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Lord Lugard's Opinion of Sappers

THESE extracts from the Diary of Lord Lugard, founder of the West Africa Frontier Force and first Governor General of Nigeria, are published without comment!

October 1887–March 1898. (Captain A J Pilcher RE)

"On arrival I found that Pilcher had been for a month or more 'organizing' the Force. He was a very nice fellow, a great theorist and lecturer at the US [United Services] Institution—a typical SC [Staff College] man and a great expert on the German Army. He had never been on service and, though I liked him personally, I think I never met a more unpractical man. His idea, like that of the CO, seemed to be that an application should be sent into the WO [War Office] for so many Officers and NCOs, that they should then be very much 'inspected', and shot off to Africa; two or three young Doctors must also be caught and despatched and there the matter ended. Meanwhile he spent endless time in devising a cardboard box to fit into the ammunition pouch and he told me of it till I was sick of it. He ordered, I think as a *first instalment* over 100 000 of these. He also worried a great deal over the dress question, and was excessively keen about the buttons and the small details of uniform. He was, I think, a rich man, and he laid down lists of things for Officers to get enough for three years' campaign with elephants for transport. This I cut down. As to the rest, he had got hold of one or two men who knew about stored provisions and had made a list—or Indent—calculated on no basis at all, for no particular number of men, and for no particular length of time, and no particular scale of issue! As each thing was suggested he chalked down apparently a ton or a cwt as the fancy seized him. This list was brought to me the day I began work on the Force (Nov 12th) late in the evening and I was asked to sign it. Leslie, a *most* excellent and intelligent and willing man of the Crown Agents' Dept, Pilcher and I went at it. I upset everything, calculated the numbers of Europeans in one Batt and one Field Hospital and made it out for six months. I knocked out a lot of expensive items, separated 'Medical Comforts' and 'Emergency Rations' (for forced marches), made a rough scale of issue, and produced *something* which, though full of errors and afterwards incorporated in my general requisition, was still *something* tangible. It had to be signed that night so as to be shipped on Saturday. We finished at 4am."

April–June 1898. (Either Lieutenant R L McClintock, who was awarded the DSO in the Boer War, or 2nd Lieutenant R S McClintock)

"I sent for McClintock and had a pretty straight talk with him. He works extremely hard and exposes himself unsparingly to the sun, but *this* is not what I want. His work is very slow. The fact is that like so many REs he thinks he can always go one better than his orders. They seem to think that God made REs first, and then, if not with their assistance, at least with their approval, made the rest of the world. I am therefore of the poorer clay, but I'll have my orders obeyed nevertheless, and the written orders—repeated verbally *ad nauseam* in London—have been absolutely disregarded. . . . Even now I find that fatal genius which is common between Indian Civilians and REs, and makes me thank God I was born an ordinary fool, has prompted him to employ one of his four Sappers (one is ill) on drilling twenty Yoruba recruits and 'teaching them bridging'. Great God, no-one but a Sapper could rise to that sublime height of folly. When Genius steps off its pedestal it naturally falls, by the laws of Nature, without any break to the bottom—and McClintock 'touched bottom' there. Here am I thinking day and night how to push on these houses, cabling to the S of S and to India for more EP tents and Madrassees, to Lagos, Accra, and Sierra Leone for more carpenters, while the men are sick and dying and the rains are nearly due, and this unique idiot sends one of only four Sappers to teach twenty savages bridging. He deserves to be tried by Court Martial for feigning idiocy."

The Falklands 1982—July to December
The Beginning of Rehabilitation

PART 1. THE BACKGROUND
COLONEL D BROWNSON CRE FALKLAND ISLANDS

Major General David Thorne together with his Chief of Staff and myself, arrived at Port Stanley 17 July 1982 and were met by Major General Jeremy Moore and Lieut Colonel Geoff Field. We were there to take over from the team that had won the war, to secure the Islands' defence, and to rehabilitate the Islands and its inhabitants.

Much has been written about the conditions in the Islands when the war ended but no amount of TV coverage or MOD briefings could have prepared us for the squalor, chaos and horror of what we saw during our takeover period. The Royal Engineers, of course, had launched themselves immediately the war ended on a succession of emergency tasks and when the new team arrived Hercules were landing on the patched runway, electricity and water had been restored to much of the population, 9, 11 and 59 Squadrons had bravely started on the minefield clearance, taken casualties, and stopped. However, the tasks were of such an enormity, both in scale and scope, that many months later newcomers would still wonder when someone was going to begin to sort out the mess!

Ammunition, weapons, aircraft, food and clothing lay in the mud and many battle positions were as the Argentinians had left them five weeks earlier. Weapons remained on trench parapets and personal belongings littered the area. Argentinian dead remained in and around the trenches.

Before leaving UK General Thorne made his outline plan and discussed it on the long journey south. It was clear that there were three main tasks to be completed.

The *first* was to secure the long term defence of the Falkland Islands. This involved deciding what force levels were needed for the three Services, and what logistic backing and facilities they needed. Already it had been decided in Whitehall that an essential part of these plans was to develop Stanley Airfield for

Photo 1. Main Road, Stanley. July 1982

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Photo 2. Debris of war

fast jet operation (See Part 2) and to provide a land based early warning system. Until the first Phantom landed on 17 October 1982 the development of the airfield was my first priority and typically three squadrons were deployed there.

The original airstrip was built in 1977-78 and used by Fokker Friendship and Fokker Fellowship aircraft of the Argentine National Airline, to provide a short haul service to Argentina. As it had been built by a British consortium, members of HQ E-in-C were able to study the construction details during the conflict and make plans for the development of the runway when it was back in British hands. It was built to LCN 16, was 4100 feet long and 150 feet wide. In order to meet RAF requirements it needed to be strengthened, lengthened, given parking and dispersal areas, provided with jet fuel storage, given lighting and navigational aids, and provided with facilities for the repair and maintenance of aircraft. In addition it was

Photo 3. First Phantom arrives on 17 October 1982, with rock crushers providing the background

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necessary to install four Rotary Hydraulic Arrester Gears (RHAG) and later a fifth was required. It is little wonder with the scope of the work required that so many very tired but proud Royal Engineers cheered as the first Phantom landed.

The *second* major task, and of course linked to the first, was to provide suitable accommodation for the garrison before the onset of the next Antarctic Winter. (See Part 3).

Early in the war the need was anticipated for some sort of temporary accommodation once Stanley was retaken. The need could not be quantified but it was realised that up to 16 000, that was prisoners plus our own forces, could require housing. An estimate was made of what our ships might accommodate, plus the tentage we held, plus the numbers that could be billeted, and financial cover was agreed for 7 × 200-man and 2 × 800-man Portakabin-type camps to meet any shortfall. These stores started to arrive at Port Stanley in late August.

As they arrived so there was pressure, both political and military, for us to offload the ships and put down the Portakabins on virgin sites, but we assessed that this would be wrong and that units were better off in heated tents, or in ships or billeted ashore, until proper camps could be built with heating and electricity, even supposing that we were able to build them in an Antarctic Winter. Another factor was that we were totally committed to building the airfield and to the engineering necessary for the force to remain on the Island. Perhaps an emotive phrase, but continual maintenance and repair of storm damage was essential.

The force levels proposed and General Thorne's Concept of Operations meant that we needed to build major camps in and around Stanley and on both main Islands. The General made his map appreciation, giving alternative options for where he wanted the camps, and a joint Sapper/Civil relations team carried out recces and made detailed site plans. That process still continued when I left.

The guide lines given me by CLF were:

(a) In principle garrisons were to be separated from the local communities, to be self contained and to have adequate leisure facilities so men would prefer to remain on camp.

(b) Camps were to have good training facilities.

(c) Small camps in some isolated areas were required to provide platoon patrol bases and perhaps give the opportunity for adventurous training.

Photo 4. Repairs to jetty

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Photo 5. The Islander's Islander

(d) Camps were to be sited tactically wherever possible.

(e) Finally we were to agree locations with the local population.

From an engineering point of view we were looking for good level ground, near and with good access to the sea, with a good water supply and shelter from the elements. It was a very tall order!

The *third* major task was to rehabilitate the Islanders and get them back to as normal a working and social life as possible in the circumstances existing. As I mentioned earlier a vast amount of mines, grenades, rockets, small arms ammunition and UXB littered the main scenes of fighting and the other areas that had been prepared for defence. The public utilities had been damaged in the war and not only had they to be restored but improved to cope with the much increased demand. Farm fences were down and sheep and cattle had strayed. Other animals had walked into mined areas and were badly mutilated. Some farmers were cut off by minefields and others were too scared to move. It was still winter time but fuel supplies were low as many peat stocks were in mined areas or had been stolen by the Argentinians. The jetties, roads and moorings could not cope with the heavy loads imposed on them and many houses needed urgent repair. It was necessary to re-establish an air service around the Islands, but all civilian aircraft were damaged beyond repair.

Once again most of these rehabilitation tasks were Sapper ones and it was necessary to formulate a plan and stick to a strict set of priorities. The first priority was to clear unexploded ordnance from the areas where people could not avoid going, ie, their houses, gardens, paths and then extend outwards to give them some living and recreation room. (See Part 4). At the same time it was important to fence off, and sign, all areas not considered safe for whatever reason, and let both servicemen and Islanders know where the danger areas were. This was achieved by regular issues of "mines" maps which were distributed throughout the Islands; if not throughout the world as they became collector's items! The next stage was to examine suspicious areas in detail and declare them clear, or extend our many miles of fencing. A dangerous and trying job which was tackled by both bomb disposal, and combat engineers.

Such were the three main tasks facing General Thorne and his team.

Until the Phantoms arrived in October, and became operational, British Forces in the area were commanded by the Flag Officer Third Flotilla, Admiral Reffell,

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with General Thorne as Commander Land Forces. However once the Phantoms were in position and ready, General Thorne assumed command of all British Forces and Admiral Reffell left by air for UK having inspected an immaculate Royal Engineer quarterguard. The routine military command and control was exercised by General Thorne through his daily "prayers" which were attended by:

Commander British Forces—Major General David Thorne
Senior Naval Officer—Captain David Dobson
Senior RAF Officer—Group Captain Bill Wratten
Chief of Staff—Colonel Roger Wheeler
Deputy Chief of Staff—Colonel Paul Symes
Command Secretary—Mr Jack Morgan
Commander Royal Engineers—Colonel Derek Brownson

Throughout the period only the bare essential orders and instructions were written down and command was exercised verbally. The pace of life, and the speed with which problems had to be tackled, dictated that action had to be swift and sure. Similarly briefings for the many VIP visitors were given informally without rehearsal, as were those to the world media.

In order to plan and coordinate the rehabilitation of the Islands a special Joint Civil/Military Committee met at least every two weeks, and more often if necessary. It was attended by:

Civil Commissioner (Chairman)	Senior Naval Officer
Military Commissioner	Senior Royal Air Force Officer
Chief Secretary	Commander Royal Engineers
Financial Secretary	Commander Royal Engineers (Works)
Senior Magistrate	Civil Relations Officer
Director of Public Works	Command Secretary

The Committee considered every aspect of life on the Islands that had been affected by the war. Plans to overcome the problems were largely agreed during the meetings. Typical problems were the lack of heating, electricity and water, the repair of houses, the offloading of ships, overcharging in public houses and shops, the reconstruction of the postal service, support to the Public Works Department, movement of goods and people around the Islands, movement to and from UK, etc etc.

Much engineer work flowed from the Committee but this and all other works tasks were fed into a Works Services Policy Committee which was chaired by the Q Staff, had representatives of all three services on it, and was attended by the CRE (Works) and my SO2. The Committee often sat in an atmosphere of mistrust and enmity as it decided which tasks to accept and what priority to give them. It was a brave man who tried to indulge in nepotism or bypass the system in a country where everyone needed something and passionately promoted their cause. The lesson learned by every Sapper Commander early in his tour was that there could be no secrets in such a small place.

In outline the Royal Engineer command and control organisation had the following components:

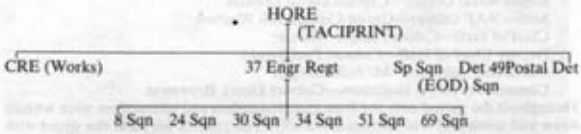
Command and Coordination—CRE (FI) plus small staff (including TACIPRINT)
Consultancy—CRE (Works)
Contracting—37 (FI) Engineer Regiment
Resources—Support Squadron (including Engineer Park)
EOD—Det 49 EOD Squadron

Of course this is an over simplification and both CRE (Works) and 37 Regiment had other roles but it gives the basic relationship that was found to work. The other Sapper unit on the Islands was the Postal Detachment and although it was part of the Falkland Islands' Logistic Battalion there was no doubt where their hearts and emotions lay and the family relationship was as firm as ever.

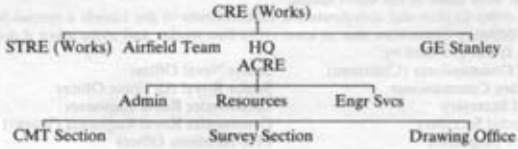
The number of field squadrons in 37 Regiment was regulated to meet the number

of urgent tasks and to the season of the year. Construction work and area clearance work are very difficult in the Antarctic winter therefore the policy is to send extra squadrons for the summer period. When I arrived in July there were three field squadrons but by late December it had risen to six. We were organised as follows:

RE Organisation FALKLAND ISLANDS December 82



CRE Works Organisation December 82



In Parts 2, 3 and 4, the three major tasks tackled during my period as CRE are described in greater detail, although those wanting technical and design criteria will need to contact the Authors direct. Some details are withheld for security reasons. Having chosen to concentrate on the three major tasks it is necessary to explain that there were many other engineer achievements which, in different times or different places, would have been considered large undertakings but space allows them only a mention.

Photo 6. 30 Fd Sqn became experts at building hangars

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Photo 7. Hospital overspill accommodation built by 69 Gurkha Fd Sqn

RAF Stanley required large quantities of fuel but for many weeks relied upon resupply by dracone on an opportunity basis, whenever the weather permitted. To make matters worse there was very limited storage at the Airfield and even during a short period of bad weather there was insufficient fuel for a full flying programme. 30 Fd Sqn and CRE (Works) were tasked with solving the problem and did so by building a 1900ft Ship to Shore pipeline and an additional fuel farm. 30 Fd Sqn was

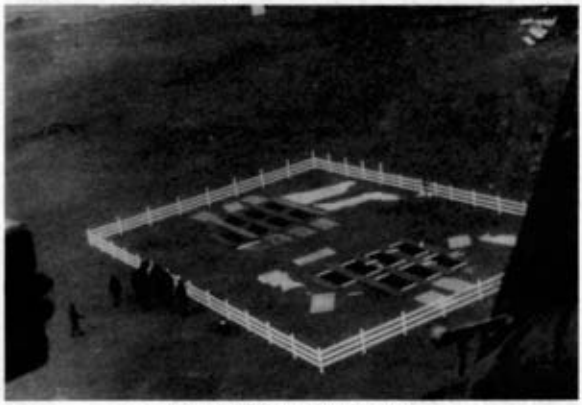

Photo 8. 3 Fd Sqn work on Cemetery

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also tasked with the construction of an engineer maintenance complex for the airfield. This comprised three SPANDREL ORBITT and two RUBB HANGARS each of 20m diameter. Meanwhile 69 Gurkha Fd Sqn, as well as working on area clearance and camp construction, became expert on providing overspill office and living accommodation throughout Stanley. The British Force HQ, the Joint Civil/Military Hospital, the local school and the Logistic Battalion were amongst those that benefited. 3 Fd Sqn in addition to their major camp construction tasks prepared the Cemetery at San Carlos.

My period as CRE was one in which I developed a great pride and respect for the ability, ingenuity and skill of Sapper Units and individuals. This respect and confidence was shared by both the military and civil administration on the Islands to a somewhat embarrassing degree. They were confident that nothing was beyond our scope whether it was a permanent strategic airport or a major radar site. It was flattering but VIPs could take away the wrong message! It was also a time which brought home to me why we maintain our professional engineer abilities and why the field squadron needs integral tradesmen—not always obvious during my frequent BAOR service. It was also a time for being grateful that the Corps had retained many equipments and items of plant that over the years of stringency were justified on the grounds of past experience and a "gut feeling", as they could not be fitted into one of the popular scenarios. The tasks we undertook were rarely limited by numbers of unskilled manpower. The critical path ran through the skilled tradesmen available, or the delivery rate of crushed rock, or the number of concrete mixers or the number of dracones and pillow tanks. A far cry from my previous experiences.

PART 2. THE AIRFIELD

LIEUT COLONEL P R IEVERS BA, RE

INTRODUCTION

In April 1982 plans were drawn up in MOD for the development of Stanley Airfield on the cessation of hostilities in the Falkland Islands. Based as they were on past engineer reports and the RAF requirement as seen in the United Kingdom at that time, many changes had to be made in the following eight months. These changes, however, could not be dramatic as they could only be accepted if they could be achieved with the stores ordered in April and May and unloaded by 11 Field Squadron in July 1982. That the airfield could be developed so quickly commends the engineer planners while the Task Force conducted its operation.

In July the airfield was a sea of mud. The runway craters had been temporarily repaired by the Argentinians and they now needed to be dug out and capped if the tenuous Hercules link with Ascension Island was to be maintained. The security of the Falkland Islands was still dependent on air defence cover afforded by aircraft of the Fleet and there was a pressing need to provide facilities for land based Phantom aircraft at RAF Stanley. The highest priority for engineer work was given to development of the airfield to reduce the Commanders dependency on the Fleet and its retention in the South Atlantic.

AIM

The aim of Part 2 of this article is to describe the development of the Stanley Airfield in the period July to December 1982.

THE REQUIREMENT

The existing runway had been built in 1977/8 to a specification of LCN 16 approximately in an area where the July water table was nowhere deeper than 0·3 metres and where peat bogs are interspersed with rocky outcrops. The runway was 4100 feet long, its 75mm tarmac surface pockmarked with scabs as well as four Harrier and one Vulcan bomb crater. It had been used almost continuously throughout the War for Argentinian C-130 operations and it had provided an essential life line for British troops ever since.

Although few bombs hit the runway itself craters proliferated elsewhere; tracks

Photo 9. The Airfield in late July 1982

generally were impassable to anything but high mobility vehicles; drainage ditches could not compete with the heavy rains and snow; vehicles, aircraft and equipment destroyed during the War littered the area; every drier space was taken for tented accommodation; some 50 000 tonnes of engineer stores from the airfield package, AM-2 pallets, geotextiles, and hangar components, covered every other flat area.

In May 1982 50 Field Squadron (Construction) were given orders while still in the United Kingdom to construct an expeditionary airfield using American aluminium matting (AM-2) on the site of Stanley airfield. But as peacetime regulations began to bite so requirements changed. Nevertheless the overall direction was little altered. The requirement included:

(a) A runway of 6100 feet, LCN 45.
(b) Five rotary hydraulic arrester gear (RHAG).
(c) An enlarged apron, five times greater than the existing one.
(d) Three dispersal areas, two for Phantom and one for Harrier aircraft together with hangar accommodation (RUBBS).
(e) An Engineering Wing complex including five hangars (SPANDREL).
(f) Dispersed fuel storage and a ship-to-shore pipeline.
(g) Road access around the airfield.
(h) Sufficient power for runway lighting and other facilities.

The initial development of the airfield was carried out in three phases:

(a) *Phase I.* Repairs to and strengthening of the existing runway to allow repeated use by C-130 aircraft.
(b) *Phase II.* Provision of RHAG to permit Phantom operation in the event of hostilities starting again.
(c) *Phase III.* Extension of runway to 6100 feet, with an enlarged apron for C-130 tanker aircraft and one dispersal with two RUBB Shelters.

It was on completion of this third phase that elements of the Fleet could be released.

UPGRADING THE EXISTING RUNWAY

The repairs of craters on a runway would not generally cause problems to a Construction Squadron trained in airfield damage repair techniques. In the Falkland Islands however there were no ready stockpiles of crushed rock upon which to

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draw; inadequate repair facilities put an even greater strain on an 8000 mile spares lifeline; and the weather could only be described as appalling, high cold winds with accompanying sleet and snow preventing work on many occasions. It was in such a setting that 50 Field Squadron (Construction) began work as soon as the last C-130 had departed on the evening of 15 August.

By 0500 hours the next morning the Harrier bomb craters had been repaired. The Vulcan bomb crater, however, took longer as it had been filled previously at a depth of 1·5m with rubbish, vegetation and topsoil. Having dug out and removed this waste material, it was backfilled with sand onto Trevira and compacted in layers, the final 150mm being compacted fine (0-40mm) aggregate. The width of the crater was some 35m and conventional screeding was not possible. A six bay screed beam, towed by a HWT (Heavy Wheeled Tractor) assisted by a MWT winch, was required. This method failed to achieve the necessary tolerances and hand working was required. Indeed final levels throughout all phases of construction were generally achieved by hand. The finished surface was capped with Terram to prevent the egress of water in anticipation of the AM-2 surfacing.

Each end of the runway fell away so sharply that the proposed extensions would demand much excavation in areas where the water table was at the surface. The last 37.5m at the western end and the last 5m at the eastern end were removed and regraded to a new level to minimise future earth works. The operational readiness pad at the eastern end required excavation outside the original alignment and here the peat was deep. The wisdom of removing all the peat before backfilling with sand and crushed rock was soon evident.

By 19 August preliminary works were completed to allow AM-2 laying to commence. Experience gained in training over the previous week had shown that a laying party could only work efficiently for three hours and would require some six hours rest, this was increased to nine hours to include travelling time. Eight mixed troops, with Sappers and Infantrymen together, were formed to permit continuous work with two troops deployed at any one time. Specialist setting out and electrical parties were also established to match the AM-2 laying rates.

The laying of AM-2 is a simple and repetitive process, but there is no doubt that many techniques for rapid laying can only be learned from experience. As the speed of laying was so dependent on the weather, with winds in excess of 30 knots making even an AM-2 plank a missile, comparisons of a troop's performance can be misleading. Nevertheless the achievements of "Tin Troops", each of a commander and twenty-six men, are shown on Table A.

Photo 10. Laying AM 2

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Troop	Area in sq ft in 3 hrs					Average
A	3504	10944	17088	7020		9639
B	12864	13440	17112			14472
C	15984	12120	17649	17088		15710
D	11136	9972	12174			11094
E	9096	12516	10464	7800	10584	10092
F	10904	12276	10476	8088	12540	10584
G	11904	12276	10476	13907	(6768)	12140
					Overall Average	11742

TABLE A : AM-2 LAYING RATES

Despite losing thirty hours because of the weather, the problems encountered at the western end, rather than the laying of AM-2, delayed completion to the evening of 27 August. Although the airfield was open on 28 August, bad weather denied a landing until 29 August. Phase 1 was complete.

THE RUNWAY EXTENSION

Whereas repairs to the original runway required only little crushed rock, first estimates for the western extension alone were in the order of 25 000 tonnes. In the event more was used and progress was totally dependent on the quarry and crusher operations which will be examined later.

Peacetime operation of Phantom aircraft required a 6100 foot runway with four RHAG, a dispersal area and an enlarged apron. The alignments of the extension and apron were predominantly over peat and sand with a high water table and much surface water. The North West dispersal was more favourably placed from an engineering point of view, but with a westerly prevailing wind it was not ideal from an RAF point of view. Nevertheless as other sites required so much excavation of peat and rock, early completion of one dispersal area became more important than optimum siting.

The alignment of the extension included two Vulcan bomb craters so early preparation of a drainage system, albeit temporary, was essential. Access to the extension was also limited to very few tracks and there was no spare capacity either of stone or plant to construct other haul roads. This together with a relatively slow output of aggregate dictated progress.

Pavement design had to be amended to match both the size of aggregate that could be economically crushed and plant operator skills. A typical cross section is shown at Figure 1. Sand laid and compacted in 250mm layers matched design compaction specifications. It proved impossible, however, to meet density specification

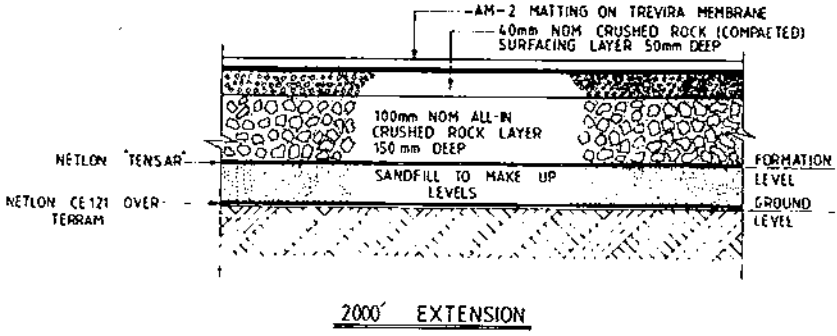

Figure 1. Typical cross-section of runway extension

Photo 11. The use of geotextiles on the runway extension

for the aggregate layer and a compromise of 90% was agreed. The use of Netlon Tensar SS1 was desirable to increase the tensile strength of the pavement and to reduce excessive loss of hard-won stone into the sand layers below.

In time plant operator skills improved markedly and the tolerances became easier to achieve. Despite this a heavy load was placed on a few experienced grader operators. Design tolerances are shown in the Table B.

Original Boscombe Down Tolerances		Amended Criteria	
Amplitude ins	Wavelength ft	Amplitude ins	Wavelength ft
1	12	1	12
2	25	2	50
4	150	2½	125
8	250	7½	250
11	350	12	400

TABLE B : RUNWAY TOLERANCES

It is of interest that in places the original runway does not match these criteria!

It is perhaps timely to digress to discuss alternatives to the selected pavement design. Soil Stabilization had been considered for all pavement surfaces and it was trialled. Sand could be won easily, despite the need first to clear the mines in the sand dunes of Yorke Bay. However the single size nature of the sand, its salt content and the low ambient temperatures combined to frustrate this option. A further short trial in the Falklands summer proved moderately successful. Provided alternative compaction rollers are made available there may be scope to use soil stabilisation for some future tasks.

ROTARY HYDRAULIC ARRESTER GEAR

The design called for the installation of RHAGs at either end of the runway. As the runway was developed in stages so it was necessary to install the RHAG at the

end of the runway at each stage. In the event, although only three American and two British RHAGs were to be installed finally, it was necessary to prepare for their installation at six points along the runway.

Major problems were encountered because of the high water table, appalling weather and initially a lack of experience in using de-watering equipment. Provided this equipment was installed correctly and placed close to the site to be excavated, the LWT backactor could be used. Invariably the sides of the 2m deep trenches would collapse, despite the use of damaged AM-2 planks as shuttering, and Sappers had to dig out as much as a metre by hand. Mass concrete provided the anchorage so this activity competed with the runway pavement for aggregate. In August and September, however, freezing temperatures rather than the availability of stone dictated progress. Once the anchorages and tie bars were installed, the assembly of the superstructure caused few problems. It was however fortunate that a third British ERHAG was available to use as a spares pack. Most of the defects, which have been reported, appear to have resulted from inadequate protection from the damp in storage.

After working for more than two months in mud, gale force winds, snow, sleet and hail it was with some satisfaction that men of 3 and 50 Field Squadrons witnessed the arrival of the first Phantom on 18 October, as it successfully took an American RHAG. There were some failures but none, fortunately, disastrous. The most dramatic, when the tape snapped, was witnessed by the Minister of Defence!

THE QUARRY AND ROCK CRUSHING OPERATION

Engineer work on the airfield and to some extent elsewhere was totally dependent on the success of the quarrying and crushing operation and this dependency will continue. At the start command of rock production had rested with the major user 50 Field Squadron (Construction) reinforced by two field troops from other squadrons. It was soon evident that the span of command was too large and it was decided to give responsibility to the Support Squadron, whose plant and dump trucks and the majority of operators and drivers were committed to this operation. As the demand for crushed rock increased to 1000 tonnes and more per day, 60 Field Support Squadron with two field troops, one responsible for drilling and another to operate and maintain the two crushers, found it increasingly difficult to manage, in addition, the resources for the countless other engineer tasks and improve plant serviceability. The arrival of the extra field squadrons for the Falklands Summer months provided the option of reoganization and 24 Field Squadron became responsible for rock production.

In July when movement off tracks was all but impossible and when there was no material with which to construct others, the two Goodwin Barsby Goliath crushing

Photo 12. A Phantom takes the RHAG

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Photo 13. Drilling in the second quarry

plants were dragged to the first rocky outcrop North of the runway. Here a temporary quarry was established with a view to the production of material for a haul road towards the old quarry at Mary Hill. The temporary quarry could only develop a face of some 4m and hence each blast gave up but hundreds of tonnes of rock. Unfortunately such was the priority to use rock on the airfield rather than for access to a better quarry, that the first site had to be used for far too long. On 25 August the second quarry was opened up, or rather re-opened as it had been the site used by Johnsons, the contractors who had constructed the airfield. It was now 3m deep in water, into which all manner of ammunition had been dumped. Above the quarry Argentinian defensive positions were still evident. After four days pumping and then clearance by the EOD squadron, this quarry offered some prospect of

Photo 14. The twin crushers

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meeting the production requirements from its face of 10-12 metres. It was at this stage that 60 Field Support Squadron took responsibility for the operation, but whereas now there was plenty of rock it was serviceability of equipment which determined the rate of progress.

The two Atlas Copco 301 drills were the first critical equipments. They had to work at all hours to keep pace with the crushing plant. When they failed, production stopped. The drilling teams had had but one day's training on the equipment in the United Kingdom and there was no one experienced enough to commission it correctly and with the runway closed there was no chance to bring in that experience. It was, therefore, with some relief that an Atlas Copco representative arrived on 29 August together with additional drills including two larger 601. He was able to correctly commission the latter and advise us how to improve the serviceability of the 301. Lack of experience with the equipment contributed to its failure, but the use of "Kilfrost" as a lubricant was identified as a major factor. Despite the bitter cold wind the ambient temperatures had not been low enough to justify its use. The other lesson learned was the need to clear the quarry overburden completely before attempting to drill. Plant shortages, strict deadlines and the conditions at the top of the quarry face often demanded a compromise and drilling often had to be done before the quarry top could be fully prepared.

No sooner had the pressure on the drilling teams been relieved than it was transferred to the crushing troop. As blasted rock production increased, so the wear on crusher jaws, and later the unserviceability of the crushing plant, increased. The rock is a fine grained quartzite, hard, (metric hardness scale 7) and very abrasive (initially value 3) and the standard crusher jaws just could not cope. Some twenty crushing hours might be expected of them and despite the sterling work of a willing team that worked in shifts by day and night to rebuild them, the crushing plant had to stop to wait for jaws. Unfortunately the life of a rebuilt jaw was often as little as six hours and as each took twenty-four hours to repair, the need for an alternative jaw was clear. Delivery of extra hardened jaws significantly eased this problem. As with the Atlas Copco drills there were few with much practical experience of Goodwin Barsby equipment and as the rate of crushing increased more faults developed. It was necessary to call for the Goodwin Barsby representatives to commission,

Photo 15. The quarry floor

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belatedly, the plant and to offer advice. In particular they reduced conveyor belt wear, simply by altering the setting on the running rollers beyond that specified in the manual, and more importantly imparted greater confidence to the maintenance teams assigned to the equipments. Morale of those working on the airfield soon became directly proportional to the noise level of the crushing plant.

It was not just upon these new equipments that this operation was dependent but also the bucket loaders, tracked tractors and the haulamatic fleet. Drivers and operators and particularly the C vehicle workshop worked unceasingly to meet the demand for rock. The MWT fleet, ten Allis Chalmers and three Terex, was severely tested and by early October the old Allis MWT's were found to be wanting. Spares could not be delivered fast enough; with bucket teeth lasting no more than ten hours and tracked tractor cutting edges only six hours, this was not surprising. A review of the quarrying operation was carried out as the third quarry was developed, to reduce the movement of all equipments in the quarry in an attempt to minimise the damage being caused by the abrasive rock. Nevertheless by dint of the industry of all supporting this operation, in early December in excess of 100 000 tonnes of crushed rock was produced and delivered to engineer projects throughout the Islands.

PART 3. ACCOMMODATION

LIEUT COLONEL J W R MIZEN C Eng, MI Mech E, RE

INTRODUCTION

For those of us in the Military Works Force at Barton Stacey, initial planning for accommodation in *OP CORPORATE* began within hours of the invasion of the Falkland Islands. The first task was to recce a 3000-man staging camp on Ascension Island, but as described by Major Peter Hill in his article (December 82), the *QE2* was requisitioned and conveniently fulfilled that requirement. Planning therefore shifted to designing camps in the Falkland Islands, well before the Task Force sailed from Ascension.

After a great deal of discussion with HQ E-in-C and a number of false starts, accommodation in the Falkland Islands was designed to the following general criteria:

(a) Huts were to be used to accommodation scales usually associated with tented camps (Scale A). This scale gave the amount of space per person, number of toilets, showers etc.

(b) Hot water was to be provided for washing and showers only and none for cooking.

(c) Interior lighting was to be to normal standards with no street nor security lighting.

(d) Cooking was to be by American M59 petroleum stoves.

(e) Water supply was to be at an assumed consumption of 150 litres/head/day.

(f) Waterborne sewage was to be provided.

In May 1982 the Director of Engineer Services tasked the Military Works Force with designing two camps to accommodate 800 men and seven camps to accommodate 200 men. Design was to proceed apace so that procurement action could be taken in order for the stores to be on board ships leaving UK on 10 August. This was a formidable task especially as the design process was somewhat hampered by not knowing where the camps were going to be located and what facilities could be relied on. Wisely the camps were designed to be totally self-contained, even to the extent of pumping sewage away from the area. The previous year, after much blood sweat toil and tears, MWF had produced a key document uncharismatically called *Accommodation in the Field*. Despite the rather turgid title, this report contained a wealth of nitty gritty detail about the vast spectrum of equipment which is required for self-contained camps. It provided the springboard for Clerks of Works to start the design process by having discussions with manufacturers. The end result of their Herculean labour, which had to be within a fixed budget, was quite simply:

(a) A range of detailed drawings on an assumed camp layout.

(b) Stores lists down to the very last item. (With an allowance for spares and wastage).
(c) A specification of how the work was to be undertaken on site.

The majority of the design work involved electrical and mechanical engineering and it was not surprising therefore that 64 CRE (E&M) bore the brunt of this work. Except for a few long lead-time items, it is a credit to those involved in the whole design and procurement process that most of the equipment was loaded on the required shipping by the deadline of 10 August 1982.

EQUIPMENT

Power Generation. The Ministry of Defence directed that containerised 255kW Dale generating sets would not be available for use in camps and that civil manufacturers should be consulted concerning suitable generators. The electrical loading schedule made it plain that 250kW sets would be required for the 800-man camps and 150kW sets should be used for the 200-man camps. As often happens, the market dictated the choice by what was available "on the shelf" in the timeframe; only two Procurement Executive approved manufacturers were found to be able to offer suitable equipment:

(a) Dales who provided the 255kW sets. (fourteen in all).
(b) Hawker Siddley who provided 112kW sets which were the only sets available in sufficient quantities. (forty-two in all).

Both of these sets were driven by high speed engines (1500rpm) and were designed for single running only. They were modified for parallel operation by the fitting of a set of synchronising lamps but still had several drawbacks requiring manufacturers and on site modifications. The sets were housed in specially adapted prefabricated "Pakaway" buildings.

Buildings. A range of buildings were selected for the various requirements. These were:

Offices & Living Accommodation—Portakabin Type 322 or Wyseplan units.
Messes & Medical Centres—Portakabin Type 024 or Wyseplan multisectional buildings.
Workshops, Kitchens & Power Stations—Pakaway prefabricated buildings.
Showers/Urinals/WCs/Washbasins—Portaloo Type 720 or 480.

Water. Pumps were selected to take water from the source to "Hydroglas" sedimentation tanks. After assisted sedimentation, with an aluminium hydroxide floc to remove peaty colouration, the water was treated and filtered using standard Water

Photo 16. The Portakabin stockpile covered several acres alongside the Airport road

Photo 17. The camps are self contained with their own sewage disposal plants

Purifying Units and then stored in further Hydroglas tanks. Several kilometers of layflat hose was ordered as it required minimal shipping space, was easy to lay, and the distances from source to campsites were unknown. Booster pumping sets supplied water under pressure to the camp ringmains, instead of elevated water towers which would have been very time-consuming to construct.

Sewage. Ejector stations were procured to enable sewage to be pumped away from the camps and discharged into the sea via layflat hose.

Electrical System. To overcome problems caused by high winds, distribution was to be underground via 95mm^2 main cables to centrally located 18 or 12-way fused distribution pillars and thereafter by 16mm^2 cables to individual buildings. This eliminated the need for any underground jointing. In the 200-man camps, the distribution was at low voltage but 11 000 volt distribution was selected for the 800-man camps because the camp locations were unknown and could have been spread over a wide area. In the event this proved a wise choice because distribution to loads up to 10km from the power station could be undertaken. Power was generated at low voltage and controlled from containerised switchgear; this switchgear had been manufactured by GEC from a prototype built by members of 64 CRE (E&M) during the conflict in another example of "hot design"! Outgoing feeders were taken to two 800kVA 415/11 000 volt transformers which in turn supplied four ringmain units rated at 500kVA.

WORK IN THE FALKLAND ISLANDS

A Military Works Area controlled by CRE (Works) Falklands had been declared in June 1982 and most of the RE work up until mid-October 1982 had concentrated on completing the 2000-foot runway extension at RAF Stanley for the arrival of the Phantom aircraft. It was heartening to see that almost all those who were involved in the camp design work at Barton Stacey volunteered to come down to the Falkland Islands to put their design into practice—motivated no doubt by the thought of all those terse signals which would come back from those in the field questioning designs! A changeover of CRE (Works) personnel from those war-weary veterans who had come down on *QE2* (and who insisted on showing you their trenches at every opportunity) took place in September/October 1982. At this time CBFFI staff had also just decided on force levels and an outline deployment, so it was vir-

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tually a new team which took on the challenging task of redesigning the camps with those stores which had survived the hazardous journey to Resources Troop in the Theatre Depot. Reality is that the stores sent from UK suffer greatly from multiple handling by the time they arrive at the Theatre Depot, universally known as "Tin Strip", (after the old Argentinian AM1 aluminium plank runway which blew away one night in a gale). They also suffer when there is no covered accommodation for sophisticated electrical and mechanical stores like circuitbreakers and engine spare parts. Early on in the construction, the CRE, Colonel Brownson, generously responded to a *crie de coeur* and allocated much sought after stores and labour to construct a building for these crucial items, but a lot of damage had already been done. It surprised no one when it became clear that no 200-man or 800-man camps as designed were ever going to be built; in fact the occupancy ranged from 80 to 400 men.

General Thorne, Commander British Forces Falkland Islands, gave a clear directive that all camps were to be finished and occupied by the end of April 1983. This forced a somewhat abbreviated redesign process; there was no time for the Staff to produce Q briefs or for the procedure outlined in JSP 358 to be rigidly adhered to. As happened throughout the campaign, hot planning was required. Briefly the process was that G4 identified the approximate location for a camp detailing the units to be accommodated and CRE (Works) undertook an initial recce. The following were main factors in siting the camps:

(a) Large reasonably flat well drained area.
(b) Suitable material to build on with a minimal peat layer.
(c) An all year round adequate supply of water.
(d) Access by sea for off-loading of construction stores and replenishment by Mexeflote.
(e) Suitable sewage disposal area.
(f) Agreement by local landowners.
(g) Suitable for fuel resupply from ship to shore.
(h) Protection from worst of weather.

In the Falkland Islands such sites just don't exist and a compromise has to be reached.

Once possible sites were identified, the units to be accommodated were consulted to determine their requirements. These requirements were then balanced against scaled entitlements and band practice rooms, lecture rooms, powder rooms etc rejected or combined with other functions. The Defence Land Agent obtained clearance with the land owner whilst the detailed recce was carried out; this was undertaken by a Clerk of Works of each discipline with assistance from CMTS (Construction Material Technician) and Surveyors. A site plan and camp layout was then drawn up by the Clk Wks (C) in consultation with the Clk Wks (E) and (M) and passed to G4 for approval.

The plans acceptance meetings were chaired by G4 with CRE (Works), the DLA, the Environmental Health Officer and occupying units in attendance. After much discussion and often heated words, CRE (Works) plans were accepted and approved (usually without change!). This lulled us into a totally false sense of security and detailed specifications were enthusiastically drawn up; at some later stage perfidious G4 would change the requirement, but this eventually became recognised as an essential ingredient to Falkland Island design work!

At last plans were finalised and stores outloaded by the Squadron responsible for construction; the Clerk of Works who had designed the camp was also required to assist with supervision on site. At about the 90% completion stage satanic G4 would then hold yet another meeting and the true occupancy figures would come to light with further changes required to the design. Stores shortages were always a crucial factor in construction because of damage and losses in shipment—changes just accentuated the problem, but Engr 4 and Engineer Resources backed us up magnificently.

Photo 18. A camp well underway

Commissioning the equipment and checking the buildings for electrical safety was the final phase of construction and this was the responsibility of CRE (Works). As often happens in civilian projects, the time allowed for commissioning was condensed dramatically as we were pressed by the Staff to complete camps ahead of schedule. At the time of writing (February 1983) three camps have been completed, with four more to be completed by the end of April. For obvious reasons the deployment must remain classified but the camp construction programme must be one of the major achievements of the Sappers since World War 2. Captain David Ronksley and his STRE made an outstanding contribution to the success of this venture.

Photo 19. Part of Company size camp under construction

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COASTEL

It became quite clear early in August 1982 that the force levels in Falkland Islands would be in excess of the 3000 men for whom accommodation had already been planned. The consequence was that a new word entered the military vocabulary—Coastel, which is a fully self-contained floating accommodation vessel for use in inshore waters. It is designed to be moored alongside the shore giving a walk-on, walk-off facility. The vessel which was chosen, *Safe Dominia*, was a large flat topped barge (100m × 30m) on which was built a multi-storey accommodation block comprising bedrooms, toilets, recreation rooms, kitchens, and dining rooms, all made up from modules based on ISO containers. Power, heating, fresh water, sewage disposal and laundry facilities were all provided on board. Clearly this was a very attractive method of providing an "instant" 930-man camp; however there was a degree of false optimism about the amount of engineering work involved in the phrase "moored alongside the shore" as we were soon to find out!

The scope of work was somewhat daunting:

(a) Construction of 1·7km of road across peaty terrain to the proposed mooring site and an additional 500m of access road at the site itself.

(b) Construction of a berthing face for the vessel to withstand design wind loading of 56m/s (100kn). This was judged to be about 300 tonnes horizontal force.

(c) Construction of six permanent mooring bollards, of which four had to take 100 tonnes and two were required to take 50 tonnes.

Almost as an aside, the work was required to be completed within seven weeks, but challenges like this are the essence of the Falkland Islands scene. It had been proposed to use piles for the vertical face of the berth, but a recce of the site revealed bedrock and another solution had to be found. Compounding our problems was how to provide four 100-tonne moorings in ground which was half peat half clay. The conventional solution of buried baulks was not practicable; even if each timber baulk could take ten tonnes, we did not have enough timber and thirty trench excavations would have been an untidy solution. On a black day when we were mulling over these two problems we learned that there was not enough reinforcing steel in the Resources Troop, nor could enough be made available except by flying out massive quantities on the airbridge. Engineers are required to be problem solvers and the following solutions eventually found:

(a) A vertical face could be made by cantilevering out two sets of horizontal piles at different elevations above sea level to which vertical piles could be attached with the bases being dug into the sea bed. Shuttering could be fixed to the vertical

Photo 20. The COASTEL road

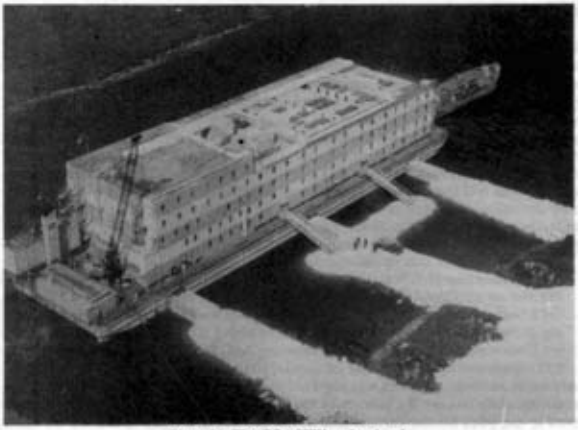

Photo 21. The COASTEL safety berth

piles so made and concrete placed behind this to make a groyne. Three such groynes would withstand the design horizontal forces.

(b) A 100-tonne Falkland Island patented anchor could be made by burying a twenty foot ISO container in the ground and filling it with concrete. Containers were made available and 100-tonne bollards, which were subsequently sent down by the Ministry of Defence, were bolted to the reinforced concrete base.

(c) Resources Troop 60 Field Support Squadron did not hold enough reinforcing steel for the design of this bollard and container anchorage, so a friendly Falkland Islands Government store was persuaded to lend us their entire stock. Still there was not enough steel and soldiers were sent out into the highways and byways to scour the countryside and acquire (RAS in Falkland Island slang) steel. Surprisingly this made all the difference, but only just.

It would be impertinent to go into the detail of the construction work which was gallantly undertaken by 30 Fd Sqn RE, who will no doubt be persuaded to reveal their own unexpurgated story. CRE (Works) was required to produce the designs and also supervised the quality control. It all sounds very cosy but many is the morning when we expected the CRE (Works) officer on site, (Major David Willatts), to suddenly disappear in a concrete overcoat, courtesy of 37 Engineer Regiment! Even when the construction was finished it was a combined service effort and feat of seamanship to get a five-storey accommodation block up the Canache Channel with centimetres to spare either side but that's another story in itself. It required a cool nerve, for which the Royal Navy are renowned, and windless conditions, for which the Falkland Islands are certainly not renowned, to complete the manoeuvre.

CONCLUSIONS

The role of the Royal Engineers has been crucial in the rehabilitation phase of the Falkland Islands campaign; the sheer numbers involved speak for themselves. Defence policy and hence the General Staff planning, have relied on the expertise of the Corps, particularly as tradesmen, in this period. In CRE (Works) we were responsible for the quality of a vast amount of construction work and offer the fol-

lowing thoughts as a result of five months work here:

(a) In April 1982 the Corps was in danger of not having enough practical experience of engineering at Officer, Technician and Tradesmen level. The situation has now changed but could easily slip back again, with the spectre of the Corps becoming high grade pioneers.

(b) There are not enough technically qualified Royal Engineers for indefinite manning of a Military Works Area.

(c) STREs should be multi-disciplined with Civil, Electrical and Mechanical expertise.

(d) None of us would have missed the experience although there were many moments when we had our doubts!

PART 4. BATTLE AREA CLEARANCE
LIEUT COLONEL A HOWGATE RE

The first post operational EOD task was to carry out Battle Area Clearance (BAC) in Stanley to minimise the risk of casualties. The scene was one of potentially lethal confusion in that there was a wide variety of all types of Unexploded Explosive Ordnance (UXO) scattered about in profusion. Exocet and Roland missiles were lying in ditches along the airfield road with mortar bombs, grenades, shells and a variety of ammunition strewn everywhere. Stanley itself was a vast ammunition dump. Garages were full of UXO including Cobra and SAM 7 missiles; mines and chemical munitions were also all too evident.

Some of the Settlements were in a similar state. Thousands of mines were stockpiled in the sheep shearing sheds of Port Howard and Fox Bay and there was an ammunition ship aground in Fox Bay East. At the start the volume and variety of UXO involved, some of it in an extremely hazardous state, was daunting. It was difficult to believe that either civilians or soldiers would be able to survive in such an environment without taking more casualties while initial BAC was being carried out.

An RAF team completed initial surface clearance of the airfield and Royal Navy

Photo 22. Typical finds

Photo 23. Clearance in Stanley

divers commenced work on under-water hazards. RAOC ATs and ATOs were kept fully occupied in dealing with a wide variety and huge quantity of bulk ammunition. The Detachment of Bomb Disposal Officers (BDOs) and BD Engineers from 49 EOD Squadron together with other Sappers, including a Search Team from 3 Squadron and an Infantry Search Team from the Queens Own Highlanders, set to work.

A Joint Service EOD Operations Centre (JSEODOC) was set up to co-ordinate EOD, record the clearance and provide EOD advice initially to the G3 staff and

Photo 24. NAPALM

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Photo 25. OC 49 EOD Detachment disposing of a bomb

then later to the CRE. The first priority was to clear Stanley and the Settlements in order to allow some degree of safe movement and a more normal existence for all involved. The combined Sapper force got on with clearing Stanley including dealing with a variety of booby traps. The value of primary search training and equipment was soon demonstrated. Work also continued on and around the airfield.

The weather was harsh in August. Snow and wind being the major problem as far as EOD was concerned. However everyone, whatever Service or cap badge, pulled

Photo 26. Battle Area Clearance (BAC) Darwin Road

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together and got on with what is a very practical business. There was a tremendous sense of achievement and teamwork on the Islands. Stanley and the Settlements, including Goose Green, Fox Bay East, Port Howard, Dunnose Head and Pebble Island, were cleared by the end of August. BDOs were dealing with aircraft bombs throughout the Islands including some of British manufacture which were used by both sides.

The second priority was to clear areas essential for a variety of military and civilian activities. These included access to farms and the ground immediately around the Settlements. The Settlement managers and indeed all the Islanders helped wherever they could by reporting UXO and abiding patiently by the restrictions which had to be placed on movement. It is largely to their credit that since 17 June 1982 no Islander has been injured by the detonation of an UXO.

The minefields present a particular problem. One lesson here is that minewarfare in an operational situation when risk is acceptable and breaching is the most likely task is significantly different from BAC. In the latter a high degree of clearance at a high level of assurance is usually required with no risk either to those clearing the minefields or to anyone entering the area subsequently. In the case of the Falkland minefields it was decided to identify, mark, fence and record them pending development of new clearance equipment. 69 Gurkha Independent Field Squadron were given this task. They worked at it for four months starting with the minefields closest to Stanley. The Squadron then moved west to locate and fence the minefields which had been laid around the main defensive hill features made famous during the Campaign. H-Troop in particular worked hard at this hazardous and demanding job fencing over thirty minefields and signing and reinforcing the fences on many others.

The remaining EOD task in the Falklands has yet to be accurately defined. It will include responding to UXO finds and instrument search prior to any form of excavation. BAC will continue and will include clearing minefields at some stage.

Few if any new lessons in Bomb Disposal have been learnt in the Falklands. Some old ones have been re-emphasised and absorbed in the form of experience which will be spread throughout the Corps as postings take the BDOs and BD Engineers involved to other Regiments on posting. The main difficulties experienced over the last year stem from the distance involved. Timely exchange of relevant information is difficult when communications are limited and the situations and pressures at each end of a very long link are diverse.

In conclusion the BDOs and BD Engineers of RHQ, 49 EOD Squadron and the TA PSIs of 33 Engineer Regiment (EOD) have all contributed to rehabilitating the Falklands. None of them are named here since it would be invidious to mention some and not others. They have achieved a great deal in a short time by safely clearing nearly two million UXO of over sixty types.

* * * *

RE Museum—Falklands Exhibit

THE Falklands Exhibit in the RE Museum includes some very interesting items. More would be very welcome.

Human Behaviour: The Key to Leadership?

BRIGADIER H F EVERARD BA, FI Plant E, FBIM

The author has just retired as Comd Engr Sp. He enlisted into the Corps in 1946 and was commissioned in May 1947. After service in Korea and Malaya he attended the Staff College, Camberley. In 1964, off to Kenya to command 34 Indep Fd Sqn followed by a course at the US Armed Forces Staff College. Elected a member of the AG7 "Club" in 1967 thence to be CRE Gulf. He then filled an appointment as a DS at the Canadian Staff College prior to becoming CRE 3 Div UK in 1974. He notched up his fourth Staff College as Dep Comdt Ghanaian Staff College before returning home as Comd 30 Engr Bde.

His article attempts to encapsulate a number of current theories on human behaviour and it may serve as a useful last minute refresher for examination candidates.

Introduction

Whilst serving on the Directing Staff of the Canadian Forces Staff College at Toronto I found that the College approach to the subject of leadership was interesting, controversial and clearly accommodated the different viewpoints of all three environments represented in the faculty and student body, ie land, sea and air. Certainly on a subject as nebulous as leadership one cannot afford to be too doctrinaire; indeed there were many strongly held and divergent views amongst both the staff and students, nevertheless the general consensus was that the human behaviour approach offered the greatest promise of a universal acceptance and understanding.

In this article I have attempted to draw together as concisely as possible a number of the more important ingredients which were discussed in the leadership package presented at the College. As I left Canada in 1974 I am in some danger of being dated as regards the current course content, however I believe that most of what I say still has validity in any discussion on leadership.

I have taken the liberty of interspersing some of my own subjective views among the more enlightened theories of a number of eminent and internationally recognised sociologists. In the preparation of the article I have drawn heavily on the pamphlets and other instructional material used at the College. Hopefully the bibliography covers all the sources used, if not, I apologise in advance for any non attribution.

The Traits Theory

I feel obliged to start with a quotation or two because whilst areas of common agreement on leadership theories are rare there is no shortage of definitions. In fact there exists a plethora of such definitions with one thing in common; they all reflect the great sagacity, understanding and leadership qualities of the author, or so he would have us believe.

Brigadier H F Everard BA FI Plant E

"The capacity and the will to rally men and women to a common purpose and the character which inspires confidence." Montgomery

"Leadership is the projection of personality. It is that combination of persuasion, compulsion and example that makes other people do what you want them to do." Slim

"The art of influencing human behaviour so as to accomplish a mission in the manner desired by the leader." Unattributed

And so it goes on. There is one thing of which you can be sure; an officer may be quite unforthcoming when he is asked for his views on other military subjects but solicit his ideas on leadership and he will defend to the death his divine right to inside knowledge on leadership skills. We all have our opinions and most of us express them with some conviction. However, how many of us when pressed would have to admit that our views are based on superficial knowledge and that we have not studied the subject in any depth. I suggest that most of us would have to concede this point.

For many years the traditional approach to leadership has been identified with the concept of personal traits. Illogically most of the traits studied have been those of the leader only and attempts have been made by such studies to distinguish a leader from the rest. Needless to say such theories are difficult to prove or disprove. For every trait one can identify in the make-up of a successful leader one can produce another leader in whom that particular trait is lacking, thus proving nothing. In recent years these trait concepts have been subjected to a very close scrutiny and, whilst one cannot be dogmatic and dismiss them, it is apparent that there are other factors and influences which determine successful leadership. Whatever attitude one adopts I believe we must accept the basic premise that leadership deals with human behaviour and the inter-action of individuals. There is therefore a sound reason for a potential leader to have, firstly, a close knowledge of the people and the events with which he is involved and secondly, to develop an effective method of dealing with such people and situations so that the human resource at his disposal is directed optimally towards the attainment of an objective. In summary, therefore, leadership is a process of influencing people and is exercised flexibly permitting a leader to adapt to a variety of changing situations.

What I propose to do in this article is to discuss various aspects of leadership. I cannot pretend to produce a comprehensive discussion on the subject within the constraints of a relatively short article but hopefully those subjects I have selected will be sufficient to whet your appetite. The aim being to engender some controversy and feed-back. A lot of what I say will be philosophical but with an intangible subject like leadership this is unavoidable. I am aware of the dangers in this approach for, if I may generalise, military officers tend to be practical and react somewhat abrasively to theorising, particularly where the practical application of such theories is obscure.

Perhaps some of the views expressed will register and make some sort of pattern for each of you to confirm your own views one way or another or to formulate new ideas on the subject.

Perhaps the situational approach which I have already mentioned is not as far removed from the traditional point of view as would seem probable on first inspection. Field Marshal Slim's writings show that the imperatives of varying situations and the need to respond to the different qualities and capabilities of subordinates is important to the leader. This might also be interpreted as flexibility of mind and therefore this approach does not invalidate the trait concept completely. Other authorities are perhaps more dogmatic. Professor R M Stodgill, an American sociologist, states categorically that "a leader is not a person characterised by any particular and consistent set of personality traits". I consider that with an art such as leadership one cannot afford to be too categoric. God forbid that all artists or musicians should produce identical works: by the same token leaders must also use different techniques. To complete the analogy certain basic aspects of brushwork

and musical composition are common to most great works and perhaps we can best occupy our time by discussing those aspects of leadership which appear to recur in the majority of leadership situations.

The Elements of Leadership

As promised I shall resort to some philosophy and perhaps as good a point to start as anywhere is to compare two early philosophical traditions that impinge significantly on leadership theories. The first is that of a British 17th century philosopher called John Locke. This is often referred to as the "British" philosophy.

The other traditional philosophy is the "German" or "Continental". This was orginated by Immanual Kant, a German philosopher of the 18th century. The assumptions of the two philosophies are set out in Plate 1.

You will recognise in these principles many which have affected our lives in one way or another and they are basic to human behaviour. Because of Locke's emphasis on experience his disciples came to be called "empiricists". Whereas Kant's teaching by virtue of his stress on the dynamic qualities of the mind, and his interest in the will and emotions plus the demand for a more heroic ethic than happiness, indicates a greater degree of personal sacrifice by the individual. His followers became known as "idealists" or "voluntarists".

Both of these influences are important in the study of leadership but paradoxically certain styles of leadership incorporate features of both philosophies. For example the tradition of empiricism is evident when considering the requirements met in many aspects of training where a trainee is expected to respond to a given stimulus. On the other hand how often is a recruit enjoined to "think it out" or "work it out" for himself by using his insight and initiative; very much a Kantian approach.

The participative style of leadership, of which I shall say more later, adopts a Lockean technique to the extent that the leader communicates by operating on an intellectual plane. The participative style of leadership is even closer to the Kantian tradition where a leader persuades and encourages his followers. Here he is playing on the emotions and exerting his own will. Kant's teaching also influences the "free-rein" leader when he places his trust in the follower and relies on the follower's initiative and the exercising of his trained skills. He permits them to act independently and to dispense with the repeated stimuli that the Lockean or passive intellect would require.

From the little I have said I think you can see that these two approaches are different but not truly dichotomous. Each has some bearing on the training and performance of a leader and are useful guides towards behavioural imperatives.

The "British" Philosophy (John Locke)	The "German or Continental" Philosophy (Kant)
The use of Common Sense	Idealism and a Moral Imperative
The avoidance of logical extremes and paradoxes	The pursuit of logic even to extremes
Practical solutions to problems	Idealistic solutions to problems
Tolerance as opposed to dogmatism	The dogmatic presentation of truth
Knowledge as gained from sense impressions	Knowledge gained from intellect itself
The intellect as being passive but responding to external stimuli; not capable of spontaneous activity	The intellect as active, dynamic, impinging on and shaping the environment; capable of insight, independent of experience
The equality of men at birth	The importance of the individual
The importance of education as a factor in bringing about individual differences	
The avoidance of emphasis on will and emotion	The importance of emotional experience and the exertion of the will
The ethic of happiness as the chief end of man	The ethic of duty, striving and sacrifice as the chief end of man

Plate 1. Conflicting Philosophies

They are however open to criticism and I leave that to you.

I mentioned earlier that we had to accept that there are factors to be considered in leadership other than the study of the leader himself. However before leaving the one sided approach it is of interest that in 1947 at Ohio State University our friend Professor Stodgill undertook an analysis of a large number of leadership studies which had been made in the past. His general conclusions were that:

(a) The average person who occupies a position of leadership exceeds the average member of his group in:

(1) Intelligence.
(2) Scholarship.
(3) Dependability in exercising responsibility.
(4) Activity and social participation.
(5) Socio economic status.

(b) The qualities, characteristics and skills required in a leader are determined to a large extent by the demands of the situation in which he is to function as leader.

I have mentioned this study because this second conclusion leads directly to a discussion of the extra factors which should figure in any study on leadership. I am referring to the leader-follower-situation concept. Having tacitly accepted that a leader's traits cannot be the sole determinant of his success one might suggest that the pattern of his personal characteristics must bear some relationship, relevant to leadership, with the characteristics, activities and goals of the followers. Thus our concept must be irrevocably tied to the interaction of a number of variables related to the leader-follower-situation idea. The inter-action of variables imply change and change is characteristic of most situations. How often have we heard remarks such as "he might have got away with it during the war but he couldn't get away with it today" or "he can do that with his troops but he would never succeed if he tried it on mine". All we are saying here is that situations change. A good leader's response to these statements would probably be that the circumstances have changed and his approach to achieve the same ends would need to be different.

Having said that situations are often in a state of flux it must also be said that the personal characteristics of the leader and the follower are usually relatively stable. The persistence of individual patterns of behaviour in the face of situational changes can often be a difficult obstacle to overcome. This applies equally to leaders and followers. A leader who is too rigid to adapt to changing situations is unlikely to be successful. It would also be true to say that the followers themselves, if adopting an inflexible attitude, exert further strains on the leader and the leader-follower-relationship. From the training viewpoint if a leader is shown to be more effective in some situations than others the remedy is to programme his training to include a wide variety of situations, he will thus become more flexible and be of greater value to his superiors.

Approaches to Leadership

From what I have said one might say that leadership is not so much what a leader is, or what he has, but what he does, and to this extent the leader-follower-situation concept replaces that of attributes or traits. This change in emphasis is not too radical as I have tried to imply, certainly no more radical than the trait concept was from its predecessors which were based upon fanciful theories related to graphology, phrenology and astrology. I have already implied that the successful leader must be prepared to change his style of leadership to conform to changing situations. I shall confine my comments on different styles to three only, authoritative or autocratic, participative and free-rein. These approaches are not separate and distinct, they merely differentiate between the styles a leader can adopt towards his followers in different situations in order that he should achieve full co-operation from those followers in achieving a particular mission. The *authoritative or autocratic approach* tends to be objective and impersonal. It is usually employed when there is little or no time available for feed-back or suggestions or in times of stress

or danger where a quick response may be required from large numbers and instant compliance is required to achieve the aim. Combat and training exercises are situations that immediately spring to mind. Leaders using this approach are usually in positions of authority backed by discipline and a system of sanctions. A degree of trust in the leader is implicit in the successful application of this approach.

The *participative or democratic approach* is inter-personal. It relies less on authority and more on the personal resources of the leader. It provides a two-way communication with the follower and permits discussion and an interchange of ideas. The leader risks placing himself in a challenging position and as a result he needs to exercise a more skilled level of leadership. This approach is usefully employed in situations where the development of the follower in an instructional or problem solving situation is part of the mission (ie involving the intellect). Interviewing, counselling and the solving of personal problems often benefit from this approach (ie involving the will and emotions).

The *free-rein approach* is conditional on the explicit circumstances obtaining where the temporary withdrawal of a leader's influence is justified. The followers are permitted to act independently. The situations where this might prove effective are where highly trained experts are working at their speciality or where a unit is well motivated, meeting its standards and accepting and attaining objectives. The free-rein approach in the services is not an abdication of a leader's responsibility. It can be applied exceptionally to a well trained organisation or unit but the leader's influence must be watchfully withheld. He must be able to tighten the reins if necessary and revert quickly to another approach. Plate 2 illustrates the problem that can arise when the wrong approach is adopted.

A further interesting view of leadership styles is afforded by examining the military leadership grid. The grid was devised by a team of three, comprising a serving officer and two behavioural scientists. It purports to illustrate the different permutations of leadership style involving the leader and his followers. (Plate 3).

The axes of the grid relate to a leader's concern for people and his concern for the mission. Those of you who have followed me so far will immediately recognise that the grid deals with the leader and follower only. The vital ingredient of the situation is missing. This omission makes it immediately suspect to the leader-follower-situation disciple. Five points from a possible 81 styles are plotted. The contention is that the amount and the character of the emphasis that the leader places on each of these two elements reveal his basic attitudes, assumptions and orientations.

	Authoritative Approach Adopted	Participative Approach Adopted	Free-rein Approach Adopted
Authoritative Approach Required	Satisfactory Results	(1) Indecision and loss of time (2) Failure to meet deadlines (3) Failure to select and maintain the aim (4) Loss of control	(1) Confusion (2) Failure to accomplish mission (3) Emergence of a leader to take the place of the formal leader
Participative Approach Required	(1) Performance goals achieved (2) Recreational goals not achieved (3) Work drops off when leader absent (4) Both aggression and apathy in followers (5) Loss of morale and group solidarity	Satisfactory Results	(1) Work goals not achieved (2) Recreational goals achieved (3) Work irregular and disorganised (4) No sense of satisfaction by followers (5) Much activity to no purpose
Free-rein Approach Required	(1) Follower resistance and sabotage (2) Information kept from leader (3) Followers withdraw from situation	(1) Followers irritated by leader's interference (2) Loss of working time (3) Distraction from objectives	Satisfactory Results

Plate 2. Leadership Approaches

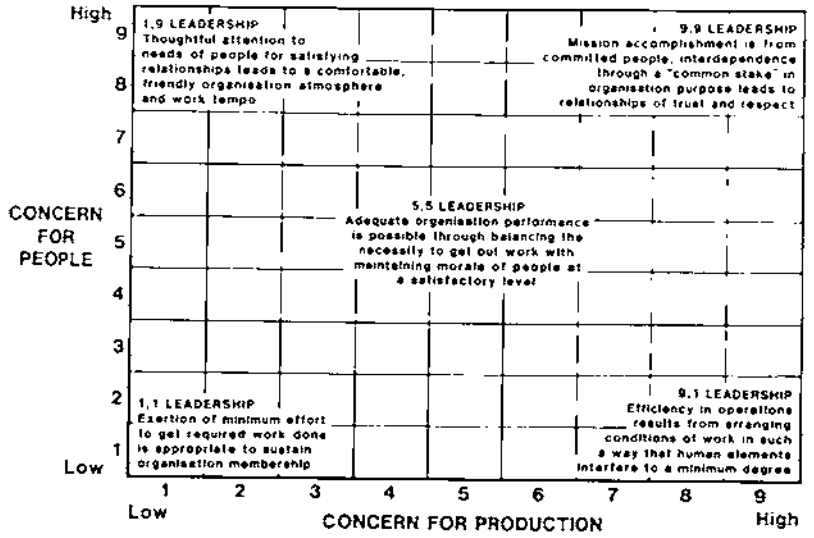

Plate 3. Leadership Grid

The 9–1 Leader. Places emphasis on mission completion treating his followers as mere tools. A typical authoritative style. Strong, tough leadership characterises 9–1.

The 1–9 Leader. Is over-concerned for followers at the risk of prejudicing the mission. The view being that if you take care of the followers they will accomplish the task. Weak, soft leadership distinguishes the 1–9.

The 1–1 Leader. Shows minimal concern for both people and the mission. This is obviously not leadership but such people do occupy leadership positions. A military organisation under such leadership soon reflects the orientation of the leader. The byword is "don't rock the boat". A defeatist attitude prevails.

The 5–5 Leader. Is a middle-of-the-road leader as might be expected. He constantly strives for a balance between the needs of the followers and the needs for mission accomplishment. A compromiser. The persuasive approach which seeks to avoid the conflict that direct criticism produces. One school of thought considers that the majority of professed leaders fall into this category. In a military organisation such a leader will command an average unit. He will never attain optimal results.

The 9–9 Leader. Demonstrates that is is possible to integrate these two concerns at the highest level. It requires a very different set of assumptions about the interaction of people and mission performance from the other styles mentioned. The 9–9 leader views his responsibility as that of achieving organisation performance through participation and the involvement of people and their ideas. This concept of team unity recognises the phenomenon that a well-led unit produces more than the sum of its parts. It recognises inter-dependence of team members who gain satisfaction from their personal contribution to mission accomplishment.

I have used the military leadership grid to give you a further illustration of views on approaches to leadership. I haven't space in this article to analyse the grid approach in depth but I suggest that if you are interested you obtain, through a library, a copy of the *American Military Review* of June 1968, in which you will find an article on the subject.

The leader-follower-situation concept has many disciples and most of the views expressed are developments of a theme. Before leaving the subject I would like to offer my own particular variation. I call it the "Chemical Theory" and it seeks to

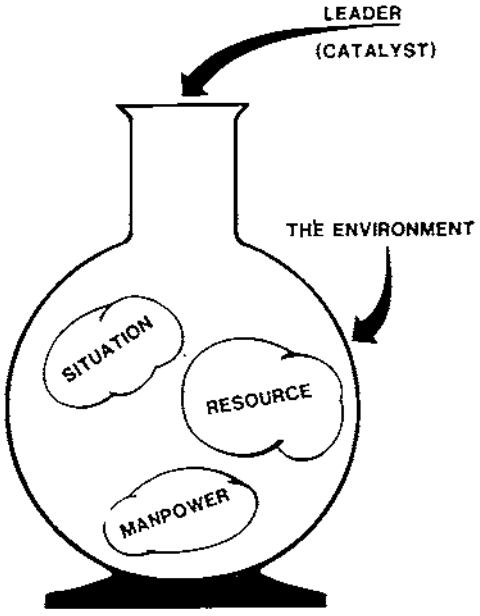

Plate 4. The "Chemical" Theory

draw an analogy between the inter-action of the elements involved in a leadership grouping and a simple chemical reaction. In pursuing this analogy one equates the environment to a retort or vessel in which is contained three relatively stable elements, manpower, resource and a situation. (Plate 4).

With no further additive the three elements co-exist in a relatively sterile condition with little or no output. A catalytic agent (the leader) is then introduced into the environment (the retort) and effects a reaction of the elements within. The extent of the reaction will be dependent not only on the constituents of the previously stable elements but on the qualities and nature of the catalyst introduced. A variety of results are possible ranging from an uncontrolled explosion to a "damp squib" effect and realistically this mirrors the spectrum of achievement that in our experience organisations do produce. Ideally what we seek is a vigorous, well controlled reaction that can be channelled into an optimally effective output. Most results fall well short of the ideal.

If this analogy is to be valid it must be accepted that the leader should have some ability to adjust his catalytic influence He must be capable of assessing the nature of the elements within the particular environment in question; remembering that environments themselves can be varied; and he should then have sufficient insight to identify or even quantify those particular characteristics he possesses for insertion into the retort. The better the leader the greater his discernment in selecting the right mix and of course the more successful his missions will be.

It was once said that there is nothing so practical as a good theory. I now propose to contradict this by straying into a patently impractical but nevertheless illustrative area. If one accepts that the optimal reaction after the introduction of the catalyst fully expends the constituent elements then conversely one must accept that any unused deposits remaining indicate the degree to which the reaction may have been uneconomical in the use of manpower, resources or failure to exploit a given situation. In a true leadership situation this would be impossible to quantify but there is little doubt that different leaders performing in identical circumstances can produce widely differing results.

In this extension of the chemical theory the imagination has run a little wild but

in general the theory does not contradict the underlying premise of this article that much depends on human behaviour and the controlled inter-action of individuals in given situations.

Motivation

Several times I have referred to the need for stimuli as being a necessary ingredient to prompt the inter-actions implicit in the leader-follower-situation concept. What we are in fact talking about is motivation. What does motivate men? The answer to this question is knowledge that is essential to you as a leader. Without it you are in no position to determine the inputs that must be provided to catalyse the follower group in a given situation. Let us look first at a definition of motivation:

"The level of desire of an individual to perform a task is influenced by the degree to which he must satisfy his physical and mental needs."

Perhaps we might look at this more simply by considering Plate 5.

The individual has needs which create tension, these needs are modified by the particular environment to which the individual is exposed and emerge as specific wants. These wants are related to incentives which, if they have been properly assessed by you, should motivate the follower to contribute towards the completion of the mission. Thus the satisfaction should act as a tension-reliever for your follower and yourself.

All people have needs and although they may not be aware of it, it is those needs which unconsciously transpose themselves into wants. Needs range from basic physiological needs through a progressive spectrum to those higher needs associated with self-realisation. Noted sociologist A H Maslow produced a diagram (Plate 6) showing a priority of needs for the individual.

It has long been recognised that needs are organised on a priority basis: the lower needs initially dominate but as they are satisfied so one's aspirations turn towards needs higher on the scale, which then become the current motivating needs. In other words the real significance of the need levels is that they have a definite sequence of domination in that the second level does not dominate until the first has been satisfied. A primitive society may never aspire beyond the first or second levels. Most individuals have a clearly delineated need profile at a given point in time. Needless to say these profiles may change shape when different circumstances or pressures obtain.

From Plate 7 it will be appreciated that this particular individual has needs at all levels. Those relating to self-esteem dominate and it must be assumed that the others are less evident either because they are relatively satisfied (first and second levels) or because they are relatively frustrated or unobtainable at that particular point in time. From this one may conclude that a satisfied need is not a motivator.

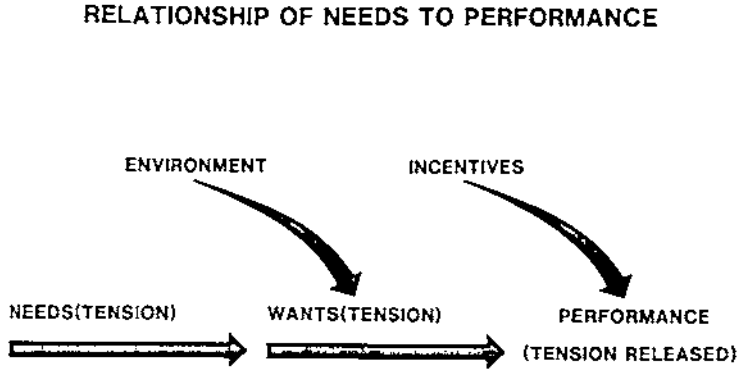

Plate 5. Relationship of Needs to Performance

Basic Physiological Needs 1st	Safety Needs 2nd	Social Needs 3rd	Self-esteem Needs 4th	Self-realisation Needs 5th
HUNGER THIRST SLEEP,etc	SECURITY PROTECTION FROM DANGER	BELONGING SOCIAL ACTIVITY LOVE	SELF-RESPECT STATUS RECOGNITION	GROWTH PERSONAL DEVELOPMENT ACCOMPLISHMENT

Plate 6. The Priority of Needs

The intelligent leader will attempt to identify a similar need profile for a follower, or he may have to compromise and identify a generalised profile for a group. This is often done intuitively. Using this information he can devise and apply incentives and/or administer rewards and punishments. One observation arising from this is that money may not be such an important factor after the early needs relating to subsistence levels have been satisfied. Putting to one side practices such as bribery, most of the higher needs are not normally achieved with money, although "keeping up with the Joneses" (self-esteem) can be expensive.

The concept of the priority of needs although widely accepted does have limitations in explaining motivational phenomena. Several theories exist to explain such phenomena related to rewards, punishments, justice, group dynamism etc: one by a Professor Barnes suggests that all needs are dependent upon each other and that they must be in balance to ensure stability of the individual. When they are out of balance they manifest themselves in the form of anxiety, frustration or some form of inner conflict. The individual affected attempts to make adjustments which often distort adversely his relationships with his peers and superiors. Such adjustments often take the form of *defence mechanisms* such as:

Compensation—(More effort in other directions to compensate for a real or imagined deficiency.)

Rationalisation—(Seeks other than real reasons to explain conduct or beliefs.)

Identification—(Associates himself with more successful contemporary.)

Projection—(Draws attention to shortcomings of others to deflect attention from own failings.)

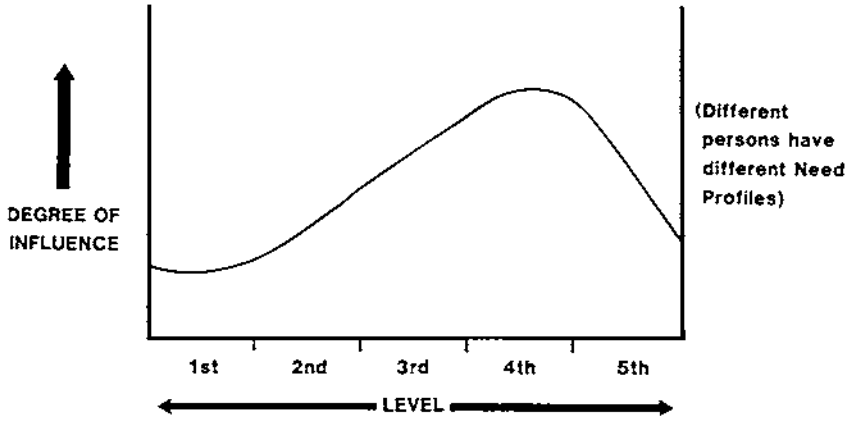

Plate 7. A Need Profile

or escape mechanisms

Timidity—(To avoid unpleasant situations.)

Fantasy—(Retires from the real world.)

Regression—(Avoids difficulties by retreating to an inferior person or less mature behaviour.)

Negativism—(Ignores existence of difficulty.)

Repression—(Fights anger internally, may erupt irrationally.)

It is important that a leader understands the adjusting process and within his capabilities he should attempt to identify the particular mechanism or mechanisms being employed. It is equally important that he does not misinterpret the mechanism and attempt to arbitrarily categorise his followers. Finally he must accept that at some time or another everyone uses a form of mechanism harmlessly: it is an over-indulgence that can be damaging. Serious behavioural aberrations are of course a medical problem and are best left to those qualified to deal with such cases.

I said that needs were conditioned by the environment to produce wants. As with needs the significance of wants vary. In attempting to identify the more common expectations of men we must generalise and no list can pretend to be exhaustive. Man will seek:

Good leadership.
Information on what is demanded of him.
Recognition of good performance.
Treatment with dignity.
Advancement opportunity.
Freedom from over supervision.
Social activity.
Good working conditions, including pay.
Explanation of changes.
Challenging work.
Fair treatment and
High contribution opportunity.

An attempt should be made to fulfil these wants otherwise the follower will channel his energies towards his own ends and priorities and this may result in his working contrary to the leader's or the organisation's objectives. If the follower does not succeed in this way he may resort to the defence and escape mechanisms discussed earlier.

I have described the wants of the follower and it may be of interest to examine these more closely through the eyes of a Professor Frederick Herzberg, another sociologist, who published the results of an analysis covering twelve surveys of factors affecting job attitudes. (Plate 8).

In the examination he draws a distinction between true motivators and what he calls hygiene measures. He concludes that the factors producing job satisfaction are separate and distinct from those leading to job dissatisfaction. He is at pains to point out that these two terms are not the opposite of each other. The opposite of job satisfaction in his analysis is no job satisfaction not job dissatisfaction. This is an important distinction. He also draws attention to the basic human driving forces. One: the built-in drive to avoid pain from the environment ie, the 1st and 2nd tiers of Maslow's priority of needs, and two: the unique human characteristic implicit in the ability to achieve and through achievement to experience psychological growth. This accords approximately to Maslow's remaining tiers. The stimuli for this latter growth-need lead to job content. The stimuli for the basic needs are found in the job environment. The motivating factors are shown on the right hand side of the diagram and the dissatisfaction-avoiders or hygiene factors are shown on the left hand side. In the study the motivators were the primary cause of satisfaction and the hygiene factors were the primary cause of unhappiness. From our own experience, if one can single out a point for commnt, is it likely that a work force the morning after a pay award would work any harder than they did the day before? It

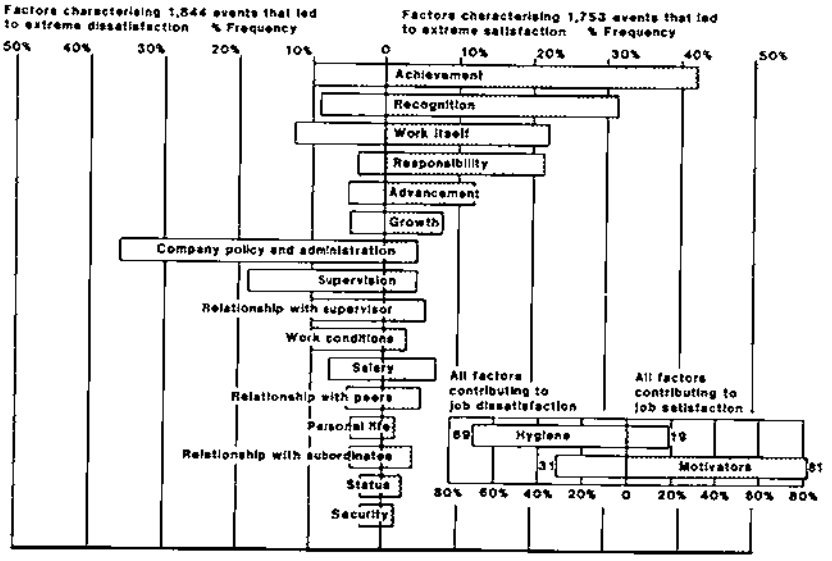

Plate 8. Factors Affecting Job Attitudes

is more probable I suggest that an individual having earned recognition for a job well executed will tackle his next task with renewed and increased enthusiasm. The conclusion drawn is that the hygiene factors, if missing, demotivate but if present do not motivate. The motivators speak for themselves and by studying these carefully a leader can enrich a follower's employment. The concept of hygiene is not entirely new but perhaps it has not been so explicity stated before. I will leave this topic by quoting again from Montgomery. He said:

"Some think the morale is best sustained when the British soldier is surrounded by NAAFI, clubs, canteens and so on. I disagree."

Here perhaps he is implying in his own way that hygiene factors do not motivate.

Individual and Group Behaviour

I have made the point in a number of ways that a leader with a workable understanding of human behaviour is better equipped to obtain a good performance from his subordinates and better able to provide them with the opportunity to satisfy their own needs. The leader must accept that men are strongly influenced by their individual attitudes, perceptions and differences. Controversy and disagreement exist among social scientists when it comes to the complex issues of human behaviour, however, useful principles, recommended practices and techniques have emerged which have a broad consensus and it is to these basic issues I wish to turn now.

Each individual behaves in a certain way when confronted by given objects, events or situations because of his in-built attitude regarding these stimuli: a stimulus being anything that elicits a mental or physical response. The attitude adopted is an enduring, conditioned mode of behaviour towards the stimulus as it is perceived by the subject. For instance a gift of money could be perceived by one person as a kind gesture, by another as a bribe. Diagrammatically this can be represented as shown in Plate 9.

These responses may be favourable or otherwise and may manifest themselves overtly or not. Picture the superficially willing soldier who gets on with the task whilst mouthing oaths and threats under his breath against his superior. Attitudes are notable for their resistance to change and when they arise from emotional factors they do not respond easily to logic.

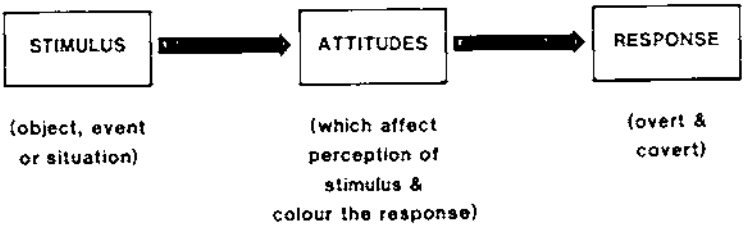

Plate 9. Stimulated Behaviour

Perception follows exposure to stimuli in terms of the individual's aspirations, fears, values and expectations. He is restricted in how much information he gathers or truth he perceives by his prejudices. People's interpretation of the same stimulus can differ widely, this is never more apparent than in operations where men often size up a situation quite differently due to their varying perception of the factors to be considered. This aspect of individuality is important in making a follower feel that he has a separate and unique contribution to make. I am sure that most individuals would identify with this sentiment and would be prepared to outline their own unique combination of characteristics that makes them that much more effective than others. One can compile an imposing list comprising factors which lead to differences between individuals. Plate 10 lists some of them.

No doubt the list could be added to. To discover what sort of man we have under command it is helpful to discover what his temperament or emotional characteristics are, what satisfies him at work and what his outside interests are. With this sort of information a leader is able:

(a) To motivate followers towards a best performance.

(b) To develop a follower's skills and knowledge with a view to promotion.

(c) To assess work performance objectively and impartially and advise accordingly.

(d) To ensure that his concern for a follower is genuine and not meddling.

(e) To avoid accusations of partiality.

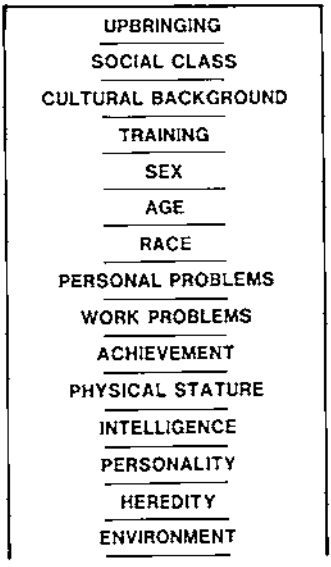

Plate 10. Factors Leading to Differences Between Individuals

(f) To become aware of changing attitudes and perceptions and adjust his leadership approach accordingly.

Before leaving individual behaviour I draw your attention to a theory advanced by a Professor Douglas McGregor, an American psychologist. He developed two sets of fundamental assumptions portraying two different types of individual: he arbitrarily called these Theory X and Theory Y. The two theories are illustrated in Plate 11.

He identified Theory X as being management's conventional conception of harnessing human energy to organisational requirements. It formed a rationale for organisational structures, policies and practices. He develops his theme by asserting that this approach has caused management to practise two extremes, hard and soft management. Hard management resorts to coercion and sanctions whilst soft management is permissive, aimed at satisfying people's demands. McGregor sees both approaches as irrelevant because they ignore the principles underlying motivation.

Theory Y is based on the accumulation of knowledge on human behaviour that has emerged during this century. The assumptions are contrary to the traditional management philosophy. These assumptions are optimistic and humanistic and they reflect an unlimited potential for personal and organisational growth. Whilst Theory X represents a static and pessimistic view of the nature of man Theory Y emerges as dynamic and amenable to the changing nature of organisations and individuals. These views on individual behaviour lead logically to a consideration of group behaviour.

Recalling our friend Stodgill once more, he remarked that leadership is a phenomenon of groups, whilst this may be a simplification the study of group behaviour can be revealing as a subsidiary factor in considering the wider field of leadership. The formal structure of an organisation gives useful guidance on the working relationships of those individuals working within it. It indicates channels of communication and levels of authority but more than that it cannot do. The more intimate personal relationships which always exist in any organisation remain concealed.

In real life people tend to encourage and practice a more informal grouping. A network based on compatibility and common interest tends to develop and an individual's social aspirations and needs play a large part in determining which informal group he will join. This type of group may cross over the barriers of the groupings envisaged in the formal organisational structure. These groups can strongly

Theory X	Theory Y
The average human being has an inherent dislike of work and will avoid it if he can.	The expenditure of physical and mental effort in work is as natural as play or rest. The average human being does not inherently dislike work.
Because of this human characteristic of dislike of work, most people must be coerced, controlled, directed, and threatened with punishment to get them to put forth adequate effort toward the achievement of organisational objectives.	External control and the threat of punishment are not the only means for bringing about effort toward organisation objectives. Man will exercise self-direction and self-control in the service of objectives to which he is committed.
The average human being prefers to be directed, wishes to avoid responsibility, has little ambition, wants security above all.	Commitment to objectives is a function of the rewards associated with their achievement.
	The average human being learns, under proper conditions, not only to accept but to seek responsibility.
	The capacity to exercise a relatively high degree of imagination, ingenuity, and creativity in the solution of organisational problems is widely, not narrowly, distributed in the population.
	Under the conditions of modern industrial life, the intellectual potentialities of the average human being are only partially utilised.

Plate 11. Basic Assumptions Regarding Individual Behaviour

influence the accomplishment of the organisation's objectives.

The leader will look upon these groups with some ambivalence. On the one hand the group will tend to develop its own hierarchy: an informal leader, a core of regulars, deviants and isolates will emerge and the group will tend to conform to a set of tacit rules. Group positions and the categorisation of members are determined by the diligence with which the unformalised code of behaviour is followed. Needless to say the degree of satisfaction enjoyed by each member of the group will vary enormously and opinions within the group are often difficult to reconcile but as a general rule such groups tend corporately to resist change. This could be the most significant area of difficulty for the formal leader.

The leader must clearly accept informal groups. He has no choice. On the other hand, if he is wise he will consider the influence of such groups when determining his leadership style for a given situation.

His aim must be to prevent the formal organisation from disrupting the informal grouping whilst retaining the integrity and pre-eminence of the formal structure. He will attempt to do this by integrating the interests of both organisations, endeavouring to direct the total human resource to a chosen objective, optimally. A difficult task as we all know.

So much for the individual and group behaviour. The last topic I would like to touch on is discipline.

Discipline

Self discipline to one degree or another should be characteristic of any responsible member of an ordered society: to this extent it is a common attribute. However, it is not innate and must be developed in the individual at some time in his formative years and this is perhaps where our society is going wrong today. The military code of conduct is more demanding than that encountered in civil life, it requires a dedication to the service and its requirements and an understanding of its unique system. A member of the services needs to be properly trained to fit into such a system and to achieve this a recruit must progress through a programme of imposed discipline and self discipline culminating in a full understanding of the military way of life.

A proportion of this training must be done by the recruit himself. He must develop an attitude or state of mind which will prepare him for the demands and the shock of combat. By doing this he supports the aim of the military organisation which is to maintain a state of combat readiness at all times. The soldier must condition himself to obey an order immediately even if it is to result in his injury or death. More importantly he must understand the reasons underlying the requirement to face this ultimate test. In some minds service discipline is synonymous with enforced control and an associated code of corrective punishment. Whilst this view has some validity it is not the whole story. Discipline is also concerned with justice, training and morale.

As I have implied discipline training aims at a voluntary and swift compliance with a system of rules for behaviour. Such compliance may well be contrary to an individual's personal or selfish desires but the object of his training is to instil into him the necessity to place duty before his inclinations. In most combat situations time is at a premium and a swift, unquestioning response to an order could mean the difference between success and failure. Practice drills are a means of conditioning a man to obey such orders in situations of great mental stress or personal danger. Reactions must be automatic and predictable if they are to be effective.

To impose military discipline requires an authoriative approach and this clearly is the way to handle recruits for those specific aspects of his basic training related to the unquestioned acceptance of orders in combat: drill is an obvious example. When the recruit has acquired basic knowledge and the ability to react and such reactions become a habit he, gradually and often unwittingly, develops a sense of self discipline. His responses tend to become second nature and his desired reac-

tions require less prompting and direction from the leader. At this stage the leader can adopt a more participative approach which remains just as effective. Unless the recruit has experienced the authoritative stage and developed his own self discipline the participative approach is less likely to be successful.

The subject of discipline deserves an article in its own right; a slight and superficial treatment as this must be does it scant justice. Further areas of discussion are morale and *esprit de corps,* individual communication, problem solving, decision making, interviewing, counselling and performance evaluation. All of these have a part to play in considering the development of the leader and the styles he may adopt.

Conclusions

I have attempted, briefly, to survey some of the basic considerations when studying leadership. I have examined the elements of leadership, various approaches, motivation, individual and group behaviour and finally discipline. As I said in my introduction my aim is to whet your appetite and encourage you to look more deeply into the subject. To those of you to whom this is a first introduction, I hope you will do so. To those who are well advanced in their study of the subject I hope it will give you further impetus to increase your understanding and to those who know it all, I trust it will bring a little humility with the realisation that there is still much that we can all learn. What is important to all of you is to ask yourself after any study on leadership the following question. What am I going to do differently as a leader as a result of my reflection? Hopefully you will have a better understanding of you own motives and behaviour and perhaps you will become more sensitive and perceptive to the underlying causes of the behaviour of others.

I have not attempted to address the vexed question of leadership versus management but for those of you who may think the terms synonymous I pass on this quote from an eminent military sociologist, Morris Janowitz:

"The military professional is confronted with a persistent dilemma, and this dilemma is deepened by the growth of automated warfare. The profession must recruit and retain officers who are skilled in military management for its elite. But at the same time many of its officers, including the most conspicuous ones, must be able to perpetuate the traditions of the heroic leader. The martial spirit continues to give the military profession its distinctive outlook, and to mould even its military managers. Modern trends make it difficult to imbue the fighting spirit in the next generation of officers, and the civilian population is often ambivalent about its implications. While civilian leaders may be able to control the strategic policies of the military establishment, they cannot dispense with heroic leadership."

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A Woman's Role?

"PANKHURST"

"*Allowing the wife of the young officer her own identity while not prejudicing her husband's concentration on, and effectiveness in, his own job, may prove one of the most challenging tasks of the British Army in the 1980s and for the remainder of this century.*"[1]

. . . I suppose that we should make certain that he will be accompanied by his wife before we publish the Command List, shouldn't we . . . (*Why? Why?*)

. . . I assume you will take over the quarter from Tim, won't you? . . . Well, actually, no, General. We've just bought a house for the first time and so Claire will be trying to get that straight . . . but . . . (*Quickly*) she'll join me for all the important things, of course . . .

Test Question 1. The Colonel's Lady is living in a quarter in the south of England close to the family who are at day schools in the area. He commands a TA Regiment in the north; never at home at weekends, commuting from a room in the local Officers' Mess. Do you find this a "Poor Show"? *Discuss.*

. . . Upsticks and buy another house closer to the job like the civilians do. But then they get paid a decent allowance for doing so, don't they? . . .

Wives' Club. Focal point of the Regiment . . . Well, the main point is that they know where I am and that they can always find me if they need me . . .

. . . Yes, thank you Mrs Weed. I think that's a marvellous idea . . . Now . . . Would anyone like to volunteer to help me and Mrs Jones organise the trip . . . No . . . Well. Alright, I'll look into it and let you all know when it's going to be . . . (*Smile. My God. Wonder why I bother . . .*)

Mauve wall-paper. Ducks climbing over the mantelpiece . . . Been 'ere a month an' 'adn't been visited 'ad I? Do come in if you'd like to . . .

. . . 'Oo the 'ell does she think she is anyway. Comin' in 'ere snooping and running 'er fingers through the dust . . .

Test Question 2. Do you think that the single man, unmarried or divorced, has no place at the head of his Regiment? Or do you just resent that HE commands well, WITHOUT being "ably supported by his charming wife"—who chooses for more than one good reason, not to accompany him? And if you do, why? And where do YOU draw the line?

Flowers in the Garrison Church. The fête. The fund-raising. Tee-shirts, jeans and camel hair coats. Hermes and Huskies . . . Look, I'm terribly sorry. I should love to help but I can't manage Fridays . . . Yes, with an Estate Agent . . Mornings only, of course . . . because of the children . . .

Woman's Liberation. A knowledge that there is a role to play but needing her own, individual, freedom . . . Oh darling . . . but you knew the kids were home that week . . . and I don't even know them . . . I suppose we'll have to move Robin out onto the landing again. Look, it's fine you having visitors to the Regiment, and I know how important it is but couldn't they perhaps take a room in the Mess? . . .

"The notion that a true and loving . . . wife inspires a man to high endeavour is largely illusory. Every sane woman knows instinctively, as a matter of fact, that the highest aspirations of her husband are fundamentally inimical to her, and that their realisation is apt to cost her her possession of him"[2]

The real essence is to know that when he is out there on Active Service, he has nothing to worry about at home and that all he has to do is to concentrate on the job in hand and staying alive in a hostile climate.

. . . Nothing to do with me old boy. Leave it to the Padre and the Families Officer. Their sort of thing isn't it? . . . Crying in a corner because I'm feeling sick again and Wayne left this morning saying he'd see me when the exercise ended and I don't know where he is and I don't understand what anyone says in these bloody flats and the baby's made a mess again and the water seems to be off . . . Oh, mum . . . Then there was this wretched business about some case of baby-battering in the Regiment. Knew nothing about it but the bloody Brigadier thought it was all my fault . . . so that's why I'm here old boy. Passed over . . .

Ladies' Guest Night. God Bless 'em . . . Well of course we both think it would be absolutely marvellous if Charles could be posted to Lesotho . . . Like a vine, spiralling upwards, career post to career post, using those soft feminine tendrils. Dinner parties . . . Really, General? Gosh, how thrilling . . . The taste of After Eight on her lips and the fragrance of Saint Laurent's "Y" at the nape of her neck. Oh for a closer smooch with thee . . . Of course, you know dear that he's seeing quite a lot of her . . . and they do seem such very good friends . . . "Dear John. I thought I should write and let you know that . . ."

Test Question 3. The Army is composed of lean professional volunteers, single in mind and body, ready to move anywhere, at any time, at any notice. Is there a place for the "Little Woman" in this society. *Discuss.*

The Contact Game . . . By that stage we had had twelve years of not being ourselves. The squadron, followed by a tour which involved me again and then Jeremy commanded the Regiment at Tidworth, followed by being at the beck and call of HMG for a further couple of years, so I reckoned I'd had enough of the Army ruling my life and left him. That, and pressing those stupid shirts . . . Sorry they split up. Must have been very tedious for him to have to command the Regiment without her . . . (*Why? Why?*)

Have the social conditions in the country changed so imperceptibly that the character of the Army has changed also, without our recognising it? . . . And I thought that when I had got to that sort of level that I'd done enough for the Army and I could start being myself and looking after the family for once. We have so little time anyway with the children and it does seem to go so very quickly . . .

Pack and Follow . . . Look, I'm fed up with you moaning about being pushed around. If you're so keen on settling down, why don't YOU go and talk to AG7 instead of me . . .

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Engineer Support in 1st British Corps, or "Whither the Corps in the Corps?"

LIEUT COLONEL P J SHEPPARD OBE, RE, B Sc(H)

The Author was commissioned into the Corps from Sandhurst in 1962. After 3 years at RMCS he was posted to BAOR as a Tp Comd and IO. Subsequently he served in 3 Fd Sqn and AG7 before going to the Staff College. From Camberley he was lucky enough to be posted to the British Embassy in Washington. He then commanded 29 Fd Sqn after which he spent a year in Corps HQ before becoming the GSO1 in Military Operations in the MOD. He is now commanding 35 Engineer Regiment.

Introduction

I Trust that readers will forgive me for adding to the title of a previous "controversial article" and that Colonel Mike Addison will not be too distraught that I have confined my remarks entirely to the combat support we Sappers provide to 1 (BR) Corps! Let me be even more provocative and say that, given the shift of emphasis from counter-mobility to mobility, it is my personal view that we have not got the level and nature of our suppor to field formations in 1 (BR) Corps quite right. I feel strongly that if we are not seen to be able to give to field formations down to battle group level the specific kind of immediate support that each needs, then our ability to have the vital impact on the battlefield at the right time and place will be much reduced and our credibility will be lost. Furthermore we must move away from the *ad hoc*ery that has dogged our organisation for the past ten years. We must, I suggest, persuade those whom we support to take a greater interest in Sapper matters, especially in terms of organisation, command and control, and level of support. Too often this has been generated by ourselves and on the basis of previous, and not necessarily relevant, experience.

So What Do I Believe is Wrong?

I suggest that our present difficulties stem from three general areas. First, we are mesmerized by the initial preparation of an obstacle plan; second, we are over-concerned about the level of representation at formation HQs; and third we have an apparently blind faith in the principle that an Armoured Personnel Carrier (APC) mounted squadron has the wherewithal to provide close support in all phases of war at brigade (and thus battle group) level.

Clearly the preparation of a Corps obstacle plan at the outset of hostilities is of great importance and we must certainly get it right. But once battle is joined, we must be able to react quickly with the right equipment to the needs of commanders at all levels. We cannot afford to think of the obstacle plan as the "be all and end all" of the engineer battle. The preparation phase may take three days but the war may go on for three weeks, three months, or three years—who really knows? So I submit that our basic organisation must be based on our flexibility to support the

Lieut Colonel P J Sheppard OBE RE B Sc

teeth arms throughout the war and not merely during the comparatively short period of initial obstacle preparation.

Once battle is joined what then will be required of us? I will not list all the possible tasks, for we all know them well, but if we are to stand and fight the Group of Soviet Forces in Germany (GSFG) and its Warsaw Pact allies then we must give engineer support to formation commanders that they can use within their own area of influence.

Aiding the mobility of our own forces is bound to assume a more important role than hitherto in relation to standard counter-mobility tasks. For armoured brigades and battle groups this dictates Sappers with protection, matching that of armour and infantry units and, as far as possible, the ability to carry their engineer resources with them. Furthermore there is a constant demand to speed up our ability to carry out counter-mobility tasks. Thus engineer support at this level ought—indeed must—comprise more battlefield machines and fewer men; armoured engineers (as we still persist in describing them today), Combat Engineer Tractors (CET), anti-tank scatterable mine dispensers (with refills, dare I suggest, on armoured High Mobility Load Carriers (HMLC)) and a section or two of Sappers mounted in Mechanised Engineer Combat Vehicles (MECV) each fitted with a small dozer blade. The combat digging equipment due to replace Light Mobile Diggers (LMD) might better be issued direct to battle groups and Gunners. Compare this to the current situation of an APC mounted field troop in support of a battle group. For timely advice, important low level anticipatory planning and certain obvious but limited tasks this is fine. But the troop needs considerable resources to be really effective and provision of them in the quantity and time scale required by brigade and battle group commanders, even with good pre-planning, is questionable. I believe this to be true even if one accepts the valid argument that, in war, events will move much more slowly than they do on FTXs in BAOR.

At the divisional level there will be a little longer for us to react since the time and space problems faced by the GOC will be less immediate than those facing brigade commanders; and of course his area of concern and influence is much greater in breadth and depth. Divisional engineers should thus have adequate time to rely on the provision of considerable engineer resources through the engineer support system (M&E, hardcore, plant and bridging) using soft-skinned vehicles moving at night in the time scale currently achievable. Thus I envisage divisional engineers as being capable of constructing major obstacles in depth, opening and maintaining routes and general combat engineering in the divisional area, usually out of contact, certainly with enemy direct fire weapons. I also believe that, if the situation demands, they must be capable of acting as second line infantry given the appropriate anti-armour weapons and Gunner support. Thus I see the divisional engineers established much as my own Regiment is at present, comprising APC (AFV 432) mounted field squadrons equipped with minelayers and mine dispensers. Medium capacity plant should be readily available as should a resources organisation which can react to substantial demands within a few hours.

At the Corps level the engineer tasks will cover a much wider range and must match the area of influence of the Corps Commander. There will be a need for specialist engineers (such as fuel, well drilling, Explosive Ordnance Disposal (EOD), E&M), for route maintenance teams on a large scale and, inevitably, combat engineers. But the need for armoured protection is less and I envisage the engineer support at the Corps level as being mounted in soft-skinned vehicles and probably operating under an engineer brigade or group commander. To imagine that we can hold and deploy engineers suited to support brigades or divisions (armoured engineers or APC field squadrons) at Corps level seems to me entirely mistaken, for surely the reaction time at Corps is entirely different to that required at division or brigade, and communications may not be quite so good (perhaps a better description is even worse) as they are on exercises. Furthermore I find it difficult to accept the logic of the argument which holds "divisional type" engineers at the Corps level

on the grounds that it would be easier to re-group them between divisions in the face of irascible divisional commanders who perceive that they themselves are short of engineer effort. Surely the Corps Commander can re-group divisional assets by issuing a simple order. It is what happens at every other level and with other arms.

In sum, let us give the formation commanders the engineer support (however costly it might be) that matches their time and space appreciations and their area of influence—and let us give it to them "under command", for then not only will we encourage their interest in our tasking, our capabilities and our problems but, hopefully, we can get away from the constant problems of re-grouping our meagre assets—an operation which, in my opinion, is rarely likely to be completed successfully in war. We will have to meet the challenge imposed by the increasing emphasis on mobility and this implies more machines (and thus fewer men) at brigade/battle group level.

The Problems of Engineer Advice and Engineer Command

This important matter is second only in priority to the question of the right level of support. It is difficult to think of a more emotive topic within the Corps than whether we should have full Colonel CREs at divisional level and COs or Squadron Commanders at brigade level. Nevertheless I will venture into the minefield for I feel that we tend to forget the facts in the face of "powerful MS arguments" and "the special importance of a 'red hat' at division". Controversial though they may be then, to me at least, the facts appear to be:

(a) The field squadron will remain our basic unit at the divisional level because it will continue to be the only one which can be sensibly re-grouped on the battlefield. Regiments are both too large and too few to be re-grouped as entities. Thus a divisional field squadron commander should not be given a permanent advisory role and must be principally a commander.

(b) If the squadron commander is controlling tasks in detail and is not tied to a formation HQ, then the CO and RHQ must have the capacity to accept a substantial advisory as well as a command function.

(c) Because engineer work at the brigade level tends to be of the immediate kind and, apart from the initial obstacle belt, the need for *major* engineering planning is limited, an RHQ is too powerful an organisation to place at brigade HQ. Nevertheless, given the present organisation and trunk communications system, I concede that only at brigade HQ will an RHQ gain access to the necessary and vital information, command and control facilities.

(d) One of the main tasks of HQ RE at division is the obstacle plan but this will only affect the first few days of any war. In war the job then becomes one of timely advice, resource management and the art of being in the right place at the right time. It is to be hoped that once the obstacle plan has been designed in peacetime, it need only be kept ticking over. There remains only half a job to be done and Parkinson's law comes in to play. As a result HQ RE spends much of its time (and at Corps too) in duplicating peacetime work more rightly the province of the G1, G2, G3 and G4 staff.

(e) Staff officers can provide much of the technical engineer advice required by formation commanders.

From all this I arrive at two main conclusions. First that the divisional regiment CO and his RHQ should not be at brigade HQ but at divisional HQ. They can manage the job of the CRE and HQ RE in war and, given an adequate level of staff support, I believe that they could cope in peacetime too. Secondly there is a problem in fulfilling the engineer advisory function at brigade level, if it is neither a job for the CO nor for the commander of a squadron in the divisional regiment. I have, however, already pointed out the need for a different (and more armoured equipment intensive) approach to the provision of timely support at the brigade and battle group level. This might well be accomplished by the establishment of a brigade (armoured) squadron. The OC and HQ of such a squadron would provide a

neat solution to the advisory dilemma. Although the principle of the OC commanding and not advising would be broken, it would be more acceptable in the case of a brigade squadron because:

Re-grouping would be unlikely.

Elements of the squadron would be under command (or at least in direct support) of battle groups,

The OC would be on the brigade command net, and

The SHQ would be co-located with the brigade HQ so that technical and engineer staff advice would always be readily available.

The provision of a junior engineer staff officer (IO?) permanently at brigade HQ in peace and war would, in my view, make the system not only workable but highly desirable.

A New Organisation

If, after having read so far, you are not spitting with rage and rightful indignation, you might well be nodding your head in agreement. I am well aware, however, that any foray into a proposed new organisation would merely lead to a separate and fiercely defended solution from each and every officer in the Corps. Nevertheless, I will, to end on a controversial note, and where I have not already made it clear, risk a few pointed generalisations which I think follow on as logical deductions from the simplified arguments I have presented so far and which may serve as discussion points for the future:

(a) Each armoured brigade should have an (armoured) engineer squadron under command equipped with AVRE (with plough and fascines), AVLB (Armoured Vehicle Launched Bridge), CET, scatterable mine dispensers and one or two field sections in MECV. It must be equipment intensive and manage with as few men as possible—say 120. This squadron must be dismountable and capable of working on an obstacle plan during a preparatory phase.

(b) Each division should have an engineer regiment comprising two or three APC mounted field squadrons and a support squadron—much as exists now.

(c) Corps engineers should be lorry mounted and "Brigaded". The brigade must contain specialist engineers and may contain TA units.

(d) As an RHQ is too powerful for a brigade and the CRE's job at division is limited, the CO of the divisional regiment should become the CRE. (Note: there are all sorts of possibilities here including making the CO of the divisional engineer regiment a full Colonel, and having a Lieut Colonel to command a number of the brigade engineer squadrons. My preferred solution however, is for the brigade squadrons to be independent and to live with an armoured regiment of each brigade. The CRE would be a Lieut Colonel).

(e) In war the brigade (armoured) engineer squadron and divisional regiment tactical HQs would be based at formation HQs but the divisional regiment squadron commanders would have no advisory function. Staff officers would be provided at each formation HQ. Say an SO3 or IO at brigade and a SO2 and SO3 at division so that the commanders with an advisory role are given sufficient flexibility to be able to exercise their command function effectively. (Note: Let's get the all arms staffs (G3 in particular) to "think Sapper" and let them control our activities—through the engineer commander—more closely).

Is all this possible? There are thirteen field squadrons and three armoured engineer squadrons in BAOR at present. For the future I believe that we need eight brigade armoured engineer squadrons and eight field squadrons to support the three in-station divisions (3 + 3 + 2). As the brigade squadrons will be smaller and manpower would be released from the disbandment of RHQs/HQREs, it may even prove possible to raise a further field squadron.

So What are the Difficulties?

The realists amongst us will point to four major difficulties implicit in my sugges-

tions; the lack of money to buy the necessary new equipment, the availability of barracks in peacetime, the collective training problem and the loss of senior posts in the Corps. I do not pretend to have all the answers to these, but as a first generalisation I am bound to say that where there is a will there is a way. Prince Philip once noted ". . . the mass of obstacles which are always lumbered into the way of any good idea when it appears in the offing. . . In my experience there are always twenty excellent reasons for doing nothing for every one reason for starting anything".

But in response to equipment problems let me ask how the Army ever bought helicopters? How did we manage to bring CET into service? We must somehow put down our shovels and become more equipment intensive. We will certainly have to do so if we are to improve our mobility support to other arms. The onus is upon us to impress the field army of the priority that should be accorded to field engineering, for without proper equipment and more assault engineers the full effect of the new weapons and vehicles we plan to buy (including Challenger, MCV80 (Mechanized Combat Vehicle) and tracked Rapier) will never be realised.

The barracks problem in peacetime is just as difficult to resolve. There are, however, two ideas which warrant further research. First we might examine the possibility of fitting the brigade armoured squadron into the barracks of one of the armoured regiments in each brigade. This may be wishful thinking but would have obvious training and co-operation advantages. Alternatively it could well be possible to form two four-squadron regiments at Munsterlager and Osnabrück. This would have the advantages of retaining the present number of command appointments as well as easing what some perceive as the central training and maintenance requirement. On the other hand, of course, this solution would weaken the essential "brigade" nature of the armoured squadrons.

There is finally then the compelling MS argument. With my proposal we should end up with three field regiments, two "armoured" and one amphibious regiment, so the situation regarding command appointments would remain much as it was before the formation of the fifth field engineer regiment. But yes, we would lose three full Colonel appointments. This would be sad, but if as a result we could improve our standing with formation commanders I doubt if it is too high a price to pay. Moreover there is a significant MS advantage in my proposal. Our Majors and Lieut Colonels would be reported on directly by brigade and divisional commanders. Both levels would have a better opportunity to prove themselves and to earn the all important recommendations for the future.

In Conclusion

I am convinced that we, as Sappers, must provide the necessary support to field formations in the time scale which matches the relevant reaction time (arising from their time and space appreciation) required by the appropriate commander. This I believe we are unable to do at present with so few armoured engineers. What, after all, can an APC mounted field troop do in direct support of an armoured battle group except brandish its shovels RE in an agressive manner? This may be an overstatement but in the manoeuvre battle there really is little the field troop can do by way of the immediate engineer assistance that will most certainly be urgently required. Carry engineer stores well forward I hear you say! What—on 10-tonners? We are making an *ad hoc* situation work now and I accept that, within its strict limitations, the command and control situation is acceptable and workable. What worries me most is that we embark on further *ad hoc*ery to overcome the severe shortage of armoured engineers. Let us please not confuse ourselves and those we support further. Let us, instead, set out what we need, endorsed, supported and positively pushed by all arms commanders—a blueprint for the future if you wish—towards which we can move as quickly as money and barracks will allow. Only then would further "interim" solutions be acceptable.

"We must surely consider the future, for that is where we will spend the rest of our lives". Mark Twain

As a parting shot I would add, for the benefit of those who say it will all be different in war, that in peace we are training for war and our equipment and organisation are decided on this basis. Our credibility and future in 1 (BR) Corps must therefore depend—for many years to come I hope—on the performance we put up on exercises.

(*See Correspondence*)

The Coldest Climb

LIEUTENANT P D SPERRY RE

Duncan Sperry was commissioned into the Corps in April 1979. On completion of the YO Course he departed for Nepal to take part in the 1980 AMA expedition to Mt Api. On his return in June 1980 he joined 29 Field Squadron in Northern Ireland, returning to Hameln in November 1980. Since then he has served in BAOR and BATUS as a Field Troop Commander in 35 Engineer Regiment.

"Whose idea was it to come here in the first place?" All eyes looked accusingly at me. "Well it seemed like a good idea at the time" I replied in half hearted defence.

We were on the South East Face of the Kahiltna Glacier at an altitude of 7000ft. Behind us loomed the bulk of Mount McKinley, at 20 320ft the highest mountain in North America, its summit some sixteen miles from our present location. The date was 22 February 1982 and we had come to Alaska to attempt the first British winter ascent and the second overall ascent of what is generally regarded as the coldest climb on earth: a winter ascent of Mount McKinley.

The team comprized of Captain Andy Simkins AAC, Flight Lieutenant Wayne Morgan RAF, Captain Jon Ayers RE, our female member Corporal "Bernie" Simpson QARANC and myself. Our aims were two-fold; firstly to climb the mountain by the West Buttress, a straightforward "snow plod", and then to come back down to 14 000ft to make the first winter ascent of the Messner Couloir, a 6000ft 55° snow gully.

We had been flown into Base Camp by Doug Geetings, a Californian now based in Talkeetna, a small town some 150 miles North of Anchorage and the nearest airfield to McKinley which is some 100 miles further to the north. The previous night had been spent enjoying the delights of "Beautiful Downtown Talkeetna—pop 400", as Doug had declared Monday too windy to be a flying day. At 0600hrs Monday Doug redesignated the day a flying day and so we all found ourselves digging an ice cave at 7000ft with enormous hangovers.

From Base Camp the route follows the main Kahiltna Glacier for eight miles to 10 000ft, where it becomes somewhat steeper, to a feature known as Windy Corner at 13 200ft. From a basin at 14 200ft the route turns up a "headwall" to 16 000ft, then over a col to the north side of the mountain. From the col a sharp ridge leads to a feature known as Denali Pass at 18 500ft and from there a straightforward snow plod takes one along a two mile ridge to the summit.

On 23 February 1982 we started to haul our 1200lb of food and equipment up to

Lieutenant P D Sperry RE

Photo 1. Setting off from 7800ft

10 000ft. This was done over a period of eight days via two camps at 7800 and 9000ft. The glacier was windswept which packed the snow and facilitated fairly quick movement, enabling us on a good day to haul 100lb sleds and carry 50lb rucksacks. We lost only one day during this period when we were pinned down in the ice cave at 7800ft by a 100mph wind coming down the glacier from the Kahiltna Notch. In fact we found that we could operate in 60mph winds but obviously movement was slow. Up to now we had been using the ice caves of an Anglo-American party who had flown in a few days before us to attempt the first winter ascent of the South Face of McKinley.

From 11 000ft the steepness of the route precluded the use of skis although sleds were hauled for a further four days, so that by 7 March we were in a position to establish Camp 4 at 14 200ft. The move up to Camp 4 was long and tedious in high winds and white-out conditions but the weather began to clear in the late afternoon as we started to dig the ice cave. It was whilst digging the cave that we noticed three figures decending the "headwall' from the col at 16 200ft. It could only have been the Anglo-American team descending having climbed the South Face—a fantastic feat in winter. We set off up the slope to greet them and they were obviously overjoyed to see us as they were very exhausted; the two Americans, John Waterman and Mike Young, having frostbite. We dug one large ice cave for all of us and rehydrated the others enough for them to be able to continue their descent the following day.

This camp was crucial in that it was the last acclimatization camp. From here the decision was made to split the team into two: Andy Simkins and Wayne Morgan would attempt the Summit first, whilst the remainder of us followed twenty-four hours behind on a second summit bid.

Two days of acclimatization followed by a load carry to 16 200ft saw Wayne and Andy ready to move up for their summit attempt. On 10 March they moved up to a camp at 16 700ft while Jon and I carried a load to 16 200ft. Unfortunately Bernie was not acclimatizing too well and had to stay behind at Camp 4. Walking over the col from the South to the North of the mountain at 16 200ft was like stepping from one world into another; the ambient air temperature dropped from a quite reason-

able −40°C to −60°C and the effect was to drastically reduce operating efficiency and speed of movement. I could then understand why Andy and Wayne had only gone to 16 700ft instead of the planned 17 000ft—much more time was needed to perform even the most simple tasks in order to prevent frostbite.

That evening, whilst Jon and I decended to Camp 4, we received a radio report that bad weather was expected within twenty-four hours. A decision had to be made and it was obvious that to avoid bad weather the summit pair would have to "go for it" from 16 700ft the following day.

Thursday 11 March, summit attempt day. Jon, Bernie and myself set off from Camp 4 but again Bernie could not acclimatize and indeed became so ill that she had to descend. Jon kindly volunteered to descend with her, thus precluding any chance of his own summit bid, and I carried on solo up to 16 700ft to await Andy and Wayne's return. There, I spent a couple of hours extending the existing ice "scrape" to accommodate three people until at 1730 Andy and Wayne returned looking exhausted, dehydrated and disconsolate.

It was obvious they could not have made the summit. They had turned back at 19 100ft when it became apparent that they would not have reached the summit until 1900hrs which would have meant an enforced bivouac. They estimated the temperature with "wind chill factor" to be −120°C and a night out in those temperatures would have definitely resulted in amputations or even death. Their decision to turn back was particularly frustrating as all technical difficulties were over and they only had a mile long easy angled ridge to the summit; but in those temperatures they could not generate enough heat to maintain core body heat. Consequently the blood supply to the extremities was being reduced which meant that they were slowly getting frostbite as they were moving. To relate to this temperature Andy and Wayne told of the occasion they tried to drink some tea; Andy held the cup in his heavily mitted hands and Wayne poured the tea from the flask (which we can assume to be about 70°C)—as Wayne poured Andy spilt the hot tea onto his rucksack; it fell as droplets of ice. It had frozen in a split second!

All that evening we rehydrated and took stock of the situation. We were enthusiastic to carry on as the weather had not yet broken and psychologically we felt fine.

The following morning we planned from our sleeping bags: we would load carry

Photo 2. Digging the ice cave (Camp 3) at 11 000ft

Photo 3. Approaching Windy Corner 13 200ft

to 17 200ft and make a summit bid the following day. However, we had not counted on the debilitating effect of the cold. It took us two hours to put our crampons on (it takes about four minutes in a warm room) and our superficial frostbite was obviously getting worse. A storm was approaching and after a lot of discussion we decided that to go on would result in amputations. Were we prepared to accept that? Before we set off I had said that no summit was worth losing fingers and toes for and having decided that this would be the result of any further summit attempts there was only one decision to make and that was to return down the mountain. The situation was very frustrating; our minds were ready and enthusiastic to continue, the route was easy, but our bodies would not function.

So with heavy hearts (none of us had really been so emotional about a mountain before) we packed our kit and returned back down the mountain to join Jon and Bernie.

Photo 4. Jon Ayers at 14 000ft—sunset

The Coolest Climb 3,4

However, our adventures were not entirely over. Bernie fell 30ft down a crevasse between 9000ft and 7800ft. The lip of the crevasse collapsed and down she went with her 120lb load. I happened to be on the end of her rope so after ascertaining that she was unhurt (very luckily!), a quick descent into the crevasse to cut away her loads, and about forty minutes later she emerged looking none the worse for wear and having found the whole experience rather fascinating!

Finally on 24 March, after ten days in our tents in bad weather at Base Camp, Doug Geetings' co-pilot managed to fly in and return us to the delights of Beautiful Downtown Talkeetna.

Although we had failed to reach the summit we were all happy that the decision taken was the correct one and this was reflected by the hospitality received from the Alaskans on return to Anchorage.

Would I return? My toes say "NO" but my heart says "YES" and so it remains to be seen which will win.

73 Engineer Regiment (V)—An History

CAPTAIN R J GRIFFITHS RE

Bob Griffiths was commissioned in March 1976 from the ranks of the RE Survey Service. He was appointed as a Tp Comd in 3 Fd Sqn and subsequently as 21C 23 Amph Engr Sqn. He served as Adjt to 73 Engr Regt (V) and is at present SO3 RE at HQNI prior to attending Staff College. His article is extracted from the concise history of the Regt compiled by Lieut E C Banks RE during the latter's tenure as RSM of the Regt.

Our Party, with the remainder of the *Exercise Summer Sales* Staff, had settled comfortably in the plush wide body of the DC10 content to put behind us the vicissitudes of a Corps CPX and look forward to that weekend's exercises on Salisbury Plain the next day. But the Friday afternoon "flap" had already crackled across the ether and Commander 30 Engineer Brigade gave it in person as we crossed the Channel. A Lynx helicopter was to meet us at Brize Norton and we were off to take on, and complete, the Engineer work for the Middle Wallop Airshow in celebration of the 25th Anniversary of the Army Air Corps. Trackway was required and a Bailey Bridge to span the neighbouring highway. By the end of the evening we had arranged to take over the necessary equipment, acquire the transport, organise labour and still end up on Sidbury Hill under camouflage nets listening to the SITREPS coming in from the Plain.

The scene is far removed from the Castle grounds of Nottingham where, one Saturday evening in 1859, Sergeant Major "Jonty" White drilled Mr Mundella, Mr Johnson, Mr White, Mr Evans, Mr Simpkin, Mr Berry and Mr Hine in response to the call for several Corps of Riflemen to be raised in order to provide the Regular Field Army with Individual Trained Reinforcements. By 1879 those six men had become 750 under the familiar sobriquet of the "Robin Hood" Rifles. In neighbouring Derbyshire the 3rd Administration Battalion the Derbyshire Rifle Corps (RVC) was also forming. In London a Colonel Wilford suggested that Sergeant Majors of the Corps of Royal Engineers should be appointed to instruct similar

Captain R J Griffiths RE

Volunteers in the Basic Principles of Field Engineering. The *East London Observer* announced the forming of the Tower Hamlets Engineers. For a membership fee of one guinea and the cost of a scarlet undress uniform (£3.10s.0d) the Volunteers appeared in ever increasing numbers. So it was that in Nottingham, Derbyshire and London the origins of Regimental Headquarters (RHQ), 575 Field Squadron (V) and 217 Field Squadron (V) began.

Between their formation and the Boer War the Volunteer Movement was both well supported and popular as the *East London Observer* again illustrates:

"One of the most remarkable demonstrations made by the Metropolitan Volunteers took place on Sunday afternoon on the occasion of the funeral of Sergeant Dransfield. About 3000 men belonging to all arms of the Service paraded. It took 1½ hours to march from the Barrack Ground to Bow Cemetery, at which the internment was to take place and so vast was the crowd that it was with greatest difficulty the procession could move along. The Mile End Road was densely packed with spectators. Every window and every housetop throughout the long route was occupied. It is estimated that 200,000 were present. In the cemetery 15-20 000 had assembled."

The priest aptly summed up the proceedings when he declared:

"One would think that a distinguished Field Marshal had gone to rest, instead of a humble Sergeant of Engineers!"

Nor was this form of tribute unusual. Sergeant Major "Jonty" White, who later became Adjutant, upon his death was commemorated by a bust of himself erected in the Castle grounds at Nottingham on the spot where he habitually stood for Drills. He died in 1889 and a crowd of 50,000 observed a funeral train that numbered 20 000.

Well recruited and popular, the Volunteers were also efficient. The "Robin Hood" Rifles were provided with, in 1895, a range of 800 yards length by the Corporation of Nottingham in order to "register" in their training. In London a local newspaper noted:

"It is not paying too great a compliment to the Officers and Men of this Corps (Tower Hamlets) to say that an unusual amount of interest is attached to this Annual Field Day. Works consisted of Batteries, Bridges, Parallels, Approaches, Field Kitchens, Ovens, Rifle Pits, Pontoons. . . The Colonel was able to speak to the men in terms of praise at the good result of the last twelve months attention to duty."

With laurels growing above the High Tide Mark for the ancestors of RHQ, 575 and 217 Field Squadrons, the predecessors of 129 Field Squadron (V) were achieving much below it, in the muddy waters of the Humber and the Tyne. A submarine mine had been developed by the Royal Engineers at Chatham for the purpose of denying access to enemy shipping along our major waterways. Once prepositioned they could be fired electrically with the target illuminated at night by powerful electric lights mounted on the shore. In 1888 the Humber Volunteer Division (Submarine Miners) was formed to lay and operate mines on the Humber and the Tyne.

With the outbreak of the South African War most Volunteer Units offered their services to the Government. It was decided that one Company would be sent from the Volunteer Battalions of all Regiments of the Line which had a Regular Battalion serving in South Africa. In Nottingham the "Robin Hoods" paraded outside the Guildhall and Captain Turner marched them off to War. They followed the Tower Hamlet Engineers who had the honour of sending the first detachment of Volunteers to the Front. In this same war the concept of this Regiment's fourth Squadron was first developed. As a result of interest prompted by an article in the *RE Journal* two Searchlight Sections were formed at public expense for deployment in South Africa. The lights were used on armoured trains, in hospitals and on the higher positions around Pretoria. Power was generated by steam engines. The men, themselves being expert in this respect, were also used as Drivers and Firemen by the Railway Companies.

In the immediate post-war period both Regular and Volunteer forces were reorganised by the then Secretary of State for War, Lord Haldane. 1908 was the year when the Volunteer Force became the Territorial Force. The exact date being, ironically, 1 April. The "Robin Hoods" and the Derbyshire Volunteers formed Battalions in the Sherwood Foresters. The Submarine Miners formed the East Riding (Electric Light) Company while in London the Tower Hamlets Engineers became the 1st London Division Engineers.

In the year 1914 many of these Territorial Units were actually at Annual Camp when war broke out in Europe. The Sherwood Foresters were bivouacked on the gentle green slopes of Hunmanby on the Yorkshire Coast. Mobilisation elsewhere took place in the Drill Halls and thereafter the country lanes were witness to smart bodies of men fully equipped, marching in the sunshine, accompanied by such horse drawn transport as could be acquired, to their respective Company or Battalion RVs.

The enthusiasm for the cause was matched by the Volunteers' self reliance and innovation in war. Major R H Joseph of the London Engineers converted the existing Dunkirk Pump (Lift and Force) for the purpose of clearing the trenches of sand and water. He submitted designs for improved machine gun emplacements, dug-out frames, bomb carriers, anti-aircraft and machine gun mountings. To meet the initial shortfall of munitions they manufactured grenades from jam tins filled with amatol and guncotton (supplied by Sappers) and ignited by the Bickford Fuse. Night bombing prompted further development of searchlights. The skill of the operators in tracking aircraft in order that the Gunners might engage them forced enemy bombers to a height in excess of 6000 feet so as to reduce their accuracy and effect. During the latter stages of the Great War various Sapper tasks were hastened by the benefit of artificial moonlight created by the lights.

The Sherwood Foresters were fighting at Kemmel in 1915. A young 2nd Lieutenant Severne saved an RE Officer from a collapsing mineshaft at great personal risk. It was here also that the famous "Via Gellia" communication trench was dug named after a well known Derbyshire road. The soldiers managed to bring down a German aeroplane and the CO, Colonel Goodman, secured the dead pilot's cap badge and forwarded it, via the Red Cross, to the victim's parents and widow. He was rewarded by a kind letter of thanks from the widow some time later. The nameboard "Via Gellia" was later recovered and presented to Derbyshire County Council.

The magnificent war record of the Volunteers demonstrated well enough their value in the defence of the country yet on their return from the War the units faced disembodiment and neglect. However, in 1920 they were reconstituted once again as a force and in proper recognition of their service during the Great War His Majesty the King changed their title to the Territorial Army. Such recognition did not alter the atmosphere of pacifism, disinterest and lack of encouragement the TA were to experience in the next twenty years.

On 6 August 1923 a landmark both historical and geographical was created near the village of Crich in Derbyshire. A Regimental Memorial Tower was erected 1000 feet up on the Crich Cliff in memory of the 11 409 Sherwood Foresters who lost their lives in the Great War and to the 140 000 who served in the Regiment. A silver replica still adorns the table of 575 Field Squadron's Officers Mess.

The London Division Engineers had returned from the War in 1919 to be, incidentally, greeted and entertained to a Wrestling Match organised by the populace of Bethnall Green! Under subsequent reorganisation 217 (London) Field Company RE emerged—but not from the wrestling match!

By 1939 the East Riding (Electric Light) Company had become the East Riding (Fortress) Company RE and mobilised to Spurn Point to construct coastal defences. The Sherwood Foresters were re-roled to the Royal Artillery and manned Searchlights. They still, however, wore their old cap badge! It was recognised throughout Lincolnshire in the first of the war years. 217 Field Company had

embarked for France with the BEF in September 1939. They were employed as Corps Troops with III Corps and moved into Belgium to assist in the preparation of an obstacle belt behind the BEF. Nine bridges were blown on the River Lys and then orders were given to march to Dunkirk. Following evacuation they reorganised at Newark and undertook many of the Sapper tasks typical of that period. These included assistance to Civil Authorities, training, developing and demonstrating new equipment and Home Defence.

Our East Riding (Fortress) Engineers had by then become 542 (East Riding) E and M Company RE. While in convoy bound for the Mediterranean Theatre on board MV *Strathallen* they were torpedoed. No lives were lost but their entire equipment scale was. Having re-equipped in North Africa they landed in Taranto, Italy. They assisted in the construction of the largest EPI Club in Italy and followed the drum to Rome building hospitals and Power Stations.

By the time the invasion of Europe was underway our ancestors were manning searchlights, anti-aircraft guns and carrying out our present day Sapper role. During those latter years of the Second World War they gave particularly distinguished service. The "Robin Hoods" now designated the 42nd (Robin Hood Sherwood Foresters) Searchlight Regiment RA won distinction which was recognised in 1951 by the award of the Belgium *Croix de Guerre*. The first citation included:

"Having played an heroic role in the organisation and maintenance of the anti-aircraft defence and defending the freedom of the Port of Antwerp which permitted that port to remain open on 28 November 1944 and causing the failure of the supreme attack of VI Bombs thrown on the English in the region of Treves and Nijmegan. . . Fighting day and night these soldiers accomplished their task in a remarkable manner."

The second citation recited the fact that they had established an anti-aircraft defence without precedent and achieved a kill rate of 97%!

The end of hostilities caused our units to be employed upon occupational and internal security duties. Some units were suspended subsequently and others were disbanded. The TA was once again reconstituted in 1947. The new concept was to produce a Field Army ever ready to take its place in line with the Regular Field Army. Reorganisation and re-roling followed reorganisation and re-roling as successive British Governments attempted to balance the cost of defence against the ever increasing demands of a Welfare State and the rising expectancy of its population.

In 1967 some ninety units of the TA were reduced to Cadre strength. However within the next two years a major shortfall in the Sapper Order of Battle was identified and, on 1 January 1969, 73 Engineer Regiment was formed. The RHQ was manned by those of the "Robin Hoods" who wanted to continue service but were unable to do so in their own unit because of strength reductions. The sub-units were designated 217 (London) Field Squadron (V), descendents of the Tower Hamlets Engineers; 272 (West Riding Artillery) Field Support Squadron (V); and 575 (Sherwood Foresters) Field Squadron (V). The Regiment was also given a REME Workshop and RAOC Stores Section. We were placed under Command of 29 Engineer Brigade.

In 1976 further reorganisation left us under command of 30 Engineer Brigade having lost 272 Field Support and gained 129 (East Riding) Field Squadron (V), descendants of the Submarine Miners. The Regiment has also acquired the only remaining Searchlight Squadron in the British Army; 873 Movement Light Squadron RE (V) now equipped with the modern 30" Xenon Lights from the USA.

The Regiment is the youngest in the Corps and its youth is reflected in the originality, flexibility, and diversity within its history and in the present day role with 1st British Corps. The Volunteer spirit is still very much in evidence, despite what the pundits might say, and those Regulars amongst us who have served with the Regiment have good cause to remember the occasional comment "you Regulars come and go—we will still be here." We hope they will be.

The First Rhine Army

LIEUT COLONEL K H TUSON C Eng, FI Mech E, FIEE

The Author was commissioned in January 1919 and spent most of his service on E and M duties. As SORE (E&M) in Egypt 1930–36 he was responsible to the CE for cold storage, electricity and water supplies, including the construction of a power station at Moascar, building a 800-ton cold storage plant at Port Said and extensions to irrigation and waterworks. On being told by a Comdt SME, together with several other E and M trained Officers, that they had no future in the Corps he retired in 1945 and set up in practice as a Consulting Engineer. Among many interesting commissions, he was called upon to save the 30 000-ton turbo-electric liner Monarch of Bermuda *from the scrapheap after a fire and flooding; to provide a new power station at Benghazi to replace the one destroyed by German and British Sappers in turn; and to extend the hydro-electric station at the Victoria Falls on the Zambesi. In 1966 he became part-time consultant to McLellan and Partners and he continued in practice until 1971.*

NEARLY every Sappery serving today will have spent one or more tours with BAOR. How many of them, I wonder, realize that this is not the first but the second British Army of the Rhine, or know much about the first one of sixty years ago, which marched into Germany after the Armistice which ended the first World War in November 1918? There are still a few of us, long on the shelf, who served in that first Army, and a very few who have seen service in both. The Sapper of today may find it interesting to compare the circumstances and living conditions then with his own experience.

History

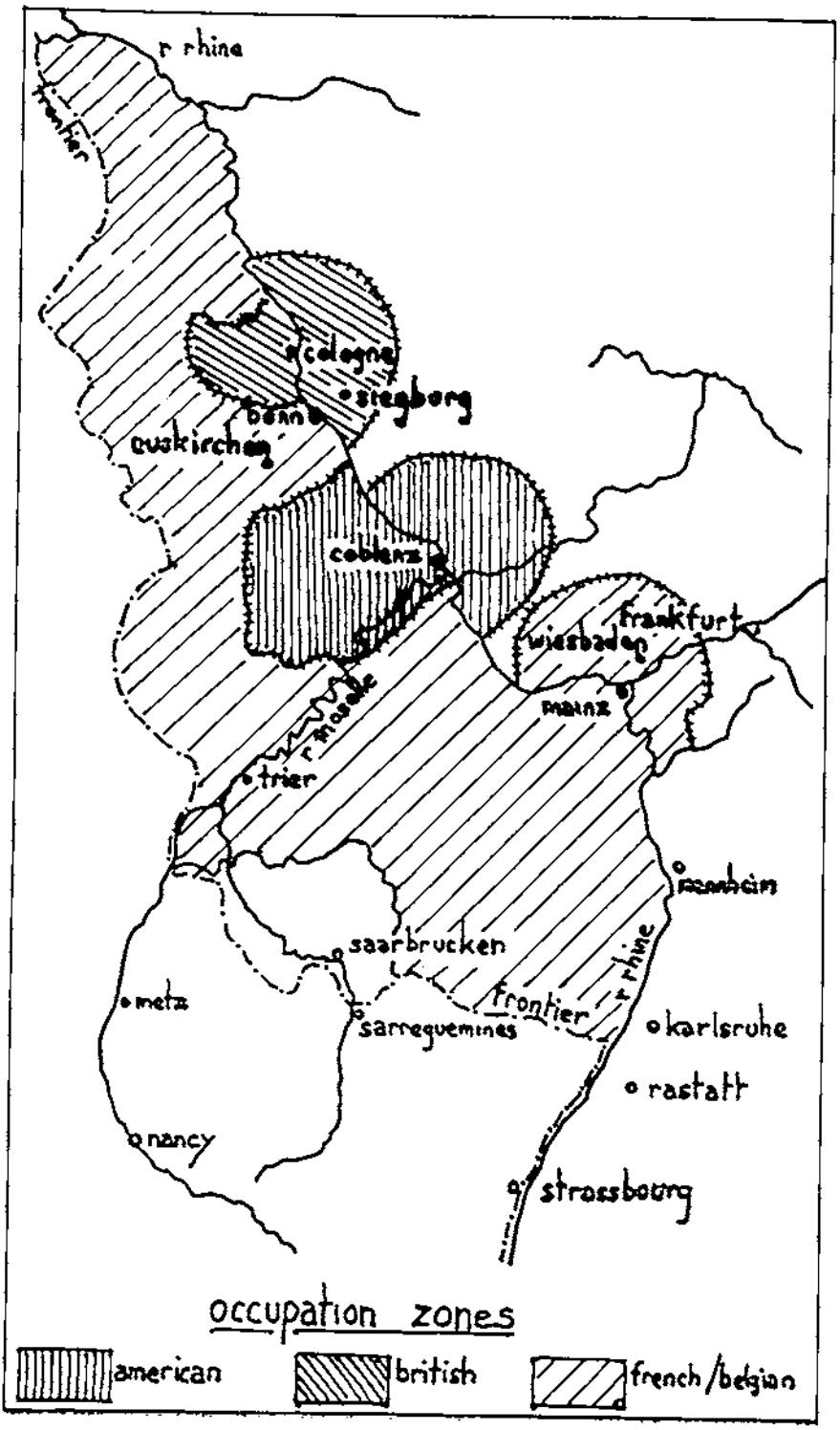
Under the terms of the Armistice, Allied Forces were to occupy an area extending from the frontiers to the Rhine, with three bridgeheads on the right bank extending over semi-circles of some twelve miles radius, as shown on the Sketch. The Americans were allotted the zone centred on Coblenz, French and Belgians an area round Wiesbaden, while the British Zone round Cologne included Solingen to the north, Siegburg to the east and Bonn with the summer resorts of Godesburg (associated with umbrellas since 1938), Obercassel, and I think Konigswinter. So the 2nd and 4th Armies of Plumer and Rawlinson began their march forward on 17 November 1918. The week's delay was decreed to permit the German units and prisoners to retreat without risk of clashes, to enable our troops to smarten up, and the Staff to plan the unprecedented operation. Some units had to move 200 miles.

Keeping some six miles behind the retreating Germans the frontier was crossed on 1 December, the troops entering a countryside with villages, roads and railways undamaged. There was little opposition or animosity; Rhinelanders were friendly people and, having no great liking for Prussians, took the occupation calmly. On 12 December the Military Governor entered Cologne and set up his Headquarters at the Hotel Excelsior on the Domplatz. On the same day the bridgehead was ceremonially occupied.

Wartime Cadets

When the bells rang out on Armistice Day, Cadets at "The Shop", and those Batches which had recently passed out and were doing a six-month "war" course at Chatham, wondered what their immediate future would be. At that time The Shop took in some eighty Cadets three times a year, selected by written examination out of over 300 candidates. The Arm of the Service was decided on entry, the top thirty usually opting for Royal Engineers, the remainder for the Royal Artillery, mostly to the field with a few Garrison Gunners.

In November 1918 the Cadet Entry of the previous autumn, with a larger number than usual of Cadets who had been "dropped" a term, were about to "Pass Out".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r rhine
frontier
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karlsruhe
rastatt
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strassbourg
occupation zones
american
british
french/belgian

The SME at Chatham was naturally not in a position to resume the full two-year course immediately, lacking qualified instructors and equipment, and to continue the short war courses would be a waste of time and delay reorganization. So the authorities decided that the Cadets to be commissioned in January should go to the Rhine Army until Chatham could take them, and offered previous Batches a choice between the Rhine and further engineering studies.

Early Days

The journey to the Rhine was a hilarious one. It lasted a fortnight, waiting in base camps at Havre and Rouen for a variety of slow trains, and then three days and two nights in the slowest of all before we reached Cologne. Accommodation was in cattle trucks and compartments lacking in glass and often without seats. Luggage racks with sleeping bags made bunks and the engine provided hot water. On arrival after a night at the never forgotten "Ewige Lampe", commandeered by NAAFI, we were distributed among the various Field Companies, mostly singly but a few Companies received two; I do not recall any Field Park Companies. The writer went to 206 (Glasgow) Company in the 32nd Lancashire Division, and the next in seniority to 208 and 209 in the same Division.

The Division had its Headquarters in Bonn, then a pleasant medium sized town. 206 Company occupied a pretty village, Putzchen, in woods three miles east of the river in the bridgehead and a little way south of the Bonn–Siegburg road. Soldiers were billetted in the village while we four Officers took over a house in the extensive grounds of a private Mental Asylum as Mess and Quarters. The Company was at little more than half strength. The three Officers not already demobilized were glad of a newcomer, even a raw Second Lieutenant, to share 6·00am stables and regimental duties.

The Wild Year

One soon settled down to a pleasant life. The Matron was friendly and the tennis and croquet lawns were at our disposal provided one did not object to finding a patient standing on his head on a path or having to intervene when one player found another cheating; mallets are much too lethal weapons, particularly in the hands of the mentally disturbed.

The functions of the Occupation were to prevent any reorganization of the German Army, many of whose Units were intact, and to ensure compliance with the terms of the Armistice and the subsequent Treaty. Throughout the occupation reparations were the main bone of contention. These functions occupied a large staff in Cologne but did not involve the troops in the countryside except on rare occasions such as a search for illegal arms or the arrest of a budding *Fuhrer*. The main problem was to keep the men, only anxious for demobilization, occupied and cheerful. Military training was unnecessary and education facilities in an embryo state. For a while the writer received extra pay as Unit Education Officer, though his only task was to keep, in his room a dozen textbooks in which no-one showed any interest. Sappers were lucky since many were employed on maintenance of requisitioned buildings, supervision of German labour, checking bridges for explosive charges, and construction of rifle ranges. My Company made a swinning pool and I spent a week with an Infantry Battalion in quarters overlooking the Rhine showing them how to build a Moir pillbox, a structure housing a machine gun and constructed of concrete blocks. A very early impression and a tribute to our predecessors was the respect shown by quite senior Officers of Other Arms to the opinion of a Sapper Subaltern with a few months service.

Sport of all kinds was the chief resource. Football of course with leagues and knockouts, tennis and cricket of a high standard. Horse shows and racing were very popular. One of our Batch secured many trophies in competition with the cream of the Cavalry, and others backed him up. Another took issue with the Rhine in a light skiff and speedly found himself upside down many yards from his starting point. My CRE, later Managing Director of a firm of switchgear manufacturers, was, like myself, a keen tennis player. Two motorcycles, a Douglas and Triumph,

arrived in May and many an afternoon one was employed taking me to the courts of Bonn with no questions asked. One of the highlights for the author and some others was a first flight, by courtesy of the Royal Air Force. We flew up the Rhine through the majestic Siebengebirge well below crest level, a somewhat alarming introduction to the age of air travel.

Apart from sport many other activities were available. There were many good restaurants, certainly in Cologne and Bonn. Half the seats in the Cologne Opera House, which quickly returned to normal, were reserved for troops, and the rapid Bonn-Cologne tramway made access easy. During winter evenings some of the Batch studied German; one took a course in Electrical Engineering which stood him in good stead at the SME two years later.

One feature of life was the daily "*Cologne Post*". In 1919 London papers took three days to reach us, and one Captain Rolston of the Buffs obtained GHQ approval and became the first Editor, using local compositors and staff with only a slender knowledge of English. The paper continued for ten years though in 1926 financial troubles reduced it from daily to twice weekly publication. There was no censorship, but international news had to be brief and without comment. The sporting and home news, brought from London by courier or GHQ communications, was an invaluable tonic to all of us.

During the hear the value of the mark fell from 37 to the pound to 200. A Sapper Second Lieutenant's pay was 9/- a day, plus 2/- Engineer pay and the Army of Occupation bonus of 3/6. This bonus was to recompnse for the long delays for demobilization, but the few Regulars also received it. While of course not qualifying for War medals (except one of us who found himself in Archangel) we did receive a gratuity of £35 in Savings Certificates, presumably because we served before the signing of the Peace Treaty.

German Relations

Relations with the Rhinelanders had to be not only correct but severe (in the words of our orders "intercourse must be limited to the essential"). In practice the British approach was more relaxed than the French or (theoretically) the American, but no-one was supposed to be seen in public with a German. Curfew was at 7 o'clock, men had to take their hats off to Officers and if they didn't we had to make them. Travel was free, seats in trains and buses had to be vacated and Germans cleared out of any compartment we required. The Civil Administration continued to function including their Courts trying cases between civilians. A Summary Court of Justice was set up to deal with offences against occupation ordinances or troops. In view of the known character of the German race it was essential to make them realize that they had lost the War.

J-Day

On many occasions during the Occupation the Reich resisted the terms imposed on them and obstructed their execution in every possible way until brought to heel. The first of these occasions was in June when the Germans at Versailles proved awkward, and provided us with a little excitement. Accordingly on 28 June the Occupation Forces, including some 60 000 British, moved forward to the perimeters of the bridgeheads in full martial array, preparatory to further advance if the negotiations failed. The overall plan, French in design, was to move forward sixty miles in one bound and then a futher sixty to surround Prussia and the rest of Germany with a steel barrier, completed by Czecho-Slovakia, Poland, and the British Fleet on the south, east and north. But the Gemeran negotiators perhaps fortunately gave in and we all returned to our previous stations.

In December my Batch was recalled to Chatham as No 1 Junior Officers (JO) Course, the first after the War to take the full two-year course. Those Cadets commissioned in 1918 and previously, had to wait many years before returning to the SME on Supplementary Courses, but had the inestimable benefit which we JOs missed of a year or more at Cambridge. And so ended what one writer calls "the wild year". Never again did the Army provide me with a horse and groom as well as

a motorbike to employ as I wished. Perhaps in our seniors' view not a good interlude between the discipline of the Shop and that of Chatham, but one which those who enjoyed it will never forget.

Subsequent Events

The Treaty of Versailles was ratified in January 1920 and laid down that the Occupation would continue for fifteen years at least. Control rested in the hands of an Inter-Allied High Commission, consisting of a permanent French President with a casting vote, one Monsieur Paul Tirard, and Belgian, British and American Members. Since the Belgian Member invariably supported the President the views of Britain and America were ineffectual and the French could and did pursue unhindered their aim of separating the Left Bank States from the Reich and associating them in some way with France.

In 1920 Regular units replaced War Battalions and Army wives were allowed to join their husbands. The main feature of the next few years as the collapse of the mark, turning the occupying troops into millionaires from 1921 to 1923 when the mark dived to a fantastic figure and a suitcase was necessary when shopping, and bringing them back to reality when the exchange recovered in 1924.

In 1923 France occupied the Ruhr regardless of the disapproval of Britain and America and remained there until September 1925. The ostensible reason was the Germans' failure to deliver a load of timber for telegraph poles as reparations within the period required by the Treaty; the real one was that she wished to lay hands on the Ruhr coal and steel production. Although we refused to take part many difficulties arose with Customs barriers round our zone and the handling of heavily loaded trains returning to France with Ruhr products. The Rhineland system was centred on Cologne and we were "awkward" when it came to handling these.

The Cologne bridgehead was due to be evacuated in 1925, but as Germany was defaulting on her obligations we stayed put for another year. By that time the strength had fallen from some 60 000 in 1919 to 20 000 of whom 9000 moved to Wiesbaden, which town was evacuated by the French who moved the troops stationed there to Frankfurt and Mainz. Negotiations aimed at balancing the Allied desire to ensure compliance with the terms of the Treaty and the German wish to avoid reparation payments and to get rid of the Occupation Forces continued for the next few years. With the admission of Germany to the League of Nations and the death of Marshall Foch the French attitude eased and the terms for our departure were settled. The British force of 6500 left in September 1929 and the French and Belgians in 1930, the Americans having withdrawn some years earlier. The last Regiment to leave was the 2nd Royal Fusiliers who had been in the van of the advance into Germany in 1918, and the last Sapper unit the 7th Field Company.

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The New (Ravelin) RE Museum Appeal

It would be greatly appreciated if donations could be forwarded as soon as possible.

If you have mislaid your forms (enclosed in the March Issue of the *RE Journal*) the Secretary will be only too happy to forward new forms.

Memoirs

COLONEL P D MACFEAT CBE MC B Sc C Eng FICE

Died 14 July 1982, aged 94

COLONEL PETER D MACFEAT who died at his home in Edinburgh was both an Engineer and administrator through two World Wars and over much of the underdeveloped world. In his retirement he wrote privately *"Some Memories"* and these I quote below.

He left Glasgow High School in the summer of 1905. He writes "I had two gold medals which I have lost, and some ornamentally bound books—which I have never read. More important was having been Senior NCO in the Cadet Corps; having shot for the School at Bisley; and having played for the First Fifteen. My plans for the future were vague. I liked using my hands and toyed with the thought of surgery, but plumped for Civil Engineering as perhaps the best way of seeing the world".

He graduated from Glasgow University in 1908 but stayed on to teach and to command the Engineer Section of the OTC. As the University Courses occupied the six winter months only, he was able to spend the summers with Sir William Arrol, the bridge builder, and gained some excellent experience of erection work. War with Germany, however, was in the air and to prepare himself for the coming Armageddon he was commissioned into the RE Special Reserve in March 1910 and was posted to 8 Railway Company in Longmoor.

His first posting was on secondment to the PWD in Nairobi in 1931. His task there—to lay thirty miles of steel pipe for the Mombasa Water Authority. The highlight of the tour was a two month safari in Nyanza Province marching from Uganda to German East Africa. It was this, more than anything, that taught him to love the freedom of the underdeveloped world.

When WW1 was declared he returned to Britain in a mad patriotic dash to join the Colours. He was rewarded by a posting to Longmoor, this time as Assistant Adjutant, to work long frustrating hours welding together new units for the front in France. His own opportunity did not come until 1915 when he was sent to Abbeville to command a railway laying unit. When the Artillery produced a target he would select a site where a spur might be built for the 12in and 200 ton howitzer. Then with a theodolite he would take star bearings to fix the true north. At daybreak the Sappers came out and laid down a curved spur where the track was tangential to each chosen target. This was necessary as the gun could only fire straight ahead. Except for a short period in the MOD, recovering from a wound, he stayed in France until the Armistice, finishing as Assistant Chief Inspector of Railways and rewarded with an MC and two MIDs.

He married Maud Cherry, whom he'd met when she was serving in Germany in the WAAC, in January 1919 during a two-week leave in Scotland before departing, on a year's unaccompanied tour in Siberia, as British representative on an International Committee to refurbish the railways in Vladivostok. Vladivostok was then

Colonel P D Macfeat CBE MC B Sc C Eng FICE

the *ultima Thule* for Russians escaping from the Reds. The population had trebled and many were in great distress and suicides were frequent.

The following year he moved, now a civilian, to Tong-sang in China to join the Kai Lan Mining Administration first as deputy to Pat Young, his old wartime Chief Inspector, and subsequently to succeed him as Chief Administrator himself. He stayed there for twenty years. The Mines were part British and part Chinese owned, and covered an area of 900 square miles. They were run under a British general manager and the output was about seven million tons annually. The mines were self-contained with their own port, eighty miles of railway, a fleet of steamers, and all the infrastructure necessary to look after the 50 000 people that they employed along with their families.

Life was never dull; socially, with the St Andrews Society, the Country Club and the Gymkhana; politically, with the warlords waging war and Japanese puppet government maintaining the peace; and with the Company for whom he was running the mines. He writes "It was obligatory to take one's hat off to a Japanese sentry, so whenever I attended a ceremony I always went bareheaded whatever the weather".

News of the declaration of War with Germany in 1939 reached Colonel MacFeat in China. Being still liable for military service he resigned and set off to find a war. This he found as CO of the Bush Warfare School at Maymu, near Mandalay. The dual responsibilities of the School were to train guerillas, to go into China as experts in demolition, and to operate an L of C on the Burma Road to supply the RAF in China. With the fall of Burma and the group in tatters he flew to Calcutta and joined the Director General of Munitions. Here it was *fiddle-fiddle* all the way. When a contractor needed tin the amount was calculated generously by young assistants in Contracts Branch. The work could take less than the tin ingots purchased from Government stocks and this had to be bought back at inflated prices on the black market. Ingeniously by selling in the first place at Black Market rates he was soon able to stop this swindle. About this time complaints came from Indian units in the Near East of grave shortages in Medical supplies and the C-in-C India ordered that the system be reorganised. This task was passed to Colonel MacFeat and this, despite a bet by a friend that he would be "off his rocker" in twelve months time, he managed. By 1944, the work done, he was sent home to the India Office and from there onward to the USA to arrange for heavy medical equipment on Lease Lend. By 1945 it was running well and he was delighted to be asked to join the Control Commission in Malaya as Chief Administrator in Penang. The sudden Japanese surrender presented something of a problem as planning had been on the assumption that the taking over of the Civil Administration would be a progressive affair, dependent on the progress of the fighting. At least Penang had no trouble though some other States did.

Despite a cable from the Directors of Kai Lan Coal Mine and two other opportunities in the Middle and Far East he decided to return home after eight years absence. He was therefore delighted to be offered a chance of going to Germany and in August 1946 he joined the HQ of the British Control Commission in Berlin, firstly to run a Committee dealing with the allocation of captured industrial plant. Later he took over a new Division set up to control captured stores and enemy vehicles. For the latter he moved to Bielefeld and then Hamburg as the task included dealing with over 800 ships and other floating equipment. Amongst ships broken-up was the battle cruiser *Hipper*. She had her thick teak decks stripped and it is rumoured returned home for parquet flooring at the Ministry of Defence!

Towards the end of 1953 Colonel MacFeat started to wind up the organisation for his retirement. As an epitaph he quotes William Ernest Henley:

"It matters not how strait the gate
How charged with punishments the Scroll
I am the Master of my fate
I am the Captain of my Soul"

JCG

COLONEL J R RAWLENCE OBE, MA

Born 23 September 1915, died 17 January 1983, aged 67

JOHN ROOKE RAWLENCE was born in Brockenhurst the son of a surgeon and was educated at Wellington and the Shop. He was a man who blossomed early and one on whom command sat easily, with his splendid sense of humour, wisdom and compassion.

At the Shop he was appointed Senior Under Officer and won the Sword of Honour. In his young days he was a highly successful athlete, particularly at rugger and at cricket; many will have vivid memories of the "Flying Prince" Obolensky, coming across from the other wing, catching John just as he was going over in the corner in the 'Varsity match of 1936; or of his opening the innings for the Army at Lords, when he made a half-century.

He went out to India in the summer of 1938 to join the Bengal Sappers and Miners and by 1942 was commanding his own company in 17 Indian Division during the retreat from Burma. When his CRE was promoted the General asked for John to replace him. Alas, by the standard of the E-in-C in New Delhi in those days, John was too young to be a CRE. On his return to Europe in 1945, John spent a short tour at 140 OCTU, but he then elected to specialise in Military Survey, attending what later became known as the "Brigadiers' Course" at the Survey Training Centre, in the company of Arthur Walmesley-White, Michael Cobb and the late David Griffith (*RE Journal* March 1982).

He served with distinction in Military Survey, commanding the School of Military Survey in 1952–54, serving at HQ AFCENT in 1957–59, completing two tours with the Ordnance Survey and one in the important staff post of AD Survey 1 in the Directorate. In all these posts he brought a high standard of dedication and professionalism to his duties and those who knew him well are certain that had he not chosen to retire at the early age of 47, he would have reached the top in Military Survey. However, despite the urgings of his seniors for him to stay on, retire he did. But all was not lost, for Brigadier Lew Harris, then Director of Military Survey, had the inspiration to recruit John into the Scientific Civil Service, for which his Cambridge degree qualified him. John was then appointed to head the important Survey 6 staff branch in the Directorate, which deals with all field and geodetic surveys required by Military Survey, including the technical control and direction of 512 Specialist Team Royal Engineers which is based in Washington DC. John's wide knowledge and experience proved invaluable, not only in his specific post, but by his general presence in the Directorate where many an aspiring young staff officer could find a wise and friendly source of advice. It is only with hindsight that one recognises that his greatest talent was that of letting those to whom he was giving advice believe that they had really reached the solution themselves.

John was a modest man of great personal charm with a fund of commonsense, a wonderful friend and true mentor to all who knew him. Both his intellect and ability were formidable; he could assimilate any problem and produce a well thought out solution almost at once. A skilled raconteur, he had an apparently unlimited fund of stories to tell, often with an absolutely poker face until at last he had to give way to suppressed laughter. This seemingly inexhaustible fund of stories was undoubtedly based on fact, but not too closely, and whatever story he told he never consciously hurt anyone.

Colonel J R Rawlence OBE MA

In 1975 he had to retire for a second time, this time on account of age, but still wishing to be of service he took on a modest clerical post in the Civil Service, which he held until illness finally forced him to give it up.

Our deepest sympathy goes to his widow, Audrey, and to their son and daughter. Their grief must be tempered by happy memories of a man who was throughout his life a wonderful friend to others, a very capable leader and a kind, generous person.

• EWB, MHC, EMH, AW-W, and others

LIEUT COLONEL P E ANDREWS MBE RE

Born 8 April 1932, died 16 January 1983, aged 50

PETER EDWARD ANDREWS was a man dedicated to the Army and a soldier admired throughout his service by his contemporaries, by his superior Officers and by those who served under his command. His links with the Army began at his birth, his father having been a Regular in the Cheshire Regiment, retiring as a Major in 1946.

Peter was educated at Runcorn School until he enlisted as an Apprentice Tradesman at Taunton in 1948, moving with the Apprentices School to Harrogate a year later. It was in those early days that his prowess as a sportsman and his personality as a leader began to develop. He was a strongly-built youngster whose skill and superb fitness enabled him to excel at many sports, in particular rugby, boxing and gymnastics. At the same time his extrovert and generous personality ensured his popularity with his contemporaries and his recognition as a natural leader. This led to early promotion to Apprentice Tradesman Sergeant and to his being placed in command of new intakes. Many a soldier who joined the Army in 1950 and 1951 will count himself fortunate to have been guided through those first strange weeks by Peter Andrews.

Peter served his first two years of man's service in Singapore, gaining his first stripe during that tour, but in 1953 he returned to the UK for a War Office Selection Board before being Commissioned on 23 January 1954. There followed a period during which Peter served as a Regimental Officer in Sapper field units at home and overseas, returning to Military Survey in 1963 as Adjutant of 42 Survey Engineer Regiment. This was followed by a tour as Adjutant of the School of Military Survey before he became a student on the Army Survey Course—an unusual selection for a Short Service Officer but his obvious ability demanded further training.

Nobody would pretend that Peter was an academic type—he would laugh at the idea—nevertheless he worked consistently throughout this demanding course and achieved excellent results. His Instructors' reports echo with phrases such as "determined application", "sound and reliable", "good commonsense", "excellent practical work" and "an excellent example as Course Senior". He proved that he was well up to the academic standards required and quite capable of competing on level terms with his Regular contemporaries. A few years later, after waiting patiently for the opportunity, he was himself granted a Regular Commission, to his immense delight.

In 1966 he returned to Cyprus to command No 1 Air Survey Liaison Section,

Lieut Colonel P E Andrews MBE RE

working alongside the RAF Photo Reconnaissance Squadrons. This small but efficient unit was responsible for directing numerous photographic missions which provided the source material for many of the maps of the Middle East, including the Western Aden Protectorate, Oman and the Trucial States, as well as missions in Sierra Leone and The Maldives. Despite the travelling Peter, as a true sportsman, still managed to Captain the RAF "Griffons" Rugger XV in Cyprus as well as being, with his wife Jill, one of the leading water skiers in the Akrotiri Water Ski Club. Peter had always been noted for his superb fitness and his exceptional ability in a variety of sports. In Cyprus his small unit won the RAF Station Commanders Cup, awarded in a competition of seven different sports. He was only put off balance once during that tour in Cyprus—he fell off his bike when carrying a load of beer! Not entirely his fault as it was traced to a temporary touch of Meunierés Disease which affects the balance in the middle ear.

Peter commanded 14 Field Survey Squadron in Germany in 1974 and 1975 and once again instilled in all members of the Squadron tremendous pride in achievement and unswerving loyalty. It was during his tour that the Squadron celebrated its 150th Anniversary, and what a celebration that was! This whole ambitious series of events was organised by Peter and Jill with every member of the Squadron, and their families, playing a part. It was an immensely successful celebration, the memory of which still brings a warm glow to all who were fortunate enough to have been invited.

Success was not limited to this Anniversary. The Squadron developed the first mock-up version of the now universally-known TACIPRINT and developed other technical procedures for rapid response support to 1(BR) Corps. But in addition they moved from the position of winning no rugby matches in 1973 to becoming Rhine Area Minor Units Champions twice by 1975, BAOR Minor Units Champions twice and winners of the RE Rugby Cup—all without fudging the postings! There is no doubt that much of this success was due to Peter's personal involvement and the encouragement he gave the team. He also found time to play hockey, tennis and squash for the Squadron! In the New Years Honours for 1976 he was awarded the MBE for his command of 14 Squadron.

A similar picture emerges from Peter's command of 42 Survey Engineer Regiment in Barton Stacey in 1977 to 1980. He was an extremely popular CO, not because he courted popularity, but because he was a natural leader who inspired others by his own example and by his generosity to his fellow men, of whatever rank. Under his command 42 Regiment repeated the successes of 14 Squadron but on a larger scale.

Peter's last tour was as a Staff Officer in HQ AFNORTH in Oslo. In the two years he was there he played squash with the Norwegians and generated such interest amongst the population that he became coach to the national team. He took them from a relatively lowly position to competing in the World Championships in Sweden in 1981 and the European Championships in Wales in 1982. The Norwegian National Squash Association plan to establish a "Peter Andrews Memorial Trophy" which will be competed for annually at the National Championships. Once again Peter's magic touch in sports has found its mark!

Peter was a true sportsman, a generous man, and an inspiration to many. He was also a family man, perfectly complemented by a wife who took care of a lot of the details and supported him in every venture. All of us who have had the good fortune to have known Peter well express our great sorrow and sympathy to Jill and their three sons at this untimely loss, in the Ankara air disaster, of such a fine man.

EWB, JFC, RAE, DPSW, MPBW, PHW

* * * *

Have you sent your donation to the RE Museum Appeal?

Correspondence

Brigadier N H Thompson B Sc C Eng MICE
HQRE 1st British Corps
BFPO 39

Engineer Support in 1st British Corps

Dear Sir,—I welcome Lieut Colonel Peter Sheppard's article on the future of the Royal Engineers in the close support of operations by 1st British Corps. Some details and organisations cannot be discussed in your pages, but it profits us all to consider how we should tailor our support to match the needs of those who do the fighting.

Lieut Colonel Sheppard has direct experience of the needs of battle groups, brigades and divisions, and has also worked at Corps. While I do not believe that our credibility is in danger of being lost, I do think that our ability to influence the armoured battle, once it has been joined could be greatly enhanced.

The re-formation of 32 Armoured Engineer Regiment is evidence that its role has been fully acknowledged and further expansion will depend more than anything else upon how those armoured engineers perform. To provide armoured engineer squadrons at brigade level would be a huge bonus. We do put troops there now and the more they work and train with their formations the better. Unfortunately several techniques need developing, the kit is old and not all of it is compatible with the integral logistic support of an armoured regiment. A squadron of say 120 men, with only twenty pieces of armoured engineer hardware, is a good slice of the brigade, and in the modern financial climate those vehicles will have to be procured in competition with bids for Sabre tanks, self-propelled artillery and mechanised combat vehicles. To justify that slice our contribution must be understood and successfully experienced by other arms. An armoured engineer squadron under command of each armoured brigade would be greatly valued by brigade commanders, as would the Sapper advice which came with it. One wonders whether the capability would be adequately used in peace, or economically used in war. There is a conflict here with the principle of centralised control of engineers giving best use of resources.

I smiled when I saw that the only really effective support which was not to be tampered with was deemed to be the engineer regiment at divisional level, and that the Commanding Officer was to replace the Commander Royal Engineers. Arguments of rank and the confidential reporting aspects must be subordinate to the needs of the operational support we provide. The Divisional Commander in war will expect to have his Commander Royal Engineers and Commander Royal Artillery close at hand to give advice. This is standard procedure, but in peace, if the Commander Royal Engineers was very busy commanding his unit, the relationship might easily fall away. The Commander Royal Engineers would, as proposed, have technical responsibility for three armoured engineer squadrons, and command his own three mechanised field squadrons and a field support squadron. His division may well have other engineer assets allocated from Corps. In peacetime the Sappers might easily lose out without a Commander Royal Engineers resident at divisional headquarters.

Under the Sheppard arguments we are left at Corps level with none of our current assets except amphibious engineers, but reserves are essential. We will not get more manpower easily. It is unrealistic to pretend that divisional Sappers could be rapidly switched to Corps tasks without justifiable complaints from their owners. Obviously this may be necessary but there must be reserves available to Corps Headquarters, and the Corps Commander needs a Sapper adviser by his side during the battle. The G Staff cannot be an adequate substitute for Royal Engineers

staff as they would not see Sapper problems as clearly.

We are already moving towards some of the adjustments Lieut Colonel Sheppard advocates. We do not have the support at brigade level perfect, but at division and Corps we have good support and representation. We can control operations during obstacle preparation, and subsequently provide support with economical and flexible use of our equipment and men.

Whither we go must depend on the weight we Sappers in 1st British Corps can carry with all arms commanders and their staff, and the degree to which our role in the real battle is understood by those we support. We must prove ourselves by deed as much as word for the message to get through. Because exercises are so different from war we have a major challenge in this respect. Our officers must involve themselves and understand the all arms battle and we must all use what resources we have economically and effectively. If we do this our customers will know what support is available and what they want from their Sappers. They will then help us to get the enhancements we need.—Yours sincerely, N H Thompson.

Major A F M Douglas RE, MA
31 Armoured Engineer Squadron
BFPO 104

Should Civil Engineering Die at RMCS Shrivenham?

Sir,—I was interested to read Professor Wood's article on Civil Engineering at RMCS in the March issue. I was the Secretary of the Killick Working Party during my previous posting, and I may be able to clarify some of the reasons why the recommendation was made to abandon Civil Engineer degree training at the College.

As those in MOD know, military and civilian manpower has been severely reduced in recent years. DGAT has to man all his training establishments from a reduced allocation. RMCS is one of the largest employers, but it was hard to identify where savings could be made. Included in Brigadier Killick's terms of reference was a requirement "to identify the maximum scope for economies, especially in civilian staff . . ." at RMCS. This was regardless of finance although a proposal that would cost more would have been unacceptable. At no time was financial saving used as an argument for closing the Civil Engineering Department.

Recruiting to the Corps has increasingly been from graduates. It was confidently estimated that only seven to ten officers each year would require Civil Engineering degree training equivalent to that provided at RMCS. The establishment of forty-three (and actual manning of thirty-four) in the Civil Engineering Department was felt to be very high to support the twenty-one to thirty RE undergraduates present at the College, especially as the training could be provided by Universities or Polytechnics.

Of course, the Department provided teaching for other courses also. However, on examination, it was estimated that four academic staff and fourteen support staff could be retained to cover this requirement. This would be too small to justify a separate Department.

The Engineer-in-Chief was consulted about the possible closure of the Civil Engineering Department. His reply has often been misquoted. At no time did the proposal come from his Headquarters, and he stated, quite clearly, that it would only be acceptable provided degree courses were sponsored at Civil Universities for RE officers recommended for in-service degree training.

It was the view of the Working Party that this could be arranged, and the recommendation was made. Incidentally, R Signals and REME were represented at all stages.

On a personal note, I would like to say that the Civil Engineering degree has a high reputation, at RMCS and elsewhere. There would remain a small nucleus of

expertise, probably within Mechanical Engineering Department, to support other courses, particularly the Staff Course. Other expertise is also available at MVEE and RSME to advise MOD. The Review recognised the risks but accepted them, for the overall benefit of the Army.

I cannot fully cover the subject in a short letter, but would be glad to elaborate through your columns or privately if anyone wishes me to do so.—Yours faithfully, A F M Douglas.

Major P M R Hill RE, MA(H), C Eng, MICE
Civil Engineering Wing
Royal School of Military Engineering
Chatham, Kent ME4 4UG

Improvised Bridge Design

Sir.—After a morning spent trying to put across to YOs the way in which engineering structures work, I read with interest Major Smitherman's article on Improvised Bridge Design in the December 1982 issue of the *RE Journal*. Logic diagrams and design performae are an excellent means of making sure a design is properly carried through but the user must have a clear grasp of the reasoning behind them, if he is to adapt them to the unforeseen, which always seems to occur in Military Engineering. About 3½ days of the YO Course are spent on engineering design. This is nowhere near enough to teach an Officer, whose only technical background might be "O" Level Mathematics, the theory behind Major Smitherman's diagram or its UK equivalent. Much of the available time has to be spent explaining basic terms such as stress or density and making sure that the YOs can handle the basic units used in the ME Volumes.

The policy used to be—"Don't confuse YOs with figures. The graduates can read the ME Volumes and work it out for themselves; the others won't understand anyway." We now try to teach all YOs how to use the Tables in *ME Volume 3 Part 1* to select standard steel or timber beams. In the time available, we can only explain in brief outline how these Tables are derived. The average YO uses them blindly and could only design the very simplest of structures—certainly nothing as complex as Major Smitherman's bridge.—Yours sincerely, P M R Hill (Senior Instructor Design).

Further Correspondence

Colonel Sir Alan Harris CBE, F Eng, B Sc (Eng), FICE, FI Struct E, M Cons E
128 Ashley Gardens
Thirleby Road
London SW1P 1 HL

Brigadier W A Fitzg Kerrich DSO MC

Sir,—Brigadier Fitzg Kerrich, the sad news of whose death appeared in the March 1983 Journal, was Chief Engineer VIII Corps in Spring 1942 at Taunton; a very new Subaltern, I was detached from a Field Company with a small party to develop an idea of his for using Dannert wire as a boom to protect floating bridges from mines. (A version was later used on the Rhine).

He dropped in on the test site and, after walking about and chatting, looked me in the eye and said, "What have you done about camouflaging your transport?" In fact, we had driven the trucks under big hedgerow trees and hung nets off the boughs, a three tonner was only ten yards behind him. What a good story it made! I used it for years.

Later, much later, I began to wonder.

Perhaps there are other ways of spreading a gospel than shouting. All my com-

panions who heard the tale of how I had taken in the Chief Engineer got the message that camouflage mattered and learnt one way of doing it. Also when a young man lacking in confidence has done a good job there may be more potent ways of letting him know than by telling him to his face.

Brigadier Kerrich is remembered with admiration and affection. I still wonder a little.—Yours sincerely, Alan Harris.

Colonel S M Hollway OBE MC TD DL
Applecross
Station Road
Heswell, Merseyside, L60 8PW

TA Sappers of Cheshire, Lancashire and W Yorkshire

Sir,—In my letter in the December issue of the *RE Journal* I stated that "In 1864 the 1st Lancashire Engineer Volunteer Corps was raised in Liverpool as Submarine Miners – –". Major McLeman of 72 (Tyne Electrical Engineers) Regt (V) has pointed out to me that the role of Submarine Mining was not undertaken by Volunteer units until 1883 and that, as worded, my statement is incorrect.

I admit my error!!

The Corps were indeed raised in 1864 but there are no records of their earliest role which was presumably a field engineering one: they were certainly Submarine Miners in the mid 1880s. At that time they owned their own craft which was sold when they became a Fortress Company and the proceeds were used to help finance the building of their new Drill Hall.—Yours sincerely, S M Hollway.

Richard Wiggan
14 Sydney Avenue
Whalley
Blackburn, Lancs BB6 9TF

Operation Freshman

Sir,—I am researching into *Operation Freshman*, and would be pleased to hear from any of your readers who may have been in any way associated with this wartime incident involving Royal Engineers.

Operation Freshman, it will be recalled, concerned an ill-fated plan to attack the heavy water plant at Vemork, in Southern Norway, in November 1942. Troops in two gliders, towed by Halifax aircraft, were to make the attack. The gliders crashed, some of the occupants being killed and the survivors subsequently executed by the Germans.—Yours sincerely, Richard Wiggan.

BOOK NEWS FROM INSTITUTION OF CIVIL ENGINEERS

All books in this section are published by Thomas Telford Ltd and are obtainable from The Marketing and Sales Dept, 1–7 Great George, Street, London SW1P 3AA

RESTORATION OF SEWER SYSTEMS

Proceedings of an International Conference in London June 1981: Price £25·00

Many of the sewers in the UK were constructed well over a century ago and their condition is causing much concern. (The media have exploited the problem many times.) However, it has been estimated that to replace the entire system would cost some £40 000m. It is doubtful whether the current UK Local Authorities' expenditure of £100m is sufficient even to keep pace with the rate of decay in our systems. With observations from overseas contributors, this volume evaluates the problems facing Local Authorities and suggests a programme for optimizing the use of the available financial resources. For "specialists" only!

SEVERN BARRAGE

Proceedings of a Symposium in London October 1981: Price £22·00

THE harnessing of tidal power generated by the enormous tides of the Severn Estuary have long been recognized as a potential source of energy. This volume presents comprehensive reports of the wide-ranging engineering and supporting studies which are behind the latest assessment of a Severn Barrage. It is concerned with the feasibility, the economics and the environmental impact. Limited interest.

VERTICAL DRAINS

Papers from a Symposium in Print in Geotechnique March 1981: Price £15·50

THIS book is concerned with the draining of ground and not those (incorrectly) associated with sewers! The past decade has seen significant advances in the development of installation plant and materials used in prefabricated drains. This has been associated with great economy in the labour required compared with that needed for the installations of conventional drains. However, the future of vertical drains as a viable geotechnical process is dependent on cost-benefit. The book contains valuable cost breakdowns and tabulated data from major contracts, including failures and successes. Limited interest.

SEA DEFENCE AND COAST PROTECTION WORKS

R Berkeley Thorn and A G Roberts: Price £13·00

THIS book is a guide to the latest methods of design of sea defence and coast protection works. It sets out the basics with sufficient information to enable outline solutions to be found for most problems and it lays stress upon the most recent design approaches available, in particular the probabilistic method of design with the use of physical and numerical models with irregular waves. Limited interest.

OTHER BOOK NEWS

INTERNATIONAL CONSTRUCTION. MARKETING, PLANNING AND EXECUTION. By Major V L Cox (RE Rtd). Published by Longman. Price £17·00. The book brings together essential information on trading conditions and trends in international construction markets and methods of assessing and entering such markets. Limited interest.

THE SEMAPHORE. By T W Holmes. Published by Arthur H Stockwell Ltd. Price £8·00. The story of the Admiralty-to-Portsmouth Shutter Telegraph and Semaphore Lines 1796–1847 is a fascinating one and includes a section on Pasley's work. Of considerable general interest.

THE NEW ENERGY

ROBERT FITZMAURICE

(Published by Vantage Press, USA. Price US $10·00)

A FIRST novel by an octogenarian retired Sapper who served in WW1 is not common! The Author is best known for his work at the Building Research Station; as one of the early UN Technical Assistance experts to developing countries and as the Author of *The Principles of Modern Building*, one of the best definitive works published on the subject.

The New Energy of the title is based on the controlling of the molecular response of certain substances to gravitational forces and the developing of machines which can utilize the differential gravity effect. A workshop in the wilds of Scotland, the power to defy gravity, commercial interests employing armed mercenaries to destroy the workshops—this is the world of science fiction and James Bond. Yet good science fiction contains much solid scientific knowledge.

Except for an irritating misuse of military terms (very dated) in the early pages, this book is a good yarn, a plausible flight into the plausible, and is very difficult to put down once the service reader gets beyond the first section. This is not uncommon in first novels written by much younger Authors!

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