THE ROYAL ENGINEERS JOURNAL

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Guidelines for Authors

The Editor is always pleased to consider articles for publication in the *Journal*.

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, or through the e-mail as an attached text file, are very welcome. Please ensure that text is typed with no formatting, ie LJ justified only, and please NO caps-only headings – all upper and lower case.

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Photographs should, if possible, be of good quality with sharp definition, and don't forget to add appropriate captions. Please do not submit laser/photo copies of photographs or files from digital cameras.

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

Contributions should reach the Editor by:

8 February for the April 2000 issue
Early June for the August 2000 issue
Early October for the December 2000 issue

Submissions before the deadline are particularly welcome.

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All correspondence in connection with editorial matters should be addressed to the Secretary, Institution of Royal Engineers, Ravelin Building, Brompton Barracks, Chatham, Kent, ME4 4UG

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Editorial

This is a bumper edition of the *RE Journal*, incorporating as it does Engineer in Chief's Annual Report to the Corps, which is normally published in the August issue, together with a larger than usual number of articles describing recent events in the Balkans, and in Macedonia and Kosovo in particular.

Engineer in Chief's Annual Report is accompanied by his Vision Statement for the Corps. The Strategic Defence Review is now over a year old but the ramifications will make themselves felt for some years to come. It was never going to be easy for the Corps to restructure its organization and training to match the target output required in the short time frame necessary but much has already been achieved. The disappointment of seeing a reduction in the number of our TA regiments has been tempered by the promised increase in the regular element of the Corps, and already old squadron titles lost under *Options for Change* in the early 1990s are being resurrected, starting with 70 Gurkha Engineer Support Squadron this year and to be followed by ten others for new squadrons and regiments being formed in the following three years.

The enormous contribution made by the Corps to operations in Macedonia and Kosovo is well covered by several articles in this issue. After reading them one is left not just with admiration for those involved but pride in a Corps that has trained individual officers and soldiers to accept whatever is thrown at them and to achieve outstanding results, often in the most difficult of circumstances. Nowhere is this better illustrated, if only because of the sheer magnitude of the task involved, than in *Power to the People*, an article describing how the power generation and distribution system in Kosovo was restored. A major was heard to remark that he was never instructed, either on his young officers course at Chatham or subsequently, on how to run a coal mine; but run it he did with remarkable success. We are fortunate that recruiting into the Corps remains strong, helped no doubt by the challenging and rewarding tasks that our young officers and soldiers undertake in the Balkans and elsewhere. *Power to the People*, together with two other articles about Kosovo, *Bridge Classification Through The Kacanik Defile* and *And They Thought It Was Another Swimming Pool*, illustrate the increasing reliance placed on chartered engineers and clerks of works in the Corps. They have a vital part to play in any expeditionary operation and their increasing contribution, as we move away from the imperatives of the Cold War days, is reflected in the very substantial increase in the Military Works Force following the *Strategic Defence Review*. Letters in the correspondence section commenting on *Skippy Goes To Skopje* published in the last *Journal* show that there is much to be learnt in our *modus operandi* on these types of operations. The debate is to be welcomed.

I would like to single out again *Bridge Classification Through The Kacanik Defile* if only because its more technical content might not appeal to the casual reader. The importance of bridge classification to troop commanders and recce officers cannot be overstated. It is relatively simple to crudely classify a bridge but a good engineer is required to do it with the degree of precision necessary for a commander to make an informed decision on operations, because the consequences of getting it wrong could be incalculable.

The founding father of the French Engineers was the Marquis de Vauban and that of the Royal Engineers Bishop Gundulph, both of whom were French. *Le Genie – The French Corps of Military Engineers* gives an insight into the organization and training of the French Army, and its Engineers in particular, at a time when it is going through a massive restructuring programme as it moves from a conscript to an all-regular force.

It has been an extraordinarily busy year for the Corps. There is little doubt that engineering in peace support operations is both challenging and rewarding. Our serving officers and soldiers, whose reputation is second to none, have been achieving magnificent results which are gaining widespread recognition both within the Army and in the country at large. They are to be congratulated.

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Introduction

The last year has been every bit as challenging to the Corps as any in my 28 years of service. All the Corps' diverse skills are in full use the world over and nowhere as clearly demonstrated as in Kosovo. The flexibility and determination to get work done to tight time scales and to a high standard was evident everywhere I visited in that theatre in August. Efforts there mirror the achievements of all Sapper officers and soldiers deployed in other theatres at home and abroad. All concerned are to be congratulated.

The SDR outcome has been announced and implementation is now in full swing; the Corps made considerable gains in overall manpower terms, though the TA cuts were considerably greater than I would have wished. Immediately following SDR, the Manpower Establishment Review (MER) put in place fundamental changes to establishments which will carry the SDR process forward; such changes will leave the Corps better balanced and ready for whatever tasks the government calls upon us to undertake. It is with SDR implementation and the MER that I wish to start my report.

SDR Outcome and Implementation

I am pleased to report that the measures submitted during the SDR process to enhance the Corps were largely funded. Engineer units in LAND are to be enhanced by some 1300 posts, of which approximately 1000 are to be RE cap badged. Enhancements include a new close support regiment to support 12 Mech Bde; a new RHQ, with a new HQ Sqn, 9 Para Sqn and 51 Fd Sqn (Air Assault) under command, will support 16 Air Assault Bde and a fifth logistic squadron which is to be Gurkha. Two independent air support squadrons will be formed for support to the RAF, and the MWF will gain substantial enhancements including five new STsRE. Regrettably, not all is good news. The Corps is still one general support squadron and one air support RHQ and squadron short of the structural requirement needed to meet, fully, post-SDR commitments. Also, parts of the Corps, notably field support and field park squadrons, remain heavily cadreised. 33 EOD Regt is still under strength compared with its commitments. Nevertheless the overall package is very good news indeed and reflects the very high level of commitment of the Corps since *Options for Change*.

Anticipated cuts in the TA were extremely painful, although a strong representation against early plans led to a reprieve for two complete regiments. The final figures amounted to a 56 per cent cut in TA Sapper manpower, and a 40 per cent cut in the regular, NRPS and civilian staff that play such a vital supporting role. The shift from regular to NRPS and from NRPS to civilian staff reflects the stated readiness requirements for the RE TA, and will require a change in working practices; I have every confidence that these changes will be embraced at all levels. I am much encouraged by the very positive attitude of those members of the TA that I have met since the cuts were announced and I have been impressed by the speed and efficiency of the reorganization that was undertaken by all units. Only by such a positive response to adversity will we be able to move forward and ensure that the Sapper TA continues to flourish.

Manpower Establishment Review

Options for Change led to a significant reduction in the size of the Corps – the "Option W Orbat". However the embryonic nature of new operational concepts and doctrine of the time meant that it was not possible to review fundamentally the structure and establishments of individual units. SDR has given the necessary strategic direction, and by building on pre-SDR British Army 2000 work, all Army establishments are being rewritten as part of the MER. The new establishments will enable the Corps concurrently to: deploy at brigade strength for warfighting and operations other than war; train at up to brigade level for warfighting; support 16 Air Assault Bde, the RAF and 3 Cdo Bde; meet ongoing operational tour commitments in Northern Ireland and the Falkland Islands and continue individual training including career courses.

The MER, which has a completion date of 1 Apr 00, will result in new establishments that are as taut as ever. They will however represent the most efficient use of our new manpower resource, and they will reflect the Corps' long held aspiration to reorganize within 1 (UK) Armd Div to

smaller mixed squadrons, one per battlegroup. The aspiration to do the same in 3 (UK) Div will not be met, where limited resources and larger brigades mean that the mechanised brigades will continue to be most efficiently supported by armoured and mechanised squadrons.

Close support regiments in support of armoured and mechanized brigades will be "paired" within a formation readiness cycle. Units typically will undertake a six-month deployment such as Bosnia, spend one year training for warfighting, and then spend one year at high readiness for warfighting deployments as part of the Joint Rapid Reaction Force. For brigade sized deployments, new establishments will allow the regeneration from unit to warfighting establishments by using regulars from the paired unit on a pre-planned basis. This will remove the need either to call up individual TA or regular reservists, or to resort to the ad hoc regeneration witnessed in preparation for the Gulf War.

The MER has provided a much needed opportunity to address the current imbalance in career structures. The "Option W" process resulted in career structures that are, for a number of trades, unworkable and do not give all individuals in the Corps the fair and equitable career prospects that they might reasonably expect. A global approach has been adopted; individual establishments have been adjusted so that they now reflect not only the specific operational capabilities required of a unit, but also broader career structure issues. I await the outcome of the strong case put forward which seeks to claw back those enhancements lost during the final stages of SDR, and in particular the enhancement lost to 33 Engr Regt (EOD).

Operations

Last year's report on operations began by highlighting the improvement in the Corps inter-tour intervals from eleven to seventeen months. The fact that I must now report that the inter-tour interval is back to ten months, having dipped to nearly six months in the summer, indicates the rapid change in the operational situation over the last twelve months. At 1 Aug 99, 31 per cent of the Corps (excluding 25 Engr Regt in Northern Ireland and those training for or recently returned from operations), were physically deployed on operations. TA Units have continued to produce a steady flow of officers and soldiers for deployment on operations, to carry out

full-time reserve service and other tasks as permitted under the Reserve Forces Act 1996 such support has given some welcome relief to hard pressed regular units.

Kosovo. The commitment of the Corps to Kosovo began with the deployment of a small Mil Svy (Geo) detachment in support of Maj Gen Drewienkiewicz as part of the OSCE mission in Kosovo. Then in Dec 98, 20 Fd Sqn, a CS troop from 11 Fd Sqn and 527 STRE deployed to Macedonia on Operation *Upminster*. The requirement for insertion into Kosovo in support of the OSCE monitors eventually transformed into Operation *Agricola*. The experience gained leading up to this point proved to be extremely valuable and ensured we had a close support, general support and design capability able to assist the arrival of Operation *Agricola* forces. The contribution of the Corps to the success of KFOR from Feb 99 to the present time has received widespread recognition and I do not intend to go into detail here. Suffice to say the story will be told, and it is one of which we can all be very proud. In outline, the situation developed rapidly following the withdrawal of the OSCE monitors from Kosovo and following their deployment, 21 and 28 Engr Regts found themselves heavily engaged in humanitarian operations in Macedonia and Albania. Fortunately, 21 Engr Regt had developed their support for 4 Armd Bde during the 1998 training year and were able to switch from their planned Operation *Palatine* tour in Bosnia, to Operation *Agricola* in

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Kosovo. This was only possible because of the flexibility displayed by 22 Engr Regt in bringing forward by six months their Operation *Palatine* tour, at very short notice. As the situation developed, RHQ (TAC) of 36 Engr Regt together with 9 Para Sqn and 69 Gurkha Fd Sqn deployed to Macedonia in Jun 99 in support of 5 AB Bde. Crucial to the effective application of engineer effort and the management of resources supplied through 65 Fd Pk Sqn, was the requirement for an appropriate command and control arrangement and CRE 1 (UK) Armd Div, with the SO2 Engr Ops from his headquarters, deployed at short notice to command the engineer effort. 53 Fd Sqn was deployed for three months by Strike Command to Pristina Airport, under very complicated NATO/British command arrangements, in order to restore the essential airfield services. Considerable geographic support has also been provided, including a detachment to support the British brigade and 14 Topo Sqn to support the ARRC. Nor must the contribution of the Engineer and Logistic Staff Corps be forgotten; their expertise in those fields where the Corps has limited expertise, such as geology, has proved invaluable. The combination of CS, general support, engineer logistics, EOD, Mil Svy (Geo) and STsRE all under the command of the CRE, confirmed the requirement for the robust engineer organization contained within SDR.

The EOD effort in Kosovo has been enormous and 21 Fd Sqn (EOD) has been heavily involved in the clearance of UXO. This has been a dangerous operation and the tragic deaths of Lt Evans and Sgt Balaram Rai testify to the dangers faced by the forces in Kosovo. Good progress is being made and I am hopeful that we will be able to reduce the EOD commitment significantly before the onset of winter.

Since the deployment into Kosovo, the pattern of engineer support has changed considerably and the Sappers have become responsible for re-establishing the ravaged infrastructure in Pristina and elsewhere. This is only a temporary situation although it has not proved easy to pass on these responsibilities to other organizations. As the situation developed HQ 29 (Corps Sp) Engr Bde was deployed under their Commander to reinforce Comd Engrs HQ ARRC. CRE 1 (UK) Armd Div was relieved at the end of his tour by the D Comd 29 (Corps Sp) Engr Bde, Col Alasdair Gardiner (V). This is, I believe, the first time for a very long time, that a TA officer has been put in command of an operation. He is bringing his wide experience to bear on the joint project between the Corps and Huntings Group to construct temporary field accommodation.

Bosnia. There have been many changes in Bosnia and in recognition of the improving security situation there have been strenuous efforts to reduce the engineer commitment. The aim is to reduce to a single CS squadron with a SO2 engineer in HQ MND (SW) and a military survey (geographic) detachment early next year although this reduction will be dependent upon the agreement of Commander SFOR which he has yet to give. Nevertheless, the reduction in the commitment to Bosnia is consistent with our efforts to support Bosnia and Kosovo from a single Balkan regiment. Linked to this is a review of the level of other UK forces in the Balkans. The outcome of this is eagerly awaited and I am optimistic that force levels will be reduced wherever possible. This is a key requirement if Sapper commitment levels are to be reduced and tour intervals increased.

Falkland Islands. There has been a number of developments in the level of engineer support to the FI. It is our aspiration to provide the capability from the lead air support squadron of 39 Engr Regt. There will still be a requirement to deploy a maintenance section to the FI but this will be an improvement upon the current situation. The intention will be to deploy a squadron annually on a HQ BFFI sponsored construction project and to exercise the lead air support squadron role regularly in the FI. We await a formal decision on this proposed change.

Northern Ireland. Given the change in the Northern Ireland security situation, it has been

agreed that it is no longer necessary to deploy the roulement engineer squadron (RES) but that it will be at a high state of readiness having completed all necessary training. Some search elements will still have to be based in Northern Ireland. This is another important step in reducing the current high level of commitments.

East Timor. As I write, our commitment to Operation *Langar* consists of an EOD SNCO and JNCO who have deployed as part of the 2 RGR Coy Gp. However, a troop from 9 Para Sqn is at a high state of readiness to deploy and we wait to see how the situation develops.

RAF Operations. RAF deployments have, for the most part, gone on relatively unseen this year. However, I would wish to emphasize that support to the RAF has been considerable. The air war in the Middle East continues almost unabated although it attracts little media interest. 12 (Air Sp) Engr Bde has carried out a wide variety of important tasks varying in size from needing a single Sapper to quite complex squadron-size deployments, all too often at very short notice. I know that the RAF is delighted with the all the support that it receives, without which it would not have been able to prosecute missions in the Middle East and the Balkans.

Urgent Operational Requirements

ALL the operations and deployments during the year have needed additional equipment and special arrangements to ensure that units have the right equipment and resources to get the job done. The efforts of those sponsoring, procuring and managing equipment has, as usual, been vital and first class; the staffs of DDOR (Engr and NBC) and within the Defence Procurement Agency are to be heartily congratulated. The projects to put in place field accommodation, including the provision of quarrying and water distribution equipment, as well as the procurement of special EOD equipment, are major success stories.

Collective Training and Exercises

DESPITE the number of operational commitments placed upon the Corps, units continued to carry out interesting and demanding training in various parts of the world. Full engineer support was only possible for three of the four *Medicine Man* exercises and, as usual, provided high quality training for all who took part.

Field troops have taken part in a number of tactical effects simulation exercises. These exercises provide extremely realistic training including the registration of "hits" on vehicles or individuals followed by their immobilization. The sight of a complete squadron of battle tanks escorting an AVLB to a bridge site to ensure that an obstacle crossing would succeed is not easily forgotten!

Engineer troops have supported battlegroups in America *(Pond Jump West* and *Trumpet Dance)* and Kenya *(Grand Prix)*. Royal Engineers special to arm training has not been neglected and LAND Engr Div has programmed exercises involving planning, design, movements, resources procurement, artisan and combat engineer work in order to prepare units for operational deployments. In the past year these exercises have taken place in Kenya, Gibraltar, Belize and Canada. Additionally, a number of students from various RSME artisan courses have been involved in public utilities exercises in Cyprus and on Ascension Island thus providing realistic and challenging training. The Sappers in Military Survey remain in great demand and have provided support to over 60 exercises in the last year. These range from support to JDSC to brigade and division level exercises. Troops and equipment have deployed with 3 Cdo Bde on their major winter exercise for three months and on desert training with 59 Cdo Sqn. Military Survey has also deployed worldwide including Cyprus and Brunei.

The provision of support to all arms exercises remains our first priority but we must also maintain the artisan skills of our soldiers through demanding overseas exercises. I remain convinced that this type of training contributes greatly to recruiting and retention while maintaining our overall capability.

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Reserve Forces and the TA

SDR and the subsequent restructuring of the RE TA have dominated TA activities over the past year. 71, 72, 76, 77 and 78 Engr Regts (V); 198 Fd Pk Sqn (V) and thirteen STsRE (V) were disbanded by 30 Jun 99. 75 Engr Regt (V) joined RMonRE(M) in 29 (Corps Sp) Engr Bde and is converting to the ARRC GS role. 76 Engr Regt (V) reorganized into the new 71 (Scottish) Engr Regt (V) to join 73 Engr Regt (V) in 12 (Air Sp) Engr Bde. 101 (London) Engr Regt (EOD)(V), 131 Indep Cdo Sqn (V), 135 Indep Topo Sqn (V) and 412 Amph Engr Tp (V) continue, together with Jersey Fd Sqn (M).

HQ 29 (Corps Sp) Engr Bde was formally established in Aldershot on 1 Jul 99 in support of the ARRC. Elements of HQ 29 (Corps Sp) Engr Bde HQ, which included key regular and TA staff, deployed in support of HQ ARRC on Operation *Agricola*. The HQ includes a signals troop (V) and local recruitment for this troop has been made a priority.

Expansion of the Civilian Affairs Group (CAG), under SDR, is underway and the unit is on track to be fully operational by 1 Apr 00. Formed CAG units have also been deployed on Operation *Agricola*. Recruiting into CAG remains buoyant.

Engineer Logistics

THE experiences of the last year have reinforced the underlying principle that engineer logistics play a key role in our contribution to military capability. Yet again we have seen the value of retaining the ability to get the right materiel to the right place, at the right time and in the right condition. In the first six months of Operation *Agricola* £20M worth of engineer materiel was deployed to theatre. This has included the materiel support to humanitarian operations and the improved tented camps for units. It has involved the procurement and deployment of a large variety of equipment such as quarry equipment and explosives.

The role of the Engineer Resources Management Cell, in Bicester, was pivotal in achieving successful operational support. It provided a key link between the various procurement agencies (Defence Procurement Agency and Defence Clothing and Textiles Agency), the enablers (Defence Supply and Distribution Agency and Defence Transport and Movement Agency) and the Sappers deployed on the operation. Integrating the engineer supply chain into the army supply chain and the wisdom of embedding RE manpower in the various defence logistic organization agencies has proved successful.

Military Engineer Services (MES)

CONSIDERABLE change has occurred in the MES area. When the Defence Logistics Organisation formed on 1 Apr 99, D Engr Sp(A) transferred from HQ QMG to HQ LAND and was disaggregated. Its engineer resources function was absorbed into Engineer Division. Engineer Services staff as G4 MES became a branch in a new Estate and Works Division. The MES mission is to enable operational infrastructure doctrine, policy, management and engineering for armed forces and other government departments. This is carried out by the four principal parts of the MES organization; the MWF, the Works Inspectorate, the Engineer and Logistic Staff Corps RE(V) and MES (Wks) (Tech Skills). In common with the remainder of the Corps all four elements are particularly busy. MES (Wks) units and individuals continue to provide infrastructure engineering support worldwide. With the loss of the director's post, I have reassumed my position as head of the Group B Corps with daily responsibility delegated to Col Engr Svcs.

Military Survey

THE decision has now been taken that Military Survey will merge with the Joint Air Reconnaissance Intelligence Centre (JARIC) to form a new combined Agency on 1 Apr 00. The new Agency will be called the Defence Geographic and Imagery Intelligence Agency (DGIA) and will be headed by Brigadier Peter Walker. The new agency remains under the control

of Director General Intelligence and Geographic Resources (DGIGR). I am well aware that such organizational change alters career paths and promotion prospects and as such may create considerable concern. However, military survey officer careers will now follow the chartered engineer model, thus there will be greater opportunities for survey qualified officers to serve at E1 and E2. I also have no doubt that this change will enhance overall operational capabilities and as such is essential. Brigadier Walker and his implementation team are well aware of the problems and intend to establish a robust and effective organization; this will obviously include a sustainable career structure.

Some 35 per cent of military survey soldiers are deployed on operations and this figure does not include the large numbers involved in planning. Every effort is being made to drive commitments down and the tour intervals up, and I am optimistic that these efforts will bear fruit in 2000.

During this year military survey has conducted a trade review the results of which will ensure that trades and careers are better balanced; and that soldiers are properly prepared for the digital battlefield.

Manning and Career Management

Now in its third year, REMCM Div has taken on much wider responsibilities than was originally envisaged. Additionally, the scale of change within the Army and the Corps to be planned and executed is massive. I am well aware that this has stretched REMCM Div to its limits. The degree of operational turbulence has compounded the problem. There is significant good news however. The Corps continues to be well recruited and manned, the quality of individuals appearing before promotion boards is extremely high and there has been success in selection for high profile and important posts outside the Corps.

Soldier Issues. The radical overhaul of the Corps manning liabilities under the MER has provided the opportunity of addressing many of the underlying weaknesses within the career structures of the Corps. I have taken the opportunity of ensuring that:

- Every soldier is able to progress to warrant officer within his own Career Employment Group (CEG).
- There is an equal chance of promotion at each rank within CEGs.
- There is an overall better chance of promotion at each rank.

These are significant improvements for the individual, and the Corps will help to sustain these improvements in the medium and long term. I am optimistic that such changes will have a positive impact on retention. I anticipate a major improvement in unit administrative efficiency with the introduction of Regimental Career Management Officers within each unit in the coming year. I am confident that, provided the Liability Arbitration Tribunal (LAT) approves these changes in October 1999, they will deliver major long term improvements to the career structure of our soldiers. In addition there are a number of initiatives in train that will significantly improve soldier manning and career management:

- The "Best Effort" principle endorsed by Comd Engr LAND, whereby soldiers undertake career courses at the earliest opportunity irrespective of operational or other tours ensures that the trained capability of the Corps is maintained.
- Introduction of Corps unit target manning levels.
- Widening of the RE limited promotion zone to allow extra promotion opportunities.
- Taking a risk by selecting individuals for promotion for posts yet to be established under SDR implementation.
- Grading of lower medical category and "about to be qualified" soldiers at promotion boards.
- Educating the decision makers by improved contribution to RSME command courses, issuing confidential report content guide for initiating officers and Part 3 writers and widening of promotion board membership to include observers.

I am disappointed that not all individuals have had the opportunity for a career interview with REMCM and neither has it been possible to run MCM courses for adjutants, manning officers, senior officers or clerks. Equally important, the lack of manpower in the APC has led to a degradation of quality control and disuse of many self-checking working practices. Col REMCM is, with my full support, working to increase the poor manning levels within RE MCM.

Soldier manning. The soldier manning position compared with other cap badges appears very healthy. For 99/00 the manpower target is 7341 and our trained strength as at 1 Aug 99 was 7408. However, there has been an increasing need to fill unestablished posts and a Phase 3 training backlog of between 300 to 400. Manpower cover is not authorized for additional soldiers to cover 5½-month long basic employment training/higher employment training courses which produces gaps in units despite the Corps being so well recruited. The

Corps lost 900 (12 per cent) soldiers last year of which 589 left voluntarily either on premature voluntary retirement or on giving notice.

Most units have stayed above 95 per cent manning except for 32 and 35 Engineer Regiments which have suffered significant under-manning throughout the year. This percentage hides the Corps shortfall in C^3S (command, control and communications systems) and driver tradesmen. These CEGs remain undermanned and the gaps are shared across the Corps equally. SDR implementation will create further under-manning. EinC(A) and Comd Engr LAND will be producing a dilution plan for implementation by REMCM Division once the MER/LAT process is complete.

Officer Issues. In the last year there has been a number of new initiatives designed to ensure greater career satisfaction and more involvement of officers in the development of their own individual careers. These initiatives include:

- An Army Personnel Centre-lead fundamental review of the way career advice is provided and organized is being conducted. A trial on the provision of a formal career review has just been completed.
- Future policy on the career management of officers is currently under consideration by the Army Board. It is based on three stages:

  Stage 1: Foundation training; from commissioning and up to approximately age 32 years.
  Stage 2: Gaining experience in approximately three of the five employment fields (defence policy, logistics, technical, combat and human resources.) until approximately age 42.
  Stage 3: Informal specialization until the end of an officer's career at approximately age 55 years.

- A "Stepping Stone Approach" to commissions was introduced for all officers on 1 Apr 99 with the exception of university cadetships and Welbexians. All other officers will start on a short service commission. However, conversion prospects to both intermediate regular commission and regular commission will be double current levels.
- The the special list will end in 2003. The proposed redundancy scheme for special list officers has now been formally abandoned.
- The transition to the new confidential report reporting timetable for majors is now largely complete.
- The introduction of the officers' joint appraisal report is likely to be delayed until 2001.

  There has been real success in filling the professional engineer training courses and in selection for Staff College which signifies a major and tangible investment in the future quality of the officers of the Corps. It will however create gaps within units.
- As a result of SDR there will be improved prospects for sub-unit command, although regimental command prospects have diminished slightly. There may be some turbulence and short notice moves until full manning is achieved by 2005.
- The Pink List for promotion to lieutenant colonel was announced on 2 Nov 99. The Corps has been allocated 14 promotions, not including chartered engineer or survey group B promotions. This is a similar quota to previous years.

Career Management Summary. There is much to be positive about the manning and career management of the Corps. However, the coming years pose considerable challenges if we are to deliver SDR and the new career management initiatives. It will require a major effort from all of us. At unit level this starts with the need to give priority to the unglamorous business of administration. I hope to be able to assist commanding officers in this respect with the creation of a new appointment: the regimental career management officer. This post will be filled by a RE late entry officer.

Individual Training

THE year has seen considerable progress on a broad front, whilst the pressure to restrict or reduce costs for training continues to be applied. The drive for efficiency within the RSME is essential. What is concentrating the mind at the moment is ensuring that no arbitrary cuts that damage our operational effectiveness are implemented. A notable occurrence was the Defence EOD School being placed under command of Comdt RSME on 1 May 98 as part of an Army Training and Recruiting Agency (ATRA) internal reorganization.

The implementation of the RE Employment Structure Review continues satisfactorily. All phase 2 courses have now been introduced, and the phase 2 specialist qualification courses will run from late 1999. The phase 3 and phase 3 specialist qualification courses will be introduced progressively from May 2000 as their design is completed. In the interim, the transitional phase 3 courses will continue. Significant advances have also been made with the introduction of National Vocational Qualification awards. Such awards are now offered on the military engineering ME C^3S class 3 and class 1 courses, the signals corporals' course, seven of the phase 2 artisan courses (bricklayers and concretors, carpenters and joiners, heating and plumbing, fabricator, electrician, fitter general and plant operator mechanic), and the phase 2 well driller module. The pilot assessment and foundation courses for ME (fitter general) and (electrical) have

proved to be extremely successful in reducing wastage rates, and similar foundation modules are being introduced for phase 2 design courses (construction materials technician, design draughtsman, survey engineer, and draughtsman electrical and mechanical) from Aug 99. The revised 26-week RE troop commanders course was introduced in Jan 99, and thus far has been well received. Three of these are now run each year, which matches the output from RMAS. The field army is providing additional instructors to the RSME in order to reduce the phase 2 artisan training backlog.

The excellent outcome of SDR for the Corps means that the RSME will be required to train considerably more soldiers than at present. During the surge training years between 2000 to 2005, annual increases of 27 to 44 per cent will be required for phase 2 combat engineer training, 40 to 58 per cent for ME (C^3S) training, and 21 to 36 per cent for artisan training. The respective annual long-term steady state increases from April 2005 are 22 per cent, 23 per cent, and 17 per cent respectively. The RSME is now working to ensure that the infrastructure needed to deliver these increases is completed in accordance with the SDR timetable.

The ATRA continues to study further options for the rationalization of training. The Corps will participate in an ATRA study into the rationalization of EOD training, and we await the outcome of an ATRA study into the rationalization of communications training. On a wider front, we expect to be closely involved with the study into the rationalization of tri-service training. Pay 2000 is another tri-service study, where officers terms and conditions of service look to broadly remain the same, but soldiers pay bands are likely to change. We have asked for a number of our trades to be evaluated, and hope that due recognition is given to the demands placed upon Sappers qualified in them. There is also a review of single entry training where proposals to amalgamate phase 1 and 2 training to produce a higher standard of soldier in a shorter time are being investigated.

RSME

THE Minister (Armed Forces) has now given his approval for the RSME's public private partnership (PPP) project to move to the procurement stage. He has endorsed a public sector comparator based on the RSME continuing to operate from its present sites. Notwithstanding this, the private sector will be invited to examine the viability of concentrating the RSME on a single site as long as it can offer best value for money. The scope of the project is wide ranging, and bidders will be invited to submit their proposals for the delivery of artisan, technical and professional engineer, tidal watermanship, and specialist driver training, as well as a wide range of support functions. The project was briefed to the private sector at an industry briefing day at Chatham on 10 May 99, which was attended by some 160 delegates. Nine consortia subsequently responded to the pre-qualification questionnaire, from which six have been invited to submit outline proposals (ISOPs). Following evaluation of these in March 2000, three consortia will be invited to respond formally to an invitation to negotiate in May. The project timetable assumes a contract award in June 2001, with contract implementation in December 2001.

Significant improvements in the RSME's infrastructure are also underway. The £15M refurbishment of north, south, and west blocks in Brompton Barracks will be completed by Autumn 2001, as will the major refurbishment of the Gibraltar Barracks cookhouse. The refurbishment of Buildings 6 and 7 at Wainscott was completed in March this year.

There is considerable change on the horizon, particularly with PPP, the number of important studies currently ongoing and the continuing pressures on us to reduce costs. The exceptional results that our officers and soldiers produce on operations are evidence of the thorough, high quality individual training that we carry out. After support to operations, the maintenance of our training base is top of my list of priorities.

EQUIPMENT

THE engineer equipment programme remains well balanced and there has been substantial progress during the year. The BR90 long span and two span equipments have been accepted and will start to enter service later in the year. Operational analysis has allowed plans for other bridging to be confirmed. The contract for Close Support Bridge Trestle has been let. Tenders for a pontoon system for BR90, for Future Light Bridge and for New Logistic Bridge are being assessed. Future Light Bridge will be based on single storey MGB and provide up to a 30m dry span bridge at MLC 35 using a new reinforcement system. It will also have a ferrying capability.

Both of our key A-vehicle projects are moving ahead well. The feasibility studies for our future engineer tanks, now called TITAN (AVLB) and

TROJAN (AVRE), are underway and due to report early next year. Two tenders for the project definition stage of TERRIER, the combat engineering tractor replacement, were awarded in August.

The first of the production run of the SHIELDER vehicle-launched scatterable mine system was delivered to Bovington in June. The ACEATM (aimed controlled effect antitank mine) off route mine project is back on track with Germany as the lead nation after the French withdrew. Tenders for an area defence weapon (ADW) have been invited. The one area of uncertainty in the mines programme is whether there is a long term requirement for pattern minefields. This is being reviewed with the help of operational analysis.

The staff requirement for MINDER (mine detection, neutralization and route marking) (route proving) is being staffed and should be approved this year with an in-service date of 2004. MINDER (recce) will follow on, making use of smart procurement procedures for incremental acquisition, working with industry to enhance the capabilities of equipments through their life as new technology becomes available.

Production contracts have been let for the DEUCE (an airportable rubber-tracked dozer) to support light forces, for the armoured heavy wheeled tractor, the flush capping system for airfield damage repair and for a new range of well drilling equipment for MWF. Machines from three companies have been trialled to allow us to select a new family of excavators and trials of three contenders for the new medium wheeled tractor will start by the end of the year. The contract for trials craft for the replacement combat support boat has been placed and that for replacement assault boats should follow shortly.

The Battlefield Engineer and Terrain Application (BETA) technology demonstrator was shown to engineer audiences in Germany and Bosnia during late 1998 and was received with great enthusiasm. Funding for BETA was achieved in LTC 98 (long term costing) and enhanced in LTC 99, reinforcing the position of BETA as one of the leading programmes in digitization stage 2. This will enable BETA to be introduced in conjunction with BOWMAN (new Army area communication system), formation battle management system and battlegroup battle management system.

Doctrine

THE DGD&D conceptual work, which is articulated in the Future Army paper, focuses firmly on force development in the time scale 2020. It directly affected SDR thinking and in turn has influenced the new establishments of our units. The Corps' aspiration for a squadron to support each manoeuvre battlegroup has been achieved for 1(UK) Armd Div and we have gone some way towards this in 3 (UK) Div. The Air Assault Brigade will have close support engineers and as the doctrine for the new brigade continues to develop, the doctrine for the engineer support required is being produced in parallel. With our continuing emphasis on expeditionary operations, our doctrine is developing in this area, and Military Engineer Services are leading in producing guidance on infrastructure management on operations in a joint publication.

The "UK Landmines Act" has passed into law, confirming the ban on the use of anti-personnel mines. All UK stocks of anti-personnel mines have been destroyed. Work to investigate alternatives has not yet identified any immediately practical options but there are some promising areas where further investigation will take place. What has been confirmed is that a substantial military capability has been forgone and that it will not be easy or cheap to replace.

On the humanitarian front, the Mines Information and Training Centre is now well established and procedures are being developed in the Mine Action Centres. The UK's policy is that the military should only be involved in demining when there is an operational need or when there are immediate humanitarian reasons for doing so. This was sometimes the case in Kosovo where in certain circumstances unexploded cluster bomb sub-munitions dropped by NATO aircraft were located, fenced, and where necessary, cleared by EOD personnel.

Regimental Affairs

RE Association. REA branches continue to play not only a vital role in providing welfare support and advice to those Sappers and their families in need but also by providing a valuable interface with the local community. If branches are to survive and continue their good works, recruitment into them of younger members of the Corps is very important. Just over 50 per cent of the day's pay scheme was spent on benevolence in the last year. The number of individual cases handled is comparable with previous years but is expected to reduce from 2005 onwards.

RE Museum. The museum was awarded Designated status by the Museums and Galleries Commission in October 1998 in recognition of the

excellence of both the museum and library collections. The only other military museum to be so recognized is the Tank Museum at Bovington. Museums with "Designated" status qualify for additional government funding support; our museum has already submitted a bid for £150,000.

The Army Board has given encouraging support to museums that play an important role in promoting the excellence of the Army in the community at large. With a formal customer/supplier agreement between the RE museum and the MOD being trialled this year, there is every prospect of continued MOD support for building maintenance and some staffing in the longer term. Equally important, a better guarantee of security of tenure which will provide the assurance necessary for longer term investment and development.

The RE Museum Foundation, the fund-raising organization for the museum, continues its valuable work. A construction industry day was held at the end of last year at Chatham, attended by many of the leaders of industry, following which generous pledges of financial support for the museum were received.

Corps Millennium Events. The Corps is sponsoring several millennium projects. Four are currently being planned. First, a sponsored run around the UK ending up at Greenwich on 31 December 1999 to coincide with the Dome's opening. Second, an expedition to Siberia by members of Military Survey. Third, an expedition by members of 25 Engr Regt to Sabbah in conjunction with the Malaysian Army. Finally three sundials are to be constructed: one on the meridian line at Greenwich, one on the embankment at Blackfriars and the third in the grounds of the RE Museum.

Recruiting and Retention. I am delighted to report that the Corps continues to attract high quality men and women. Our officer and soldier recruiting figures are the envy of the rest of the Army. Despite the demographic trough bottoming out this year, the number seeking a commission in the Corps is at a five-year high. The RE Arms Selection Board is interviewing a quarter of each Sandhurst intake and the number of RE sponsored cadetships is steadily increasing. On the soldier side, the single entry target of 923 recruits for the year was exceeded by nearly 10 per cent. A new RE Youth Liaison Team (REYLT) was formed when the RE Mobile Display Team was disbanded at the beginning of the year. The team has been active in visiting schools and colleges throughout the country and has presented to over 6000 students since it formed. A hands-on exercise developed by the team for students to build and test a bridge made of cardboard to their own design has proved very popular. I am convinced that such buoyant figures are indicative of the high regard in which the Corps is held by society and the hard work that everyone puts into recruiting and public relations. I am, however, a little concerned at our retention levels. This is a much studied and complex area; suffice to say that I wish it to receive everyone's full attention. We must all work together to both recruit and retain our officers and soldiers.

Corps Sporting Achievements. The Corps has always worked hard and played hard at team and individual sports; last year has been no exception. Some of the successes have been:

- 42 Svy Engr Gp reached four Army championship finals, winning the Army Minor Units Hockey Championships, the Army and Corps Orienteering Championships, the Army Minor Units Football Championships (14 Indep Topo Sqn) and were runners up in the Army Minor Units Rugby Championships.
- Corps footballers had their most successful season for many years winning both the Massey Trophy (Inter-Corps League) and the Triangular Trophy. In the Army Major Units Cup, 3 RSME reached the semi-final and went on to beat 1 RSME Regiment in the Blythe Cup (UK).
- Turning to boxing, Cpl James won the Army Individual Novice Light-Heavyweight Championship and Cpl Vella was a losing finalist at Heavyweight, both serving with 33 Engr Regt (EOD). 59 Indep Cdo Sqn are Army Minor Units Champions.
- Once again the Corps canoeists came second overall in the Devizes to Westminster Canoe Race, were the first Services team and Cpl Vaughan and Spr Waterstreet paddled the fastest Services Canoe.
- Golf saw Cpl Taylor of 22 Engr Regt become Army Champion and the Corps winning the Army Team Championships.
- At shooting, in the Inter-Corps Target Rifle Match, the Corps Team was runner up with WO2 Quillam achieving the second best individual score.
- 35 Engr Regt Alpine and Nordic skiing teams retained the Princess Marina Trophy for the 5th time in succession; a magnificent achievement.
- In rugby league, 38 Engr Regt became Army Champions.
- At cricket, 39 Engr Regt was runner up in the Major Units competition and 14 Indep Topo Sqn was runner up in the Minor Units.
- Lt Col Mills skippered the leg from Penang to Cape Town in the Transglobe sailing race. Lt Col Nell then took over from Cape Town to Buenos Aries.
- Finally, Major Williams won the Inter-Services Master at Arms title and the Army Foil Championships at fencing.

Adventure Training and Minority Sports. Seventy five adventurous training expeditions involving individuals and units were supported by Corps funds during the past twelve months. They included:

- climbing in France, USA, Bolivia, Tanzania and Nepal;
- trekking in Nepal and central Spain;
- sub aqua expeditions in Belize, Scotland and Devon;
- expeditions in Ghana, Chile, and Paraguay;
- sailing from Singapore to Capetown, and in Denmark and Sweden;
- white water rafting in Nepal;
- skiing in France, Spain, Austria, USA and Canada;
- parachuting in Cyprus.

In addition, a number of individuals competing at Army, national and international level have been supported, taking part in the Army Judo team competitions, the World Karate Championships, the Army Bobsleigh Championships, the Sahara Marathon and the World Sailing Championships, and as national representatives in triathlon and dualthon.

Military Secretary Appointments and Honours and Awards

Lieutenant General Sir Scott Grant KCB was appointed the Chief Royal Engineer and Major General R A Oliver CB OBE a Colonel Commandant Royal Engineers, both in May 1999. In the early part of this year, the following senior officer appointments were announced: Major General C L Elliott CB MBE to COS HQ Quartermaster General, Major General K O'Donoghue CBE to Assistant Chief of the General Staff, Brigadier I D T McGill CBE to Commander Individual Training Group, Brigadier P A Wall OBE to Commander 24 (Airmobile) Brigade, Brigadier T H E Foulkes to ACOS Estates & Works HQ LAND, and Brigadier K H Cima to ACOS Ops HQ Adjutant General.

The following appointments were recently announced: Major General J D Moore-Bick CBE to be Military Assistant to the High Representative in Bosnia-Herzegovina. Major General C L Elliott CB to be Director General Development & Doctrine in February 2000 in succession to Major General A D Pigott CBE, who is to be Deputy Chief of Defence Staff (Commitments) in the rank of Lieutenant General. Brigadier D R Bill to be BGS LAND in January 2000, Brigadier P A Walker to be Leader Implementation Team Defence Geographic and Imagery Intelligence Agency (DGIA), Brig M A C Hughes OBE to be ACOS Plans HQ Adjutant General in January 2000, Colonel M F N Mans to be Commander Engineer LAND in January 2000. Colonel R M A S Melvin OBE, to be Comd Engr ARRC in May 2000 and Colonel N H Rollo to be Commander 19 Mechanised Brigade in April 2000.

During the past twelve months, the number of honours and awards conferred on serving members of the Corps includes: The award of a MB (Canadian Medal for Bravery) to WO2 Carr and QGMs to Capt Shields and WO1 Grantham; appointment to KCB of Lieutenant General Sir Scott Grant, to CB of Major Generals Elliott and Oliver, additionally five were appointed OBE, eleven MBE, ten were awarded the QCVS and four the QCB.

Conclusion

The Corps remains heavily committed. Wherever the government chooses to deploy a military capability Sappers are to be found carrying out essential enabling works and providing intimate support to all manner of units. Without us they would be less operationally effective and certainly less comfortable! Tour intervals are too short, especially for specialist units and an increasing number of individuals with particular skills; I am working to drive them back up to a more appropriate level. But the utility of the Corps has been recognized by a 14 per cent increase in manpower following the SDR. The challenge now facing us is to maintain our success on operations whilst at the same time implementing SDR. Implementation will take five years and a key factor will be our ability to recruit and train soldiers. At the moment, recruiting is going very well indeed; the other side of the same coin is retention and this requires our constant attention. We must get it right; keeping experienced young men and women, in whom we have expended considerable training effort and resources, is absolutely vital to the Corps' future wellbeing. I am confident about the future. There are many challenges ahead but the qualities displayed by all who I have visited this year make it quite obvious to me that the men and women of the regular, TA and reserves who make up the Corps will rise to it all.

Strategic Plan For The Corps of Royal Engineers in the 21st Century

MY predecessor set out a Development Strategy in which he identified that the role of the Corps was widening from the traditional; helping the Army "to live, move and fight whilst preventing the enemy from doing so." His strategy, pre-Strategic Defence Review, set out a way forward for three years and, in particular, provided the bedrock for the Corps to argue its case within the SDR. It remains valid. However the strategy relates to an EinC(A) mission and is not entirely one for the Corps as a whole. Consequently future action is defined more in terms of action within HQ EinC(A) or with the interfaces between HQ EinC(A) and other parts of the Corps. He advised me that a more far-reaching strategy would be required once I was firmly in the chair. Indeed this is necessary if I am to fulfil the mission of EinC(A), given to me by CGS: "As the professional head of the Royal Engineers, to provide both the focus and direction for the Corps."

I have consulted widely and am very grateful for the time devoted to assisting me. The comments have been most perceptive and helpful. Nevertheless I have not adopted them all since in the final analysis this paper must reflect what I want to say and be set out in my language. The focus for the vision is commanding officers, officers commanding, regimental sergeant majors and squadron sergeant majors along with engineer staff at all levels. It is a first iteration so I have deliberately included my methodology to assist in your understanding of its construction.

So this paper articulates a strategy and a vision for a coherent Corps. It sets out a framework for now and the future and must be revisited time and again to ensure we are all pulling together. It will need amending when necessary. What the Corps has done and is doing is magnificent. We are extremely well recruited and our people are competent and motivated. My priority remains the individual. Individuals make up the teams that produce the output. Commanders design and deliver that output: operational success. We must embrace change, it is a constant, but we must know what it is we are trying to achieve. This paper provides the framework and the vision to do that. We must continue to be innovative and seize the initiative, continue to build the family of the Corps and continue to succeed in getting the job done. Our people are our strength and allow the Corps to be, truly, ubiquitous.

Engineer in Chief's Vision For The Corps of Royal Engineers Into The 21st Century

INTRODUCTION

THE end of the "Cold War" resulted not in a decrease in the commitment of armed forces but an increase, albeit in more varied and discrete forms. "British Army 2000" (BA 2000), latterly the Future Army concepts, has been the ongoing force development work articulating the need for a flexible and modular army for the next century. The Strategic Defence Review (SDR) has taken many of the threads of both BA 2000 work and Future Army and, within the resources available, has set in motion the creation of an army within that doctrinal base. SDR provides a framework upon which to build. CGS has set out his Vision for the Army in the 21st Century *(see over the page)*. This is the foundation for the Vision for the Corps into the next century. CGS has given me my mission as EinC(A) "As the professional head of the Royal Engineers, to provide the focus and direction for the Corps." In this short paper I articulate the strategic plan for the Corps of Royal Engineers, as part of the Army, in support of the Nation's wider defence interests. Resources are, and will be, a constant limitation on what we wish to be and to achieve. Hence we must have a strategy against which the Corps can prioritize, develop and maintain core capabilities and professional standards, and seize advantages when they occur. Further, we must continue to invest in our most valuable asset, the individuals who man the Corps in both its active and reserve components.

CGS' Vision

"A high quality professional Army, valued by the Nation, robust and useable, an Army ready to undertake at short notice any tasks required of it from civil aid to warfighting. An Army characterized by an ethos whose core values are:

Selfless commitment, physical and moral courage, (self) discipline and respect for others; which therefore recognizes the need to develop and educate its people, bases advancement on equal opportunities and merit, offering them a rewarding and valued career of first choice."

General Sir Roger Wheeler GCB CBE ADC Gen

Methodology

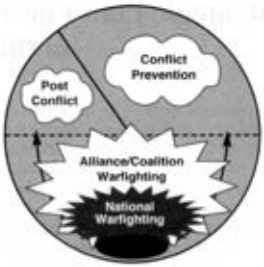
I HAVE taken as a start point the wide analysis set out in my predecessor's development strategy. I have used the Army Policy and Resources Committee-endorsed Strategic Planning Process and Terminology and CGS' Vision as a template. This paper sets out my analysis in the form of:

- Building the Vision.
- The Vision.
- The Corps' Mission.
- Strategic objectives.
- Summary.

The responsibility for detailed planning remains with those who own, in command and budgetary terms, the various parts of the Corps. This paper is thus, of necessity, philosophical and descriptive in nature not prescriptive. My intent is to develop a number of interrelated lines of activity which lead to the strategic objectives. They should focus the activities of the component parts. I would hope that the vision and mission articulated here will be enduring whilst, clearly, the strategic objectives will change with time, success and circumstances.

Building the Vision

Spectrum of Conflict. The CGS' Vision clearly puts the ability to fight, sustain and win high intensity combat above all else. So it is for the Corps. In broad terms there is a pre-eminent requirement to organize, prepare for and be capable of high intensity warfighting whilst being sufficiently flexible and able to meet the requirements of the, more likely, lower end of



the spectrum. Specifically the key challenge is to develop and maintain professional excellence on the combined arms battlefield whilst at the same time redeveloping our expertize in the lines of communication/joint rear area (including support to air operations) set against the current high level of commitment.

High Intensity. High intensity conflict is likely to be characterized by being joint and multinational, large scale and expeditionary. Operations will have high tempo and will give priority to manoeuvre. The engineer contribution will stretch from intelligence (mapping, data, infrastructure, Terra, support to the combat arms, support to the logistic effort and to infrastructure (ports, railways, airfields, accommodation, store areas etc). Works and resources will also play a key role. Strong links must be established with the specialists from civil industry so that they can play their part and we can use them appropriately. To manage properly our support to such a wide spectrum of geographically-spread activities, with insufficient resources to manage all essential support at once, leads to the need for main effort and for flexible and timely resubordination of units and sub units. Hence we must be part of the planning process and command engineer troops at the highest level.

Lower Intensity. Lesser operations are also likely to be expeditionary and may also be joint and multinational. Deployments are likely to be of longer duration, on a smaller scale and the engineer force (like others) is likely to be capped. Again engineer input into the planning phase is essential and a commander engineers must be appointed to maximize the use of assets and resources. There will be increased emphasis on being able to operate independently at lower levels and on individual skills, both leadership and trade skills. As in all types of operations, engineer force packages are likely to be tailored to the tasks envisaged and will require flexibility at unit level.

Roles

Tri-Service Support. The Corps is part of the Army; it provides our ethos and support. Whilst the largest part of our orbat and effort is in support of the Army, we also support others. For example, a very significant proportion of the Corps, some 11 per cent post-SDR, is to be dedicated to support of air operations. Support to maritime operations remains grouped on two dedicated squadrons. However this can only be seen as a generic structure. It does maintain an essential level of core expertise but in any joint operation there will be supported and supporting components, land, maritime and air. As a campaign develops the emphasis will move from one role to another as the situation unfolds and this will almost certainly require the re-tasking and resubordination of engineer effort between and within components to meet the operational need. Whilst our new organization, training and overall emphasis is on support to all three services, there are other roles that do not focus on defeat of the enemy in warfighting.

Support to Other Government Departments (OGDs).

General. The Army, and the Corps, is mandated to support the nation in military aid to other government departments, to the civil community and to the civil powers.

Home Office. Support to the Home Office has resulted in some ad hoc taskings for the Corps such as fencing Molesworth and maintaining vital public services. There is also a standing requirement to provide EOD, high risk search and survey capabilities. The threat from international terrorism will ensure that these latter capabilities will remain vital parts of the nation's armoury.

Foreign Office. Support for the Foreign Office is broader in scope. It includes support to humanitarian demining, disaster relief, international training and development, and military equipment sales. Under the broad banner of defence diplomacy (one of the specified roles in SDR) we can foresee a more coordinated effort developing where the Army, and particularly the Corps, works within an overall campaign in conjunction with the Department for International Development (DFiD, formerly the Overseas Development Agency), the host nation, perhaps British industry and others.

Wider Engineering. The history of war reveals army level engineers dedicated to such tasks as port reconstruction, constructing airfields, railways, works, tunnelling, mining and many more. Outside full mobilization for war we have been unable to afford the full breadth of role specialization for the Corps. So now and in the future, military engineers need to be multi-roled and multi-skilled to retain core capabilities and to give best value for money, so making maximum use of minimum resources. Our trade base must be as broad and as deep as is necessary and affordable. We must maintain a cadre of chartered engineers and specialists who have the training and the capacity, with a workforce of artisan tradesmen to undertake challenging engineer projects. Inevitably, recognizing resource constraints, the Corps has, and will have, only limited capability for large-scale engineering tasks. Thus we must maintain our important links to industry, particularly through the Engineer and Logistic Staff Corps (E&LSC).

Military Engineers. The Sappers of today and the future are to be military engineers not engineers in the military. Hence all Royal Engineers must be:

- soldiers,
- combat engineers,
- specialists,

in that order. Within the term specialists I encompass all our professional and trade skills and qualifications. I restate these priorities to reaffirm our broad military engineer ethos. Nevertheless by undertaking all three we can never attain the standards that could be achieved by concentrating on any one area. The above paragraph illustrates that frequently, to undertake particular tasks, the priorities need to be reversed. In these circumstances the specialist takes the lead. We must continue to reassess the balance between these priorities in terms of the training and resources devoted to them. The Royal Engineers Employment Structure Review (REESR) continues to do this for our non-commissioned ranks and the job evaluation and redesign of the Troop Commanders Course is the mechanism for our officers. But our policies, doctrine, structures, procedures and the majority of training must be based on success in war. This requires repeated emphasis since we will more often structure for and undertake other tasks. For tasks other than war the risks taken in our training can, in part, be offset by pre-deployment task-specific training. Key to maintaining the necessary range of capabilities is a fully integrated TA to bring not only their enthusiasm but also their depth of expertise that we cannot always maintain in the regular part of the Corps. There is but one Corps of volunteers with regular, territorial and reserve components. They are interdependent and are mutually supporting.

Structures. The Corps must be based on coherent, viable and sustainable units. They must be based on support to warfighting and adjusted to

match other tasks. They must be manned at the minimum effective level, balanced by the need to provide realistic and achievable skill development and promotion chances for individuals. Sufficient reserve is needed within the whole structure to cope with the manning demands of training courses, the sick, leave and overall care for individuals. There must be a proper balance between combat support output and combat service support sustainment. The overall structure, modular in its concept, must be flexible to allow reinforcement to match commitments. And having committed ourselves to the SDR structure we must also ensure that close support regiments are capable of fulfilling general support roles and field squadrons in general support regiments are capable of taking on Corps- and Army-level tasks.

Equipment. The Corps must have the best equipment for its role based on the doctrine of how we undertake our work. It must match the tasks and be at least as capable as the equipment of other Arms. It must be properly supported. It must also provide value for money, recognizing that the cheapest is not necessarily (and rarely is) the most cost effective. We must build on the Sapper trait of embracing the innovative. Hence whole-fleet management (WFM), public private partnerships (PPP) and the like need to be seen as opportunities to do things better.

Corps Ethos. Multi-roling, multi-skills and reorganizing manpower for specific roles and tasks before an operation or during it, requires planning of and command of engineers at the highest practical level. The backbone to this capability and that which sustains our people is Corps ethos: the "family of the Corps"[1]. I am convinced that this will remain more important than unit or sub-unit loyalty; strong though that is. This is likely to be tested fully when we are required to backfill units from others.

People. The Sappers of the 21st Century will be human, subject to the frailties, ambitions and strengths of the species. He or she will need to be physically and mentally robust, capable of maintaining a fighting spirit in the face of sustained hardship and danger. In the most demanding of missions, they will have to be capable of withstanding, both physically and morally the stress of 24-hour battle, at a pace and intensity so far not experienced. The bonds of comradeship and the response to personal leadership will remain essential features of the moral element of fighting power. Despite the opportunities offered by technology, human willpower and courage will remain predominantly important foundations for military success. The inescapable requirement to be operationally effective at all times ensures that the individual will remain the Corps' most critical asset.

Leadership and Training. Individuals, and the Corps as a whole, must be properly trained, motivated and well led. They need sufficient initial training to allow them to take their place in a unit order of battle. Thereafter they must be given sufficient additional technical training to match the Corps' requirements as to capability and, within constraints, match the need for individual personal development. Upon this skill-base collective training then produces operational effectiveness. Leadership is key. Our leaders, NCOs and officers, must be of high quality, challenged and well trained. The individual must be nurtured and treated with respect. He or she is our most valuable asset and must be properly managed. This means: challenge, career

[1] The head of the Corps family is the Chief Royal Engineer, appointed by HM The Queen. He runs Corps affairs assisted by eleven other colonels commandant, the EinC(A) and the Regimental Colonel. The EinC(A) is the professional head of Arm. The Corps RSM guides the Corps' WOs and SNCOs thus building them into a corporate body and channels a vital two-way flow of information between those who direct the Corps as a whole and those not commissioned. There are nine broad components of the family of the Corps: The Institution of RE, Corps Finance (sport, adventure training, ethos and benevolence), the Regimental HQ, The RE Band, The RE Association, the HQ Messes, the museum and library, those retired from the Corps and, of course, the serving body of the Corps. The Chief Royal Engineer's Committee directs the components of the Corps in all areas that are not EinC(A)'s specific province; setting out direction for the future. It sets out a common set of ideals and standards and looks after individuals serving and retired. Honorary colonels, people of distinction, are appointed to our TA regiments. They not only bring great interest and influence to bear in supporting their own regiment but also act as advocates of the Corps as a whole. In addition there are "friends of the Corps" both retired Sappers and non-Sappers who hold positions of influence who directly and indirectly assist the Corps.

opportunities, variety of postings, stability and looking after their welfare at unit and Corps level. They must feel that they belong to the family of the Corps both during and after their service, and have pride in cap badge, unit and sub unit.

Vision

So my vision for the Corps into the next century (and for the last part of this one) consists of:

- A highly professional, capable and flexible Corps of military engineers: regular, territorial and reserve.
- In its discrete parts and as a whole, the Corps must be competent, confident and reliable.
- It must be manned by well educated and trained personnel, individually and collectively.
- They must be physically and mentally robust individuals so we must recruit, retain and reward the best.
- Units and sub units must be sufficiently well manned and equipped to accomplish the most likely tasks and be capable of reorganization and expansion to match the worst case.
- We must continue to be multi-roled and multi-skilled. Combining this with our ability to be fully manned will open opportunities in the future.
- Our soldiers and officers must be challenged and we must look after them.
- The Corps must continue to be a respected national institution, as described by CGS for the Army as a whole and be seen to strive and attain the highest professional and engineering standards. This is true both as part of the Army and in our own right.
- We must be optimized for success in warfighting in a joint, probably multinational force, equally at home in the combined arms battlefield as in the communications zone/joint rear area.

in order to deliver the Corps' Mission.

Corps' Mission

To provide the military engineering required to enable the UK's armed forces to deliver the military capability required by Her Majesty's government in peace and conflict.

Strategic Objectives

General. The strategic objectives for the Corps, loosely grouped into operational, human resources and influence, are pulled together by various lines of interrelated activity for the Corps in the medium- to long-term providing direction as we move forward. These objectives will require routine re-examination to ensure they remain relevant and regular revision as short-term objectives are achieved.

Operational

Success. The most telling arguments within the SDR debate that led to the increase in the regular part of the Corps centred on the degree of overstretch, considerably greater than most of the Army. Operations in Kosovo already mean that tour intervals will be even shorter. Nevertheless, the Corps has got the job done and to the highest standards possible within the circumstances. This must continue – it is our strength. Indeed, whilst it is imperative that some new units programmed into SDR need to be drawn forward to reduce this overstretch, our purpose and focus must remain on operational success. It is the Corps' performance in the field, meeting our mission, that is our output.

SDR. We need to implement the changes inherent in SDR as quickly as possible. However it must be done in a balanced way so that risk is minimized and we continue to care for our people. We must create viable, coherent, sustainable structures and organizations based on operational output. We must also ensure that we have sustainable trade structures and reasonable and equitable opportunities for promotion. SDR set out our needs for the future against a set of assumptions. However our increase in manpower was capped to match available resources. Therefore we must ensure, in future post-SDR establishment action, that we gain these necessary enhancements which were identified in SDR but postponed. Although in the SDR our TA has taken cuts of 56 per cent it remains an essential part of the Corps. The TA must, as soon as possible, be able to contribute to the operational output of the Corps. Every effort must be made to get the new, reconfigured, units firmly established, manned and trained for role. Even more so than in the past, they must be fully integrated into the body of the Corps. So it is also for the reserves. In the post-SDR establishments they play a vital part in rounding out units with individuals and formations with units.

"Jointery". SDR identified our key support to all three services and OGDs and thus the Corps is truly joint. We must continue to strengthen our ties with all those we support to ensure that we fully understand what it is that they require of us. At times, we will need to advise them of how our military engineering capabilities can best be employed to support them. Above all is the requirement for the Corps to be involved in the joint planning process from the outset. This will benefit both those whom we support and the Corps.

Multinationality. The South Atlantic campaign showed that the nation may have to go it alone. Whilst this remains a fundamental planning principle, it is far more likely that we will be part of a combined or multinational operation with one or more allies. Within this NATO is pre-eminent. Thus our links to the ARRC and the post of the Chief Engineer within it are key and must be built on and supported. Indeed, it is here that we can maintain and nurture our ability to operate at a level higher than the divisional level. We bring to the table considerable expertise of expeditionary operations across the whole spectrum of conflict and must further develop our ties and establish common ground with those allies with whom we are most likely to work. Multinational operations are not easy. We must do all that we can beforehand to ease our cooperative efforts on operations.

Force Development. The move of arms directors directly under ACGS and the forging of even closer links with DGD&D will mean an even greater involvement in doctrine and force development. This is to be welcomed. Our input must not be solely restricted to the engineer field but must also be based on our experience in the combined arms, joint environments and in logistic and infrastructure engineering.

We must contribute to and be part of the debate. We must also ensure that we play a part in evolving joint doctrine and force development. We must continue to contribute to, leading where possible, the evolution of NATO engineer doctrine, ensuring that best and workable practice is accepted.

Equipping the Corps. Our people are innovative, as history has so often shown. We must continue to embrace technology, including digitization, be part of its development and part of the vision for its application. We must ensure that we are equipped to fully maintain the tempo of the battle. Our engineer specialist equipments must be man enough for the tasks envisaged and, as far as possible, contain only essential RE "specials". We must embrace WFM, ensuring that we are equipped with the minimum essential resources to train whilst having available, within readiness periods, sufficient high quality equipment for operations.

Human Resources

Corps Ethos. The CGS has made it clear that the regimental system is the bedrock upon which the British Army is based. For us, the Corps is our regiment. It provides the glue that allows units and individuals to be task-organized to meet operational needs. It must be nurtured. The family of the Corps, serving and retired, is vital ground.

Recruiting. If we are to continue to succeed on operations and in training we must continue to attract and recruit the best. This requires continuous attention and effort by us all. The Corps is doing splendidly although, at times, we have difficulty in attracting the right number of recruits for the more technical trades. Recruiting is everyone's business.

Retaining and Sustaining. It is far more effective to retain those we have than recruit new. It builds on the wealth of experience possessed by the Corps and provides the foundations for innovation and confidence. Thus we must look after those we have whilst welcoming the newcomer. Our sappers and officers need to be challenged, well trained, well led and have opportunities for personal development. The effort which goes into the management of our people must continue. To sustain our people all should have opportunities for adventure training and sport *which must* continue to be supported by the Corps. Leave is essential and an entitlement. Our soldiers', officers' and their families' needs must be met as far as they can be and all must feel that the Corps is there in support. Our people are likely to stay longer if they know that we are endeavouring to ensure their future after their service. We must continue our links with civil industry (particularly the construction industry) to ensure our highly skilled workforce can be placed both to the benefit of the individual and and to the nation. We must recruit, promote and retain the best.

Training. We must continually re-examine the range of capabilities we need both in discipline and depth of training to ensure we can continue to meet the challenges of the combined arms battlefield and the joint rear area whilst only expending the minimum resources. The Royal Engineers Employment Structure Review provides the auditable baseline against which the requirement can be validated. In the short-term the regular Corps is to become larger and this is not going to be without pain. Our units are overstretched yet we must find an increased number of high quality individuals to reinforce the RSME to build the larger Corps. This means that our units may only deploy at best effort and thus

individuals have to work harder and there is more stretch. Additionally we cannot afford for higher level individual training to cease if we are to maintain the capability of the Corps. This pain must be borne if the relief of additional units in our ORBAT against current commitments is to be achieved. Hence training, at least for the period of implementation of SDR must be the Corps main effort. This is, of course, subject to the imperatives of resourcing a major operation within the same time frame.

Influence

Information. The purpose of our Corps' information initiative must be threefold: to sustain those we have in the Corps, to attract high quality people into our ranks and to ensure we are seen as part of a respected national institution, as described by the CGS. Any information campaign addresses two audiences: internal and external. Internally, we must keep our people informed so that they feel they own the Corps. So all our people need to know what is going on and why. A satisfied and motivated Sapper remains our best recruiter and retainer. Sapper publications play a key role in support of the chain of command. They will continue and be further developed. Externally, to remain a respected national institution, to convince individuals of their worth to the Corps, the Army and the nation, and to aid recruitment, we must "sell" the Corps. We have a magnificent story of both past and present achievements and it deserves to be told in a structured and effective way. I see this information initiative being the most important task for me to develop as the next step to achieving the Vision.

Reputation. The influence the Corps has is directly proportional to our reputation based on success in the field. This alone is not enough. Those in positions of influence, key decision makers, need to be aware of what the Corps capabilities are and the professional standards we achieve. We must inform in a coherent, comprehensible fashion. The information initiative is the first step but there are broader issues, ways and means that will need to be developed further. Our future rests on a broad understanding of the Corps' function in enabling operations across the whole spectrum from warfighting to humanitarian operations, from technical design and planning to combat engineer and project works. The breadth of our capabilities gives us wide utility in support of all three services, other government departments, the civil community and the civil powers. There is much to be done to ensure that this is widely recognized.

Summary

This paper logically follows on from the CGS's Vision and the mission of the EinC(A), given to me by the CGS: "As the professional head of the Royal Engineers, to provide both the focus and direction for the Corps". To assist in your understanding of my Vision for the Corps of Royal Engineers I have included my methodology in its construction. We need to strive towards the Vision in order to deliver the Corps' Mission.

To provide the military engineering required to enable the UK's armed forces to deliver the military capability required by Her Majesty's government in peace and conflict.

In order to keep us moving forward in the same direction I have laid out a number of strategic objectives which can be categorized under the headings of operational, human resources and influence. These objectives, combined with the many interrelated lines of activity, will provide a framework to achieve the Vision, that of:

A highly capable, flexible and valued Corps of military engineers.

Preparing For Operations in Kosovo

CAPTAIN P E HOULSTON BSc (HONS)

Captain Phil Houlston read mathematics at the University of Sheffield and subsequently was commissioned into the Royal Engineers in August 1995. On completion of Troop Commanders' Course 115 he was the Armoured Troop Commander in 3 Armoured Engineer Squadron, completing tours in Bosnia on Operation Resolute *in 1996 and Operation* Lodestar *in 1997/98. He joined 21 Engineer Regiment in April 1998 as the Intelligence Officer and on deployment to Operation* Agricola *assumed the position of Operations Officer. The photo shows the author in front of the MUP[1] building in central Pristina, damaged during the NATO air campaign.*

INTRODUCTION

THE Regiment deployed in support of 4th Armoured Brigade on Operation *Agricola* from late February to early September 1999. The deployment was initially a joint rapid reaction expeditionary force, prepared to carry out the complete spectrum of conflict operations from high intensity to peace support. With these possibilities in mind it soon became apparent that the key would be a speedy and successful entry into Kosovo from the Former Yugoslav Republic of Macedonia (FYROM). With mobility support and battlefield area evaluation being key Sapper business, the regiment was soon locked into the planning for entry into a semi-permissive environment.

DEPLOYMENT

THE regiment was busy preparing for a tour in Bosnia when events in Kosovo led to the deployment of the brigade. As the affiliated engineer regiment, 21 Engineer Regiment deployed to Macedonia, and 22 Engineer Regiment deployed to Bosnia. The fact that the regiment was already planning to be on tour during the period made life simpler as much of the preliminary work for a six-month tour was already complete. Deployment was understandably complex and involved a huge air and sea move based initially on the lead armoured battle group (LABG). This was, at the time, the Kings Royal Hussars supported by 1 Field Squadron.

The main difficulties with deployment were the compressed time lines. After the initial warning in the first week in February, lead elements of Regimental HQ and 1 Field Squadron landed at Skopje Airport on 21 February 1999. By the middle of March, 7 HQ Squadron and Workshops had joined the regiment in Macedonia, with 26 Armoured Engineer Squadron deploying with the Irish Guards Battle Group in late April. Whilst the pause in Macedonia was longer than expected it did afford time to focus on the problems involved with entry into Kosovo.

HISTORY OF KOSOVO

LIKE so many of the current problems associated with the Balkans, the conflict in Kosovo can be traced to medieval times. In 1217 Serbia conquered Kosovo adding to the power base that Serbia held in the Balkans during the 12th to 14th Century. This period ended with the expansion of the Ottoman Empire, and in June 1389 a group consisting of Serbs, Bulgars, Bosnians and Albanians fought the Ottomans just outside Pristina in the "Field of Blackbirds". Sixty thousand soldiers

[1] Paramilitary Serbian police.

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fought with the Serb leader Prince Lazar, who was killed in the process and now holds legendary status as a heroic leader. The events of 1389 still remain an important chapter in Serb History; with the "Field of Blackbirds" being considered the seat of Serb nationalism.

The Kosovan population is 90 per cent Albanian and this has been the major cause of the current conflict. The ethnic Albanians still strive for independence, despite the historic Serbian ties. By the early 1980s the struggle for independence became more prominent; by 1995 Belgrade was dealing with problems in Croatia and Bosnia and the Kosovo Liberation Army (UCK) emerged as the leading separatist movement. In response to UCK attacks, Belgrade mobilized army reservists and converted much of its police force to armed militia. In the summer of 1998 reprisals against Albanians and subsequent international calls for intervention led to a US initiative, suggesting a ceiling of Serb Army (VJ) and police units (MUP) within Kosovo, and that OSCE observers enter the area to monitor the situation. The agreement was unsuccessful, with Belgrade continuing to operate against the UCK. An alleged massacre of 50 ethnic Albanians resulted in further pressure from the international community, and the threat of air strikes brought all sides to the Rambouillet talks in France. The failure of these talks and a second round a few weeks later led to the three-month air campaign targeting both military and civil infrastructure in Kosovo and Serbia. Belgrade finally agreed to a withdrawal of VJ and MUP from the province, and NATO troops entered Kosovo on 12 June 1999 to establish a secure environment in which refugees could return to their homes.

Geography

The province of Kosovo is 4203 square miles and is approximately the same size as Northern Ireland. It is completely surrounded by rugged, wooded hills and mountains with peaks reaching 2000m, particularly in the regions bordering Montenegro, Albania and Macedonia. Within the central region of Kosovo there are two areas of relatively flat open plain at a height of 750m above sea level, which are separated by a rough wooded hilly area. On the plain most of the land is used for agricultural purposes. Metalled roads link main towns to many villages. Macedonia is similarly landlocked, although heavily forested with the majority of the country lying in excess of 900m. The only relatively flat area is a corridor in the east that houses the Salonika to Belgrade motorway (the MSR for the entire region) along which the majority of the population reside. Transit through the highly mountainous area to Bulgaria and Albania is very limited.

Planning for entry into Kosovo began in earnest on deployment into Macedonia. HQ ARRC had done some initial planning and had identified two possible entry routes as shown in Figure 1 below.

The first approach, A1, was identified as the principal approach from the south. Just north of Skopje this approach enters the Kacanik defile, a narrow valley running from three kilometres south of the Macedonia/Kosovo border through to the town of Kacanik in Kosovo itself. Once through the defile this approach opens up onto the central lowlands of Kosovo which could support manoeuvre of a brigade-size formation. The second approach, A2, splits from A1 in Skopje and follows a motorway to a point just past the Serbia/Macedonia border. The approach then turns northwest through Gniljane, crossing into Kosovo on a road estimated at the time to be MLC 70. At the Serbia/Macedonia border is a flat open plain, about eight kilometres wide. The approach narrows as it enters Kosovo but was estimated to still allow deployment of up to a brigade-size formation.

As the plan for entry evolved it became clear that 4th Armoured Brigade was likely to enter

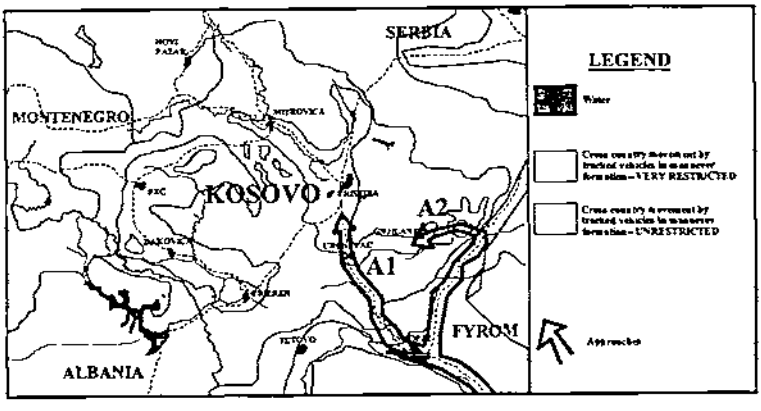

Figure 1.

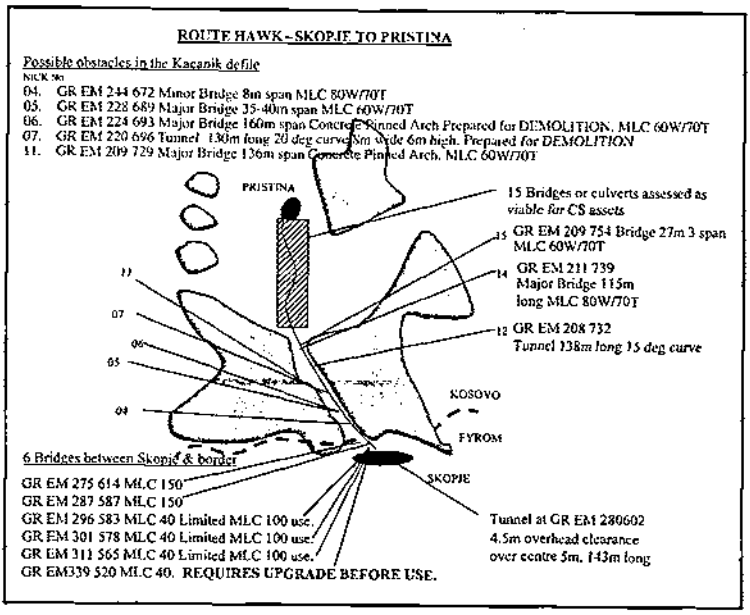

Figure 2.

Kosovo through the Kacanik defile. The main effort for the regiment was to source as much information as possible on the likely obstacles and limiting factors associated with that route.

Engineer Intelligence

THE regiment had worked hard during the training year with 4th Armoured Brigade, to establish and integrate the Engineer Intelligence Cell fully as part of the Brigade G2 Cell. This had been highly successful with a junior captain and staff sergeant being responsible for all engineer matters, running a database of all ground, route, obstacle, and infrastructure information. Deployment on Operation *Agricola* was a natural extension of this training, and the addition of the Geographical Support Detachment provided a highly potent tool. Battlefield area evaluation using available mapping and imagery showed that the Kacanik defile would be a slow and tortuous route for an administrative move, let alone a tactical deployment. The brigade however was looking at all eventualities, and needed to understand the exact nature of all bridges, tunnels and other obstacles on that route. The use of terrain-based modelling techniques to "fly" down the Kacanik defile was extremely useful to indicate the problems that would be met.

Disappointingly, data and products drawn from a large number of sources initially lacked the information required at brigade for planning, such as dimensions and statistics of the key bridges and tunnels. Despite requesting this information from UK agencies upon deployment, little was released until the last safe moment. Most was gleaned from photography and physical measurement by those individuals who had previously been to Kosovo. A huge amount of time was spent by the STRE interpreting the available measurements and comparing bridges and tunnels to those in Macedonia to give estimates of MLCs on the route from Skopje to Pristina. By 8 March, only 17 days after arriving in Skopje, we had assembled a diagram of the route with the scant information we had gained to assist both brigade and battle group planning. This is shown in Figure 2.

The classification of the route was a major problem. The bridges in the Kacanik defile were complex structures, five of which were in excess of 43m long. Indeed on entry into Kosovo on 12 June 1999, Captain Matthew Walton-Knight (2IC 527 STRE) found himself with lead elements of 4th Armoured Brigade assessing and confirming the suitability of the route as the advance continued.

Implications For Movement

AN estimate was carried out to ascertain the implications for the move into Kosovo. The estimate sought to identify problems and propose solutions to overcome obstacles along the route, first to get the LABG through to Pristina and thereafter to maintain the route as the principal KFOR MSR. There were three distinct stretches:

Skopje to the Macedonia Border. This is 21kms long and has one tunnel and six bridges: four at MLC 40 and two at MLC 150+. The road climbs from 200m to 380m at the border (180m climb – 9m/km). Work was carried out by 28 Engineer Regiment to strengthen the bridges before any deployment across the border.

Macedonia Border to Kacanik. This is 12kms long. The road runs through the Crna Gora feature and rises from 380m to 530m (150m climb – 12.5m/km) from

the border to the highest point on the outskirts of Kacanik. This is the most difficult part of the route where the road width is largely limited to a minimum of 5.5m and a maximum of 7m. There are few passing places and the road crosses a series of deep gorges and rivers. The road passes across eight bridges and through two tunnels. A railway runs parallel to the road. The assessed length of each potential obstacle was on this following unconfirmed information:

Gap (metres)	Number	Remarks/alternative route
0 – 5	0	
5 – 10	0	
10 – 24	0	
24 – 32	1	Railway line.
32 – 43	2	Railway line.
Above 43	5	1 possible with a No 10 overbridge. Railway line also an option.

Kacanik to Pristina. This is 55km long. The road continues to rise from 530m to 650m (120m climb – 2m/km) through Urosevac and onto Pristina. The route crosses a number of rivers, ditches and minor obstacles. There are few restrictions on width although subsidiary roads are small and unlikely to take heavy traffic. There were assessed to be 15 sites where the road crosses a watercourse either by a bridge or culvert, although there were further culverts along the route. The assessed information on gaps, based on map analysis, is given in the following table:

Gap (metres)	Number	Remarks/alternative route
0 – 5	0	No information was available at the time on bridges and culverts in this area. From a map recce it was assessed as possible to bypass or overbridge using CS assets.
5 – 10	10	
10 – 24	2	
24 – 32	1	
32 – 43	1	
Above 43	1	

The VJ, MUP and UCK were all assessed as being able to lay mines, but only the VJ were believed to have the capability to complete major demolition works. There was intelligence to suggest that a bridge and tunnel had been prepared for demolition within the defile (this was later confirmed in negotiations at the tactical level prior to entry). VJ likely courses of action in the event of an Agreement were to:

- Allow free access.
- Achieve consensus at the strategic level, but result in a non-permissive environment at the tactical level, in which case demolition and obstruction are possible. This was the worst case and needed to be planned for.

The regiment's bridging capability was:

Asset	Number	Span	Limitations
Fascines	12	5m single 9m double	A vehicle crossing only, without significant work.
HGOB	2	6.8m	Out of contact only.
MGOB	2	9m bridge 9.8m overbridge	Out of contact only.
No 12	8	12m	
No 10	6	24.5m	
BR90 GSB	2	32m	Out of contact only.
CS combination	Misc	30-60m	Limited by depth of defile. Out of contact only.
MGB (with LRS)	2 x MGB	Maximum 29m MLC 100W/70T	Out of contact only.
	1 x LRS	Maximum 43m MLC 100W/70T	

It was assumed that all works south of the border would be carried out prior to deployment. The assessment of bridge capability against gaps for the two stretches north of the border are given below:

Macedonian border to Kacanik:

Gap (metres)	Number	Bridges Available	Remarks
0 – 5	0	26	
5 – 10	0	21	
10 – 24	0	10	
24 – 32	1	4	
32 – 43	2	1	
Above 43	5	2	Only if Mabey & Johnson released. Critical span.

Kacanik to Pristina. If all assets used from the above table:

Gap (metres)	Number	Bridges Available	Remarks
0 – 5	0	26	
5 – 10	10	21	
10 – 24	2	10	
24 – 32	1	3	
32 – 43	1	0	Critical span.
Above 43	1	0	Critical span.

It was impossible to judge the outcome of any VJ action, but a shortfall of bridging existed at 32m and upwards. In that case a deliberate bridging operation and possibly a general support task would have been required. The regiment therefore felt balanced and confident in overcoming any close support problems encountered on the route.

Implications For "A" Vehicles

The route through the Kacanik defile was very narrow, down to 5.5m in places. Of more concern was the fact that the route had, on information received, only been assessed as MLC 60. With some risk it was agreed that for the entry into Kosovo this could be raised to MLC 70. This was adequate for Challenger but for the road move there was now no possibility of AVLBs and AVsRE being transported on heavy equipment transporters. This caused some concern at regimental level as the thought of a broken-down engineer AVLB and AVRE compromising the only route into Kosovo was not an entertaining one. A comprehensive equipment support recovery plan was orchestrated so that recovery assets were dispersed amongst the lead elements of the brigade in order to ensure success. Despite these concerns the heavy "A" vehicles tracked successfully during the move into Kosovo with very few problems. This is a credit to the crews whose time and effort during the pause prior to entry was very evident.

These concerns were minor compared with the problem with one of the tunnels in the defile *(see left.)* From the personnel who had been into Kosovo, and from the manipulation of imagery gathered, it was assessed that the tunnel was not large enough to take an AVLB with a No 10 or No 12 tank bridge loaded. The tunnel was known to be 8.3m wide, between 4.33m and 4.58m high over the centre 5m, and have a 120° curve in it to compound the problem. Therefore there was a requirement to identify a place just north of the defile where AVLBs could be reloaded with bridges for the remainder of the entry operation. Again the actual operation was highly successful with TBTs showing their value in following behind the empty AVLBs carrying No 10 tank bridges. No 12 tank bridges were ground-dumped just south of the border and then flown forward underslung by Chinook following the insertion of 5 Airborne Brigade.

Conclusions

The preparation, planning, and subsequent entry into Kosovo were all a huge success. The benefit of the training cycle and the regiment deploying with its affiliated brigade made the integration at both brigade and battle group level much easier. The continued use of engineer intelligence, supported by the Geographic Support Detachment was key to brigade and regimental planning especially with the IT-based system now in common use throughout 1 (UK) Armoured Division engineer regiments. Heavy "A" vehicles were again ill suited to the Balkan geography, but thankfully caused few problems. Their numbers in Kosovo are now in the process of being reduced, commensurate with the threat assessment. A key lesson that the regiment will take away from the planning and entry phase is the requirement for professional engineer advice. There are currently no chartered engineers within the regiment and without the advice of the STRE the regiment would have been unable to give such a firm message to the brigade on the suitability of the route for armour. This was a fulfilling deployment for the regiment and one that will surely rest in the minds of all those involved for many years to come.

Preparing for operations in Kosovo 1

An Unusual Occasion at St Paul's Cathedral

BRIGADIER JOHN CONSTANT
The first Commander Arab Legion Engineers

It may have been my holding of the Order of *Istiqlal*, which caused my wife and I to have received an invitation to the Memorial Service for HM King Hussein bin Talal of Jordan on Monday 5th July 1999 at St Paul's Cathedral in the City of London. On the day, we arrived in good time and were delighted to find that we had been allotted excellent seats at the front of the nave, with a clear view of the events under the dome itself. We also enjoyed the sight of all the dignitaries as they filed in from the west door and up the length of the nave, to take their places beneath the dome. They included King Hussein's widow, Queen Noor, looking elegant and serene, escorted by the Duke of Edinburgh, and the new sovereign HM King Abdallah II escorted by HRH The Prince of Wales, Queen Rania of Jordan accompanied by a score of other members of the royal family, including Crown Prince Hamza, whose name reminded me of my long hot summer in 1941, spent in the Western Desert of Egypt close to the shrine of Sidi Hamza, one of the few landmarks there.

As well as the Duke and Duchess of Gloucester, the Duke and Duchess of Kent, Princess Alexandra and her husband, there were representatives of HM The Queen, the Queen Mother and the other members of our royal family. Also present were Queen Sophia of Spain, King Constantine of the Hellenes and members of his family and the Crown Prince and Princess of Yugoslavia. The prime minister and Mrs Blair were accompanied by all our other living prime ministers, and by William Hague, Lord Carrington, Lord Hurd, Robin Cook and a score of other peers and ministers of the Crown, as well as the Lord Mayor and Mayoress of London. The number of ambassadors and high commissioners must have been around a hundred, as well as their families. This amazing concentration of VIPs passed us close enough to touch: no wonder we just hoped the security was as effective as it was unobtrusive; and it was!

An unusual aspect of the Service was its aim of embracing what the Arabs would call "The peoples of the Book", not just "ecumenical" to embrace the divisions of Christianity, but also to include the various branches of Islam, and of the Jewish Faith. The Dean of St Paul's underlined the unusually close links between the late King and Britain, while I mused on the day his handsome father, HM King Talal, had told me how much he had always wanted to live on the River Thames at Maidenhead. The prayers were chosen to avoid offence to anyone, and they included "The Lord's Prayer" which the whole congregation of some 2400 was asked to repeat.

It was King Abdallah himself who read some suras of the Qur'an as the First Lesson; they were then translated into English by his nephew, Queen Noor's son, the 18-year old Crown Prince Hamza, a Cadet at Sandhurst, whose fellows there formed an impressive Guard of Honour on the steps of the Cathedral.

The Second Lesson, from the Gospel of St Matthew, was read by HRH The Duke of Kent, and my mind wandered again, to recall the year when I was "in charge" of Army hockey in the UK, and the Duke was representing Eastern Command, as a result of which I had enjoyed his company at many meetings, both at Woolwich in my Army quarter, and in London at my Club, the Royal Thames.

For most of the packed congregation, the highlight of the whole service was the Address, brilliantly crafted and delivered with perfect diction by HRH The Prince of Wales, whose eulogy on so many facets of the late King's life was lit up by a handful of appropriate touches of humour, as well as by the gravity of such phrases as "a man amongst men, a King amongst Kings", whose magnanimity and far-sightedness enabled him "to survive and triumph over the enormous challenges to his country and to himself". Then prayers were led by the recently appointed Minor Canon, the Reverend Lucy Winkett, the first lady to reach such an appointment. The Blessing was given by the Archbishop of Canterbury, Dr Carey. Our seats in the Cathedral had been next to those of Peter and Mary Stewart; Mary was one of the three Arab orphans mercifully adopted in the forties by Glubb "Pasha" (later Lieut General Sir John Glubb, late Royal Engineers) and his wife,

Lieutenant Colonel John Constant when Commander Arab Legion Engineers *(Qa'id al Handasa al A'em)* and Commander Field Engineer Regiment, 1st Division, *al Jaish al Arabi*, 1951 to 1954.

Rosemary, after her own second child had died of fever in Jordan. As the four of us drifted out of the Cathedral together, we linked up with the wife and children of Godfrey Glubb, the Pasha's son, who had not been able to return from his duties in Kuwait in time for the service. Then, one by one, we identified and gossiped with several more old friends from our happy days in Jordan in the early fifties.

Memories came rushing back to me from July 1951, when I had left my family in an Army quarter in Moascar (Egypt) and had travelled from Suez down the Red Sea in the ancient *EMPIRE ROACH*, escorted by a destroyer, *HMS CAVALIER*, and round Sinai to Aqaba in Jordan, with my household furniture and my private car also aboard the ship. It was not my first visit to Jordan, but now I was there to raise a new regiment of the *Jaish al Arabi*, "the Arab Legion." A lorry had been sent for my 19 packing cases of household goods, and as an escort as I drove my car with it up the long dusty trail to Amman, and on to Zarqa. We had seen nobody on the way, since (unknown to the lorry driver and me) King Abdallah had been assassinated by a terrorist at noon that very day in the Mosque of Al Aqsa, near the Temple in Jerusalem. Standing beside the King had been his grandson, Prince Hussein, a schoolboy at Victoria College in Egypt, who survived the gunshots. The first news I had of this tragedy was that same afternoon from Major Tony Condon, as I arrived in Zarqa, where he already had a squadron of Arab Sappers, from which my regiment was to expand.

In the Cathedral, my memories continued, highlighting meetings with King Talal until the day he had to abdicate, and later with the 18-year old King Hussein when he joined us from Sandhurst. On the day he actually ascended the throne, one of my squadrons was deployed to the Mount of Olives in Jerusalem to fire 101 explosive charges, representing the 101-gun salute to which the new monarch was entitled. Under the terms of the armistice with the fledgling State of Israel, both sides were denied the presence of artillery in that city and its surroundings. Another of my squadrons was out in the desert towards Iraq, fighting a plague of locusts coming in from Saudi Arabia, while a third was on Jebel Amman, the Citadel since Roman times, preparing the royal fireworks for that evening. A fourth squadron was on guard for the accession itself, along with units of infantry and other Arms, securing the safety of the sovereign and the wealth of VIP visitors present. The remainder of my regiment was at our base in Zarqa entertaining the students from the Canadian Defence College, whose visit had been agreed some months earlier, and the Pasha was not one to cancel such an invitation.

In those days I still had a private pilot's licence from my pre-war flying, and I had renewed it on my last leave in the UK so the Pasha allowed me to fly myself when I was visiting any of my troops deployed in the desert. The aircraft was one of the Austers of our air regiment, the commander of which was Jock Dalgleish. He was teaching the young King to fly at RAF Amman, and we became close friends, Jock often inviting my wife and me to their house to chat there with the King, in those days still unmarried.

Another well-engraved memory is the official visit of King Hussein to my regiment, accompanied by Anwar Nusaibi, then Jordan Minister of Defence, as well as the Chief of Staff, Glubb "Pasha". After an impressive parade of over a thousand of my men, I drove the three of them in my Landrover from one of the many displays to

another, all around our extensive base in the Khaw area. Our good luck held, and everything went well until the formal lunch, when a single file of soldiers appeared, each bearing a huge tray with a whole carcass of lamb on a pile of rice, to place one of them, as a *mensif**, in front of each of the little groups, into which we had formed. With the King still sitting on his transportable throne, which accompanied him on such events, the leading tray-bearer was in the act of approaching him when his nerve gave way, and he fell flat on the earth with the trayful almost intact. In a matter of seconds it was all cleared away, while the next bearer was guided to the King and, this time, his tray was landed safely on its little table. King Hussein managed to control his laughter until the poor wretch was out of earshot, then we all allowed ourselves to react naturally to the unfortunate event, which dispelled any further formality, leading the way to very relaxed conversation.

Of many other memories I have to mention one. Seven years ago, when King Hussein rightly felt that the Gulf War had somewhat alienated the British Foreign Office from our long-standing links with Jordan, he had the (then) chairman of their Joint Chiefs of Staff invite six of us old warriors and our wives for a luxurious visit to Jordan for ten days' sightseeing, the better to appreciate the magnificent improvements throughout his kingdom made in the 40 years since our days in the Arab Legion. Every aspect of the visit was certainly memorable by any standard, but my admiration for the King reached new bounds from the lengthy audience he gave us, when he spelt out his political and strategic philosophies, with his hopes for the future.

All these thoughts crowded into my mind in St Paul's Cathedral and afterwards, this July.

The author with HM King Hussein.

* A traditional Arab dish consisting of a whole roast lamb atop a pile of hot rice, served on a platter about 1 metre in diameter; it is eaten by taking a lump of the flesh with the fingers of the right hand and moulding it with some of the rice to make a sort of dumpling which is flicked into the mouth without the latter touching the fingers.

An Unusual Occasion At St Pauls Cathedral

Dressed to Kill?

LIEUTENANT COLONEL M W WHITCHURCH MBE

"A well-dressed soldier has more respect for himself. He also appears more redoubtable to the enemy and dominates him; for a good appearance is itself a force"

Joseph Joubert 1754-1824

24 Engineer Regiment
BFPO 38

Dear General Freddie

You asked about how the Corps could improve as we move into the next century. Here is a fresh line of thought. Lets get a new mess kit. A common view in the Corps is that we undersell ourselves and that we should be more colourful. Easy to say, hard to do and easy to get wrong. So here is my part of the solution. Are you sitting comfortably?

THE NEW (?) MESS KIT FOR THE NEXT CENTURY

On display at G D Golding's Shop in Camberley from 2 December 1999 until 30 April 2000.

Dressed To Kill

More Flash to our Dash – The Revived Mess Kit.

Gosh! You say, why this? The kit that you see is (wait for it) in fact what we wore by the regulations of 1897. This **was** up! The cut, material, and embellishments are in accordance with the 1897 pattern.

Mess Jacket – Scarlet cloth, with Garter-blue velvet collar and cuffs. Gold Russia braid ¼ inch wide, all round the jacket and along the bottom of the collar, with small eyes at the ends of the collar and bottom of the front, and a crow's foot at the centre of the collar seam and of waist. At each end of the collar a grenade, 2½ inches in length, embroidered in gold. Hooks and eyes and gilt studs down the front. Pointed cuffs, 5 inches deep, edged for field officers, with 1-inch lace, traced above with Russia braid ¼-inch, forming a crow's foot at the top; for captains, with ½-inch Russia braid, forming a crow's foot at the top, a row of small eyes above and below the braid, terminating in plain braid round the crow's foot; for lieutenants, with plain Russia braid, ¼-inch, forming a crow's foot at the top, the crow's foot extending to 7 inches from the bottom of the cuff; scarlet silk serge lining. Shoulder cords as for tunic.

Mess Waistcoat – Scarlet cloth, with hooks and eyes and gilt studs down the front, and edging of gold braid all around the collar seam. Pockets edged with gold braid, forming crow's feet at ends and centre. The edging is 5½ inches in length and 2½ inches wide, and a black silk tab inside collar, fastening with hooks and eyes.
Trousers, boots and spurs – as in present full dress (eg no change to the current mess kit.)

The Case For the 1897 Pattern Mess Kit

- It is smarter than what we have now. Smartness is understated in our army and society and we need something that is stunning.
- It makes us distinguished from the rest. Just look at some of the features: Unique RE grenades and shoulder boards for example.
- It is a subtle way to improve awareness of our history – something we should do more because we have a terrific story to tell and this kit would help to do just that.
- It improves pride in our arm. Not only should we be good by day but we should also look good by night. Many young officers don't feel like that. (And us not so young officers feel that way too!)

Dressed To Kill 2

- The current mess kit makes wearers look like a cross between a penguin and a British Rail waiter! When I approached the Corps tailor with this idea he made the point that it was no coincidence that other recently-formed cap badges have a similar cut to this style **but not half as smart or authentic.**
- **It will** impress others including the opposite sex. If an officer wears his mess kit with pride and swaggers a little he sets himself apart, and in the eyes of impressionable youth even creates a little envy. I consulted several women about the design. They considered the design very impressive and valued the idea. The reality of human nature tells us that this can play an important part in any profession. Perhaps Charles Dickens had a point when he wrote:

> "A good uniform must work its way with the women, sooner or later".
>
> From "The Pickwick Papers" 1837

- Mess kit aids recruiting and will help to attract and recruit the best. Ask any Sandhurst Cadet and he will tell you that a seriously smart mess kit does help the choice of arm. I stress that this is only one factor which helps us to recruit the quality that we want.

How To Organize the Kit for the Corps

Money. A look at the recent experiences of other arms and services tells us how we could fund this project. First, allow five years for the Corps to convert. Second, cost would be about 35 pounds a month for two years or 700 as one payment. That's about a weekend in the West End, Paris or Berlin. Newly commissioned officers would buy with their dress allowance.

Some Arguments That May Be Offered Against the Idea

Cost. Some may say this is too much. Now 35 quid a month over two years is not even a day's pay for a second lieutenant. In terms of opportunity costs, this is one weekend away or a night out a month. You would hardly notice it on your mess bill. Indeed research suggests that a tax concession may also be possible.

Use. Some may say that they use their kit but twice a year. That is up to them – the bulk of the officers I asked want to wear mess kit more often. At ladies nights, balls, receptions, guest nights, boxing matches, various social engagements in London and elsewhere, and on exchange exercises; they all add up. The French Army do just this in Paris and elsewhere and their élan is all the more for it. So why not us?

Aping Others? Not so. This is what we wore in the last century and the beginning of this one. It is therefore our heritage. Consider: an officer from 1897 is brought back to life and goes to a brigade guest night at Tidworth. He would not recognize most or any of the Regiments or Corps present. However he certainly would recognize the Royal Engineers and their mess kit. Tradition? Yes please.

This does not contribute to our operational capability. Wrong. It improves pride in what we are: one of the most accomplished arms in the finest Army in the world. We must therefore look good too. Serving readers should look at this point through the eyes of what is called "the moral component" and the case becomes clear. Smartness and colour have their place in adding a little dash to our *modus operandi*. The fact remains we are something special and this kit helps to reinforce that perception which the current design does not. Furthermore we have a magnificent history and this revived uniform would assist us in "selling" the Corps. *Longue vie au systeme Regimentaire*[1]!

Proposal

- That we re-adopt this uniform.
- That Corps officers be allowed to decide by a ballot.
- That readers comment on the idea.

Final Thought

Let that gifted 19th Century soldier General Sir Garnet Wolseley have the last word:

"The better you dress a soldier, the more highly he will be thought of by men and women both in and out of the profession of Arms".

Your Obedient Sapper

Sticky

---

[1] Long live the regimental system.

Le Genie – The French Corps of Military Engineers

LIEUTENANT COLONEL J D BEAUMONT BEng BA(H)

Derek Beaumont joined the Corps as a Territorial Army Sapper in 1971, and after reading for an engineering degree at Sheffield University was commissioned into the Corps in 1974. Since then he has filled a variety of regimental and staff appointments in the United Kingdom and Germany, as well as surviving Staff College. Commanding a squadron on a construction task in Kenya and serving with the United Nations forces in a besieged Sarajevo are among the highlights of a varied career. Since 1997, he has been the Sapper Liaison Officer with the French Engineer Corps based at the Ecole Supérieure et d'Application du Génie in Angers, ancient domain of the Kings of England and one of the most beautiful regions of France.

Introduction

In 1671 the Marquis de Vauban organized companies of men within the army of Louis XIV trained in the art of construction works for defences. In 1693, these units were formed into a Corps of military engineers responsible for building the fortifications to defend the frontiers of the Kingdom, which at that time were ill-defined and susceptible to incursion by neighbouring princes and dukes who laid claim to various parts of what we now call France. By 1749, it was recognized that the officers of this Corps needed to be given specialist training in the art of fortification, both to construct them and to attack them. And so *l'Ecole Royale du Génie* (which translates as the Royal School of Military Engineers) was founded at Mézières in northeast France. 1999 marked the 250th anniversary of this establishment.

Students of British military history will be aware that the Royal Military Academy Woolwich was founded in 1741 to train officers for the newly formed corps of artillery and engineers, but the first company of soldiers dedicated to engineering tasks was that of the soldier artificers that was raised in 1772 in Gibraltar. I cite these two examples to show that the French military engineer corps – *Le Génie* – look back on a history and tradition as long and as rich as our own. For those who look upon Bishop Gundolph as our founding father, it is as well to remember that he was French.

There has been a Royal Engineers liaison officer with *Le Génie* since 1951 and I have been fortunate to hold that post during a period when there has been a resurgence of links between our two armies. This new *entente cordiale* was cemented in July 1999 by the signing of a twinning agreement between CinC Land Command and his French counterpart COMFAT *(Commandant de la Force d'Action Terrestre)*. As a result of this accord, field force units with a similar role have been "twinned" with a view to them arranging, at unit level, visits to each other's exercises and special events such as open days. (Within the Sappers, due to the disparity of organizations, roles etc, there are still a few units that do not have a twin, but it is hoped to rectify this in future.)

My aim in this article is to give a brief insight into the workings of the French Army and *Le Génie*, particularly as this is a period of great change for the French forces because they are converting from national service to a fully professional force.

Le Genie The French Corps Of Military Engineers
Lieutenant Colonel J D Beaumont BEng

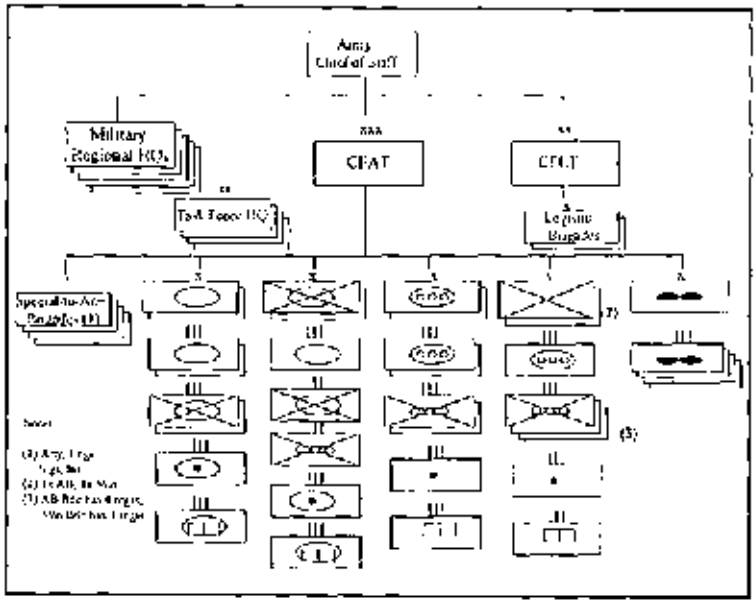

Figure 1. French Army: organization of field force units.

dual structure. Four (task) force HQs (*Etat-major de force* (EMF)) have a responsibility for operational planning but in peacetime have no units under command and have no routine administrative or training responsibilities. When deployed, the EMF take under command the forces assigned to that particular operation.

The field force combat and combat support units are grouped into a number of all-arms brigades – two each of armoured, mechanized, and light armoured, plus one airborne and one mountain infantry and an airmobile brigade (though this latter does not have its own integral ground troops, only helicopter assets which provide both antitank and troop lift support). The all-arms brigades have integral artillery fire support and engineer close support units. As there are no divisions, there is no "divisional" grouping of combat support or service support units. Instead, for combat support, there are a number of specialist brigades: artillery, engineer, signals and intelligence, which provide the assets required to support the force that deploys. Field force logistic units are formed into two logistic brigades which can also be tailored to the needs of an operation. These latter are commanded by a separate land logistic force HQ, *Commandement de la Force Logistique Terrestre*, based in Montlhery, just south of Paris.

Peacetime administration and training is the responsibility of the static regional chain of command, of which there are five principal HQs (down from nine under the previous structure), covering Isle de France (ie the Paris area) and northwest, northeast, southwest and southeast France. These HQs report to the Army staff in Paris rather than CFAT. The organizational diagram of this structure is at Figure 1.

At this stage, it is worth saying a few words about the French Foreign Legion, *la Legion étrangère*. The Legion exists as a completely integrated part of the French Army and I often drew a parallel to

Army Reorganization

The French Armed Forces' restructuring (*la refondation*) covers the period 1998 to 2002, the major feature of which is the phasing out of national service. The reduction in overall strength of the Army from approximately 250,000 to 140,000 has necessitated a significant reorganization of the peacetime command structure and the make-up of operational formations.

Prior to 1998 the French Army had two corps-sized formations: the *3ème Corps d'Armée* (3CA) which was a heavy corps of three armoured divisions and an infantry division, plus combat support and combat service support units. It was manned mainly by conscripts and its units were based chiefly in northeast France to repel an enemy from the east (!). In contrast, the *Force d'Action Rapide* (FAR), consisting of "light" divisions capable of rapid overseas deployment, was based mainly in the south and west of France. The parachute, marine (though these are not commandos in our sense) and foreign legion units that comprised the bulk of these formations had a high proportion of volunteers.

The FAR and 3CA were merged in 1998 to form a single land force HQ (*Commandement de la Force d'Action Terrestre* – CFAT), based in Lille. At the same time the divisional level of command was abolished and was replaced by a

our own Brigade of Gurkhas: they are "foreign" troops (in fact a reasonably high proportion of the Legion are native French) who are commanded by French officers. Recruits are trained initially as legionnaires, and then allocated to a unit – infantry, engineers, armoured etc – where they undertake special-to-arm training. Units of the Legion serve alongside "normal" units in the all-arms brigades, principally the 6th Light Armoured Brigade (whose engineer close support unit is *1er Régiment Etranger du Génie*) and the 11th Parachute Brigade. It is interesting to note that during the recent reorganization, the "French" engineer regiment that supported the Mountain Brigade was disbanded, to be replaced by a newly formed Foreign Legion Engineer Regiment. The Legion also provides manpower for some of the exotic (and not so exotic) permanent garrisons overseas, such as Djibouti and Muraroa.

Training

Within the French Army, recruit training for soldiers is carried out in the field force unit that they join at the start of their military service: there is no equivalent to our Army Training Regiment. Thus in each field unit there is a training company which is responsible for basic training of soldiers. This is a hangover from national service when the ten-month period of military service for a conscript was most efficiently done in a single unit rather than by having to move him at the end of his first couple of months. In an army where a soldier is taught to do just one specific job – driver, bottom panel-pin man or even mess waiter – this made sense. However, there appears to be no thought of moving away from this system, even with professionalization. Similarly, basic trade training – tank crewman, gun-number, combat engineer – is done in unit, since the arms schools – *les ecoles d'application* – are oriented toward training officers and senior NCOs.

Le Génie

There are three components to the French Engineer Corps:

- Combat engineer branch – the field force regiments.
- Infrastructure branch– made up of professionally qualified officers and NCOs, similar to our professionally qualified engineers and clerks of work. Their main role is the management of the defence estate. There is no unit equivalent to the MWF or STRE.

Civil defence sappers fighting forest fires.

- Civil defence branch. The main part of this is the Paris Fire Brigade (*Brigade des Sapeurs Pompiers de Paris* (BSPP)), but there are also a number of civil defence units which train to deal with natural disasters or major industrial accidents involving public safety. Teams from this branch are frequently deployed overseas to incidents such as the earthquake in Turkey.

Combat Engineers

For engineer close support there is one regiment per brigade. Engineer regiments are approximately 900 to 1000 strong, and consist of six or seven companies, depending on role:

- HQ company (~ 250 strong), including HQ elements, operations/training personnel/administration support, vehicle and equipment support, recce.
- Three or four combat companies (~ 100).
- Support company (~ 150-200).

Training to rescue victims trapped in a collapsed building.

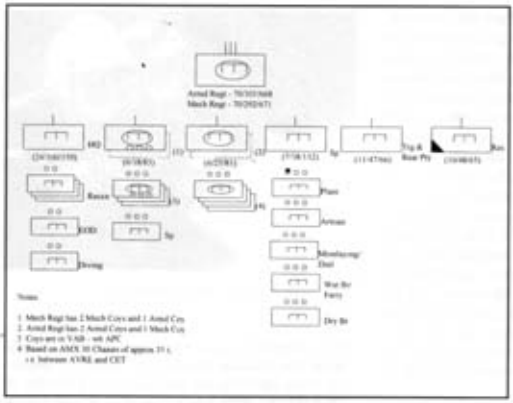

Figure 2. French Engineer Regiment – armoured and mechanized brigades.

- Training company of about 100 with trainees. This also provides the basis of the rear party whilst the unit is deployed elsewhere.
- Reservist company (~ 120).

Regiments are commanded by full colonels, with a lieutenant colonel as second in command. Authority is much more centralized than in a British Sapper unit: a key function is that of *Chef de Bureau d'Opérations-Instruction* – the operations/training officer, who is a lieutenant colonel or senior major with a large supporting staff. Companies are commanded by captains.

A PFM ferry.

Although performing the same overall functions, regimental HQs are organized along different lines from the British Army and there is no direct equivalent of, say, adjutant, quartermaster or regimental sergeant major.

All close support engineer regiments are organized along similar lines. Even "light" units such as the 17th Parachute Engineer Regiment (17 RGP) are equipped with wheeled APCs, the *vehicule de l'avant blindé* (VAB). The support company may have a troop of M3 equivalent *(engin de franchissement de l'avant* (EFA)), a vehicle-based dry bridging unit *(pont d' accompagnement de l'avant* – a kind of soft- skin, wheeled AVLB) together with plant, minelayers and power/water supply troops. There may also be a special-to-role troop eg 17 RGP has a landing zone troop. There is a regiment of air support engineers, *25ème Régiment du Génie de l'Air*, which is employed by the air force, whose companies are deployed on several different airbases. These carry out real construction work for *l'Armée de l'Air* when not training for their primary function. A typical close support unit organizational diagram can be seen at Figure 2.

For general support there is an engineer brigade – *La Brigade de Génie* – comprising three functional support regiments:

- 1st Engr Regt is an obstacle-crossing unit. It is equipped with the French ribbon bridge *(pont flottant motorisé* (PFM), dry bridging (Bailey) and minefield breaching/clearance equipment comprising AMX 30 roller-plough tanks, MADEZ *(matériel aerotranspondable de déminage de zone)* (= joint service flail unit, Aardvark), and SOUVIM *(système d'ouverture d'itineraires minées)* (the South African mobile mine detection system route-clearance train).
- 2nd Engr Regt is an infrastructure support regiment. French Sappers are not dual-traded combat/artisan, hence tradesmen are specialists. This regiment has companies that specialize in electricity generation/distribution, water supply and infrastructure repair.

Le Genie The French Corps Of Military Engineers 2,3

- 5th Engr Regt is a heavy works (ie plant) unit, and also has a railway repair capability.

Companies from these units can be "force packaged" to provide general engineer support appropriate to the operation. The engineer brigade commander and his staff also act as Commander Engineers and engineer planning staff for CFAT. At force (ie divisional) HQ level there is no CRE or engineer staff. On operations, the engineer brigade will provide an engineer cell appropriate to the size of operation at the theatre/force HQ. At brigade level, the engineer regiment CO is the commander's engineer adviser.

Whilst the French Army has had reservists for a long time, the idea of giving each regular unit a reservist company is a product of the *refondation* and is not yet fully in place. In effect it will be similar to our TA: reservists will do about 30 days training per year and may volunteer to go on operational tours with one of the regular companies. The reserve companies themselves will probably train for a home defence type of role and are unlikely to deploy on overseas operations as formed sub-units.

Infrastructure Branch

Infrastructure Branch is the principal construction service of the French defence forces. Until recently, its tasks were mainly related to a peacetime role. These are:

- To design and adapt the built infrastructure of the armed forces.
- The management of the Defence estate.
- To help to manage and control funds allocated to military infrastructure works.
- To supervise construction work being carried out on behalf of the Defence Ministry.
- To advise on and inspect fire prevention measures.

Clearly, these tasks still exist, but recent military operations have demanded a greater involvement of Infrastructure Branch personnel in operational tasks. These include:

- Involvement in engineer infrastructure support to deployed forces.
- Providing expert advice for civil-military affairs.

There is, currently, no equivalent to our MWF to carry out this operational tasking. Instead, ad hoc "teams" are formed by drawing on individual reinforcements from the regional and district works offices.

The VAB – the standard section armoured personnel carrier.

The Branch is commanded by an engineer services directorate based in Versailles, with five regional offices (Rennes, Metz, Lyon, Bordeaux and Paris-Les Loges) corresponding to the peacetime command structure, plus about 18 subregional or district works offices based in the principal garrisons. Prior to the Army restructuring, the Infrastructure Branch consisted of about 3200 personnel, roughly half-and-half military/civilian. Post-reorganization, this will come down to about 2700 in total, of which about 25 per cent will be military and 75 per cent civilian. This will still leave a service of approximately 300 professionally qualified officers and 400 clerks of work. The bulk of the civilian staff are technical grade civil servants, that is they are qualified engineers carrying out design work and supervising construction by contractors. A typical district works office, commanded by a colonel, has 100 personnel, and is responsible for several administrative *départements*, dealing with, say, 100 French MoD installations.

Civil Defence Branch

There are two main elements to the Civil Defence Branch:

- The Paris Fire Brigade.
- The civil defence units, which are called *Unités d'Intervention et d'Instruction de la Securité Civile (UIISC)*.

The BSPP provides the fire and rescue service in Paris and the three surrounding *départements*, an area in which there are nearly seven million inhabitants. The fire service in France also provides emergency medical treatment at the site of

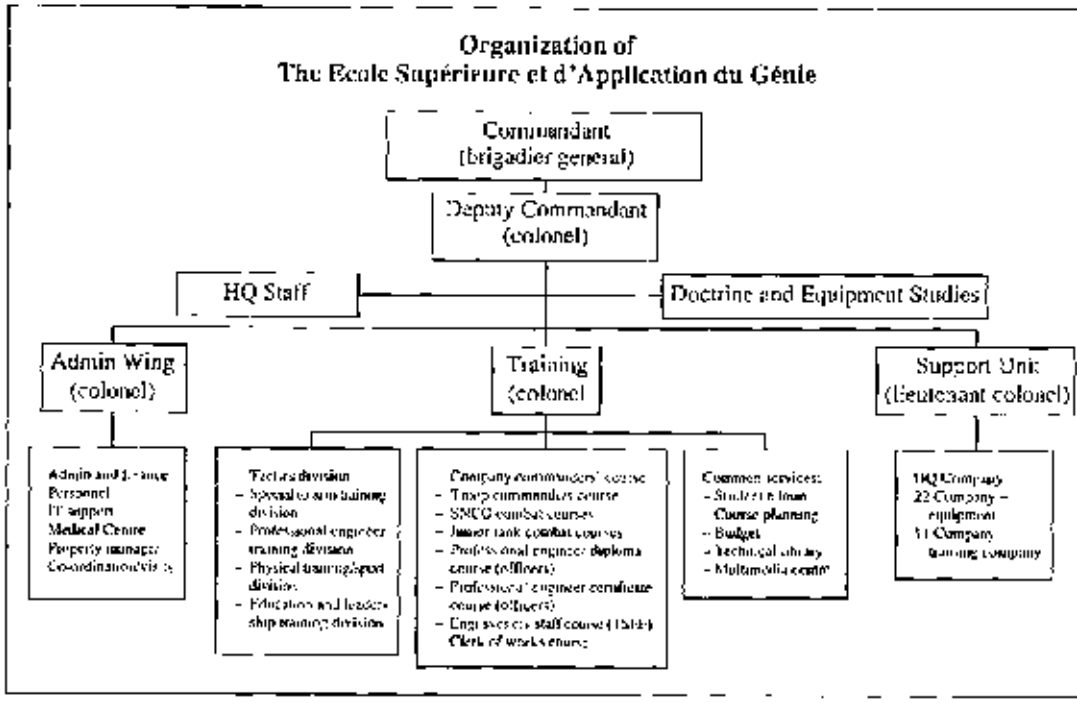

Figure 3.

incidents, there being no ambulance service of the style we are familiar with in the UK. Thus the 7350 personnel of the BSPP include 45 doctors, and many of the call-outs are to medical cases where the need is to render first aid treatment of some kind. In 1998 there were 417,000 calls, representing an average of over 1100 per day.

Although it is commanded by a brigadier general, the BSPP is placed at the disposal of the civil authorities, principally the Prefect of Police. It comprises:

- a headquarters;
- three "fire groups", roughly the equivalent of regiments, each about 1700 strong and each based in over 25 fire stations throughout their "tactical area of responsibility";
- a support group of 1200 personnel, with heavy equipment;
- a training group with a strength of 500, which carries out both basic training for recruits and continuation training in advanced fire-fighting and rescue techniques.

Due to the specialized nature of the task, non-commissioned ranks tend to spend their entire military service in the BSPP. Officers, by contrast, can opt to go to the BSPP at the conclusion of their young officer training at the engineer school. Although many then stay with the BSPP, it is possible to switch back to the combat engineer branch later on, though this is not common. However, BSPP officers selected to command "fire companies" come to the engineer school to attend the "normal" company commanders' course, and later are eligible for staff college etc.

The civil defence units are also placed at the disposition of the local civil authorities for tasking. Commanded by a colonel, and with around 1700 personnel, the Civil Defence Command comprises three major units: one southwest of Paris, one in the south of France and one on Corsica. Their role is to provide disaster relief both at home and overseas. They are trained and equipped to deal with both natural disasters – they are heavily called on to fight forest fires in the south of France and Corsica in the summer months – and, say, major industrial accidents that are beyond the capability of the local civilian part-time fire brigade. This latter may include rescue of civilians trapped by debris or taking measures to cordon and contain environmental pollution caused by a leak of hazardous material. In addition, a detachment is kept

at short notice for deployment overseas to assist foreign governments in case of major incidents such as earthquakes. (A recent front cover of the *New Civil Engineer* magazine reporting on the earthquake in Turkey used, by chance, a picture of members of the UIISC team helping victims in the debris. In 1998, they were involved in incidents in 22 countries in four Continents. There is a much greater flow of personnel posted between combat engineer and civil defence units.

The EFA – one rig can carry the new Leclerc MBT.

The Engineer School – The Ecole Supérieure et d'Application du Génie (ESAG)

The arms schools of the French Army are grouped under the command of *Commandement des Organismes de la Formation de l'Armée de Terre*, which is their equivalent of our Army Training and Recruiting Agency (minus the recruiting function). Their primary mission is to train officers and NCOs. The initial training of soldiers, both conscripts and volunteers, continues to be done within the unit to which the soldier is drafted. The organization of ESAG is at Figure 3.

Combat Engineer and Tactical Training:

Officer Training. The two main officer training courses are the Troop Commanders' Course – *La Division d'Application* (DA) – and the Company Commanders Course – *Le Cour des Futurs Commandants d'Unité* (CFCU). There are also some short specialist courses, such as an EOD staff officer's course, and an international staff officers' course geared to those going to UN/NATO operational HQs.

- **DA.** There is one DA course per year which lasts a training year (ie September to July); it has 60 to 70 students, divided into four sections or *brigades*. The course content and instruction is supervised by a lieutenant colonel, with a post-command captain running each section as the section leader or *brigadier*. The aim of the course is to prepare the young officer for his first appointment as a troop commander. The student officers come from a variety of backgrounds:
  - graduates from St Cyr-Coëtquidan (Sandhurst equivalent) who have completed three years as cadet officers;
  - reserve officers who have completed national service and then subsequently volunteer (perhaps after some time as a civilian) for a contract of full-time service of up to 15 years;
  - officer candidates who are being commissioned from the ranks in their late 20s or early 30s, having been NCOs for several years;
  - those being commissioned from warrant officer rank in their mid-to-late 30s.
- **Le CFCU.** As with many European armies, French officers command their sub-unit in the rank of captain. This is only about five to six years after completing the DA and prior to undertaking formal staff training at their equivalent of Army Junior Division JSCSC. For the St-Cyriens, this puts them in their late 20s. In most cases they will have completed only one appointment as a troop commander and possibly a further one as a company 2IC or as part of the regimental staff. The CFCU lasts two months and is aimed at teaching an officer how to command and train his sub-unit in barracks and on operations.

Warrant Officer and Senior NCO Training. The career structure for NCOs is quite different to what we have in the British Army and is too difficult to explain in any detail in this brief article, so I will restrict myself to a few salient points:

- As well as being promoted through the ranks, there is a direct entry system through an NCO training academy where potential NCOs enter as civilians, follow a 7-month training course, and become sergeants upon successful completion. Generally, responsibility levels are not the same as in the British Army: for instance a typical first appointment for a sergeant will be as a section commander.
- There is no trade structure as we would recognize it until the rank of sergeant. This is chiefly because

PFM pontoon being launched.

many of the junior NCOs up to now have been national servicemen.

- In the Engineer Corps, senior NCOs follow one of five main career streams:
  - **Combat engineer**: this covers basic engineer skills, basic bridging, mine warfare and demolitions.
  - **Electro-mechanic:** responsible for all types of power supply and distribution including maintenance of generators.
  - **Operational infrastructure specialist:** capable of running a simple construction site, principally with a view to carrying out repair work to buildings to make them habitable by military forces, as in Bosnia.
  - **Gap crossing**: specialists in the use of all French military bridging equipment plus work required for site access/exit.
  - **Engineer works:** this covers the control and use of plant and is roughly the equivalent of our military plant foremen, though candidates are not necessarily experienced plant operators themselves.
- There are a number of specialist qualifications: combat engineers can take Minex– EOD/IEDD – courses; there is also a suite of diving courses similar to our own.
- After a certain number of years of service and with satisfactory annual reports, senior NCOs and warrant officers may be accepted onto a long career engagement. This will allow them to serve up to their early 50s, depending on rank attained.
- At warrant rank, competitive exams are more prominent in further promotion than experience gained through years of service, although good annual reports are still required.

Junior Rank Training. The training of junior ranks is not a principal mission for the arms schools. ESAG did run some centralized training for junior ranks, but the reduction in training support at the school has placed even further restrictions on what can be done, and much of this training previously undertaken has had to be returned to unit level. There is no artisan trade structure in our sense of the term, but having realized from their experience in Bosnia that they need to be able to carry out basic repairs to buildings to make them habitable, they have set up a short specialist course in infrastructure repair. On a course lasting about eight weeks, students do a couple of weeks each of carpentry, metal fabrication work, plumbing and brickwork – a veritable handyman's course. There is also a specialist qualification in basic electricity supply and distribution and the operation of generators and water supply equipment.

Professional And Technical Engineer Training

The educational system in France is quite different to the British one. Candidates for technical engineer training are selected by competitive examination from those with the appropriate educational qualifications based on the *baccalauréat*. Military candidates do not hold prior technical qualifications before starting – such as an engineering degree or, for NCOs, a technical trade – since the course will give them the knowledge required. Nor need they be of the Engineer Corps, although many transfer upon successful completion of their training. It must also be said that the French do not differentiate between civils and electrical and mechanical as we do: all trainees are taught something of both disciplines as well as touching on subjects we do not teach, such as architecture.

Officers. Officers undertake professional engineer training post-company command in their late 20s or early 30s. They do either the two-year *Diplôme Technique* course – in effect an engineering degree – or the one-year *Certificat Technique* course. Both are full-time engineering theory courses, with only a few weeks attachment to civil industry to gain practical experience. This is adequate since, once qualified, they will spend the majority of their career on real tasks in a regional or district works office. Those who gain a diploma will transfer to the Engineers at the end of the course, if not already a Sapper, and will be available for employment anywhere in the engineer service (also returning to regimental duty occasionally as our PQEs do). Holders of the certificate may transfer, but for employment in a more limited capacity. These latter, if not Sappers, may also retain their cap badge and return to their home

unit or garrison where they will used as garrison infrastructure officers, roughly equivalent to our quartermaster/property manager.

Warrant Officers/Senior NCOs. The training of clerks of works – *conducteur de travaux* – is similar in scope to that found at Chatham. As indicated above, recruitment is by examination from throughout the Army, candidates do not need either practical trade experience in construction or necessarily to be Sappers. The course lasts one academic year.

Civilians. Technical grade civil servants for the engineer service (*techniciens supérieurs d'etudes et de fabrications(TSEF)*) are also recruited by competitive exam. Many candidates will already have a technical degree from a civilian institution, so their ten-month training at ESAG is aimed at ensuring they have a common baseline of knowledge and are given sufficient "military ethos" to enable them to take their place within the defence milieu. With the overall reduction in the number of military personnel having its impact on the engineer services, the requirement for TSEF is increasing: up to 1996 there were about 15 students a year. In 1998 the number was 80 and in 1999 there are 106.

Conclusion

It is a common human trait to claim that "we" – however that term is defined – are better than "them". At one level, this can be healthy rivalry in the form of inter-section/troop/squadron competitions etc. At another level, it can lead to a certain smugness and sense of superiority, often quite unjustified. The British Army, sadly, is very prone to believing itself to be better than any of its NATO allies. Whilst serving on the international staff in Sarajevo in 1994, I was able to see the work of several different armies' engineers corps.

Class 60 trackway system.

One soon learnt that, what counts is the result that is achieved – outputs, not processes, to use the latest jargon. The fact that someone else does something in a different way does not make it better or worse than one's own preferred method.

This very brief tour around the French Army and *Le Génie* cannot do more than skim the surface of a force that is taking enormous strides forward in the space of a few years, under the sort of budgetary and resource constraints that we are all familiar with. There are many developments that might appear strange and which we might tackle in a different way, but to criticize would be to give the advice of the Irishman who, when asked for directions by a lost tourist, replied " If I were you, I wouldn't start from here". The bottom line – *le bilan* – is: will the French Army and its engineers be able to carry out the missions assigned to them in peace and war? From my experience, both here in France and formerly in Bosnia, the answer must be "Yes".

Bridge Classification on the Advance Through the Kacanik Defile

CAPTAIN M P WALTON-KNIGHT BEng(Hons) CEng EurIng MICE MCIWEM

Captain Matthew Walton-Knight read civil engineering at the University of Birmingham then completed Sandhurst and 100 Young Officer Course. After his troop commanders' course he attended the Professional Engineer Training (Civil) Course and later qualified as a chartered engineer. As second in command of 45 Field Support Squadron, he squeezed in two tours of the Balkans returning in August 1998. He was then posted to the Military Works Force as Second in Command of 527 Specialist Team Royal Engineers (Works) part of 62 Commander Royal Engineers (Works). In December 1998 he deployed to Macedonia as Officer Commanding the small Operation Upminster *Specialist Team Royal Engineers. Following the initiation of Operation* Agricola *in February 1999, he remained in Theatre as Second-in-Command 527 Specialist Team Royal Engineers (Works). He returned to the UK in August 1999.*

Introduction

THE headline in the *New Civil Engineer* magazine on 17 June 1999 read: British engineer is first into Kosovo to assess the damage (on *12 June 1999). Hardly a surprise until you read* that the subject of the article was not about 9 Para Sqn or 69 Gurkha Fd Sqn but about a chartered engineer (civil) (CEng(C)) from 62 CRE (Wks). The media rarely tell the whole *truth, probably 9 Para or 69 Gurkha Fd Sqn were* the first in by a few minutes, but when has that ever stopped a good story?

The deployment of British Forces on Operations *Upminster* and *Agricola* into Albania, Bulgaria, Greece, Kosovo and Macedonia[1] gave the Corps many challenges, including the classification of all of the routes to be used by KFOR. At stages during the operations 62 CRE (Wks) consisted of 507 STRE (Railways) (V), 516 STRE (BP), 521 STRE (WD) and 527 STRE (Wks). The area of operations for CRE (Wks) extended from the northern tip of Kosovo in the French Multi National Brigade (MNB) (North) area, south through the British MNB (Central) and the Italian *MNB (East) areas into Macedonia, and on to* Thessaloniki in Greece. It extended from Sofia in Bulgaria in the east, to the Port of Durres in Albania in the west. No other unit in the Corps operated over such a large area. Personnel from CRE (Wks) are typically involved in infrastructure development tasks but they also provide the Corps' CEngs(C), who, with their structural engineering experience, are the Corps' "experts" on the military classification of bridges.

The Kacanik Defile[2]

MUCH of the interior of Kosovo is a plateau but it has significant mountains along all of its borders especially to the south with Macedonia. These mountains are up to 2498m high. There are only two roads from Macedonia into Kosovo, both are highlighted on the map *(right)*. One starts at Tetovo, winding up to 1093m, and

[1] The correct NATO title for Macedonia is the Former Yugoslav Republic of Macedonia. This is a compromise forced upon the international community by Greece. As it is both clumsy and resented by Macedonians, I will not be using it.

[2] Defile is the military term for restricted terrain in this case a gorge.

Captain MP Walton Knight BE CEng MICE
Bridge Classification

is for summer use by light vehicles. The other starts at Skopje, winding through the Kacanik Defile, and allows traffic all year.

It is only 64km from the Kosovo-Macedonian border crossing point at Deneral Jankovic[3] to Pristina, but it includes eight major bridges, 28 minor bridges and well over 30 culverts. The ground is generally open and undulating, except for the 12km section through the Kacanik Defile, which is constricted. There is only enough space between the mountains for the River Lepenec, a single railway line, and a road. The Kacanik Defile was key terrain for the entry into Kosovo. It was here that an 87m concrete pinned arch bridge, on a difficult bend had been prepared as a reserve demolition. It also had a minefield below it. Just to the north of this bridge the road passes through a tunnel that had been prepared as a reserve demolition too. Here is where a Serbian defensive battle would have been fought. If the Serbian forces had initiated these demolitions KFOR could have been held up for days or more likely weeks, perhaps taking heavy casualties from any forces located in the surrounding mountains. Thankfully KFOR was invited into Kosovo and the forced entry options, remained only options.

Routes from Macedonia into Kosovo.

Engineer intelligence on the route through the Kacanik Defile to Pristina was limited, satellite and drone photography existed together with video and eye witness reports. But few bridges could be classified by anything other than rules of thumb, as the best information on some bridges was simply "large bridge at Grid ...", hardly enough for a classification. Classifying the bridges on the route was the engineer reconnaissance priority for 21 Engr Regt, though on 12 June 1999 the task actually fell to 36 Engr Regt. Bridge classification became a Corps priority; it initiated a process of preparation and training, heavily assisted by 62 CRE (Wks).

The Entry into Kosovo

We should have entered Kosovo on 11 June 1999 but Commander KFOR imposed a delay of 24hrs so we spent this time in Piper Camp, the home of 65 Fd Pk Sqn, in northern Macedonia. In the camp was 5 AB Bde with 36 Engr Regt and its 9 Para and 69 Gurkha Fd Sqns. The brigade's mission was to secure the Kacanik Defile up to Cardak[4]. 4 Armd Bde was then going to take the lead to Pristina Airfield, although by lunchtime on Day One these missions had changed. Sapper Loxton (my driver) and myself were TACOM 36 Engr Regt for the entry into Kosovo. The Commander's intent was that we should always be with the lead packet of vehicles, whichever they may be, and we were to classify and prove every bridge between the border and Pristina Airfield.

On the evening of 11 June we joined 69 Gurkha Fd Sqn, and moved with them to the line of departure just on the Macedonian side of the Deneral Jankovic border crossing. There we spent the remainder of the night with what seemed like

[3] Deneral Jankovic is just on the Kosovo side of the Kosovo-Macedonian border in the Kacanik Defile, and is 22km northwest of Skopje.

[4] The village of Cardak is 8km north of the town of Kacanik.

Bridge Classification on the advance through the kacanik defile 1

the world's media. In the darkness I was able to classify the bridges at the border crossing. As dawn came at 0500hrs by 12 June, the lead company from 1 Royal Gurkha Rifles started forward across the border, led by a Mamba mine resistant vehicle from 21 Fd Sqn (EOD), and with the STRE detachment, initially, bringing up the company's rear. We were one of the few free-runners in the advance, and within two hours had left the company behind. Elements of both 9 Para and 69 Gurkha Fd Sqns were moved forward by support helicopter over our heads, being dropped off at key points, normally bridges, along the route[5]. One of their tasks was to classify the bridges at their drop-off points. Many of these were difficult structures to classify without roped access equipment, and they had many other tasks to do, such as EOD clearance. A recce sergeant from 69 Gurkha Fd Sqn managed to classify his bridge, the main bridge in Deneral Jankovic before I reached him, but I classified all other bridges in the Kacanik Defile.

In my vehicle I carried roped access equipment which allowed me to climb under all of the major structures. I was not concerned about climbing under a bridge on demolition ladders, even when I could see the remains of a cow blown up by a mine, for I was always fixed to the bridge by a line. My concern arose when it was necessary to walk below a bridge that was not EOD cleared. At one bridge a corporal from 21 Fd Sqn (EOD) informed me that there were signs of possible mining around the bridge and that I should not go under it. Unfortunately I could not climb under the deck of this bridge: I had to walk below it. I dropped down the side of the bridge onto the ground and kept very still! I classified the bridge and then climbed back up the side of it.

When I arrived at the concrete pinned arch bridge and tunnel that had been prepared as reserve demolitions, 9 Para Sqn was clearing the last of the suspected booby traps. The withdrawing Serbian forces had removed the bridge demolition charges, though the area was littered with explosive boxes and accessories. I did not find any explosives on any bridge, but I found many bridges that had been camouflaged, some even with dummy bridges off to one side. By the end of Day One I had classified eight major bridges, 28 minor bridges[6] and well over 30 culverts. Throughout I used the bridge classification "Bible" Pamphlet 7B.

Pamphlet 7B Classification of Bridges

The current in-service bridge classification manual is "Military Engineering" Volume II Field Engineering Pamphlet No 7B *Classification of Bridges* 1994. I have been involved in the revision of this pamphlet since 1996, and I am now leading on writing the new 1999 edition. It should have been published this year, unfortunately Operations *Upminster* and *Agricola* have caused a delayed. My final draft should be finished before Christmas, ready for publication early next year. The principal technical changes in the new pamphlet that influence the classification of bridges in the Balkans are included in this article.

The existing pamphlet is technically sound but has a number of limitations, the greatest being that the layout within the chapters is occasionally illogical and not user-friendly. This is being addressed. Bridge classification is by its nature complex due to the number of variables in bridge design. Only with a good, thorough inspection can an accurate bridge classification be attained. It is here that the greatest inaccuracies in a classification are generated. The principal limitations with the existing pamphlet are:

- All bridges are assumed to be simply supported. Continuous bridges are converted to a simply supported equivalent, which generally results in an under-classification. Complex bridges such as suspension, concrete or steel arches, portal frames and truss bridges can only be classified by assuming that the main bridge structural members are compatible with the capacity of their deck, stringer and cross beam systems, which can normally be assessed.
- Concrete bridges, especially concrete slab bridges are under classified.
- Steel-concrete composite bridges are significantly under classified.
- Bridge classifications can only be determined for one-way traffic[7], at a maximum speed of 40kph, for bridge spans of 40m or less.

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[5] See the article Kosovo – "First Men In" in the September 1999 issue of *The Sapper* Magazine.

[6] I repeated the classification completed by 69 Gurkha Fd Sqn at Deneral Jankovic for it served as a good "warm-up" classification.

[7] Only "The Royal Engineers Supplementary Pocket Book" 1957: No 3 – *Bridging* currently allows a two-way bridge classification to be determined rapidly.

Definitions of Risk Levels for the Military Load Classification of Bridges

Low Risk. The MLC for a low risk of bridge collapse means that the bridge is loaded to between 60 to 80 per cent of its theoretical maximum capacity. The probability of bridge failure when trafficked to this MLC is negligible.

Medium Risk. The MLC for a medium risk of bridge collapse means that the bridge is loaded to between 95 to 100 per cent of its theoretical maximum capacity; normal factors of safety have been reduced to give this classification. The bridge should not fail when trafficked to this MLC, but this classification should only be adopted when authorized by the commander.

High Risk. The MLC for a high risk of bridge collapse means that the bridge is loaded to over 100 per cent of its theoretical maximum capacity. The bridge should collapse when loaded to this MLC. A high risk MLC should never be adopted.

Table 1.

Critical Military Load Classifications (MLCs)

MLC 100W	Heavy equipment transporter carrying a Challenger MBT.
MLC 70T	Challenger MBT
MLC 60W	Light equipment transporter carrying a Warrior IFV
MLC 50T	AS90 Artillery
MLC 30	Warrior IFV DROPS MMLC

Table 2.

When the limitations of the pamphlet are understood it is possible to achieve far greater accuracy in bridge classification but this requires training and practice. These limitations are being addressed in the 1999 edition of the pamphlet.

Risk Management in Bridge Classification

A CONCEPT that I am introducing in the 1999 edition of the pamphlet is risk management. In all our activities we conduct risk assessments, these are only combat estimates by another name. Yet when a bridge is classified, is the resulting military load classification (MLC) for a low or high risk of collapse? What guidance should the Corps give to a brigade commander who is happy to accept a high risk of collapse, or perhaps to one who will not?

In Table 1 *(above)*, I give my proposed definitions of risk levels. The MLCs determined using the rapid or simple calculation methods in the pamphlet are all low risk classifications. The classifications determined by using Chapter 11 – *Reduction of Safety Factors* in the 1994 pamphlet are all medium risk. I have introduced this concept not only to simplify terminology but also so that the Corps can give accurate guidance to a commander. A bridge classification should never stop once a classification has been determined using only the rapid or simple calculation methods unless a MLC has been achieved that meets the commander's requirement. In Table 2 *(above right)*, are the critical MLCs that the Corps normally needs to achieve. By calculating a medium risk classification, the commander is given greater options so that he can meet his operational mission. As it should only be the commander[8] who decides to use bridge classifications with reduced factors of safety, he needs to be aware of the increased risk he is accepting by adopting a higher MLC.

By reducing the impact factor of safety on beam and deck or concrete slab bridges and giving a medium risk classification the bending moment capacity of the bridge can be increased by 10 per cent. By reducing the deck width factor of safety[9] for concrete slab bridges the bending moment capacity can be increased by 50 per cent. This extra capacity may often be needed; it was in the Kacanik Defile.

Bridge Classification Training

DURING Operation *Agricola* I classified over 375 bridges in Albania, Bulgaria, Greece, Macedonia and eventually in Kosovo. As part of the preparation for entering Kosovo, I conducted bridge classification training sessions. These sessions were attended by almost all of the troop commanders and recce sergeants in theatre from both 21 and 36 Engr Regts. The sessions included both theoretical and where possible practical training. The aim of the training was to give guidance on the more effective use of the 1994 edition of the pamphlet when classifying bridges in Albania, Bulgaria, Kosovo and Macedonia.

Bridges in Kosovo and Macedonia

IN general the bridges in Kosovo and Macedonia are designed to load criteria 40 per cent less than

[8] On Operation *Agricola* the decision to use medium risk bridge classifications for the bridges in the Kacanik Defile was made at CRE not CO level.

[9] This is only possible if the concrete slab is more than twice the width of the vehicles that will cross the bridge.

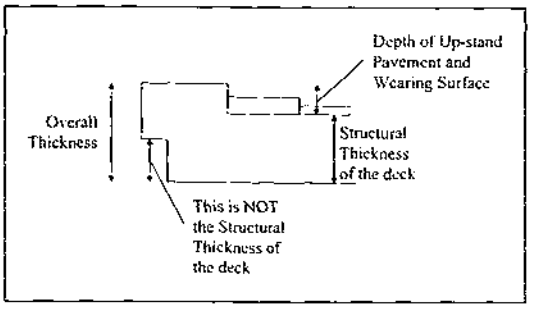

Figure 1. Cross section through a concrete slab bridge.

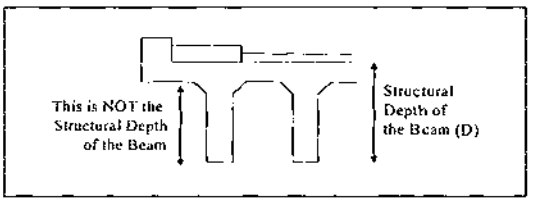

Figure 2. Cross section through a concrete beam and deck bridge.

in the UK[10]. The bridges have also received significantly less maintenance than would be expected in the UK especially in the last five years. Bridge decks are generally not designed to carry UK-style concentrated point (wheel) loads. It is often the strength of bridge decks that govern low risk bridge classifications. The principal bridge types that will generally be encountered are:

Concrete beam and deck bridges.
Concrete slab bridges.
Complex bridges.
Stone arches.[11]

Inspection of Bridges[12]

Experience has shown that most inaccurate classifications are caused by inadequate bridge inspections. The bridge inspection is the most important phase of the classification and should not be minimized, unless you have adequate experience. The key here is not the completion of proformas, although they are always useful for reminding you which dimensions need to be taken, but rather to draw an accurate plan of the site, a longitudinal section of the bridge and a cross section through the bridge deck. Take all dimensions accurately. Initially to the nearest 100mm for all spans, and to the nearest 10mm for cross sections through concrete decks, but always to the nearest 1mm for steel beams. Take instant or digital photographs, and note anything that is unusual, especially cracks and gaps. If there is any evidence of battle damage see Chapter 9 in the 1994 pamphlet or request assistance from a CEng(C). Always try and determine why something unusual has occurred, for example if a structural member changes in section, such as a concrete slab increasing in thickness. With concrete slabs and any large beams look for any indication that it may contain voids, this is especially important on larger spans over 12m. Finally categorize the bridge[13] to determine which simple classification method should be used.

The structural thickness of a concrete slab is the dimension that is most often incorrectly measured on concrete slab bridges. As shown at Figure 1 *(above left)* the structural thickness is the overall thickness less the depth of any up-stand, pavement and wearing surface. On concrete beam and deck bridges, the structural depth of concrete beams is the dimension most often incorrectly measured. This dimension is shown at Figure 2 *(above)*.

The pamphlet gives guidance on the equipment that should be used for a bridge inspection, but STsRE do have more specialist equipment such as ferric scanners to determine the size and depth of steel reinforcement in concrete. They also have items such as Schmidt rebound hammers[14], these are not only simple to use but after a ten-minute lesson they will give a reasonable guide to the compressive strength of concrete (f_{cu}). If this is known the bending moment capacity of a concrete slab bridge could be increased by 50 per cent!

Classification of Bridges[15]

There are three basic types of bridge classification: rapid (including the correlation methods),

[10] Determined from various sources held at TICRE.
[11] Stone arches are mainly found in Albania.
[12] See "Military Engineering" Volume II Pamphlet 7B: 1994 Chapter 5.
[13] See "Military Engineering" Vol II Pamphlet 7B: 1994 Chapter 4.
[14] They are part of the ME CMT's (military engineer construction materials technician's) equipment.
[15] See "Military Engineering" Volume II Pamphlet 7B: 1994 Chapter 2.

simple calculation and detailed (complex) methods. The latter is not covered in the pamphlet and is for CEng(C) only for they have more complex methods of assessing structures that could result in higher classifications. Before initiating a classification determine what information is already known about the bridge: Has it already been classified? What vehicles have crossed the bridge in the past? What type of vehicle does the commander intend should cross the bridge?

All structural members should be inspected and classified but with experience and engineering judgment only certain members need to be checked, in fact whole bridges can be classified visually, to a surprising level of accuracy. These are not lessons that can be taught they are gained by experience. A level of experience that troop commanders could reach but a level most CEngs(C) have already attained.

Rapid Methods of Bridge Classification[16]

In general the rapid methods of bridge classification should not be used in Kosovo and Macedonia. The age, road type, simple and detailed correlation methods are not accurate for the Balkans. Classification by the analysis of civilian traffic method remains accurate but it is normal for the population of the Balkans to overload their bridges, so this method may not be very conservative. As a guide the following low risk MLCs can generally be adopted for any bridge in Kosovo and Macedonia:

- Bridges on tarmacadam trunk routes[17] are normally at least MLC 50T and between MLC 30W and 80W depending on the bridge span[18] and type[19]. If a medium risk of bridge collapse is accepted then these bridges should be MLC 70T and suitable for Challenger MBT.
- Bridges on tarmacadam minor routes[20] are normally at least MLC 30 but may only be MLC 8 due to low deck strengths. These bridges should be suitable for Warrior Infantry Fighting Vehicle (IFV) but are unlikely to be suitable for Challenger MBT, even if a medium risk is accepted.
- All short span bridges[21] are normally at least MLC 30. These bridges should be suitable for Warrior IFV.
- All long span bridges[22] with a roadway over 7m wide are normally MLC 70T 100W. These bridges should be suitable for both Warrior IFV and Challenger MBT.

These are only for guidance and should not be used in place of undertaking a full bridge classification that may result in the award of a higher bridge MLC. Once a bridge has been categorized, it is possible to give a slightly more accurate guide to the bridge MLC.

Concrete beam and deck bridges will generally be:

- Low risk MLC 50W 50T but check for a possible weak deck that may reduce the classification to MLC 30W 50T.
- Medium risk MLC 60W 70T with vehicles crossing along the bridge centreline at (CL@) 30kph.

Concrete slab bridges will generally be:

- Low risk MLC 80W 50T.
- Medium risk MLC 80W 70T if:

  Slab width >= 7m all vehicles on CL@ 40kph.
  Slab width 5.5 to 7m all vehicles on CL@ 30kph.
  Slab width <5.5m all vehicles on CL@ 10kph.

Simple Calculation Methods of Bridge Classification[23]

The simple calculation methods of bridge classification remain very accurate in Kosovo and Macedonia. Remember to always complete the classification before you leave site so that you inspect any structural member you may have initially missed. Also, if the bridge has a continuous span, you should multiple the span length by 0.8 and assess it as a simply supported span, not forgetting to use the actual span length to calculate the bridge dead weight.

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[16]The guidance given in this section is only to be used for bridges in First and Second World countries. See also "Military Engineering" Volume II Pamphlet 7B: 1994 Chapters 3 and 10.

[17]Trunk routes should have a roadway width >= 6m.

[18]Bridge spans less than 8m and over 20m will be strongest. Spans from 12 to 18m will be the weakest.

[19]Beam and deck bridges generally have weak decks.

[20]Minor routes should have a roadway width >= 3m.

[21]Short bridge spans are those under 8m.

[22]Long bridge spans are those over 20m.

[23]The guidance given in this section is only to be used for bridges in First and Second World countries. See also "Military Engineering" Volume II Pamphlet 7B: 1994 Chapters 6, 7 and 8.

Beam and Deck Bridges[24]

Steel Beamed Bridges

For steel beamed bridges always take accurate dimensions. If a classification results in a low MLC and the bridge has a concrete deck then it could be a steel-concrete composite bridge[25].

Concrete Beamed Bridges

For concrete beamed bridges the difficulty remains in assessing if any voids exist in the bridge deck. In the 1994 pamphlet on page 6-37 at paragraph 0635a, and on page 6-10 at figure 6/3 serial 5e, an equation is given for determining the unit moment of resistance (UMR) of a concrete beam:

$$UMR = CBd^2/L_m x 10^6$$

Where C is a constant with a value varying from 1.3 to 2.0. This assumes that the f_{cu} is 30N/mm^2, the strength of the steel reinforcement (f_y) is 460 N/mm^2, and area of steel reinforcement (A_S) is between 0.65 per cent to 1.0 per cent. These are conservative assumptions for Kosovo and Macedonia, and result in an under estimate of the UMR. If you can, try to determine A_S[26] and then use the following values for C[27]:

A_S	C
0.5%	0.5
1.0%	2.0
1.5%	3.5
2.0%	4.3

If you cannot determine A_S, or if in doubt, use A_S=1.5% and C=3.5 for bridges in Kosovo and Macedonia. This will result in a higher bridge classification than if the guidance in the 1994 pamphlet alone is followed.

The structural depth of a concrete beam (d) = 0.85 x the overall depth of concrete beam (D) (or 0.9 if D>250mm) due to the position of the steel reinforcement in a concrete beam. This can be adjusted if you are able to determine the depth of concrete cover to the steel reinforcement.

Concrete beam and deck bridges will normally have concrete decks that are structurally tied into the concrete beams. When classified the decks will generally prove to be weak and will dictate the low risk bridge MLC. When the bridge starts to fail the concrete decks will crack, but are unlikely to fail to the extent of allowing a vehicle to pass through the deck. A medium risk bridge MLC should normally be dictated only by classifying the main bridge beams, not the bridge deck.

Timber Beamed Bridges

For timber beamed bridges the impact factor of 15 per cent is incorrectly applied in the 1994 pamphlet. The Note on page 6-6 paragraph 0614 should be amended to read: If girders are of timber, **multiply** the live load unit bending moment by 1.15 before using Table 6-3. This will increase the bending moment capacity of timber beamed bridges by 30 per cent.

Concrete Slab Bridges

Concrete slab bridges[28] are relatively simple and rapid to classify. All that is required is to determine the bridge structural slab thickness and span, and then insert the values into the tables. But remember to measure the width of the concrete slab too. The tables in the 1994 pamphlet contain a few strange values such as on page 7-9 table 7-2 where for a 14m span, a MLC 90W gives a live load bending moment (LLBM) of 840kN/m but MLC 100W gives a LLBM of 820kN/m. This is not wrong, only confusing and is due to changes in axle spacing as the notional MLC vehicles[29] increase in overall weight. Remember that the classification that should be awarded to a bridge is for the lowest MLC that equates to the calculated LLBM capacity. So that if the LLBM capacity of a concrete slab bridge was hypothetically 830kN/M for a 14m bridge then the classification would be MLC 80W. The classification tables in the pamphlet assume that the concrete slab bridge is simply supported and only as wide as the vehicle trafficking the bridge. It is assumed that f_{cu} is 30 N/mm^2, A_S is 1.0 per cent and the cover to the steel reinforcement is 50mm. If these can be determined then[30]:

f_{cu}	A_S	Cover	Change to the LLBM Capacity in Table 7-1
40 N/mm^2	1.0%	50mm	Increase by 10%
30 N/mm^2	1.5%	50mm	Increase by 40%
40 N/mm^2	1.5%	50mm	Increase by 50%
		<= 20mm	Increase by 10%

[24] See "Military Engineering" Volume II Pamphlet 7B: 1994 Chapter 6.

[25] No steel-concrete composite bridges had been found in Theatre by August 1999.

[26] A STRE will be able to show you how.

[27] These increased values of C were adopted after consultation with Professor G C Mays at the Royal Military College of Science.

[28] See "Military Engineering" Volume II Pamphlet 7B: 1994 Chapter 7.

[29] See "Military Engineering" Volume II Pamphlet 7B: 1994 Annex A Table A-2.

[30] These increases in LLBM capacity were determined by calculation following the inspection of bridges in Macedonia.

Generally in Kosovo and Macedonia if f_{cu} is 30 N/mm^2 then A_s is approximately 1.0 per cent, and if f_{cu} is 40 N/mm^2 then A_s is approximately 1.5 per cent (so you can increase the LEBM by 50 per cent)[31]. By taking a Schmidt rebound hammer on your bridge inspection you could award much higher MLCs to bridges.

Assessment of Culverts

Kosovo and Macedonia have hundreds of culverts. The principal reference document for them is "Military Engineering" Volume II Field Engineering Pamphlet 8A *Roads* 1983. In simple terms, all culverts that are less than 0.6m in diameter must have a minimum of 300mm cover to the top of the road-wearing surface, and for those over 0.6m in diameter the minimum cover should be ½ the diameter of the culvert pipe. Culverts can then be trafficked to MLC 100W 70T.

Under Classification of Bridges

The pamphlet will under classify certain types of bridges (as I have highlighted above) but the two principal reasons that bridges are incorrectly classified are an inadequate initial bridge inspection, and a classification using only a *rapid method* of classification. This is contra to the suggestion made in the August 1999 edition of the *Journal*[32].

Bridge classification takes time. Most of this is in the inspection of the bridge, normally because of the difficulty in gaining access to the structural members on the underside of the bridge deck. There are many short cuts to speeding this process up. Calculating the classification also takes time but even with the tempo of 5 AB Bde's advance into Kosovo on 12 June 1999, there was still adequate time to complete a simple calculation method assessment for selected elements of all of the principal bridges in the Kacanik Defile. The operational tempo is never likely to be so intense that there is not adequate time to conduct a classification using at least the *simple calculation method* for principal bridges.

Conclusion

The rapid classification of bridges is a close support *engineer* function but CEngs(C) are available to assist both on the more complex structures and when the tempo of warfare is such that military bridge classification has to be *undertaken rapidly or even visually*.

The current bridge classification pamphlet is being rewritten, the principal technical changes in the new pamphlet that may influence the *classification* of bridges in the Balkans, have been discussed. Bridges on trunk routes in the Balkans are normally at least MLC 50T 30W to 80W depending on the bridge span and type. If a *medium risk* of bridge collapse is accepted then these bridges should become MLC 70T and suitable for Challenger MBT. Bridges on minor routes are normally at least MLC 30 but they may have weak decks. These bridges should be suitable for Warrior IFV but are unlikely to be suitable for Challenger MBT.

On the 12 June 1999 it was a CEng(C) from 62 CRE (Wks) who classified all, bar one, of the bridges in the Kacanik Defile in Kosovo, and onwards to Pristina. He would have had the same role even if KFOR had adopted a forced entry option. In expeditionary warfare personnel from Military Works Force will always be there from the beginning of a deployment, and will have a critical role in bridge classification.

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[31] This guidance was determined by inspection of bridges in Macedonia.

[32] In the article "A Bridge and a Plan at Demir Kapija" by Lieutenant D A Holdsworth, *The Royal Engineers Journal*, August 1999.

And They Thought It Was Another Swimming Pool!

MAJOR G R N HOLLAND MA CEng MIMechE

Maj Nick Holland started his army career in the Army Air Corps. After being recruited into the Sappers to blow things up legitimately, he served for four years at Waterbeach as a Troop Commander and Squadron 2IC, which included an operational tour in the Gulf. A staff job at the dying 1st British Corps Headquarters in Bielefeld was followed by command of 2 Field Support Squadron in Iserlohn. A further staff job at Headquarters Royal School of Military Engineering was concluded with an invitation to attend the Professional Engineer Training course at the ripe old age of 36. Successful conclusion of the course resulted in another command appointment as Officer Commanding 527 Specialist Team Royal Engineers (Works) and the attainment of Chartered Engineer status.

He has just returned with his team from Operation Agricola *in Kosovo and the Former Yugoslav Republic of Macedonia.*

So you thought that the Corps no longer got involved in significant construction works? I am not talking about something like an army training area reconstruction or project management of an Army Air Corps flight hangar, but design, management and construction of a major technical facility.

Let me first set the scene. On 7 December 1998 my team, whilst on JRRF standby, was warned to deploy an element in support of the KORBR Company Group that was to be the UK element of the NATO Extraction Force deployed into Macedonia on Operation *Upminster*. So, five of the team deployed with some support from 62 CRE (Works) on 7 December 1998. They were responsible for all the design works and project management on the infrastructure engineering works constructed by 20 Field Squadron through Christmas and the New Year as the British force worked to get itself established in Theatre, in temperatures that went as low as -25°C.

On 11 February 1999 the rest of the team was placed on 24hrs notice to move to deploy to Macedonia on Operation *Agricola*. This deployment was to provide a NATO peacekeeping force to police any agreement that may be reached between Serbia and the rest of the western world. We actually left the UK on Wednesday 17 February 1999 and arrived in Macedonia on a glorious spring day full of hope. Our hope was short-lived as we woke up the next day in the Macedonian equivalent of the "Bates Motel" to discover six inches of snow on the ground and temperatures that had plummeted below freezing again.

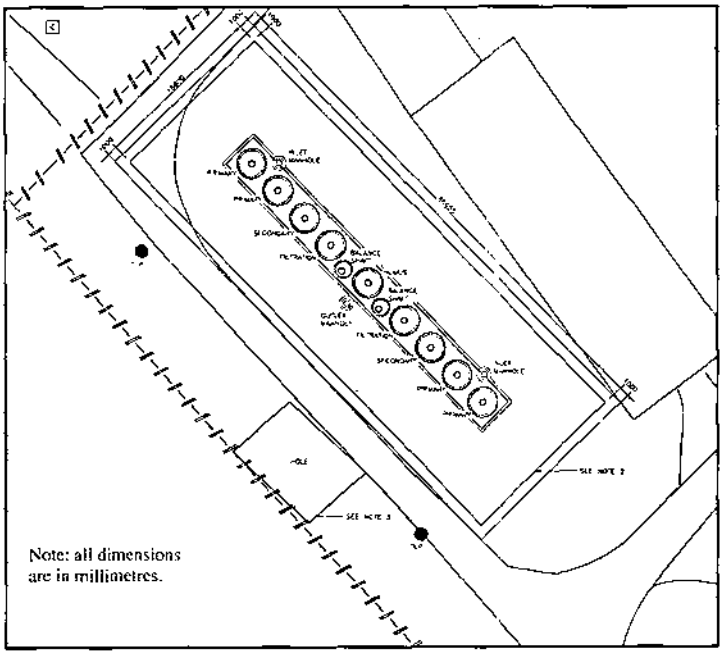
The following day the CO arrived and we started the real business of trying to find somewhere for 4800 British soldiers to live. One of our main concerns was to establish a transit camp for between 500 and 750 personnel, where people could stay for up to seven days before moving to more permanent accommodation. Fortunately we found a suitable location in what used to be an American ammunition compound from around the time of the Second World War.

CO 28 Engineer Regiment realized that this camp would make a very good engineer logistic squadron base and it became known as "Piper Camp". However, there was nowhere near enough infrastructure to support the numbers of people envisaged. Indeed the area consisted of a large hardstanding and ten wooden sheds that looked like Nissen huts, only they were 30m long and 12m wide. After some discussion it was decided that the huts could be readily converted into living accommodation, a kitchen and a REME workshop, but there were no ablution facilities. These latter would be provided by the

And they thought it was another swimming pool Major G R N Holland CENG MA MIM

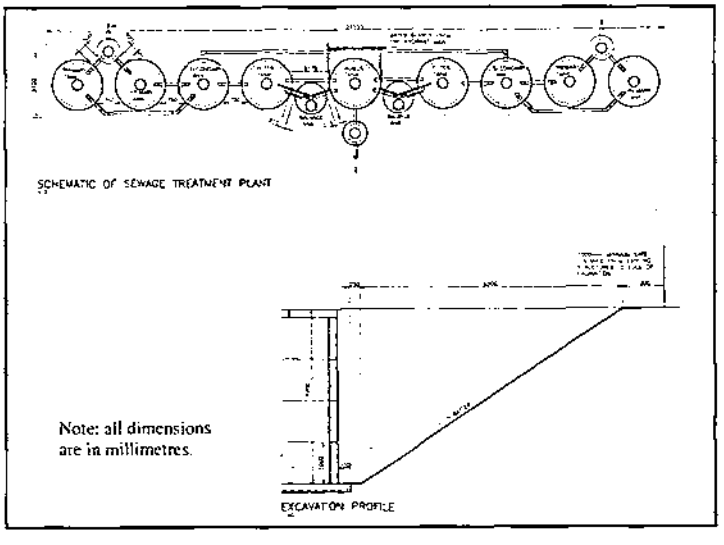
use of containerized toilet units and containerized shower units. There was a 100,000-litre water storage tank on site and ready access to electric power, albeit after installation of a 160kVA transformer.

A major problem arose when we started to discuss the disposal of sewage and waste water as the existing cesspits were far too small (at 8m³ and 24m³) for the numbers that were to use the camp. The usual means of sewage disposal used in Macedonia is to pipe raw sewage direct into the nearest watercourse. We could not do this and so set about resolving the problem, working to EU standards and designing to the highest possible within monetary constraints and local conditions.



Drawing 1. The plan.

A culvert at the bottom of the site was discovered which might travel to a nearby dissipating stream. Although we were concerned that the pipe might be blocked between its known start point and the apparent end point that we found, it was a starter for a couple of the options being considered. We looked at three: a cess tank that would require regular pumping out, a septic tank that would provide relatively clean effluent which would be removed through a soakaway, and a proper sewage disposal system. The first option, that of a cess tank, was rapidly ruled out because of cost and the need to rely on a local contractor who, we discovered, would just dump the waste into the nearest hole! When we started the calculations for the other two options, using a variety of sources including "ME Vol IV", *The Design and Operation of Small Sewage Works* by D Barnes and F Wilson, and our own experiences in Theatre, we soon discovered that we would have to deal with a base production rate of 22.5m3 of water per day rising to a surge peak of 112.5m3 litres per day. In addition we have to deal with a minimum of 67.5kg per day of solid matter and 110 litres per day of digested sludge per person per six-month period, rising to a peak



Drawing 2. The detail.

flow rate of 270kg per day of solid matter. We realized that there were actually four possible solutions to the problem: a packaged septic tank (such as manufactured by Klargester), a packaged treatment works, a packaged mobile treatment plant (such as those used in Bosnia) and a custom-designed treatment works.

The septic tank option was soon ruled out after a percolation test showed that the effluent would not soak away, and that the system would require thirteen 9000-litre tanks, these being the largest manufactured by Klargester. The proximity to a borehole was another nail in the coffin.

We then contacted Klargester to get prices. A packaged treatment works came in at around £75,000 without delivery, and a mobile system came in at £150,000. We had at that stage calculated a rough order of costs at £30,000 for a custom-built system using local resources.

After discussions with CO 62 CRE (Wks) and the Civil Secretariat in Theatre, who wanted to ensure value for money and lowest price where possible, the decision was that we should design a real sewage treatment plant.

The first step was to reanalyse the volume throughput in a steady-state operation. This was critical as both the "black" water from the toilet units and the "grey" water from the shower units and the kitchen were to be put through the system. Taking into account showering, washing, cooking and cleaning, and an additional two litres of waste matter per day per person, we worked on a permanent staff of 150 personnel, with a surge capability of up to a further 600 personnel for up to a week at a time. Confirming as correct the figures previously worked out, all the information was at hand to start designing the system.

We had a good feel for the basic concepts involved in the design of a sewage plant, but had to do some reading up on the subject as none of us had any useful notes from our respective courses. We had another useful document entitled "Public Health Engineering Practice Volume II" *Sewerage and Sewage Disposal* by L B Escritt.

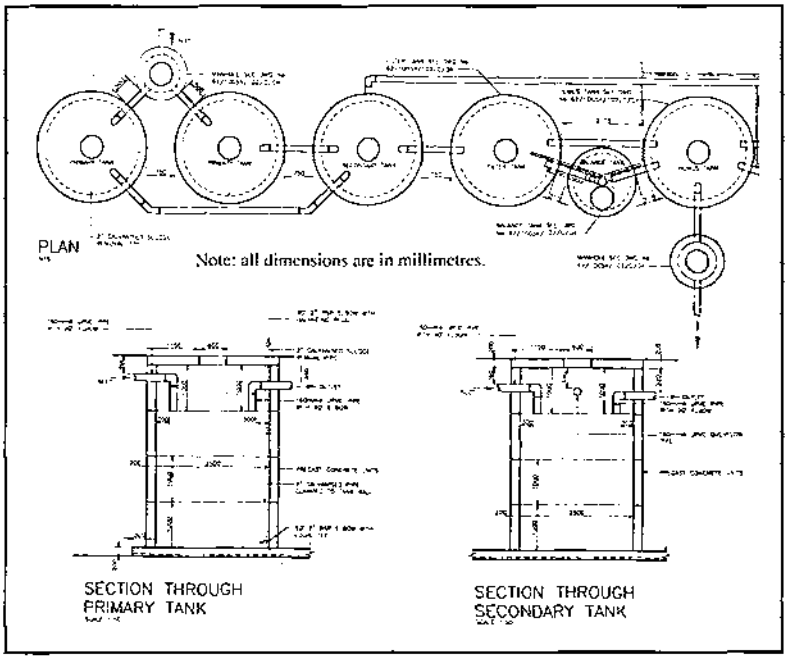
After some fairly intensive reading and research, it soon became apparent that there was actually a variety of solutions to our problem. We could have used any one of the following systems:

The big pit!

- **Imhoff tanks** – a system in which sedimentation and sludge digestion are effected in upper and lower compartments of the same tank respectively.
- **Travis hydrolytic tanks** – designed by W Owen Travis, who held the view that the deposition of colloids to form sludge was dependant on the exposure of the suspending liquid to surfaces such as the sides of the tank or grids or laths fixed in the tank.
- **Fieldhouse tanks** – a design of sedimentation tank in which the incoming sewage is made to mingle with the contents of the tank by outward diffusion as it travels towards the outlet weir.
- **Contact beds** – use the same medium as a percolating filter. However, instead of settled sewage being distributed over the surface and allowed to percolate through a well-aerated medium, the bed is filled with sewage, which is retained for a time, then drawn of by gravity to a second bed at a lower level for similar treatment.
- **Dibdin slate beds** – tanks filled to a depth of three feet with horizontal layers of slate. Designed to be filled with crude sewage once a day, then thoroughly drained in the manner of contact beds.
- **The Sheffield system** – a variation on the theme of activated sludge, where the necessary oxygen is picked up by the sewage from the atmosphere by means of constantly changing the exposed surface.
- **Percolating Filter** – settled sewage is trickled over the surface of particles of medium, which soon become coated with a film of bacteria and other oxidising organisms.

After analysis of all these systems, it became apparent that we would be best served with a variation on the theme of percolating filter tanks with primary and secondary sedimentation.

And they thought it was another swimming pool 1



Drawing 3. The fine detail.

The next step was to come up with some design parameters. Again analysis showed that there were seven key elements to consider during the design process. They were:

- Simple construction.
- Safe construction and operation (applying the principles of construction design and management).
- A design that was within the construction capabilities of the military construction force (MCF).
- Constructed from local materials.
- Use of the minimum construction time.
- Designed to BS 6297.
- Located at the lowest level of camp to allow influent drainage flow.

Whilst one of the recommended systems for a small treatment works was to settle in a septic tank and then aerate in a percolating filter, we decided that a system using primary and secondary settlement tanks, to maximize settlement, followed by filtration would provide a better solution for our needs.

Due to site constraints we elected to use circular vertical tanks, as opposed to rectangular beds, which provided a compact plant. The photo below shows the size of the excavation required to hold the tanks, and the bitumen-coated concrete pad to support them.

It was necessary to have two separate intakes to the system. The drawing left shows the layout chosen for all the tanks.

Then began the tedious phase of crunching through more calculations. For guidance on this we relied heavily on BS 6297. We also discovered at this point that the Dutch had built something similar for their main camp on Petrovec Airfield. However, they had decided to use the simple septic tank system, which they are now having to pump out once a week!

Having consulted BS 6297 at great length we calculated that it was necessary to have the following size of tanks:

- Primary tank $61.5m^3$
- Secondary tank $30.6m^3$
- Filter tank $260.0m^3$
- Humus tank $16.5m^3$

Given that we could get our concrete rings in 1, 1.5, 2 or 2.5m diameter sizes, we elected to go big and chose 2.5m. This meant that we needed a depth of 6.25m to get the required volume in the secondary tank. Because of the mirrored design we then realized that we could halve the depth and use four 1m deep rings. This gave us actual values for the tanks as follows:

- Primary tanks:
  Four tanks each of $19.6m^3 - 78.54m^3$.
- Secondary tanks:
  Two tanks each of $19.6m^3 - 39.27m^3$.
- Filter tank:
  Two tanks each of $19.6m^3 - 39.27m^3$.
- Humus tank:
  One tank of $19.6m^3 - 19.6m^3$.

We undersized the filter as we believed that we would get additional aeration during the effluent disposal to the watercourse. In addition we

would also gain additional dilution of the effluent in the watercourse. Into the design we added a back-flushing system to increase the life of the filter medium.

Although we had to keep the cost down and construct the plant in a restricted site with limited area and depth available for excavation, we were pretty confident that whatever we produced would be significantly cleaner than the water in the watercourse where the effluent was to be dispelled. However, we wanted to be sure and so we added a humus tank based on the standard of one sixth of a day's flow. To guarantee the correct operation of the percolating filters and the humus tanks we decided that it was worth installing a balance tank between each of the filters and the humus tank. The humas tank is a tank in which any solid particles that have passed through the filtration tanks are allowed to settle out. The humus is an unpleasant by-product with no value and would be pumped out and removed roughly once every three months.

The construction of the system started on 2 March 1999. Once the pit was dug and the concrete pad laid, we used a civilian contractor to do the bitumen painting necessary to prevent seepage through the concrete.

Next was a phased installation of the tanks. This had to be co-ordinated with the painter to ensure that he always had reasonable and safe access to the tanks because we were running the site under UK health and safety rules and did not want the painter working at height.

We then had a pause of four weeks (while the MCF was redeployed to various refugee assistance tasks in Macedonia and Albania) before installing the pipework associated with the plant and the creation of a suitable filter medium. It was at this point that we had to find ten tons of well-rotted horse manure to mix with the single-sized basalt stone we intended to use for the medium. This proved to be a harder task than we thought it would as there was no one in Theatre who actually collected horse manure. We revisited the design and decided that we could probably get away with not using any manure. As time was pressing, this was the decision we made and an on-site instruction was issued to the MCF. They were very grateful for this particular instruction!

Meanwhile the plumbers had been beavering away establishing all the necessary pipework. Not just the connecting pipes to ensure flow through the system, but also the simple, but yet complicated, system for backflushing the filter bed. However, all were eventually installed, leak free, and we then started the final stages.

Backfilling.

Once construction work was complete, the system had to be primed so that we could get it into operation smoothly. For this we had specified four dead cats because of the strange nature of bugs that a cat contains within its system. The ones we wanted had to have had a chance to rot down for a bit but their acquisition was not a problem as there are literally hundreds of cats running wild in Macedonia. However there was some discussions with the vet concerning potential hazards to the MCF. We then found

Bitumen painting.

And they thought it was another swimming pool 2

The completed plant.

out that Klargester sell packets of biological activators and so decided to use some of these instead of the cats. This was also gratefully accepted by the MCF.

So, now the system was primed and ready to go. The final stage was the installation of the effluent disposal line down to the local watercourse. We hadn't got anywhere seeking permission through correct channels. Then 5 Airborne Brigade used the area around Piper Camp as a staging area for the move into Kosovo and caused a lot of damage, so we took the opportunity to install the pipeline anyway, using the well-known Macedonian adage that: "It is better to ask for forgiveness after the fact than to ask for permission before!"

It was then time to commission the plant. The toilet and shower units (that had been waiting for three months) were connected and the system was off!

So there you have it. Designed by 527 STRE (Wks) and built by Sappers from 28 Engr Regt, the first sewage plant in Skopje. Planned to run on four dead cats and ten tons of horse manure, but made cleaner and less hazardous, the plant was renowned throughout BRITFOR in Macedonia and Kosovo and was known as: "The Millennium Pooh Pit".

Power To The People!
Restoration of Power in Kosovo

COLONEL J M HERON MBE BSc(ENG) MIMGT

Colonel Max Heron was commissioned into the Corps in 1975. Tours as a troop commander in Nienburg and Waterbeach, were interspersed with a degree course in civil engineering at the Royal Military College of Science at Shrivenham. Adjutant Junior Leaders Regiment was later followed by the Army Staff Course and in 1988 he assumed command of 1st Field Squadron which included deployment to the Gulf in support of 7 Armoured Brigade. After this he was posted to HQ 1st British Corps and saw the transition to HQ Allied Command Europe Rapid Reaction Corps. SO1 Management Plans in HQ 4th Division, in 1993, was followed by command of 73 Engineer Regiment(V) in 1995. In 1998 he became SO1 Engineer Branch HQ Land Command prior to deploying as the Chief Engineer Support in Sarajevo for three months. He assumed command of 29 (Corps Support) Engineer Brigade in 1998 and deployed to Kosovo as Deputy Chief Engineer in June 1999. He is an active veteran oarsman in addition to being Chairman of the Royal Engineers Rowing Club and Chairman of Army veteran rowing.

INTRODUCTION

KOSOVO Force entered Kosovo on Saturday 12 June 1999 following the signing of the Military Technical Agreement with the Serb Army (VJ) and the special police force (MUP) at Kumanovo, FYROM[1] (Former Yugoslav Republic of Macedonia), on Wednesday 9 June. The overall situation on arrival in the province was not as bad as the media would have had the world believe. In Pristina there was little evidence of war damage with the notable exception of the obliteration of an entire VJ barracks and the surgical removal of a MUP building in the centre of the town. In general, the main utilities had been largely untouched by hostile action, except where VJ positions had been placed near pylons or power lines, thereby attracting some collateral damage. However, no serious repairs or maintenance had been carried out for some ten years and this was where the greatest problems lay. Sanctions and other pressures had meant that things were only fixed when they failed and even then rectification was probably achieved through cannibalization from other facilities. The result was a gradual degradation of the infrastructure of the Province.

[1] Turkey recognizes the Republic of Macedonia by its constitutional name.

SITUATION

THE power industry was working on a shoestring. Neither of the two thermal power stations, Kosovo A and B, was operational and the transmission lines had been cut in several places; some parts had not worked for 18 months. The province was reliant on imported power and the whole system was inherently unstable with no redundancy.

Multi-National Brigade (Centre) (MNB(C)), based on 4 (UK) Armd Bde, established security around all the utilities within its area of operations. At this time, the utilities were all managed and run by Serbs, the Albanians having been purged from management positions in all public organizations in Kosovo in 1990. On 25 June 1999, all the Serbs in the power industry walked out due to concerns for their safety in the light of increasingly aggressive behaviour by extremist Albanians. The United Nations Mission in Kosovo (UNMIK) was still in its infancy; the 15-man planning team had only arrived in theatre on 15 June and it was certainly in no position to take any substantial action. It therefore fell to KFOR to assume the initiative and take on the power industry.

Power To The People Restoration of power In Kosovo
Colonel J M Heron MBE BSc MIM

The Kosovo Power Situation

It took some time to determine the composition of the power industry in Kosovo. Electro Priveda Serbia (EPS), with head offices in Belgrade, was the state-owned power company for the whole of the Former Republic of Yugoslavia (FRY). There was a subsidiary, headed up by an assistant general manager, which covered Kosovo, although many of the executive functions were retained centrally. There were four main elements: coal mining; power generation; transmission and dispatching, and distribution.

The two main power stations were coal-fired from lignite mined to the west of Pristina at Dobro Selo and Belacevac open cast mines. The equipment was old and poorly maintained and most of the heavy equipment, including bulldozers and excavators, had long since died *in situ* or been removed. The mines employed about 1500 staff.

There were two coal-fired power stations plus one large and two smaller hydroelectric power stations in Kosovo. The coal-fired stations were both closed down in March 1999. Kosovo A, which was built between 1962 and 1968 and was rated at 670MW, primarily for internal use, included five generators: one English Electric (60MW), one Westinghouse (160MW) and three Russian units (150MW each). The Westinghouse and one of the Russian generators were terminally ill but the other units, A1 (General Electric), A4 and A5 (both Russian) had been running recently. Kosovo B was the largest station, rated at 700MW, and was linked to both the super grid (400kV) and the local grid (220kV). It was also the newest having been built by a MAN-Alstom consortium between 1983 and 1985 and included two 350MW generators. The Gazivode hydroelectric station, situated northwest of Mitrovica near the Montenegrin border, produced 34MW from two turbines. With the exception of Gazivode which was in excellent condition, routine maintenance had not been carried out for lack of spare parts, due to sanctions, had hampered remedial work. As a consequence, some parts of the power stations had not worked for some time. About 2000 staff were employed in this sector.

A super grid fed the transmission system with links to Serbia, Montenegro and FYROM. It was non-operational due to war damage and lack of maintenance; the link to Montenegro had been down for over a year. Power was being supplied through the local grid (primarily 220kV but some on the 110kV) which was also damaged and was not designed to take the load. There was no redundancy in the system and it was very unstable. Serbia had clearly been degraded during the bombing campaign and all the Kosovo and Serbian power stations were, in effect, connected to the same 220kV line. Some 120 staff were employed in transmission and dispatching.

The distribution network converted from 110kV through 35kV down to 220V for domestic and commercial supply. This system had also been damaged and neglected. It was assessed that 30 per cent of consumers did not have power but that situation was worse in the west and southwest (Pec-Dakovica-Prizren areas) where it was assessed that 50 per cent were without power. This had been exacerbated over the years as the predominantly Serb workforce would not repair lines in Albanians areas; in return, they did not pay their bills. About 1500 staff were employed in distribution.

In addition, the company had a headquarters staff, a research and development institute (INKOS), a repair and maintenance workshops, its own medical centre akin to a small hospital, a transport company, several hundred security staff and a total of 22 canteens. These areas accounted for a further 1000 staff making a total of over 6000 in the industry, although it had previously employed up to 17,000 people!

When KFOR arrived, there was no internal power generation taking place and the supply was totally reliant on imports. 80MW was being fed into the northern and eastern side of the province on the 220kV line from Serbia. A further 40MW was being supplied on a 220kV line from Albania but, due to breaks in the line, this only covered the Prizren area, creating, in effect, two islands.

Negotiations For A Return to Work

The CO of 21 Engineer Regiment, Lieutenant Colonel Geoff Nield, grasped the nettle initially and identified the key players in the industry. After an abortive meeting on 25 June, a further meeting was initiated on Monday 28 June when the Serbs and Albanians were brought together for the first time. The majority of the power utilities were located around Pristina in MNB(C)'s Area of responsibility. However, with power having clear implications province-wide, the KFOR Chief Engineer, Brigadier John Hoskinson, took

the chair. At this stage it took much persuasion to get the Albanians to enter into the same room as the Serb management who had been in charge for the previous nine years. Eventually, five Albanians arrived and timidly huddled together at one end of the table for security.

There followed a detailed and protracted negotiation to determine the conditions under which Serbs and Albanians could return to work. The intention at this stage was to first get them to agree to an ethnic mix and second to make progress in restoring some indigenous power generation capability. It was agreed that all should look to the future and focus on the following:

- The security of personnel and facilities.
- The productive operation of the facilities to provide a service to the whole community.
- The root cause of instability within the company, namely the return of workers.
- The integration of workers throughout the company, according to their professional competence and qualification.

As far as employment went, the basic principle was that all those who had a post on 24 March 1999 (the start of NATO's bombing campaign) would be entitled to retain their job. There would then be a gradual take up of additional staff, as and when required, based on their technical competence and suitability for the post. This was not universally popular as the Albanians considered that employment should be in the ratio nine Albanians to one Serb, approximately reflecting the population of Kosovo. After four hours of lengthy debate in three languages (English, Serb and Albanian), broad agreement was reached and it was agreed that the committee would meet again on 30 June. The Chief Engineer promptly departed on R&R leaving me in the chair!

The second meeting was even longer than the first as almost everyone on the committee wished to revisit each and every part of the proposed agreement. Some progress was achieved by getting the Serbs and Albanians to sit within their specialities, such as power stations, albeit separated by a KFOR officer. After about four hours, it was clear that we were going around in circles. I adjourned the meeting and took the two leaders, Mr Petar Kostic and Mr Fatos Alia, into a separate room. Another hour of detailed negotiation ensued, which finally resulted in agreement on the composition of the committee. It was essential at this stage that we had equal numbers of Serbs and Albanians on the committee. The Serbs had turned up with ten and the Albanians only had five. The final committee was as follows:

Chairman (KFOR)	Colonel J M Heron
Joint Vice-Chairman (Serb)	Mr P Kostic
Joint Vice-Chairman (Albanian)	Mr F Alia
Member (Serb)	Mr B Boha
Member (Albanian)	Mr F Yberi
Chairman Coal Mines	
Sub Committee (KFOR)	Major J Fuller
Joint Vice-Chairman (Serb)	Mr L Petkovic
Joint Vice-Chairman (Albanian)	Mr A Kastrati
Chairman Power Stations	
Sub-Committee (KFOR)	Major J Fuller
Joint Vice Chairman (Serb)	Mr Stanislavec
Joint Vice-Chairman (Albanian)	Mr J Klinaku
Chairman Transmission and Dispatching	
Sub-Committee (KFOR)	Major S Cannons
Joint Vice-Chairman (Serb)	Mr B Kovacevic
Joint Vice Chairman (Albanian)	Mr J Gucaferri
Chairman Distribution	
Sub-Committee (KFOR)	Major S Simonini
Joint Vice-Chairman (Serb)	Mr D Markovic
Joint Vice-Chairman (Albanian)	Mr N Bejtullah

Whilst it might appear to be unwieldy, it had the advantage that all the key operating divisions were included and each was under KFOR control with equal representation from the two ethnic groups. Finally, after eight hours, Mr Kostic and Mr Alia signed the agreement. The first milestone had been achieved.

The committee met again on 2 July when the atmosphere was more co-operative as all involved got to know each other better. There was no issue over where people sat; they went to their new places without prompting. For the first time the discussion centred on how we were going to get the power industry going again, rather than on the semantics. This meeting was shorter (two hours) and more focused. Each sub-committee chairman gave a short report on the state of his sector of the industry, which painted a dire picture. However, it was important that some progress was seen to be made at an early stage and therefore the sub-committees addressed the return of workers on 5 July.

The Challenge

The challenge was very clear: we had to find a fast way to restore historical levels of power to the province, which were about 250MW in summer

and, more importantly, 600MW in winter. This had to be achieved from the following startpoint:

- There was only one transmission line which reached the power stations and that was from Serbia.
- The power stations, less Gazivode, had been shut down in March; there was no black start[2] capability in Kosovo. This meant that we had to rely on getting a power surge of about 60MW in from elsewhere to give sufficient power to restart a unit.
- There were very few vehicles and no spares left in any of the subsidiary companies with which to carry out any repairs.
- There was no income and no bank account for the company; the funds were all held in Belgrade. Diesel and chemicals were required for restarting a unit.
- There were no funds for paying the workforce.
- UNMIK had no financial or contracting organization with which to either fund or contract repairs.
- Refugees were returning to the province at unforeseen rates; 750,000 returned in little over a month with the consequent demand for electricity.
- The legal status of the Kosovo element of the company was unclear. UN Security Council Resolution. 1244 authorized UNMIK to occupy state-owned property and the power industry was taken over on this basis.
- Electrical power was the primary means of heating for most of the population especially as the communal heating plants were out of order. It was also essential for the maintenance of all the key utilities including water pumping facilities.

Workforce

The next challenge was to get them all back to work. The power industry had been an ethnically mixed workforce although Albanians had been purged from all management positions on 26 June 1990. Serbs, who were little respected by the majority of the workforce, had replaced all of these. Many of the Albanians presented themselves at the gates of the various power installations demanding their former jobs back. Clearly, they could not all be taken on at once so the situation had to be carefully managed in accordance with the agreement that Mr Kostic and Mr Aliu had signed.

Return to work was achieved through a relatively simply mechanism by getting everyone,

[2] A "black start" is the term used when starting a power station from cold. Most modern power stations include some form of auxiliary generation capability for black starts; this facility was not available in any of the Kosovo power stations.

Kosovo A coal-fired power station.

regardless of the position that they had pre
ously held or when they had held it, to registe
the relevant gates of their place of work. T
sub-committees then worked their way throu
the lists and took on staff in accordance with
30 June agreement until they had sufficient to
the job. Local advice and the consensus of
sub-committee were essential in this pha
However, where disagreements arose, it was
KFOR chairman who gave a ruling which w
largely respected by both communities. T
industry as a whole had been grossly overstaff
For example, in Kosovo B alone there were o
1000 staff; the equivalent in the UK would
run by less than 200. The initial priorities w
Dobro Selo coalmine, Kosovo A power stati
the transmission and dispatching staff and
distribution staff. Other sections of the indus
were registered but the names were retained
recall at a later date when sufficient work w
available. Despite our attempts to keep the nu
bers down, we still ended up with some 61
including 1500 Serbs. A comment was made
the Associated Press wire service that "precis
mediation by the Royal Engineers" had brou
the workforce back into the industry.

The work ethic in Kosovo is very different
that in Western Europe. The culture is that
you do not have a specific task then you
around waiting for someone to tell you what
do. However, the workers responded well to
application of military leadership! T
Albanians, in particular, had little managem
experience and were given direction by KF
officers. Results followed; repairs were carr
out in the coalmines and on Friday 9 July c

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was sent along the conveyors from Dobro Selo mine into Kosovo A in front of some of the world's press.

The power stations were in a shocking state, full of rubbish and dirt, including 3m of accumulated dust above the unit A1 boiler. Cleaning was carried out for the first time in years.

Technically, the Albanians knew what they were doing and demonstrated that they were competent to run the industry, albeit lacking in management experience.

Interim Management Structure

EPS had been a centralized, post-communist style company, which had been grossly overmanned and was institutionally inefficient. A job in a utility in the FRY was still a job for life. There were clearly perceptions to be changed and a new culture to be introduced. However, it would not have been in our interests to attempt to restructure it in the early stages; that would only have added to the unemployment within Kosovo and become another potentially destabilizing factor. There was also the contradictory stance of the Albanians: they wanted to be restructured into a western European company but, simultaneously, they also wanted jobs for all those who had been removed from their posts in 1990!

We therefore determined a simple solution as an interim organization. There would be one overarching company, called the Electricity Company of Kosovo (ECK), which would have four operating divisions and a headquarters element: coalmines; power stations, including all the associated functions of separation, drying and steam plants; transmission and dispatching; distribution; and a HQ and support division, including security, transport, repair and maintenance, INKOS, medical centre and canteens.

A clear sign of progress was the delegation from Belgrade, which presented itself unannounced at one of the committee meetings, comprising: Mr Z Cosic, minister of mines and energy for Serbia, and his deputy minister; Mr Vukicevic, head of the committee for cooperation with the UN Mission in Kosovo who subsequently became the FRY ambassador in Pristina; and Mr P Babic, general manager of EPS, the parent company. They were obviously piqued that we had both taken over the company and were making progress in restoring power to the province. However, they did not achieve much. Their demands were purely political so they could therefore be referred direct to UNMIK and specifically the head of Pillar II, the civil administration. Nothing more was heard from this quarter until much later when they suddenly realized the amount of foreign investment which was to be put into their company.

Initial Work To Restore Power

Following extensive discussions with the management committee a short-term strategy was determined for immediate implementation. It was clear that additional transmission lines had to be restored if any stability was to be maintained in the system. The influx of refugees was imposing a daily increasing demand on the limited power available. The hydroelectric station at Gazivode had to be run almost continuously to keep the province supplied but this seriously reduced the water levels in the reservoir which would normally not be used in the summer.

The transmission and dispatching staff investigated several options for improving supplies. It was decided that it would be better to try to reconnect lines first rather than attempt a black start, which had a limited chance of success. From an aerial survey of the damage, two lines were identified which would provide additional redundancy: Line 212 from Kosovo A to FYROM and Line 293/1 which would reconnect Kosovo A to Glogovac and on to Albania. The former required the erection of one pylon and the subsequent restringing of some 2kms of cables. Line 293/1 required both restringing of cables and the replacement of a number of insulators over tens of kilometres.

The first problem was funding; there was none! A military solution, for what was considered a mission essential task, was therefore the only way forward in order to establish an initial capability. The workforce had no pay but was keen, in the interests of restoring power, to work unpaid.

The next issue was how to replace the pylon on Line 212. The company that used to carry out the work throughout FRY was based in Serbia; this was clearly not an option. An alternative was to bring in a Macedonian company but the urgency of the situation, and the lack of any funds, precluded this option. Eventually, a replacement pylon was located in the repair yard at Kosovo B. There were no handbooks available but sufficient parts were found to make up a full set along with a new concrete block foundation.

There was some debate over which power station should be started up. Kosovo B was the newer station and was in much better condition. However, it was primarily connected to the 400kV lines, which were damaged, although it also had the facility to connect to the 220kV lines. The local advice was that Kosovo A should be the focus as it was designed primarily for domestic consumption, with four generators on the 220kV and one on the 110kV line. Pre-start checks were therefore initiated in Kosovo A.

The following plan was adopted:

- The relevant MNBs were tasked to carry out mine clearance of the damaged areas on Lines 212 (MNB(E)) and 293/1 (MNB(N)).
- The damaged pylon on Line 212 near Urosevac would be replaced by a troop from 26 Armd Engr Sqn. The troop commander, Lt Steve Lumley, commented that this was not a subject that had been covered on the troop commanders' course and had it been, most would have considered it too far fetched! (BEW, please note.) A local team, using winch vehicles supplied by 26, would subsequently restring the lines.
- As a second priority, Line 293/1 would be repaired, again with military assistance for winching.
- Unit A4 in Kosovo A would be restarted using a power surge from FYROM through Line 212.
- Further generators would be restarted on the completion of maintenance in order to restore some stability.

UNMIK Responsibilities

UNMIK, as the interim civil administration, was responsible under UNSCR 1244 for the running of the utilities within Kosovo. However, intent and practice were somewhat different. It was not until early August that anyone from UNMIK *really* got interested in the power industry, probably because it was being run by KFOR and not, therefore, at the top of their list.

UNMIK's method of running the public sector was to establish joint civil commissions (JCC) chaired by UNMIK with representatives from KFOR and the appropriate Serb and Albanian workforce. In effect, we had established this in June and all that was required was to hand it over to UNMIK Pillar II chairmanship. This was achieved on 1 September. However, handover of the chairmanship was one thing but actually delivering the goods was another. It was noticeable that most of the issues which needed action, came back to KFOR to resolve. However, Pillar IV also wanted to have their say as they had responsibility for reconstruction and this led to much confusion especially within ECK.

Expert Assistance

It was abundantly clear that the operation of the whole power industry was beyond the capability of KFOR's engineer troops. None of the five officers intimately involved had any expertise in this area, the closest was the GE(E) (general engineer (electrical) of 527 STRE(Wks), Captain Carl Artis. It was therefore with much relief that Lt Col Roger Urwin, a director of National Grid Company plc and a member of the Engineer and Logistic Staff Corps (ELSC), arrived in theatre on 28 June and carried out a preliminary assessment of the system. This visit was invaluable for a number of reasons. First, it provided vital expert advice. Second, it confirmed the competence of the Serb and Albanian staffs who were running the system. Third, it used follow-on visits from across the power sector. A three-man team arrived in theatre for a 48-hour advisory and fact-finding visit on 14 July and included a power station manager from Powergen along with two transmission managers from National Grid. They carried out a rapid assessment of the entire system, less the coalmines, and provided a report along with further reassurance that competent local engineers and technicians were giving us good advice. This team reported back to the Department of Trade and Industry (DTI) task force in London which eventually, after funding problems between DTI and the Department for International Development (DFID), led to the deployment of a five-man team on 30 July for 28-days. The team came under the guise of British Trade International (BTI) task force, an adjunct to DTI. It was led by Mr Brian Stone, a consultant engineer with Mott Macdonald, who was supported by representatives from Powergen, Scottish and Southern Power, and National Grid.

It was apparent early in the BTI deployment that the team would be required for longer than a one month assessment. They were making a huge difference to KFOR's ability to manage the industry. UNMIK was seriously understaffed in the civil administration area (Pillar II) and there was no indication that they would be able to deploy more staff in the short term. Until early August, they did not even have anyone dedicated to the vital area of utilities and it was not

until 12 August that a permanent appointment was made. There then followed a period of infighting in UNMIK between Pillar II and Pillar IV, who were responsible for reconstruction. The result was an untidy situation whereby Pillar II chaired the JCC, which was supposed to cover policy, and Pillar IV dealt with anything concerning inward investment, restoration and reconstruction. In practice, this meant that Pillar IV had the upper hand and really held the reins of power.

After much persuasion, UNMIK finally agreed that the only way in which power restoration for the winter could be achieved was to establish a management contract. The EC Task Force in Kosovo (EC TAFKO) had already agreed that management expertise was an area which they would be prepared to support. It should have been a simple matter to put the two together and establish a contract, or so we thought. The Terms of Reference (TOR) were duly drafted and agreed on 16 August but EC TAFKO then insisted that the contract had to be put out to 15 power companies across the EC as a competitive bid. There was great concern in UNMIK that this would make the process drag on and we would also lose the expertise that had been gained by BTI. The Special Representative to the Secretary General (SRSG), Dr Bernard Kouchner, therefore prevailed on EC TAFKO to go for a single source and open up negotiations with a view to letting the contract with BTI. This was finally agreed and the expectation was that the contract could be put in place before the expiry of the BTI contract on 27 August but this turned out to be a vain hope. EC TAFKO refused to enter into a contract with a government organization and so the contract had to be drafted with Mott Macdonald Ltd (MML), the parent company of the team leader. After endless negotiations, EC TAFKO in Pristina finally signed the contract on 13 September. Even then the problems were not resolved as MML came back with a number of subsidiary questions to be answered before they would sign their part. These struck us as strange and at a meeting on 20 September attended by Pillar IV, EC TAFKO, KFOR and MML it all became clear: EC TAFKO had issued an early draft of the Terms of Reference and not the final version which had been agreed by UNMIK and KFOR. It also transpired that EC TAFKO had not provided any of their standard financial terms or contractual rules leaving MML in the dark. Over a month after the original TOR was drafted, we still did not have a contract in place and vital time had been lost through interminable bureaucracy. However, we now had the Team Leader back in the Province, so work was able to progress, and the remainder of the MML team finally deployed on 28 September.

The modus operandi for the management team was not to take over the power company but to assist the local staff in managing and running their own company. At the end of the 7-month contract, the desired endstate was to leave behind a company which could stand on its own feet and operate commercially, albeit that considerable capital investment would be required in both the short and long term. This would mean some restructuring of the company, away from its overstaffed communist roots, towards a commercially viable organization. However, there was also a balance to be struck as there was no wish to have a lot of unemployed, and potentially disgruntled, former workers on the streets.

Donor Aid

Donor aid was a fundamental aspect of our work. In the early stages there was a stream of well meaning people representing every organization imaginable, who would make approaches claiming to have funds available immediately. In practice it was obvious that most could not deliver in anything approaching the timeframe required. DFID was the exception and no other agency matched their speed. Their representatives in theatre were authorized to commit up to £10,000 without reference to London and they also had a responsive system for getting larger sums authorized. EC TAFKO arrived with 9 million Euros to spend immediately but it was nearly six weeks before any funds were released and a further month passed before the physical transfer. The remainder all had to refer back to governments following their initial visits. Consequently, one became adept at spotting those who could really provide assistance and those who were either looking for commercial contracts or were so out of touch as to be unbelievable. The prize for the latter category went to an NGO (non-governmental organization) called Balkan Sunflowers who tried to get us interested in fitting energy conservation measures. It was pointed out to him that windows and roofs were a rather higher priority this year!

Donor co-ordination was another area where there was confusion. There was no single point

of contact and donors were setting out their stall to anyone who would listen. Initially, KFOR Engineer Branch took on this task until UNMIK Pillar IV was in a position to co-ordinate. Finally, after more cajoling of UNMIK, a weekly donor co-ordination meeting was established and this did much to focus the donor efforts. It was stunning to see the sums that governments were prepared to invest in this industry alone with UK, Norway, Denmark, Sweden, Holland and the EC all being major contributors.

The lack of funds to pay the workforce was a major area of concern. UNMIK were very slow in addressing this vital aspect but the first payments were eventually made from SRSG's Trust Fund and paid by KFOR, pay parade style, to the workforce. Again, UNMIK was slow in establishing rates of pay and setting up a payroll system which caused much anxiety among the workforce. The situation was not helped by the lack of any fiscal agency within UNMIK or any operational banks within Kosovo.

Ethnic Factors

At the outset of our negotiations over the return to work and restoration of the industry, there was some satisfaction that both Serbs and Albanians were working alongside each other. On 18/19 July, when Kosovo A as restarted, there were mixed staffs in all the control rooms at both the power station and the dispatching centre. Smoke coming from the power station chimney was a very visible symbol of progress in restoring the utilities. Consequently it was decided to hold a press conference at Kosovo A on 20 July. This was a great success and the media were able to see the operation of the power station at first hand as well as interview both Serb and Albanian staff. However, in retrospect, it may have had an adverse effect on the Albanians. Within hours of the press visit, the senior Serb on the power station sub-committee, Mr Zoran Stanislavec, was targeted whilst driving from Kosovo A; he was very lucky to escape unscathed, two bullets having passed through the headrest of his car seat. At the same time, other Serb managers in both power stations were attacked; two were murdered. The message was writ large and, understandably, the Serb management started to leave, mostly for Serbia. The workforce followed their lead and, within days, there were no longer any Serbs working in the industry. Members of the senior management

Kosovo B coal-fired power station.

committee followed and Kostic himself left at the end of July. Stanislavec was a great loss as he had done more than any to encourage Serbs back to work; he was also a very competent engineer and an exceptionally brave man who had withstood considerable intimidation before capitulating as a result of the assassination attempt. Even after he left, he maintained contact by telephone with KFOR staff and was still assisting the process from Serbia! Mr Kostic arranged for replacements on the main committee and a new team led by Mr Slobodan Djekic joined us. Djekic was an inspired choice. He had worked in Kosovo until 1988 and had been part of the commissioning team for Kosovo B. As such, he was apparently untainted by the spectre of the post-1990 regime. He went out of his way to be accommodating and to understand both viewpoints. He even started to locate equipment in Serbia which had been removed from the facilities in Kosovo.

Another interesting factor was the relatively seamless transfer of the security staff. Whilst we had selected staff based on the advice given by the respective sub-committees, the Albanian management clearly started to replace them with their own people. One noticeable change was the increasing number of younger security staff who appeared coincidentally with the demilitarization of the UCK (KLA).

Reintroduction of Serbs into the industry remained a high priority throughout our time in the industry. Having lost them all at the end of July, we actively pursued their return with Mr Djekic and his deputy, Mr Papic. A small start was made in early September with an

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escorted visit of representatives from six Serb villages. This went well and plans were put in place to reintroduce up to 50 workers a week later. However, at the last moment, they decided that they did not feel ready to go back and the buses left empty. Attempts continued to be made and some small success was achieved in the repair and maintenance workshop but this was collocated with a KFOR REME workshop, which provided on-site security.

Restarting Power Generation

The reconnection of Line 212 to FYROM turned out to be a nightmare. The apparently straightforward task of clearing the site of trees and scrub, removing the damaged pylon, assembling the new pylon and erecting it turned into a major operation. Trial and error eventually produced a complete pylon on the ground despite the lack of handbooks. The tricky bit was getting a 23m high pylon into a vertical position. This was too high for a crane so a CRARRV (Challenger armoured recovery and repair vehicle) and two CETs (combat engineering tractors) were used as winch vehicles. First the crane lifted the pylon as high as it could then the CRARRV and CETs took the strain to raise the structure into position. However, the pylon was a fairly flimsy design, despite the load it had to carry, and the first lift ended in failure when the cross bar buckled. It was back to the repair yard to source replacement parts which, luckily, were found. The pylon was reassembled, a new lifting arrangement was designed and another attempt made. This one was thwarted by the weather, which had turned the site into a quagmire and resulted in the foundations having to be reinforced. Finally, after three more attempts, the pylon was upright and securely anchored. The local transmission line team then moved in and started to restring the cables, with the assistance of two CETs. The first cable went up without incident and the second was also reconnected. With one to go, disaster struck without warning. The pylon buckled and crashed down. Unfortunately, one of the civilian team was on the cross bar at the time and he fell with the pylon. Despite a speedy evacuation by KFOR helicopter to hospital in Pristina and onto Skopje the next day, he died of his injuries four days later. A structural survey failed to determine why the pylon had collapsed and absolved the construction force from any blame. However, the death left everyone concerned with this sad episode somewhat deflated after the previous successes. It was therefore decided that no further attempt to repair this pylon would be made until a donor could be found and that an alternative means of restarting the power station would have to be found.

A plan was made to start a generator overnight on 18/19 July. The enthusiasm amongst the workforce was tangible and infectious. They saw this very much as their chance to prove that they were capable of running the show by themselves, although they could not achieve it without KFOR assistance. It had already been agreed that Unit A4, a Russian unit, gave the best chance of a successful restart.

KFOR sourced and secured donor funding for all the fuel and chemicals required to enable the restart to take place. Fuel was a constant problem with about 50 tons of diesel required for each cold start. Various funding sources were used: the SRSG's short impact project fund provided sufficient for 150 tons and the EC Humanitarian Organisation (ECHO) provided a similar quantity. However, the problems did not stop there: UNMIK had no fiscal or contracting organization so could not let a contract for the supplies; the EC wanted to pass its funds over for someone else to contract; and NATO was unable to hold funds for a third party! The solution was for the Civil Secretary of MNB(C) to take the funds into his account and for 21 Engr Regt to control the ordering and supply of chemicals and fuel. A further unforeseen twist was over the fuel price. France, as KFOR lead nation, supplied the fuel but it was transported by the British and paid for through the Civil Secretary. The French price, on which the bids for funds were based, was 15 pence per litre but the UK charged 59 pence per litre after the addition of tax and other charges. Consequently on the first delivery, when this came to light, the quantity available was significantly less than was expected. After some negotiation, it was agreed that the price could be reduced to 17 pence per litre. To cap it all, the EC quoted their funds in Euros, which caused a wobble with the Civil Secretary! We subsequently managed to secure an advance of one million Euros from the EC which was lodged with MNB(C) in mid August to cover running costs for three months, although the actual funds did not arrive until the end of September.

A meeting, effectively an O Group, was held on Saturday 17 July, to which all those involved

with starting A4 and subsequently synchronising the output with the grid, were invited. A synchronisation matrix was produced to ensure that all understood clearly what they had to do. It was agreed that all the pre-start checks would be carried out over the weekend and that a power surge would be arranged from 0001 hours on Monday 19 July in order to get the auxiliary systems working on generator A4. Despite this, most of the workforce were so excited by the prospect of the restart that they arrived early for their shift and had to be physically restrained from starting the boilers at 2100 hours on 18 July!

The power surge had originally been planned to come from FYROM along Line 212 but the pylon collapse had put paid to that plan. Dispatching therefore negotiated with Belgrade and a power surge was duly arranged for midnight on 18 July. It seems that power generation knows no political boundaries and this remained the case throughout our involvement with the industry. It is also likely that Serbia saw the restarting of power generation in Kosovo as a bonus to them as their system was equally badly damaged and insufficient for the winter. The alternative was "load shedding", otherwise known as a power cut, throughout Pristina for eight hours, hence the start up time.

To everyone's amazement, everything fired up first time and Major Fuller was invited to light the boiler at 0045 hours. This in itself was an interesting event. We were informed beforehand that it involved lighting an oily rag with a match and inserting it into the burner; everyone assumed that we were having our legs pulled but no, Major Fuller did in fact light the rag with a match fuse!

The start up progressed smoothly and by 0900 hours synchronisation had begun. This was built up in 5MW increments over the day to peak at about 120MW. The morale effect on the local population was noticeable as smoke rose from Kosovo A again. It also provided a filthy residue of ash and a strong smell of sulphur from the poor quality lignite.

Sadly, within two days the boiler had started to overheat and the unit had to be shut down. It was restarted and ran for 19 days, which turned out to be a record for that unit! An assessment of the industry, carried out in 1997, mysteriously arrived at HQ KFOR and, from the information given, it could be seen that the mean time between failures for the each of the generators in both Kosovo A and B was in the order of seven days! Reliability was less than 50 per cent and had been since the stations were built and it was not helped by the lack of maintenance since 1990. By the end of July, we had had power being generated from two units (A1 and A4) at different times.

Running Problems

The restart did not solve all the problems. The system was still inherently unstable, FYROM and Albania still being off the grid. However, funding was at last starting to arrive, rather than just promises of funding. The transmission sector managed to reconnect Line 293/1 at Glogovac and opened up the line to Albania on 3 August. This was only achieved with the assistance of 21 Engr Regt with CRTs and HQ ARRC Power Troop. The latter provided a generator to close the switches in the Glogovac substation which resulted in the resupply of electricity to the town for the first time in over a year. A pylon erection company from FYROM was also contracted to repair Line 212 which was completed in mid-August.

Just as things were starting to go well and some stability had been achieved for the first time, we had a major power blackout in the Balkans on 4 August. The problem started in Bulgaria when a power station crashed and shut down. This had a domino effect throughout the Balkans taking down first Serbia and then Kosovo. Our very success in reconnecting to Albania also proved disastrous as the same failure took out Albania as well! Added to that, significant damage was sustained in the power station. Unit A4 had been on line at the time and the additional load caused two pipes to be blown out of the boiler immediately reducing pressure and tripping the generator. Luckily, A1 had been taken off line two hours earlier and was unscathed. This unit was then used to restart the system but, with an output of only 60MW, it had limited effect. Having all the power stations in the region connected to the 220kV line had caused the problem. Two days later, a similar, but smaller, blackout occurred but this time A1 was on line and also suffered similar damage to its boiler pipes. Two units now needed significant work to get them ready for operation and so the focus switched to A5.

Dispatching also had considerable difficulties. It is normal in a dispatching office to find a circuit board which includes lights and dials. The

Kosovo dispatching centre had all of these but, inevitably, none of them worked! There was only one small LCD (liquid crystal display) on the board, which produced a readout for frequency, and all power balancing was carried out on two telephones and even then these did not reach many transformers and sub-stations. On one occasion, part of Pristina was only reconnected to the grid by taking one of the office staff physically in a KFOR vehicle to the sub-station, waking up the manager and getting him to flick the appropriate switches! There were many similar teething problems in managing the system.

Restoration Strategy

Restarting a generator was one thing but ensuring a sustainable supply throughout the winter was another. The essential ingredient was a detailed and costed report on the state of the industry along with priorities for immediate action. The output of BTI's original month deployment provided exactly this information, although we were inundated with other reports as well. ABB[3]/Alstom provided a very detailed report on Kosovo B but, as the original suppliers of the units, their report was in the doom and gloom category; the EC International Management Group (IMG) produced a report which was good on generalities but lacked specifics; and the World Bank produced a report which drew on the IMG report and was designed for a funding bid to the EC. Pillar IV held a meeting on 15 September when the following strategy for the period 1 October 1999 to 31 March 2000 was agreed:

- Restore production in both Dobro Selo and Belacevac in order to meet winter production rates for two power stations.
- Maintain two units running in Kosovo A throughout the winter.
- Restart unit B2 whilst carrying out maintenance on unit B1. Restart B1 and then carry out maintenance on B2.
- Restore all priority A and B 400kV, 220kV and 110kV transmission lines to give redundancy within the grid.
- Develop a distribution restoration plan in conjunction with donors.
- Develop a black start strategy and a load shedding strategy.
- Start to define and restructure the company.
- Meet an endstate of a reliable power supply (target - 600MW) for Kosovo throughout the winter months.

With the strategy finally agreed, we were then able to have another meeting two days later with the potential donors. A total of some DM100M worth of work had been identified by BTI but realistically some of this would not be achievable before the winter. Through a degree of robust chairmanship, we effectively held an auction with the donors. After one hour, donors had signed up to some DM70M of aid covering all the key areas within the power industry. This was very much Pillar IV's preserve but prior preparation, in the form of a draft written proposal, helped to keep these meetings focused with consequent results.

Exit Strategy

It was clearly easy to get embroiled into a civil infrastructure task such as power but extracting military troops and handing back to civilian control was another matter. We identified early on that we had to find a solution that satisfied everyone. KFOR had no wish to run the sector for any longer than necessary and the arrival of BTI provided the catalyst to achieve this. By getting EC TAFKO to agree to invest in management expertise, and subsequently bringing them together with such a provider, we were able to set the conditions for the extraction of KFOR from the industry. This was achieved by mid-October leaving liaison only at KFOR level.

Lessons Learnt

We were fortunate in that there was plenty of local technical expertise available in the workforce but those with it suffered from a lack of management experience. Their impetuous nature almost caused a number of disasters such as the one I mentioned earlier when they were so keen to fire up the power station on 18 July that they nearly launched six hours early, which would have blacked out most of Kosovo!

The old adage that a little knowledge is a dangerous thing is never truer than in the context of the power industry. The initial task of restarting Kosovo A appeared to be relatively straightforward; it was only once we had had the benefit of the ELSC visit, and subsequently the DTI/BTI visits, that the enormity and complexity of the task was realized. There was also a general expectation within the military hierarchy that

[3] ABB/Alstom is a multinational power company known by these initials.

this was something that the Corps could take in its stride!

The influential membership of the ELSC ensured that there was a rapid immediate response to the call for help including the three-man advisory visit. Bureaucracy then ensued over who would fund the initial 28-day mission by BTI. This was compounded when the EC and DTI were both involved in setting up the seven-month management contract. It is clear that a system needs to be devised which permits such deployments to take place in a timely manner. One solution would be to have a dormant arrangement in place, covering all the main utility areas such as power and water, along with funding to cover initial deployments for, say, up to three months. Such a system would probably have gained six weeks restoration time which was lost through bureaucratic delays in Kosovo. It is strongly recommended that suitable arrangements should be established now between DTI and DFID.

The question of whether the Corps should have power generation expertise, other than the limited capability provided by MWF public utilities teams, is bound to be raised again. After all, we have now been faced with power situations in Kuwait, after the Gulf War, Bosnia and now Kosovo in the last ten years. Power generation is a complex area and one that would incur an immense training burden. I do not personally see the need to re-establish the capability if there is the means to rapidly deploy teams of appropriate specialists from the private sector. However, there may be merit in including power as a speciality within Central Volunteer HQ RE as part of the RE Specialist Advisory Team.

The experience of running a power industry, once again, underlines the need to train our young officers and NCOs to expect the unexpected. Putting individuals into unexpected situations in training will always bear fruit on operations. The fact that none of them appeared fazed by the prospect says much for our training standards as well as being a strong argument for retaining those standards.

Running a multimillion deutschmark business with no cash flow was an interesting experience which forced us to live from hand to mouth. If it had not been for a very few agencies, such as DFID and ECHO, which could produce immediate cash, then we would never have got off the start line in July.

Conclusion

Assuming control and running a major national utility was an exhilarating experience made all the more challenging by the political and language difficulties encountered along the way. I hope that by grasping the initiative at the outset, we were able to set the conditions which allowed UNMIK and donors to come in and rebuild the indigenous power generation capacity in Kosovo. The early deployment of an experienced and qualified team from the power sector in the UK was considered to be one of the critical elements. The subsequent establishment of a management contract funded by the EC and DTI permitted a controlled exit strategy for KFOR and an early return to normality for the power industry in the Province.

What Is Good Written Style?

CAPTAIN M PROVAN

Captain Provan joined the Royal Engineers in 1972 from Whitehill Comprehensive School in Glasgow. He has served in a variety of units including 59 Independent Commando Squadron and, recently, 35 Engineer Regiment as Regimental Sergeant Major. Commissioned in July 1997, he is currently employed as Second in Command 24 Training Support Squadron in Chatham.

BACKGROUND

THE following words were written in my first annual confidential report as a late entry officer:

"He writes clearly, if a little rigidly, in strict accordance with Defence Writing Standards."

At first glance, I thought I was being praised for my lucid prose; writing "clearly" surely must be good. As part of my daily duties in the Army, I was responsible for checking the correctness of all written work before it left my squadron. I had taken great pride in my ability to detect the slightest flaw, be it spelling, punctuation or grammar; I was infamous for my dreaded yellow highlighter pen. However, as I sat in my CO's office reading my report, the use of the words "rigidly" and "strict" made me reassess my initial assumption. Thinking that perhaps I was being a little naive, I hastily inspected the positioning of the all-important crosses in the boxes of my confidential report; most were excellent, but I was marked-down for my "written power of expression." My immediate suspicions were confirmed; this was bad! I was naturally (or maybe unnaturally) miffed to hear that I was weak at something. As a warrant officer, I was used to being told that I was without fault; I had fully convinced myself that this was the case; narcissism had always reigned supreme. Picking the pieces of my shattered ego off the floor, I tried desperately to defend my virtues.

"Colonel, what exactly is wrong with my written powers of expression?" I asked defensively. To give him credit, he listened to my protestations and whinges with a great deal of patience and aplomb, but his answer was not one I wanted to hear:

"It's your written style that needs changing," he said. "Improve your style, and next year I might change your report."

I left with pride dented, and my head was full of unanswered questions. How could I possibly change my written style? Was it simply a matter of trying harder? In a confused but determined state, I decided to research the subject. I started my exploration by reading Fowler's "Complete Plain Words." This was extremely helpful, but contained too much for my mind to absorb and memorize. As I began to gather material, I quickly discovered that I was following in the mired footsteps of many other students of the "style" enigma; this was obviously a contentious subject. It finally dawned on me that before I could continue the search for this evasive quarry, I would have to ask myself one all-important question:

"What is Style?"

Defoe said "If any man were to ask me what I would suppose to be a perfect style of language,

What Is good written Style Captain M Provan

I would answer, that in which a man speaking to five hundred people, all of common or various capacities, idiots and lunatics excepted, should be understood by them all, and in the same sense which the speaker intended to be understood."

Buffon turned this same question back on itself and said "Style is the man himself."

Does this simply mean that each individual has his or her own unique style, be it good or bad? I am sure this is true, but what is good to one, may be bad to another. Who is the arbitrator of such decisions? We can all relate to "style" when we think about clothes. A country gent would not dress in the same style as a city executive. A "mod" would dress differently from a "rocker". These are obviously distinct styles, but who is qualified to say which is the most stylish? Perhaps you might choose to take the advice of a fashion guru, but will any two of these so-called experts agree on what is fashionable. Would you honestly like to walk into your local officers' or sergeants' mess in a nice little Vivien Westwood creation? If you were to take out your old photo albums and look at some of the clothes you used to wear: tank tops, flares, kipper ties etc - would you dress in the same way today? I think not! However, all those years ago you were obviously convinced that you were the very embodiment of style, no matter what anyone else told you! If you looked at some of your old love-letters, perhaps ones you had composed as a teenager, would you write in the same fashion today?

What then has changed? Is it simply an unavoidable fact a given style will change with time, or is it our perception of style that changes? It really makes no difference how we compare the vagaries of trends, whether fashion or literature, style is difficult to define!

So – was I to fall at the very first hurdle on my race to enlightenment? Perhaps I had initially asked myself too hard a question. Undeterred, I decided to change tactics and try approaching the subject from a different angle. If I could not define style, then maybe I would have more luck with my second question:

"What is good English?"

It could be argued that the answer to this question is: the English used by the average educated person. But is it? It may be one source of good English, but is it the only and authoritative source? Grammar seems to be inextricably linked with "good English", and "good English" appears to be the language which all educated people speak, whereas grammar is only a body of knowledge about how we use English; and that is changing continually. Is there then such a commodity as good or "correct" English in the pure sense? Correct English must surely be the English that fits the situation you are in. I have heard officers switching their English unconsciously as they turn from speaking to a private soldier to a fellow officer, or from a wife to a tradesman. We all change our diction to suit the circumstances and we all put snob-meters into the mechanism of our speech. If we accept the dictionary's definition of the word "good" as "having the right or desired qualities" then "good English" is plainly what is suitable to each environment.

It is said that a man's use of language constantly declares his place in society. Every writer and speaker has the right to choose the source of their learning. The means of acquiring the knowledge on which to base each choice, is to read the great body of English literature. The basis of judging "good English", then, can be the body of English literature; but literature itself is diverse. It is the work of a number of individuals. When you judge an individual writer, what measuring stick do you use? People will say that they enjoy a good book, but different things, apart from style, can affect their enjoyment. Children will learn how to speak by mimicking their parents, this tutelage continues at school. The flavour of this early education may give a taste of its own to their ways of expressing themselves. By reading, we acquire a style, consciously or unconsciously, because we soak up the rhythms of what we read. A person who only reads the local newspaper will eventually write in the style of that newspaper. Is it then fair to say that the wider the range of your reading the better your style? Here it may be prudent to remember Ruskin's fearful warning: "You might read all the books in the British Museum and remain an utterly illiterate, uneducated person; but if you read ten pages of a good book with real accuracy, you are, for ever more, in some measure, educated."

When you speak, you can use tones of voice, gestures, and facial expressions to help impart your message. When you write, you can only get the same effect by two things: the words you choose and the pattern they make. Part of the

pattern is controlling the rhythm of your sentences; this can be better achieved if some basic rules are followed.

The Rules of Style

Schopenhauer's observation that "The first rule of good style is to have something to say" may be more helpful, I thought. This statement was further endorsed by Mathew Arnold, who once said "The secret of style was to have something to say, and to say it as clearly as you can."

This seems over-simple, but amongst grammarians and literary experts alike, it is a commonly accepted tenet. Fowler fully advocated this view, and translated these generalities into some practical rules.

- Prefer the familiar word to the far-fetched.
- Prefer the concrete word to the abstract.
- Prefer the single word to the circumlocution.
- Prefer the short word to the long.
- Prefer the Saxon word to the romance

"These rules", he added, "are given in order of *merit*; the last is also the least." They can be summarized as "be short, be simple, be human."

So, is it really that simple? To write clearly do I only have to reduce my composition? Was brevity the key to my conundrum? During my year's research, I had the good fortune to read an article by Lieutenant Colonel J A Thorp MBE, called "Breeding Beautiful Butterflies" He outlined the problems encountered while marking his subalterns' essays, and warned about the dangers of editing. He likened good writing to gardening, and advised writers to examine their completed work, and then remove offending (or overgrown) verbiage. He prescribed a brush cutter to remove the undergrowth, pruning shears to trim straggling branches, and secateurs to snip off little twigs. He did however, warn that too much trimming might destroy the garden. The following example of literary paring highlights his warning.

The Unkempt Garden

Cervis D Ress strode purposefully into the bar. His athletic frame, square jaw and well-groomed looks spoke of a successful man in the city. The barman mixed a cool Martini while Cervis cast a confident glance around the interior of the rather exclusive establishment. His gaze halted abruptly on the gorgeous form of Jenny.

"She has to be a model," he thought, admiring her classic, full figure and jet-black hair, swept back with a hint of rebellious youth. Cervis only stopped to wink at the barman before smoothly moving over to Jenny's table.

"Hi, I'm Cervis D Ress, may I join you?" he asked with an expectant grin.

Jenny swept her eyes over his body taking in every detail, and lingered on his deep blue eyes before nodding her assent.

"Please do," her voice lapped like honey.

"Chanel," he breathed, "My favourite."

"Tell me, how can such a good-looking girl be sat alone?"

"Maybe I just haven't found the right man," she purred, shooting a questioning glance at him.

Cervis grinned, his eyes devouring her. She crossed her black-stockinged legs nonchalantly and he felt himself burning in the heat of her pouting, red lips.

"You have now," he croaked.

"I'll take you to a pretty, French restaurant. Do you like Coq au Vin?"

"Mais, bien sur!" she giggled, her laughter bubbling like champagne.

The barman grinned wryly as the couple left chatting merrily, arm-in-arm.

Brush Cutter to Remove the Undergrowth

Cervis D Ress was a success. In a nice bar he bought a drink and spotted Jenny.

"I fancy a slice of that!" he thought and walked over.

Jenny watched the smoothie approach.

"Bags of money," she thought, as he sat down.

"You smell nice, would you like to go out tonight?"

"Why not!" she said as they left the bar.

Pruning Shears to Trim the Straggling Branches

Cervis D Ress was classy. He saw Jenny in a Pub.

"Fancy a good time?" he asked.

"Not half!" she answered, and they left.

I think that you will agree that this method of abbreviating sentences, while successful for Cervis D Ress, is an utter failure for the reader. The unkempt garden can quickly become a barren plot if too much is cut from it. So – brevity is good, but only if applied sensibly. What is the point of writing, if the result is not clear or readable?

Readability

Readability must be an essential ingredient for any piece of writing, be it imaginative fiction or a technical document. If our work is easy to read, then we must have written it effectively. This surely is a writer's whole objective. To be effective in our writing we must aim to avoid placing any barriers between the message and the reader. Samuel Butler made a wry comment on the situation: "I never knew a writer who took the smallest pains with his style and was at the same time readable."

In many books on writing, it is stressed that style must be simple, clear and concise. Although this is good general advice, it is not particularly helpful when it comes to improving your own writing style. When considering this style, it is also important to distinguish between the requirements of factual and fictional works. A piece of fiction may well be full of florid descriptions and embellishments. It might have a plot; it could be humourous or even scary. Since I do not intend to write a best seller, I have concentrated my studies on only factual works, and examined some of the elements that may affect readability.

- The writer's choices of material, the correct use of grammar, spelling, brevity, clarity, and perhaps the most important consideration – awareness of the reader.
- The reader's disposition and motivation.
- The text: the use of language, composition and wording; its physical presentation, layout and titles.

Conclusion

As I asked in the title of this article: "What is good written style?" I have tried to find a qualitative universal judgement but to no avail. However, I have discovered that although the components of "style" can be identified, it is not possible to define "good style" without being subjective. My research has led me to the conclusion that poor style usually refers to complicated writing with faulty structure and limited vocabulary; this can be defined while still being objective. Can I change my style: yes – it changes constantly! Can I improve my style: again yes! During my studies, I have repeatedly read one message that stands out above all others: "Writing should be clear and simple, but maintain the interest of the reader." I firmly believe that a person should "write to express – not to impress." That in itself is stylish, and is enough!

If language is not correct, then what is said is not what is meant. If what is said is not what is meant, then what ought to be done remains undone.

Confucius

Operation Agricola Sex Scandal

MAJOR R K TOMLINSON BSc

Major Rob Tomlinson's previous units include 52 Field Squadron, the Army Apprentices College Chepstow, 10 Field Squadron, Headquarters Rhine Garrison and 72 Engineer Regiment (V); all of which disbanded during or shortly after his tenure! Only Headquarters Allied Command Europe Rapid Reaction Corps and 65 Field Park Squadron have so far survived his presence. He took part in Operation Resolute *with Headquarters Allied Command Europe Rapid Reaction Corps and more recently deployed on* Lodestar *and* Agricola *with his squadron. Reluctantly he handed over command in August and is currently attending the MSc Defence Logistics Management Course at the Royal Military College of Science.*

OPERATION AGRICOLA SEX SCANDAL
(65 Field Park Squadron in the Southern Balkans – February to September 1999)

IT is a cheap trick but one that clearly works well; had I more honestly entitled this piece "Engineer Logistics Support to Operation *Agricola*" few of you would have got this far. Please bear with me and read on, for I can offer you gratuitous sex, drugs, allegations of murder and all sorts of deviant behaviour. You may find logistic support issues stultifyingly dull – and lets be frank, they often are – but if the use of a few blatantly sensational statements can get you through 4000 words on the subject then they will be white lies well told.

THE real aim of this article is to raise general awareness of engineer logistics support to operations. Using examples from our recent experiences on Operation *Agricola* it is hoped to tease out some key issues and possibly even encourage further debate.

The leading elements of 65 Field Park Squadron deployed to Macedonia in February this year TACON 28 Engineer Regiment. Just prior to that the squadron had been conducting UNTAT training in the expectation of another 6-month tour in Croatia. 22 Engineer Regiment then drew the short straw for Operation *Palatine* but they required some additional support; the squadron was ordered to detach three resources specialists and a MT corporal to Split. The loss of these four men significantly reduced our ability to support the operation effectively. More on this later.

It was a very busy tour. In early July the Corps had three regimental HQs, 11 squadrons and a large slice of the Military Works Force in Theatre, excluding *Palatine* troops. The squadron provided engineer logistics support to the whole force. In addition, because of a dearth of corps troops, considerable advice and practical help was provided to HQ KFOR. The author also spent the first month of the tour working at HQ Combat Service Support Group (UK) – later retitled 101 Logistics Brigade – co-ordinating the resources in-load and support to enabling tasks.[1]

The squadron was fortunate to locate and hire a suitably large site for the engineer logistics base – quickly dubbed Piper Camp – just a few miles south of the Kosovo border. This site was chosen so that we would be ideally placed to support operations inside Kosovo when our ground forces went north. The camp was close to the

[1] The recently established SO2 Engineer post in the logistic brigade had not been filled at that stage.

Operation Agricola Sex Scandal Major R K Tomlinson BSc

main supply route and, very importantly, close to Skopje which was to be our main market for locally-procured construction stores. Unfortunately, our proximity to the border was not so welcome when the Allied air campaign began. Well within range of enemy artillery, and with constant rumours of Serb special forces activity along and across the border, we were not surprised when we were ordered to evacuate all but a 40-strong security force. For the best part of two months 65 Field Park Squadron (Forward) held the dubious honour of occupying the most exposed NATO base in Kosovo. The oft repeated phrase "tradesman first, combat engineers second and soldiers last" became a hollow joke. We dug battle trenches and observation posts, put out wire entanglements and mounted frequent and irregular clearance patrols. Being within the Garibaldi Brigade area of operations we were often visited by a squadron of Italian cavalry. They liked the camp so much they moved in, and refused to budge until the air campaign was over. Quite who protected who during those tense weeks was never really clear.

British Soldiers Living Like Refugees

Not true, the refugees had far better tents than we did. We were rescued from the Italians, and the 40-man rate cap, by the refugee crises, first at Brazda Camp – 2km from Piper – and later in Albania. This latter operation was successfully supported from Piper Camp along a 500km-long supply loop. A great deal has been written about the support that the Corps, and specifically 28 Engineer Regiment, gave at this time so it will not be covered in any depth here. In summary, the Refugee Handling Centre at Brazda began as an empty greenfield site but was home to over 20,000 refugees 40 hours later; this figure rose to over 33,000 during the following days. 28 Engineer Regiment led the massive All-Arms effort to provide shelter, water, latrines, food, rubbish disposal and a degree of security during three hectic and emotionally draining weeks. It was an immensely satisfying phase of the operation for all involved.

When the civilian aid agencies were eventually able to take control of the refugee situation and allow the Sappers to pull out of the camps, our focus switched back to preparation for the imminent ground campaign. The regiments concentrated on training, particularly for bridging, mine breaching and water supply operations. The squadron provided equipment, crane and transport support to this training and in-loaded an 80m Mabey Johnson universal bridge on behalf of HQ KFOR. The release of this bridge from its NATO storage area in Greece was a sure combat indicator that ground action was imminent. When 5 AB Bde, supported by 36 Engr Regt, turned up we knew that the green light was well and truly on. We had the pleasure, nay honour, of hosting 5 Brigade for 48 hours at Piper Camp prior to their dramatic, but thankfully unopposed, heli-borne move into Kosovo. 4 Armoured Brigade followed a few hours later and that was that: 65 Field Park Squadron, for so long at the forefront of the NATO operation, was pushed to its rightful place in the rear without moving an inch.

Refugee child – Brazda camp.

Soft Core Banned

Clearly worried about the deleterious effects that pornography can have on the fighting spirit of our soldiers a politically correct ban was imposed on the display of all such material. Irrelevant though this clearly is it does provide me with a tenuous link to the core functions of engineer logistics. These are: the provision and management of engineer resources; engineer workshops support, and; transport. Plant support is not a logistics function per se but in line with recent best practise within the Corps the squadron's heavy pool of plant and operators was detached to the GS Regiment HQ Squadron. Comment on each of these core functions follows.

The Provision of Engineer Resources

CO 28 Engineer Regiment and the author were included on the initial recce to the theatre of operations in February and invited to the PJHQ/LAND Mounting Conference that followed. This was hugely significant as it allowed an early estimate to be made of the requirement for the correct establishment of engineers and resources in theatre. From that estimate shipping space was bid for. The initial requirement was for 600 linear metres (LIM) of shipping space on

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90 per cent of engineer materiel was delivered by civilian hauliers.

the first vessel in order to provide an enhanced mobility support capability to the lead armoured battle group (LABG). We were given just 60 LIM. I learnt later that the KRH Officers' Mess silver arrived in theatre before the first bridging assets! Priorities like these sit unhappily with the need to confront narrow mountainous roads, weak culverts, tunnels and bridges rigged for demolition and minefields. Thankfully, the LABG did not charge straight through the infamous Kacanic defile into Kosovo as had been planned. Had they been required to do so the squadron, and indeed the GS regiment, would not have been in a position to provide any form of second-line mobility support.

It soon became clear that we could not rely on getting sufficient shipping space so, with the help of Sappers at HQ LAND and the Supply Chain Operations Centre (SCOC), bridging, trackway, water supply kit, construction stores packs and field fortification stores were deployed by road. At the time of writing, over 190 civilian truckloads of resources have been delivered to Piper Camp at a cost of between £5000 to £10,000 per truck! Regardless of cost, this overland option proved to be faster and more responsive than the sea route. Clearly not every future theatre of operations will be as easily accessible by road, so shipping priorities do need to be examined carefully.

There were occasions when the urgency of the operation did not allow for road or sea movement of resources. An early recce revealed a weak bridge on the main (and only) military supply route from Greece into Macedonia. This required urgent remedial work to raise its military load classification from a marginal 40 to 100 to allow safe passage by the LABG. The process of STRE design, DCTA (Defence Clothing Textiles Agency) procurement, SCOC delivery by C130 aircraft, and construction by 20 Field Squadron took less than five days. The first heavy armour crossed the bridge eight hours after completion of the task. Four other high-priority enabling tasks were similarly supported by the air movement of engineer resources in the first few weeks of the operation. The message is clear – when you really need resources in a hurry the system can and will supply.

The squadron provided resources support to over 220 separate engineer construction tasks; 90 per cent of which required locally purchased stores. Fortunately, Skopje had a healthy construction industry and most of our stores requirements were met within a few days. Two SNCOs were employed exclusively in the squadron's local purchase cell and they spent over DM3 million on the local market[2]. When this market could not supply specific items the squadron turned to the DCTA. The small engineer cell within DCTA worked very hard to establish robust enabling contracts with a number of major UK suppliers. The majority of our demands were met within just a few days. Only a few one-off or high specification items took longer to procure. The unfortunate troop commander who had to wait several weeks for that final high spec grommet would cuss our archaic and unresponsive resources organization. Had he only experienced previous such tours, when it was the expected norm to wait 12 weeks or more for UK-sourced resources, or been unfortunate enough to rely on the UN for resources, he might have been less critical. Sad though it was to have lost Long

[2] 60 per cent was spent on stone for the temporary field accommodation project.

Marston, I for one am now a great fan of SCOC, DCTA, and the single supply chain. With decent Sapper personnel in the key jobs, which we currently have, the system works far better than it ever did in the "good old days". Without those embedded RE posts, however, support to the Corps will deteriorate.

I cannot discuss resources support without mentioning resources specialists (res specs). If, like me, you once thought these people to be charlatans, over promoted, self-important, clever with smoke and mirrors and little more than glorified storemen – then of course you are absolutely right. But just try running a successful operation without them. In fact, resources specialists and supervisors are nothing more than combat engineers and tradesmen who have been trained to run resources accounts. But they are Sappers. As such they are intelligent, versatile, flexible and experienced in all things sappery. (You only have to work closely with the RLC's equivalent – who are pretty good with bar codes but can't tell the difference between a WPU NBC and a puncture repair kit – to realize how well off we are as a Corps.) We have a nasty habit of employing them out of trade in barracks: it may be handy to use a spare res spec to run the diving store, the armoury, or even the bedding store, but employ them out of role on operations at your peril! The units that had the luxury of deploying with their establishment of res specs, and used them correctly ie in close liaison with the engineer logistics squadron, got the best service. 53 Air Support Squadron, for example, deployed with a strong, well trained and in-role resources team and reaped the benefits. A few other units tried to cuff it and lost out.

I have been increasingly attracted to the idea of pooling more of the Corps' res specs – in either a new resources STRE or with the existing engineer logistics squadrons. These men would benefit from working in a resources environment in barracks, would be misemployed less, and could be demanded by units to provide additional resources support on exercise and operations.

Sapper Wilson adapting bridge components.

Deviant Sexual Behaviour in Shower Block

Now this one is true but it definitely didn't involve British troops – or at least none of our res specs. I thought that I was close to losing a few of you then; we are half way there so stick with it.

Engineer Workshops Support

In Hameln the squadron runs an excellent level 3 engineer workshop facility. 15 Field Park Squadron is currently developing a similar capability in Ripon and both the support squadrons have at least a level 2 facility. (The different levels of support are defined, in simple terms, by the complexity of the tasks that can be carried out: level 1 tasks are the most basic and can normally be conducted by regimental artisans in the field; level 2 tasks require more time, greater technical expertise and higher specification tools and equipment and; level 3 are more complex still and usually require a semi-permanent field workshop facility. Level 4 tasks are termed base repair and are now carried out exclusively by the Army Base Repair Organisation). At present our so-called level 2 and 3 field workshops facilities are static and cannot readily be deployed to support exercises or operations. In the field and

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RE DROPS with screen protector.

on tour we improvise. This tour was no different and we were lucky enough to acquire some very old UN tools and machines. "Statements of Operational Requirement" were submitted soon after deployment but five months into the tour our skilled tradesmen still had little more than their personal tool boxes, an ancient box body machine wagon and some domestic power tools with which to support the large engineer group. In short, the Corps has no deployable workshop capability.

Penny Pinching MOD Sends Infantry to War Without Rifles

Scandalous tabloid rot but substitute carpenters and bench saws for Infantry and Rifles and we could be sailing a bit close to the wind.[3] So what have our tradesmen been up to? They have improvised and overcome of course. Our main artisan effort was to maintain, service and repair generators, lighting towers and water purification equipment; eight fitters looked after 160 separate pieces of equipment. The squadron also deployed a forward repair team to Albania in support of 28 Engineer Regiment's mission to construct refugee camps there and one young Sapper spent four harrowing (and very smelly) days in the bowels of the Pristina city mortuary repairing the refrigeration plant.

Our single carpenter dedicated much of his tour to the construction of timber latrines. Over 220 such contraptions were constructed in his workshops for the refugee camp at Brazda and many more were built for, and used gratefully by, British soldiers. Indeed, demand was so high at one stage that the RAF under-slung them from Chinooks to fly them into Kosovo. We also manufactured tank and small arms targetry for the battle groups, shelves and weapon racks for everyone and a small, rather cute little bird house for the brigade commander. (The request had been for a bird table but our ops offr is both deaf and mischievous.)

The squadron's team of welders and metal fabricators carried out numerous repair and maintenance tasks and helped 42 Field Park Squadron to demolish some large bomb-damaged steel frame structures in Pristina. They also repaired damaged medium and heavy girder bridging equipment and manufactured heavy steel grillages for a Mabey Johnson bridge build. There was no sign-making equipment in theatre (which was a mixed blessing) so time-consuming hand-made signs were produced for one-star HQs and above.

Transport Support

Army's Drivers Get Stoned

With lumps of limestone not cannabis: over twenty of the squadron's vehicle windscreens were destroyed by stone throwing youths in and around Skopje. Which brings me neatly to the third core function of engineer logistics – transport. Support Troop ran a fleet of five DROPS vehicles; the workhorses of the squadron. Five is an inadequate number to support an engineer group as large as that on Operation *Agricola* but fortunately 21 Engineer Regiment deployed with their own DROPS section – on loan from 45 Field Support Squadron. We were also able to borrow several DROPS trailers for the busiest part of the tour, which was a godsend. The RLC was supposed to provide all the second-line lift requirements for the engineer regiments but they, also, deployed with far too few vehicles and drivers for the task. Our own drivers were on the road for much of the tour and each vehicle covered over 35,000km.

Equally important was the support that the squadron's cranes and plant transporters provided. Our four crane operators, in particular, were kept busy both on construction projects and providing

[3] There is some good news in that a new trailer-mounted bench saw comes into service this summer.

ISO container lift support to the RLC. Their fleet of container handlers and rail transfer equipment proved unreliable.

Hardcore Shortage Worries Army Top Brass

This is not what you're thinking. The movement of stone from quarries in Macedonia to task sites in Kosovo proved to be one of our most vexing problems. The Temporary Field Accommodation (TFA) project was let to civilian contract but required Sappers to construct stone bases in advance – the design for these included approximately 300,000 tonnes of crushed stone which had to be imported to site and laid before the contractor could begin work. The contract was tight and stated that every day's delay in the construction of bases would incur a £50,000 financial penalty on the military. 2nd line military tipper support was not initially available in theatre nor would it have been adequate for the scale of this task. Plans were drawn up to conduct our own quarry operations in Kosovo but these could not begin until the equipment was purchased and shipped to theatre. Initially, therefore, the task to move the stone went to local civilian haulage companies but they were forced to run the gauntlet of Macedonia border guards, belligerent customs officials, French, American and Polish movement staff, and hundreds of thousands of returning refugees. The inevitable result? Gridlock and a four-hour loop that regularly took three times as long. The unenviable task of sorting this mess out and forcing the stone through usually fell to our support troop commander, Lieutenant Eldon Millar, who visibly aged years in just a few weeks. I have not been particularly kind to the RLC – largely because there were too few Gunners around – but they did ultimately come to our aid by moving large quantities of stone across the border in the KFOR train, operated by the railway children of 79 Railway Squadron RLC.

Summary

British Officer Suspected of War Crime

Nothing more than malicious gossip and circumstantial evidence – a dog dies and I lose a 9mm round – it would never stand up in court. So far I have kept your attention with sensational headlines of dubious veracity and some rather introspective views, principally on the good bits of the tour. So, now to the crux of the paper as I review what has not gone so well; for it is from our mistakes that we learn the best lessons.

Water supply to Brazda Refugee Camp.

Financial Delegations. Nothing happens without money, particularly at the start of an operation when logistic support is embryonic or non-existent. Selected engineer officers and the local purchase cell SNCOs need instant access to cash if they are to be able to provide essential support to an operation. The Civil Secretariat (CivSec) resisted granting adequate financial delegations to the engineer group for the first four months of the operation. This resulted in frustration and lengthy procurement delays – even operationally urgent tasks were delayed for want of CivSec's signature. This put the squadron's local purchase staff in the invidious position of having to set contracts and buy stores and services in the hope that CivSec would eventually sign up for the expenditure. Adequate financial powers must be delegated to RE personnel prior to any such new operation.

Operating Stock. CivSec, on PJHQ instructions, also refused to allow the squadron to

establish any form of operating stock of fast moving or difficult to acquire construction stores. Items had to be purchased for specific, financially authorized tasks only. Requests to prestock stone, timber and long lead time electrical and plumbing stores in advance of anticipated tasks were refused until the force moved into Kosovo, and even then the most stringent restrictions were placed on the squadron. Again this resulted in unnecessary and sometimes quite lengthy delays; even simple tasks would be delayed if locally purchased stores were needed at a weekend or during a local holiday period. This was immensely frustrating, particularly as the precedent was set long ago in Split where the resources park was authorized to hold a £250,000 operating stock.

UK Sourced Resources. The tour proved that DCTA and SCOC are able to provide excellent resources support to operations. This support was far quicker and more proactive than it was during the squadron's previous tour to Bosnia in 1997. The provision of water purification chemicals, however, was disappointing and must be reviewed. In providing potable water for the refugees – requiring a peak output of 400,000 litres a day – we used 80 per cent of our operational stock of chemicals for the WPU NBC prior to the ground campaign. Because of UK restrictions on shelf storage of such substances DCTA had to bid to a chemical manufacturer for resupply. As a result it took over eight weeks to restock our supplies in theatre: with the fragile state of water utilities in Kosovo, the very high summer temperatures and the inherent risk of disease, this could have had disastrous implications.

Manning. The squadron deployed to theatre with just 75 personnel. We lost our plant operators to the HQ Sqn, by necessity we had to leave men in Hameln to maintain the skeleton resources and workshop function for the division, and we were required to detach four men in support of Operation *Palatine*. The loss of these four men, in particular, meant that the squadron was unable to deploy a forward resources detachment. The deployment of such a detachment both to Albania and later to Kosovo would have significantly improved our logistic support to the engineer group. Fortunately we were permitted to employ an eight-strong section of civilian labourers which alleviated the manning problem slightly and meant that we did not have to call for combat engineer support from other squadrons.

Deployable Workshops Equipment. I have already mentioned the lack of a deployable workshops capability within the Corps. Our tradesmen are expensively trained and eager to support on operations but are being significantly under-utilized, and therefore devalued, through lack of decent equipment.

Co-operation Between the Squadron and Military Construction Forces (MCF). This harks back to my previous comments about the correct use of resources specialists within the HQs and field squadrons. Proper use of in-role res specs and direct liaison between them, the MCF and the logistics squadron, led to better co-operation and more effective support. It was clear that those res specs who regularly ran resources and local purchase accounts, and who operated "Global" in barracks, were more effective on operations than those who had been misemployed before deployment.

Tendency to Skip Peacetime Accounting Procedures. As the pace and scope of the operation increased so did the temptation to short-cut proper resources bidding and accounting procedures. Indeed, there was considerable pressure to simply send the kit out and to sort out the paperwork later. Inevitably "later" would bring new crises that would make it impossible to catch up retrospectively. Had this happened we would have lost track of vital equipment, failed to maintain it and could not have sustained the operation. The squadron did cut corners once during the tour – when there was a real risk of refugees dying for lack of clean drinking water – but only once. The accounting procedure is done in order to track, maintain and sustain equipment. It also keeps the National Audit Office happy. More importantly the procedures, when properly adhered to, always saved time and effort in the long run.

Army Whitewash over Foul Language Claims

Engineer Logistics is not a dirty word – nor is it two dirty words. I can hardly be accused of covering up our shortfalls in logistics capability and may even be slated for hanging out too much dirty washing. The tour did, however, highlight a few serious flaws in the engineer logistic support which we, as a Corps, can currently provide. Few of the lessons are new and most are

resource-driven so will be resolved only as money is made available. All, however, are receiving very careful consideration, particularly at HQ LAND where the engineer logistics staff has now been significantly enhanced. My overriding impression from the tour, particularly when I see how other corps and nations do business, and despite my criticisms above, is that we already have an excellent logistics capability in the Corps and it is getting better. The four logistics squadrons have gained considerable collective operational experience during this decade and more lessons have been remedied than repeated in recent years. Importantly, because of that experience, there now seems to be a greater understanding at all levels in the Corps about the necessity for timely and effective engineer logistics support; and if my cheap tricks have got you this far then I have added to that awareness. Commanders at all levels must continue to take the time to understand how the engineer logistics chain works and to train those within it for operations.

Journal Awards

The Budget, Investments, Membership, Scholarship, Memorial and Publications Committee announces the following awards for articles of special merit published in the August 1999 issue:

AN APPROACH TO CLOSE SUPPORT FOR THE NEXT CENTURY
by Major M W Whitchurch MBE – £100.

DESIGNING AIR POWER
by Major C L Wilks £100

THE CLOSURE OF LONG MARSTON ... AND THE NEW ORDER
by Lieutenant Colonel P M Naylor – £75

"UBIQUE" COMRADE ...
by Major C M Hainge – £75

A BRIDGE AND A PLAN AT DEMIR KAPIJA
by Lieutenant D Holdsworth – £50

The Larnica Project – July 1954 to February 1955

MAJOR J H BAZLEY

John Bazley was commissioned from Sandhurst in 1949. His first postings included 3 Training Regiment, Military College of Science, 37 Army Engineer Regiment (British Army of the Rhine), 35 Field Engineer Regiment (Suez and Cyprus), Army Survey Course, 42 Survey Engineer Regiment and 1 Radar Air Survey Liaison Section (Cyprus), and 2IC 13 Field Survey Squadron (Sussex). In 1960 he joined the Directorate of Military Survey as a GSO III in Survey 1 (responsible for postings of survey soldiers). On promotion to major, he served as Air Survey Liaison Officer at Royal Air Force Wyton, which took him to Australia, Southern Rhodesia and Trinidad. After a brief spell with the Ordnance Survey, he returned to the Directorate of Military Survey as Deputy Assistant Director Survey 2c (responsible for map and air chart supply). He qualified as a chartered secretary, and retired from the Army in 1968. He was called to the Bar in 1969 and spent 17 years as Partnership Secretary with a firm of chartered accountants, followed by one of chartered surveyors until he finally retired in 1991.

BACKGROUND

I WAS in command of Workshops Troop, 18 Field Park Squadron, 35 Field Engineer Regiment when the regiment moved from the Suez Canal Zone to Cyprus in December 1953. The transition was a very welcome one. In Egypt we had lived in stuffy tents and slept under mosquito nets, on beds smothered in DDT powder (now banned), yet were still plagued with bed bugs and unpleasant insects. Because Abdul Nasser had abrogated the latest treaty with Britain, the natives were distinctly unfriendly and consequently all places of interest were out of bounds and our camp was surrounded with barbed wire and patrolled at night. Apart from sport, the only relief was the Club, but there were few detached women and the water of the nearby Great Bitter Lake was well laced with sewage.

Cyprus was a paradise by comparison. The regiment was housed in Polimedhia Camp on the slope of a hill overlooking the (then quite small and undeveloped) seaside town of Limassol. The camp consisted largely of wooden huts built in Kitchener's time. It was a pleasantly rustic situation with no perimeter fence and herds of goats wandered through with their bells jingling. The natives were not only friendly, but civilized, and we enjoyed a relaxed social life. It was not to last much longer, as the seeds of discontent sown by the EOKA movement had begun to take root, but the deteriorating political situation had no direct affect on the Larnaca Project.

THE PROJECT

SOON after we arrived in Cyprus, the regiment was assigned two major projects. The one which demanded most of its resources was the construction of a pipeline from a spring in the foothills of the Troodos mountains, to supply water to the Episkopi Cantonment (later to become one of the British Sovereign Base Areas). It was named the *Anogyra* project after the village nearest to the water source. My Workshops Troop became heavily committed in support of this project, but I was soon transferred to 16 Fd Sqn and the *Larnaca* project which, I learned at a briefing in Nicosia, involved the erection of ninety TG (truss and girder) sheds that had just been shipped from Kenya, where they had been used in the abortive *Mckinnon Road* Project (alias the "Ground Nut Scheme"). They were now to house ordnance and engineer stores. The sheds were of standard size, but most were to be erected triple in both length and width. Apparently this had never been done before and it was thought that there might be technical difficulties in tripling the width. Another

The Larnica Project July 1954 To February 1955 Major J H Bazley

complication was that the rag bolts to fix the stanchions to their concrete bases were not available (presumably because they were still in lumps of concrete in Kenya). The solution was to align vertical reinforcing bars with the bolt holes in the base plates of the stanchions and bend the protruding ends of the bars over to provide an anchorage. This proved satisfactory.

The proposed site was a disused emergency airstrip on marshy land near the sea about two miles south of Larnaca. It has since become Larnaca International Airport, thus fulfilling the prophetic statement of a British Governor in the 1930s when the burghers of Larnaca had been clamouring for a decent harbour. The Governor's response was that a harbour was unnecessary and that the future of Larnaca lay in the air.

The 2nd Battalion, The Green Howards, were to act as the main labour force, supplemented by some locally recruited civilians and supported by my troop. By coincidence I had travelled to Port Said with the Green Howards in *HMT EMPIRE CLYDE* and had been impressed with their turnout and discipline when they embarked at Liverpool. The regimental band played them aboard and later beat retreat. In place of the regulation canes, the officers carried walking sticks which they flourished with great style. Not surprisingly, being a senior regiment of the line (the 19th of Foot) and covered in battle honours, they were highly indignant at being used as labourers. But, like good soldiers, they did what they were told and were good enough not to take it out on me!

PRELIMINARIES

ACCOMPANIED by Nick Wykes (a competent and pleasant National Service subaltern, whose family owned a meat exporting business in Argentina) I spent some time at Famagusta docks, checking that the full consignment of shedding had arrived complete and that a set of components was delivered to a nearby stores depot for trial purposes. Whilst there, Nick and I had a delightful trip in my old Ford car to the ruins of Salamis and the remote Byzantine castle of Kantara perched on a crest of the Kyrenia mountains. From there the range stretches in a series of diminishing peaks, like a dragon's back, to Cape Andreas in the East.

On returning from a fortnight's leave in the UK I was was told that experimental erection of the sheds at Famagusta was not going well and that I should go and get things moving. There was much to be done. Triple construction laterally required the assembly of the roof trusses and their bolting to the stanchions to be carried out in a particular sequence, otherwise the purlins would not fit. This had to be carefully explained to the infantry by means of lectures, diagrams and specimen assemblies. They also had to be briefed on the phases of the project and the estimated time required for each. The main phases were:

- excavation and concreting of foundations;
- laying out and sub-assembly of components;
- erection of the steel framework;
- cladding, finishing and painting.

There was a separate process of treating all the steelwork with red oxide paint. This was done at a place some distance from the construction site under the direction of SSgt Dyer, a large, amiable and unflappable clerk of works. He was supported by a few Sappers and a gang of, mostly Turkish, Cypriots. It was an unenviable job. The 2IC of 16 Sqn, John Elderkin, came to see that everything was being done and went away satisfied.

I took the troop Sgt and one section of my troop to set out the site and mark the foundations. The sheds were to be constructed in two parallel rows astride the airstrip, which had a tarmac surface in reasonable condition. Although adjacent land was firm, dry and covered in stubble and scrub, the approach roads were rutted tracks running across marshy land, and heavy rain and thunder storms caused a convoy of lorries delivering the steelwork to be bogged down. The waterlogged ground later caused a mobile crane to topple sideways off of one of the tracks. A REME recovery vehicle was required to right it and the sergeant in charge warned all onlookers to stand clear in case the steel winch cable snapped under the strain. It did, and the severed ends snaked through the air at lightening speed. A man standing in the way could easily have been cut in half.

Close to the site is a large salt lake (now no longer harvested due to pollution from the airport). In a grove of trees on the far side of the lake stands a domed building surmounted by a minaret. It is the Tekke of Umm Haram, Mohammad's aunt, and said to be the third most holy place for Moslems. Near one end of the airstrip stood a wooden pavilion with a small veranda and three rooms; ideal as a site office. It was inhabited, however, by a man with an incurable skin disease (psoriasis). It caused the surface of his skin to break out in dry flakes, looking just like fish scales. The entire floor and every other flat surface

in the building was carpeted with them. He produced a certificate stating that he was authorized to live there and that his distressing affliction was neither infectious nor contagious. We all felt great pity for him, but he had to go and the necessary arrangements were duly made. To my eternal regret, I could not bring myself to shake hands with him when he left.

Setting out the site was a tedious task in the broiling heat. The troop Sgt moaned about it constantly and became a liability. I sent him packing. His replacement, Sgt Acerman, *(see left with author)* could be described as an "old sweat" with a large beer belly and ruddy cheeks; but he was cheerful, hard working and very experienced.

Construction

The number of sheds and the length of the site enabled the four phases of construction to begin in sequence so that, at one stage, all were in progress simultaneously. The roof trusses were assembled at ground level and hoisted by crane for bolting to the stanchions *(see bottom left)*. When possible a roof section consisting of two trusses linked by purlins was lifted into position complete. Trusses lifted singly were supported by the crane until the top purlins had been fitted. Light ropes were used to hoist the purlins and smaller parts manually. A platform mounted on a five-ton trailer was available to assist with the more difficult procedures at high level. It was necessary, in particular, when fitting a gable truss to the centre stanchion. This was a tricky operation as it involved splitting the joint in the truss either side of the stanchion. The peaks of the trusses were about 25 feet above ground.

It was interesting to note that, at first, few of the soldiers, wearing denim overalls and plimsolls, were prepared to leave the ground but, eventually, most of them were scrambling about the skeletal steelwork like monkeys *(see left)*.

It was a tedious process, particularly for the officers [Green Howards], who had little to do except attend to the welfare and morale of their men; but they tried to take an interest in the technical aspects and to accelerate the rate of construction by organizing competitions between platoons.

My time was fully taken up with resolving technical problems and trying to ensure that the necessary materials and equipment were delivered on time and to the right place. I can recall only one moment of friction with the Green Howards when some items were not placed according to plan. One of the company commanders came up to me one afternoon and protested, "But, Bazley, you said the (whatever they were) would be over there." It had been a trying day and I was hot, tired and thirsty. My impulsive response included the tactless comment, "The trouble with you infantrymen is that you expect everything to be done by the book." As the major's face started to turn purple, I hastily

apologized profusely and the incident was forgiven and forgotten.

To remind them of their proper role and to relieve the monotony, the Green Howards periodically took days off for training programmes and regimental parades in addition to sports. There were also, of course, weekend breaks. My chief recreation at weekends was to visit my future wife in Limassol, about 40 miles away. On one of these trips my old Ford car let me down badly. I was accelerating to climb out of a dip and, though the engine responded well, it was evidently no longer connected to the back wheels. I had bought the car for £150 from a small local builder (who later became a millionaire.) Apart from nearly bald tyres and about three inches play in the steering (disconcerting on hairpin mountain bends ... especially in snow) there seemed to be nothing wrong with it. On this occasion I discovered that, at some stage in its earlier life, the spline of the propeller shaft had worn out and the remedy had been to put a quarter inch bolt through it. I had it repaired in a village garage (the owner of which was also to become a millionaire). The repair consisted of replacing the quarter inch bolt with a three-eighths-inch bolt, which seemed perfectly satisfactory and made me question the need for a spline. On leaving Cyprus I sold the car for £100 to (of all people!) the MTO of 35 Regt, though he was well aware of its deficiencies.

The first three phases proceeded at a good pace and it was satisfying to see the site beginning to look like a potential stores depot. It was the fourth phase that seemed to drag on. Thousands of CGI sheets had to be bolted to the steel framework and painted. The grey paint supplied for the project came in two-gallon drums, which had obviously been stored for many years. The pigment had settled in a solid lump at the bottom of each drum and had to be broken up and sieved after the liquid had been temporarily poured off into separate containers.

Conclusion

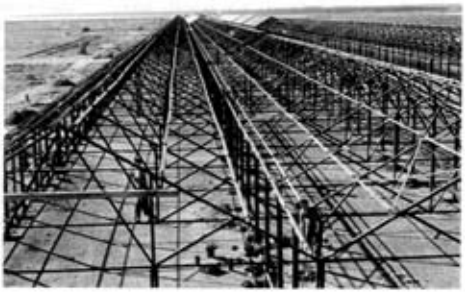
When the project was nearing completion, I basked for a while in the blandishments handed out to a young officer who has done a good job. These included a captain's pay (which was very welcome, but did not seem to make much difference after tax), an invitation to dine with the Chief Engineer, Brigadier Phipps, in Nicosia (which I had to decline because it clashed with our engagement party in Limassol) and an invitation to stay a few nights with the CO and his charming wife, which I accepted and enjoyed.

My wife and I were married on 12 February 1955, and after a brief honeymoon in a mountain hotel, we spent a comfortable two weeks at the Four Lanterns Hotel which is conveniently close to the site. By then, work on the project had become fairly routine and there was just a bit of clearing up for me to do.

We had to leave Cyprus before the project was finally completed, when I believe it became 625 Ordnance Depot. Being an amateur artist, I presented the Green Howards with a water colour painting of the site with all four phases in progress. I was aware that the *Larnaca* project had been an episode in the regiment's illustrious history which they would prefer to forget, but I had nothing else to offer as a parting gift. I doubt if it hangs in their officers' mess!

Epilogue

My wife and I, and now our children and grandchildren, are frequent visitors to Cyprus. Following the Turkish invasion in 1974, all commercial air traffic was diverted to Larnaca. On our first landings there several traces of our labours in 1954 could still be seen, although the sheds had long since been removed (where to, I wonder?) Continual development and expansion of the airport has now obliterated all evidence of the project. *Sic transit gloria mundi*.



Making progress!

Fast Track Construction – Is It Possible in Croatia?

CAPTAIN S W DAVIES BA

Prior to enlistment, Captain Davies served as a Royal New Zealand Engineer officer. After three years at the Australian Defence Force Academy and a year at the Royal Military College, Duntroon, Australia, he returned to New Zealand in January 1992. A year was then spent as a troop commander before attending the Royal Australian Engineers troop commanders course at School of Military Engineering, Australia. This was followed by tours as a field troop commander and Second in Command of 25 Engineer Support Squadron before taking up a six-month post as the Training Major at the Cambodian Mine Action Centre in 1997.

Moving to the United Kingdom, Captain Davies enlisted into the Corps in 1998. After a period of induction training he attended Troop Commanders Course 122 and was then posted early to 22 Engineer Regiment where he is serving as Operations Officer 5 Field Squadron.

Capt Davies is a keen sportsman and supports two rugby teams: the All Blacks and anyone who plays Australia!

THE period of February this year, for 22 Engineer Regiment, was one of swift action. The Kosovo crisis escalated British Army commitments overseas, including the requirement to reshuffle the Royal Engineers tour plot to allow the provision of two engineer regiments to Macedonia and one to Bosnia. 21 Engineer Regiment, which was due to deploy to Bosnia in March for the summer tour, was redirected to Macedonia to join 28 Engineer Regiment and 22 Engineer Regiment stepped in to deploy in its stead, six months earlier than planned.

For the author, February was equally hectic. Having completed the reconnaissance phase of exercise *Phantom Sapper* on Friday evening I found myself, twelve hours later, sitting in 22 Engineer Regiment's HQ receiving orders from my new CO. By Sunday afternoon I was standing in Mrkonjic Grad Bus Depot, waist deep in snow.

Whilst assisting with the necessary arrangements for the squadron's deployment to Mrkonjic Grad, my focus was "down under" in Split. 5 Field Squadron, with an attached armoured troop from 3 Armoured Engineer Squadron, was to be the Military Construction Force (MCF) for the UK's engineer regiment. Its main construction task was project *Basha* and I was to be the project officer. The aim of the project was to reduce the UK logistic regiment's footprint in the Split area of operations. At the time, 10 Logistic Regiment Group occupied three locations: RHQ in DJ Barracks, the UK Stores Squadron in Dalma Warehouse Complex (DWC) and the UK General Support (GS) Logistic Squadron in Split North Port (SNP (smelly, noisy, polluted)).

From the investment appraisal it had been established that the drawdown of the UK logistic units would allow DWC to be closed (providing a saving of approximately £6M over a five-year period) and that their functions and accommodation could be amalgamated with those of the GS squadron in SNP. The project budget was calculated at £1.27M.

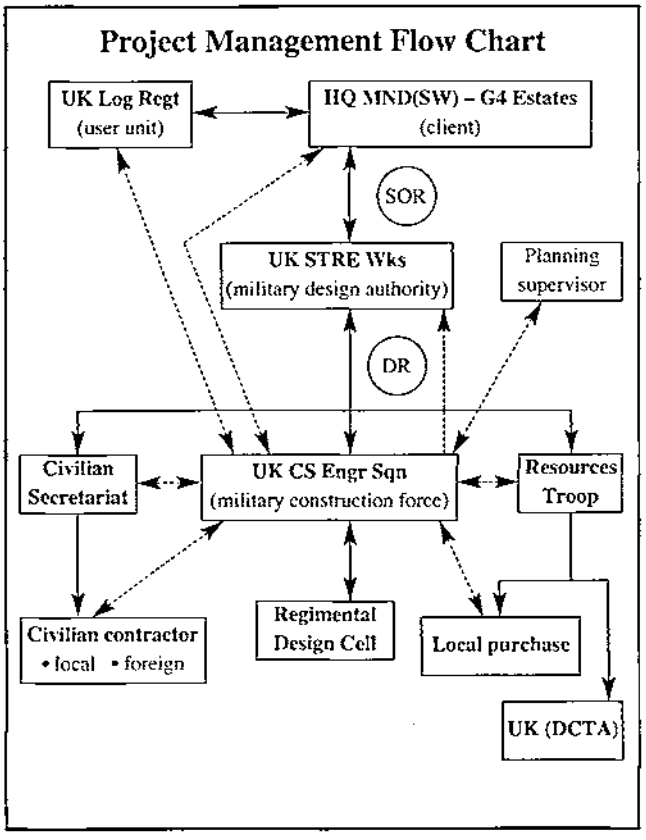
The RE role, as principal contractor, was to undertake the necessary construction; and it was to be a *fast track* project. What is *fast track*? The four stages of a RE project remain: define, plan, execute and recover, however the stages are greatly compressed (especially the first two). Indeed work on some stages will begin well before all the work on the previous stage is complete, placing additional pressure on the construction agencies

Fast Track Construction Is It Possible In Croatia
Captain S W Davies BA

involved. "Design as you build" projects occur frequently within the UK, it remained to be seen if the same would work in Croatia.

The nature of the construction was not technically difficult. However, in addition to the *fast track* challenge, the works programme would need to be well synchronized with the Royal Logistic Corps' (RLC) drawdown timetable and to occur at a tempo which would not unduly affect the ongoing operations of the RLC units at both SNP and DWC. Development of the statement of requirement (SOR) was staffed in mid-1998 and the initial reconnaissance (IR) followed in September 1998. Almost immediately after the IR, the Military Design Authority (MDA), then 519 STRE Wks, began design work and issued a long lead stores list in anticipation of the execution stage beginning early in the new year. The scope of works fell into two categories: to create sufficient space within the port to absorb the functional activities of DWC and life support, namely the construction of a 375-man camp. For ease, the project was divided into ten design packages:

1 Preliminary work – sub-contractor to remove derelict building and upgrade power.
2 Central Services Inspection Bay (CSIB).
3 External areas.
4 Workshops and internal shed improvements.
5 Stores shed.
6 Accommodation.
7 Catering and dining.
8 Decommission DWC.
9 Electrical mains distribution – sub-contractor.
10 Other (changes to SOR).



In a *fast track* project, indirect relationships (dotted lines) are very important in achieving swift decision-making.

Soon after the project had been handed over to 5 Field Squadron Group, a significant problem developed. Use of an area known as Shed 1 (the proposed location for the 375-man camp) was denied by the Port Authority. The area which had been offered was now to be used for the in- and off-loading of bulk petroleum, a serious hazard to the proposed 375-man camp! It necessitated a complete redesign of the port layout, but there were now forty Sappers "on the ground" and ready to build.

Critical to *fast track* project work is effective and open liaison, and in the two weeks that followed this sudden "shift in goal posts", a series of meetings was held to generate ideas as to how the project should develop. The solution was to reconsider the use of shed space in the port so that the camp could be housed inside one of the large warehouses. This in turn required alteration to the allocation of space to the functional departments, both those already in the Port and those to be incorporated from DWC.

The closure of DWC was to occur in two stages. The first was Dalma 3, a workshop facility due to move into a purpose-built stud-partition office with a new central services inspection bay (CSIB) including two sets of large concrete ramps. The offices were changed to CORIMEC (flatpack portable cabins) and the concrete ramps were changed to a number of concrete pads incorporating the in-service vehicle inspection Somers lift

equipment. This solution resulted in the closure of Dalma 3 two months ahead of schedule saving £80K, and was brought about by good liaison between the user unit, the UK logistic regiment RLC and the MCF.

Ordinarily the decision cycle would flow through the normal chain *(see diagram on previous page)* but in the case of *fast track* projects the emphasis is on unofficial relationships (dotted lines). This is not to say that changes are undertaken without correct authority and due consideration, far from it. However, this type of work places the onus on the MCF and user unit to "drive" the project on.

It is worth noting that *fast track* projects can lead the client and user unit to believe all problems can be solved quickly, directly and without adhering to the decision cycle. This mis-understanding is overcome by educating the client and user unit with regard to project management and the correct decision-making cycle.

Next, effort switched to the more significant task of reconfiguring SNP to allow the evacuation and closure of Dalma 1. The MDA had issued summary drawings which enabled the MCF to get on with some tasks, namely Design Package 2 (CSIB) and Design Package 3 (external areas). Both were "tweaked" to reflect a design based on more readily available resources to allow a quicker construction time. It is not the role of the MCF/MDA to tell the client/user unit what they require, however it is fair to comment that in a *fast track* project the design and construction agencies need to take on a more forthright approach than would be normal. This not only includes the aforementioned education of the client, but also the need to analyse the SOR constantly in an attempt to identify "better ways to do business." Development of "new ideas" within a projected operation such as deployment to Bosnia, tend to formulate every six months when a unit changes over, and it is necessary to maintain a balance of "good ideas" against getting the project finished!

A new works programme was developed to incorporate the amended Port layout and allow for RLC activity in the forthcoming six months. The programme was based on a great number of assumptions concerning design and resourcing. The MDA was working frantically to issue detailed design packages ahead of the MCF work rate, whilst the Resources Troop worked equally as hard to provide the materials required quickly, and information on those materials to be delivered later in the project. In the absence of all the designs and resource information, it was difficult to predict the timeframe for each task accurately. However, this was compensated for slightly by maximum consultation with the MDA and Resources Troop. In addition, allocation of troops to task was ever changing. Early in the tour tensions within Bosnia were high and there was a need to provide additional Sappers from the MCF to support the squadron in Mrkonjic Grad. Without the ability to predict task duration accurately, or indeed when a specific task could start, a deliberate measure was taken to keep the works programme simple and not to compress the cascade with too much concurrent activity. This provided an inherent time reserve whereby unforeseen design or resource difficulties could be absorbed to some extent. Equally applicable to any *fast track* project this method is a good way to minimize changes to the project completion date, especially when all the necessary information and resources are not available at the start.

Resources, as with any construction project, are a determining factor in the project outcome. In the case of Project *Basha*, it was necessary to select resources based on the timeframe in which they would be available rather than on cost or standards of the material (within reason (and which ruled out the construction of a second millennium-type dome as the new camp!)) Often it was quicker to obtain materials locally but at the sacrifice of quality and standard. In Croatia, timber is provided from Bosnian forests, but is often still wet when delivered and in some instances poorly cut. Whilst this source was a means to a quick end it also brought about difficulties with its use in construction. The advantage of a quick delivery versus the potential delays associated with using materials of a different standard need to be deliberated. In addition, it should be noted that provision of a better quality of material does not necessitate a more speedy construction, as the material may need additional preparatory work before its use. Whatever that standard of material, it needs to be selected so that its use will not add delay beyond the estimated gain.

Local contractors proved to be a real asset to the project. The possibility of gaining a SFOR contract, and therefore "guaranteed payment", meant that there were a number of contractors who were

very forthcoming in their offer of assistance. Again, education and liaison were the keys to getting the right help, where and when it was needed. In some instances, contractors who had worked previously in the Port were of great benefit, not just in the provision of services or materials, but also in the provision of information such as the location of buried services and construction methods of old buildings. In one instance, a contractor turned up with a concrete cutter before it had even been requested! The "pro-active" co-operation of local contractors was very welcome and maintained by keeping them as informed as could be permitted. However, it was also necessary to channel this "enthusiasm" carefully to ensure that they did not undertake work without due authority.

Split North Port. The tank transporter park and roulement park are in the foreground with the Royal Fleet Auxiliary ship Fort Grange, far left. The sheds and main storage areas are either side of the the main road.

Ordinarily the relationship between the MDA, MCF and Regiment Design Cell is quite straightforward. Once a design is issued from the MDA, interpretation and quality control becomes the responsibility of the Regiment Design Cell, but authority for design changes remains with the MDA. However, the necessity to compress this cycle was achieved because the MDA was relocated to Split early on in the tour which enabled a very quick turnaround in design changes. Conversely, the Regiment Design Cell was based in Gornji Vakuf where it could provide necessary coverage to other construction tasks. This required a lot of "on the phone" dealings and a good deal of trust between all parties, and it worked very well indeed.

After three and a half months I had to return to the Squadron HQ in Mrkonjic Grad where I was to replace the second in command, recently posted out. The sense of relief from the 3 Troop Management on my departure from Split was disturbing. No longer could I greet them in the morning with "Staff, I've had another idea!" or "Troopie, I need this done yesterday!" Under the capable direction of Lt O'Brien and SSgt Holmes, the MCF increased and maintained a very high work rate, with excellent direction and support from the MDA (522 STRE Wks) and equally from the Resources Troop. At the time of writing, the construction to allow the move of the functional aspects from Dalma 1 to SNP had been completed and MCF effort was focused on completing the 375-man camp and its facilities. Some tasks had been identified that could not be completed by the MCF and preparations have been made to hand them over.

As a *fast track* project and one with significant additional complications, there was considerable pressure on all parties to produce results quickly. Additional tradesmen and better materials provided limited gain in the project time-frame. Real success was achieved by ensuring all parties were fully aware of problems as they developed which enabled good solutions to be generated and swift decisions to be made. A similar project in the UK would take 12 to 24 months to complete; the key components for Project *Basha* were completed within eight months. *Fast track* project management is not the most cost-effective process (even though Project *Basha* finished approximately 300K under budget), however it suits the flexible and dynamic nature of military operations, even if they are Smelly, Noisy and Polluted!

Fast Track Construction Is It Possible In Croatia

Memoirs

BRIGADIER C A LANDALE

Born 28 September 1924,
died 29 January 1999, aged 74.

TONY Landale was the only child of a colonel in the Indian Army. Because his parents spent most of their time in India, young Landale was sent away to boarding school at the ridiculously young age of six. Perhaps this is why as an adult he used to think of himself as shy and retiring; and certainly any problems he may have had throughout his life he kept very much to himself, solving them all without anyone else's help. Having said this he was a wonderful communicator, especially with soldiers, who would have followed him anywhere; and similarly with children, who one and all, whether his own or any he met for an hour or two, adored him; romping with him and climbing all over him the moment they met.

CAL was commissioned in December 1943, commanding his "platoon" of 69 sappers, ten vehicles and four motorcycles (at the age of 19), engaged on mine-clearance, assault bridging and other normal divisional engineer tasks, from Normandy to the Baltic; during which he was Mentioned in Despatches. He never talked about his exploits, except to say that he enjoyed himself hugely despite being scared out of his skin from time to time.

In fact he was a man who knew no fear. On one occasion all the snorklers swimming at a place over the reef on Christmas Island, on hearing one of their number say that a large shark was lurking deep below, left the water in indecent haste. CAL, who was fishing nearby promptly dropped his rod, took a deep breath and dived in to investigate. He surfaced after what seemed minutes to declare "yes it was a shark, and at least ten feet long, but not to worry it was only a harmless variety." CAL knew his fish and never exaggerated – he never had need to. He was a superb fisherman having inherited his talent, and his love of the sport as well as shooting, from his father. During his time on Christmas Island he became the acknowledged master of fishing with rod and reel in the lagoon, matching his tackle to the weight of the fish he was after, be it a two-pound red snapper or a 75-pound jack-fish.

He was very well set up physically; representing his school, Marlborough, at athletics when the rest of the team were months older than he. Academic work held no terrors for him and he earned an upper-second degree in Mechanical Sciences at Cambridge on his supplementary course there.

He was an ideal leader of airborne soldiers, proving to be an excellent troop leader in 9 Airborne Squadron. He had a warm heart and a good sense of humour and was popular and widely respected by all ranks. Although on the surface a modest and quiet personality, he had a very positive outlook and was a man of action. Intelligent, quick-witted and decisive, and with a wholesome contempt for regulations, he was at his best in an emergency. Blest with boundless energy and enthusiasm, his obvious position on the rugger field was wing-forward; being a star performer in the 9 Squadron team which won the major unit Rugby Cup in the Canal Zone, beating 3 Parachute Regiment in the final. He was also a regular member of the Corps' Rugby team.

Brigadier C A Landale

CAL attended the Staff College, Camberley, in 1955 from where he was posted as DAQMG Northern District. He next spent two years as Brigade Major HQ SME, after which he was a student at the JSSC.

During his three years as Company Commander of Waterloo Company RMA Sandhurst, the company won the Sovereign's Company Competition. Of particular importance is what he achieved as military chairman of a committee appointed to study leadership training at Sandhurst. The prime mover in this work was Dr John Adair who went on to make leadership and management his life's work, becoming an acknowledged expert, writing more than 20 books on the subject. When first mooted at Sandhurst, Adair's theories were received with deep suspicion by almost everyone from top to bottom of the hierarchy. CAL, however, recognized the value and importance of Adair's ideas and with tact and wisdom was instrumental in changing everyone's approach to the subject. Without his efforts, cadets at the RMA might still believe that if they possessed or could demonstrate the correct characteristics of courage, integrity, etc, to their men they would make good leaders. Before Adair, supported by Landale, no-one at the RMA had thought that it was equally (perhaps more) important for a leader to ensure that men understood why they were fighting, and to see that they were properly trained and provided with the best equipment for the job in hand.

In 1966 CAL was appointed CRE 3rd Division. A new adjutant recalls being ushered into the CO's office. While awaiting the great man's arrival he admired what was clearly the operations map of the local area which was festooned with a number of strategically placed coloured pins. Enquiring shortly afterwards what the pins were for, the CO explained: "They are the beats for the shoot. I shoot Mondays, you shoot Tuesdays, we both shoot Saturdays."

In the Regiment he was known as a man who never spoke ill of anyone and one who always stood up for those under his command; himself fielding any letters of reproof or complaints from above.

On hearing of CAL's death, his former RSM wrote:

"In the course of a lifetime many thousands of people pass through one's life but few of them stand out like beacons. Brigadier Tony Landale is one of my beacons. It was my privilege to serve as his RSM, though we first met much earlier in life as members of 9 Parachute Squadron.

"Then he was a young officer who commanded the affection and loyalty of his soldiers and he carried this asset on with him as he moved through the ranks. As a CO he was greatly loved by the soldiers in the Regiment. He could talk to them in a way that made them feel that he valued their opinions."

Further appointments included: Instructor at the Joint Services Staff College; Colonel GS at the RSME; Brigadier Commanding a TA Engineer Brigade; Deputy EinC and Vice President of the Regular Commissions Board.

He was appointed ADC to the Queen in 1976.

During his time on Christmas Island, he and his squadron had done much demanding and complicated building and construction work to the highest standards, to meet the requirements of the Atomic Authority scientists in charge of the tests. This was to stand him in good stead when, on retirement from the Army, he became the RO1 responsible for the design and construction of military buildings in the south of England.

His final home was in Coombe Bisset where he was much respected as a man who never pushed himself forward but was always ready and willing to help, whether in support of individuals or, more generally; such as officiating in charity auctions or simply mowing the grass in the churchyard.

He married first Alison McNaughton who died in 1967. They had two sons and a daughter. He married second Tessa Hale who, with her son and daughter, survives him.

HWLB IHLG JNB-S JM

MAJOR T B D McMILLEN MC

Born 19 June 1919,
died 1 March 1999, aged 79.

Major T B D McMillen MC

To a whole generation of Sapper officers, Tom McMillen will be remembered for the style he brought to the Headquarters Officers Mess, a style which was part of his own personality and which he promoted so eloquently. Nor did he ever conceal the pride he enjoyed in having been selected to run the Mess of what was to become his adopted Corps.

Tom had originally been commissioned into the Bedfordshire and Hertfordshire Regiment and went to war with them in 1939. He was evacuated from Dunkirk and when the opportunity arose, volunteered for service as a glider pilot and eventually transferred to the Glider Pilot Regiment. His first operational mission with them was in the Sicily landings in which he distinguished himself by earning the first Military Cross awarded to his new regiment. There was a touch of the bizarre about the circumstances, which seems appropriate to Tom's personality, in that he was mounted on a bicycle at the time. This he had grabbed, having negotiated his glider through searchlights, flak and, finally, obstacles on the ground. His passengers were unhurt but he himself sustained a broken ankle. Nothing daunted he engaged with the enemy to the best of his ability and inspired his men to success. Later in the war he took part in the Rhine crossing, where he was observed strolling into battle in corduroy trousers and swinging a walking stick.

Tom joined the Headquarters Mess in 1962, following a stint with the Malay Regiment that coincided with the Malayan Emergency. For the next 23 years he was responsible, at the head of a loyal and dedicated staff, for ensuring that it was and remained an adornment to the Corps and a worthy home for the traditions of the Sappers for which he demonstrated all the enthusiasm of a proselyte. He maintained a wonderful home for the officers of the Corps who invariably felt welcome on their return. He had the enviable knack of treating very junior and very senior officers with equal courtesy and kindness.

Tom rose to the occasion, in characteristically unflappable form, in the aftermath of the disastrous fire in 1975. He ensured that a promised wedding reception two days later took place. Tom's contribution to the restoration of the Mess was incalculable, a combination of determination, knowledge and sheer cunning.

During his time in the Mess Tom was a great supporter of Corps and Garrison activities. The RSME Shoot owes a lot to his energies and his own enthusiasm for the sport. He was a faithful member of the congregation of the Garrison Church and when he retired he and Helen, his wife, moved to Minor Canon Row in Rochester from where Tom was privileged to support the Cathedral as a Steward. He was devoted to his family, his stepdaughter, her husband their three children and grandchildren who, with Helen, survive him.

JFMG

BRIGADIER A G PEART OBE

Born 30 March 1915,
died 11 March 1999, aged 83.

BRIGADIER Arthur Peart will be remembered by many retired regular Sappers as a wise head of AG7 whose understanding of the needs of the Corps and the career requirements for individuals came to fruition during his time as Deputy Engineer in Chief.

Arthur Peart was the eldest son of a Dublin solicitor. He was educated in Dublin, and at Stonyhurst College and the Shop before being commissioned into the Corps. After Chatham and a degree course at Jesus College, Cambridge, where he read for the mechanical engineering tripos, he was posted to 30 Fortress Company in Singapore. Tours then followed in a variety of units in the UK in preparation for active service but, after Staff College in 1942 and a stint as brigade major in HQ Chemical Warfare Brigade, he became involved in D-Day planning as SORE 2 in Engineer Operations at the War Office. It was not until 1944 that he was able to get away, on promotion to lieutenant colonel, to Army HQ in Delhi, and later Kandy, until the war ended. He then found himself back in Singapore, now as SORE 1 in HQ ALFSEA.

Reverting to his substantive rank, Arthur Peart then served as Second-in-Command of 36 Engineer Regiment at Maidstone, Brigade Major 25 Engineer Brigade at Colchester and, after the Joint Services Staff Course in 1952, as SORE 2 at HQ North Rhine Westphalia at Düsseldorf. Promotion followed in that posting and he filled the appointment of AQMG. Then in 1954 he was posted as CRE Cyprus. When he arrived, with the EOKA troubles in full swing, he had to handle the Episkopi end of the arrangements for mounting the Suez operation. Later he was able to exploit his own addiction to golf by designing and building the nine-hole course which has since provided so much recreation for subsequent generations.

From Cyprus Arthur Peart moved to Paris in 1959 as head of the UK team on the *Live Oak* staff and from there returned to the UK for his last two tours in the Army, at AG7 and as Deputy Engineer in Chief.

On his retirement he became a director of a civil engineering firm in the Midlands, specializing in building bridges, multistorey car parks and opencast coalmining, before moving to his final home in Lymington. There he continued to pursue his lifelong passions, golf and stamps. He had built up one of the best collections of the West Indies, becoming an authority on the Queen Victoria Leeward Islands' stamps and postmarks. His entire collection was stolen during a burglary in 1990 – on Easter Sunday, on his birthday, while he was at church.

RWML writes: "When he was AAG of AG7 he made it totally clear how he wanted AG7 to work. He ran it on a loose rein, but was always ready to offer help and advice, and he invariably backed his staff in times of difficulty. He was a clever, clear thinking staff officer, and he gained the complete confidence of MS, the EinC and commanding officers, which was, in fact, quite a feat. He led a happy, committed team, and we all greatly enjoyed working for him. He had a great depth of wisdom, he was always relaxed, and he had a ready sense of humour.

"He and his wife, Nan, were the most generous of hosts; their parties were always stylish and great fun.

"Nan's death was a terrible blow. In addition he had to give up golf, which had become his great

Brigadier A G Peart OBE

passion. A trapped nerve made walking painful, and subsequently confined him to a wheelchair. He faced adversity with enormous courage, and will long be remembered in his house in Lymington with a wheelchair downstairs, another upstairs and a chair lift to get him up and down. Visitors were met by an apology for the quality of the meal, but he remained a generous host and never lost his charm and sense of humour. He was a delightful man and splendid friend."

His wife died in 1988. His daughter survives him.

RWML PP

COLONEL H F G BOSWELL OBE

Born 6 January 1915, died 14 March 1999, aged 84.

Colonel H F G Boswell OBE

HARRY Fitz Gibbon Boswell was one of a dozen or so Canadians in the Corps at the outset of the Second World War. He grew up in Quebec City and went to Bishop's College School in Sherbrooke, Quebec. In 1933, he went on to the Royal Military College (RMC) at Kingston, Ontario, where he excelled in track athletics. In his last year, 1937, he was a company sergeant major and graduated with honours, which secured him the option of taking a commission in the Royal Engineers. This he did, along with four fellow-graduates from Kingston and in August 1937 they set sail for a new life in Britain. After a somewhat inauspicious start, in which the delights of London caused them to lose track of time to the extent that they reported for duty at Chatham four days late, thereby losing four days' seniority, they joined 38 YO Batch and almost immediately afterward went up to Cambridge University. Harry was at Emmanuel College, and during his two years at Cambridge he represented the University at lacrosse and gained his Half-Blue. He took an honours degree in Mechanical Sciences, and then moved to Chatham to complete his YO training. The outbreak of war on 3 September 1939, however, soon put a stop to all that and in company with many other half-trained and youthful second lieutenants he was posted off to a unit to complete his training the hard way. He joined 55 Field Company, then at Aldershot.

During the winter of 1939-40, 55 Field Company was under War Office control and had been trained to blow up the oil installations at Rotterdam should the Germans invade Holland. As things turned out, its first excitement came when it embarked as part of a small expeditionary force which was intended to come to the aid of the Finns, at that time putting up a very gallant resistance against Russia. Perhaps fortunately for those concerned, peace was declared before the expedition sailed. The unit was then ordered to embark in a warship to prepare the Norwegian airfield at Stavanger for demolition but, two hours before sailing, the Germans began their threatened invasion of Norway and so the troops were disembarked to release HM ship for more pressing duties.

It was shortly after this that Harry's fiancée, Phyllis Henshaw, arrived in London from Quebec. She telephoned Harry at Aldershot and asked him to meet her in London. For reasons of

security, he was unable to explain over the phone that his unit was off to Norway that afternoon, so he simply told her to come down at once. She did so, a wedding was swiftly arranged, and they were married half an hour before the train left Aldershot for the port of embarkation. That night Harry, sharing a compartment in the train with his fellow-Canadian, Don McLeod, looked at him and said, "I never thought I'd be spending my wedding night with you!"

Norway was a difficult operation for the Allies. With no air support, no artillery and little transport, British troops fought a bitterly contested withdrawal with great gallantry. For his part in the operation, Harry was awarded the Norwegian War Cross and was also mentioned in despatches for demolition work on roads and bridges.

Having returned to the UK, Harry spent the next three years as second-*in*-command of a field company, and was then promoted to major and briefly given command of another field company. After attending a short course at the Staff College, Camberley, in the summer of 1943, he was posted to the Combined Training Centre in India, where he instructed Indian Army units in amphibious landings.

In July 1945 he was posted as lieutenant colonel to the Engineer Branch of HQ XV Indian Corps, which was one of the formations earmarked for an assault landing on the Malayan coast. In the event, atomic bombs persuaded Japan to capitulate immediately, and so XV Corps went directly to Singapore to accept the surrender of their forces in Malaya. A month later, it was sent to the Dutch East Indies (now Indonesia) to accept the surrender of the Japanese in that country, but a strong nationalistic uprising, accompanied by much bitter fighting, resulted in XV Corps' role being changed to one of support for the Dutch colonial administration.

In January 1946 Harry Boswell was posted to Malaya as ACRE Works. His wife, Phyllis, and their six-year-old son accompanied him. Tragically, one week after their arrival there, Phyllis was killed in a car accident.

Harry remained in Malaya until the summer of 1948, when he was selected to attend the US Command and General Staff College at Fort Leavenworth, Kansas. After graduating in 1949, he married Patricia Post, daughter of the Chief of Staff at the college. He took her back to the UK, where he was posted to Glasgow as brigade major of a TA beach brigade. A further posting in the UK, followed by one to Egypt, eventually led to command of 9 Training Regiment and return to the rank of lieutenant colonel which he had last held ten years before. Three years later, he was appointed AAG at HQ Aldershot District, and, for his services there, he was appointed OBE.

Harry Boswell's next posting was in 1961 as a colonel, commanding the Engineer Base Group in Singapore. This was a delightful appointment, which he and his family very much enjoyed. Three years later, he was selected to attend the Nato Defence College in Paris – another posting which, in his own words, "was not hard to take." On completing the course, he was sent to Washington DC to serve on the International Military Staff of the Nato Military Committee.

This was his last appointment, and in July 1967 he retired, after thirty years' service with the British Army. He took his family to Canada and settled in West Vancouver, where for eleven years he worked for Canada Manpower as a counsellor for engineering and technical people. He kept in touch with Corps affairs, and also with RMC Kingston, Ontario. It was a source of great pride and pleasure to him that, as the senior living alumnus of fifty years standing, his erstwhile classmates at RMC chose him to address the graduating class of 1983 and to present the prizes at the graduation parade. His wife, Patricia, recalls that this was the highlight of his later years, and that he particularly enjoyed rewarding the lady cadets!

Tall and distinguished-looking, Harry Boswell carried himself with an air of patrician dignity tempered by a robust sense of humour. Those who served with him will remember him for his unfailing courtesy and consideration for others. He was, in every sense, a truly Christian gentleman. In recent years, loss of memory had sadly compelled him to move into a Home for Veterans in Burnaby, British Columbia, where he died.

He is survived by Patricia and their two children, together with his son by his first marriage, and by six grandchildren.

Harry Boswell's death offers an opportunity of paying tribute to a much-respected coterie of officers who in their day added lustre and colour to our Corps. His younger brother Robert, and one or two others, all long since retired, are now the only survivors among those Canadians who decided to make their careers with the Royal Engineers, a practice which started as long ago as 1880. From then until 1942, when it ended because the Royal Canadian Engineers were by

then expanding rapidly, no less than 125 ex-cadets from RMC Kingston were commissioned into the Corps. Of these, a number became general officers and many were decorated or otherwise honoured. 38 YO Batch received the unusually large number of five, of whom three were sadly killed in the War. Their service is commemorated by a handsome piece of silver in the HQ Mess. Those Canadians known personally to the writer were generally about a year older than the British YOs with whom they were batched, were more street-wise (to use modern jargon) and less hidebound by convention. They appeared to have an enviable degree of *savoir faire* in their dealings with young ladies. They were excellent companions and good fun to be with. They were a breath of fresh air. They served their adopted Corps well. They deserve a salute.

BSzG

Memoirs in Brief

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

Orville Fisher, who died recently in Vancouver at the age of 87, was a Canadian war artist who was commissioned into the Royal Canadian Engineers during the Second World War. During the campaign in North-West Europe he made 246 sketches while sharing the dangers of the front line. One driver was killed beside him; when another captured seven Germans, Fisher had to stop work to help disarm them. His "D Day: the Assault", one of the many pictures worked up from the sketches, now hangs in the office of the Canadian Minister of National Defence. In later life Fisher ran the graphics department of the Vancouver School of Art, continuing his own work, first concentrating on etching and later switching to acrylics for landscapes.

Sir Alex Gordon CBE, who died recently at the age of 82, was President of the RIBA from 1971 to 1973. A Scot by birth, his family had settled in Swansea, where he trained and obtained his intermediate RIBA qualification just before the Second World War. He served throughout the war in the Corps and was demobilized as a major. He then set up a partnership which eventually became Alex Gordon and Partners with a staff of 50 in Cardiff and branches in London, York and Carmarthen. His output was prodigious, the Crown Offices, Cathays Park, Cardiff being perhaps the most distinguished of his projects. As well as his professional work, Gordon took on numerous other responsibilities on committees and advisory bodies in connection with the arts and design and also with the development of the education and training of architects.

Jack Holmes MC, was another professional architect who joined the Corps for war service. Aged 21 in 1939, he did not complete his training until after demobilization. He then set up his own practice in Glasgow. Described in the *Glasgow Herald* as "one of the most distinguished and influential architects of his generation", Holmes' practice produced some particularly fine public buildings and a notable 22-storey tower block which had the rare distinction of being listed by Historic Scotland. He was also much involved with planning through the Jack Holmes Planning Group in which he worked closely with his architect wife, Kirsteen Borland. They both worked hard to protect Scotland's architectural heritage, campaigning to preserve a number of important buildings.

Correspondence

AN APPROACH TO CLOSE SUPPORT FOR THE NEXT CENTURY

From: Major R E Ward

Sir, – Matthew Whitehurch has again asked me to comment on his latest article in the August *Journal*, but first I must congratulate him on being awarded prizes for his earlier article, on which I commented last April.

I wish straight away to support him again and to tell you that I have just heard from Peter Leslie, Assault RE Secretary, who was a troop commander at Le Havre, and he says: "Matthew has some quite controversial views which we would support from our Wartime experience". This sums it up for me too.

Assault Engineers and Armoured Engineers. Matthew speaks of both. I would like to make clear to modern readers that "Assault Engineers" were originally formed to breach the Atlantic Wall, a task in which they succeeded on "D" Day. The squadrons then at first had four troops, each of six AVsRE with two in HQ, total 26, later reduced to three troops, total 20. All were armed with Petards and all were capable of carrying many types of device, as needed; no specialist vehicles were used at first. Later after Normandy, Le Havre and other Channel ports we more usually joined divisional engineers in more normal operations, even encounter crossings and the pursuit, so by April 1945 we were all redesignated "Armoured Engineers" with no change in organization or equipment at all.

In 1947, 32 took over from 42 in the UK and were again called "Assault Engineers", but after some years reverted to "Armoured Engineers". As I see it "Assault Engineers" are intended for siege warfare and must have offensive weapons. I do not know if we still need to prepare for siege warfare, as Matthew hints - in the past, lack of siege engineers led to disasters, eg Badajoz, Dieppe and perhaps even the Somme. The SME at Chatham was formed as a direct result of Wellington's demand for properly trained siege engineers. So are we right to be without them? At our last reunion the CO of 32 said he hoped they would soon be restyled "Assault Engineers". I would only support this if they were given the weapons to do the job!

Battlefield Tours. When I was at the Staff College (over 40 years ago) I thought that the Battlefield Tour of Normandy was the best and most realistic part of the whole course, bringing out above all how things could go wrong. So I strongly support Matthew in his enthusiasm for battlefield tours and I have given him advice several times. I was, however, rather surprised when he took on Le Havre, being mainly siege warfare calling for assault engineers, although in the later stages we did operate more as armoured engineers in a mobile penetration. However I was pleased to hear that he made a very good job of it.

But if we are to consider more typical work for armoured or close support engineers I suggest that Overloon and Venray would be very valuable. I heard that 3 (UK) Div did a full study in 1994, just before we went over for the 50th Anniversary ceremonies. I did send HQRE a few notes but never heard how they got on. The Dutch National War and Resistance Museum at Overloon have very full records and a tour of the museum itself is very worthwhile. Travel is not difficult and the Dutch people are very hospitable and grateful to their liberators.

Organization. Although we now have close support engineers with armoured and field engineers integrated in the divisional engineers, there still seems to be much argument as to how they are to be organized and integrated – eg at troop, squadron or regimental level.

Integration at troop level has, I believe rightly, been abandoned.

Integration at squadron level seems to be the plan in Germany, where they have three, rather small, close support squadrons to support three battle groups. This, although heavy in overheads, must give the baule groups very intimate and dedicated support.

In the UK, I understand, separate armoured and field squadrons are used, but, according to Matthew's figures, there are only two armoured troops to support four battle groups, so I would think they would be hard pressed and this must call for much regrouping both before and during battle, something which earlier writers, like Jonathan Welch, wish very much to avoid. Although I have heard it said that separate squadrons give advantages in peacetime training, administration and equipment management, as well as fewer overheads, shortage of armour in the present arrangement must have led Matthew to

call for a much larger armoured squadron – incidentally on the same organization as armoured engineer squadrons had in 1945!

Command Vehicles. If, as Matthew says, Warriors are being considered for troop and squadron commanders this must be a great improvement on Spartans and, I take it, give more armour and fire power. But if a troop were to be equipped with CR2 tanks, as Matthew also recommends, then the Warrior would not do for the troop commander as he would be marked out and attract enemy fire. He would be better off in a tank.

But at squadron HQ they might offer advantages in space for command and communication functions. During the campaign in northwest Europe my OC did recommend the use of ½ tracks, but these never did materialize. For my own part, when commanding for short periods, I preferred the protection given by the HQ AVsRE. I even used one for echelon work.

Conclusions. I think Matthew has some very good suggestions – ones that, as Peter Leslie says, would be supported by most Assault RE veterans.

Organization is still controversial but must be flexible enough to reorganize to meet varying conditions and tasks. Regrouping can NOT be entirely ruled out.

We have a good close support setup but still lack weapons, namely demolition guns and machine guns, as well as the best of tanks. Yours sincerely – Roland Ward. (Formerly 2nd in Command 617 Assault Squadron, British Liberation Army 1944 to 1945.)

THE GAUGE BOOK

From: Capt (retd) J E Borer

Sir, – One of my tasks in the coming year as SO3 Trg Sp of Command Wing is to move the Wing from North Block into the former *HMS WILDFIRE*. In preparation for this, my clerks have been checking, sorting and packing records for storage.

One item which has come to light is "The Gauge Book". The order to start the book was given on 26th February 1931 by Major M Everett DSO, the Brigade Major, SME, and the first entries were made on 19th March 1931. The first name is that of Lieutenant General Sir Aylmer Hunter Weston and the second is Major General J R E Charles who was apparently re-gauged on his appointment as MGO!

As can be imagined, the book reads like a "Who's Who?" of the officer Corps of the Royal Engineers.

When gauging stopped in 1972, Batch Records continued to be entered. My clerk, Mrs Angela Colyer, is, as "a labour of love", bringing the book up to date. She has reached 113 YO and since the current course is 125, she does not have far to go.

My reason for writing is two-fold. Firstly, I think the officers of the Corps would like to be aware that such a record does exist. Incidentally, the 1931 "Instructions for Gauging" are pasted inside the front cover. (A copy reproduced below.) Secondly, the reason for the Brigade Major starting the book was "The Ceremony of Passing The Gauge degenerated on the last occasion into a most unpleasant rag. It is a ceremony for officers, not a Snookers' [sic] Concert for cadets. Above all, it is NOT to be made an excuse for young officers to drink too much". Although "unpleasant rag" does not sound too bad, I did wonder what on earth they had actually done for the BM to re-think an ancient Corps tradition – perhaps someone out there knows. Yours sincerely – John Borer.

"THE CEREMONY OF THE GAUGE"

1. The ritual, which is fixed by traditional usage and is therefore on no account to be altered, is as follows:–

(a) The Large Anteroom is vacated by all officers below the rank of Major and the Gauge is placed in the centre of the room. A table is placed at one end of the room and a settee across the door leading into the Hall.

(b) The senior batch of 2nd Lieutenants present carries out the ceremony; the last joined batch is initiated; no other officer may take any part in the proceedings. The Head of the senior batch takes charge.

(c) Each member of the junior batch in turn is brought into the Anteroom from the Conservatory, told to stand up on the table, and state his name. While this is being done officers must keep quiet in order that all present may hear who the newly joined RE officer is who is being admitted to the Mess. The initiate is not to be made to do anything else beyond shouting his name in full.

(d) The initiate is then passed through the lower space of the Gauge; he is swung through the Gauge twice forwards and twice backwards, and then swung clear of it. As he is swung batons of paper are used to make him fit the Gauge.

(e) He is then at once carried to the settee barring the door into the Hall, and passed over it.

(f) Being now a fully admitted member of the Mess, he is taken by other officers from the Hall to the Conservatory.

This ends the ceremony as far as that particular officer is concerned.

2. The passing of the Field Officers' Gauge consists of the portion of the above ritual described in paragraph 1(d), the upper space in the Gauge being used.
It is carried out by Field Officers; no officer of lower rank is allowed in the Anteroom during its progress

3. The Passing of the General Officers' Gauge consists in passing the initiate, seated in a chair, over the top of the Gauge. This ceremony is carried out by General Officers, Colonels and Lieutenant Colonels assisted by such majors as they may require. No other officers are allowed in the Anteroom during the progress of the ceremony.

SKIPPY GOES TO SKOPJE

From: Lt Col D W Taylor

Sir, – Major Bowyer was concerned that he might be stirring up a hornets' nest with the views expressed in his article in the August *Journal*. I rather hope that he has not, since he has articulated rather well many of the concerns that this PQE [professionally qualified engineer] observed in similar circumstances in Bosnia in 1996. Good on yer, Skippy!

I offer views on four of his points.

Command. What a hoary old chestnut! No you do not produce sweetness and light if you put the STRE under command of the field squadron. This is by no means the only time in the history of the universe that two equal commanders have needed to come to an understanding. Rather than seek false clarity, or suggest that the practicalities of life "do not sit easily in a military context", we need to address the factors that generate heat not light. The problem is the word "command". Neither OC will meet the higher commander's intent if he forgets that flexibility and cooperation are more important than treading on each other's toes. Watch the Royal Marines working with the Royal Navy to see how leadership passes naturally to the man best able to influence the battle. Teamwork makes 2 + 2 = 5, whereas autocracy struggles to make 2 + 2 = 3.

Competence. The English have avoided this very european notion, perhaps because of the emotion attached to its opposite. But the recognition of one's own limitations is vital to disaster-avoidance. I have worked with plenty of *staff* college trained squadron (and regimental) commanders who are competent to interpret technical data, but some have exceeded their limits and have had to be reined in at one-star level. Doubtless the same is true of PQEs' tactical and staff skills. The point is that we are all different, and doctrine is an entirely useless tool for deciding who is best placed to have authority over which element of the construction process. As Major Bowyer himself notes, the relationship finds its own level.

Local Standards. I would love to be able to design to 237 different national standards. I admit it, I can't! After the fiascos of the UN mandates in Bosnia, with 16 different "standard" pipework configurations in only 3½ years, I strongly advocate the use of prescriptive specification of fixtures, fittings, plumbing and cabling. That way RSME can teach the military engineers to assemble the widgets that RSME teaches the clerks of work to design. It may be an inefficient use of materiel and the logistic chain, but by goodness it would reduce cock ups on site.

Advice versus Decision. We must stand this battle on its head. Why waste design time producing a solution (advice) that is then rejected? That is a true "lose lose" scenario. If the commander (for it is he) can articulate his needs properly at the start (the decision), then the design can be made compliant first time. But in the real world, where we are all grasping in the mist, the design must be iterative. Talk to each other frequently, and remember that the other party doesn't use the English language the *same* way that you do. Remember, you were both 90 per cent right to begin with! Yours sincerely – D W Taylor.

SAPPERS IN THE RAF IN WW2

From: Lt Col B D Mackenzie

Sir, – You will think it strange that I should be taking up a point in a *Journal* three years old (Volume 110 No 1, April 1996), but put it down to old age!

In the memoir in brief on page 89 there are named five sappers who volunteered for service with the RAF in WW2, but a sixth was omitted, namely O L Gwynne in 43 Batch. According to my memory, he was killed whilst flying a fighter. He was a particular friend of mine, known as John. Dick Begbie, also in our Batch, recently corroborated my version of this, so I hope it is accurate.

Are these RAF Sappers commemorated in any particular way? I would be most interested to know. Yours sincerely – B D Mackenzie.

COMMONWEALTH WAR GRAVES

From: Major R J de V Wade

Sir, – I wonder if people are aware of an excellent facility provided by the Commonwealth War Graves Commission on the Internet. There is a two-page printout for each serviceman who died on service in the World Wars, and after – one general (coloured) memorial page, and a specific page showing the details of his war grave or memorial.

The Commission can also provide, for a fee, three-line listings of individual casualties and graves, by the desired category. For example, I obtained 25 pages listing the 350 railway Sappers who died on operations during 1939 to 1947, showing where they became casualties and where commemorated.

An invaluable way of recalling memories of one's own friends, relations, and comrades. Yours sincerely – James Wade

AN APPROACH TO CLOSE SUPPORT FOR THE NEXT CENTURY

From: Major M A Napier

Sir, – In Major Whitehurch's interesting article in the August issue of the *Journal*, he is a little harsh on the designers of military assault vehicles. At MEXE [Military Engineering Experimental Establishment] where the design work used to be carried out, there were many designers both military and civilian who, as a result of their service in WW2, most certainly had been shot at and who did understand what happens to a vehicle in an assault, as did those experienced officers who carried out the field, troop and user trials.

I am sure that the Major is aware that in all design of military vehicles there has to be trade-offs among the three essential characteristics of assault equipments, namely firepower, protection and mobility. In the case of the Chieftain AVLB it was stated by those responsible for issuing the "Operational Requirement" that mobility and a weight limitation were to be considered paramount. In those circumstances the firepower and protection, the lack of which the Major deplores, had to suffer. In the real world it is not possible to achieve the optimum in all three.

In the final paragraph of the paper on the design of the AVLB system "The Chieftain Bridgelayer" in the *Journal* of June 1978, the point is made that the maximum possible protection was given to exposed hydraulic cylinders and also that they were reasonably well covered when not actually launching the bridge. As it is not possible to have everything we would like, it must be the Operational Requirement which guides the designer with stated priorities when the inevitable compromises on performance have to be made. A relevant article was published in the *Journal* in March 1975, "The Achievement of quality Through the Operational Requirement Statement and the Design Phase of Defence Equipment".

Incidentally, the choice of illustrations for the article shows a certain partiality, since the Churchill is not shown in the launching mode, whereas the Chieftain is and nor is the considerable difference in span capability made clear. Further it would have been more instructive if a picture of the Centurion Bridgelayer had been chosen for comparison rather than the AVRE, which is necessarily designed for a role which is much more aggressive.

Having made these various points in defence of the designers, I'd like to congratulate Major Whitehurch for this article and his previous contributions, because designers must always be aware of the user's views. Yours faithfully – M A Napier.

SKIPPY GOES TO SKOPJE

From: Lt Col J A R Strong

Sir, – I read Darren Bowyer's article "Skippy goes to Skopje" with interest in the August 99 *Journal*. While he clearly enjoyed the challenge of his tour in Macedonia, his frustration over command and control issues came across strongly. He seemed to share the common misconception that the function of the STRE(Wks) is merely to design construction works. If this was the case then it could come under command of the field squadron, as the article suggests. Equally the field squadron could be under command of the STRE(Wks).

However a key function of the STRE(Wks) on an operation such as *Upminster* is to fill in for a missing element of G4 staff. Requirement definition and financial justification are G4 functions which provide the basis for RE tasking. In this capacity the STRE(Wks) is acting as the client and cannot be subordinate to the field squadron which is acting as the contractor.

The article took issue with the building standards set. This reinforces the argument to keep the STRE(Wks) separate. The hard-pressed squadron commander, in seeking to make tasks

more manageable for his unit, is probably not best placed to be the arbiter of standards. This is part of requirement definition – the province of the STRE(Wks). Yours sincerely Alastair Strong.

THE CLOSED SHOP BUT THE OPEN UNIVERSITY!

From: Maj Gen P J M Pellereau

Sir, The History of the Corps as quoted in the splendid article (*RE Journal* Aug 99) on The Closed Shop is undoubtedly wrong. Sappers from the Shop were not finished off at Sandhurst. Timekeeper's memory overall is pretty good I would say. Indeed events of those days were etched indelibly on many memories.

I can certainly recall my experience as a direct contemporary of his term at The Shop. Intending to enter the Army via a university I had obtained a place at Cambridge to take Mechanical Sciences and was due to go up for the 1939 Michaelmas Term. Uncertain how the outbreak of war could affect this arrangement I wrote to the CO of the University OTC (a Colonel Murray) asking for advice.

Swiftly he replied that I should proceed with my plan because Government was anxious to avoid the mistake of the 1st World War and see that engineers, and medics completed their training. I met one second-year medical student, who had been mobilized with the TA as a Gunner yet hauled back from France to Cambridge whether he liked it or not.

A special attestation centre had been set up at Cambridge where we could sign up and then be placed on the "Z" Reserve until we graduated. It was a wonderful meeting of the military and academic minds. Responding to the question "Are you prepared to be inoculated?" one undergraduate wrote "No". Fiercely the sergeant told him that he must answer "Yes". "In that case," said he quite reasonably, "Why do you put this question on the form at all?" Another volunteer was hard put to say of what his Father had died. "Worn out" was his eventual and probably adequate solution. For my part I reacted to the Doctor's held out hand by shaking it. It seemed he was merely reaching for my papers and was not accustomed to such courtesies as handshakes! I still passed his examination.

With my King's shilling received and spent I matriculated and joined the Engineering Faculty well known to those leaving The Shop between the two World Wars. On offer, too, was the chance, which most of them also had, of being excused the first year of the Tripos. Always one for the fast track I went straight into the second year. Thus by June 1941 I was judged to have earned an honours Degree Second Class. I always maintain that if I had done the full three years I would have got a Third because I wouldn't have worked so hard.

Again there was a fast track via the OTC and Cert "B" into the RE OCTU which had by then moved from Shorncliffe to safer Aldershot. So by my 21st Birthday in April 1942 I had two pips on my shoulder (thanks to being made a Class Officer) and an Honours Degree in my pocket. It was a few more years before a Regular Commission was granted me and even longer before seniority brought me nearer those splendid "snookers" who had taken the traditional route into the Corps. I was imperfectly trained no doubt – but I was on the winning side! Yours faithfully – P J M Pellereau.

WHERE'S ALL THE FUN GONE?

From: Lt G Webb

Sir, – Surely RE activity is not always serious, sober and solemn? Where are the stories and anecdotes of relaxation, laughter and, dare we suggest – fun?!

Can any correspondent explain the origin of the "Conga", which was a favourite way of concluding a mess party?

The party goers, still more or less in control of their movements, were called to form a crocodile as if to play "Oranges and Lemons". They debouched from the mess in snaking locomotion each holding on to the person in front, crying the "Conga" jingle.

There was often a fountain or pool in the mess garden, which the "Conga" headed straight for, carelessly dipping into the water and out the other side – dripping!

Don't tell me Royal Engineers did not have fun! Yours sincerely – Geoff Webb

Reviews

SECRET UNDERGROUND CITIES

NICHOLAS MCCAMLEY

Published by Pen & Sword Books (Leo Cooper) 47 Church Street, Barnsley, S70 2AS Price £25. ISBN 0 85052 585 3

NICK McCamley is a knowledgeable and passionate enthusiast in industrial archaeology and the local history of the Bath area. His detailed and highly readable book describes the development, both prior to, during, and after the Second World War, of a vast complex of underground factories, ammunition and explosive storage depots and safekeeping for some of the Nation's treasures in decommissioned Bath stone quarries.

The Royal Engineers part of the story is significant. As early as November 1934, Major Minnis "an able Officer and distinguished military engineer who was to play a continuing role in the efficient development of the project" took part in a thorough War Office inspection of the site.

Captain Terry, Sergeant Major Kennedy and a small detachment surveyed the sites. The Royal Engineers supervised the work to develop a miscellany of stores, workshops, operational HQs (for the RAF), factories and administrative areas. The labour force was civilian. Construction began in July 1936 with a vast influx of men, materials and machinery superimposed on a small rural community. This absorbed a substantial proportion of the military budget and mopped up the great pool of chronically unemployed from the northeast. The project cost over £4.5m and eventually Central Ammunition Depot, Corsham, held 300,000 tons of explosives in an underground citadel of 125 acres of chambers. As it approached the peak of operations in late 1943, by which time the Sapper construction was long completed, over 1200 RAOC officers and men, 400 pioneers and 300 civilians were directly engaged in ammunition handling.

The author covers many subsidiary aspects such as administration, welfare and housing in a well-informed manner. The post-war period is also well narrated. As the author acquired Monkton Farleigh mine himself in 1984 and developed it as a public heritage site until 1991 his knowledge is indeed detailed.

While this book will not find its way to every Sapper officer's bedside it is of considerable value to anyone with an interest in ammunition storage, and the associated engineer works, and a little known aspect of the logistic side of the Second World War.

SRG

WE FELL ON STONY GROUND

EDWIN L ROBINSON

Published by The Book Guild Limited, Temple House, 25 High Street, Lewes, BN7 2LU Price £12.95 ISBN 1 85776 239 8

EDWIN Robinson describes his book in the dedication as "a window on my salad years". It is a short account, some 118 pages, of his contribution to the Allied war effort from 1942 through to his release from captivity in 1945, followed by some personal thoughts on post-war Britain. It is easy reading, anecdotal in style and just the book for those who like to be near the earthy secrets of soldiering. It is certainly not a definitive history; indeed the facts are sketchy. There are only two maps and a limited number of black and white illustrations.

The author, who was a regular Army sergeant in the Royal Corps of Signals at the outbreak of war, begins his story by describing life with his troop in Surrey prior to their deployment to North Africa by troopship. His apparent aversion to officers becomes obvious at an early stage; his criticism is constant, but perhaps they really were like that?! Monty was the exception. The hardship of service in the desert, the horrors of battle including El Alamein are well described. The story then takes the reader off to his service in late 1943, early 1944 with the Inter Services Liaison Department. Yugoslavia was his next theatre of operations, but he did not manage to leave the DZ before being captured on his first mission. The second half of the book describes his incarceration as a suspected spy in exceptionally unpleasant conditions, interrogation by the Gestapo in Stalag XVII and finally his journey to Colditz where he was liberated by the Americans in 1945.

Edwin Robinson provides a very useful insight to soldiering both orthodox and unorthodox. It is

the story, no doubt, of many who played their part in the defeat of Nazi Germany. The book will appeal especially to those who lived through those times. I recommend it.

RJDR

BRITISH BARRACKS 1600-1914 – THEIR ARCHITECTURE AND ROLE IN SOCIETY

JAMES DOUET

Published by The Stationery Office, PO Box 276, London, SW8 5DT – Price £40
ISBN 0 11 772482 3

JAMES Douet was a builder and stonemason before becoming an adviser to English Heritage on updating registers of listed buildings. Part of his work involved producing reports on protecting barracks, which gave him the ideal opportunity to produce this unique book charting the history of British barracks from 1600 to 1914. His thesis is that the development of British barracks was driven by political and social factors (hence the subsidiary title) rather than the military considerations which necessarily prevailed in Continental Europe.

Douet approaches the subject chronologically, punctuating the text with photographs and plans of the barracks. There are also specially inserted sections on themed subjects, for example, the development of military academies such as Woolwich and Sandhurst, and the role of women in barracks. There is an excellent set of colour plates, many reflecting coloured drawings of barrack structures, which were the common draughting standard in the 19th Century.

The book begins by describing the attitude to barracks in the 1600s and early 1700s, the fears that barracks might upset the public, and the fact that billeting was cheaper, public houses being one of the most popular bed spaces! The counter-argument was that barracks would improve discipline and provide a network for moving the army efficiently around the country. The earlier developments were the requirement for marine barracks in ports and a network of barracks to subjugate Ireland following the Williamite conquest. The first map charting the growth of barracks shows Britain bare but Ireland dotted with cavalry and infantry barracks.

Changes in attitude began in 1792. The result was a barrack development programme to which the Napoleonic Wars added urgency. Woolwich, the largest barracks constructed at this time, was capable of billeting 3500 men and 1700 horses.

The Royal Engineers figured large in the development. It was driven by the Chief Engineer of Ordnance on behalf of the Ordnance Board. In 1802 this appointment became Inspector General of Fortifications. The list of appointees still hangs on the wall of the Engineer in Chief's headquarters and the role today is delegated to Director Engineer Support at Andover as the Inspector of Works and Fortifications. Indeed the book is probably of most interest to those who work in G4 Estate today. The familiar problems that are faced today in running the peacetime infrastructure were just as prevalent in history.

Douet then records the dire period after the Napoleonic Wars when barrack development declined to the extent that soldiers lived in unhealthier conditions than those of convicted prisoners. This was not rectified until the Sanitary Commission of 1857 in the aftermath of the Crimean War. The Cardwell reforms continued the process up to the First World War.

This book is a most useful reference guide to anyone researching the history of their own barracks. It is well illustrated and the chronological map guides provide an excellent visual summary of the development. It is of particular interest to Royal Engineers as both Chatham and Woolwich are given considerable coverage. The odd famous name is also dropped, including General Burgoyne and William Green, who played a large part in the Napoleonic development following his success in the Great Siege of Gibraltar.

James Douet has now moved to Spain where he is researching a book on European barracks, which I am sure will be as readable and useful as this book.

GT

BRITAIN'S ARMY IN THE 20TH CENTURY

FIELD MARSHAL LORD CARVER

Published by Macmillan Publishers Ltd, 25 Eccleston Place, London, SW1W 9NF
Price £30, ISBN 0 333 73777 6

PUBLISHED in association with the Imperial War Museum, this well-presented book has a rather misleading title. It could more accurately be described as a potted history of the campaigns

fought by the British Army, from the Boer War to the operations in Bosnia. In the haste to publish this account of the Twentieth Century, the cut-off date used is 1997; thus Kosovo is excluded. The campaigns are described succinctly and the book is a useful work of reference for this feature alone – particularly for the less-well-known operations, such as in Ireland before and after the First World War, and the Mau Mau and EOKA campaigns in Kenya and Cyprus respectively. The text is illuminated with excerpts from some eighty unpublished accounts written by officers and soldiers who fought in the various campaigns; most of these are taken from papers deposited at the Imperial War Museum. These accounts serve to enliven and add a human scale to the narrative, although – perhaps inevitably – most are by infantrymen. Some are particularly poignant, such as the story of a private who was a member of a firing party in the First World War. Only four of the accounts are written by Sappers, of which the most significant is one, previously published in this *Journal*, by the then Captain John Elderkin on dealing with a riot in Cyprus in the mid Fifties.

The book is lavishly illustrated with photographs and there are also some clear maps, although the latter appear at the end of the book and are not cross-referenced in the text; thus it was not until I was half-way through the book that I discovered, by chance, their existence. There are a few small errors in the book, such as the description of the 66mm and 84mm anti-tank launchers used in the Falklands as "mortars". The author also has a rather pedantic habit of listing the names of the formations that took part in each action, and their commanders, which in places breaks the flow of the narrative.

The most disappointing aspect of the book is a lack of analysis of what has made the Army "tick" during this action packed century. There is little or no mention, for example, of recruiting, training, ethos, living conditions, terms of service, relationships between ranks, and the contribution made by the support services. Structural aspects are covered, but fairly perfunctorily; for instance, the upheaval of *Options for Change* is covered in less than two pages. The most salutary feature of the successive reorganizations of the Army is that the underlying assumptions have invariably been overtaken all too rapidly by events. Examples include the assumption at the end of the last century that "it will be distinctly understood that the probability of the employment of an Army Corps in the field in any European war is sufficiently improbable to make it the primary duty of the military authorities to organise our forces efficiently for the defence of this country" and of course the infamous "Ten Year Rule" of 1932, when it was assumed that the British Empire would not be engaged in any great war during the next ten years, and that no Expeditionary Force is required for this purpose ..." But are we any more confident that the assumptions of last year's Strategic Defence Review, which came too late to be included in this book, are correct?

CPRB

IRONSIDE'S LINE

COLIN ALEXANDER

Published by Historic Military Press, Green Arbor, Rectory Road, Storrington, RH20 4EF
Softback, 152pages, illustrated, maps –
Price £14.99, available to RE Journal readers for £11.99 incl p&p.
ISBN 1-901313-04-2

TODAY we still spot pillboxes and old concrete emplacements with rusting mountings lying apparently haphazardly round the country. It is often difficult to imagine any coherent pattern or purpose in these relics. Colin Alexander, a local government officer, spent some fifteen years researching the matter as a personal hobby and the results are recorded in this handy and well-produced book.

Officially the "General Headquarters Line", the Ironside's Line took its name from the then Commander-in-Chief Home Forces, General Sir Edmund Ironside who, in the desperate days of 1940, produced the plan for the defence of Britain against the threatened German invasion. In an extraordinarily short time a line of defences was built west to east from Bristol to the Medway and south to north from Brighton to north of Edinburgh. After Dunkirk, when the nature of the German onslaught was better understood, this linear plan was replaced by a more mobile concept of operations based on strongpoints from which enemy thrusts might be countered by armoured forces. Not all the earlier work was wasted as many of the pillboxes, anti-tank obstacles and gun positions were able to be incorporated in the new plan.

This book introduces the subject with a summary of the problem: the German invasion plans

and the nature and paucity of the weapons with which they might be confronted. The defence plans are then detailed for different sectors round the country, followed by details of design and construction. A most valuable *gazetteer* lists all the installations with grid references.

This invaluable record of the endeavours of our forefathers to face the German invasion is long overdue. The author has done us and future generations a great service by recording the results of his life's hobby so clearly and thoroughly. His industry and meticulous research has produced a definitive handbook both for enthusiasts and those with curiosity and interest in the wartime activities in their own locality.

GWAN

NO PROBLEM TOO DIFFICULT
The History of the Forces Help Society and Lord Roberts Workshops
JULIAN PAGET

Published privately in conjunction with SSAFA Forces Help Society.
Copies can be obtained from: Secretary SSAFA Forces Help, 19 Queen Elizabeth St, London, SE1 2LP
Price £12.50 incl p&p

This admirable history of one of the oldest joint services charities, covers the period from its founding in 1899 until its amalgamation with the Soldiers, Sailors, Airmen and Families Association (SSAFA) in 1997. Julian Paget, the son of General Sir Bernard Paget, is a well known military historian and was himself on the executive committee of the society before amalgamation.

Julian Paget traces the society from its founding by Princess Christian, daughter of Queen Victoria, as the Soldiers and Sailors Help Society to help soldiers and sailors returning from the South African War. Originally the aim of the society was to establish "friends" in every parish or ward throughout the Empire; to provide and maintain convalescent homes and to contribute to the support of disabled ex-servicemen in their homes; to teach useful trades and to train men who had been discharged as medically unfit. The first workshops for disabled ex-servicemen were established over four years later and these became the Lord Roberts Workshops, further workshops were established after WW1 and WW2. The history traces the further development of the society and changes of name through both Wars up to the 80s when it became necessary to consider saving overheads by joining up with one or more of the many ex-service charities doing similar work.

The author gives a very clear account of the financing of, and the fundraising for the society; the provision of homes and cottages; the partnership with SSAFA over casework; the rise and fall of the number of workshops; the association of the society with the royal family starting with Princess Christian and particularly with Queen Elizabeth, the Queen Mother, who visited the Dundee Workshops every year for 63 years.

The history is of particular interest to the Corps as for the last 40 years (over a third of the life of the society) the chairman has been a senior Sapper, Lt Gen Sir Ronald Scobie, Lt Col Richard Black, Brig Hugh Hamilton, and Maj Gen Lennox Garrett.

HGWH

THE WESTERN FRONT
RICHARD HOLMES

Published by BBC Worldwide Ltd, Woodlands, 80 Wood Lane, London W12 0TT –
Price £17.99, ISBN 0 563 38493 X

As Professor of Military Studies at Cranfield, the author is a respected historian who possesses a detailed knowledge of the Western Front with which, on his own admission, he has been associated for the whole of his professional life.

This BBC publication complements the BBC2 series of the same name and is considerably more detailed than the 30-minute documentaries could ever be. Immensely readable in Holmes' direct and enthusiastic style, it deals with the Western Front in chronological fashion, as well as covering many defining events, for example the shell scandal, the formation of the New Armies, politics and the relationships and rivalry of general officers. However, in 220 pages this can necessarily only be a cursory look and aficionados of particular subjects will have to look elsewhere for a detailed treatise of their topic. With liberal use of *bon mots* and vignettes, Holmes sets the scene at Sarajevo and, following preliminaries such as mobilization and Schlieffen, proceeds to Mons manoeuvre warfare, through Le Cateau, First and Second Ypres, the smaller operations such as Loos and Neuve Chapelle before dealing with Verdun and the Somme. He highlights the

effect which Third Ypres, and particularly Passchendaele in late 1917 followed by the Cambrai reverse and then the German offensives in March and April 1918, had on the morale of the BEF, in stark contrast to the euphoric victory at Messines earlier in 1917. Third Ypres might be called a pyrrhic victory. Cambrai, after initial success, descended into a litany of incompetence, and the shattering attack of 21 March 1918 came as a profound shock.

We deduce that the state of the BEF in late 1917/early 1918 was not good. We learn that, although it did not break, morale was fragile, optimism was lost and an aura of depression had set in. As one officer commented during the March retreat, the Army "was just a rabble – no panic, no hurry – just a dogged steady slogging towards the rear". The recovery and the tactical triumphs of the last 100 days, perhaps the finest feat of arms that the British Army has ever undertaken, appear almost an anticlimax but certainly a tribute to the competent field generals as well as the 18-year-old tommies. All this is admirably covered.

Read this book and be grateful that we have the likes of Richard Holmes to bring such momentous military history to life.

MDC

THE FIRST WORLD WAR

JOHN KEEGAN

Published by Hutchinson, Random House (UK) Ltd, 20 Vauxhall Bridge Road, London SW1V 2SA. Price £12.50, ISBN 0 09 1801788

LIKE Richard Holmes' "The Western Front", also reviewed in this issue, John Keegan's "The First World War" is described as fulfilling a lifelong ambition. In Keegan's case it comes as something of a surprise to discover that such a well-established author has not already produced his version of the events of 1914 to 1918. We can be grateful that he has held back so long. In presenting this investigation of what he himself calls a mystery, Keegan is able to draw on his immense depth of knowledge. He delves down into the roots of the military and political experience that culminated in the tragedies not only of 1914 to 18 but also of 1939 to 45, its direct consequence and, he reminds us, five times more destructive of human life. His scholarship gives credibility to some new interpretations of accepted attitudes.

On a much broader canvas than "The Western Front", the strategic picture holds the whole story together so that, for example, Germany's pre-war anxieties seem a reasonable and logical start-point for the conflagration that followed Austria's unwillingness to staunch the spark of Sarajevo unilaterally. Keegan has a gift for zooming in from the broad picture to the detail on which it is really constructed. 5 Field Company's epic contribution to the First battle of Ypres at Nonneboschen (often overlooked) can be seen as the climax of a much wider phase of the war as a whole.

Nevertheless all the main engagements are narrated with clarity. The war at sea and in the air are fully covered and linked in with overall strategy. There is even an unravelling, with an unexpected slant, of the complex series of events in the aftermath of the Bolshevik revolution, which led to the continuation of the war after the Armistice. The publisher could have been more generous with detailed maps but those we are allowed are clear enough.

Keegan's judgements on personalities are not explicit. They have to be read by inference from the pictures he paints which are vivid and sensitive. One almost feels sympathy for Ludendorff, the consummate professional but with human feelings, finally cracking under impossible difficulties; less so for the cold Haig: "On the Somme he had sent the flower of British youth to death or mutilation; at Passchendaele he had tipped the survivors into the slough of despond."

The hero of the book is the soldier, of all nationalities, to whom Keegan returns like a magnet at whose gifts of stoicism, courage and loyalty to his fellows he marvels.

GWAN

Explanation of Abbreviations and Foreign Words Used in This Journal