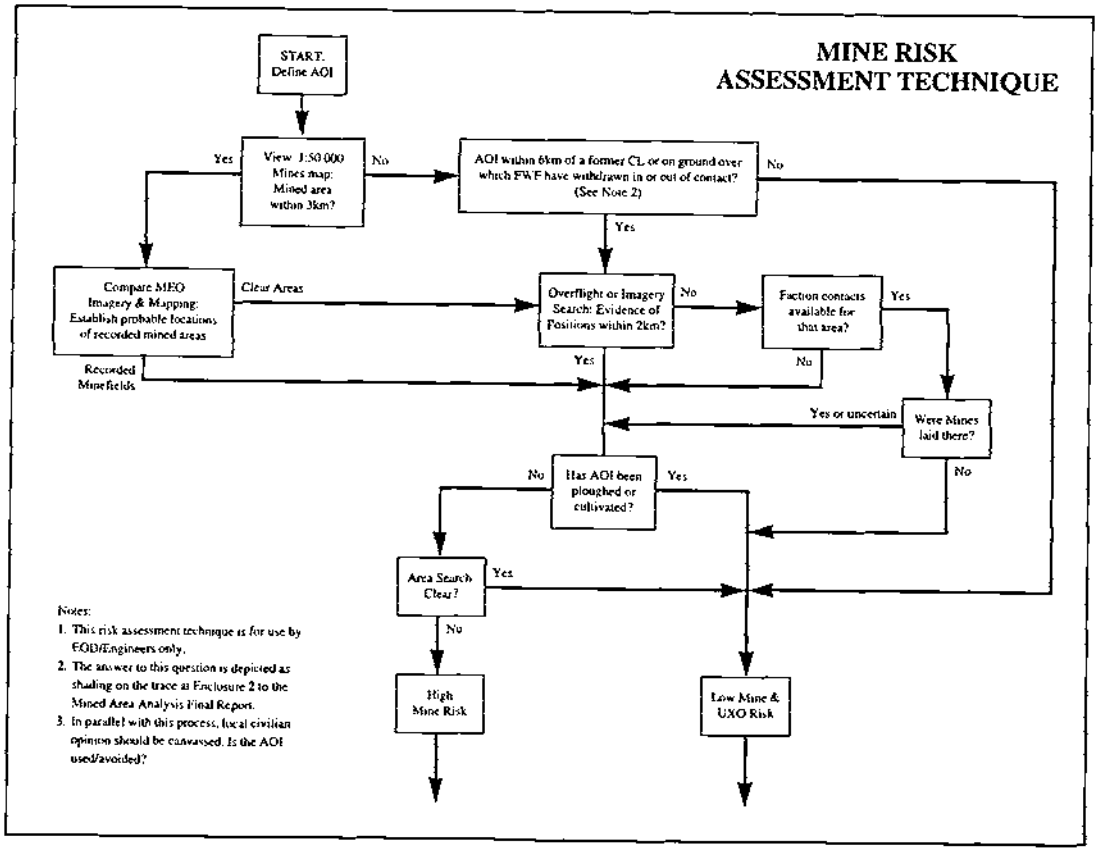
The key conclusions from the mined area analysis which were incorporated into the risk assessment are listed below. Many now seem obvious, but they all had to be proven through painstaking research.

- Mined areas in MND(SW) fall into one or both of the following categories:
  - Located no more than 4km either side of any former confrontation line.
  - Located on ground over which FWF withdrew either in, or out of, contact.
- Most locations of mined areas as recorded on minefield records are inaccurate, sometimes by as much as 1.2 km. The typical error is 600m.
- Sketches on minefield records are usually good enough to allow identification of mined area locations from comparison of the sketch, imagery and mapping.
- The majority of minefields are within sight of defensive positions.
- The locations of virtually all minefields laid by faction engineers were recorded.
- Unrecorded minefields, laid by other arms for protection, are located as follows:
  - Within small arms range (500m) of defensive positions.
  - Almost always within direct line of sight of at least one position.
  - Covering likely enemy approach routes.
- The numbers and types of mines recorded on minefield records are invariably accurate.
- Since the cessation of hostilities, local people have started cultivating their fields, and in the process

have lifted some mines. These areas are assumed to have been cleared to humanitarian standards.

Based upon these facts, the algorithm developed for assessing mine risk is shown below.

Looking to the future, the UN-sponsored Mine Action Centre in Sarajevo, established in June 1996, is charged with driving the clearance operation. The greatest challenge its staff face is the collation of accurate information on mined areas with which to plan clearance operations. The mined area analysis in MND SW has contributed substantially to the success of this challenge. At a practical level, inaccurate minefield coordinates and the poor use of reference points mean that any long-term clearance plan will rely heavily on individuals who laid the mines, or those with detailed knowledge of certain sections of the confrontation lines, to act as guides to mined areas. The task of finding these individuals is becoming ever harder because, four years after the first mines were laid, the tolerance of individuals to risk-related employment decreases daily as normality returns, and inevitably their memories fade. Finally, there seems to be ambivalence by many in Bosnia Herzegovina to a self-created problem, which is probably why tangible progress has been slow in the first relatively peaceful summer since the start of the conflict. That said, I believe that if peace holds, the work by IFOR engineers will prove very valuable in helping shape the long-term solution to the mines problem in Bosnia Herzegovina.



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Quarrying Operations

Major M A Fenn

Quarrying operations have been a vital aspect of engineer construction work during both Operations *Grapple* and *Resolute*. This contribution considers quarrying operations during IFOR's tenure, and in particular covers the experiences and observations encountered by members of 61 Field Support Squadron.

Most camp construction tasks require crushed stone for the foundations of accommodation units as well as for vehicle hardstanding areas and access routes. Route construction tasks such as bypasses and reinstatement of embankments also demand huge quantities of stone. In Bosnia, in nearly every case existing quarries were used to provide the crushed stone, even though they were usually neglected and war-damaged. Few commercial quarries had crushing and screening plant that worked, and those that did were inefficient with very low output rates.

The rock throughout Bosnia Herzegovina is predominantly a friable limestone. Deposits of granite and basalt exist but quarries in these areas were never adequately developed during the communist era. A quarries database map was developed by 38 Engineer Regiment during the early part of Operation *Resolute* and subsequently updated by the plant operations warrant officer (POWO) 61 Field Support Squadron. Data was gathered from existing records and maps, including a *Waffen SS* geological map. A helicopter and ground recce followed, often with EOD support, and the resultant MND SW quarries and borrow pits map and database proved an invaluable aid to engineer planning in theatre.

Establishing contact with a quarry owner and then setting up a contract between him and the theatre Civilian Secretariat (CIVSEC) was the first stage in getting a quarry back into operation. Liaison between the POWO, who confirmed the most suitable source for the stone, and CIVSEC, who authorized funding, was effective. The biggest problem was usually locating the owner in the first place, and then establishing whether or not he was bona fide. The quarry section of the squadron was responsible for control of the quarry during drilling and blasting. Once the stone was won, however, the section moved to its next location and responsibility for control of the quarry fell to the user unit. Security was a problem as squadrons could not dedicate manpower for guard duty, and as a consequence stockpiled stone was occasionally "hijacked" by civilians and other engineer units. In some circumstances this jeopardized the completion of tasks and caused difficulty when it came to payment.

The drilling rig used in Bosnia was an Atlas Copco Roc 460 PC drill rig with a 365XAHS MD compressor purchased by the UN during Operation *Grapple*. It operated a 105mm (down the hole) drill hammer and bit.

Spares support has been based on a theatre spares pack resupplied on demand through the engineer resources chain. An unsuccessful UOR for a mobile crusher was staffed during Operation *Grapple*, and a second UOR was staffed in May 1996 but it too was unsuccessful because the need for substantial quantities of crushed rock during the remainder of the IFOR operation was deemed to have passed. Our experience was that civilian crushers in Bosnia had a nominal output in the region of $20m^3$ per hour; this was a factor of three less than the output needed to keep pace with construction rates. The rock crusher output was, therefore, always on

The Atlas Copco drilling rig in action in a Bosnian quarry.

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The Atlas Copco drilling rig in action in a Bosnian quarry.

the critical path and as a consequence many projects were delayed or took longer than necessary to complete. There is little doubt that over a two to three-year period on similar operations to *Grapple* and *Resolute*, a mobile crusher would be a cost effective option.

Presently, there is little support in the Corps for a rock crusher and screening plant, but we must be careful not to draw false conclusions from operations in Bosnia where, fortunately, the limestone was extremely friable. By contrast, quarry operations in the Falkland Islands were wholly dependent on a Corps rock crusher to break the tough igneous rock.

All quarry blasting was carried out using UK commercially accepted methods which proved to be reasonably accurate but involved a certain amount of trial and error to determine the optimum spacing, burden and blast ratio. In general, good results were achieved on the first, (sometimes the only) blast. This was very important as, due to widespread lack of processing plant, the stone frequently had to be used in its "as blasted" form. A variety of commercial explosives were used and the exact loading densities were calculated through experience and with the manufacturer's guidance. A nonel[6] cord (shock tube) system of initiation was used to detonate the explosives loaded into the shot-holes, and also for the surface delays, however, an electric detonator had to be used at the point of initiation, fired by a shrike exploder and a conventional firing cable. UK legislation requires that two means of initiation are used, but by incorporating detonation cord throughout the full length of the shot-hole we achieved a third means. If a misfire was caused by both nonel shock tubes being cut (a possibility during the process of loading the shot-holes with explosives) then the situation could be rescued by simply connecting another detonator to the end of the detonation cord and firing again. This added a greater safety factor in the event of a misfire.

The local purchase of explosives and accessories was a relatively straightforward process with a lead time of approximately ten days. Immediately after the end of the war, however, shortages of explosives caused delays, and difficulties were experienced with import licences. An initial deployment pack of commercial explosives and accessories, procured under a UOR, would alleviate this problem for future operations.

The quarry team was manned as follows and this proved to be the absolute minimum required for sustained operations:

- 1 military plant foreman: (often absent from site due to other responsibilities) qualified blast designer and shot-firer.
- 1 plant section commander: assistant shot-firer trained.
- 1 fitter RE Class 1. Essential to maintain and carry out prompt repair work, also trained at RSME to operate drill rig.
- 2 plant operator mechanics.
- 1 driver RE (to drive DROPS Medium Mobility Load Carrier) also trained in theatre to operate a drill rig.

Quarrying is a potentially dangerous operation and specialist training is essential. All training within the Corps is conducted with the approval of the Quarry Products Training Council (QPTC), the only body which can issue licences for the different levels of competence. The QPTC equates some military appointments to their civilian counterparts. For example the CO

[6] Nonel is a trade name. The tube is a hollow plastic sheath containing black powder explosive whose function is to pass an impulse from the point of initiation to the detonator.

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or OC might be considered to have similar responsibilities to the quarry owner for the quarry's safe operation; the MPF equating to the quarry manager by holding blast design and shot-firing licences, and the plant SNCO shot-firer equating to the civilian shot-firer. The qualifications required are only granted after successful completion of an approved training course and an attachment to gain relevant experience. All MPF are now trained and qualified for blast design and shot-firing licences as part of their course syllabus, and gain the relevant experience during a one-week attachment to a civilian quarrying firm. Plant SNCOs can only qualify as shot-firers if they have been warned for an operational tour where the qualification will be required. A special course is not normally run and selected SNCOs are usually expected to attend the first week of the MPF's Course. A plant SNCO is not permitted to design a blast and, more importantly, may not fire a shot until a MPF has inspected the circuit. The quarrying expertise within 36 Engineer Regiment was excellent and reflected well on pre-tour training.

The conclusion I draw from the deployment is that the Corps must retain its capability to conduct quarrying operations. Valuable training was gained in the lead up to and during Operation *Resolute*, but essential to the success of quarrying operations is the provision of appropriate equipment and its subsequent spares support.

The future strategy of the Corps[7] regarding procurement of quarrying equipment is based on the recognition that a quarrying capability should be retained. The requirement for two drilling rigs has been endorsed and is currently with the Procurement Executive. One will probably be held for training whilst the second will be committed to operations. This proposal is strongly endorsed. Perhaps, further consideration should now be given to the procurement of a mobile rock crusher for future Bosnia-type contingency operations.

[7] Details confirmed by Engineer 2 on 4 September 1996.

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Camp Construction

Major T L V Treanor

69 Gurkha Field Squadron, The Queen's Gurkha Engineers, in common with other field squadrons deployed on Operation *Resolute*, was heavily involved with camp construction. Between April and July 1996, in addition to plant work for hardstandings, 105 field section weeks were committed. The squadron went on to bridging, route maintenance and G5 tasks, but the purpose of this part of the article is to draw a few lessons from our camp construction experience.

All camps utilized the containerized stores procured as an UOR worth £30 million. The squadron built a 250-man camp at Kupres for the General Support Regiment RLC and made significant improvements to five camps in Glamoc, Gornji Vakuf, Jezero and Jajce. In total, we installed 102 flat-packed accommodation units, 58 toilet combination units, two containerized kitchen sets and two laundry units. The water supply systems consisted of 50,000-litre hydroglass water tanks, in-line chlorinators and polyurethane piping with heat tracing; electrical power was produced by 250kVa Wilson generators; sewage was treated on site by containerized plant.

My first observation concerns the high standard of engineering expected. Specifications near peacetime standards were set for the provision of water, sewage disposal, electrical distribution, fire prevention, kitchen and medical facilities and so on. The government expects troops on peace-support operations to be accommodated in safe, hygienic conditions. As the CO has stated, the army does not yet have adequate expeditionary stores for short-term use, but for long-term occupation a solution such as the use of containerized camps is probably appropriate. These camps require a high level of engineering competence to construct properly and work carried our during Operation *Resolute* validated the increased emphasis that has been placed upon the Corps' construction capability.

This leads on to the observation that individual and collective construction training is important in developing operational effectiveness. 69 Gurkha Field Squadron was fortunate in two respects: we deployed with a strong artisan trade mix and had completed Exercise *Waterleap 95*. It is recognized widely that tradesmen require continuation training in order to maintain their skills. However, major construction tasks are

also important so that project management skills are developed. These skills include planning and the writing of works reports, quantity surveying, procurement of and accounting for engineer materiel, financial accounting, managing local contracts, health and safety matters and quality control. The excellent training opportunities the Corps has enjoyed in Canada, Kenya, Belize and so on are indeed part of the foundation for success on operations.

Unfortunately, it is these very construction exercises that have created a model for project management that is not entirely appropriate to military engineering on operations. During 1995 the squadron was involved in a number of overseas training exercises and military aid to the military community tasks. These were subject to CDM Regs; the Corps' direction on project management to conform with these regulations is contained in Commander Engineers LAND Instruction No 1: *Royal Engineers Projects* dated 16 November 1995 and Royal Engineers Technical Directive No 2: *Project Documentation* dated 22 March 1996. In essence, a formation HQ acts as project sponsor and sometimes client; MWF is normally the military design authority and may well provide the project manager; engineer units provide the military construction force. This division of responsibilities may be satisfactory for peacetime projects, but I do not believe it has served us well on operations. Indeed, if we are to train the way we operate, then it may not be appropriate for peacetime either.

Before elaborating, I must stress that I have no antipathy with the professional side of our Corps nor do I take a Luddite view and disagree with CDM Regs – as an historian by training I am ill equipped to do so! These regulations are law, apply on most types of operations and, therefore, must be treated as one of the factors considered in the estimate process. To me they are about quality assurance and safety, which are, again, important factors in our planning. For the squadron, I reduced the subject to this directive:

> Do the task first time, correctly and safely.

My problems with the Corps' current model begin with receiving design reports referring to me as the "principal contractor". Technically that may be so and one could argue endlessly about the nuances of definitions, my point is that our tradition ascribes primacy of action to regiments and squadrons. If we must use civilian terms, then the position of field units should be analogous to a construction firm that undertakes "design and build" work. Indeed, if one considers combat engineer tasks such as building a medium girder bridge, that is exactly the case.

On Operation *Resolute*, the divisional headquarters staff undertook many of the detailed aspects of project management, controlling finance, resource allocation, design amendments and so on. The STRE was involved in task definition and then design. The regiments were tasked with specific projects and operated within tight constraints: a detailed design, and authority to draw specific UOR stores and locally purchased items. Design changes of any significance arising once work had begun were required to be referred back up the chain of command to become the subject of variation orders. This increased workload, created bottlenecks and did not fully utilize the capacity for thought and action below. As the regiments and their squadrons were not being involved in the task definition stage and as they had limited control over the project management, it was difficult to build up a sensible relationship with the unit that would eventually use the facility, and to respond to the changes that are inevitable on operations. More significantly, sapper units only did the work they were ordered to do and this was almost always designed by the STRE. On the ground this compounded the effect of our lack of true expeditionary stores, already mentioned by the CO in his introduction, to the extent that client units lived in basic conditions for unnecessarily long periods and had to wait for a technically excellent solution; they went from near squalor to splendour, but we had nothing to offer in between.

My proposal for construction work (and not just camp construction) on future operations follows. Rather than attempting to make the military conform to CDM Regs, I would reverse the problem and see how CDM Regs can operate within our existing ethos. Before I elaborate, I stress again that I am fully aware CDM Regs are a legal requirement and that we are not at liberty to alter the law to suit our particular circumstances. What follows is, therefore, a view on how we might more closely conform to the principles of mission command and directive control, whilst remaining within the legal constraints of CDM Regs. The formation HQ has the vital task of setting policy and allocating resources. Orders must be given to commanding officers, and thence to officers commanding, that give a mission (a task, or tasks, with the

intent) and sets out the freedoms and constraints. There should be as much freedom as possible. Project management then becomes the responsibility of the commander: he selects the most appropriate solution to the problem and, if it requires significant technical input, "sub-contracts" the STRE to produce a design for him. He is then in a position to balance the variables of quality, money, resources, labour and time, as well as the legal requirements of CDM Regs, to produce a product that meets his mission. He also has the ability to respond as the situation changes – the vital Question 4 of the Mission Analysis. An example of how this can work was given during the construction of a crossing at Sanski Most, which included approach roads, abutments and a nine-bay triple double extra wide Bailey bridge (EWBB) with level ramps. The divisional staff identified the requirement and allocated EWBB. 36 Engineer Regiment managed the task from its inception, including the design work, part of which was completed by the STRE as it was outside the technical competence of the Regiment. The work was completed by 69 Gurkha Fd Sqn.

Operation *Resolute* yet again demonstrated the importance of the Corps' construction capability and our ability to produce high quality solutions that matched demanding specifications. For me, the major lesson, however, is that we must develop a doctrine for peace support operations that harmonizes CDM Regs with mission command.

* * * * *

Conclusion

Lieutenant Colonel R C Hendicott MBE

THESE observations were written as our tour drew to a close. The overall approach to our business in this peace-support operation has provoked endless discussion throughout the regimental chain of command. We have tried to reconcile the very nature of our business to an environment which crosses the boundaries of military familiarity, particularly in the Corps' area of expertise. This has required much lateral thought and has often led to misunderstandings about responsibilities and capabilities. The subjects upon which my officers have written were of their own choosing and I did not seek to influence their views. It is not necessarily easy to reach overarching conclusions from what has been said, but what is becoming increasingly clear is that we are rediscovering many facets of our profession which would have been accepted practice by our forebears, but which have been gradually lost as we refined our skills to meet the peculiar circumstances of the Cold War. These range from our breadth of capability and ability to project it, for example in quarrying operations, through our ability and doctrine to support G5 operations, to our internal relationships as engineers in a wider peace-keeping operation such as *Resolute*. We perhaps also need to consider our position as combat engineers in mine warfare, in which area we have been limited, through understandable political constraints, to the role of monitors and theoreticians. Is this what we really want, for ourselves, or for the perception of the Corps by the rest of the army? In many areas we have adapted successfully to the post-Cold War requirements of military engineering support to the armed forces. Operation *Resolute* suggests that we could go some way further still to adapt to the new order. Furthermore, I would suggest that many of the lessons we should be drawing from an operation conducted well to the left-hand end of the conflict spectrum might easily be applicable to war-fighting operations. No one can deny that Operation *Resolute* has been an enormous success for the Corps and certainly this article is not trying to suggest otherwise. As always, though, we need to draw lessons while they are fresh in our memories. The need must be to move forward using a military approach, rather than a commercial engineering one. We are, after all, military engineers, not engineers in uniform: a combat support arm, not a logistics service.

"A Smell of Burning Fills the Startled Air"

LIEUTENANT COLONEL P O M CHITTY MBE

Sit by the fireside with sorrow, –
you with the unpaid bill

Percy Bysshe Shelley

THE Korean civil servant in a too-tight fitting suit, sweltered in the heat but gazed at me with an air of expectancy – and a pen. Not so my CO. "Is this another d... roundabout?" he asked, waving a very heavy invoice at me.

Some fortnight prior to embarking with the 29th Infantry Brigade for Korea as part of the UN forces in 1950, our squadron had been sent on a final training exercise in Thetford. For three or four days and nights we tried to convince our brigadier, and to lesser extent ourselves, that we were what he had called us earlier, Britain's finest post-war contribution to world peace.

Then on the way back to Tidworth it happened. Add a total lack of sleep to the trials and torments of trying to be something you weren't, had all proved too exhausting. Sitting in the lead Bren carrier, I was taking the massed might of our squadron armoured element back to base in Tidworth. All the other officers had diverted for a night briefing in London, but not me. Although the youngest officer, clearly I had blacked somewhere, somehow and with someone on the exercise.

As we approached a magnificent new roundabout, or to be truthful, as the council witnesses later reported, for I and my driver were asleep, we took it head on. Tracks churning and mud flying, we mounted peripheral London's latest traffic flagship at about 25 miles an hour. Loyal to a man, the other 13 carriers followed in their master's tracksteps in best Beechers Brook style.

I think the roundabout had only recently been completed for mixed with some massacred geraniums, some of the opening tape was later found in our tracks, and a pair of ceremonial scissors mysteriously appeared near the ammunition bin. Perhaps we had opened it?

Suffice it to say, d... council were neither amused, nor were they assuaged in any way by the fact that we were Britain's potential heroes. As a gracious gesture befitting the dockside mood, an enormous bill was served on us in Southampton as we embarked on the troopship, and later increasingly menacing and more demanding letters followed the squadron around two retreats and one advance.

But this Korean businessman had a stronger case.

During the first retreat I think, I had been sent like a modern John the Baptist to prepare the way for the brigade. It was winter, and the cold was unbelievable in intensity. The troops needed somewhere dry and warm in which to rest and reorganize. There was one place only near the main supply route to the south, which could house most of the brigade, the country's only silk factory. It covered acres of Taejon with fine, substantial industrial buildings and at first seemed to give us all that was needed – accommodation, garages, water and potential warmth. That being just what we needed after a long day, my recce party unrolled their sleeping bags as the cook tried to get the petrol hydro-burner cooker started for supper.

I said "at first", advisedly. For soon I saw the whole complex in a totally different light. The light of millions of yensworth of buildings gradually brightening the drab surrounding city, with a warmth of colour, blazing symbols of light, a beacon of welcome to the exhausted brigade.

In the cold light of dawn, I consoled myself that it had been touch and go whether or not all the brigade could have fitted in. Even today I like to think that the fact that now there was nowhere left for the brigade to go somehow stiffened the resolve of the brigade commander to stand and fight it out where they were, which proved to be the turning point of the war.

A hydro-burner cooker does not readily spring to mind as a war-winning invention...

And when that devilish iron engine
ordained to kill, conceiveth fire

Edmund Spenser

They Don't Teach You This At Sandhurst

NOMINAL

"THERE are four prison officers being held hostage, the whole compound of 120 men is armed with makeshift weapons, the prisoners have barricaded themselves in and they are breaking up the furniture. As you can see, the dining and recreation areas are in flames."

Having announced this to the brigadier, who had turned back to the camp, having left only a few minutes earlier when there had been no indication of trouble, the governor paused. A flurry of stones landed near to where they were standing.

"Well, what are you doing about it?" asked the brigadier.

"This is a military matter now," the governor replied, "I'm handing over to you!"

The brigade commander turned to the squadron commander who was in charge of the guards around the perimeter.

"What are you doing about it, then?"

There was no sergeant major to turn to, so the hapless squadron commander was on his own. Putting down a mutiny had not been part of the curriculum at Sandhurst, he reflected bleakly, and Staff College did not consider it either. Just what did one do? Of course there were contingency plans in the event of a breakout and there were even plans to help the warders in the event of a shortage of staff, but a mutiny ...? He remembered Attica Prison and what the Americans had done there. That seemed rather drastic, though, and hardly in keeping with the British Army's avowed policy of "minimum force."

The brigade commander was waiting.

"Well Sir, I've got my squadron deployed round the perimeter and I've sent for the backup squadron. They'll be here shortly." It sounded a bit inadequate.

A fire engine arrived at that moment and hoses were run out. As luck would have it, the hydrant was within range of the rioters who speedily pelted the firemen with rocks and abuse. The firemen sensibly withdrew.

There was a pause then, while everyone took stock. The fire was going well and being stoked with anything inflammable that the prisoners could lay their hands on. There was no sign of the captured warders. The prisoners seemed to have armed themselves in a remarkably short space of time: bed legs, jagged pieces of metal, chains, hammers and murderous looking cudgels with nails in the end, presumably torn from their ablution benches. Sharp instruments from hobbies kits were also in evidence. Beds, many of them two-tiered, and also cupboards, were piled high against the inner gate, making a very effective barricade, guarded by a belligerent looking group of men.

The flames crackled and a deep pall of black smoke hung over the camp.

A further volley of stones clattered on the tin roofs of the administrative buildings as a soldier tried to move forward.

There were two other compounds. What if they joined the riot too? Were there enough men to stop a mass breakout?

The brigadier had moved over to the Sappers, who were building an extension to the camp, and told them to line up round the other compounds. They stood there, two yards apart, swinging pick helves and looking hopeful. They had been working within earshot of the prisoners and had had to put up with constant barracking. Perhaps they would get a chance to get their own back!

A helicopter arrived. This would help and could be used to watch for signs of a breakout, but the pilot couldn't spot the hostages; they must be being held out of sight in one of the huts.

Where were the reinforcements? The contingency plans had all been rehearsed and the timings had been carefully worked out but, as in war, even the best laid plans do not seem to work out quite as one expects. The opposition had also complicated things by seizing the warders. Word came out that they were threatening to murder them. That would really put the fat in the fire.

The brigade commander had decided to play a waiting game. He did not want to break into the compound too soon as he had insufficient men readily available, there would inevitably be some fierce fighting and it was probable that troops would be forced to shoot. There were also the warders' lives to think of. By waiting, he banked on the rioters losing the edge of their anger and their will to resist.

An offer came to negotiate. The brigadier replied that he had no intention of negotiating. He was going to come in and get them!

A further pause while the radio buzzed to see where the reinforcement squadron had got to. Though one of their troops was on standby, they were filling in time by mounting a road-block – theoretically able to get back in time, in practice it was taking a bit longer. There was no immediate help from regimental HQ either: the CO was in England attending the funeral of a soldier shot the previous week, the 2IC had taken a long overdue afternoon off and gone to play golf, the adjutant was visiting brigade HQ. The squadron commander was on his own and the brigadier was breathing down his neck! This would happen to him. Why do senior officers always seem to turn up at the wrong moment like this? But, on the other hand, it might be useful to have him to turn to if things got sticky.

Word came in from a nearby compound that their leader would be able to make the rioters see sense if they would only let him out to speak to them. The brigadier told him that he was quite capable of sorting this sort of thing out without help from him.

Tension began to mount and everyone wondered what would happen next. Would the rioters try and break out? Would they kill the hostages?

At last the reinforcements arrived, a good 20 minutes later than expected, but at least they had got here in time.

The 2IC had also got back from his golf, kicking himself for going off.

A hurried conference took place, plans were made and troop commanders briefed. The brigadier was beginning to chunter but orders take time and every soldier had to be carefully briefed.

The double gates were to be used for entry as it would take too long to cut through the close mesh of the perimeter fence; tear gas was to be fired just before the gates were rushed; special squads were detailed off under an officer with the sole object of rescuing the hostages; others were to deal with the rioters. A guard was to stay by the gate to stop escape, and search teams were detailed off for use as soon as calm had been restored.

It was nearly dusk so speed was now important. The opposition's shouts did not sound quite so defiant now, but they were still armed and looked pretty formidable. The soldiers did too: flak jackets, steel helmets and batons. Rifles only for those guarding the gate. In this way, casualties could be kept to the minimum and the chances of anyone being shot inadvertently would be lessened.

The men fidgeted nervously. It was the waiting they didn't like. Some of them were very young, others newly arrived, and for many this would be their first taste of rioting. The flames looked even more eerie in the evening light and the helicopter overhead switched on a searchlight. Suddenly more flames appeared and it was evident that the remaining huts were being set on fire.

There had been enough waiting. Now was the psychological moment and the men were ready. Tear gas was fired and a rush made to the outer gate with an officer brandishing the key leading the way.

A shower of stones greeted them, but soon they were sheltered under the lee of the high perimeter fence.

Speed was vital if the warders were to be rescued.

The officer fumbled, but could not get the gate open. The brigadier was following events from a watch tower overlooking the entrance and it was only too evident what he was saying. And it was equally evident that the officer had the wrong key, and no other means of getting in. Even the best laid plans ....

Fortunately, a warder ran up with the right key and the assault gained impetus once more. It had been an awkward hiccough.

The assaulting party quickly moved to the inner gate and forced a way in against the barricade of beds and furniture.

The prisoners withdrew a few yards and many took refuge in the huts while the leading troops raced through and spread out for their objectives, the likely hiding places of the hostages. More men followed to deal with the armed prisoners.

Into the first hut: a quick surrender and no fighting. The men came out with their hands up.

The next huts though, and the parties outside them, put up a fierce resistance but the soldiers weren't going to be stopped. This was a chance to get to close quarters and, in the heat of the moment, with both sides shouting and yelling abuse, the batons flew freely.

Word came that the warders were free. Lucky for the prisoners that they were unharmed.

Bodies came flying out of the huts, propelled by soldiers.

The brigadier had appeared in the midst of it all. He called a halt and the prisoners were ordered to line up against one of the huts. Everyone was breathing heavily but the assault had only lasted ten minutes.

There was a lot of groaning and plenty of blood about. Fortunately the doctor was on hand and he

was soon administering first aid, sending those who needed stitching to the nearby military hospital. Most of the injuries were round the head, or on the arms where they had fended off the batons. Despite all the blood, none were serious.

All the prisoners were lined up, counted and searched. All were accounted for. Ringleaders were picked out by warders and segregated. The brigadier addressed them. Never could he have had such an attentive audience: one could have heard a pin drop. He explained to them that as they had broken all the perimeter lights, he had no option but lock them in their huts early. They had therefore only 40 minutes to clear up the compound. As they had burnt all the wooden furniture and most of the bedding, they would have to make do with what was left. If they wanted another riot, he would be only too pleased to come back and suppress it – the option was theirs. They did not take it up!

At last all was quiet. The flames had died down; the prisoners were making themselves as comfortable as they could on a cold night; the sappers were put to clearing up the debris from the fire, thus eliminating a source of makeshift weapons for the morrow.

A pile of vicious looking weapons was laid out by the entrance. The injured were taken away.

The governor was pleased.

The squadron commander was thankful.

The brigadier was late for his dinner engagement.

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What does one learn from this story? Well, the moral is this: faced with an unexpected situation, keep your head (as those about you may well lose theirs), be ready to adapt your contingency plans (the reality is never the same as your crystal ball predicted) and resign yourself to the strange fact that senior officers have a nasty habit of turning up at the worst possible moment.

Further gratuitous advice comes in the form of: never use more force than necessary (unless you wish to go down in history as another General Dyer), be swift and decisive once you are ready – and do make sure you get your story out first!

After all, they can't teach you everything at Sandhurst!

Shaping the Future of Training With VFM Through CFQ and PFI

MAJOR J D BEAUMONT BEng

Derek Beaumont joined the Corps in 1971 as a Territorial Army Sapper and, after reading for a degree at Sheffield University, was commissioned in 1974. Since then he has filled a variety of regimental and staff appointments in the United Kingdom and overseas, highlights of which were commanding his squadron on a construction task in Kenya and serving with Headquarters United Nations Protection Force in Sarajevo during the height of the conflict in the Former Republic of Yugoslavia. Neither of these was particularly good training for his current post with the Royal School of Military Engineering Competing For Quality Team (now retitled the Business Development Unit) but, in the best Sapper tradition, common-sense and a bit of Sapper ingenuity have come to the rescue.

Introduction

There are many changes taking place in the armed forces and this is particularly the case within the army's new training agency, the Army Individual Training Organization (AITO). A plethora of studies are in progress, many of which are driven by the need to achieve greater value for money (VFM) when carrying out individual training.

There are those who see such studies merely as measures that threaten values and traditions established over many years. Throughout their history, however, sappers have never been afraid of change and on many occasions have been in the vanguard of new developments.

Within the MOD's competing for quality (CFQ) programme, the Corps is being required to make a radical reappraisal of how the RSME carries out its training function. This is an opportunity to make changes that encompass the best ideas from the civilian training world, whilst preserving those elements of military life that are important and achieving the financial targets set in the long term costings (LTC).

Background

It is government policy that, whenever practical and in the interests of obtaining VFM, activities conducted within the public sector should be exposed to competition in the private sector. As part of the AITO CFQ programme, a feasibility study (FS) has been carried out at the RSME to identify the range of activities that might be suitable for this process.

RSME Chatham and RSME Minley were looked at separately for a number of reasons: their geographical separation and different scope of activities suggested that it would be more cost effective to treat them individually, and, in addition, there was a directive that the Minley study look at the possibility of RSME Minley being covered by a joint, geographically-based, arrangement with RMA Sandhurst, as already exists in many garrison areas for cleaning and catering contracts.

The FS was to take about six months and implementation a further 18 months, giving an overall time-frame of two years. Estimates were made on the likely level of savings, based on precedents in other areas of government, and adjustments then made to the LTC; in other words, future budgets were reduced in anticipation of savings prior to the studies being carried out.

The author was part of the Chatham study team and this article concerns only RSME Chatham. It

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is not the intention to go into the *minutiae* of how each study was carried out, but a few words on the general principles used would be useful background. I regret that this cannot be done without a certain amount of "management speak".

The Task

Within the world of commerce and industry there has been a tendency in recent years to "outsource" non-core activities. That is to say, an organization decides what its essential or "core" functions are, retains only those key areas of work in-house, and lets contracts to specialist suppliers to provide all supporting activities. This allows management to concentrate on those aspects of the business that they know best and lets the specialist supplier deliver what he is best at. Within the MOD, this has been the rationale behind the drive towards contracting-out catering, cleaning and similar activities.

It does not even follow that all core activities must be carried out by an in-house organization, as long as policy and financial control of the activity is retained. As an example, local government authorities are responsible for refuse collection, but in most cases this is now done by commercial firms acting under contract. A similar situation exists with general road repairs. Local authorities have virtually no directly-employed labour force for many of the tasks that 20 years ago were all done by the council works department. A reduction in costs is achieved because private sector management techniques are more efficient than those in government; they devise better ways of doing tasks by more flexible use of staff, the introduction of labour-saving methods and, where possible, by labour replacement through better use of technology.

Modern business practice specifies a requirement in output terms, that is the "end product", without being prescriptive about how that end is achieved. This gives the supplier free rein to decide the most cost-effective way of providing the product and allows for new ideas and methods to be brought to bear. This is a civilian version of the technique of mission command, and so should not be unfamiliar to the military mind. At Chatham, it does not take too much effort to deduce that the core function is training or, in output terms, is to train X number of soldiers to Y standard. To assist in this aim, a number of supporting functions are required: transport; office and clerical services; buildings and facilities, to name a few. Just about all of these are non-core functions and can therefore be put forward for inclusion in the CFQ process. All are managed in the private sector and there is no reason to suppose that the MOD can provide better. It is also possible to look at the core function of training. Army and Corps personnel are justifiably proud of their training techniques, and usually take the view that as most operations are "successful", there is no need for civilians to tell them how to improve. However such a simplistic attitude does not stand up to close scrutiny. Ways to improve training are always being sought, hence the greater emphasis on doctrine and training in recent years and the creation of the army's training agency. It would be arrogant to assume that we cannot learn from the private sector in fields of instructional or educational techniques, course scheduling and use of resources.

Private Sector Involvement at Chatham

After a survey of activities at the RSME and informal discussions with a number of organizations in the private sector, a number of areas were identified which, it was felt, could usefully be exposed to the private sector.

Technical Training. Historically, the army has not concerned itself with optimizing output efficiency in the use of its assets. When a training facility has been required it has been provisioned from within the military sphere without thought to other ways of providing the service. In addition, many of the present facilities were built to cater for an army much larger than that which now exists. As a result there are a number of classrooms, trade training workshops and other facilities that are not being used to their optimum capacity. Some of these assets could be used for income generation by marketing in the private sector. In addition to "selling" courses already run, it would be possible for a private sector company to extend its range of subjects by making use of existing training facilities. For example, military road construction concentrates on the preparation of basic non-metalled, macadam surfaces. It would be feasible, however, for a private sector partner to offer "civilian" aspects of road construction such as black-topping and the erection of street furniture.

Other training. A traditional feature of military life is that a wide range of facilities is provided for the benefit of the military community. This

ranges from accommodation and catering for single officers and soldiers, to comprehensive physical training and sports facilities. Within RSME Chatham, there is scope for using these facilities as a vehicle for providing vocational training, for example in catering and hotel management.

Property Investment. In recent years, one area that has been particularly affected by public spending restraint is investment in the estate. Although essential work may be carried out, there are many areas where additional funding for lower priority work has not been available, often resulting in increased maintenance costs and inefficient use of assets. Investment in the short term may well result in longer term savings, as well as increasing output. It may also be possible to gear investment in property to enlarge or otherwise enhance facilities to provide training for civilian students as outlined above, through a combination of additional classrooms and workshops, and hostel-type accommodation for students from outside the local catchment area.

Manpower Provision. Where a function is put out to contract, then clearly manpower will be provided by the contractor. However, RSME Chatham employs substantial numbers of civil service staff in core functions, ie as training instructors. There is no substantial reason why these posts could not also become part of the CFQ programme. One model that may be used for this is RMCS Shrivenham, where Cranfield University is the employer of all the civilian academic staff. It is recognized that in departments based on operational, tactical or combat skills – at Chatham this covers Command Wing and Counter Terrorist Search Wing – it will not be possible to use civilian instructors. In these times of reduced manpower it is important to ensure that soldiers are employed only where their particular skills and experience are essential. There will, of course, be discussions about which functions and posts fall on which side of the line as there is a need to strike a balance, particularly in the teaching wings for example, to ensure that career rosters are not unduly affected by the loss of instructor posts.

Vehicle/Equipment Provision. Historically, the MOD has procured its own vehicles and equipment for training, and managed the attendant problems of maintenance, repair and replacement. Some of the reasons for this have been connected with the requirement for equipment – especially vehicles – to be specially adapted or modified to carry out military tasks. Increasingly, the trend is towards procuring "off the shelf", and with this comes the possibility of other approaches, eg forms of leasing rather than owning. In the training environment this can provide a means of ensuring that students can be taught using the most modern equipment, without the need for expensive replacement programmes. For example, the bulk of the "green" plant used for basic plant operator training could easily be a "yellow" fleet supplied by a contractor who would also be responsible for fleet maintenance and replacement; a few "green" items of plant would be retained to allow the student to "convert" at the end of his course onto the equipment he would expect to find in his unit.

There are some difficulties involved with the inclusion of this field: currently the budget responsibility for procurement lies with the Procurement Executive and that for maintenance with the QMG. There will be a need to negotiate disaggregation of funds from these top level budget holders to the RSME's intermediate higher level budgets, if the RSME is to reap any financial benefit from such a strategy.

Commercial Development of Land. Although the MOD has a clear policy on the disposal of those parts of its estate that are no longer useful, it is still the case that, as with training workshops, many facilities are retained due to a small but nevertheless essential requirement. In some cases the difficulties and costs involved in preparing lands for disposal (so that they can be certified as free from residual hazard) outweigh the benefits that would accrue from disposal. Both these situations exist at Chatham. There is scope, however, for the MOD to retain ownership of, and hence liability for, some parts of the estate whilst allowing some form of commercial development that does not interfere with the RSME's requirements, and where risks from hazards are minimized. The funding for such development cannot be provided from within the public sector, but a private partner could use funds raised in the private sector for such purposes if there was seen to be the prospect of a return on the investment. RSME would naturally look to reap some of the benefit from such an arrangement.

The Private Finance Initiative (PFI). The PFI was introduced by the Chancellor of the Exchequer in November 1992; it has become

one of the government's main instruments to bring the private sector more directly into the provision of public services that use capital assets. However, the PFI is not solely about finance and capital investment being provided by the private sector; it also seeks to engage the full range of private sector expertise, including management, commercial and operating skills, in the delivery of services needed by the MOD. It could, for example, bring funding and expertise to projects and areas which may not be high priorities for the MOD, or to areas where the MOD has not always performed as well as the private sector has. The PFI will probably not provide a complete solution for Chatham but a number of the areas described so far may lend themselves to this approach; capital works is an obvious example, but provision of the "yellow" plant fleet could also be included. In all cases a detailed investment appraisal will determine the best solution.

The Bidding Process

Once agreement to proceed with the project has been given by ministers, a competitive process will be used to encourage members of the private sector to put forward innovative proposals for both future development and to meet the present core requirements of the RSME. The aim of this process will be to identify a private sector partner that will be able to:

- develop RSME Chatham's core activity – technical training – by introducing industry best practice;
- provide non-core facilities and services more cost-effectively than can be done in the public sector;
- provide investment capital to enhance and develop the facilities at Chatham;
- exploit various aspects of core and non-core activity that would not attract public sector funding.

The first stage in the process is to invite an initial expression of interest. This will be done by advertising in the MOD contracts bulletin and in appropriate industry journals. Initial respondents will be issued with a prospectus indicating the size and scope of the overall project. A short list of, possibly, 12 to 15 contenders will be invited to continue. In the next stage, the successful candidates will be given a requirement scoping document (RSD), which outlines the activities being offered for private sector involvement, and describes the parameters relating to standards, method of delivery of services, current facilities available, and the training output and essential military nature of the training carried out at RSME. Contenders will be invited to RSME Chatham for a briefing day which will comprise a tour of the facilities and the estate, and briefings on how business is carried out at present. Proposals arising from this exercise will be assessed to provide a final short list of two to three bidders.

During the final stages of the competition, the intention is to follow the negotiated procedures route, with separate bidders developing their ideas in conjunction with the CFQ Project Team at Chatham. Only at this stage will the draft statement of requirements be issued, around which further negotiations will be discussed. Negotiation methods will be agreed beforehand with the final bidders to ensure that the principles of objectivity, non-discrimination and equality of treatment are adhered to, whilst at the same time preserving the commercial confidentiality of competing proposals. At present, it is anticipated that a contract will be awarded in mid-1998, with implentation at the end of that year. The length of contract awarded will depend on the proposals put forward, since it is recognized that the greater the investment, the longer the period needed for an adequate return.

Conclusion

There is an opportunity in the CFQ project at Chatham for shaping the future of training rather than just being the passive recipients of changes forced upon us. Graduates of the RSME have put their skills to the test in all parts of the world and have proved that the training they have received is second to none. In line with government policy, the Corps is now seeking to enhance this excellence with the help of the private sector. In following this route, it is not the intention to surrender control of training at Chatham to a private company; the aim is to harness commercial best practice to improve current sapper training. The opportunities for private sector involvement are many, but it cannot be denied that there are a number of obstacles to be overcome and dangers to be avoided during this foray into the wide world of commerce and industry. That, however, should be part of the challenge.

"Black as Hell and Thick as Grass" – Reflections on Rorke's Drift and Isandhlwana

COLONEL T H E FOULKES BSc(ENG)

Colonel Tom Foulkes is a third generation Sapper and keen photographer. Educated at Clifton, Sandhurst and Shrivenham, he commanded the Independent Field Troop Allied Command Europe Mobile Force (Land), 1st Field Squadron (in which his grandfather served during the Boer War on special photographic duties) and 28 Amphibious Engineer Regiment. Since 1980 his military career has been principally committed to the development of new engineer equipment and bridging. He is currently employed as an Equipment Support Manager at the Headquarters of the Quartermaster General. He enjoys gardening, history and sport, and he is President of Corps Football.

ROUNDING another corner on a dusty red murram track, suddenly there it was. Unmistakable, even in that first instant: Isandhlwana. Dark and menacing, the rough grey sandstone of its sphinx-shaped rock reared up towards the empty African sky, just as strange and sinister as survivors had described it on that ghastly January day in 1879 when it seared its name into the pages of British military history. All around stretched the endless rolling pastures of Zululand, dotted with traditional beehive huts, stone kraals and grazing cattle, untouched by the passage of time.

The previous afternoon we had descended the towering, basalt ramparts of the snow-covered Central Drakensberg Mountains and driven north across QuaZulu Natal to the home of David and Nicky Rattray at Fugitives' Drift, a few miles down the Buffalo River from Rorke's Drift. Empty roads carried us across the vast, brown, treeless velt as we marvelled at the endurance of those 19th Century pioneers who once marched and trekked through its unlimited space to fight and die.

Rattray is an acknowledged authority on the Isandhlwana campaign. Cosy, paraffin-lit cottages on his game reserve provide a welcome oasis for visitors and offer spectacular views of the adjacent battlefield. Arriving at sunset, we joined half a dozen other guests with gin and tonic around a huge camp fire. After dinner Rattray announced deteriorating weather and an early start next day: a cold front had chased us up from the Drakensberg.

So next morning found us high up on the shoulder of Isandhlwana, wrapped in blankets against the wind and listening, spell-bound, as Rattray recounted the dreadful tale. And as he spoke, the battlefield below came to life before our very eyes. We saw Chelmsford's camp, the unentrenched wagon park, the fruitless reconnaissance, the division of forces, the confused messages, the shock of encounter, the black torrent boiling towards the thin red line, Durnford in the donga, the break at the knuckle, the fighting withdrawal towards the Rorke's Drift track, the realization of encirclement, the overwhelming odds, the sickening inevitability of catastrophe, the desperate last stand, the end.

Poignant evidence of that ghastly slaughter remains to this day. Graves dot the battlefield; each white cairn marks the place where between 10 and 15 men fell. They are most numerous in the vicinity of the saddle. Just below its crest a

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white smudge marks the place where Colonel Durnford, that enigmatic Sapper adventurer, and the remnants of his loyal Natal Native Contingent finally succumbed to the stabbing assegais of the frenzied horde. Rattray tells his story well; drawing on Zulu oral history as well as British documentary evidence, he unravels the sad and tangled web strand by dreadful strand. For three hours we sat there on that rock, transfixed and oblivious to the biting wind, re-living every twist and turn of that cataclysmic day on which 1500 British troops were out-manoeuvred, overwhelmed and disembowelled by the onslaught of 40,000 Zulu warriors. The scale of defeat sent shock waves reverberating around the Empire. Before Isandhlwana the destruction of a British army by "savages" was unthinkable; afterwards invincibility could never be assumed again.

Rounding the corner, there it was: the sphinx-shaped rock of Isandhlwana.

Reflecting on the extraordinary events of 1879, Lord Chelmsford's arrogance now seems astonishing and absurd. Spoiling for a fight and dangerously over-confident, he led a well equipped column of the 24th Foot (later the South Wales Borderers) across the ford on the Buffalo River at Rorke's Drift on 11 January. His sole intention was the destruction of Cetewayo's Zulu army. Doubtless he believed he was bringing the blessings of Christian civilization, but in retrospect it is hard to discern anything more than the corrosive power of British hegemony. Eleven days later, on the morning of 22 January, his jingoism and incompetence were punished by one of the most humiliating defeats ever inflicted on a British general. And yet, as has so often happened in our military history, the pain of catastrophe was eased by outstanding heroism. Later that same day, the 8 officers and 131 men (many of them sick and wounded) at Rorke's Drift beat off 16 hours of sustained attack by 4000 Zulus. Their courage and fortitude earned them 11 Victoria Crosses: the most ever awarded for a single action.

Rorke's Drift has changed since then, but it is not difficult to imagine the scene there as Chelmsford's cumbersome column struggled across the river. Wagons, oxen, horses, guns, men and supplies, all churning the ford to a muddy quagmire. Lieutenant Chard RE was on hand to perform those classic Sapper tasks of maintaining the crossing, levelling the rutted approaches and operating the pontoons (or "ponts" as he called them in his official report, published in the RE *Journal* on 1 April 1879). Once the column had

The Saddle at Isandhlwana. White cairns mark the graves of 1500 men. The site of Durnford's last stand is just visible left of centre.

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The Mission Station at Rorke's Drift. Chard's mealie bag defensive perimeter is marked with stones on the ground.

crossed safely, he remained there to keep the route open for logistic traffic and communications.

The mission station at Rorke's Drift consists of a few low sandstone buildings surrounded by acacia trees. Today they look very much as they must have done before the battle in 1879. Stones mark the lines of Chard's biscuit box and mealie bag defences. But it is the smallness of the position which is most striking. Arriving straight from the miles of open battlefield at Isandhlwana, it is hard to believe that Chard's action was fought within a perimeter of less than 100 yards, his final redoubt no bigger than a small bedroom. It is an evocative scene, resonant with history. Standing there today it seems almost incredible that even the bravest, most disciplined British soldiers, outnumbered 30 to 1, could have defended these uninspiring little buildings against such a ferocious attack by men equally brave and determined and in such overwhelming numbers. However, that is exactly what they did. And as the blood red sun chased the shrieking shades of night from the smoking ruins around that tiny redoubt, it found just 2 officers and 80 men still standing to arms; 15 of their comrades had perished, all the others were severely wounded. During the night they had fired 20,000 rounds of ammunition and killed 350 Zulus, wounding countless more. As dawn broke on 23 January, the shattered Impi withdrew back over the river into Zululand. In true British style, Chard's exhausted defenders cleaned their rifles, cleared Zulu corpses from the kitchen and made a brew.

When news of this epic struggle reached England Chard was recalled and feted as a hero, but he never seemed comfortable with the fame and greatness thrust upon him. He certainly did not exploit it. He wrote an official report two days after the battle and a personal account for Queen Victoria (who gave him a gold signet ring): that was all. He received the Victoria Cross and was promoted major, skipping the rank of captain. Subsequently, he went on to live a modest and unremarkable life culminating in his appointment as CRE Scotland in 1896, two years after my grandfather was commissioned into the Corps. Chard developed cancer and died the following year at Hatch Beauchamp in Somerset. Standing beside that final, lonely redoubt at Rorke's Drift with Chard's official report in hand, the sense of history is almost palpable. No visitor, least of all a Welsh Sapper, could remain unmoved.

Our two days with the Rattrays at Isandhlwana and Rorke's Drift were unforgettable. The battlefields were profoundly moving; our guide was knowledgeable, passionate and compelling. The memory, with its poignant echoes of tragic heroism, will remain with us for ever. Sappers fortunate enough to travel to that rich and wonderful land should make the pilgrimage to Fugitives' Drift. Their blood will tingle with pride, and they will never forget the experience.

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1946 – A Fateful Year

COLONEL W G A LAWRIE MA CEng FIL FRSA MICE

In 1877 Queen Victoria was proclaimed Empress of India, but as early as 1890 the British government announced its intention to grant independence to India. In 1917 Montagu, Secretary of State for India, announced that the goal of India's political progress was responsible self government. Plans to implement this were held up by two world wars, but by 1946 the writing was on the wall. The Viceroy, Lord Wavell, was in no particular hurry and proposed a kind of federation of provinces, with the Indian states coming together under the Chamber of Princes. At that time there were no plans for Pakistan.

The 625 princely states occupied about one third of India. The remaining two thirds was called British India and comprised a number of provinces with their own provincial governments. Some of the princely states had been in existence for thousands of years and many others since the days of the Mogul emperors. The East India Company had left most of them alone, and in 1858, when the British government took control, Queen Victoria made an important proclamation "... we shall respect the rights, dignity and honour of the Native Princes as Our own, and We desire that they, as well as Our own subjects should enjoy that prosperity and that social advancement which can only be procured by peace and good government."

In 1877 Queen Victoria, on becoming Empress of India, had written a personal letter to each of the rulers, offering eternal help and friendship. The princes set great store by these royal promises and in return provided troops from their state forces, which they maintained for internal security purposes, to fight alongside the British in numerous wars and campaigns.

During World War Two they made the valuable contribution of roughly three divisions of troops, but it was clear that they could not be taken from their traditional and almost medieval role and sent off to fight against the Germans and Japanese. Hence the creation of a military adviser in chief and a team of military advisers for the different arms. Six states had raised sapper and miner units which by 1945 were already in action in Burma. I was appointed Military Adviser Sappers and Miners with my HQ in Roorkee alongside the Bengal Sappers and Miners. I had a training battalion where recruits were trained in field engineering and trades by personnel of the Bengal Sappers and Miners and then sent off to Burma as reinforcements.

I was in close touch with the rulers of these six states – Faridkot, Malerkotla, Mandi, Suket, Sirmur and Tehri Garhwal, and used to visit them several times a year for liaison purposes. A number of other rulers realized the potential advantage of having sappers in their States Forces and invited me to visit them to discuss various projects. This took me to Hyderabad, Mysore, Patiala, Nabha, Kapurthala, Bikaner, Jaipur, Cochin, Travancore, etc, a fascinating addition to my normal work. My wife could often accompany me and enjoyed meeting the ladies of the harems who were very shut off from the world.

Because of the war few of the rulers had been able to travel outside their own territories. Living among obsequious courtiers they were quite out of touch with reality and could not accept the possibility that in a matter of months their way of life would be swept away. The presence of Queen Victoria's great grandson as Viceroy gave them a misplaced feeling of security.

Hyderabad was the largest state in India – about the size of Italy. The Nizam was said to be the richest man in the world and also the meanest. He wore shabby old clothes and drove about in a 1909-model car. He asked me to prepare a scheme for raising an engineer regiment on a no-cost basis – actually a perfectly feasible project. When I was taken around the palace grounds I found dozens of competent bricklayers building walls and steps, any number of excellent carpenters busy repairing furniture, and fitters and blacksmiths in the museum looking after antique weapons. All that was required was some khaki uniforms and some instruction in drill and field engineering. However for some reason the regiment never materialized and the Nizam must have regretted this when his state was invaded and quickly overrun by the Indian Army in 1948.

The ruler who most impressed me was His Highness of Patiala. Immensely tall and good looking he was a world class athlete in polo, hockey, cricket and squash, but at the same time he was a far-seeing statesman.

His capital had been badly damaged by floods and he wanted to raise a mechanical equipment unit which would be able to build a bund 15ft high and about a mile long to stop the flooding happening again. This was easy to arrange and the bund was built, though I have never been back to see it. I had long and interesting talks with him when I was invited to Chail, his private hill station not far from Simla. I was shown what was claimed to be the highest cricket ground in the world. It had been formed by slicing the top off one of the Himalaya mountains like a boiled egg. When you hit a six it went over the edge and landed in the jungle a thousand feet lower. His father had been another big, powerful man, whose hobby was girls. He had produced hundreds of off-spring but could afford to have them all brought up and educated by English nannies and tutors. I can see nothing reprehensible about this. Everyone was happy and the state had a useful annual intake of qualified young people. However when he started dating English girls the Vicereine put her foot down and he was banned from Simla altogether. On the way to Chail we passed a long crocodile of neat little boys and another of girls out for a walk. I was informed with pride that they were some of the children of "the late His Highness."

The polo-playing Maharajah of Jaipur was well known in England. He had been a cadet at the RMA, Woolwich, and I had met him there in 1933. He wanted to build hundreds of miles of roads across Jaipur with the help of a mechanical equipment unit. This was quite a good idea, but his prime minister, the famous Sir Mirza Ismail, begged me to say that the state could not afford a mechanical equipment unit as well as his pet guards regiment, for which he had just built an exact replica of Wellington Barracks. The real reason was that Sir Mirza had an unemployment problem and preferred to build the new roads in the old fashioned way with 20,000 coolies.

Bikaner had a particular irrigation problem which could only be resolved if they could borrow well-boring equipment from the British. Unfortunately I could not help since all the military well-boring units in India were already fully employed on famine relief projects.

The Maharajah took me round his fabulous palace from room to room. I was shocked to see some men with pick-axes bashing a hole through a wall decorated with delicate Mogul paintings. "But don't you see, Colonel Sahib," explained the Maharajah, "the little man over there with a paint brush behind his ear is the direct descendant of the man who did the original painting 400 years ago. The skills have never been forgotten and he will make the wall good so cleverly that you would never notice it."

Malerkotla had a courteous but poverty-stricken Mahometan ruler who had actually been on the *gaddi* as a small boy before Queen Victoria became Empress. He told me that his ancestors had had 10,000 cavalry that roamed all over the Punjab. He had once invited the Viceroy to visit him and had got Lutyens to design a grand façade for his palace; but behind this were wretched buildings with corrugated iron roofs. Each year he got me to come and help him work out his budget by the flickering light provided by his antiquated electric plant. He sent a 1920 Rolls Royce to pick me up. When I asked the chauffeur how he managed for spares he said that so far none had been necessary. The State Forces included a camel corps, and also a very efficient field company in Burma.

The Rajah of Mandi also had an excellent field company. Once when I was visiting him I inspected the quarter guard and was very shocked to see toes showing between sole and uppers. The commandant explained that he had ordered a supply of new boots but had had to cancel the order when the Rajah sent a telegram from the Bombay races demanding the immediate dispatch of 10,000 rupees. Normally it wouldn't matter as they usually paraded in bare feet; boots had only been put on in my honour.

The Rajah of Suket had two hobbies – clocks and birds. The road up to his palace was lined on both sides with magnificent parrots and cockatoos, each on its own perch. There must have been 40 to 50 clocks in every room inside the palace. He insisted that they all kept time and all struck together at each hour. He also kept a lion in a cage and one day the keeper left the door open. The lion wandered round the town but could find nothing to eat except potatoes – the main product of the state – so he slunk back to his cage to wait for his usual breakfast of half a goat. The whole of the rajah's State Forces were in Burma except for his commander in chief, who wore a cocked hat, and the band.

I was very fortunate in being able to meet so many of the rulers and discuss the current political situation with them. Sadly they all placed their trust in the promise made in the letter from Queen Victoria, which I saw framed and displayed in more than one of their palaces. None could see what the next year would bring but they were confident that the British would never let them down.

After a long tour in south India I met Lord Wavell. He was very worried about reports from agents in the Punjab, that weapons were being stockpiled in all the villages. He still hoped that Independence could be phased over two to three years. The problem was that he would have to have two divisions of British troops to keep order if a blood-bath was to be avoided, and this would be difficult to justify in parliament when the nation wanted to see their sons home again.

I put up a paper suggesting that the State Forces might fill this role if they were formed into three skeleton divisions with a sprinkling of British officers. They were trained soldiers, loyal to their rulers and reasonably impartial, who would be glad to remain on imperial rates of pay for another year or two. Troops from northern India could be employed in the south and vice versa. They could occupy barracks evacuated by British troops. This was considered worthy of further study but unfortunately was overtaken by events and nothing came of it.

In the meantime I became eligible for five months' leave and in January 1947 sailed for England with my family and a nanny, leaving my house in Roorkee, with servants, car, horses and dogs, hoping to be back in June for at least another year in British India.

We arrived in Liverpool on 15 February in a thick fog, a record cold spell, and a general strike. It took a little time to get accustomed to British conditions, with wartime rationing still in force, and friends and relations to visit, so affairs in India were not uppermost in our minds.

Lord Mountbatten flew out to India on 22 March to take over as Viceroy from Lord Wavell. The programme was still for the British to hand over power in June 1948, however, early in June, Mountbatten announced that India would become independent on 15 August! It seemed rather pointless to go back for only six weeks and I sent a telegram asking if I need come back. The reply was: "Return at once. Urgent job awaits you." The family was now nicely settled so I packed up and flew out on 30 June. This was the most comfortable flight I have ever had. There were only six passengers in a York aircraft. At night we undressed and got into roomy bunks. In the morning a steward knocked on the partition and produced early morning tea. I remember seeing Malta far below us as we spiralled down to a luxurious breakfast in the RAF mess, of eggs and bacon and sausages – unthinkable in England, in 1947.

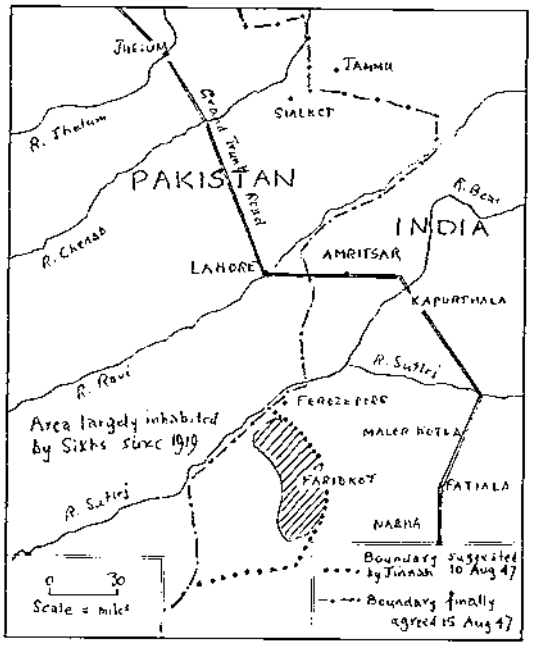
I reported to Army HQ on 2 July and was shown into a large office with a pile of white foolscap on the desk and a couple of neatly sharpened pencils. Next door was another large office with draughtsmen and stenographers waiting for instructions. I was told that on 14 August it was intended to hand over to the newly created armies of India and Pakistan, a complete set of engineer training manuals incorporating the lessons of World War Two in every theatre. All I had to do was to write these and have them typed out! Printing presses were standing by to run them off as fast as I could produce them.

The first thing was to collect the available data, so I went back to Roorkee and asked for copies of all the existing manuals with their amendments, and sets of training memoranda from the Western Desert, Burma and Europe. This covered normal field engineering, defences, laying and lifting of minefields, water supply and all types of bridging. While in Roorkee I paid off my servants, sold my car, horses and anything I could, and had everything else crated up for shipping back to England.

I next went to Dehra Dun and carried out the same exercise at the School of Military Survey getting copies of all their specialist manuals and pamphlets. From there to Lahore, to the HQ of Transportation, to collect information about locomotives, rolling stock, railway bridges, etc. I got back to Delhi with two weeks to go before Independence. All I could do was to go through the information I had collected and decide what was really required. In fact I managed to write one letter listing the titles of 43 books which I was supposed to have written. As it turned out I was able, over the next few years, to write four of these books, with English on one side of the page and Urdu on the other, and they were still in use when I was back in India 40 years later.

In July and August 1947 I could not fail to be caught up in the intense and complicated politics of Independence. When I called on an old friend, the Rajah of Faridkot, he at once asked me to become his unofficial aide-de-camp, and I got heavily involved in a power struggle among the ruling princes. It was still hoped that the princely states could be incorporated into some sort of federation. States with a population above a certain figure might have a continued existence, but most of the 625 states would have had to merge with neighbouring states in order to reach the population target.

The Maharajah of Patiala, had already announced the formation of PEPSU (Patiala and East Punjab States Union) comprising Nabha, Jhind, Malerkotla and Kapurthala, which were all contiguous with Patiala. He was anxious for Faridkot to join the



Map showing parts of northern India and Pakistan, and the Faridkot State, in August 1947.

union but, although the rulers were related, there was bad blood and jealousy between them.

The ruler of Faridkot decided to try to form his own union and he took me round with him to interview several rulers who had not joined PEPSU. This was a complete failure. All the rulers we approached still relied on Queen Victoria's promise of 1877, that Britain would give them help and encouragement in perpetuity, and were sufficiently out of the picture to imagine that they need not take any action to help themselves.

Out of the blue Mr Jinnah, the president designate of Pakistan, asked Faridkot to come and see him and I went along to the interview. The significance of this only becomes apparent when a map of the Punjab is studied and we see exactly where Faridkot fits into the overall picture. The Punjab at that time contained numerous pockets of Sikhs, surrounded by Mahometans, and just as many pockets of Mahometans, surrounded by Sikhs. The British Indian Army was stationed throughout the area and kept order apart from occasional flare-ups. The Punjab was probably the most fertile part of the sub-continent, being watered by five rivers, and canals built by the British over the previous century. The last area to be settled was in the southeast, where a million or more Sikhs had been given plots of newly irrigated land in return for their loyal service in World War One. They had worked very hard to make this area highly productive but it was many miles to the east of the probable boundary between India and Pakistan.

It was pretty clear that the boundary line would have to run roughly north and south with Lahore in Pakistan and Amritsar in India.

The state of Faridkot had a Sikh ruler but a large Mahometan population. It was situated a few miles due south of Lahore and Amritsar, which meant that the boundary line could equally be drawn to the east of Faridkot which would put Faridkot within Pakistan, or to the west, when it would be in India. Jinnah suggested that if the rajah acceded to Pakistan he would become the ruler of an autonomous Sikh province within Pakistan, consisting of the state of Faridkot and all the areas of the south eastern Punjab which were occupied by Sikhs. This was in the first week of August and there was still time for Faridkot and several other states to declare allegiance to either India or Pakistan. After long discussions Faridkot agreed to join Pakistan and I was delighted that the Sikhs who had worked so hard in the new territories would not have to leave.

On 14 August I was invited, with about 5000 others, to a final drinks party at the Viceroy's House. Mountbatten, in naval uniform, received the guests as they came in and seemed in terrific form. Lady Mountbatten, however, was clearly wilting.

We strolled about in the formal Mogul gardens, which needed over 300 gardeners to keep them in order (and the number is still the same), and watched the sun go down on the last day of the Indian Empire. It was difficult to take in the importance of what was happening. The Rajah of Faridkot was there and invited me to take pot luck at his palace. His wife and mother, the two Ranis, were there and we dined off a service of silver plate which had once belonged to Charles I, and then played a few rubbers of bridge, at which they were all pretty expert. At 11pm the Rajah got up and said he must change before going to see the Viceroy which he had to do before midnight. He came downstairs in full regalia – a pale blue satin suit with a golden sword and ropes of pearls and said "Colonel sahib, you'd better come along with me to see the fun." But I declined as I had really no official reason to be with him, and watched him go off in his Rolls Royce. It was 20 years before we met again. I wandered out into the streets among millions of happy Indians. We

watched the Union Jack come down and then joined hands to sing the new Indian national anthem. Then there was a three-day holiday.

Suddenly I was ordered to report to the airport along with two or three other British officers and we were flown to Lahore, where there was utter chaos. Throughout India, nearly all British officials, army and police officers, had either sailed for England or were waiting in Bombay. Indians who had been promoted three ranks overnight were overwhelmed and unable to take charge of the situation. I was told that the brigade major of the brigade stationed in Amritsar had had a nervous breakdown and I was to take over.

When I got to Amritsar the British brigadier was away trying to contact political leaders, and in fact I never saw him at all. There were no other British officers in the HQ and the signal office, staffed by Gurkhas, was trying to cope with a constant stream of desperate messages pouring in on three telephones and five wireless sets. In a field outside the office were about 10,000 refugees with no food, water or latrines. There were many wounded; people were dying and babies being born. The refugees had brought with them their cattle and horses, sheep, goats, camels, dogs and chickens and there was not a scrap of cover for any of them. On top of all this we had the heaviest rain I have ever seen, which washed away bridges and railway embankments. Some brave characters got up and set off for Pakistan only 10 miles away but there were gangs of Sikhs hiding in the standing crops who cut them all up. I saw a platoon of Hindu soldiers supposed to be protecting the office and ordered them to intervene to help the refugees, but they simply turned their backs on me.

20 August was a terrible day. Two RE officers serving with a Pakistani field company, who were trying to rescue trapped Mahometan villagers, were killed by snipers. Then Lady Mountbatten arrived with a crowd of hangers-on demanding to see all the horrors. To try to get refugees across the border into Pakistan I made all units stockpile three days' rations, then ordered all spare vehicles to report to my office at dawn. I rushed over to Lahore to get Pakistani vehicles to meet them on the frontier. Animals and luggage had to be left behind, but we got all the people away in several lifts.

Next day I went over to Lahore to report to HQ Boundary Force, but the jeep I was travelling in skidded on the wet road and ended up in the ditch with me underneath it. After ten days in the BMH in Lahore I was flown back to Delhi still ignorant of what was going on or what had happened to Faridkot. Long afterwards he told me that on the way to the Viceroy's House on 14 August he had been waylaid by an armed gang from Patiala who said they had orders to shoot him if he opted to join Pakistan.

In early September, Delhi was in a terrible state with rioters looting shops and dense clouds of black smoke rising from the old city. A battalion of British troops, which had not been able to get away by 15 August, were brought in and walked about armed only with pick helves. Almost within minutes the rioting ceased.

Major General Williams, who had been EinC India prior to independence realized that the few qualified Indian and Pakistani engineer officers would all become brigadiers overnight and there were no junior officers at all. The few RE officers still in India and Pakistan were offered generous terms to sign on with either country for seven years.

For various reasons this appealed to me but I had to ask my wife. I cycled down to the main telephone exchange, pistol in hand, without incident, and got the operator to ring up my home number. My wife was by now rather fed up with life in England and gladly agreed to come out again, although all her friends and relations thought she was mad.

I was offered a job at Kirkee, near Bombay, and therefore far away from the riots. I made my way back to Roorkee and was in time to reroute all my belongings to Kirkee.

When I got to Kirkee I was shown a blank area of 5000 acres of black cotton soil and told that this was the site for the new SME. Also that the first course was due to arrive in two weeks. But that is another story.

What a year it had been! I could not help wondering what would have happened if Winston Churchill had won the general election in 1945. I am sure that Wavell's plan, called Operation *Madhouse*, for the gradual handing over of India province by province, would have been carried out, possibly with the use of State Force troops in an internal security role. Pakistan would never have been born, particularly since Jinnah died of cancer within the year. The history of the world might have been quite different if I had agreed to go to the Viceroy's House with Faridkot on 14 August and he had acceded to Pakistan instead of India.

The Fleury Brewery

MAJOR J W SETCHELL MBE ERD CEng MICE MRSH

Commissioned into the Corps (Supplementary Reserve) on 11 September 1935, the author was mobilized in 1939 and, after a brief spell as Lieutenant Garrison Engineer Exeter, he went with the British Expeditionary Force as a captain with 2 Engineer Stores Base Depot (ESBD). Evacuated from St Malo in June 1940, in November he was posted to 1 ESBD at Olympia, London, but finding store keeping dull, volunteered for bomb disposal. After a two-day course and with little practical experience, he was promoted major and posted as Deputy Assistant Director Bomb Disposal Scottish Command. He became the first OC of 206 Works Section Royal Engineers when they were formed. Back to France soon after D-Day, and subsequently Caen, Eindhoven, Breda and Walcheren, he was demobbed in December 1945. Moving to Canada in 1953, after two years as a road engineer for an Ontario municipality, he started a consulting engineering (civil) firm with another Englishman in 1955. Retired as President and Chief Executive Officer in 1985.

EARLY in August 1944, "Monty" – Lieutenant General Bernard L Montgomery, in his TAC HQ at Blay, some 14 miles from Caen, was probably watching closely as Operation *Cobra* unfolded.

At my HQ at 6 Rue Charles Leandre in Caen, I was trying to work out how the units under my supervision could carry out even more engineer services, in addition to the large number on which we were then engaged.

These meditations were interrupted when Sgt Hudson, my Chief Clerk, came into my office and announced that a Major Young of NAAFI/Expeditionary Force Institutes wished to see me.

To back track a little, Caen was captured on 10 July. 206 Works Section RE, of which I was OC, had moved in (after doing a fair bit of mine-lifting and booby trap removal) soon after the Germans moved out. We had "liberated" the furniture, cutlery, glassware and a piano from a German officers' mess, where it was obvious that the former inhabitants had departed hastily, as we found food still on plates in the dining room. In and around Caen at that time there were several thousand English and Canadian troops. The weather was fine and hot. The troops were thirsty. Area Orders – often blissfully optimistic – had announced that a ration of one bottle of beer, per man, per week, would be forthcoming; but no beer appeared.

To return to Major Young. He told me that a french brewery had existed at Fleury-sur-Orne, on the enemy side of the River Orne. It was not known whether it had survived the fight for Caen, or whether any damage incurred was repairable, and he wanted me to do a reconnaissance with him to find out.

This was obviously a matter of supreme importance and merited my highest priority, and I arranged to go to Fleury the next day. Young arrived promptly and Fred Tapp, my driver/batman (who had been with me earlier in my bomb disposal days) had the jeep warmed up and we moved off smartly. Eastwards down Rue Sadie Carnot to the Orne, across Tickell bridge and thence southerly on the road to Thury-Harcourt to Fleury. We soon found the brewery, which was in a mess. All the buildings had been damaged by shell or mortar fire and not a pane of glass had survived. Most of the roof tiles had been blown away or were badly damaged and the general impression was of complete ruin. However, a superficial inspection disclosed that the mash and holding tanks seemed to be undamaged and the automatic bottling plant, covered in debris, also appeared to have suffered little.

No water was available from the mains, which we knew had been blown up at several points and, as the generating station in Caen was out of action,

Maj J W Setchell MBE ERD
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no local power was available. In any case the overhead lines had mostly been blown down in the exchange of gunfire.

I was as keen to get the brewery going as was Young, so I said that I would arrange for an E&M officer to look at the bottling machinery and test the tanks, and would assess whether it was possible to put the buildings into working order within a reasonable time. I arranged to telephone Young at NAAFI HQ, near Bayeux as soon as the inspections were completed. Meanwhile Young told me that if my report was favourable, he would order the necessary hops, malt, etc, and would have them delivered to the brewery. It was agreed that the whole affair should be treated as SECRET as it was thought to be undesirable for the whole of the LofC troops to form a queue outside the brewery.

The E&M officer could see no insuperable difficulties when he and I reviewed the brewery that same day, so I appointed Sgt Bolton to be OC brewery repairs and he was sworn to silence.

We learned that the brewer had been shot by the Germans. However, a few days after work started the former brewery foreman appeared and was of considerable help thereafter.

To provide water I ordered about half a mile of victaulic pipe, pumps and filters etc, together with diesel generators for the bottling line. A supply of coal was ordered from the RASC. My friends in the REME workshops at Vaucelles made various fittings, mainly for the bottling line, but were not informed what they were to be used for.

About three weeks after I had reported to Young that we could get the brewery to function, hops, malt, etc were delivered and safely stored out of sight.

The battle for Normandy can be said to have ended on 19 August 1944. On this day the final remnants of the enemy were cleared out of the Mortain pocket, in the Falaise area. On 25 August, Paris fell into Allied hands and about ten days after this Major Young rushed into my office, told me he had been appointed OC Leave Hotels in Paris and was en route to take up his new job.

He stayed long enough to tell me that when I got to Paris, I was to contact him and he would have a suite for me at the best officers' leave hotel. Subsequently he was as good as his word. He then dashed off without mentioning the brewery or leaving the name of any contact in the NAAFI.

During September work pressed on at the brewery. I made a point of personally checking progress at least twice a week. About the end of September Sgt Bolton, the brewery foreman, and I agreed that things were sufficiently advanced for a trial brew to be made. This was done and the result was as I feared it might be, the beer was watery and "French".

Luckily, I recalled that on a list of officers on the CE's staff, based in or near Bayeux, there appeared a Major Tamplin. I telephoned and cautiously enquired if he was connected to the well-known brewery in the south of England. To my surprise and joy, he said he was a director of the company and he enquired what he could do for me. Earlier checking had discovered that he was an E&M officer, so without naming my problem, I invited him to come to Caen and have lunch in my mess. We had a good lunch, aided by some first class Burgundy. After lunch, I described the situation to date and drove the four miles, or so, to Fleury. Tamplin had a long talk with the foreman and Bolton and requested a "sample" if the brew turned out satisfactorily.

Some time later a broadly-smiling Bolton appeared in my office and invited me and Capt Bob Selby, my 2IC, to "test the product". This was real beer and Tamplin's instructions were undoubtedly correct. Arrangements were promptly made to dispatch two cases to Tamplin for his approbation.

There were still a number of things to be completed at the brewery: drains, roofing and glazing, but all these were completed by mid-October.

Still no sign that the NAAFI knew or cared that there was a functioning brewery in Fleury. On the site was an enormous amount of hops and malt, etc, which Tamplin estimated would last about a year.

It seemed a pity to let such a promising project die of neglect, so I decided that we would run the brewery. The foreman and a couple of local helpers were satisfied with a few dozen bottles per week – most of which they probably sold on the black market and so were well reimbursed for their labour. As far as we could find out, no other brewery was working within 150 miles.

Sgt Bolton was assigned to other projects but was given the additional task of keeping an eye on the brewery and ensuring that any replacements or repairs were attended to promptly. He also kept an eye on production and was responsible for seeing that, at all times, supplies were available to 206 Works Section. By this time all ranks of the unit were fully aware that we were operating a brewery, of which they were very proud.

101 Beach Group had become 101 Base Sub Area (101 BSA) and was commanded by "Little Monty" (Brig E J Montgomery), responsible for Caen and a large area surrounding it. We had been toiling in Caen when 101 BSA arrived and at Monty's request I was made his RE adviser.

Now that the battle of Falaise was well behind us, Little Monty decided that it was time to open up clubs for the troops in and around Caen. To this end he directed that we should turn three large buildings, discovered relatively unharmed, into clubs complete with bars. It will be appreciated that this decision had the unanimous approval of all ranks and work was completed on all, in record time. The first club to be ready was the ORs' club and a few days before it opened, at Monty's daily morning conference, he had bemoaned the fact that the NAAFI could only come up with soft drinks.

I decided that it was time to come clean and so one morning after Little Monty's staff had inspected a POW compound which we had built, about a quarter of a mile away from the brewery, I confided in Capt Bill Morgan of the Devons, who was Monty's Q officer, and took him along to sample the product as it came off the bottling line. Bill was amazed and delighted and quietly arranged for a few hundred cases of beer to be delivered to the about-to-be opened club.

On the evening in question, the club was opened by Little Monty, who on completion of his speech, which had included a reference to the inability of the NAAFI to produce other than soft drinks, was astounded to find a tankard of real beer thrust into his hand.

When the officers' and sergeants' clubs were opened, Bill Morgan made similar arrangements and each received a large consignment of beer. Also, but without indicating their origin, cases of beer were sent to the CRE and to Maj Tamplin. Brewing continued and we had to put on an extra shift to compete with the Christmas thirst.

For reasons unknown to me, the NAAFI never mentioned the brewery. It might seem that Young was responsible for the original supplies but had not informed anyone else.

In February 1945, 206 Works Section RE was ordered forward and it became necessary to ensure the continuity of brewing operations. Before we departed I called on the CRE, (no names, no pack drill) and gladdened his heart when I told him that he had now inherited a working brewery and was about to become the head brewer of the excellent beer with which his mess had been supplied.

We arrived in Eindhoven and not long afterwards were delighted to find that 21 LofC HQ (the reincarnation of 101 BSA) had moved in, complete with Little Monty and all our friends on his staff. They were still there when I left to resume my "bowler hat".

As a footnote. In early December 1945 I was sitting at the bar in the officers club in Brussels, en route to demob. I found myself sitting next to an RE captain who was wearing the flashes of the LofC. He confirmed that he was based at Bayeux and I enquired if the CRE, Lt Col "X", was still running the brewery. The captain seemed surprised that I knew about the brewery, and after I supplied confirming details, he told me that Lt Col "X" was indeed still running the brewery and that sappers in the RMA were still receiving ample supplies of newly brewed beer!

It is well known that sappers can turn their hands to most things. However I would be surprised to learn of any sapper officer who managed to run a brewery concurrently with his other duties.

Building the Peace
Engineers Open Up the Country in Bosnia

BRIGADIER J D MOORE-BICK OBE MA(H)

Since writing the article *Facing The Future with Confidence – HQ ARRC Reaches Operational Readiness*, published in the August 1995 *Journal*, Brigadier Moore-Bick, as Chief Engineer HQ Allied Command Europe Rapid Reaction Corps, has spent the last year in command of engineers on Operation *Firm Endeavour* in Bosnia, and has written the following short piece about this period.

The author presenting a spirit level to Major Ralf Orthen, German Engineers. Major George Tankersley, G5/Civil Affairs, US Army stands on the right.

OPERATION *Joint Endeavour* made an enormous variety of demands on the 7000 military engineers committed to the campaign in Bosnia. Getting the force in during winter conditions, establishing base camps and providing force mobility in every area of the country, took superhuman effort. Once military freedom of movement was established, engineers used the opportunity provided by the lack of resistance and benign working environment to "open up the country", the overarching expression for COMARRC's (Commander, Allied Command Europe Rapid Reaction Corps) engineering strategy. Whilst many of the engineers at divisional and brigade level remained committed to sustaining their force in camps and logistic installations, others ensured that movement by road, bridge and rail was secured during the months of election, redeployment and winter.

At Corps level, a force of eight nations used all of the equipment and skill at its disposal to reconnect the principal road system. Following hard on the heels of the early tactical military bridging of the campaign, ARRC engineers established a more permanent and durable route network by employing a mixture of steel panel, timber and improvized bridging and culverting.

The force itself was remarkable, using many items of Russian equipment, and on any bridge site the Hungarian Tatra truck was welcome, as was the heavy Romanian "Wolla" tractor or 40-tonne crane. NATO officers in the Corps Engineer Staff, comprising personnel from 11 nations, soon became familiar with PMP[1], PTS[2], TMM[3] and BAT 2[4]. Design capability was provided by the UK's Military Works Force (formerly 62, now 64 CRE (Works)), whilst the command support troops of the engineer force were completed by the UK Geographic Support Group (formerly 14, now 13 Topographic Squadron) and the Belgian engineer company. These units provided vertical construction support to corps headquarters' installations, and also a very versatile, compact unit for a multitude of other tasks, vertical, horizontal and G5 engineering, in support of the restoration of normality to civilian communities.

The field force was made up principally of the Hungarian engineer contingent, based at Okucani in Croatia, and the Romanian engineer battalion at Zenica, with additional reinforcement from the German engineer battalion at Benkovac in southern Croatia. Both of the PfP (Partnership for Peace) contributors brought impressive skills in horizontal engineering for roads and bridges; the saw-milling capability was particularly useful, and men who could design MLC 80 bridges in timber made a uniquely valuable contribution, whilst some could drive piles, a task long neglected by NATO engineers.

[1]Ribbon type folding pontoon bridge.
[2]Unarmoured tracked amphibious transporter.
[3]Truck mounted scissors bridge.
[4]A Russian-made armoured engineer tractor.

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Major General K J Drewienkiewicz, speaking to Lieut Colonel Marian Dumitrescu, Romanian Army, right, with Colonel Constantin Graur Vartopeanu, Commander Romanian Engineer Battalion, centre, and Captain Marian Cioca, Romanian Army, left rear.

For larger bridges, especially those over big rivers such as the Sava, the chief engineer aimed to make bridge building a multinational task: Hungarians with the US 16th Engineers at Brcko; Romanians assisting the German engineer battalion at Visoko; the 16th again, with Swedish engineers assisting the Romanians at Lukavac and Doboj, and finally, Finnish engineers assisted the Hungarians at Slavonski Brod. These operations brought the best skills and most appropriate equipment from each unit onto the work, and helped all the engineers to respect one another equally.

Preparation of the Visoko bridge site is carried out by German engineers before construction by German, Romanian and Austrian engineers and drivers, of a 55m Compact 200 bridge.

Opening up the country demanded more than bridges; roadworks featured heavily and engineers were aided by the mobile teams of the regional engineer offices from Zagreb, Ploce, and Split, part of the organization of the Commander for Support, in Zagreb. The 2500km corps route network utilized local contractors wherever possible, since a bituminous surface-laying capability among military engineers is not widespread. As the roads opened up, new life was injected into moribund contracting firms, and employment was given to demobilizing soldiers as a result of awarding IFOR (Implementation Force) contracts. All of the road and bridge works on the system were paid for by NATO common funding.

Engineers need backing with materials and transport. A powerful Austrian transport contingent, optimized for engineer support, backed up the corps force with tippers and bridging trucks, augmenting those held in engineer units. They seldom rested. Two engineer parks were set up, at Split and in the Zetra Olympic stadium in Sarajevo, and stores shipped into, or procured on, the Croatian coast, were brought forward by Austrian, Belgian or German convoys. The parks, part of the civilian engineer support services, provided: materials management and accounting; artisans and technicians for camp support and limited camp construction; and, last but not least, Bosnian consultants for all major utilities work in the early days of the operation to ensure that local expert knowledge was always to hand. Completing the picture was the regional contracting office and the NATO Management and Supply Agency with the work carried out by their contracting officers.

Freedom of movement would not be complete without a railway service and our initial aim was to reconnect external links to Zagreb and Belgrade

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to provide a robust military line of communications through the winter months. The challenge was to link the lines internally across several different areas of former battlefields. The first step was taken on 29 June when the railway bridge over the river Una in the northwest of Bosnia was reopened. This was another Hungarian project, but with a Hungarian civilian contractor to assist. A large contract drawn up with the Republika Srpska railway authorities will see the line refurbished for 140km to Doboj – and will also employ a large number of demobilized military personnel, by design, making engineering serve the widest interests of the campaign plan.

Turning to the concerns of the people, later stages of the bridging strategy aimed to link isolated communities, whilst engineer materials and equipment were being made widely available to help IFOR forces and civilian aid organizations to contribute to the restoration of normality. Water and electricity play a vital role in resettlement of displaced persons and in restoring the appropriate conditions for elections. Engineers assisted in this by providing logistic support, mines information and awareness training and, not least, by providing consultants and electrical specialists where these could help. Engineers could not do it all, however, but their aim was to do their best to enable others to get on with the job.

Collectively, the military engineers of IFOR in Bosnia have achieved much. They have made multinational operations work well across a wide diversity of tasks. Above all, they have shown that a common professional challenge and a common professional instinct can force success where language and sometimes logic fails, and tried and trusted procedures whether NATO or non-NATO, have run out. Their mission continues and the next challenge is, as ever, just out of sight, around the next corner.

Conclusion

350-odd corps engineer tasks on from December 1995, RE officers and senior NCOs have provided the core of the international engineering campaign of the ARRC and of IFOR. In the ARRC they have planned and commanded operations, and done their utmost to coax the international reconstruction agencies to build up momentum and consolidate the peace. The MWF units of 62/64 CRE (Works) have designed and set international standards and policed them in the corps-level execution of operations. In our civilian Engineer Support Services, retired Royal Engineers have run our camps, parks and workshops. The Engineer and Transport Staff Corps, together with the MWF(V) have come up with unstinting help. Retired Royal Engineers have supplied and supervised our bridging. In the support command at Zagreb, Ploce and Split, our regimental colleagues have designed, contracted and executed quality control over civilian contractors. Regardless of the fate of the Dayton agreement, military engineers have left a clear and visible record on the landscape of Bosnia and its rivers. Success, if it be so judged by those who come after, is there to be widely shared. The course of events has tested many engineers of many nations, often to the limit of capability or skill. In this, the initiative, ingenuity and flexibility of Royal Engineers in uncertain surroundings and unclear command chains, creating something from nothing, has been a testament to our Sappers' ability at all levels, serving and retired, regular and territorial.

The first bridge across the Una river, joining Croatia to Bosnia. The replacement, a Russian military railway bridge, was built by Hungarian civilian and military engineers, and can just be seen at the far end. Hungarians also laid the track.

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Safe, and Sorry, Explosions

COLONEL D G RASCHEN OBE MA

After the Partition of India Dan Raschen visited Aldershot, Chatham and Cambridge, before volunteering for Korea. From being adjutant of 6 Training Regiment at Worcester, an unexpected technical staff course at Shrivenham lead to a three-year association with steam-age atomic weapons while in command of 73 (Christmas Island) Squadron.

He returned to Shrivenham to become the Directing Staff Ammunition, previously a gunner preserve. His two commands were of Cambridge University Officer Training Centre and of 40 Army Support Regiment RE in Germany, with a Ministry of Defence tour sandwiched between. After three marvellous years as Military Attaché Stockholm, he became Master General of the Ordnance's Project Manager Infantry Weapons.

Back at Shrivenham again, as the weapons and vehicles colonel, he influenced his civilian selection, in 1977, as the college's infantry weapons specialist.

He retired fully and easily in 1989, and he and Judy still live in Shrivenham village.

This light-hearted piece is an edited extract from the author's book "Wrong Again Dan!" and covers a period of time the author, a second lieutenant aged 20 at the time, spent in Sumatra during 1946. It is published with the author's kind permission.

I was lucky, in that each of the eleven trips I made in troopships or equivalent was more comfortable than the one before. On the *Sontay* I was making my first trip as an officer, thus being allotted a cabin, which I shared with an Indian doctor. In all other respects the ship was a real shocker, an abnormal number of rats being the speciality, but she delivered us, in her own good time to Sumatra.

Java is about the same size as the British Isles, but with a rather larger population. Sumatra, three times as big, had lots of swamps and only 12 million people. Apparently the soil was some of the most fertile in the world, so nobody starved. Many countries had tried to rule the East Indies, including England, but for a full 150 years before 1942 the Dutch had been in charge and, of course, this had had a tremendous effect on Dutch outlook and prosperity, probably more than India had affected the British.

Whereas the Dutch, prewar, had been fully in charge of the local Indonesian population, things changed when the Japanese arrived; their attitude was that, providing the locals produced everything the Japanese asked for, they could administer themselves, and this they were left to do. They helped the Japanese to put the Dutch population, and British forces who had escaped from Singapore, into prison camps, then started to run their country, learning a lot in the three and a half years before the war ended.

Lord Mountbatten, into whose area the responsibility for the East Indies fell, had no forces to send there immediately so, "had no option in the circumstances but to place upon the Japanese Supreme Commander and his forces the responsibility for maintaining order until the Allied forces could arrive to relieve them." (*Administrative History of the War*, p422.)

It was nearly seven weeks after the end of the war that the first British forces arrived in Java, and in Sumatra a few days later.

We arrived at Belawan, the highly unprepossessing port near the capital of the island, Medan, at the northeast end of Sumatra. I had given scant thought to my reception in 26 Indian Division Engineers, but was introduced to the major acting as the CRE staff officer, who told me about the division and of the situation in the Netherlands East Indies. Our Indian corps had been sent to take the surrender of a large Japanese army, to disarm them and, later in 1946, to hand the colonies back to the Dutch, who, as might

Col D G Raschen OBE MA
Safe, and sorry, explosions p230

be remembered, had recently been occupied in a war with Germany and were not yet quite ready to do the job themselves. An unforeseen factor had been the local Indonesians who, on their own initiative, had decided that they did not want the Dutch back. Consequently, and immediately following the Japanese surrender, they had suggested that it would be to their mutual benefit if they, the Japanese, handed their arms over direct to them, the Indonesians. The arrival of the British Raj two months later had not, therefore, been greeted with tumultuous welcome. Shooting of one form or another had continued most days, and all nights, since. In Padang, on the west coast, the brigade major and a nursing sister had been brutally murdered after a swim, and everyone generally was very much on edge. Luckily things were much better in Sumatra than in Java, and 26 Division's job was to keep the peace.

The major went on to explain that the division had been together through hard campaigns and was lucky in being fully up to strength with experienced officers, so I was sent to 98 Company as a supernumerary officer.

98 (Royal Bombay) Field Company was in a pleasant spot on the perimeter of our wired-in possessions in Medan. The place had been built as a school for the locals by the Dutch, good brick buildings with tiled roofs. I immediately recognized the OC and two of his officers as some of those whom we officer cadets had envied in their self-assurance in Bangalore. Not only were they my heroes, but they turned out to be friendly as well. The major was a tea planter, none of them wished to be regular officers, all were unconventional and all intended to enjoy their remaining months in the army as fully as possible.

Doubtless the company had much useful work to do, but the most obvious item on hand was the construction, in quantity, of latrine seats; every kind of combination from single seaters to banks of eight. So proud were they of their achievements that, that very evening, the officer's mess was giving a party for the dignitaries of the division with no other form of seating provided. I was certainly duly impressed, but much more so after the guests had all left and the OC ceremoniously fired a magazine, some 30 rounds, from his 9mm Sten gun through the mess ceiling. This agitated some trigger-happy guards nearby and then a few Indonesians, so that a cheerful chatter of firing continued for a few minutes. During this time the OC had pleasure in phoning to report the local disturbance and to congratulate his brigade HQ on putting such a fine unit as his, well capable of coping with such situations, on the perimeter.

The next morning, without a word being spoken, a squad of three Mahrattas arrived barefoot in sports kit and proceeded to climb the roof and adjust and replace the broken tiles. This was the standard procedure. For low-level climbing, (poles, coconut trees and the like) I doubt any race can touch the Mahrattas; one of the many reasons for which we were lucky to recruit them.

On my third day with 98 Company, a raid on a factory was planned. A few miles out into the country, far beyond the area normally patrolled by our troops, lay a large workshop, associated in better times with a major rubber and produce company. Rumour had it that the Indonesians were making some rudimentary weapons there to augment what they had received from the already generous Japanese. A party of an officer and ten men would spend an hour on Sunday afternoon putting the place out of action for a while. They would be escorted and guarded by a company of the South Wales Borderers (SWB). The OC must have seen the look of envy in my eyes, and his generous platoon commander, who had been given the task, agreed to take me along too, providing that I was not a nuisance and left him to get on with the job. I promised faithfully and attended the briefing at the SWB mess with eyes agog: so battle experienced were they that even a captain had a DSO on his chest. It was stressed that speed was essential; I think they thought our convoy might be ambushed on the way back, so the time for the job was cut to half an hour.

Our party of eleven plus me arrived at the due time in two 15cwt Dodge trucks. I glowed with pride to think that the apparently enormous escort was just for us. Despite destruction being our task, there was a feeling that the locals would remain friendlier, if that were the word, if bangs were kept small and fires avoided. Thus we were to be limited to charges of about two pounds of high explosive (HE), which could be stretched to five if absolutely necessary. Hand tools, sledge hammers, crowbars and a variety of jemmies still had an important place in our belongings.

We found the factory completely deserted and securely locked. If any arms manufacturers had been there lately, they had certainly covered their tracks well. The sappers were from the Sikh platoon, a splendid choice; they put their hearts, souls and considerable brawn into the task. Although some

locks were shot open, it was an eye-opener to see how large a padlock could be swiftly broken with an ordinary hammer. It wasn't long before we had every door in the building open.

In the twenty minutes or so which were left to us our leader said that he and the Sikhs would destroy, with explosives, as many of the metal cutting tools as possible. Perhaps I would like to work alone at the end of the factory on the electrical power supply and the office safe? Nothing would be more to my liking, but neither target was precisely covered in the RE demolition pamphlets which I had studied avidly during the previous two years.

All the electricity for the place seemed to come in through a large transformer standing a little way from the building. This was lucky, as the three pounds of HE I had applied caused a splendid flash, followed by a fire; I had never before realized that transformers were full of oil. Anyway it burnt out quite quickly, but the smoke made the commander of our escort rather peeved.

The safe was a more difficult task. It was not very large, but even if the door were only three inches thick it was likely to be more than I could get through with five pounds of HE. The rule for cutting steel was to square the number of inches of metal you wished to cut, and that gave you the pounds of HE required. One pound for one inch, four pounds for two inches, nine pounds for three inches. Anyway, I had just deftly secured five pounds in and around the keyhole when a message arrived that time was up and that if I wished for a lift back to Medan, would I kindly come, now. Much as I longed to see the effect of my handiwork, the horror stories about those taken prisoner dissuaded me from staying, so, leaving the charge in position but unprimed, I just caught the convoy for an uneventful trip home.

There was no need to mention the transformer during the debriefing, the fire had been obvious to all, but I explained what I had planned for the safe. "How thick did you say the door was?" my OC asked, then looked horrified when I said "Three inches." "Don't you realize that there would have been a couple of inches of asbestos in that? You probably had only two half inches of metal to cut, so you would have blown the front of the safe straight out through the back." I thanked him for this information and promised to remember when next blowing safes.

It had been a wonderful afternoon, but the outcome of that raid had its ironic moments. The next day I heard that much of the port of Belawan was out of action because the electricity had failed on Sunday afternoon. "How did it happen?" I asked nonchalantly. "For some unknown reason the main transformer there suffered an overload. They are having the devil of a job finding a replacement." Never have I behaved so unconcernedly, but it did seem to be a coincidence.

Before leaving for Sumatra, so great was my confidence in the country going back to normal, that I had invested a month's pay in some rubber shares. Later, when back in England, I read in the annual report of the company concerned that they were pleased it had at last been possible to repair the estate workshops near Medan. Financial acumen has never been my strong point, but to blow up one's own company is the best way I know of retarding its growth.

I had enjoyed my four days with 98 Company and we parted on the best of terms, when the field park company at the other end of Medan actually said that they could do with a spare officer to run their transport. A field park company's job was to supply the field companies with all the things they needed, like stores and workshop facilities. This involved building up a dump, or builder's yard, of useful resources and, given transport, the Medan area was an Aladdin's Cave of such treasure. The Japanese had collected together, in a huge storage camp about 15 miles out in the country, all the useful things the Dutch had left nearby, but we might not be able to get there safely for much longer, so my job was to get every vehicle I could on to legalized looting or, to use the correct term, resources procurement. This was great fun until I let a bulldozer transporter, carrying a load of timber, go through a small bridge; an interesting bit of recovery but the time wasted was hard to make up.

26 Division only held three towns in Sumatra: Medan where I now was, Padang on the west coast, with a brigade which included 28 (Royal Bombay) Field Company, and Palembang, up the Moesi River in the south with a couple of battalions and various Japanese units which we had found propitious to leave armed and operational under British command. There were no sappers allocated to Palembang, so an officer from 28 Company had been sent to command the Japanese engineers. 28 Company, therefore, needed an officer, and the field park in their turn generously spared me. On hearing that he would receive a second lieutenant, the OC of 28 Company could scarcely believe that anything so inexperienced had been allowed into the country and requested that I put the second pip up

immediately, so as not unnecessarily to advertise my naivety. He told me that I was to take over the Mahratta platoon. Apart from the unpredictable jobs of field engineering, nicely balanced between construction and destruction, I would be responsible for the water supply of the town and port and also would keep an eye on the port as a whole, which included sheds and the handling gear to export coal and cement. Water, with portable pumps and rubber and canvas hoses, had been in my training, but wells, large pipes and pumping stations had not. They quickly gained my attention.

Luckily I had a splendid Indian Viceroy's commissioned officer with my Mahratta platoon, *Jemedar* Kondi Lawand. We had plenty of work in hand and, although most of it was going on concurrently, matters may be simplified if I relate, separately, a few of the tasks which taxed both my engineering skills and the patience of my OC.

We employed large numbers of Indonesian labourers, and the manner of payment they most appreciated was in rice by weight. This came from a little rice mill on the outskirts of the town. As rice was so important and as the situation in Sumatra could soon become ugly, brigade HQ had prudently decided that the mill must be moved to well inside our perimeter. The task was obviously important and my OC didn't seem over keen to give it to me, but had no choice. "It is really quite simple," he said. "At present there are two rice milling machines each run by belt drives from old petrol engines, all bedded on concrete plinths. The engines are horrors, so we won't move them, we'll use electric motors instead. There are plenty to be had, so you must find a couple. All you've got to do in the new mill is build four concrete plinths for your two millers and two motors, and get Mac to connect the necessary electricity." Mac was the commander of the Punjabi Mussalman platoon, a strong and efficient paratrooper who, less than a year ago, had parachuted over the Rhine with 6 Airborne Division.

Just as I was leaving the OC shouted, "Make sure you grout your rag-bolts in well." You may come from the rag-bolt set, but until then I had not, so again an omission from my lengthy training came to light.

Mac, who before he joined the army had helped to build the new Waterloo Bridge, enlightened me later. An electric motor is likely to have, say, four bolt holes in the bottom through which it can be secured by bolts cast into a concrete plinth below. Now, until that day I would have guessed that one somehow cast the plinth with the bolts sticking out in the right places. Not a bit of it. I learnt that when I cast a plinth, I must insert large wooden pegs as best I could where the bolts would be. Once the plinth had set I could remove the pegs, that is if I had remembered to grease them first, and would then be left with holes through which I could dangle the bolts from the motor, which I would keep neatly chocked up above the top of the plinth. Then, when everything was squared up, a very strong cement/sand/water mix would be poured in, this being the grout. Once it had set good and hard, which with quick setting cement should be the next day, I would gingerly remove the chocks, lower the motor gently onto its plinth and tighten down the nuts. Presto, job done. "All clear" I agreed, "except, what, pray, is a rag-bolt?" "Oh, that just means that you get the blacksmith to rag the end of it into an arrow tail, so that it won't pull out of the grouting." "Of course!" I said, then explained all to the *jemedar* and left him to get on with it whilst I went to scrounge electric motors.

Apart from crops like rubber and coconuts, Sumatra seemed to specialize in two more unusual produce lines, black pepper and cinnamon. Not everyone expects to find electric motors in a cinnamon warehouse, but that is where I was led. Cinnamon comes in pinkish sticks of bark and there must have been many tons of the stuff in the shed. Under it I was assured there were some motors left by the Dutch. After some digging and scrabbling and much sneezing, true enough the motors were there and, with the help of Felix, our superb, locally engaged Chinese electrician, two suitable examples of about 20 horse power were selected.

The building of the four concrete plinths now went ahead, or at least the preparations did, a longer job than I had imagined, but all, I was assured, very necessary. For the two electric motors the procedure was exactly as Mac had described; the steel reinforcing was placed in the wooden shuttering (or mould), the concrete poured and duly agitated, and the pegs, complete with grease, emplaced. The motors were supported on chocks and the rag-bolts grouted into their holes.

In the case of the milling machines things were not so easy. Our stocks of milled rice were low, so brigade HQ wanted the minimum gap between closing one mill and opening the next. All the setting out and preparations had, therefore, to be made as if by proxy, using a wooden board called a template. We made holes in this at exactly the points of the bolt holes on the millers, then I used the template to hang and grout in the bolts in the new mill. This template

was quite a simple thing, just a rectangle of wood with a rectangle of holes in it, but it was so necessary to get the measurements right that I insisted on supervising the task myself.

The ten days between the casting of the plinths with their grouted bolts being ready for use passed, and the day to close the old mill arrived. The two milling machines were unbolted and delivered to the new mill and the old mill abandoned without remorse. The first machine was raised, then lowered onto its rag-bolts. The fit was perfect, much better than I had ever dared to hope. I was feeling very pleased indeed when the ghastly truth dawned. The miller was sitting at right angles to its accustomed line, so that the belt pulley in no way lined up with that on the electric motor. My measurements had been correct, but I had failed to note which way the long side of the rectangle of my template should lie.

My OC agreed that there was nothing whatever to be done, the two miller plinths, each of many cubic feet of reinforced concrete, must be demolished and recast in the right direction. There was no hope of using explosives, the shed was too flimsy, so there was nothing for it but to chip them away with a compressor and concrete breaker. This at least proved that we had cast some exceedingly good concrete. It was a full fortnight before the mill actually opened, meanwhile payment in rice became a very sensitive subject and most officers in the brigade seemed to have heard of me. It was quite worrying how kind everyone was.

The completion of my rice mill almost coincided with the completion of my first Braithwaite tank. These are sectional water tanks made of steel plates, 4ft square, securely bolted together. Functional, if not beautiful, you see them around factories and the like, usually sitting on towers. Mine was to be no exception, though the tower would be quite low, a job for the carpenters with baulks of wood, and the tank quite small, a cube of two plates in each direction, 8ft wide, long and deep. It would contain just over 3000 gallons, or 15 tons, of water. None of us had ever built a Braithwaite, but the water supply pocket book included instructions.

I quickly discovered that there was much more to a tank than just plates and bolts. Our stores depot was not as well manned as one might wish, and finding the components of the tank was a difficult day's work. All items were marshalled, except for a keg of special sealing compound that had to go between the plate flanges before they were bolted up. None seemed to have arrived. Now, had not the whole theme of my engineer training in India been, "When necessary, improvize?" So I scrounged a tin of thick bituminous goo, which I felt would do the job.

Building a Braithwaite tank, even a small one, for the first time on a tower is a tiresome job, involving considerable persuasion by force and the insertion and tightening of many hundreds of bolts. So great was the difficulty that I never had time to doubt the efficacy of my improvized goo. At last the pumps were started and the tank began merrily to fill. All was well until the level was nearly at the half way mark, then quite suddenly the goo squeezed out, so that great lines of water gushed from between the plates.

My OC ordered a fresh search of the engineer stores for the missing sealing mixture and it was duly found, having been there all the time. Down the tank had to come, every bolt's worth of it, now liberally coated in bitumen and up it had to go again, which proved even more difficult than the first time as we had distorted some of the components.

I was having minor success, and needed it, down at the port with the water supply, and had actually managed to get some water, (under negligible pressure), out of a pipe at the quayside.

The problem was how to get it from there into a ship. I had never realized before just how much fresh water even a small ship liked to carry. They asked for it by the ton, not the gallon, and in Emmahaven a ship couldn't sail if it hadn't collected sufficient water.

No fitting on any two ships' water standpipes seemed to be the same, so I set about getting an array of adaptors made. This involved giving the railway workshops in Padang old Japanese brass cartridge cases, which were melted into brass ingots then machined most deftly to meet our needs. I always seemed to be in the railway workshops, very interesting they were too, but I trusted those present not one inch. We were entirely dependent on their cooperation, so couldn't go armed to the teeth with a proper escort, which would have shown how we truly regarded them. It would have been the perfect place to kidnap a British officer; I felt increasingly that this might be me, and did not relish the prospect. When I left Padang for a while no one seemed to continue to visit that workshop.

A peremptory signal was received one day from the senior captain of a large destroyer. He just said he was coming in that afternoon for 160 tons of water and could not stay longer than five hours. That this was impossible everybody knew, but nobody dared tell him, so I was sent to the port to do my best. The captain got about 40 tons in his

five hours and I have never been confronted with an angrier officer. "To know me is to love me" had, I hoped, until then fitted me perfectly, but he just didn't seem to see me, or the British army, meaning the Royal Engineers, in particular, in that way. It was little use explaining to him that unfortunately the Dutch had put in an inadequate piping system before the war and that the Japanese had been poor at maintaining it. So far as he was concerned, I personally was to blame and he would see that my brigadier and all in the long chain from him to me should know just what a danger Lt R was proving to be. I think he duly did this, but the brigadier (*et seq*) had already formed their opinions and needed no confirmation from the senior service, however senior. In fact I gained certain kudos for actually surviving the encounter.

Our brigadier was a man of character, a much respected soldier, red headed and with an amusing turn of phrase, providing one were not the recipient. His nickname coincided, affectionately, with a derivative of his favourite adjective. Relaxation in Padang after the murders was hard to come by, but trips by launch from the Emmahaven port to a series of coral islets some miles down the coast were considered safe. Each Sunday the brigadier used to invite the more senior officers in the brigade for the launch trip and a picnic lunch and bathe on the islands. The trip back could be a little boring, so he struck upon the idea of taking a sapper officer along to drop a fishing charge of HE over the stern. The last sapper officer had done this to the brigadier's intense pleasure before he left, and Mac had also been successful. On the next occasion the OC would have sent Mac again, but only I could be spared.

Like so many senior officers, whatever his juniors' sins on duty, our brigadier could be most charming to them at other times, and this was another time. Of course he would be delighted to have me with his party. Would I please make up the usual form of charge and bring it with me? Certainly I would. Very simple this was too, just five pounds of a form of HE called Nobel's 808, rather like plasticine with a strong smell of almonds, pushed into a jam tin, with a suitable initiating set of primer, detonator and safety fuze inserted. The fuze didn't really have to be very long, as water has an excellent muffling effect on explosions, but I cut a length to allow ten seconds. We had a great picnic, even to the extent of cans of beer being offered, a luxury not then available locally. The whole thing was an experience worth repeating, so I very much hoped my charge would be a success.

I duly lit the fuse and dropped the can over the stern. We all counted ten slowly, and precisely on time there was a small smack on the launch's side, a boil in the water and a nasty black patch spreading out on the surface. As the launch wheeled round we could see the silver of fish, some quite large, lying dead in the patch, others still flapping. It was quite exciting leaning over the edge and flicking them aboard. Although I thought that the whole affair had been unspectacular and something of an anti-climax, the brigadier was delighted, particularly as we had caught him the main course for a large dinner party. All was smiles as we parted at the port and I was asked to repeat the performance the following Sunday.

Now, though I would never claim to be a perfectionist, I have also never been one to spurn improvements, and in the field of underwater explosions I already had some experience. At our jungle camp in India the year before there had been a large crocodile who insisted in living just where we, firstly, had to cross the river in small boats and, secondly, wished to bathe. With a view to catching or dislodging him, we fired a larger than normal fishing charge on the river bed. That is not wholly correct: we eventually fired the charge. There were snags, but when overcome (by which time the crocodile had gone for an alternative lunch) the plume of water caused by the explosion would have been the envy of any fountain designer. The charge had been a complete tin of guncotton, which came as 14 one-pound slabs in a tin. It happened that in Padang we had some spare guncotton, so I decided to use a tin on the next Sunday's trip.

I collected the tin from our magazine. It was one which had already been opened, but was still complete, so it was obvious that this would be as well used up. I pulled out one of the slabs, inserted a guncotton primer with some detonating fuse passed through it in the prescribed manner and fitted my initiation set further along that fuse. I was tempted to reduce the burning time, but my normal prudence prevailed and I again chose ten seconds.

On Sunday I duly reported to the brigadier's launch. He viewed my tin with interest and asked what it contained. I explained that the charge was nearly three times that of last week, so even more fish should be produced. "Are you sure it'll be safe?" he asked. He was a man who did not normally show concern, so I had no trouble in reassuring him. I explained that, rather than the slightly pathetic boil on the surface last week, perhaps we would have a pretty plume, nothing more.

"Nickname marvellous", he said, and off we set. That Sunday was just as enjoyable as the previous one, especially as the air of expectation for my fishing charge was keener than before.

On the way home I duly lit the fuse and the 20 or so aboard didn't miss a movement as I lowered the charge into the launch's wake. I realized, even before counting one to ten slowly, that all was not well. They were not so quick. "When is it going to sink, Dan?" could only be answered by "I don't think it is."

It couldn't help much, but I asked them all to move forward and lie flat. They did. Even under circumstances of impending doom there was a certain satisfaction in seeing how quickly the brigadier obeyed my command. The bang, or crack, was painful to the ears, hardly surprising as the charge was about the equivalent of the filling of a medium shell, and the splash considerable, so that we got wet. Nobody was hurt, and after wheeling round we picked up one very sorry fish. Conversation was a little stunted during the rest of the trip home.

It hadn't taken me long to work out what must have been wrong. Although the tin of guncotton had looked full when I found it, somebody must have removed a slab or two for purposes of his own, then replaced the remainder so that the tin still appeared pristine. I now know that a full tin sinks like a stone, but one with a slab or more missing floats. I explained this to the brigadier. Although it was a warm day at sea level on the equator, we were both shivering. I with fear, and he with rage. I gathered that, as we had not been on official duty, he was not going to take official action, but I understood that my OC would hear of it. He, and the rest of the brigade, did, quite quickly.

The brigadier was soon transferred to Palembang in the south of the island and, with its oil fields, apparently considered to be of greater importance than Padang. He had a couple more picnics but did not require fishing charges and I was not invited.

Journal Awards

The Publications Committee announces the following awards for articles of special merit published in the August 1996 *Journal*.

ARMOURED ENGINEERS IN BOSNIA?
by Captain B G Legg – **£75**

BRIDGING – WHERE DO WE GO FROM HERE?
by Colonel Tom Foulkes – **£50**

SUSTAINABLE METHODS FOR CLEARING LANDMINES AFTER CONFLICTS
by Terry Thomas and Andy Smith – **£50**

BRIDGING FOR THE NEXT MILLENNIUM
by Lieutenant Colonel J Fitzgeral-Smith – **£25**

"AN OFFICER NOT ONLY OF GREAT TALENT BUT OF RARE COOLNESS AND COURAGE"
MAJOR GENERAL W S TREVOR VC ROYAL (BENGAL) ENGINEERS 1831 TO 1907
by Dr John N Rhodes TD – **£25**

OPERATION RESOLUTE: AN OCEANOGRAPHER'S PERSPECTIVE
by Second Lieutenant S Gardner – **£25**

OPERATION GRAPPLE – PROTECTIVE STRUCTURES
by Major J F Pelton and Lieutenant S B George – **£25**

A further special award of £50 was made to Colonel E P F Rose TD and Professor C Pareyn, for their article: ROLES OF SAPPER GEOLOGISTS IN THE LIBERATION OF NORMANDY, 1944.

A Twentieth Anniversary Celebration

COLONEL M G LEG BRIDGES OBE BSc(ENG), MIMECHE, MIMGT

INTRODUCTION

AT 0910hrs on 10 July 1996, four members of the British Services Gasherbrum Expedition stood on the summit of Gasherbrum I (8067m) in the Karakoram in North Pakistan. Their arrival there signified a landmark achievement for the British Forces, and it was an achievement in which the Royal Engineers played a leading role.

The Joint Services Gasherbrum Expedition began to form in the egg way back in July 1993, when the Joint Services Mountaineering Committee called for proposals for an objective from individual Services clubs for the next Joint Services mountaineering expedition. At that point I got myself involved, volunteered to lead the expedition and in October 1993 was appointed leader. Over the course of the next five months I developed the objectives, with the support and approval of a higher management committee consisting, initially, of Vice Admiral Rutherford, President Royal Navy and Royal Marine Mountaineering Committee, Air Marshal Sir Roger Austin, President Royal Air Force Mountaineering Association and Major General Pett, Chairman Army Mountaineering Association.

PLANNING

BY May 1994, the plans had congealed as follows:

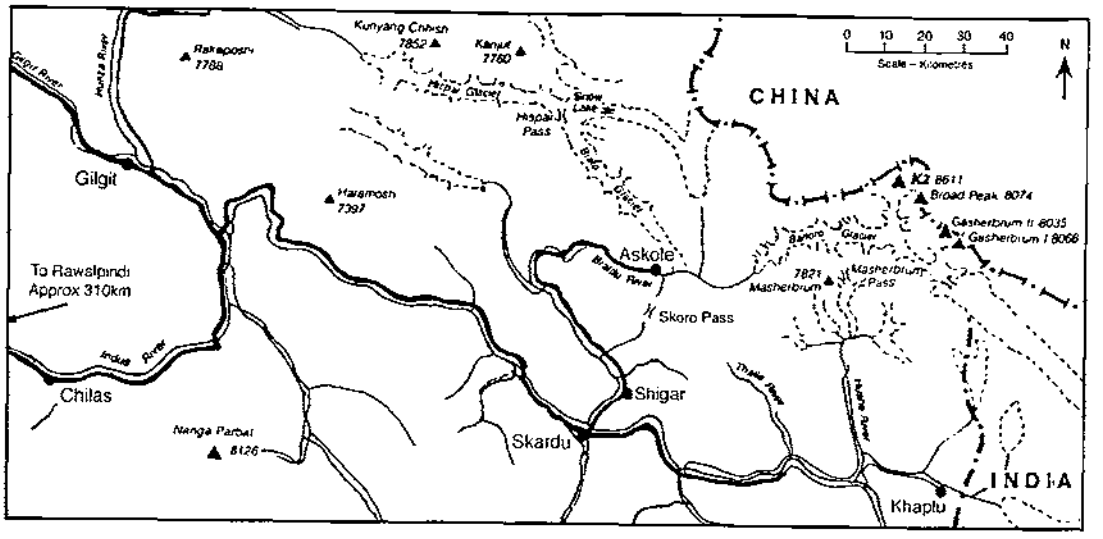
- A main team of twelve of the best mountaineers that the Services could produce would climb Gasherbrum I. At 8067m this is the world's eleventh highest mountain. The climb was to be made in contemporary Alpine style, without using supplementary oxygen.
- A junior team of eight young personnel, all to be under 23 years of age, and led by an experienced leader and deputy leader, would undertake an extremely arduous trek through the longest high altitude glacier corridor in the world, 75 miles at or about 3000m, and en route would climb one or more peaks of 6000m. This team was to consist of two persons each from the Royal Navy, the Army and the Royal Air Force, and two civilians.
- A medical research party of three would accompany the expedition main team, and supervise the conduct of studies into aspects of acute mountain sickness, and acclimatization, and into sourcing medicinal compounds from native herbal resources in the area.
- The expedition would raise a substantial sum of money as a donation to the Prince's Trust, which exists to create opportunities for young people.
- The exercise period would be May to August 1996, and the estimated budget was £125,000.

These plans were encapsulated in a brochure, which was printed in July 1994, at which point fund raising commenced, and invitations to apply for membership of the various parties were published in a DCI (Defence Council Instruction). Team selection took place in March 1995. Training meets were run over the next 12 months, including piggy backing on the Joint Services Alpine Meet at Zermatt during two weeks in August 1995. Preparation of detailed plans, and plans for procurement of food, equipment, methods of communication, medical items etc, were also progressed. The expedition departed for Islamabad on 25 May 1996, under the overall leadership of a sapper, and with a sapper (Major Andy Edington) as deputy leader of the junior team. Sadly, a third sapper, (Lieutenant Marc Owen) selected as one of the two Army members of the junior team, had to drop out due to operational commitments.

CONCEPT

THE concept behind plans for the expedition was primarily to spread the benefit of the trip as widely as possible. High altitude mountaineering tends to be incestuous in that in order to maximize the chances of success, teams tend to be selected from amongst proven climbers, thus making the gaining of qualifying experience very difficult for new climbers. By forming a junior team, this expedition deliberately created an opportunity for a new generation of promising young climbers to get initial experience of Himalayan mountaineering. At the same time the main team, while taking mainly those who appeared to be most eligible, would also include two less experienced but none the less very promising climbers. If successful, it would also serve to hold out to the junior team the continuing prospect of aspiring to mountaineering's ultimate objectives, ie successful Service expeditions to 8000m peaks.

The medical party's participation would fulfil the requirements of the Joint Services Expedition Trust for scientific work to be included in the expedition's activities, without threatening to take the main team's eye off the ball. The inclusion of two



Map illustrating route covered from approximately 310km north of Islamabad.

civilians, and the donations to the Prince's Trust, were representative of a desire to contribute to civil/military relations, and to help young people with perhaps fewer opportunities than ourselves.

Of particular relevance was the fact that the Services had not had a success in attempting to climb an 8000m peak in 20 years (since Everest 1976), and the credibility of Service climbing had suffered from the failure of some major expeditions in recent years. It was therefore doubly important that the climb of Gasherbrum I should be successful, and that it should be conducted in a contemporary style, involving no oxygen, few camps, and minimal logistic build up.

Transit

Since this was the first major Services expedition to the Karakoram for a long time, it was with relief that the unfamiliar entry and clearance formalities in Islamabad went without a hitch. Indeed, despite public holidays on Monday and Tuesday, we were away up the Karakoram Highway (KKH) in a coach on Wednesday (having arrived on Sunday morning) thanks mainly to the efforts of our three-man advance party.

The KKH was built by the Frontier Works Organisation between 1966 and 1978, and is undoubtedly a very impressive piece of engineering as it follows the steep valley of the Indus for several hundred kilometres. However, far more impressive is the 170km of road from the KKH just south of Gilgit to Skardu. This was built by the Pakistani Army with Chinese labour, and it too follows the Indus, which, despite its size, is now constrained in a rugged and narrow gorge. Extended sections of the road are hollowed out of the near vertical cliffs, or cut across highly unstable slopes of schist and scree. It takes over six hours to cover the distance in a minibus, and the river is crossed just short of Skardu on a 480ft Bailey suspension bridge. We arrived in Skardu at 2200hrs on the Thursday night, after a second day of 14 hours on the road.

We took a day in Skardu to shake out and recruit the 180 porters required for the main team and 55 for the junior team and, over the next two days, followed a quite outrageously dodgy jeep track to Thongol, two hours short of Askole, borne in ancient Toyota Land Cruisers. From thereon walking was the only option. Another two days up the valley took us to Korophon (Big Rock – there's nothing else there!) which was the parting of the ways. The junior team turned sharp left up the Biafo Glacier, while the main team continued up the Braldu Valley to the famed Baltoro Glacier.

Junior Team Activities

The junior team reached their base camp in the snow lake at the source of the Biafo Glacier on 9 June, after a trek through some unbelievably wild and barren country, flanked by jagged peaks such as Latok and the Ogre.

They spent 10 June establishing the camp, and on 11 June took off to the hills in two groups.

Group A, under the team leader, Squadron Leader Richard Gammage, climbed a new route to the top of a 5791m peak in some 14½ hours, while Group B, under Andy Edington, carried out a recce of two peaks to the north. The next day this group reached 5500m on Cornice Peak, but were turned back by avalanche danger.

On 13 June, although two members managed to climb a 305m ridge at grade 2/3, the weather began to go off. By afternoon it was snowing, and during the next eight days the weather was very bad. On 15 June, they summoned their porters from further down the Biafo Glacier, with the intention of crossing the Hispar La before the snow became too deep; this would give them the run of the peaks down the Hispar Glacier when the weather improved. However it was not to be. The porters appeared in dribs and drabs out of a blizzard on 17 June, having bivouacked overnight on the glacier. Contrary to express instructions given to the guide, they were unroped and one of them had taken a bad fall down a crevasse. If he really had fallen the 40m claimed he was lucky to be alive but was seriously hurt – possibly fractured hip and skull, lacerations, etc. The young doctor in the junior team, Nick Cruden, a medical student in his final year, did an outstanding job in patching the poor bloke up, but there was then no real alternative to returning to Askole.

Over the next three days the team beat a fighting withdrawal through continuing blizzards and waist-deep snow. White-out conditions prevailed and navigation on the wide open glacier was exceedingly difficult, aggravated by the presence of, by then, concealed crevasses. All members contributed magnificently during the retreat, navigating, supervising the porters, helping the injured one, breaking trail. As they descended to Askole the snow turned to bitterly cold rain, but there was no let up, and the porters needed as much help as they could be given.

It is a great credit to the team that they got their injured man back to Skardu hospital without a deterioration in his condition, and without further accident. The fact that the trip had not gone according to plan, and that they had had to extricate themselves from a potentially very serious situation, taught the young members much more than they would have learnt otherwise, and also gave them far more sense of achievement and excitement. On the way out to Skardu they heard of a little girl with a life-threatening infection and persuaded her parents to let them take her to Skardu hospital too, so in all probability two lives were saved by their actions. Their maturity, their steadiness, and their team spirit were remarkable in such a young party, and they and their leaders deserve high praise.

Main Team Climb

MEANWHILE the main team was able to complete the walk into its base camp in brilliant, clear weather, allowing them to view the fantastic peaks and spires which flank the valley. Names such as Trango Tower, Baltoro Cathedrals, Mustagh Tower, Masherbrum, and K2 came and went, as dramatic in the flesh as photographs ever made them. There was a significant buzz to be had from finding oneself amongst such fabled peaks.

The fine weather continued for 12 days, most out of character for the Karakoram which has a reputation for lowering grey skies and recurring snowfall. In nine of those days we walked in to base camp, traversing the Baltoro glacier to Concordia, the upper Baltoro glacier, and the Abruzzi glacier, to the point where, at 5000m, it is joined by the south Gasherbrum glacier. The tenth day was used to shake out and get base camp set up, and on the last two we made rapid progress on the mountain. On the thirteenth day the snowfall began. This was 14 June, the day the junior team's trip took on a serious character.

The plan for climbing Gasherbrum allowed for the establishment of a temporary Camp, since the position dictated for Camp 1 was 6km distant from, and 800m above, the base camp, and it was anticipated that this would be too much for members carrying loads to manage until they were fully acclimatized. Camp ½ was therefore located and pitched on 12 June, but on the 13th we established the route right through to Camp 1, and left a dump of stores there, as the acclimatization proved easier than anticipated.

The route to Camp 1 negotiated the south Gasherbrum ice-fall all the way, but unlike the overt threat of the Khumbu ice-fall on Everest, with its tottering towers and yawning crevasses, this ice-fall was covert and lethal. It was riddled with holes, some of which were easily large enough to swallow a London bus; 95 per cent of them were covered over, even the big ones. Many were totally concealed, and the strength of the snow bridges which spanned them was completely indeterminate. On the 13th Mark Watson was swallowed by one, and disappeared as if Jaws had seized him by the legs. He went down about 20m and jammed, and it was only by the mercy of

Gasherbrum I from the slopes of Gasherbrum 2, showing the slopes above Camp 3 to the summit.

Providence that he was not seriously bent. He was quickly recovered, but this very object lesson had us firmly roped together whenever we moved in the lower part of the glacier thereafter. At this stage all the team was still housed in base camp.

From 14 to 20 June, the weather remained consistently foul with continuous snowfall and, apart from one sortie to Camp ½ on 18 June in deepening snow, we made no progress. By 21 June the situation was becoming desperate in that we were now at risk of losing the route through the glacier altogether. This had been pioneered by a US team attempting Gasherbrum II before we arrived, and it had taken them ten days to navigate through the maze of obstacles. Once lost, we would have to start again from scratch, and it would take us as long to retrace it. Accordingly on 21 June I led a slightly desperate charge through very deep snow, using snow shoes bought from the Americans when they departed. Four of us made trail, and three carried loads. It took seven hours to regain Camp ½, a distance previously covered in just over two hours. However that was the complicated bit, and above Camp ½ the line of the trail was more obvious.

Camp ½ was completely buried, there being half a metre of snow over the top of the tent; we only found it by virtue of some pairs of skis which were stuck upright in the snow alongside. Half an hour's hard digging cleared it, and a further three hours saw us back to base camp, completely knackered. However the object was achieved, and we left behind a well-flagged and well-trodden path through the deep snow and the intricacies of the lower ice-fall.

The timing of this foray was remarkable since, with no prior warning, 22 June turned out to be the first of six consecutive fine days. While the weather spent a couple of hours in the morning making up its mind to be fine, we made up ours to occupy Camp ½. The first brick (group) of four therefore moved up mid-morning, taking with them a second tent. The next day they rebroke the trail up to the site of Camp 1, while those in base camp carried up a load of stores behind them. This day saw the first use of skis between Camp ½ and Camp 1, something which immediately became the standard both on the upward and downward runs. Skiing down through the glacier was exhilarating, and reduced the descent time to around 12 minutes from about an hour on foot. With the trail remade, the first brick moved up to Camp 1 on 24 June, and thereafter Camp ½ was not occupied again.

From 25 to 28 June, the Camp 1 party receed and then established the route forward to Camp 2, while the remainder in-loaded stores to Camp 1. Camp 1, sited at the top of the ice-fall at 5800m, was located in a most dramatic cwm which had two branches, and which was surrounded by some of the world's most dramatic mountain scenery. Of the six Gasherbrum peaks, two are over 8000m, and two are fractionally below this threshold. One branch of the cwm led east between G I and G II, while the other led up towards the magnificent rock peak of G IV. The route to Camp 2 followed the eastern branch, gaining height slowly, but was slashed by huge crevasses associated with the top of the ice-fall. Some 4km from Camp 1 the route reached the base of a second ice-fall which dropped 500m sharply down from the saddle between G I and G II. Passage through this ice-fall was not overly complicated, but the route-finding was delayed by deep snow. On 28 June a site for Camp 2 was located on the saddle at 6400m, and the same day the second brick of four moved up to Camp 1 in renewed heavy snowfall. The following day, bricks 1 and 2 in-loaded stores to Camp 2, ready for occupation, but the weather was on the way out again, and to conserve stocks on the mountain, all personnel were withdrawn to base camp on 30 June.

1 July was a rest day, but on 2 July the weather returned to its earlier good behaviour and so an

early start was made to get everyone back up on the mountain. Because on fine days the radiant heat of the sun made any activity in the ice-fall unbearable after about 0830hrs, a typical run up to Camp 1 started with a call at 0130hrs. A hasty breakfast of spiced porridge (porridge with cinnamon, cardamom and cloves) and tea, preceded an 0230hrs departure and in good snow conditions, this means that Camp 1 could be reached before 0700hrs, allowing the carriers to get back to base camp by 0900hrs.

On 2 July, both Camp 1 and Camp 2 bricks moved back up to Camp 1. The first summit pair of Andy Hughes and Steve Hunt had by now been identified, and they ran a load of personal gear up to Camp 1 and returned, while Larry Foden and I stripped out Camp ½, bringing down everything that remained. Excitement was now mounting as a summit bid could be as little as four days away. Everything depended on the weather and the snow conditions which would be found in the Japanese Couloir, – the 700m high obstacle that remained above Camp 2.

The next day the Camp 2 brick moved up and occupied that camp, supported by a second supply run by the Camp 1 brick. At the same time the summit pair moved up in echelon to Camp 1. They were to make one carry to Camp 2, and then spend a second night in Camp 1 for acclimatization. They would then move up to Camp 2 to be poised to go for the summit as soon as the couloir was secured with fixed rope and Camp 3 located. The plan sought to maximize the acclimatization of the summit pair, while at the same time minimizing their exposure to high altitude with its attendant debilitating effects.

Like many good plans, it didn't work – almost. The couloir proved to be exceedingly difficult and the weather didn't help. Trying to climb upwards on a 50+ degree slope against chest deep snow is an unrewarding pastime. Doing it at altitudes approaching 7000m takes what little remaining fun there is out of it, and with spindrift filling in your tracks with loose snow as soon as you have made them, complete sense of humour failure is forgivable. In fact sense of humour was preserved by the very strong Camp 2 team, but progress was inevitably very slow. On 4 July all efforts were frustrated by the high winds, which reduced visibility to a couple of metres, and that evening the weather deteriorated further, with heavy snowfall overnight and the next day, precluding any activity at Camp 2. 6 July was similar, and although the Camp 1 brick brought a load of stores to within 300m below Camp 2, the Camp 2 brick remained holed up as the wind shrieked across the saddle, and the snow streamed down the walls above. The complete stagnation of activity thus imposed when we were psyched up to go for the summit was intensely frustrating and stressful.

7 July saw some improvement, and progress was again made in the couloir. The final assault was launched the following day, with the summit pair moving up to Camp 2, while I moved up to Camp 1 to be in close touch with developments. It was intended that Camp 3 would be little more than a resting place and a refuge if required. The summit pair would move up there, supported by the Camp 2 brick, rest and brew from about midday to 2200hrs, and then go for the summit. The duration of their stay in Camp 3 on the way down would depend on their state, but ideally they would carry on down to Camp 2. A second pair, drawn from the Camp 2 brick, would then be able to occupy Camp 3 the following night to make an ascent the next day.

On 9 July the Camp 2 brick and the summit pair moved off up the couloir, carrying sufficient stores for two assault tents to be placed at Camp 3. In fact they still had a lot of very hard work to do at the top end of the couloir, and didn't reach the site of Camp 3, at 7100m, until around 1330hrs. At that point, two members of the Camp 2 brick, John Doyle and Dan Carroll, requested my approval for them to join the summit pair, since they assessed themselves fit enough to do it, they were in position at Camp 3, and they had a second tent. This was agreed, and so our summit attempt became four strong. I had already agreed that they would climb together with two members of a Spanish military team who were on the mountain, and with whom we had been coordinating our movements for some days. This had the mutual advantage of providing strength in numbers, particularly in respect of breaking trail in the very deep snow on the mountain. At the last minute the six were joined by the British guide, Alan Hinkes, who had appeared at base camp on 3 July and come up very quickly, courtesy of our route and our fixed ropes. He followed in the trail of the six to the summit the following day, being scarcely acclimatized and needing all the help he could get.

They left for the summit at 2200hrs. There should be no misunderstanding the scale of their achievement over the next 24 hours. For over 11 hours they battled upwards in snow that was

loose and often thigh deep. Without oxygen they gasped and gagged in the thin cold air, struggling to get enough to maintain their muscles' output. At times they were ploughing a trench uphill at an angle of over 50 degrees. As dawn came the sun warmed them a little, but a bitter wind from the west strengthened, tearing at them and lashing spindrift in their faces. The physical effort of gaining height in such conditions cannot be equated to any comparable activity at sea level. Without the stamina and psychological commitment to success which is to be found in Olympic standard athletes, the pressure to give up is overpowering. For John and Dan, who had just completed several days of arduous work in the couloir, the effort required was colossal. Despite this they made it, reaching the summit at around 0910hrs. The day was still fine, so they had a view of the sea of peaks that surrounded them, albeit through blasts of spindrift. The great peaks of the Karakoram: K2, Broad Peak, and the other Gasherbrum summits, were ranged about them, while further away Masherbrum and the Mustagh Tower stood out above the mass of lesser peaks and spires.

This was not of course the end of their day. The weather dictated a stay of no more than about 15 minutes, and then they began their descent. At the least they had to come down 1000m to Camp 3. Ideally to reach Camp 2, they would have to descend 1700m. Getting down through the trench they had carved on the way up was tricky, with a persistent risk of catching a crampon and tripping. John Doyle fell for some 500ft a short way below the summit, and there were some other lesser falls. The strengthening wind tore at them, blinding them with spindrift, threatening their balance, filling in the track. The exhilaration of reaching the summit was short lived, and as weariness crept over them, the need for vigilance to avoid a mistake called for more and more reserves of stamina. They reached Camp 3 in safety at about 1500hrs, and rested for an hour before continuing down the couloir to Camp 2, where they arrived at 2000hrs, after 22 hours of almost continuous extreme effort.

That night one further attempt was launched, in that Mark Watson had moved up to Camp 3 during the morning, and he set off for the top in the company of two other Spaniards. Due to the onset of frostbite in his feet, he turned back at 7500m, while the Spaniards went on to reach the summit on 11 July. Sadly however their success turned abruptly to tragedy. On the way back from the top they had a serious fall in which one of them, Manolo, was injured. With great difficulty they managed to regain Camp 3, but they were then holed up there for eight days through a spell of bad weather. Eventually they managed to struggle into the couloir to descend to Camp 2, but on the way down they took hold of an old rotten fixed rope which broke, precipitating them down the steep slope. In the course of this second fall, Manolo was killed, though his team mate, Alphonso, survived with minimal injuries.

With our resource of potential summiters exhausted, we cleared the mountain over the course of the next few days. In reaching the summit, those four broke the 20-year duck on Service climbs of 8000m peaks. They were the first Service personnel ever to reach an 8000m summit without oxygen, and they did it in contemporary Alpine style. Deducting days lost for bad weather, we had climbed the mountain in 23 climbing days, (vide Everest 1992 in which nine weeks were spent on the mountain), and used three camps above base (on Everest we used six). The expedition was a resounding success, and this success has done much to reinstate the credibility of Service mountaineering in the wider civilian scene. I cannot praise too highly the commitment and spirit of the team which achieved this splendid result, and I can only hope that it will provide an incentive for further major Service expeditions to the greater ranges in the future.

41 Years On – Malaya November 1954 – Fiji November 1995

BRIGADIER A C S ROSS FIPLANTE FIMGT

IN the autumn of 1995 my wife and I cleared out our piggy banks, gathered up some summer clothes and set off round the world. Hong Kong, 11,000 kilometres driving through Australia, then New Zealand, the Cook Islands and, most memorably, Fiji.

While making plans for our trip I had written to the town clerk, Nadi, Fiji, to say that while in Malaya in 1953 to 1955 I had often worked with, and played rugger against, the 1st Fiji Infantry Regiment (1st FIR) in Johor. In particular I was in Kluang when several wounded Fijians were brought to the military hospital following an ambush. I said it would be interesting to meet any old comrades from those days, or that incident, when in Fiji.

I had a letter back from Mr Apisai Tora, President of the Fiji Ex-Servicemen's League, saying they would be glad to see me and on what plane would I be arriving? Our itinerary through the South Pacific involved crossing the International Date Line three times and I was incapable of working out if the plane leaving Rarotonga at 2200hrs arrived in Fiji earlier the same day, or the next morning or the day after the next. So I replied saying I would ring him from our hotel after our arrival breakfast.

A few weeks later there we were on the evening New Zealand Airways flight ex-Tahiti via Rarotonga to Fiji. After aperitifs, dinner, a few digestives and a short film we landed to hear over the intercom: "Would Brigadier and Mrs Ross please make themselves known to the Protocol Officer." One's heart sank. Tired, scruffy and perhaps with a half a glass more than is required for "bright eyed and bushy tailed," we were whisked to a private room, assured that immigration, customs and our kit would be dealt with, and quickly briefed by Mr Tora on what was to follow.

What did follow for the next couple of hours was a move to the VIP Lounge, to have the most ornate floral leis put round our necks and be greeted by some 20 of the Fijian ex-Malayan servicemen. As we were introduced I couldn't help noticing that just as in the intervening 40 years I had moved through various ranks so, rather more effectively, had they. Fellows who had been corporals and lieutenants in Malaya were members of parliament, one was a chief medical officer, one a KBE, and others were senior men in the community. Some of course were farmers and fishermen.

The president, my wife and I, were then seated in armchairs while all the others in their sarongs sat cross-legged on the floor in a horseshoe facing us, to partake in the yaqona ritual. This involves making and offering kava (a non-alcoholic though intoxicating narcotic drink extracted from the crushed roots of the kava) in a ceremonial bowl, accompanied by many formalities, slow hand-claps and murmurings of approval. The hardwood bowl is adorned with cowrie shells attached by braided copra. Cowrie shells are often speckled but the high-status bowls have pure white shells. The braid tail is pointed towards the principal guest during the ceremony. The kava drink was served to us in half coconut shells with expectations of it being drunk down in one. A not unpleasant flavour and easy to believe in its ability to intoxicate. Second and third cups were partaken before we realized that offerings would go on for as long as we would accept. After all the members had toasted us and the league, the president talked about the regiment in Malaya and the tragic ambush just 41 years before, on 25 November 1954.

1st FIR was stationed in Batu Pahat and operated through central Johor as part of 17 Gurkha Division – commanded by the Sapper, General L E C M Perowne. Another Sapper, Brigadier Mark (Honker) Henniker, commanded one of the Gurkha brigades in Johor at the same time.

The Fijians are brilliant soldiers (and pretty good rugger players) big, fast, tenacious, fearless and well disciplined. The ambush was the only setback in a very successful tour against communist terrorists. Of the platoon some half dozen were killed, another six badly wounded and a similar number hurt or unhurt. Warrenpoint comes to mind. The platoon was extracted by others of the battalion (some of whom were in the room) and taken to BMH Kluang. I happened to be at the BMH chatting up one of the sisters. The

medical staff immediately went into action and any hangers-on had needles jammed into them and a bag of blood taken out. I was called in for a further extraction later in the night.

The president's recollection of the Fijian action (he was in the company at the time) was very emotional and moving. I was glad to see tears streaming down the cheeks of the senator as I was feeling much the same. My wife, the only woman present, said later that she was the only person emotionally under control.

Then to formal presentations. In his letter to me, Mr Tora had said that there were three survivors of the ambush still alive. A month later one died and then another. There was then an abundance of advice and admonishment to the lone survivor, Private Racele, to keep him from any disaster. In fact he is a tough cheerful man with many years potential life in him, although this is surprising having seen his injuries: shoulder and heel half shot away and deep wounds in his back. He presented me with an ornate yaqona bowl with three cowrie shells and the inscription "Eternal thanks to Brig Alan Ross (a blood brother) for saving my life. From Private Savenaca Racele, B Coy, 1 FIR, Johor Malaya, 25 November 1954." The league presented me with a ceremonial tribal club, a whale's tooth, which is indeed a high honour, and a traditional floor mat. To Christine they gave an ornamental fan and a multi-coloured mat.

I said an impromptu few words of thanks and then we all got up and chatted away.

At some time in the night we were put in a car and driven to our hotel on the other side of Viti Levu, the main Fijian island.

The whole evening was recorded by Fiji television. I only hope it was heavily edited though was told by Brigadier Thorpe, from Government House. that it looked quite impressive. The evening certainly made an impression on us.

A week later when we were leaving Fiji we were met at Nadi airport by a dozen of the Ex-Servicemen's League who again gave us leis, and for some half hour sang traditional songs most beautifully and to such effect that the whole airport came to a halt to watch and listen. Our fellow passengers on our flight to Hawaii thought I was the outgoing High Commissioner (I had a tie on this time).

Our holiday encounters with the Fiji ex-servicemen were fascinating, exciting and humbling. The Fiji army served with the British army in both world wars and, since Malaya in the 1950s, has served with the UN in many theatres. What a shame we do not have a battalion of Fijians with the British army today.

A Searchlight on the Phoney War

COLONEL R C GABRIEL MC

The following has been extracted from diaries kept by the late Colonel Gabriel MC, copies of which are kept in the Corps Library. The illustrations were drawn by Colonel Gabriel (then Second Lieutenant Gabriel) at the time.

It was 10pm on Friday 1 September 1939 when I drove out of Brompton Barracks, in my almost new Ford Prefect, on my way to the mobilization centre where I was due by 12 noon the next day. The car was loaded with all my military kit, and personal belongings to be dropped off at my Bournemouth home. It was the first night of the blackout and only specially dimmed vehicle lights were allowed, so I turned into a side road and slept at the wheel for two or three hours. After a hurried breakfast at home and farewells to my parents, I reached Blackdown Camp and reported to 1st Anti-Aircraft Battalion RE in which I was posted to No 2 Company. The following day, Sunday, Britain, along with France, would be at war with Germany.

The title of the parent unit was changed several times within the first few months; sometimes it was a battalion and at others a regiment, while S/L for searchlight seemed to be used along with AA and then instead of it. The fact that a searchlight battery RA worked alongside the two RE companies which also operated searchlights, and that the CO was a RA officer with RE staff, was probably responsible for these changes. Perhaps it was all done to confuse the enemy!

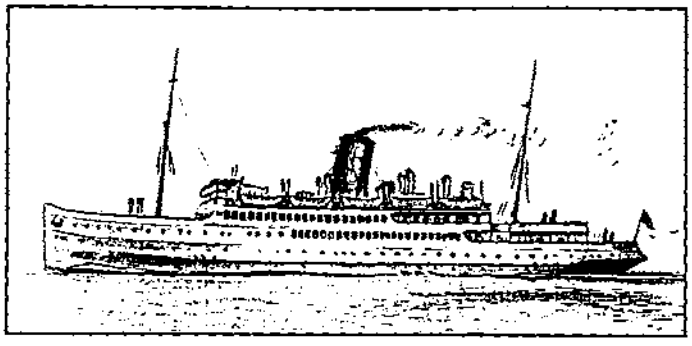
I found it somewhat bizarre that I was going to war with a unit whose equipment I knew next to nothing about; the last two parts of the three-year SME course were wiped off our programme; one of these dealt with searchlights and the other, really the most important, dealt with motor transport! So I was thrown in at the deep end and would learn the hard way!

The company strength was a little under 400 I think and there were four sections each providing six searchlight detachments, equipped with one huge searchlight with its attendant 3-ton lorry, the source of electric power not only for the light with its carbon arc but also for the all-important sound locator trailer, the latest mark of which was so new that not all detachments had the latest model (I think it was Mark VIII). I scarcely had time to glimpse these equipments before they were driven away for loading. On the 12th it was my turn to move when the company left camp at 4.15am and marched to Farnborough railway station. The men were in high spirits and I remember being terribly embarrassed when they loudly sang some distinctly bawdy songs as we skirted a council housing estate; yes, I was still very "green"! Some four hours later we were all waiting, on Southampton Common beside the main road, to be taken in lorries to the old docks to board the *Mona's Queen*. We sailed at about 5.15pm and, with a destroyer escort, headed down Spithead into the English Channel, which was pleasantly calm.

I forget when I first learned that our eventual destination was to be the large city of Nantes in France. Our job would be to protect the base to be established there, with our searchlights deployed in an arc to the east and south of the city in conjunction with anti-aircraft guns.

A dull and drizzly dawn revealed the large naval base of Brest ahead. A number of large freighters could also be seen and the rattle of our anchor chain showed that we were not to be given a quay berth. After a lengthy wait we were ferried to the docks and would stay in Brest until our MT could be unloaded. One snag was that the French dockers quite amazingly refused to unload our military cargoes! Resentment increased when the OC told us that the French authorities could only offer overnight accommodation either in an unfinished and only partly roofed hospital or a string of goods wagons in a railway siding! We were all shocked and it was at this point that my long-standing shipping hobby, and consequent technical knowledge of merchant navy vessels, came into use as I suggested that two or three of the British ships I had noticed were cargo liners of well-known companies like Glen and Blue Funnel, that might be able to offer accommodation.

The OC instructed me to recce the possibilities, and I was soon able to report success, the troops being divided between three ships that were carrying some of our vehicles. The best ship was the very new *Glenearn* on which the OC, following



Mona's Queen.

my advice, installed himself and allowed me also to occupy one of the magnificent cabin suites. That evening, therefore, after a bath, I joined my fellow officers in the small but comfortable panelled dining saloon. The ship was well stocked so there was no need to broach our rations. We were alongside and enjoyed two restful nights on board. Though only on the 'tween decks the troops were also very happy.

Each morning, with a hearty ship's breakfast inside, we worked hard to locate all our vehicles and G1098 equipment, much of which we were obliged to unload using quay cranes and the ship's own derricks. Fortunately one of our subalterns knew the technique and quickly established a small cadre of military stevedores amongst our sappers to reinforce the crews.

The unloading proceeded so quickly that we were able to leave Brest in convoy about 3.15pm on the 15th, finally reaching our destination, a brickyard on the Poitiers road in Nantes. The following day all officers were sent out to recce their detachment positions. I accompanied my section commander, an experienced and resourceful reservist called Sallitt. He had already done a preliminary recce off the map and had selected a large country mansion as our section HQ. The *Chateau la Bourdinière* was clearly a wonderful choice and the family in residence readily agreed to us both living there. There was of course a beautiful daughter but, alas, our pleasure was short-lived for within a couple of days plans had changed and the battalion was sent to the Belgian border! This meant a long and tedious journey in convoy but nobody worried; the war seemed far away and the weather was glorious, just perfect it seemed for a slow drive up the lower Loire Valley then across to the Seine and beyond through famous Picardy to Flanders.

I went down with flu and was confined to bed for two days but was up and about the day before we left. It was quite a red letter day for me for I discovered that the local offices of the big French shipping company, *Compagnie Générale Transatlantique*, were nearby and I felt I must go in to ask for some ships postcards for my collection. This I did with enormous success and still have them today! They of course joined the *Glenearn* one! What a war!

The journey across France was very enjoyable and a great experience. There was little traffic and we maintained a very sedate speed. At Seiches-sur-le-Loir (a tributary of the big Loire river) the villagers gave us a great reception and peaches were handed out in quantity. In the warm weather the local swimming club on the banks of the river was a welcome amenity. Later the officers entertained the mayor and his wife and son to dinner.

Local majors were important for it was they who decided where everybody could be quartered for the night. Armed with requisition and billeting forms, Sallitt would drive on ahead to make arrangements that took into account proper dispersal and camouflage of the vehicles. I would follow at the head of the slow-moving section. Communication was entirely by written messages carried by dispatch riders (DR) on motorcycles.

I do not remember seeing French army units in the countryside, but there were plenty in the towns and they certainly did not impress; transport, guns and other military equipment looked shabby and poorly maintained. It was not what I had been led to expect. But in marked contrast to military and other officials, especially those at Brest, all the local people I met were most kind and friendly. The *entente cordiale* was definitely very much alive in the countryside which, incidentally, was scenically beautiful and gloriously peaceful.

The next stop was in a pretty little place called Juillé. We had covered just under 60 miles, as against 67 or so the day before. We stopped the weekend at Juillé for necessary vehicle maintenance, personal "make and mend" and practising of manning drills, not forgetting a parade or two to keep everyone smart. There was time for letter writing and I wrote my second letter home. All outgoing mail had to be censored and that day I dealt with about 60 letters written by my men.

On Sunday morning there was an open air service in the big field, conducted by the battalion padre. The battalion doctor also called and gave everyone a second inoculation, the first having been administered at Blackdown. The field cashier also "opened shop".

On Monday we were once again on the road. Near Rouen traffic was noticeably heavier with several British Army units passing. I even saw and hailed three or four RE officer friends and the excitement lifted me spiritually. We were all "motoring into battle" and everything seemed at that time to be "going well"!

We were now nearing our final destination and in retrospect I find it somewhat strange that nobody seemed to know exactly which area we were heading for. However I was not unduly worried, all would soon be revealed. Sallitt had found temporary accommodation for us in a farmhouse where I remember that the farmyard smells, largely from heaps of manure stacked close beside the house, were quite overpowering, and this kept me out on recces helping to select our own section's searchlight sites in accordance with the "grid overlay" we had been given. The recces were carried out to fit the theoretical layout on the overlay, on to the ground, taking into account obvious obstacles such as woods or a river, and ensuring that suitable approach roads and tracks for the heavy equipment as well as light maintenance traffic were available. Ideally lights were to be 4500yds apart but the actual location could be up to 500yds from the allotted map reference.

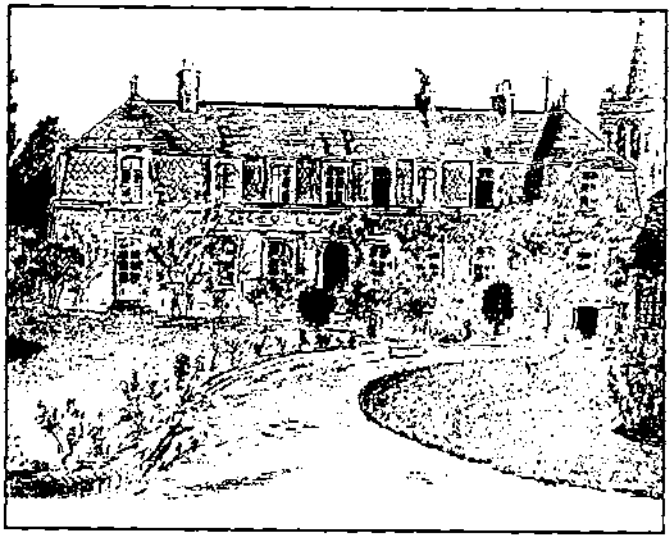
No 2 Company was responsible for the centre part of the illuminated zone, the other sapper company being to the north, nearer Calais, while the gunner battery lay to the southeast; the total length of the "belt" being between 30 to 35 miles by some 7 or 8 miles in depth. Unlike the Nantes layout which I think featured French AA artillery, this one had fighter planes of the RAF instead. No 60 Wing was one of the formations involved, using airfields at Merville and Seclin. Another RAF wing, No 61, operating largely from Vitry, was soon introduced and before Christmas a second RA searchlight battery (No 4) would extend our northern limits to the Channel coast. Our six detachments were sited and operational by nightfall on 30 September.

Section HQ was in a small but smart country hotel called the Hostellerie, just outside the village of Bayenghem-les-Seninghem. I was responsible for the Q side of all six detachments. Amongst other things this meant the early construction of a proper weatherproof, splinter proof and inconspicuous billet, to sleep eight men, for each detachment at a spot reasonably close to the searchlight position. A mini field kitchen was required, and a rudimentary field latrine also had to be carefully sited. If existing farm sheds and barns were not available, then new structures to a standard design had to be erected, not unlike the modern Portakabins of today. Each hut measured 15 x 10ft by just over 6ft high. Frames of 4 x 2in timber uprights and scantlings were built to form the sides and assembled in a 16 x 12ft pit dug to a depth of 4ft or more depending on the ground and slope, if any. CGI sheets were nailed to the frames to provide roof and walls, hessian canvas being used to cover the latter on the inside. Because of the cold and damp, a most important "extra" was the small cast iron military pattern stove whose chimney extension had to be led outside. Proper drainage was important and a sump was situated in the entrance porch. The porch was L-shaped and had steps down from the outside. Timber duckboards served as flooring inside the structure and I think that there was a single electric light bulb, powered either by batteries or the searchlight lorry's generator itself.

Mail from Blighty was of such importance that I used to make a special tour of all six sites acting as postman. The men were gladdened by the arrival of their local home newspaper as much as if not even more than a letter from the wife. On alternate Fridays I had to collect the section's pay from company HQ and personally deliver it to each man according to the regulations affecting pay parades.

Surprise checks and night time "turn outs" were also part of my normal duties. These visits were no fun at all either for me or for the men, especially that first October of the war when there was frequent heavy rain. Our little Austin runabout was not suitable for many of the muddy country lanes, punctures were not uncommon and fog was another hazard especially when visiting detachments after midnight. A complete tour of the detachments was a lengthy business.

I made friends with the local store-owner and his family, soon becoming a regular Sunday evening guest. I well remember we sometimes discussed the "Phoney War" or *"Drôle de Guerre"* as my friends would call it. The atmosphere was amazingly unreal and the exposure of several searchlight beams simultaneously was quite a major event. Once, a German recce plane was shot down by one of our Hurricanes quite close to Saint-Omer, while



L'Hostellerie De Bayenghem.

Lille and Roubaix, not far away, were bombed one night. But it was all just as well; how else could we have had a darts league and a championship meeting at section HQ! or Frances Day's Christmas season concert for the troops in Saint-Omer. There were film shows too and I remember enjoying "Jamaica Inn" on Boxing Day.

For my fairly frequent journeys into town to watch sporting fixtures between French and British army teams, a special road pass was necessary. I used to go in with French friends who also showed me round the local sights such as the cathedral, the public gardens and the banks of the canal. Our friendship survived the war and I have been back to see them on several occasions.

After an extremely wet autumn there followed a cold and unpleasant winter with frequent fogs and some snow. Though peaceful, life in the detachments was tough and hardly enjoyable. A hot bath was rare and laundering of uniforms and underclothes was by no means easy. On most nights either Sallitt or I, and sometimes both of us, would be making surprise visits to our detachments usually before midnight but occasionally very early in the morning. So the little leisure one could enjoy was during daytime and I remember one day just sitting quietly in the garden and sketching the Hostellerie. I have always been keen on that pastime.

The administrative part of the detachment site has already been described but the operational one was of course the more important. Here was to be found the searchlight projector, the sound locator and the special 3-ton lorry that provided the electric power. So that no trees or buildings would obstruct its beam, the searchlight had to be situated on open ground suitably flattened in its immediate vicinity. It was like a large cylindrical barrel, with a diameter maybe of 3ft, pivoted on a small but strong mounting that had tracks, so that it could be propelled over very short distances but never more than a few yards from the sound locator trailer, a wheeled platform for two pairs of large listening horns of parabolic shape connected electrically with the searchlight. These were able to pick up and follow, three dimensionally, the source of aircraft engine noise, and were manned by a pair of operators on sort of bicycle seats. Nearby a powerful telescope on a tripod was used to spot (hopefully) the enemy plane and ensure it remained illuminated for our fighter pilots to see and attack. This was the detachment commander's (usually a corporal) post. His job throughout was an important one for besides keeping his men keen, efficient and up to the mark in all respects, he needed to be on specially friendly terms with the local French farmers and their families. Language difficulties had to be overcome but I found on my tours of inspection that excellent relationships developed and the men benefited with various perks such as fresh eggs or a glass of something. Most sites were close to a lone farmhouse or only a few minutes walk from the village store.

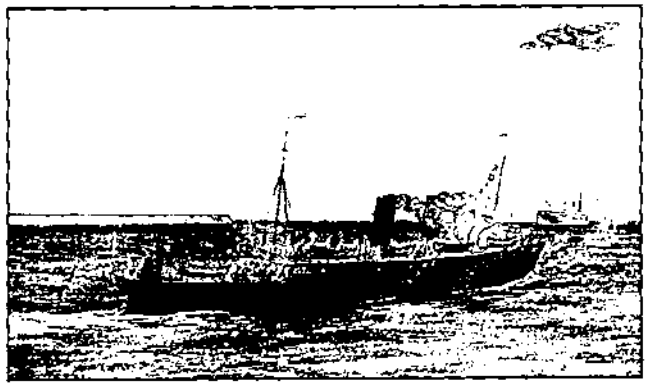
Should a detachment sentry or lorry driver be found asleep at his post he had to be charged with dereliction of duty and brought before the company commander. I remember having to do this once and the soldier was awarded 28 days field punishment for his offence.

At section level there were no operational wireless sets and for static conditions we relied on the field telephone and, once the above ground lines had been laid by the small R Sigs unit, all six detachments in our section were connected to HQ in the Hostellerie grounds, and Sallitt and I had an extension set in our bedroom.

Mention of communications reminds me that in those days people's christian names were never

used and in fact were not even normally known. Shortened versions of the surname or a nickname were however commonly used by both officers and their soldiers. Today that seems strange but it was all part of the very rigid military discipline or code of behaviour that was enforced.

Either REME did not yet exist or was only just being formed, for all vehicle repairs were the responsibility of the Ordnance Corps. The standard of vehicle maintenance was distinctly poor which is probably why a new corps viz REME became so necessary for the British army.



Maid of Orleans, March 31st, Boulogne.

After more than 50 years I have been back to try and identify exactly where those detachment sites were during that autumn and winter of 1939. The environment had scarcely changed and I was broadly able to recognize localities and some landmarks. Many memories come flooding back. By far the greatest, nostalgically at least, was achieved at the Bayenghem Hostellerie where memories were vivid; the main building, the large outhouse with the garden and driveway, all being very easily recognizable. Even my 1939 entry in the *Livre d'Or* was still intact and after all these years my signature remains virtually unchanged!

With such a peaceful war front, home leave was started and the first leave boat sailed from Boulogne on 18 December. Under the scheme ten days in the UK were allowed and there were to be further departures at about fortnightly intervals. As a single man I was not likely to be given a leave vacancy before February.

In the meanwhile snow and bitterly cold weather hit us and in January many, myself included, went down with the flu. The end of the month saw my automatic promotion to full lieutenant, and before long a third searchlight regiment (No 3) started to arrive and would later be taking over all our lights and duties.

At last, on 13 February, an icy cold day with frequent snow showers, I boarded the leave boat at Calais for Folkestone. Ten days later I was on my way back by the same sea route.

Much had happened in my short absence and I learned that the battalion, less its technical equipment, would soon be returning to England to be disbanded there and reformed as a chemical warfare training unit to be located at Barton Stacey, near Whitchurch in Hampshire.

In fact the main body of the unit sailed out of Boulogne on 21 March. I was on the quay to see it off and with the rest of a small rear party left Boulogne ten days later on the *Maid of Orleans*.

Thus my phoney war days in France were over and I had safely left the European mainland with all my baggage intact only six weeks before Hitler invaded the Low Countries, an act that led to the Dunkirk evacuation and a little later to the surrender of the Calais garrison that by then included the RA searchlight units that had taken over our duties.

How fortunate I had been!

Armoured Engineers and Military Bridging
Some Operational Realities

LIEUTENANT R THOMSON BSc

Lieutenant Robert Thomson graduated with a degree in building construction and management from Reading University, in June 1994. He completed Commissioning Course 933 and was attached to 22 Engineer Regiment, working on the Berrill Valley Obstacle Belt Project. After completing Troop Commanders' Course 113 he was posted to 26 Armoured Engineer Squadron in July 1995 and was attached to 2nd Royal Tank Regiment as opposition forces at the British Army Training Unit Suffield from July to November 1995. He commanded an armoured troop, deployed in the combat engineer role, on Operation Resolute *from January to April 1996.*

Introduction

In October 1995 approximately 80 personnel from 26 Armoured Engineer Squadron, deployed on Operation *Grapple 7*. At the time the OC, Major Simon Tenison, said that it was probably the last time for 12 months that the squadron would be together. How wrong he was; on 12 January 1996 the remainder of the squadron deployed on Operation *Resolute*. By the close of the tour in late April, 3 Troop (which had been reroled as a field engineer troop) had completed the construction of a 16-bay triple single reinforced (TSR) heavy girder bridge (HGB) and an 11-bay double storey (DS) medium girder bridge (MGB). These tasks placed hefty demands on all involved.

The aim of this article is to describe both bridging tasks, noting the use of armoured engineers for combat engineer tasks, whilst highlighting some operational realities of military bridging.

A squadron deployment to Northern Ireland and an infantry training package in Kenya (Exercise *Grand Prix*) trained the armoured sappers very well for construction and combat engineering. For example, during a hot and dry exercise covering several weeks in Kenya, water purification and distribution was well practised. Incidentally, the hot dry conditions of Kenya did not prepare us for the severe cold of a Bosnian winter! And, training on water supply and distribution does not include how to deal with extremely low temperatures and extremely poor water quality (the river used as the source for the squadron in Bosnia was being used by the town's people as a sewer and rubbish tip). A great deal of "on the job" learning took place in order to avoid long-term damage to the NBC WPU (nuclear, biological, chemical warfare water purification unit) systems used.

Reroling and Initial Deployment

The decision to include a mechanized and an armoured squadron (the latter with two armoured troops and one mechanized troop) with the close support (CS) engineer regiment, deploying with the UK IFOR (Implementation Force) contingent, was made in October 1995. 77 Armoured Engineer Squadron and 3 Tp 26 Armd Engr Sqn converted to the mechanized role; there was only time for 35 Engineer Regiment to issue AFV 432s (armoured fighting vehicle 432) and field troop G1098 stores (complete field squadron's stores equipment). It was implicit that a soldier in the Corps could handle combat engineering without further training.

Lt R Thomson
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26 Armd Engr Sqn completed the deployment of 32 Engineer Regiment (known in HQ 4 (UK) Armoured Brigade as 32 **Armoured** Engineer Regiment) in Mrkonjic-Grad, Bosnia on 13 January 1996. Within the first few days it was clear that combat engineering was the main immediate requirement. Several construction and maintenance tasks became a squadron responsibility and remained so for the remainder of the tour.

The Neame Bridge (HGB)

As the tour progressed, the regiment and in turn the squadron became more committed to taskings across the UK divisional area. One such tasking came to light a month into the tour; a class 70 bridge was required on a main supply route (MSR) connecting two major towns in a Muslim area in central Bosnia. The original requirement was for a 17-bay TSR HGB over the river Sana, 10km south of Sanski-Most, the northern connecting town, on MSR *Phoenix*. The site was a demolished three-span continuous concrete bridge 59m long, 25m of which was over the river. Before bridge construction could begin, a considerable amount of plant work had to be carried out to repair the approaches and improve an existing pontoon bridge. However all work stopped when human remains were discovered, and could not continue until the International Criminal Tribunal for Former Yugoslavia had arranged for their removal. In fact, the squadron was unable to resume work on this site before the end of the tour.

The site was given the codename *Neame* after Lieutenant (later lieutenant general) Philip Neame, who was awarded a Victoria Cross during the First World War.

The Ross Bridge (HGB)

One of the central dictates of the Dayton Accord was freedom of movement (FOM) for everyone. During March 1995 it became vital for IFOR to monitor and control movement throughout our areas of responsibility, but many bridges on MSRs were damaged to an extent which prevented tank patrols from crossing. In particular, in the Dutch area of responsibility (AOR) 20km east of Mrkonjic-Grad, a crossing was required over the river Ugar on Route Clog. The decision to rebuild this bridge was taken 15 days before it was required, leaving little time to complete the initial recce, design and build. The site consisted of a continuous concrete slab highway bridge, which was demolished, creating a gap of 55m. In order to span this gap, a 16-bay TSR HGB was required, which gave a total bridge length of 61m. By comparison, the Neame bridge site required 17 bays and gave a total bridge length of 64.8m. Fortunately much of the design work completed for Neame bridge would end up being of assistance for work on this bridge.

The bridge was named after Corporal John Ross, 2nd Company Royal Sappers and Miners, who on 21 July 1855, was awarded the VC for his actions during the battle of Redan in Russia. The 2nd Company is now 2 (HQ) Sqn, 32 Engr Regt and it was quite fitting for the bridge to be built by a troop from the regiment.

Design, Planning and Construction of Ross Bridge (HGB)

Lack of experience, up-to-date information and construction precedent (other than the Berrill Valley Obstacle Belt Project on the Salisbury Plain Training Area in 1995), meant that the design and construction of a HGB was not going to be easy. It was difficult to appreciate the size of such an undertaking at first. It was not until detailed planning started, that several issues came to light.

In order to plan the logistics, design the grillages and ultimately the bridge itself, it was essential to have detailed knowledge of how to build the bridge. The planning and design work proved to be more than a problem-solving exercise; an interesting point from Sir Alan Harris' article in the August *Journal* states that "Design is not working out the dimensions of a beam – the significant design decision was that to have a beam." In the design of Ross bridge, it was not a matter of the dimensions of the bridge parts, but which bridge parts were required and how they fitted together. Many nights "burning the midnight oil" produced the answers required. It was realized at this point that a bridge of this size had probably not been built within the last 30 years.

The HGB pamphlet glossed over many points of detail which became crucial to the success of the build. In particular, the explanation and detailing of roller set-ups, as well as booming tables, inconveniently stopped at 15-bay TSR construction. After "back to basics" tutorials (where the troop commander wished he had taken some notice of the RSME structures lectures), a solution was found. The reverse side of

The Ross bridge grillage construction.

the design proforma for the HGB is also convoluted and lacks mathematical logic, common sense and clarity. It is anticipated that there will be a resurgence in the use of line of communication bridging, such as the HGB. Publishing a full explanation of how to use the proforma would save future HGB designers many hours of work.

The most intricate and time-consuming part of the design came when selecting the launch plane of the bridge. This in turn dictated the roller set-up heights and, from the ground levels, how much excavation or fill was required to achieve them. The crux of this process is accuracy. As long as ground levels are taken accurately, then a true reflection can be made on paper. With a launch plane tolerance of 5mm, the time to reconsider calculations, or attempt to rectify inaccurate levelling, is not when 160 tonnes of bridge are hanging over a gap. Monitoring levels, therefore, was an activity carefully controlled on site.

With the Ross bridge a certainty and the Neame bridge requirement pending, a check of all HGB parts in theatre was carried out. The feasibility of using a pier (which was available) was considered, because this might leave enough HGB for Neame bridge, which would otherwise be short. Given 12 hours to produce an answer, when complete equipment schedule (CES) numbers differed from the pamphlet and other available information, proved a taxing exercise to say the least. In the end it was concluded that even by using the available pier set, a further issue of bridge components would be necessary.

The great Operation *Resolute* cry of "to be issued theatre" rang rather hollow when it was realized that bridge components were in Long Marston. The news, it was thought, could not get worse. Information was then received that the bridge would arrive at Split ten days before the construction deadline, and that components would require sorting and loading. The manpower required to pack, load and move them from Split to site would have to be supplied by the squadron. Only eight days were left when they arrived.

This was not the only logistic problem encountered. Available information listed standard four-tonne loads which were not suitable for Royal Logistic Corps transportation by DROPS (demountable rack offloading and pick-up system). In order to squeeze the maximum out of every DROPS flat-rack, a packing method was devised for each particular component. This process went hand in hand with the plan for the build until eventually a DROPS load plan had been completed. The eventual requirement was for 40 DROPS flat-rack and six 18-tonne flat-bed vehicles.

The components were eventually moved by DROPS vehicles, which it is acknowledged made a massive demand on regimental and brigade logistics. Unavoidably the stores were, in most cases, triple-handled. Components not required from the standard sets sent (but not ordered) from Long Marston, were returned to the Engineer Resources Support Squadron in Split, which could hardly spare the space or resources to handle them. Instead of standard bridge sets (in our case an A and two B sets) being used, the bridge components could have been loaded in the UK, or indeed Split, as required, and this would have saved a major strain on the already stretched support squadron.

Logistics were hampered further by the travelling times between Split in Croatia and Mrkonjic-Grad in Bosnia, where the squadron was based. Tortuous routes on narrow roads in appaling weather conditions meant journeys of between 24 and 36 hours (compare a similar distance in UK, say from Oxford to Penzance, of five to six hours). Roads were regularly covered with deep snowdrifts, which even the snow and ice clearance teams (SNIC teams, making team members: "snickers") could not keep up with. The route to the site in the Ugar Valley from Mrkonjic-Grad

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was even more demanding, although weather conditions improved slightly by the time the bridge components were transported to site. Great demands were placed on the bridge-train drivers, who performed extremely well. Two alternative routes to site existed, both averaging an eight-hour journey from Mrkonjic-Grad in good weather conditions. This meant that the odd forgotten panel or panel pin could mean not meeting the deadline. Communications similarly were affected by weather conditions which meant high frequency reports were sometimes difficult to send.

The Ross bridge finally in place.

Due to the rapidly approaching deadline, the grillages were started on site (concurrently with the loading of the stores at Mrkonjic-Grad) thus saving three days of the programme. Preparing the grillage bases and bank-seat grillages was a lengthy process requiring accuracy and regular checking, and a surveyor was kept on site for the entire period.

One interesting aspect of this build was the excellent collaboration we received from the nearby Royal Dutch Engineer Company. The Dutch battalion, based at the time in Sisava (a disused Olympic village), dealt with requests from the squadron for a crane for the entire build with impressive cooperation. A Leopard armoured engineer vehicle (an extremely agile and versatile vehicle) was also supplied for booming the bridge. On numerous occasions wheeled excavators were supplied for moving large amounts of material from borrow pits to grillage bases. In return for all this help, it was agreed that a section of Dutch engineers would assist in the build. But, the real reason why the Dutchmen volunteered soon surfaced when they arrived at the final rendezvous (a disused cafe at a very picturesque spot in the Ugar Valley) at 0600hrs every day for an "English breakfast"!

The fact that so much equipment, manpower and help was supplied at the last minute is a tribute to the Royal Dutch Engineer Company. If a Coles crane (the crane used by the Corps in most construction work) had been used, work would have been in far longer shifts, working round the clock until completion. By contrast, the Liebherr crane (of German manufacture) made light work of the build, being able to lift the entire nose section of the bridge (six bays of double single and five bays of single storey, being approximately 50 tonnes).

The logistic problems already highlighted started to affect the build itself. The bridge components and in particular the roller set-ups, had not all been delivered as ordered. With such vital components deficient as the final boom approached, some lateral thinking was necessary. In order not to delay the build, a way of continuing construction with less roller support had to be found. With the expert guidance of Major Taylor, OC 523 STRE (Wks), a solution was found, albeit with a small amount of "engineers eye". We concluded that the weight of the bridge had been over estimated. This meant that the existing rollers would "most probably" be sufficient for the boom. No guarantees, but the only other option was to delay. There was a small element of risk involved in this rapid reassessment and so, with the familiar cry of "adapt and overcome" the boom went ahead with the reduced number of rollers and was completed two days before the deadline.

The final technical challenge to be overcome was the anti-scour protection of the abutments. This consisted of hesco-bastions anchored into the river bank and tied together, filled with non-sedimentary rock. Although plant was unavailable for constructing and filling gabions before we left to take on priority work elsewhere in the division, the work was completed at a later date.

KULEN VAKUF (MGB)

THE Dayton Peace Accord demands a constant watch on potential and actual areas of disagreement

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and conflict. One isolated pocket of friction can threaten to upset the peace if not monitored and controlled. At Kulen Vakuf, a small town on the river Una whose valley forms the northwest border of Bosnia and Croatia, one such pocket existed. By the week ending 14 April 1996 negotiations between the leaders of 5 Corps ARBiH (Bosnian Muslim Army) and the HVO (Bosnian Croat Army) over the possession of Kulen Vakuf had faltered. By 16 April, relations were improving, but a suitable crossing site for light armoured fighting vehicles (AFVs) was still required in case of future unrest.

The site eventually selected was a steep gorge approximately 30m deep, with a gap of 25.4m. Approaches to the home and far banks were severely restricted in width, reducing to 5m on the immediate approaches. On the home bank the approach road curved away from the site well within the booming clearance (referred to as the "dim R") required. Buildings obstructed any movement left and right outside the 5m width; notably a derelict disused house and a set of concrete steps on the home bank. On the far bank a steep rock face jutted out vertically in front of the proposed location leaving 7.6m to slew once off the ramp. Not surprisingly this site was called the "site from hell".

The dimensions of a Warrior AFV became important at the design and recce stage, as this would be the largest tracked vehicle to use the crossing. The length of track in contact with the ground became the dominant dimension, as this dictated the clear space required for the vehicle to slew once off the ramps. It became quite clear that the turning circle required was larger than the space available. The options were therefore to slew on the far ramps (thus writing these off in the space of a few days), or to devise a cunning alternative. Cunning alternatives eventually whittled down to one: employing hardcore as a base on the ramps, with trackway at right-angles to the end of the bridge, which formed a rough "L" shape on the far bank.

The recce report on the site has been the subject of much scrutiny since the bridge was built. It was identified straight away that even by doing some remedial clearance work on the restricted "dim R", a restricted site build would be necessary. An 11-bay DS MGB was recommended, for which significant clearance work would be required. After the recce and before the build it was deduced that, even with these preparations, there was still a possible requirement to remove the house obstructing the boom. This was acknowledged and the build then went ahead with the intention of limiting damage as much as possible, although secure in the knowledge that the means and the go-ahead had been given to complete the bridge.

Unfortunately, even with expert assistance from the squadron sergeant-major (an ex-QMSI bridging instructor from the Combat Engineer Training Centre) the build had not been possible without demolishing the house. For those not present for the actual build, it was a contentious point as to whether the restricted build would or would not have worked. It was quite clear however, to those involved, that it would not.

Irrespective of these contentions, the crossing was completed, albeit not very quickly and not, of course, without the house being dozed into the gorge (a photograph of the completed bridge can be seen on the back cover of the July issue of *Sapper* magazine). What is interesting to note here is that MGB is a simple bridge system. However, templated designs and gap dimensions are all very well in training, but they do not stimulate flexibility of mind when one is presented with a gap such as this for the first time, especially when there are no alternatives. As with the Ross bridge, engineer problem-solving and "lateral thinking" was essential, which reiterates the issues so cleverly highlighted by Sir Alan Harris in his article *How Engineers Engineer*.

The Lessons Learnt

As far as the Ross bridge design and construction went, the problems encountered probably happened again with the construction of the Neame bridge. Logistics were a problem for any sizeable project on Operation *Resolute*. Even though IFOR are fortunate enough now to have their own logistic chain, which relieves many of the old UN supply problems, line-of-communication bridging still has a huge impact on the limited logistic support available to an engineer regiment in Bosnia.

The design information for the HGB is convoluted and out of date. Current CES for the HGB is different to the stores listed in pamphlets. The parceling and standard bridge set configurations are of no use to an engineer squadron with limited manpower and time to reconfigure the components in theatre. No up-to-date standard load information exists for the DROPS system.

Ross bridge site.

Standard four-tonne pallets are not now a viable method of transportation.

The capability of the Coles crane seems tiny in comparison to the Liebherr crane used to build the HGB. The reach of the Coles crane and the limited lifting capacity would have meant lifting each component separately. The Liebherr crane lifted several components at once, at one time half the total nose section (five bays).

Several lessons for troop commanders were highlighted during the construction of the MGB at Kulen Vakuf. MGB recce is simple, but **applying** the MGB to a site where it does not fit is quite something else. Left with no option but to build at a near-impossible site (in this case the site from hell) as many experienced personnel as possible should be taken with the troop.

Training at present does not provide enough guidance on restricted site builds, and the question of how this should be taught to troop commanders needs to be addressed. HGB is a very capable line-of-communications bridge; it will undoubtedly be used again and the lessons highlighted here, which have direct influence on how student military engineers think and plan (for example the author), should be learnt for the future.

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BIEJCOSA

BRIGADIER H G W HAMILTON CBE DL BA

WHAT an odd title for an article in the RE *Journal*. What is it about? It's a short piece recounting recollections of my time with the British & Indian Element of the Joint Chiefs of Staff in Australia (BIEJCOSA) 50 years ago. I received urgent orders to report there (Albert Barracks in Melbourne) as General Staff Officer II (Staff Duties) in 1945.

The task of JCOSA was to make detailed arrangements for logistic, setting up the British Commonwealth Occupation Force (BCOF) in Japan. BCOF was to consist of a British/Indian contingent and an Australian/New Zealand contingent, each roughly of brigade strength, under a small Commonwealth HQ with naval and air support, mostly for transport purposes, and would be located at Kobe "in support" of the Americans under General McArthur. The Australian chiefs of staff would be responsible for maintenance and administration and, to a certain extent, for executive action regarding BCOF. Thus the primary task of the British and Indian element was to advise the Australian chiefs of staff, liaise between them and the chiefs of staff in London and the commander in chief (CinC) in India, rather than any command or execution duties. The secondary task was to provide advice to and liaise with the British High Commissioner in Canberra, and also to undertake all the administration connected with the return of a number of ex-POW British service personnel and families who had been evacuated to Australia, and any other administrative and personnel matters, mostly of a single service nature.

To undertake these tasks we were given a large representative staff of four senior officers of "2-star" rank, including the representative of the CinC India, and some 20 staff officers.

At a very early date it became apparent that there was a requirement for some inter-service co-ordination. Signals and letters of a joint service nature from "Cabinet offices" in London (this was before the time of the Chief of the Defence Staff) were sent to each of the four representatives who each started to draft a reply or take action, with inevitable duplication and confusion! A secretariat which could also arrange and run meetings for the four heads was obviously required and, as there was little or no work for me to do, I was given the job and became Secretary BIEJCOSA.

After some months it became apparent that four senior officers of different services, without much to do and without any direct responsibility for operations, were a menace; each seemed to feel that he had to make his own contribution for the honour of his service. I would prepare a draft reply to a letter or signal, and each would then feel in duty bound to make amendments, few of which made any difference to the sense of the draft. One time, the representative of the CinC India, an otherwise charming man, amended a draft which I then presented to a later meeting. Forgetting that he had already amended it, he produced further amendments which changed it back to my original! I could not resist pointing this out to him.

One day I was called in by the Air Vice Marshal, "Oh Hamilton sorry to worry you with a small matter but you see my desk chair,"

"Yes Sir, what's wrong with it?"

"Well it's rather hard and although it has arms it does not swivel. Now the general has one which has a soft seat and swivels. Now I don't really mind but I am the representative of the Chief of the Air Staff and its a "slight" on him for the representative of the Chief of the General Staff to have a superior chair."

I received a similar call from the Rear Admiral who was complaining that his "In & Out" trays were made of plastic-covered wire whereas those of the Air Vice Marshal were in polished wood with dovetailed joints. "Now I don't really mind but it is a "slight" on the First Sea Lord ..." etc etc. Needless to say I soon arranged for the appropriate furniture to be provided.

A far more serious matter was on the JCOSA side. The Australian chiefs not only had the main responsibility for administration and executive action concerning BCOF but, with the war only just ended, they also had much larger problems concerning the run down and reorganization of the Australian forces, and planning for the future. Our "team" had no such responsibility, and were continually badgering the Australian chiefs on matters of detail to find out

what was being done on comparatively minor problems such as a "hitch" in the supply of say *ghee* to the Indian contingent. The Australian chiefs soon got fed up, our "top team" was recalled and BIEJCOSA was reduced in size and headed by one 2-star (a rear admiral). It soon just became the United Kingdom Liaison Staff (UKLS), as India had become independent, BCOF was by then established and running and was later to be withdrawn.

One day we received a long signal from Cabinet offices. Would we please provide an estimate of the residual value of some of the POW camps in Australia. It transpired that there were about ten large hutted camps situated in Victoria, New South Wales and South Australia, which had been built and paid for by the British government, but which were administered and guarded by the Australians. As there was no further use for the camps, the British government wished to hand them over to the Australians, but for how much? I saw this as a wonderful way of having a free tour round Australia (accompanied by my wife for the local ones) so, as the only Sapper on the staff, I gave myself the task. But how do you value a hutted camp in the back of beyond? The huts themselves were easy, you counted the number and size and condition and came up with a figure. Roads and paths sewers and hut bases no value unless the camp was being sold as a going concern, but what about the miles of water-piping, electrical wiring and fittings, and above all the quantities of barbed and other wire? Some of the camps were adjacent to the old gold mining towns in Victoria famed for Ned Kelly and his bands, others in South Australia near the lovely wine growing areas mostly settled and developed by Germans. In one camp we found that the leader of the big air raid on Coventry in 1940, was held; he had been shot down in the Middle East. As my wife had been at the receiving end, in Coventry General Hospital, that night she would have liked to meet him!

In the end I came up with a wild estimate with a lot of provisos, but suggested that it would be better to hold a disposal auction. Cabinet offices thanked me but that was the last I heard of it!

During my posting the British government sent out recce teams for the construction of facilities for the rocket range and the testing of missiles such as Blue Streak. We were not directly concerned other than to arrange accommodation and with liaison duties. After we had gone of course the whole thing escalated, and our first nuclear bomb was tested, the aftermath of which is still producing problems, particularly with the local Aborigines whose lands remain radio active in places.

Three years in Australia with BIEJCOSA and the UKLS was a great experience. My wife and twin daughters had joined me after only five months, coming out on a bride ship for the British brides of Australian servicemen. Rationing in the UK at this time was as bad or worse almost than as during the war but in Australia was minimal (you were limited to only one lamb chop for breakfast!)

Royal Engineers Support to the RAF, 1964-1967
A Personal Memoir

BRIGADIER J R E HAMILTON-BAILLIE MC MA(H) CEng MICE

Brigadier Jock Hamilton-Baillie was commissioned in January 1939. He expected to leave Chatham for Cambridge in September but went to war instead with 26 Field Company. Much movement back and forth in France ended in the surrender at St Valery, which for him meant nearly five years as a prisoner of war, two of them in Colditz. After release, he was posted to India where he taught airfield construction at the Engineer Officers Training School, Bangalore, then came home in 1949 to marry, and go at last to Cambridge. There followed a prosaic career of Staff College, a War Office staff post, command of 5 Field Squadron, Staff Officer 2 Headquarters 2 Infantry Division, chief instructor at the Army Apprentice School Chepstow and a more exciting posting to Aden. Then came the period covered in this article followed by Colonel Q Quartering in Germany and finally Brigadier Engineer Services, a title he invented. After retirement he taught Soil Mechanics at Shrivenham. His main interest is the history of fortifications and for 18 years he was chairman of the Fortress Study Group.

In July 1964, the Defence Council decided that the Royal Engineers should take over the responsibilities of the RAF Airfield Construction Branch (ACB). As one of the first moves to implement this, I arrived in Northumberland House on 1 October that year, posted as Col E, Engr 2 (Airfields). The first day was somewhat lonely, with no staff and nothing in the "in-tray". However I was able to call on Group Captain Jackson, RAF Director of Airfield Construction and meet his staff. They were then and always most helpful and cooperative, but it would have been too much to have expected them to be enthusiastically welcoming; my arrival signalled the beginning of the end of the small, technically efficient and close-knit organization to which they owed great loyalty.

My superior, the Brigadier Engineer Plans, was in Golden Cross House, across the Strand; I suppose Engr 2 had been put in Northumberland House to be next to the RAF Airfield Construction Directorate, which was no doubt sensible. Engr 1, also in Golden Cross, was much more welcoming, and their staff lost little time in persuading the brigadier that now he had an airfields branch the management of the "Crown" airfield project should be given to it. This project was then already in full swing and was generating and continued to generate many problems. My briefing had been that my main task initially was to be management of the takeover from the RAF and this it proved to be, but *Crown* added a technically interesting assignment.

The establishment of my branch included a GSO2 RE, a garrison engineer, a military chief clerk, a draughtsman and, I think, two civil service clerks. In addition we were to have an attached RAF officer; I asked that this should be someone from flying duties and not an administrator or ex airfields construction officer. To my relief, the GSO2 RE, in the person of Hugh Tudor, arrived quite soon and the rest gradually built up.

The transfer of responsibility was announced in Parliament on 16 November 1964: I asked if I could have a seat to hear it, but was told I was far too late! Soon a Joint Service Working Party was set up by the EinC(A) and the Director General of Organization (RAF) to coordinate arrangements for the takeover, with me as chairman, and work started in earnest. By the end of the year the main stages of the plan were unanimously agreed. We had been pre-empted over the first move. The uncertainty that had hung over the future of the airfields construction branch for some time had

Brig J R E Hamilton-Baillie MC
RE support to the RAF, 1964-1967

naturally caused their recruitment to dry up and they had found themselves unable to maintain all their four operational squadrons. 60 Field Squadron had taken over from 5004 (Airfield Construction) Squadron in Aden and the latter had returned to Waterbeach for disbandment. This standard field squadron and the three other RAF squadrons, 5001 in Singapore, 5002 supporting 38 Group, and 5003 for general RAF support including overseas reinforcements, both the latter in the UK at Waterbeach, were to be replaced by field squadrons (airfields). 10 Squadron (Airfields) had started to form at Maidstone and was due to relieve 60 Squadron at RAF Khormaksar in Aden in August. The other three new field squadrons to be raised were, as far as I know by good luck, allotted the numbers 51, 52 and 53, so by using them to replace 5001, 5002 and 5003 respectively, a sense of continuity was achieved; this I believe pleased the RAF and one or two squadrons at least were offered, and assumed, symbols used by their predecessors. An establishment for 10, 51 and 52 Field Squadrons (Airfields) was well under way towards approval and a larger establishment for 53 was proposed. The latter was necessary, as this unit would have special responsibilities both for contingency plans abroad and for crash rescue and other special tasks in the UK.

51 Field Squadron (Airfields) was to start forming at Ripon in August and to move to RAF Seletar in Singapore in January 1966. Plans for the two UK based squadrons were held up over a decision on their permanent location. Waterbeach was the obvious choice. It was the depot of the ACB as well as the home of 5002 and 5003 RAF Squadrons. It had good permanent barracks and excellent technical accommodation. The runway would remain in occasional use for RAF training and tests of undercarriage design were planned on an earth strip beside it. An airfields squadron was needed on the site to prepare and alter this strip during tests. Disturbance of married RAF personnel who transferred or were seconded to the RE would be avoided and the transfer of special tasks would be easier. Against this it was said that the savings on the closing down of RAF Waterbeach and the disposal of the barracks had been taken into account in the financial calculations on which the whole takeover had been approved; to keep Waterbeach at this stage would be cheating. Against this we pointed out that the decision to raise the new RE units must have assumed their accommodation somewhere, that there were no spare permanent army barracks, indeed many were at the end of their useful life and plans were in hand to replace them. To give up the excellent barracks at Waterbeach with all its advantages and rebuild new elsewhere would be extravagant madness. After much lengthy and heated argument this was agreed. It was accepted as the location of 52 and 53 Squadrons, a CRE and a HQRE to command them, and an engineer equipment workshop REME to support them; they eventually formed 39 Engineer Regiment (Airfields). These units started to form during 1965 and Waterbeach Barracks was formally handed over on 1 July 1966.

Arrangements were also made to fill a variety of posts worldwide, in replacement of ACB personnel. Amongst these was an increment to the Mideast Park Squadron and an engineer equipment workshop in that command and a similar provision for the Far East; a detachment of 16 sappers in Cyprus and an officer and two at Gatow, East Germany; five logistics officers of the rank of lieutenant colonel in NATO Headquarters and a colonel (airfields) in HQ FARELF. In all, posts for 61 officers and 1070 soldiers were created, corresponding to the increase in army manpower authorized when the takeover was approved.

It was agreed from the start that all vehicles, plant and RAF ground equipment (except weapons, radio and cooking equipment) should be taken over by the RE squadrons from their RAF predecessors. The army took over the provisioning of complete equipments from April 1965 and of spares from April 1966. The necessary adjustments to army and air votes and long term costings, though complicated, were agreed.

If the transfer of equipment went smoothly, the same could not be said for the transfer of personnel. Broadly, the alternative open to the RAF officers and airmen was to transfer to the Royal Engineers, subject to acceptance and some retraining, secondment to the Royal Engineers for employment in airfields posts for a limited time, accepting other employment in the RAF, or accepting premature retirement or discharge. The greatest difficulty was over the conditions of transfer for non-commissioned ranks. The terms of service were clearly less favourable in the army, with no time promotion and no guarantee of service to 55. It proved impossible to get financial agreement to reasonable compensation for these losses and despite

much trouble taken over every individual case, the great majority of airmen and a number of officers left the service. Many of these were highly skilled and would have been very welcome in the sappers. Their loss caused sadness and ill feeling in RAF circles, but fortunately the blame lay with the financiers and not with the Sappers.

The main worries that the RAF had over the takeover were that the sappers, doing much more military and combat engineer training than the ACB, would be less technically expert than their RAF predecessors; that for the same reason they would have less time on training tasks with which the ACB significantly stretched what could be done with the RAF Works vote, and that in an emergency airfield units might be diverted to non air force tasks deemed to be more urgent. Comparing unit with unit, there was some truth in the first fear, but the RAF soon realized that sapper squadrons had the backing of highly professional military works units and I do not think that the RAF were ever let down technically. The fear of reduced peacetime works support also had some justification, but of course the ACB had not been established for this purpose any more than the sappers had. In fact, not only were a number of training tasks carried out for the RAF by the airfields squadrons, but also by other sapper units. The last point about support in an emergency worked in favour of the RAF. When the EinC became responsible for airfield construction support to the RAF, additional non specialist RE units could more easily be diverted to this task.

To sum up, on the whole the takeover went smoothly, the least satisfactory part being the loss to the services of considerable skilled manpower, due to inadequate financial compensation on transfer. Apart from this the RAF were satisfied with what was done. Relations between the two sides remained very good to the end. This was symbolized by the invitation I received to the last guest night held in the officers' mess at Waterbeach before the disbandment of the ACB and the hand over of the station. It was a sad and emotional occasion, at which I was honoured to be present.

I come now to matters other than the takeover from the ACB. As early as March 1965, I toured FARELF, visiting first *Crown* at Loeng Nok Tha in Thailand. Here work on the original economic design was well advanced. This design, intended to achieve a load classification number (LCN) of 30, was for a sub-base of nine inches compacted laterite over variable sub-grade, a base of six inches of laterite stabilized with cement and lime and a two-inch bitumen macadam surface. After initial difficulties with the old mixing plant and quite a lot of learning on that and the spreaders, surfacing on the runway was proceeding well. Base stabilization was proceeding on the apron.

I went on to Borneo. There, at a jungle clearing airstrip where a Gurkha field squadron was building a landing strip, I watched the spectacular air drop from a Beverley, of a medium wheeled tractor. Sadly a last minute gust of wind carried the platform over a steep fall in the ground and the machine ended upside down in the river. The Gurkha sapper sitting next to me scarcely paused in eating his rice from his mess tin to remark most calmly, "Ha, gone in the river!" I believe it was subsequently retrieved and the strip completed. These two visits illustrate the amount of airfield work already being undertaken by the Corps, unrelated to the takeover of the ACB.

I soon found myself a member of a long running MOD committee, the Short Term Airfield Research and Development Committee, always known as the "Star and D". It had a wide membership, not only from the War Office and Air Ministry, but from the Admiralty, Ministry of Supply, Ministry of Public Buildings and Works (MPBW), Military Engineering Experimental Establishment (MEXE), School of Military Engineering (SME), Road Research Laboratory, Old Uncle Tom Cobley and all. Much of its work was done in sub-committees and many of the subjects I worked on were done in conjunction with one of these. The aircraft with which it was concerned were principally tactical transport and light aircraft, helicopters and, later, Harriers. Other fighters and bombers, which required permanent runways, were not considered.

The date on which the EinC formally assumed responsibility for advising the Air Ministry on airfield construction was 1 April 1965 and soon after this I asked the airmen for the criteria required for various aircraft. I got two foolscap pages of inadequate and out of date data. This started a long study, in cooperation with a "Star and D" sub-committee, to establish full criteria for all aircraft, including helicopters, that could use short-term airfields. This generated a lot of work, especially for the wing commander on my staff. Standards of airfield for various uses and lives had

to be defined; all the geometrical factors of length, width, shoulders, overruns, cleared areas, approach funnels, etc had to be defined and specified for each type; a method of assessing soil strengths for unsurfaced strips required for various aircraft for various numbers of sorties was devised and many other factors considered. It all added up to a fair sized book, which was finally written up, edited and put together by me. The book was aimed jointly at Air Force and RE officers planning these airfields and I had expected it to be a Joint Service publication. Though complete, it had not been published when I left Engr 2 and when it did appear not long afterwards, it was as an RAF manual. Perhaps this is the only occasion when an official manual of another service has been substantially written by a RE officer.

A related subject on which MEXE put in much work, in conjunction with the "Star and D", was the level of undulations and bumps of an unsurfaced airfield that were acceptable for various types of undercarriage. Experiments were carried out at Waterbeach on trial earth strips prepared alongside the main runway by the resident airfields squadrons. No satisfactorily accurate method had been found by the end of my tour in Engr 2. Another, probably more complicated, study was pursued by MEXE and the "Star and D", to identify possible landing sites with suitable soil strength and profile by terrain evaluation, without ground access to the site.

Another series of trials continued through much of this time at MEXE, of new airfield surfacing materials: prefabricated surfacing (aluminium) (PS(A)) and prefabricated surfacing (Neoprene) (PS(N)), that were to replace pierced steel plank (PSP) for temporary landing strips and helicopter landing pads. We had, incidentally, inherited a large stock of PSP from the RAF, which was useful for non-operational tasks. The trials of the new surfacings included full scale runways in both materials. The PS(N) runway near Boscombe Down remained in place for quite a long time. Early difficulties with these surfacings were all overcome, in particular "bow-waving" of PS(A) (whereby the slight play in each joint was pushed forward by an aircraft's wheels until enough had been collected to cause the planks to rise up in a bow-wave) by laying at an angle of about 30 degrees to the direction of the runway, the play then ran off to the side and did not build up.

A quite new and interesting requirement for surfacing that developed during this time was for vertical take off and landing aircraft. As early as July 1965, I visited a Hawker airfield to watch the vertical take off and landing of a Kestrel, the experimental predecessor of the Harrier. Short take off and vertical landing, as later developed for the Harrier was not then considered. On the contrary, the optimistic idea of a supersonic production successor to the Kestrel was still thought possible. The designers had few ideas for landing pads; they tried a sprayed plastic, but it was not satisfactory. The newly developed PS(A) seemed the obvious answer, the only problem being how to fix down the edges. A design was worked out to do this with a particular number of steel pins of a particular length. A trial set was laid at Upnor. The sappers laying the mat found that in one place a few pins would not drive home, probably because there were some old foundations buried underneath. They therefore cut these pins short and replaced them. We were very lucky that the senior test pilot making a landing was not killed; as he hovered over this edge of the mat, the short pins pulled out and a plank hurtled into the air, just missing the underneath of the aircraft! however, with this lesson cheaply learned, the pad was a success.

In the autumn of 1965, while all these R and D (Research and Development) concerns were going on, *Crown* suddenly became our major worry. When almost complete, the runway was found to have some very soft spots due to the failure, in places, of the lime and cement-stabilized base. Much worse was found however from plate bearing tests, that most of the runway was well below design strength and that even with the soft spots repaired, it could only be classified LCN 15, rather than the LCN 30 specified. A plan to retrieve the situation was very urgently required, especially as maintaining the force at Loeng Nok Tha was costed at £24,000 a month. Accompanied by an engineer from MPBW, I set out for Thailand, being joined by the Chief Engineer FARELF at Singapore.

Tests showed that the trouble lay in the nine-inch compacted laterite sub-base, whose average Californian bearing ratio was four per cent and in places as low as two per cent against a design requirement of 22 per cent and a minimum soaked strength according to the original tests of 12 per cent. The explanation was twofold. Firstly, the bituminous macadam surfacing was very porous, with bad adhesion of the bitumen to the stone, due to dust. As a result, water percolated

through it, spread along the joint above the stabilized layer, penetrated through cracks in the latter and kept the laterite layer fully soaked rather than close to optimum moisture content as had been assumed. Secondly, the properties of the laterite were quite unlike those found in the design tests. The clay content was much higher so that the gravel particles were not in contact with each other and the whole was in a plastic condition. This was most likely due to the winning and compacting of the laterite breaking down the nodules and releasing the clay within. It was also possible that there was some loss of fines from the test samples that were collected in sandbags.

Two designs for reconstruction were worked and costed, one in blacktop and one in pavement quality concrete (PQC). Both were very dependent on the time to complete due to the high force maintenance costs. Planning and calculations were done in a great hurry mostly late at night and could only give a rough guide to time and hence costs. Within the probable margin of error the two schemes came out the same at about £500,000 to £550,000. After further investigations into the availability of plant and stores and taking into account that the concrete pavement might prove suitable for Britannia aircraft (over and above the original requirement), the PQC solution was chosen. The plan was to strip the existing two-inch blacktop, using the material to form a base for the incomplete apron. The sound stabilized layer (patched in a few places as necessary) was to be sealed by spraying and blinding, and have an eight-inch unreinforced concrete pavement laid upon it.

Once I had a decision on the concrete pavement plan and technical approval for it, I had the task of persuading the MOD financiers and the Treasury to agree to the necessary sum of a little over half a million pounds, a not inconsiderable amount in those days. This was not made easier by the fact that the costings were based on the assumption that approval would be given within a month; any delay would have added to the maintenance costs. In the event the approval was given just in time, and work at *Crown* continued.

Fortunately a batching and mixing plant and a Belgian laying-train were available and were moved to Thailand, and supply of materials was arranged through the Thai government by FARELF. When concreting started it was soon found that the standard rear-tipping lorries were unsatisfactory for taking the mix to the spreading train. Manoeuvring them was slow and they were liable to back into and displace the forms and rails when tipping into the spreading train. Side tippers were needed, but the procurement of these was greatly complicated by a ruling that they were "B" vehicles, not engineer plant. However, suitable Bedford chassis were bought and side-tipping bodies fitted by a specialist firm in East Anglia. Though we would happily have accepted them unpainted, the "B" vehicle procurement branch specified their special standard camouflage paint which had to be applied by a specialist firm in the west of England. Accordingly the tippers were dispatched there by British Rail and disappeared! This and other hiccups were overcome and the project continued to finish on time and just within costs at the end of 1966.

During 1966, as well as *Crown*, the discussions on criteria and the R and D work already described continued and a new subject started. This was the important one, at first called emergency repair of airfields, then rapid runway repair, airfield damage control and now airfield damage repair. It was realized that as high performance aircraft could only fly from long, smooth-surfaced runways, attacks on these posed a very serious threat, and repairs which had been acceptable in World War Two were no longer adequate. The MEXE started to work on this and a new sub-committee of the "Star and D" was set up. I also became a member of a committee set up by the Vice Quartermaster General to rationalize the holdings, maintenance and casting policy for engineer plant. This was of course by no means exclusively an airfields matter, though members had a considerable influence on requirements. It was known as the Lindsell Committee after the Brigadier Engineer Plans who chaired it; management of engineer plant was based on its recommendations for many years to come.

Other interesting events for me were liaison visits to the airfield engineering organizations in the USA and in France. In the former, I found that exactly contrary to us, the US Air Force was planning to set up its own engineers to supplement support from the US Army Corps of Engineers. Considering the lavish scale of the latter this seemed rather surprising. The US Marine Corps, of course, always had their own engineers who included airfield work in their tasks. I saw a Marine Corps short aluminium plank airstrip from which Phantom aircraft took off by catapult and landed catching an arrester wire much as on an aircraft carrier. The sight of a Phantom catching the wire just after

touchdown with throttles full open was a dramatic one! The French Air Force was supported by specialized units of the army engineers, much like the system we had just set up, though on a considerably larger scale. Surprisingly the head of this organization, though a career officer of the *Génie*, was seconded to the air force for the duration of his tour and wore blue uniform. The embarrassing thing about the visit to France was that I and the RE liaison officer who came with me were so well entertained, and given an aircraft to ourselves to travel between sites, that it was difficult to reciprocate adequately when the French came on a return visit. However we did our best.

The hand over was completed according to plan and the ACB finally disbanded. Conversion courses were run by the SME for personnel transferring. The newly formed field squadrons (airfields) started to take on works support to the RAF as had been promised. In Aden 10 Field Squadron (Airfields) lengthened and improved the runway at Beihan to take Hunters operating in support of the Aden Protectorate's border quarrel with the Yemen. When, about a year later, the Protectorate became South Yemen and the Yemen the North Yemen, the Russians took over this role with MiGs of a similar vintage. I expect they used that runway. 10 Squadron also did work at Salalah where there was trouble with dissidents, and that place has remained on our side!

The amount of airfield construction work and works support increased in 1967 as the organization settled down. Early in the year a new task appeared for the airfield engineers. The RAF adopted rotary hydraulic arrester gear (RHAG) for aircraft landing on fighter airfields. This was a machine similar to that which I had seen used by the US Marines, but much less violent in its action. An aircraft with a hook could pick up a wire supported just off the ground, pulling out heavy tapes each side of the runway which ran round blocks and then to a drum, where they revolved paddles in water, absorbing the energy and bringing the aircraft to rest. Unlike the Marine Corps version, the gear used was at the upwind end of the runway, only being picked up by an aircraft that would otherwise have overshot. Nonetheless they required strong anchorages, both for the blocks and the drums. There were two types, permanent, a MPBW responsibility (though the sappers might do the installation as works assistance) and emergency, a RE responsibility.

In the Middle East, 10 Squadron moved to Sharjah. They installed RHAG at Masirah and started on the improvement of a number of strips in the Trucial Oman and Oman State to take Argosy and Andover aircraft. In the Far East, 51 Field Squadron (Airfields) built a tactical airstrip for medium range aircraft in Malaya, I believe using PS(N), and took part in a bulk petroleum supply exercise in Singapore. At home 39 Engineer Regiment (Airfields) sent specialists to help 3 Field Squadron install a RHAG at El Adem, near Tobruk (now Al Adam, near Tubruq, on the northern coast of Libya). Works tasks undertaken by them for the RAF, included parts of a new taxiway in concrete at Brize Norton and the demolition of the old US special storage site there. Other tasks were at RAF Aldergrove, Locking and Shawbury. Airfield work was not confined to airfield units, as 15 Field Support Squadron started a 2000ft runway at Unst in the Shetlands. [See *An Airstrip Built by 15 Field Support Squadron on the Island of Unst in the Shetland Islands*, by Lt Col P F W Jackson MBE, Dec1989 *Journal*, p268.]

In September I was posted, at the end of an interesting three-year tour, and handed over a fairly busy concern to Colonel Tony Crouch.

Crashed Aircraft Recovery – Use of an Engine Test Pad to Recover a Harrier GR7

LIEUTENANT R D BURRIDGE BEng ACGI AMIEE

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The first time I appeared on orders as the duty-CAR officer I thought little of it, assuming it to be some obscure transport duty to be filed under "safely ignore." Later, I accidentally discovered it to mean crashed aircraft recovery and, hurriedly pulling the file, was alarmed to find myself responsible for the recovery of crashed military aircraft in Eastern District. "Don't worry", said the 2IC, "it'll never happen." A short time later, it did.

I was contemplating a clearance operation on the huge mountain of paperwork on my desk before it collapsed and buried me when the phone rang. An RAF Harrier GR7 was reported crashed in a field – be prepared to assist. Within minutes the crises team had sprung into action – we'd need plant, a crane, we might have to lay matting, build a road. All leave cancelled – a recce team to depart at dawn.

On arriving at the field, which turned out to be Biggleswade Aerodrome, we were surprised to discover a very much intact Harrier magnificently alone in a hanger. Having failed to find a large hole in the roof we awaited the arrival of the engineers from RAF Wittering, Wing Commander Mergher and Flight Lieutenant Hallam, with interest. It transpired that the plane, which had been performing in an air display, had suffered power failure during a vertical take-off which had forced an emergency landing. It had been in the hanger ever since.

There were two options: the first, requiring the removal of the wings, the creation of a large hole in the aerodrome fence and a low loader, seemed unattractive. The second, to repair and test *in situ* would require the construction of an engine test pad (ETP). The latter was chosen, construction to begin on the morrow.

The underlying principle of an ETP is very simple. A mat, 16m x 11.25m, is constructed of 0.3m-wide tin planking and secured with 1.22m pins driven into the ground with a hydraulic hammer. Anchor points are fixed around the perimeter and tensioned. RAF technicians then secure the Harrier to centralized anchor points, after which it attempts to take off vertically at full power. This allows any faults to be simulated and identified in a safe environment. The whole procedure is generally quite a sight, particularly on soft ground when planks have been known to fly about all over the place. After three runs the pad must be repositioned as the pins are torn, slowly, from the ground.

The primary requirement for an ETP is a level site, and this was identified some 50m from the

Lt R D Burridge
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main grass runway. With permission from the local village council and the aerodrome manager, construction began.

An investigation revealed the underlying soil to be clay, the top layer of which (0.2m) was baked hard by the uncharacteristically hot weather. As aerodromes have many underlying cables, a line clearance was essential before pins could be hammered into the ground. It was also essential to position the aircraft to minimize the noise signature, as the test was predicted to generate in excess of 120 decibels. A heavy lorry puts out about 85 decibels, and 120 would probably cause permanent hearing loss if ears were unprotected. A permanent surface scorch mark would probably be produced to a distance of 15m to the rear of the pad and the danger of debris, particularly tin planks, being thrown some distance on partial failure of the ETP was very real. To minimize the foreign object damage hazard, a teram[1] layer was extended beneath and beyond the area around the engine intakes to reduce the amount of material which could be drawn into them.

The next morning the Harrier was towed out to the site and secured by the RAF technicians. With the arrival of the engineering officers from RAF Wittering the equipment to monitor the on-board control systems electronically was connected, the engine fired and the test began. Power was incrementally built up to 100 per cent with the exhaust nozzles at 90 degrees to the horizontal. The condition of the ETP was closely monitored. With no significant lift observed the nozzles were rotated to 30 degrees to the horizontal and the test continued. At full power a standing harmonic was generated in the metal surface – the rear third of the metal pad rising so that, in profile, it subscribed the classic sinusoidal wave.

Use of a hydraulic hammer to fix retaining pins into hard clay.

On completion of the test the technicians began work to isolate the fault and, after a period for cooling, an inspection of the pad was conducted. A number of pins rear of the exhaust were found to have risen a maximum of 5cm proud of the tin but all primary anchor pins remained in place and the pad was otherwise secure. Most of the geofabric rear of the pad had been charred and ripped apart, an indication of the force and heat produced.

The pad weathered the test successfully, damage being well within expectations – it is common for whole planks to be ripped away when engines are tested at full power, which they rarely are. The success can, in part, be attributed to the ideal soil

Rear detail of Harrier correctly anchored and ready for testing.

[1]Teram is a geotextile, which is an artificial material, in the form of a woven or continuous sheet, used in combination with soil or rock in civil engineering, landscaping etc.

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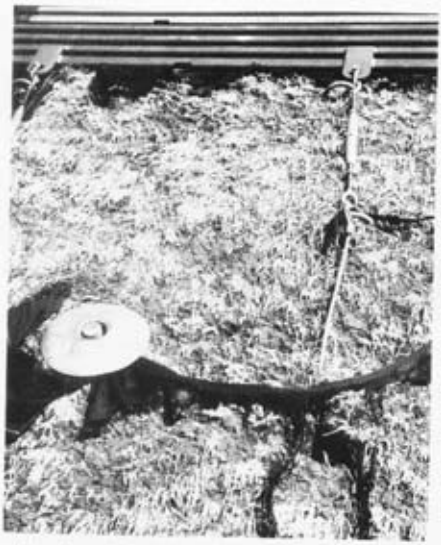

Rip and tear of the fabric on the rear anchorages after the first test, disclosing earth where grass has been burnt away. The fabric is a thermoset ie after formation it is incapable of melting and burns (or chars) at high temperature.

conditions. It is interesting to note that, whilst the engine nozzles were heavily blackened the tin, against all predictions, was almost unstained and simply required wiping off.

After five hours the technicians managed to isolate and replace a control module. The test pilot, Squadron Leader Mike Young, arrived from RAF Wittering to carry out a confirmatory test which was conducted at a lower power and judged satisfactory. The Harrier was towed out to the main runway and stripping out of the ETP began.

The temperature had reached 90 degrees as the troop began to extract the 120 pins anchored deeply into the ground. Midway through this task the Harrier took off, using the short grass runway to best effect, rewarding the tired sappers with a victory roll. Two hours later the strip was complete, the only visible damage was a 3m x 5m scar of scorched earth and the 12 anchor point holes, to be filled and compacted later.

Whilst it is anticipated that ETPs will be used widely in an RE support to the RAF operational scenario (battle damage repair etc) it is rarely possible to obtain aircraft for training in peacetime. It is, in fact, debatable whether a £25m aircraft should be used in what is quite a hazardous procedure unless, as in this case, it is strictly necessary. Much existing data on ETP performance was generated by the Harrier presence in BAOR, where ETPs often failed because of the weak, sandy soil characteristic generally encountered there.

The success of this task is satisfying, and demonstrates the readiness of Royal Engineers to support the RAF Harrier fleet at short notice.

50th Anniversary Articles

The Editor of the *Journal* would be pleased to receive articles from anyone who took part in projects during the aftermath of WW2, or have something interesting to relate of happenings during the year of 1947, with a view to their publication on or near to the 50th anniversary of the event. Accounts of later events are also welcome as they can be kept for publication in the appropriate issue.

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The Three "Rs"

MAJOR ANDREW WILLIS TD BSc(H), MSc CEng FIMM MIQA AMICE

After the Territorial Army Command and Staff Course, staff and training appointments in '49 and the ill-fated 54 Brigades; and in between bouts of Territorial Army Commissions Board assessing, National Employers' Liaison Committee and Territorial Army Volunteer Reserve Association activity, Andrew Willis owes primary allegiance to Military Works Force (Volunteers) as officer commanding 518 Specialist Team Royal Engineers (Construction). He continues here his (very occasional) contributions on the Territorial Army – last musing on Motivation and the TA Sapper *in the* RE Journal *in 1992. His "day job" is with a civil engineering consultancy.*

Definitions

No, not "Reading, 'Riting and 'Rithmetic", although a passing familiarity with at least one of these is conventionally regarded as useful for a sapper officer. For although there is something comforting in the simplicity of the Victorian notion of the Three Rs, which they saw as the morality pathway to virtue and success, my mind turns to those which obsess us in the Corps today, particularly in the RE TA.

Recruiting, Retention and, well, that's the point, what ought the third to be? Considering the histories of my current and previous subunit commands perhaps "Reorganization" should be an appropriate choice, or even "Recycling", maybe even "Resurgence".

On the other hand, perhaps "Relevance" ought to be the word. If we fail in our endeavours to identify clearly our relevance in the modern-day world, both to the "boys" (nothing sexist, I assure you) and their/our employers – civilian and military – our task of recruiting and retention will become if not impossible, barely worth the ticket. Forget about the quality of soldiers, the skills and expertise promised as a result of real world contrivances such as agency training, there simply will not be the critical mass of bodies present to make any of it commercially effective. But, still, has that not always been the case? Let us look at some likely "Rs", having first considered the situation.

Situation

As I toy with that amazingly constructed and exhaustively thought out little desktop flip chart with which I was issued as a resurrected troopie, I gaze in awe at the "matrix of individual responsibilities". Diligent attention to the 34 prime and 50 associate responsibilities delegated to my OC within the action priorities arising from the 19 policies subordinate to the three objectives would, we were convinced, go a long way to ensuring we would recruit, and retain. I was never quite sure, as later an OC myself, just where I was expected to get the time to implement all of this good stuff; noting with some satisfaction that the CO's prime responsibilities numbered an even larger 44.

We thought we had identified the problem, quantified it, and put the action plan into place. Despite the increasing bite of Thatcherism, there still was the Third Shock Army, poised beyond the Wall, ready to throw us an invitation to a "come-as-you-are" party at rather less than 30 days' notice. So our priorities were more importantly focused – and real. But then incredibly, the Wall fell down. The Warsaw

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Pact disintegrated into the component parts of what had all along been the Russian Empire anyway. Most of the components seemed intent on embracing capitalism. And before we knew what was happening there was the prospect of a live Warsaw Pact Motor Rifle Demonstration Division, skilled in ROWEN (Rest of the World Enemy) tactics, ready to supplement our Brigade and Battle Group Trainer for only the cost of the air tickets.

"Peace dividend" became the cry. Reorganization in the face of inevitable financial realities for a somewhat recession-hampered Western democratic economy gathered pace into an alphabet of options. Almost out of letters, a direction change was forced, but only slightly, by events in the Middle East, into considering the Front Line First. (As a soldier I would naturally warm to that concept.) So instead of being "task oriented" and centred on the reassuringly monolithic, static and tax free BAOR, we now became "capability-based". As a reaction to a government engaged in domestic "realpolitik" (and I apply Bismarck's less than sympathetic definition unreservedly), the Army has been realistic and effective. Pound-for-pound, in any Treasury's reckoning, we pack a better tactical and operational punch than perhaps we ever have before.

I do harbour a sneaking suspicion that the adoption of "capability based" as a battle winning (vote attracting) cry is often an attempt to disguise the fact that a capability base on its own is a fallacy. What you are attempting to do is sift through a bewilderingly large range of threat (remember the word?) possibilities to determine that for which you may devise a counter for which you are prepared to pay. A threat remains a threat no matter how you may euphemistically try to define risk of its not happening. So with us, the Corps, the RE TA, as within society at large, with life in all its aspects, there is a lack of certainty. Attempting to establish a successful programme for recruiting and retention has become, therefore, no simpler.

Establishing Relevance

It never does any harm to throw statistics about. For instance, the 1997 manpower target for the army is about 102,000. The Corps' regular strength sits currently at a shade under 9000. RE TA numbers are in the region of 5500, representing about 38 per cent of the Corps. The proportion of "RE to the rest" is at about the historical norm. Wherever the army is located there will be an engineer presence. The Falklands, Cyprus, Hong Kong. Operational deployments of late have included Rwanda and Angola (which hardly qualify as sunshine tours), and Northern Ireland (almost 30 years of that). And often an RE presence may be the only manifestation of a British army presence. We all know about that, and the public at large know about Bosnia (you'd have to be blind and deaf to miss it). The sight of UN berets is strikingly emotive; however, their effect on public perception, although immediately powerful, is perhaps short-lived.

So what? Along with other examples of today's buzz words and phrases such as "boring" and "past its sell-by date", comes "irrelevant". Ask any five of the lay public what "relevance" means and you'll get six definitions. A conclusion that something may lack it, as often as not indicates a shortcoming on the part of the observer who won't make the effort to see and understand what's in front of him. But if the presentation itself is obscure, ill-defined, and lacking conviction, the recipient has a more than adequate excuse for condemnation.

Thus in establishing relevance – the relevance of the army, the Corps, and the TA – we should be very careful of the message we try to put across. For a quarter of a century the TA at least has suffered from a distinct lack of uniformed profile on the streets. The government's more local peace dividend resulting from the "cease fire" in Northern Ireland looked likely to remove at least that impediment. But in most other respects, extent of knowledge of the TA by the public at large is thin, absent, or probably incorrect. It was more than a little disturbing to learn recently, analysing the feedback from a group of civilian employers asked to comment on the (what I consider to be stunningly presented) series of television adverts inviting people to phone the number, that most of them had not made the "connection". They appeared still to be unaware that the presentations were not a means for stating the self-evident case of the soldier's excellence, commitment and professionalism. They were not, it seems, aware that the advertisements are part of a recruiting campaign to counter the loss of men to the colours.

Putting my "NELC person" hat on for a while, I have frequently been asked to provide a commentary on what the TA is all about. One would think that as a committed TA soldier (and I'm often told I should be) it would be no complicated task. In

fact that is not the case. Quite often, as an employer, I feel as if I am acting more as an apologist than evangelist. No matter what the means for upping the profile (and executive stretch is perhaps the best example) I am still left with the need to answer the question, "What will the TA do to benefit me?" Be it the employee, or the employer paying for his staff member to go on two-weeks' training. If I find myself tempted to say, once again, that it will certainly enhance his/her management skills, etc, etc, I should slash my wrists on the spot. It really isn't specific enough. If, as well, I am faced with the question, "How will the Reserve Forces Act affect me?" with all of the negative undertones, I shall probably stand expressionless at best. More likely there will be a hint of impending bowel disorder reflected in my eyes, the sherry glass shaking in my hand. I avoid the subject, using the stock phrase of the outrageously arrogant of my profession (civil engineering) that "you've actually asked the wrong question", or address the truth: which is what?

For a long time it was true that skills enhancement gained for the employer through his employee's TA service was a positive effect. Can that truly be said today? Across the complete range, from artisan to advanced communication and managerial skills, the army is not necessarily ahead of its industrial counterpart. If one considers the ethereal stuff of "leadership", then it may be true that some of the most effective (and expensive) abstract and eclectic management team-oriented training courses available to your average conglomerate, are a pretty pale reflection of the highest standard similarly-constituted courses the army runs as a matter of course. But with the best will in the world, that is an arena in which the larger company will be operating for its senior managers (and TA officers). It is not going to be of prime relevance to the bulk of UK industry. It is the "30 per cent" turnover at sapper level on which we need to focus more earnestly.

A concern held by employers, and not one based on pure cynicism, is that the army, the TA, needs the skills from civilian employees, beyond those traditionally needed for the teeth arms, for which it cannot afford to pay. After all, isn't that what front line first is all about? Again, nothing in this for an employer who has to balance an absence of a valued (cost item) employee, maybe even paying for leave for camp, selflessly serving Queen and country, against his need to operate with tighter profit margins and other pressures.

The need for weekend work, the need for optimum manning at the workplace, competition from working wives for "off duty" domestic time, and the comparatively low rates of pay, do nothing to promote an employee standing up for his rights in contest with an unsympathetic employer. The student-soldier who needs the money and is not penalised by the benefit system, is arguably the only real case of TA pay acting as an incentive. The Bett Report is being absorbed by the services as we speak. And although some of its implications – which might make positive noises in regard to bringing service pay closer to the market rate for comparative skills – are promising, it will be a long time before any effect is registered by the TA. There has, of course, been good news for TA soldiers otherwise unemployed who will not now be so penalised under the new Jobseeker's Allowance. Simply, the money is not what motivates.

The world today is in many ways so much less stable, or perhaps the disappearance of the third shock army has simply removed the excuse to ignore the other dangers on the planet. Consider the Spratly Islands (situated in the South China Sea between Brunei and South Vietnam) the immense proportion of North Korea's GDP spent on its armed forces, the Arab-Israeli impasse, Chechnya. These perils present strategic managers with a dilemma. Being forced more than ever to concentrate on planning for God-knows-what contingency, and building a capability base to cope with it, the main effort has of necessity been to optimise training. The senior management are regular, not unaware of the TA and its vital role, but focused on training for what they've got to handle: which are the foreseen problems. Rather lower, on an already seismically alarming priority scale, is the relevance of the TA sapper's training to his civilian employer. It is good to know, however, that the convocation of TA colonels has centrally on its agenda the options available for the way ahead.

Colonel Pagan has experience of an initiative, taken in the Scottish Division a few years ago, which gave every infantryman recruit, on completion of basic training, eight vocational qualifications. Not of a particularly high level, granted, but ranging from first aid through instructional techniques, hygiene, to health and safety, they were directly "transferable" to civilian application. However, although all TA soldiers' training includes a lot for which there is civilian recognition, the cost of obtaining formal recognition, and transferability, is a problem still to be overcome. He describes how the ACF (Army

Cadet Force) in East Anglia "marketed" a scheme in which employers are shown what can be expected of cadets, year-by-year, as they pursue their ACF careers. A particular further education college has a two-year course leading to a diploma in public service. Membership of that course is dependant, inter alia, on joining an associated detachment.

To be negative for an instant, however. The ACF, comprising in the main a younger and less domestically encumbered age group, and being possibly less remote or removed from an academic environment, are atypical in comparison with "Group A[1]". Nevertheless, the ACF do provide innovative examples of what may be accomplished. In any event it becomes important that alternatives to the traditional training weekend be considered, and made more readily available. This would be facilitated particularly through the use of distance learning packages, perhaps. In the same way that we will be seeking to use and employ the TA more flexibly, so their training should become more flexibly programmed. This should make the TA more of a pervasive extension to the soldier's day job (quite like the Open University), rather than a complete contrast to it. The traditional 15-day camp, perhaps also could be critically examined. Before howls of criticism ring too loud – it is intended that the formal teaching and individual skills training of soldiers may find a more time efficient framework in this manner. As a sub-unit, the collective training must obviously be centred on weekends and camp.

Having grasped that the implementation of some change is essential, significant thought must be given to the new message to be got across. The current advertising effort alluded to above, as it exists across the whole range of media, with a large measure of geographical emphasis, is tending to be competitive rather than unified. Again, the competitive spirit, which local allegiances promote, and which are to be valued in a TA soldier, must to a certain extent be harnessed by senior leadership toward a wider aim.

Enthusiasm, quickness and willingness to learn, adaptability, continuity, the "different approach", are the undoubted strengths of the TA. They will still be, provided some unforeseen apocalyptically inept management does not destroy them, after you get your recruits across the threshold and attested. But without that leadership, and in a realistic and commercially aware framework, not a lot is going to get done further towards the sharp end. With all the pressures on the OC currently, the last thing he is going to welcome is another list of 30 for prime and 50 associate responsibilities. Information fatigue syndrome will set in quickly.

[1]Group A: serving Territorial Army officers and soldiers.

Recycling

One of the aspects of TA service which has an emotively effective appeal to soldiers (and all the more effective because it isn't cynical but real though intangible) is the unit's history. It is the recycling almost, over generations, and through social and political change, of that common experience of service and comradeship which appeals to the sense of desire for continuity felt by many.

The lineage of the squadrons and specialist teams comprising the RE TA are complex. The two with which I have most recently served illustrate the point.

518 STRE (Construction) (V) was officially formed in October 1995, and is part of 67 CRE (MWF (V)). During the Second World War, 518 Field Company was a topographic survey unit. Formed, or reformed, after Dunkirk, it served in North Africa and Italy, and was disbanded in 1946. Prior to that its history is a little uncertain, although it was in existence in 1939. But whether it was part of 56 (London) Division (previously 1 Division prior to early 1940) is not too clear. Doubtless someone out there has an intimate recollection of that past.

It is clear that in the First World War, from its renumbering from 4 Field Company, 518 Field Company was part of 47 London Division and served in France from March 1915. Battle experience included Loos, Vimy Ridge, The Somme, Messines, Ypres and Cambrai. Before the outbreak of war, 4 Field Company was part of divisional engineers to 2nd London Division, formed as part of the Territorial Force in 1908. To complete the genealogy: the predecessor of these gallant sappers was the 1st Middlesex Volunteer Engineers. Raised in January 1860, these volunteers endowed their descendants with the honour of being part of the senior Territorial Royal Engineer Regiment.

I note that the "well drillers", that redoubtable body of enthusiasts I was supposed to be commanding and came to know so well in my ESP (Engineer Specialist Pool) days, have now been numbered 520 STRE (V). 520 Field Company was a sister (or is it brother?) to 518 in 47 Division in 1917.

218 Field Sqn (ADR) was formed at "the Beach" in 1984/85 and became allocated to RAF Honington. The elision of dates is due to the amalgamation in 1993 of 212 and 218 Squadrons, both ADR and part of the response to the Warsaw Pact threat to home defence airfields. 218 is now at Brize Norton, and it too is part of the newly configured air support group which now includes 518.

218's incarnation in support of force projection was preceded by almost 30 years "off the books" after the disbandment of 218 Field Company in 1956. Before that, since its formation as part of the Bethnal Green Volunteers in 1793, the company went through at least two other disbandments and merging of genealogies subsequent to the formation of the territorial force in 1908. The pinnacle of the company's historical range in the First World War was the award of two VCs (to a surviving sapper and the OC) in the last week of the war; within seven days of the Armistice – the "last big push".

This continuity, and personification of the volunteer spirit (exemplified by the 50 annual 218 Old Comrades Association (OCA) reunions since 1946) was recently acknowledged by a letter from the EinC to the OCA. As one of its latest OCs I was acutely aware of the ghosts of at least 50 others standing behind me, when I was privileged to attend a reunion evening. Whilst researching my squadron/team histories the RE Museum expressed a plaintive wish that more of us spend a little time researching and recording. The value of the continuity of unit identity is well understood in some quarters.

Resurgence

I DETECT a certain cunning on the part of some who sit at EinC and beyond. There's method in their madness; and this triggers more statistics. At the end of the Second World War the strength of the Corps stood at 280,000; more than twice the size of the entire army today. Those charged with keeping the Corps' books have carefully seen to it that all our recycled numbers have been reissued to the host of sub-units; ready against the prospect that we will one day inevitably expand. An accountant's cadreisation – very clever; and obviously based on the lessons of history.

Requiem

To conclude. Precious few answers – lots of suggestions; and once again challenges are presented to us. More dire challenges than perhaps we have faced before, to increase the depth in which we are already knee deep. In a society for which the bottom line appears to be the prime consideration, for which cost is everything and value has no meaning, the challenge is one of relevance. If this "R" is not met, then the first two will be absent.

The Role of EOD Teams in Bosnia

CAPTAIN KATE JACKSON MA(H)

Captain Kate Jackson graduated from Cambridge University and attended Royal Military Academy Sandhurst commissioning course 931. After a six-month attachment with 32 Engineer Regiment she attended Royal Engineers Troop Commanders Course 112 and qualified as a bomb disposal officer in March 1995.

A posting to 33 Engineer Regiment (Explosive Ordnance Disposal) as 3 Troop Commander, 49 Field Squadron saw deployment on Operation Cornelius, *a chemical weapons task, and as a team commander on Operation* Resolute 1.

She is a keen runner, swimmer and enjoys mountain biking, climbing and mountaineering. She has represented the Army at rowing.

Captain Jackson will shortly spend six months commanding the Joint Service EOD Detachment in the Falkland Islands.

On 12 January 1996, the squadron headquarters (SHQ) and three teams from 3 Troop 49 Field Squadron (EOD) deployed to Bosnia on Operation *Resolute 1* to complete the full orbat of six EOD teams in theatre. Initially based at Gornji Vakuf and later at Banja Luka, the deployment of a field squadron (EOD) SHQ was a new concept. During Operation *Grapple* the EOD detachment was commanded by the senior troop commander, himself an EOD team commander, but with Operation *Resolute* the command switched to a 14-strong slice of SHQ and echelon. The SHQ had to establish itself and prove its worth to those who had operated quite efficiently without any EOD top cover. It soon became apparent that with six teams in theatre and the increased mobility of IFOR troops, SHQ needed to collect, decipher and disseminate the multitude of tasks generated by the large IFOR presence. Also, a substantial echelon support was required to oversee the large amount of EOD equipment and vehicles brought with the squadron to cover any eventuality from the immunization of 500kg bombs to the disposal of chemical weapons.

By the end of January, teams had been deployed throughout Multinational Division South West (MND SW), with 2 Troop supporting 2 Canadian Multinational Brigade and 3 Troop supporting 4 (UK) Armoured Brigade later replaced by 1 (UK) Mechanized Brigade (1 (UK) Mech Bde). Within this the teams also provided a divisional quick reaction team and divisional reserve EOD team.

The nature of tasks depended on the location of the team and their tasking authority. For example, tasks in the Canadian area tended to concentrate on route clearance and opening, whereas most routes in the British brigade's area of operation were already open. However, the British brigade's area of operation had been the scene of some of the fiercest fighting and a significant amount of unexploded or unused ordnance was found lying around on the verges and in IFOR bases; here many of 3 Troop's initial tasks involved recovery of unexploded ordnance (UXO).

Tasks fell into seven categories:

- Quick reaction team (QRT).
- Route clearance.
- Area clearance.
- Building clearance.
- UXO recovery and destruction.
- Monitoring of minefield marking and clearance (MMM and MMC).
- Mines awareness training (MAT).

Quick Reaction Team

The QRT was manned by teams in rotation, on 30 minutes notice-to-move, and prepared for

Capt Kate Jackson
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either vehicle or heliborne deployment anywhere in the MND SW area. The team was deployed only in an emergency, or life-threatening situation and fortunately was not deployed very often. In late January it was tasked to the tragic accident involving a Spartan which had tracked a TMRP-6 mine, killing the three occupants. The EOD team worked long into the night, in inclement weather, to clear a route to the vehicle which was on fire. Regrettably no survivors were found in the carnage. The professionalism, courage and competence of the men involved in the operation were widely praised.

Russian Frog 7 rocket and launcher.

Route Clearance

In order to increase the effectiveness and mobility of IFOR, it was recommended that all new, non-metalled routes were EOD-cleared prior to use. Route clearance is time consuming and threat assessment was used to determine the type of search required. Mine indicators such as packaging left lying about, locally-made mine signs, a lack of civilians or livestock in the area, and local knowledge, was used in conjunction with the type and state of the track. A planning figure (for a single track lane) of 2km per hour per team of one officer and three men in two Landrovers, was used.

Area Clearance

Whenever possible deploying units chose a hard-standing location, but when this was not possible an EOD team was tasked with the clearance of a large area. A planning figure of two hours per team (one officer and three men in two landrovers) was used for the clearance of an area the size of a football pitch, using instrument search. No unnecessary risks were taken, and any indication of mines resulted in a recommendation to select an alternative site. Sometimes this was not possible, for example during bridge site clearance. Fortunately, many bridge demolitions carried out by the FWF (former warring factions) were hastily done and as a result the mining of abutments was not common. A large number of landing sites were cleared for helicopters. An ongoing project involves the clearance of gun and mortar positions, observation posts, tank lanes and small arms field firing areas in a region near Glamoc. The clearance of these areas is vital for in-theatre live-fire training.

Building Clearance

Prior to the return of civilians into the area of transfer known as the "anvil", most buildings had either been destroyed by fighting, by fire or had been looted. Those remaining in a habitable state had usually been occupied by the factions. In all cases there existed the threat of booby traps and unexploded ordnance. All buildings intended for use by IFOR, and some of those used by organizations such as the UN High Commissioner for Refugees, were searched by EOD teams. Many items of ordnance in various states were found, but no booby traps. One particular incident relates to a suspected booby trap in a Mrkonjic Grad house. The item was constructed from an empty grenade case with a finely hollowed 7.62mm round protruding from one side. On the top of the object there appeared to be a screw thread detonator. The object was pulled from a safe distance and examined: it was found to be a carefully constructed "bong" or drugs smoking pipe!

Other Clearance

It is often forgotten that items of UXO are as dangerous as mines, and many lives and limbs have been lost due to their being handled. Recently a child lost an arm whilst investigating a 64mm antitank weapon, another lost a leg playing with a KB-1 bomblet, described by locals as "little yellow bells". Another incident involved two civilian workers killed after one hit

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FWF soldier lifting antipersonnel mine

a mortar with a pick whilst clearing out a gutter in the centre of Gornji Vakuf, just metres from a main supply route.

The discovery of UXO was constant and steady. Items were often found on roadsides placed there by locals who had recovered them from their houses or land. This was a result of the IFOR policy of dealing only with items threatening IFOR lives. To combat this problem MND SW authorized the clearance of UXO that was an immediate threat to civilian life. Units discovering UXO reported the find and marked the item; unfortunately items thus marked became more apparent to inquisitive passers-by, including other units, civilians and especially children, and often items disappeared before an EOD team could investigate them.

Monitoring of Minefield Marking and Clearance

Monitoring the clearance of minefields is required under the Dayton Agreement, and in accordance with this all minefields had to be marked or cleared by D+30 (19 January). Strict regulations were enforced to ensure the safety of our teams whilst carrying out monitoring, a minimum safety distance of 50m being maintained between the monitors and FWF clearance teams searching for mines. The process enabled an up-to-date record of the minefields to be drawn up, but depended upon the willingness of the FWF to participate. FWF benefited from the joint operation in two ways, however: firstly the provision of IFOR medical cover, and secondly through explosives resupply through the supply of explosive charges used for destroying mines. Relationships with the FWF were on the whole very good. All factions cooperated with the clearance of their own minefields before the D+30 deadline, but after this date minefield clearance lost some momentum due to:

- Heavy snow cover.
- The demobilization of FWF troops, and their return to cantonments.
- The need to locate further minefield traces.
- The delay in the provision of protective equipment and mine detectors that had been promised to the factions by the European Union.

The protective equipment and mine detectors were finally supplied in June and clearance work began to progress well, particularly in the Vitez, Bugonjo, and Livno areas.

Mine maps are updated showing the location of minefields still in position and those believed to have been cleared.*

Mines Awareness Training

Mines awareness training (MAT) was carried out in theatre by EOD or dedicated mines awareness teams. The audiences for MAT were varied, but included IFOR units, visiting military and civilian personnel, non-government organizations, school teachers and children. All IFOR personnel arriving in theatre at Banja Luka and Split receive a mines awareness brief from an EOD officer or SNCO.

Mines awareness training is undoubtedly very successful. The evidence for this comes from talking to soldiers on the ground and from the nature of taskings received by EOD teams. Fewer UXO sightings were received from remote locations, indicating that patrols were staying on recognized patrol routes. More tasks for helicopter landing sites and patrol route clearance were requested

*Further information on mined area analysis can be seen in the article written by Captain D H T C-G Johnson Poensgen, printed elsewhere in this *Journal* under the title: *Operation Resolute — Observations from a Summer Tour in Bosnia 1996*.

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indicating that commanders were unwilling to send their men into uncleared areas.

Unfortunately, however, deaths and injuries from mine strikes are still occurring. Statistics collated for the period D-Day to 30 April 1996 are listed below:

	Dead	Serious	Minor	Total
IFOR	9	16	31	56
BiH*	2	3	1	6
VRS*	2	4	2	8
HVO*	3	1	10	14
Civilians*	12	8	20	40
Totals	28	32	64	124

*Only those reported to IFOR

EOD Intelligence and Knowledge

There is no substitute for experience when carrying out an EOD task, and with the vast number of tasks executed by the teams, experience was gained quickly. A knowledge of the area, including a sound understanding of the battlefields, was important when assessing the likely threat. EOD team commanders took every opportunity to improve their knowledge by talking to the factions, locals, and IFOR units based in an area. Battle group engineers were an invaluable source of information, as they had close contact with the FWF while coordinating minefield clearance.

The amount of ordnance encountered in theatre was vast and it was often necessary for the BDO to make a rapid assessment of an item. A number of publications were useful in the initial recognition and assessment process. These were:

- "EOD Bosnia RSP (Render Safe Procedure) Handbook" – Produced by the Intelligence Cell 33 Engineer Regiment (EOD).
- "Defence Recognition Journal" – Former Yugoslavia Air & Ground Forces Special Edition.
- Janes Defence publications.

Conclusions

The knowledge and experience gained by all members of the EOD teams was invaluable. Nowhere else in the world offers so much in variety and "hands on" experience. Items from 500kg air-dropped bombs to unexploded hand grenades, from surface to air missiles to mines were dealt with.

The squadron rouled with 21 Field Squadron (EOD) in July, in time for a well earned summer break. If NATO remains in Bosnia, many members of the squadron are likely to return for second or third tours. We already have volunteers.

Memoirs

COLONEL R R L HARRADINE

Born 6 April 1913, died 25 September 1995, aged 82.

RODERICK Robert Lloyd Harradine was commissioned into the RE TA before the Second World War and obtained a regular commission in 1939. After his YO course he served in 287 Field Company which, in October 1941, embarked for Malaya. Arriving just after Christmas, the company was quickly involved in operations in Johore Bahru and later in Singapore, until Singapore's fall in mid-February 1942. Roddy was one of a small party which escaped to Sumatra (in one of the few small craft that succeeded in evading enemy attention in the perilous sea crossing,) and thence to Ceylon, to the joy of his family who had by then received a telegram that he was missing, presumed dead.

Roddy Harradine then joined King George V's Own Bengal Sappers and Miners at Roorkee, India, where he was first a training officer and subsequently Adjutant of 2 Training Battalion. After attending a War Course at the Staff College, Quetta, he went back to operations and commanded 77 Indian Field Company in Arakan. He took part in the Kohima battle and the subsequent advance into Burma. The history of the 7th Indian Division (*Golden Arrow* by Brigadier M R Roberts, DSO) gives a graphic account of the 11 May attack on Jail Hill and the DIS Ridge at Kohima for which 77 Company provided a bunker-destroying party of one officer and seven sappers with each of the leading companies and had the "hazardous task of clearing the anti-tank minefield in the cutting between DIS Ridge and Jail Hill... when both hills were being shared between the 33rd Brigade and the enemy."

Just before the cessation of hostilities in Burma, Harradine was sent to the UK to attend the RAF Staff College course at Gerrards Cross from which he returned to Burma, joining HQ 33 Indian Corps Troops whose main task was to restore communications in the Northern Shan States. He returned to the UK in 1946.

A variety of staff and regimental appointments then followed: on the staff, in the War Office, at HQ Western Command and the Joint Intelligence Bureau, Middle East; regimentally as Second-in-Command 23 Field Engineer regiment in BAOR (the redoubtable Arthur Morris was CRE. As TGG put it, "Roddy survived – many didn't"); in command of 25 Field Engineer Regiment; as CRE 3rd Division and as Chief Instructor of the Field Engineer School at Chatham. His last job was as Director of Public Relations, HQ Far East Command in Singapore.

For five years after his retirement from the Army in 1964 Colonel Roddy Harradine was engaged as a technical author at Chatham and later as editor. In 1967, the Royal Engineers Old Comrades Association and the Royal Engineers Benevolent Fund amalgamated to form the Royal Engineers Association carrying out the combined functions of the two predecessors; Roddy Harradine became Honorary Treasurer of the Association and in July 1970 was appointed its first Controller, remaining in that post for ten years. During that time he oversaw the development of the infant organization into today's well-established form bringing to the REA those same qualities he displayed during his service: a great sense of loyalty to colleagues, friends and the Corps and an enthusiasm and sense

Col R R L Harradine p276

of fun. The Corps owes much to him for the hard work and vision which he applied to his stewardship. An indefatigable visitor to branches, he always found a warm welcome awaiting him.

Roddy Harradine is survived by his widow, Doreen, whom he married in 1939, and a daughter, son, four grandchildren and two great-grandchildren.

CFC GSH ERBH TGG

COLONEL C S V COOKE MC

Born 16 March 1898, died 14 May 1996, aged 98.

COLONEL Charles Cooke was awarded the MC in the Ypres Salient in 1917, for outstanding bravery while in command of No 1 Section 237 Field Company, who were working in extremely hazardous conditions at night, clearing minefields and relaying fresh ones. He was gassed by mustard gas during this work but recovered well.

In 1988, when Cooke was presented to the Princess Royal at the opening of a residential home, Hoyle Court, he was asked about his MC. He replied that it was for clearing minefields because he had been too young to know any better. She was very amused.

Charles Stanley Vernon Cooke was born on 16 March 1898 in India and was educated at Bedford and Woolwich. He was commissioned into the Royal Engineers in 1916 and after further training at the School of Military Engineering, was posted to 237 Field Company.

After the war, Cooke went to Clare College, Cambridge, and read engineering. A course with Ordnance Survey at Southampton followed, after which he was sent to Nigeria to assist in the preparation of a new map of the country. The project took three and a half years.

From 1931 to 1935 he was in the Channel Islands as OC Royal Engineers, and then went to India, joining the Bombay Sappers and Miners.

In 1942, by then a lieutenant colonel, Cooke was posted to Ahwaz, Persia, as one of the RE commanders handling the massive build-up of supplies to Russia. Most of the Aid to Russia programme was in American hands by April 1943 and, with British concern then focusing on Burma, Cooke returned to India as CRE Madras, covering the area between Bombay and Madras. In 1944 he was posted back to Britain, and two years later was appointed CRE Malta.

In 1949 Cooke resigned his commission and promptly obtained a post with the National Coal Board as restoration officer of open-cast coal sites, based at Sheffield to cover sites in Yorkshire.

He married in 1933 during his time in the Channel Islands. His wife died in 1964, just before his retirement from the National Coal Board the following year. They had a son and two daughters and were a close-knit family. He then went to live in Bakewell, but retirement meant active work for Bakewell church and the British Legion, productive gardening, worldwide travel and genealogy, and keeping up with his family who, by the time of his death, included eight grandchildren and fourteen great grandchildren.

In his younger days he had been a keen rugby player and represented Cambridge University and the Army, won many prizes for revolver shooting, and was an enthusiastic tennis player and cricketer.

GWAN

Col C S V Cooke MC p277

COLONEL F H FOSTER DSO OBE TD DL

Born 6 February 1904, died 30 March 1995, aged 91.

FRANCIS Harold Foster, who was always known as John, was an architect by profession and soldier by vocation and had the distinction of being the only Territorial to command 1st Division Engineers, which he did from 1942 to 1945 throughout some of the hottest campaigns of the war.

John Foster, son of a Sussex Volunteer Sapper, was commissioned into the Territorial Army in 1924 after an upbringing during which he showed enthusiasm and talent for soldiering. Later in life he wrote his reminiscences in a book entitled "Recollections of an Amateur Sapper", a copy of which is lodged in the Royal Engineers Library. From these recollections it is clear that his early life in the TA contained so much soldiering, drill days, annual camps and both training and induction to the Corps at Chatham, that it is a wonder he ever managed time to practice as an architect. In 1935 he took command of 210 Field Company as a captain but was promoted the next year. By annual camp in 1939, with war in the offing, 210 Company was over 500 strong. They duly mobilized and set off for the BEF in France in April 1940. They took part in the hectic days of retreat across the rivers of Belgium and northern France where demolitions were the order of the day, and were finally evacuated from Dunkirk. Two of John Foster's *Journal* articles (August and December 1990) cover this period.

In March 1941 Foster was promoted lieutenant colonel and posted as CRE IV Corps Troops responsible for anti-invasion measures in Sussex and Surrey but by 1942 he had joined 1st Division as CRE and was to remain with them for the rest of the war. After nearly a year of training and operational planning, the division finally deployed to North Africa, embarking in January 1943. The division fought across North Africa until the German surrender in May. On 11 June they captured Pantelleria, an essential part of the Allied plan to capture Sicily. John Foster recorded the story, which is not mentioned in *Corps History*, in the March 1980 RE *Journal*.

Italy was to be the next stop and they deployed there to take part in the Anzio landings in January 1944. For his work at Anzio he was awarded the OBE. Mine clearing and road improvement, and later minelaying, became priority tasks until the breakout. Thereafter what Foster called a "bridging extravaganza", during which he won an immediate DSO in the field, and a tough campaign in the mountains, brought the division's work in Italy to a close and they were dispatched to Palestine on internal security duties early in 1945. By May Foster was on his way home.

After the war John Foster returned to his practice as an architect but, although he had sworn to "soldier no more" he was unable to resist the offer to form the new 44th Division Engineers. In 1950 he was appointed Honorary Colonel of 119 Field Engineer Regiment TA, an appointment he held until March 1967 when the regiment was disbanded. He was promoted full colonel in 1951 and accepted the busy job of County Cadet Commandant Sussex ACF in December 1959. Even after he retired from that he continued to serve the Corps and the Army in every way he could. He was a staunch REA supporter and maintained his contacts with the association for the rest of his life.

John Foster's first wife died in 1961 and he is survived by his wife, Gwen, whom he married in 1963.

BNW LJM GWAN WB

Col F H Foster OBE TD DL p278

LIEUT COLONEL H R CARR DSO* MBE

Born 14 March 1914, died 19 June 1996, aged 82.

RALPH Carr was one of the Corps' outstanding field commanders in the Second World War, whose military career was cut short by the severity of the wounds he received in 1945 but who went on to make a successful second career as a farmer and countryman in Northumberland.

Henry Ralph Carr was born in Burma, where his father was serving with the Worcestershire Regiment. After education at Repton and Woolwich, he was commissioned into the Corps in 1934, continuing his training at Chatham. He then read mechanical sciences at Corpus Christi College, Cambridge. His first military posting was to Palestine in 1936: railways had to be kept running in spite of attacks by Arabs displeased by Jewish settlements.

Later he went to Egypt and was at Operations Headquarters when the Italians invaded. He went on to take part in the campaign which culminated in the defeat of General "Electric Whiskers" Berganzoli, and the capture of 130,000 prisoners of war, 845 guns and 380 tanks. "The weather was appalling", he recalled, "with bitter cold and blinding sandstorms. A great deal of the desert was boulder country in which for 30 miles one crept over sharp stones, the size of footballs". He was appointed MBE (military).

He was then posted to Greece, which fell soon after. Carr got away by caique, reaching Crete and then Alexandria by destroyer.

In September 1942, after a tour in Syria, and attendance at the Staff College course at Haifa, he commanded 21 Field Squadron in the mine clearing operations at Alamein. He was awarded an immediate DSO for his work in the advance after that battle. "His unit lifted many hundreds of mines and carried out a considerable amount of road repair works under great difficulties and often under fire. The speed of the advance was largely due to the work of this unit inspired and directed by Major Carr".

In January 1943 he rejoined his squadron after a spell of jaundice, from which he had been suffering for some time, only to be wounded in his right leg three months later when he trod on a mine whilst on reconnaissance near Djebelina.

In January 1944 Carr was posted as CRE 51st Highland Division, which had been fighting in Sicily, and was returning to England to take part in the Normandy Invasion. They were involved in heavy fighting from Caen and on to Le Havre. He was again wounded but recovered in time to take part in the fighting in the Ardennes and, later, in Operation *Veritable* in the Reichswald for which he was awarded the Bar to his DSO for his contribution to the crossing of the river Niers, south of Kessel, in February 1945. The citation recorded that "although the bridging site was under continuous fire, Lieutenant Colonel Carr established his Tactical HQ only a few hundred yards from the bank, and though fully realizing the situation stayed continuously on the site. Owing to his determination the bridge was completed in time for a further offensive to begin".

At Goch he was wounded again, this time in the head; he was thought to be dead and laid out for burial when someone noticed that he was still breathing. He recovered consciousness in hospital in Oxford.

He then spent three years moving between several military head injury hospitals, and various light staff jobs. In 1948 he underwent a final medical board at Millbank which placed him on sick leave pending full retirement in 1951. So ended 15 years service, four years of which were employed in continuous intensive warfare.

Subsequently he moved to Otterburn in Northumberland, where his family had established a home and productive smallholding. In 1952 this was expanded to a 400-acre beef and sheep producing

Lt Col H R Carr DSO* MBE p279

farm which he ran in partnership with his sister Sylvia. The land and farm buildings acquired had been neglected during ten years of absentee ownership, and it took very hard work and the application of Ralph's engineering skill and training to modernize and construct new farm buildings and roads, and to plan and undertake extensive field drainage.

As well as farming Ralph took a great delight in all facets of country life, especially fishing and forestry. He also took a full part in village and church activities. Sadly his wife Hester Speke, whom he married in 1956, died in 1968 and they are survived by two married daughters and three grandchildren. *JFA*

MAJOR MAXWELL JAMES ALLISON MBE

Born 20 April 1927, died 7 June 1996, aged 69.

MAX Allison died at the John Radcliffe Hospital in Oxford, after a brief illness, and is buried, with his wife, at St Peter's Church, Eynsham, near Oxford. His funeral was attended by many comrades from his service days, many of whom had shared his triumphs on the rugby field.

Commissioned into the Corps in 1946, Max joined the army in April 1945, and attended No 9 Short Course at Manchester University. After completing parachute training, he joined 6th Airborne Division RE (147 Airborne Park Squadron) in Palestine, then transferred to 9 Independent Airborne Squardron via 1 Airborne Squadron, and served in BAOR and the UK within airborne forces. Following a wide-ranging career, including a tour at Staff College, and an exchange appointment in Canada, Max served three years in Berlin during which time Her Majesty the Queen visited, as did the President of the United States: Max was appointed MBE.

Max married Peggy Casey, a QARANC nurse, in 1953. Two sons survive them: Michael, a TA officer for several years, who lives in the USA, and Patrick, currently a squadron commander in 2nd Royal Tank Regiment, in Germany.

FJR

Memoirs in Brief

BRIEF memoirs are published below of distinguished men whose deaths have been notified recently in the national press and who served in the Royal Engineers during WW2.

Lieutenant Colonel Harry Stow MC, who has died aged 86, was awarded an MC for drilling wells in hazardous conditions during WW2.

Harry's father was a water engineering expert who, feeling his specialized knowledge had never been used to the full during WW1 had persuaded the War Office to let him form a mobile well-boring unit for use in future campaigns. Commanded by his sons, and composed largely of the firm's civilian employees, the unit, 1 Boring Section RE, served successfully in France, the Western Desert, Sicily and Italy.

After the war Stow worked for the family firm, before building up a hotel business in Cornwall.

Harry Stow is survived by his wife Gwyneth, whom he married in 1936, and by a son and a daughter.

Graham Couper Law, who died on 13 September 1996, aged 72, served in the Corps during WW2. Graduating from Cambridge, he later became a very distinguished Scottish architect, partner and consultant to the architectural practice of Law and Dunbar-Naismith.

Maj Maxwell James Allison MBE p280

Correspondence

"AN OFFICER NOT ONLY OF GREAT TALENT BUT OF RARE COOLNESS AND COURAGE"

From: Colonel W G A Lawrie MA, FIL, MICE

Sir, – I am writing to you with reference to the article in Vol 110 No 2 about Major General Trevor VC to amplify the information contained in it about Sir Henry Durand.

The Dictionary of National Biography (DNB) contains a lengthy account of his life, from which you can see that he died at Tank, not Tong, but there is a lot more to the story.

After the Treaty of Tilsit in 1807 between Napoleon and the Czar of Russia, a plan was discussed for a joint attack on India by France and Russia which caused some alarm in this country. Even after the fall of Napoleon at the Battle of Waterloo in 1815, there were thought to be Russian agents in Afghanistan conspiring with King Dost Mohammed.

Wellington wrote his despatches in his tent after the battle and gave them to his ADC, Major Henry Percy, telling him to take them to London.

At some stage Major Percy had made the acquaintance of Mlle Marion Durand of Tours and when she gave birth to a son in 1812, Major Percy adopted the child and had him christened with his [the child's] mother's names; the child was then educated in England and commissioned into the Bengal Engineers in 1828.

Durand took part in the siege of Ghazni in 1839, when the British tried to replace Dost Mohammed with Shah Shuja. This hazardous attack was the occasion for the first ever award of the Indian Order of Merit to the sappers who carried the bags of gunpowder. It was only last year that the Commandant of the Bengal Sappers in Roorkee asked me to find out the names of these individuals so that they could be written up on the board of honours hanging outside his office.

Henry Durand's subsequent brilliant career is set out in the DNB but not that of his sons. After the second Afghan War in 1879 the King of Afghanistan met the Viceroy and suggested that to avoid further disputes it would be as well to have the common frontier demarcated. The man in charge of this was Sir Henry Mortimer Durand, Foreign Secretary to the Government of India, who walked along the 2000-mile frontier, taking several years over the job. He had complete freedom to put the frontier where he pleased, marking it with piles of rocks every few hundred yards, which were painted with whitewash. I remember clearly seeing these markers when I was serving in Waziristan in 1937.

Where Sir Henry was particularly clever was in the way in which he carried the frontier right across to the Chinese border, interposing the territory known as the Wakhan between Russia and British India. When I was visiting Hunza in 1987 people were worried when they saw Russian troops who had entered Afghanistan, patrolling the Durand Line. But they never crossed it. On my next visit in 1994 there were of course no Russians to be seen.

The DNB mentions the Durand Medal which is bestowed annually on a deserving Indian officer or NCO. When I was in Roorkee in 1989 I was delighted to meet the latest recipient of the medal, which he was wearing hanging from a ribbon round his neck.

General Durand's second son, Alexander, was British agent in Gilgit, when he was ordered to depose the reigning Thum of Hunza who was suspected of conspiring with the Russians. During a fierce campaign in which Captain Aylmer RE won the VC at the siege of Nilt, Colonel Durand was seriously wounded by the discharge of a musket loaded with a charge of garnets, which I was shown in the local museum. Yours sincerely – Aitken Lawrie.

SOCIETY OF MILITARY ENGINEERING

From: Major (retd) John G Bitcon, SMIEAust, CPEng, Royal Australian Engineers

Sir, – I am pleased to enclose a copy of the first edition of our society's journal [lodged in the Corps Library at Chatham] for your information and interest. I will ensure that you receive copies of all future editions of our journal and we hope that it may be possible to receive copies of your equivalent publication. Such an exchange of information, we believe, would be to the mutual benefit of our respective organizations.

On behalf of our committee I would like to extend an open invitation to any of your members who may be visiting Australia to attend any of

our meetings held in the cities of Melbourne, Sydney, Brisbane and Adelaide. They can be assured of a warm welcome. If any member of the Institution of Royal Engineers would like to take up this invitation, he or she should contact me in the first instance. Yours sincerely, – John Bitcon, Honorary Secretary, Society of Military Engineering, National Secretariat, 21 Bedford Street, North Melbourne, VIC 3051, Australia.

SUSTAINABLE METHODS FOR CLEARING LANDMINES AFTER CONFLICT

From: Lieutenant Colonel J R Wyatt MBE

Sir, – In the spirit of Brig Hooper's letter and the article on *Sustainable Methods for Clearing Landmines after Conflict*, I am responding to the August *Journal*. By way of credibility in this field, I was the Joint Services EOD Commander in the Falklands clearance, held the post of Senior Instructor Mine warfare and Search at the RSME and carried out the original recce and initial planning of the clearance of Kuwait after the Gulf War. I am sympathetic to some of Brig Hooper's views and am disillusioned with the organizations that should be coordinating and controlling demining throughout the world. One of the main problems is the commercial aspect in that it has inevitably attracted a great number of unqualified, inexperienced and at times not very bright people who are hoping to make a "fast buck" out of these circumstances. One of the things I felt about the article and study by the University of Warwick was the lack of understanding of the real practicalities of demining in all situations. For instance they suggest reducing costs of detectors by local manufacture and locally sourcing minor non-technical items. This makes sense theoretically but in most places where this is required it would be a real administrative headache and may in the end cost just as much in time consumed for investigation and realization of the aim.

The second point is their discussion on carrying out a rapid clearance at a lower rate followed thereafter by a more detailed clearance. This is to reduce the number of local casualties. In practice this is very difficult to achieve – eg the psychological factor of going over the same ground again degrades the effectiveness. Also where do you draw the line? an initial 75%, 80% or 90% – who decides? Allied to this is the drive to find a simple cheap mechanical means. My experience is that this is fraught with difficulties. Mechanical means may be acceptable in war time for military manoeuvres such as minefield breaching but in humanitarian demining, poor clearance rates are achieved, the rates are difficult to define and extra problems are incurred by different environments.

Lastly, I would endorse Brig Hooper's point about the waste of money and duplication of effort. The lack of post operation reports are also mentioned in the article. I would also add the lack of audit so that quality of clearance can be monitored. This is the main reason why I did not continue in Kuwait and why I have been reluctant to become involved in demining since. There needs to be a central technical body that gathers the intelligence together on demining. This should include, types of mine found (including variants and local DIY modifications) how detected, soil types, comparison of detection methods in that environment, efficiency of organization, clearance rates, casualty figures with explanations etc etc.

This intelligence then needs analysing by experts with subsequent recommendations for areas of possible improvement and experimentation in those subjects discussed in the article.

But all the while, there are petty jealousies, "cowboy" companies competing for cash and manufacturers of detectors and protective equipment vying with each other to sell no matter how appropriate, I am not optimistic that many great advances will be made. – Lt Col J R Wyatt MBE MIMgt MIExpE RE(V).

BRIDGING – WHERE DO WE GO FROM HERE?

From: Lieutenant Colonel J P Fitzgerald-Smith BEng, MICE

Sir, – I can't say I don't agree with the opinions expressed by Tom Foulkes in his article; because I agree with almost half of them. I came to the conclusion that this is because the article is really two articles in one. The first part could have been written before the demise of Russia as a super power, and the development of weapons that brought the Gulf war to such a speedy conclusion. The second part attempts to face up to the changes that must take place in our future

bridging. In the first part Tom sees nothing wrong with BR90, and the M2 and M3 amphibious bridges; which is not surprising since he must have been involved in their procurement. He says: "BR90 is fine as far as it goes; but time has marched on". It is no use saying that the "success of BR90 stands us in good stead" – What success? when it does not meet the criteria which will be required in our future bridging. He also says: "study of terrain yields likely spans, and the nature of operations influences load classes". This has always been a fundamental truth, and it was precisely because of the difficulty in forecasting the terrain where the Bailey would be required that led to its design. In the end it was used in terrains as diverse as France, Italy and Burma.

"Our ability to provide and sustain crossings over wide rivers is starting to look thin" – starting to look thin! In 1983 when I first proposed the concept of the universal pontoon I said for the first time in the history of the British Army we had no pontoon. The M2 which came into British service was a complete rejection of the staff requirement at that time for a floating bridge. It was based on the French Gifois – a bridge for the fifties with its dedicated transport and dedicated troops. If in 1983 we had gone for the universal pontoon instead of the M2 and M3 we would now have had stocks of pontoons which would have been as useful for the next generation of bridging as it would have been for any of the earlier bridges, instead of which our floatation capability becomes obsolete with each bridge that is wasted out of service. Transportability of pontoons, and superstructures, by road, air or sea is more important than speed of erection. Tom points out quite correctly that "enemy response times are continually reducing". He poses the question "How fast will be fast enough?" The answer to my mind is that there is no point building a bridge that can be taken out quicker than the time taken to erect it. Which means no bridges until the shooting war is ended over the bridging site. "Speed of construction is no longer a cardinal performance criteria."

Heavy tanks and their transporters are by no means as essential as the article indicates. It was not heavy tanks that saw off Sadam Hussain's Republican Guard – but helicopter gun ships with night sights and laser guided weapons!

The conclusion must be that the kind of bridge required is one that can be built to any desired classification by adding trusses or storeys – such as a Bailey derivative would give. A universal pontoon is required that is more portable than the MGB pontoon, and which is capable of being man handled (with launching aids) at any point in its movement down the logistic chain. Our experience with the development of the military outboard motor should show us that a commercial firm will not develop a piece of military equipment unless there is a big market in the civil field. A feasibility study done some time ago indicated how such a partnership could have resulted in a commercially produced military pontoon hull; with a marketable variation in the very profitable leisure industry. Remember the off-the-road four-wheeled drive vehicle now seen in increasing numbers is a spin off from the military quarter-ton vehicle. – Lt Col J P Fitzgerald-Smith (retd).

From: Major M A Napier, MSc, FICE, FIMechE

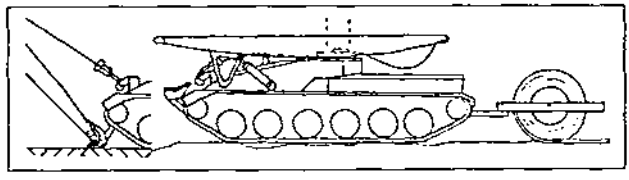
Sir, – Colonel Tom Foulke's article on future bridging (August issue) with its reference to the APC launched bridge of Alvis and the need for a trestle or pier for use with AVLB, reminded me of the various studies carried out in my mechanical bridging group at MEXE in 1963 and 1969 respectively.

In October 1963, MEXE was asked to consider the feasibility of fitting a gap-crossing device on to the armoured engineer vehicle (winch) (AEV(W)), (subsequently replaced as a requirement by the combat engineer tractor), to carry Class 60 loads over a 20ft gap.

Of the many possibilities explored, the pencil sketch below, from the feasibility study report, illustrates the solution recommended for further consideration; the AEV(W) was also to lay the assault trackway but neither use materialized.

In 1969 I wrote a study for the further development of the Chieftain AVLB, (see RE *Journal* June 1978) to satisfy its use over longer spans in the 1970s.

Illustrated in the draft report of the study, was the multiple span concept, which has since been



employed in service and, inter alia, a pier or trestle attachment to fall into place and lock as the bridge was launched.

Testing of this proposal did take place subsequently but, because of the complexity of the hydraulics, did not figure in proposals for BR80. However some were produced for use with Nos 8 and 9 Tank Bridges in about 1984 and were used in service in Germany. Yours faithfully, – M A Napier.

COLONEL BY DAY

From: Lieutenant G P Webb BSc(Eng), PEng

Sir, – You will be interested to hear, and may wish to make a note in the *Journal*, that Ottawa and the region's annual August holiday (the first Monday in August) until now known as Civic Holiday, has been renamed Colonel By Day. Ottawa was originally known as By Town until, I think, Queen Victoria named it the capital of Canada, as Ottawa. Best wishes – Geoff Webb.

Reviews

THE NATURE OF FUTURE CONFLICT

RICHARD CONNAUGHTON

Published by Leo Cooper, Pen & Sword Books Limited, 47 Church Street, Barnsley, South Yorkshire, S70 2AS – Price £19.95
ISBN 0 85052 460 1

FROM the signing of the North Atlantic Treaty in April 1949 until the fall of the Berlin Wall in 1989, British defence policy was largely governed by the overwhelming need to deter the threat posed to Western Europe by the Soviet Union and its Warsaw Pact allies. Throughout the cold war, it was the United Kingdom's commitment to Article 5 of the North Atlantic Treaty that, in the main, determined the equipment, structures and roles of the Services. However, since 1989, the old certainties have disappeared: the Warsaw Pact – and even the Soviet Union itself – has disintegrated; the ideological challenge of communism has been discredited; and the straitjacket on ethnic, religious and regional conflict, which has existed in Europe for the last 40 years, has been removed.

In this new security environment, in which British soldiers are more likely to be involved in conducting short-notice, unpredictable operations than in deterring a long-standing, well-defined threat to national survival, it is essential for the British armed forces to reassess the priorities attached to the competing demands for size, readiness, sustainability and modernization. Richard Connaughton's book, "The Nature of Future Conflict", is therefore timely.

Despite the fact, announced on the book's dust wrapper, that Lord Healey – a former Sapper officer – considers that Richard Connaughton has produced "by far the most penetrating analysis of the subject" that he has read, "The Nature of Future Conflict" probably lacks the conceptual coherence that one would expect to find in a truly influential work. Instead, the book is more like a collection of lengthy, albeit closely associated, essays, each of which is well-written, supported by a wealth of detail, and, in many places, accurately reflects the mood and thinking that existed in military circles prior to NATO's deployment to the Former Republic of Yugoslavia at the end of 1995.

As one would expect of Richard Connaughton, who had a lengthy and successful career as a regular officer before becoming a full-time author, the opinions expressed in the book are invariably sound, realistic and, at times, show great insight. He rightly stresses that, whatever the changes to the United Nations, it will only be effective in preserving peace and controlling conflict if it is able to generate and maintain the political will within the organization to carry through its own resolutions. In a similarly realistic vein, he suggests that "Europe will be unable to adopt a leadership role until there is a common European foreign policy founded upon domestic consensus". These conclusions, although simply stated, are important, as is the author's suggestion that "the challenge facing the new NATO lies in avoiding the isolation of Russia and the Ukraine" – no easy task when considered alongside NATO's recent decisions on enlargement!

"The Nature of Future Conflict" is an interesting book, of value to both the academic and the soldier. At less than £20 a copy, there is no reason why it should not be on the book shelf of every young officer. SCG

CHANGING STEP

RUTH JOLLY

Published by Brassey's, 33 John Street, London WC1N 2AT – Price (Hardback) £20.00
ISBN 1-85753-129-9

IT is a pity that Ruth Jolly's book did not arrive earlier on the scene for it contains much of interest for those planning to leave the Services. Notwithstanding this, recent redundees may still find it interesting, if only for the reassurance that their own is not a unique experience.

Military training is geared towards producing predictable outcomes from given sets of circumstances. This can be a positive product because teamwork is crucial for military achievement and teams perform cohesively if individuals know, or can deduce, what other members of the team will do as circumstances change. However, the downside is that military training produces minds which constantly search for templates. People leaving the Services often ask for advice on what they need to do to land the new career they believe they deserve. As Ruth Jolly points out, few leavers have any real idea of the job they want. Possessing the "flexibility" which has always been stressed by their training, most feel they could tackle anything since they have faced a wide range of challenges during their careers to date. The challenges of military service should not be underestimated but there are two crucial viewpoints which civilian employers have of these. First, that they were faced and overcome within a well-defined context – the rules of military life; and, second, perhaps because of their lack of understanding, that military challenges have little relevance to civilian business life. There are, therefore, no templates and Ruth Jolly offers a number of examples of people who floundered until they recognized this axiom.

The book usefully highlights the effect which a change of career has upon the families of leavers. This is an area which seems to have been ignored in the past. In stepping out of a society where families are expected to be an integral part, into one where they play no part at all in an individual's work environment, there are bound to be problems. Ruth Jolly's research indicates that wives who have "normal" jobs which take them out of the Wives' Club/producing babies syndrome adjust more readily to their partner's career change. There are other family factors exposed in the book and it would certainly be worth reading by any prospective or recent leaver, if only to put family considerations into perspective.

There are some omissions which might usefully have been included in the book. For example, to understand the motivation and aspirations of a leaver one should, perhaps, understand why he, or she, joined in the first place. People do change with maturity, but it is unlikely that any civilian job will be satisfying if it contains none of the elements which an individual perceived necessary for his/her job satisfaction in the first place. It would have been interesting, also, to have seen how "attached Arms/Services" personnel cope in civilian life. They never really belong to their parent units so, perhaps, they fare better, later, in the environment where individuals have to rely upon their own resources. Some comparison of the relative successes of different trade/rank groups would certainly have added to the value of the study.

To a degree the author mirrors the expectations of her subjects in that the Services should have prepared them better for civilian life. But surely there can be no other employer who emphasizes from the outset that theirs is not a job for life and who, then, provides so much training and reorientation to prepare an individual for another employer. In military life one may, occasionally, be asked to put one's life on the line. However, one's livelihood is never at risk. The cheque is in the bank every month whatever happens. This is not the case in civilian life and the redundancies and upheavals of recent years have meant that no job is secure: the sword of Damocles hangs over all. It would have been helpful to leavers looking to this book for guidance if the author had spelled this out. There are difficulties in the life of a soldier, sailor or airman but the Services offer the cocoon of a "nanny state" *par excellence*. It is the cutting of this Gordian knot which underlies the trauma most leavers feel and which should not be ignored as the day of leaving approaches.

In this vein, there were two vital areas which might have been given more attention by

Ms Jolly. First, the feeling, almost, of embarrassment on the part of many who elect to leave of their own volition. Loyalty in Service personnel is stronger than it is fashionable to admit and there is a long period of soul-searching before the decision to leave is made. Once this hurdle is crossed the "system" unwittingly helps by virtually cutting off the individual all together. The handing in of one's ID card is the first step to becoming a non-person. The book does touch upon this but it does not deal with the continued loss of face which often follows. There is a perception that, in order to remain credible amongst former colleagues, one must succeed in landing a highly-paid, high-status job. This is a particular pressure for someone who has always been graded "Excellent" in his/her confidential report. (Interestingly enough, the use of this grade seems to be far less prevalent among those civilian employers who have an annual appraisal system. Perhaps there is a message here.) The plain fact is that most leavers do not get a job which is better paid than their last salary in uniform and almost none enjoy the status which the old-fashioned values of the Services confer upon an officer or senior NCO. This book fails to address either of these issues adequately.

Life as a civilian is very different from military life. But transition one to the other is inevitable and there is no going back. This book will be a disappointment to those who seek "template" guidance to their futures but it does provide lots of food for thought for leavers with open eyes and minds. Its style is rather rigidly academic and it is a little difficult to get into. It was page 17 before the aim of the book was defined. However, on the whole, the "story" is one which is worth hanging on for. Not a "must" but certainly a "desirable" for anyone crossing the military-civilian threshold with eager anticipation but no clear idea of what is in store.

CMD

BATTLEFIELD GUIDE TO THE SOMME

MAJOR & MRS HOLT

Published by Pen & Sword Books Limited, 47 Church Street, Barnsley, South Yorkshire, S20 2AS – Price £12.95
ISBN 0-85052-414-8

THE question that any reviewer of this very detailed, but eminently readable, guide must ask himself is "for whom was it principally written?" As this year's 80th Anniversary Commemoration Service of the Battle of the Somme showed only too sadly, survivors of the First World War are now limited to a few veterans approaching their 100th birthday. So those who might use this guide must surely fall into two other main groups: the serious student of the history of the First World War, whose principal interest lies in the ground over which the fighting took place and the movement of troops; and the now elderly sons, daughters and middle-aged grandchildren of those who lie beneath the headstones in the cemeteries, or whose names appear in their thousands on the memorials at Thiepval, Ypres and elsewhere. They have come to pay a personal tribute more than to study the detail of the tactics.

The guide begins with an eight-page historical summary of the Battle of the Somme (1 July to 17 November 1916). This section is well written and, with the aid of the excellent map supplied, gives a clear account of the sequence of events.

The main section begins with two suggested routes to the area of the battlefield from the Channel Ports, each with optional detours en route. Four itineraries covering the area are then described in detail. Some 250 memorials, 136 war cemeteries and 10 museums, exhibitions or sites of exceptional interest are referred to. All these locations are described at length and related to particular phases of the battle. Many of the cemeteries are devoted to the fallen of particular units or formations, whose roles in the fighting are explained in detail to the reader.

Individual officers and soldiers of particular interest are also mentioned, like the Reverend T B Hardy VC DSO MC DCM, distinguished on the field of battle; or others, famous in their own right, such as Sergeant Hector Hugh Munro, the author of "Saki", killed by a sniper on 14 November 1916, at the age of 46. But many others had no great claim to fame. They were the ordinary sons of ordinary families; Kitchener's Volunteers of the Pals Battalions from Accrington, Barnsley, Sheffield and elsewhere, who died in their thousands between July and November 1916.

Much of the content of this guide would be known to the serious historian, who will also want to record the personal stories of the individual men who fought and died, but not necessarily using this guide while tramping through

the mud of Picardy. Likewise, the family pilgrim, before setting out from home, might well want to record the details of the cemetery or monument of his particular concern, the remainder being of passing interest only.

So while this detailed and assiduously compiled work is a valuable reference book it is less of the traveller's vade-mecum which one assumes was the authors' intention in writing it.

By coincidence, earlier this summer, your reviewer joined one of Major and Mrs Holt's battlefield tours, which covered the Battles of the Ypres Salient, the Somme and Vimy Ridge. The tour was meticulously organized and proved a moving experience for all who took part, reviving many half-forgotten memories of tales of horror and heroism. The same care and diligent research has obviously gone into the preparation of this book.

CFC

THE FIRST AIR CAMPAIGN AUGUST 1914 – NOVEMBER 1918

ERIC AND JANE LAWSON

Published by Combined Books Inc, 151 East 10th Avenue, Conshohocken, PA 19428 USA – Price $24.95
ISBN 0-938289-44-6

HAVE you wondered why all American fliers are much bigger than their European counterparts? Take birds, the North American robin is the size of a thrush; the North American swallow is larger and more colourful than its cousin in Europe – and then there is the Jumbo jet. But now I know why US fighter aces (who only started fighting in France in April 1918) scored so many victories in the air in such a short time. When British or French airmen contributed to a kill, they were credited with a share of that one victory, whereas under the US system every pilot involved was allowed to claim a full kill. For 341 kills, 1022 awards were handed out – but I did not find this out from this book.

This is the story of US airmen in the First World War woven into a shallow history of the development of air power. It provokes as many questions as it answers. The volume is one of the great campaign series that "is intended to reach the professional and the serious amateur and the concerned citizen alike". Written by Americans, it seems to be for Americans but it falls short of the standard it sets itself as "a unique reference to the theory and practice of war in the period in question".

I was reminded of the adventure strip cartoon magazines I used to enjoy as a boy, that told larger than life stories of derring-do in a battle setting. But with this book I kept wanting to know what effect these innovative and valiant deeds had on the course of the battle they were part of. I had to turn to other books for analysis like that.

However what I did get from the underlying theme was the story of how Trenchard and others pursued the quest for air superiority. They wanted the ground forces to benefit from the reconnaissance, artillery direction and later the interdiction conducted by their own aircraft without interference from enemy planes. As the war progressed technology and concepts developed, and the scale of forces escalated so that by September 1918, in the US Army's first major offensive at St Mihiel, almost 1500 Allied planes with many different roles were assembled for a single operation.

Although the book does not live up to its own billing, it is an interesting and well illustrated story of American aviation heroes.

TRW

FIGHTING MAD

MICHAEL CALVERT

First Published in the UK in 1964 by Jarrolds Publishers (London) Ltd. Second Edition published by Airlife Publishing Ltd, 101 Longden Road, Shrewsbury SY3 9EB – Price £18.95
ISBN 1 85310 762 X

SUBTITLED, rather inappropriately, "One Man's Guerrilla War", this book covers the warlike activities of Brigadier Mike Calvert, arguably one of the most famous Sapper officers of the last war. A brigadier at 30, he first saw action (literally) in Shanghai in 1937 during the Sino-Japanese War. Britain was strictly neutral but Mike Calvert was employed on intelligence duties and frequently left the confines of the international settlement in disguise to observe the fighting. Not only did he see what he describes as some of the fiercest fighting he had ever seen but he also observed a Japanese amphibious landing utilizing flat-bottomed landing craft with bow opening doors, something never seen before and a portent of what was to come in World War Two. Reporting this exciting

development to London, he heard nothing more and presumed the report was just filed by some junior officer in intelligence. It was probably this experience that led to Mike Calvert's subsequent contempt for all staff officers.

The start of World War Two saw him as adjutant of the London Divisional Engineers, but he was soon in the thick of the action: Norway, early commando training, then back to the Far East. He devotes a chapter to each of his many adventures and manages to convey the flavour and the atmosphere in just a few words. He was a column commander on Wingate's first expedition, where he earned his first DSO, the second coming soon after the start of the next, by which time he was a brigade commander. An American Silver Star from the American General "Vinegar Joe" Stilwell followed before he returned to England for the last few months of the war. Here he was given command of the Special Air Service Brigade and saw further fighting in northeastern Holland. The brigade included troops from both France and Belgium, their governments awarding him yet more decorations.

As soon as the war in Europe ended, an SAS brigade, comprising two British SAS regiments, was dispatched to Norway to help oversee the German surrender and Mike Calvert soon felt that he could have done with rather less training in fighting and more in politics and diplomacy! His connection with the SAS did not end here and, in 1950, he was in Malaya and forming the Malayan Scouts (SAS), later to be renamed 22nd SAS Regiment. By this time, though, Mike Calvert had been invalided home and his adventures came to an end.

It is timely that this book should be republished, together with "Prisoners of Hope" which expands on his time in command of 77 Infantry Brigade under Wingate, for there can be few men who have managed to pack so much activity into their lives. The end result is a fascinating book which every young officer, as well as those not so young, should read. It is an exciting story.

GLC

DEAL AND DISTRICT AT WAR

DAVID G COLLYER

Alan Sutton Publishing Ltd, Phoenix Mill, Far Thrupp, Stroud, Gloucestershire – Price £16.99
ISBN 0-7509-1025-9

THIS is a day-by-day account of the excitements and hardships experienced in the Deal area from August 1939 to August 1945. Quotations from diaries (kept mostly by a local nurse, Mrs Vera Dadd) and from the official St Margaret's Bay ARP logbooks, are backed up by an excellent introduction and commentary on each of the entries based on correspondence and interviews with local residents. The result gives a vivid impression of "normal" life at the time from the mundane: "Meat shortage – tinned steak for dinner"; to the deadly serious: "Fierce air battle over the Straits of Dover ... (followed by details of aircraft destroyed, casualties and damage...). This is a model presentation of local history by an acknowledged expert local author, lecturer and broadcaster.

GWAN

Operation Resolute: An Oceanographer's Perspective

SECOND LIEUTENANT S GARDNER BSc

CORRECTION to photograph caption in August 1996 *Journal*. Please note that although the photograph on page 159 shows a heavy girder bridge under construction, the correct name of the bridge should read: "Ross", not "Neames".

Explanation of Abbreviations and Foreign Words Used in This Journal

2IC ..... second in command
AA ..... anti-aircraft
ACF ..... Army Cadet Force
ADR ..... airfield damage repair
ADP ..... Army Doctrine Publication
Armd ..... armoured
ARRC ..... Allied Command Europe Rapid Reaction Corps
ATS ..... Auxiliary Territorial Service
AVLB ..... armoured vehicle-launched bridge
BAOR ..... British Army of the Rhine
BEF ..... British Expeditionary Force
Berks and Oxon ..... Berkshire and Oxfordshire
BMH ..... British military hospital
CGI ..... corrugated galvanized iron
CinC ..... Commander in Chief
Col ..... colonel
CRE ..... commander RE
CSM ..... company sergeant major
Div QRT ..... divisional quick reaction team
Div Res ..... divisional resource
DCRE ..... deputy commander RE
E&M ..... electrical and mechanical
E&TSC ..... Engineer and Transport Staff Corps
EinC(A) ..... Engineer in Chief (Army)
Engr ..... engineer
EOD ..... explosive ordnance disposal
FARELF ..... Far Eastern Land Forces
Fd ..... field
FWF ..... former warring factions
GDP ..... gross domestic product
GSO ..... general staff officer
HQ ..... headquarters
HM ..... Her/His Majesty
ID ..... identification
IFOR ..... Implementation Force
KBE ..... Knight Commander, Order of the Bath
LANDCENT ..... Land Forces Central Europe
LofC ..... lines of communication
Lt Col ..... lieutenant colonel
m ..... metre/million
Maj ..... major
MEXE ..... Military Engineering Experimental Establishment
MiG ..... Russian fighter aircraft
Mk ..... mark
MLC ..... military load class
MOD ..... Ministry of Defence
MP ..... member of parliament
MT ..... motor transport
MWF ..... Military Works Force
NAAFI ..... The Navy, Army, and Air Force Institutes
NATO ..... North Atlantic Treaty Organisation
NBC ..... nuclear, biological, chemical warfare
NORTHAG ..... Northern Army Group
OC ..... officer commanding
OCTU ..... Officer Cadet Training Unit
OR ..... other ranks
P&O ..... Peninsular and Oriental Steamship Company
POW ..... prisoner/s of war
Q ..... quartering
QARANC ..... Queen Alexandra's Royal Army Nursing Corps
RE ..... Royal Engineers
REA ..... Royal Engineers Association
REME ..... Royal Electrical and Mechanical Engineers
RLC ..... Royal Logistic Corps
RMA ..... Royal Military Academy
RMCS ..... Royal Military College of Science
RSigs ..... Royal Signals
RSME ..... Royal School of Military Engineers
Sgt ..... sergeant
SME ..... School of Military Engineering
SNCO ..... senior non-commissioned officer
SO ..... staff officer
Sp ..... support
ss ..... steamship
SS ..... *Schutzstaffel*
Sqn ..... squadron
STRE ..... Specialist Team RE
TA ..... Territorial Army
TAC HQ ..... tactical HQ
UK ..... United Kingdom
UN ..... United Nations
US ..... United States
(V) ..... (volunteer)
WPU ..... water purification unit