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Editorial

"HISTORY is bunk!" said Henry Ford Snr, or so we are told. Over the last six months some impressive hard work has been devoted to setting up our own collection of bunk in its new location and, at time of going to press should be open or soon ready to open for members and the public. It may be worth a moment to reflect on why we have gone to this effort and no small expense to make this move and why the Corps is totally committed to a course of developing the Museum into a magnificent celebration of its past achievements on a scale which could make it one of the leading military museums in the country.

Those who subscribe to the bunk point of view were much in evidence when the appeal for the first £50,000 for Stage 1 was launched. Even now many have not subscribed and some who have may feel resentment at the arm-twisting which committed them. Apart from sheer close-fistedness the reasons are hard to pin down. Some disapprove of glorying in the past and the self gratification implied in displaying achievement, especially as the British so often seem to revel more in heroic disasters of little historic significance, such as Rorke's Drift and the retreat from Afghanistan, than in more mundane triumphs. To others "museum" would be better spelled "mausoleum"—a graveyard of events irrelevant to a Corps which should be looking forward to the high technology era of the twenty first century. A museum is not, perhaps, the sort of thing that "with it" people ought to be involved in; more the province of ageing senior officers wishing to indulge an unhealthy taste for nostalgia.

The believers, on the other hand, may also find difficulty making their case. The inertia of the early stages of the appeal demonstrates their failure to win over the doubters. Pure nostalgia is unattractive; the past is indeed past and those who indulge in it obtain gratification in many ways. The pure historian simply takes a delight in discovering facts, in putting the record straight and in interpreting the motives, passions and interrelationships of our forefathers. Many who use our museum in the future may be in this category and they will be welcome. But the academic study of history and its curiosity value for its own sake is not enough reason of itself for committing the considerable resources required for the proposed expansion. We need to keep the Corps in the public eye. Certainly. We hope that many a young man visiting the future museum will have his appetite whetted to try his hand at joining us. However, recruiting will be a spin-off but certainly not a *raison d'etre*. Moreover, unless the displays in the new museum can somehow reflect the Corps as a dynamic evolving outfit so that visitors are inspired to extrapolate mentally to the future, our potential customers will be unimpressed.

While the thousands of the public who we hope to attract to the museum's turnstiles will not only be welcome but essential to its prosperity, the primary reason for existence is perhaps for the benefit of the serving members of the Corps themselves, the group who have used it less than any other hitherto. It will be a symbol of achievement and a source of shared pride but above all it must stimulate. It may be, for example, that a visitor to the museum will be struck by the extraordinary fertile innovation that characterised our Corps in the past and be inspired to revive some of that inventiveness which has been less obvious a characteristic of Sappers in recent years.

Certainly it is to be hoped that both believers and sceptics will find their way to the new museum in the Ravelin building as soon as they can after it reopens. They will find an imaginative and well presented display and it will be a dull stick who fails to see the great opportunity for the future that Stage 1, thanks to the efforts of the outgoing Curator and the Clerks of Works and tradesmen who have been working on the project, presents us all.

Major General C G Gordon CB

This is the text of the Sermon given by the Chief Royal Engineers, General Sir Hugh Beach GBE KCB MC DL in St Paul's Cathedral at Evensong on Sunday 27 January 1985.

ONE hundred years ago yesterday, the most eccentric Sapper General of his day—he was among other things a Mandarin, holder of the Order of the Yellow Jacket, and Field Marshal in the Chinese Army; a Pasha, holder of the Grand Cordon of the Order of the Medjidieh and Field Marshal in the Turkish Army; Charley Gordon was speared and hacked to death by Muslim extremists at the Governor General's Palace at Khartoum. One hundred years ago tomorrow, a relief party in two Nile steamers, under another Sapper General Sir Charles Wilson, came round the last bend on the river and found no flag, no welcome. The siege had lasted nearly a year and they came two days too late. It would have been Gordon's 52nd birthday.

His career had begun, thirty-three years earlier, at the Royal Military Academy Woolwich, badly. He should have graduated as a Gunner subaltern, but there was an inquiry into bullying and it came out that Gordon had hit a junior cadet with a hair-brush—though not very hard. (The Commandant at the time had lost a leg at Waterloo and as Gordon himself remarked "it's a mistake to employ anyone minus a limb to be in authority over boys, they are apt to be irritable and unjust".) Gordon was back-termed, his commissioning delayed for six months and he changed his choice of arm to Sappers.

His career ended far worse. The fall and sack of Khartoum was the greatest victory for Islamic fanaticism in a hundred years. A million square miles of Africa became Mahdi territory, from the Egyptian border to the Great Lakes, from Abyssinia to Chad. The Mahdi and his successor ruled for another thirteen years until the British had their revenge at Omdurman by the hand of yet another Sapper General, Kitchener. If it is difficult to say that Gordon was to blame for what happened at Khartoum, it is certain that he presided over it. The result was abandonment of the many thousands of Sudanese who had trusted him; to arson, looting, executions; and subjection to just the kind of fundamentalist Muslim theocracy that we have learned once again to hate and fear. Yet Gordon himself was acclaimed in every British newspaper as a martyr. Services were held at the Abbey and in this Cathedral, and a large sum of money raised to endow the school which stands as such an excellent tribute to his memory to his day. Why? Gordon himself hated eulogy, and I will try to paint him warts and all.

HE was an inconspicuous figure, short and slight, with an extraordinary way of moving described as half tripping, half gliding. He had curly hair, looked young for his age, spoke in a low, soft but distinct voice, often very fast, and had piercing blue-grey eyes that come out even in the photographs. He ate little—for long periods apparently almost nothing—and such meals as he had were often odd, like a stale loaf with a tea-pot emptied over it. For years on end he took not a day's holiday. He spent a high proportion of his life in most unpleasant climates—the Crimea, Bessarabia (hands up who knows where Bessarabia is!), the Yangtse Delta, Gravesend (not called that for nothing), the Danube, the Equatorial Provinces of the Sudan, Khartoum, Abyssinia, Mauritius, Basutoland—and finally the year-long siege. And yet, he was never ill, and almost never weary.

Even the most critical conceded his genius, as a tactical commander in the field. He appeared to be completely fearless. He carried only a cane. He put himself into positions of appalling danger but was only once wounded and that slightly. He had an extraordinary flair for tactical expedients, stratagems and surprises—often (as befits a Sapper) involving mines, ladders—above all boats. He had the very rare gift, at the height of a battle, of spotting the crucial sector, seeing exactly what had to be done,

MAJOR GENERAL CHARLES GEORGE GORDON CB
(Photographed at Chatham as a young man)

Major General Charles George Gordon CB

issuing crystal clear directions, circumventing set-backs, his brain as cool as a computer. But this reads like a Staff College precis. What no precis could convey was his extraordinary strength of character. At the age of just thirty he was put in command of a private army, 3,000 strong, raised by the merchants of Shanghai from local riff-raff; ill-disciplined, ill-organised, constantly on the verge of mutiny—supporting itself on plunder—liable to vanish into thin air. Gordon drilled them, put them into uniform, armed them systematically, substituted pay for loot. There were some terrible moments when he had to face down the lot of them. Scenes of rage, desperation, summary executions. I quote: "Eventually he attained an almost magical prestige. Walking at the head of his troops he seemed to pass through every danger with the scatheless equanimity of a demigod. The enemy themselves were awed into a strange reverence. More than once their leaders; in a frenzy of fear and admiration, ordered the sharp shooters not to take aim at the advancing figure of the faintly-smiling Englishman." These words come not from one of his many pious biographers, but from the sardonic pen of Lytton Strachey!

The range and power of Gordon's intellect were striking; his views original and modern. He seemed to have no colour prejudice whatever. He served as cheerfully under the Chinese governor of Shanghai as under the Muslim Khedive of Egypt. He had a passion for liberty and justice (his words) and the clearest of eyes for misgovernment. His analysis, for the Times newspaper, of the situation in the Sudan was a classic. I quote again (his words this time): "The Turks, the Circassians, The Bashi Bazouks have plundered and oppressed the people in the Sudan, as they plundered them in the Balkan peninsula. Oppression begat discontent; discontent necessitated an increase of the armed force at the disposal of the authorities; this increase of the army involved an increase of expenditure which again was attempted to be met by increased taxation and that still further increased the discontent. And so things went on in a dismal circle until they culminated, after repeated deficits, in a disastrous rebellion. The Sudanese are a very nice people. They deserve the sincere compassion and sympathy of all civilised men. With regard to Egypt the same principle should be observed. Let your foundation be broad and firm and based upon the contentment and welfare of the people. Hitherto, both in the Sudan and in Egypt, instead of constructing the social edifice like a pyramid, upon its base we have been rearing an obelisk which a single push many overturn. Our safety in Egypt is to do something for the people". Of how many countries could not that be said today?

Of course he had a quite infuriating conviction that he himself was always right and that anyone who disagreed with him was wrong. He had a loathing for red tape and bureaucracy and a penchant for resignation—both threatened and real. When he was invited back to China on an advisory mission; the War Office tried to stop him and the British Ambassador ordered him to remain within the legation compound. He totally ignored both and never as much as set foot in the legation. In Pekin, at meetings with members of the Grand Council, he warned them of the utter folly of going to war with Russia and when the terrified interpreter balked at translating him he picked up the dictionary and thrust it under the Mandarins' noses with his finger on the word "idiocy". In this instance, as in so many others, he was maddeningly right. He really did have that very rare gift of seeing into the future. He followed up this meeting with a Memorandum on how China could best be defended against an aggressor which set out in detail the concept of guerilla operations, commando style which prefigured (almost at times to the very words) Mao's doctrine of revolutionary war.

And yet—this extraordinary intellectual vitality, and clearsightedness, often fifty or as one can now say a hundred years ahead of his time went with a form of personal piety which was in a sense primitive. He seems to have been converted, during his first posting as a second-lieutenant, by a colleague typical of the Officers Christian Union. Gordon was never confirmed but he took communion that Easter and thereafter as regularly as he could for the rest of his life. His religion was biblical,

personal and direct. He had a total disdain for money and honours. In China he refused a huge gratuity and the Chinese, we read, were "puzzled as to the advantages to be derived from such uncompromising honesty". In the Sudan, he settled for a salary exactly one-fifth of what was offered—to the total incredulity of the Egyptians. The Chinese struck a special medal for him in gold which he had to accept; but a few years later, when asked for a contribution towards a fund for poor and hungry in Lancashire and having no money to hand (which was quite normal) he sold his gold medal for £15 and sent the proceeds to the fund. He had a loathing of dinner parties and never went. He was completely shy with women. After China, where if you remember he was a Field Marshal, his next and last appointment in the British Army was CRE Gravesend, where he spent six years building expensive and entirely useless forts along the Medway. He opened his home to the sick and the decrepit, mended tattered garments, lit old people's fires—and above all befriended rootless youngsters, housed, clothed, fed and schooled as many as he could, got them jobs and followed their careers for years. All this can sound like "do-gooding" in the extreme. It wasn't. His life at Gravesend was that of a sound, commonsense Christian man, intent upon doing the best he could to better the misery that lay around him.

And it was the same, of course, writ large during his six years in the Sudan—first as governor of the Equatorial Provinces and then as Governor-General. The miseries that lay around him there were the slave trade, oppression, injustice, corruption, lethargy, the climate, fear. He brought to every one of these enemies, not only his towering gifts of command but the spirit of a sound, commonsense Christian man. Much of the time he was completely alone—which in one sense suited him best. But it left him to fight off his own private devils. He would go into his tent, put up a sign, and remain for days at a time with only his bible. The devils he fought were those he thought he was tempted by: sadism and cruelty, unnatural love, self-indulgence, arrogance, the love of power. Strachey says he fought them with brandy and soda, but the evidence for that is thin. I have no doubt whatever that the spirit he fought these with was that of prayer. He prayed his soldiers in China through the breaches when they wavered. He prayed the river boats up the Nile rapids when the eddies caught them—as he said in letters to his sister. I am sure that he fought his devils, also, with prayer.

THE last chapter of his life is too well-known to need re-telling. It reads like a Greek tragedy; everyone in the story being betrayed by the weaknesses which were the obverse of their strengths. HMG, not for the last time in human history trying to pursue two mutally exclusive policies simultaneously. Gordon, sent off with instructions to "report upon the best means of effecting the evacuation of the Sudan, within the month calling openly for 'smashing up the Mahdi'." Lord Hartington, Minister for War, convinced that Gordon must be relieved, taking three months between so deciding and threatening to resign—thus forcing Gladstone's hand. Lord Wolseley, Gordon's lifelong friend in charge of the relief expedition, spending a month constructing boats all over England for the River Columns which never got within 300 miles of Khartoum. Redvers Buller, Chief of Staff, failing to order enough fuel for the steamers thus wasting three more weeks. Sir Evelyn Wood VC, Sirdar of the Egyptian Army, taking up ninety-six boxes of personal luggage, forty of them containing wine. At the very end, after incredible heroism, when the Desert Column had got to a point on the river within reach of Khartoum, Sir Charles Wilson waiting three more days before setting off, to arrive—two days too late. And even that, Gordon has precisely foreseen!

How to sum up such a man? There have been many people in history who took the bible in the direct and personal way that he did, who prayed their way, as he did, through their work; who sought the Master's will in all things. Many have disdained, as he did, money, honours and social acclaim; and have been led instead to give their lives in the service of the poor, the needy and the outcaste. All this is strong in the

story of the early church, in St Francis and his friars, in the lives of priests, hermits, religious. Sometimes they are called saints. What is extraordinary is to find all this in a mid-Victorian middle-class English (or perhaps Scottish) gentleman. An officer he had to be. His great-grandfather had fought at Prestonpans, his grandfather with Wolfe at Quebec, his father with Wellington in the Peninsula. So we find this mystical, fatalistic and highly evangelical spirituality incarnate in a man of action "a lover of danger and the audacities that defeat danger, a passionate creature flowing over with the self-assertiveness of independent judgement and the arbitrary temper of command . . . whom God's hand led to violent excitements and extraordinary vicissitudes".

In the first memorial service to Gordon in this cathedral the Bishop of Newcastle in his sermon quoted from something that Gordon himself had written, before he went back for the last time to Khartoum

> "I would give my life for these poor people of the Sudan. How can I help feeling for them? All the time I was there every night I used to pray that God would lay upon *me* the burden of their sins, and crush *me* with it instead of *these poor sheep*". What Gordon prayed for, Allah granted.
> Greater love hath no man than this.
> May he rest in peace
> May his memory live, to hearten and inspire.
> May we all, in however small measure, try to live by its light. Amen.

Operation YELSTEAD

BRIGADIER J B WILKS ADC

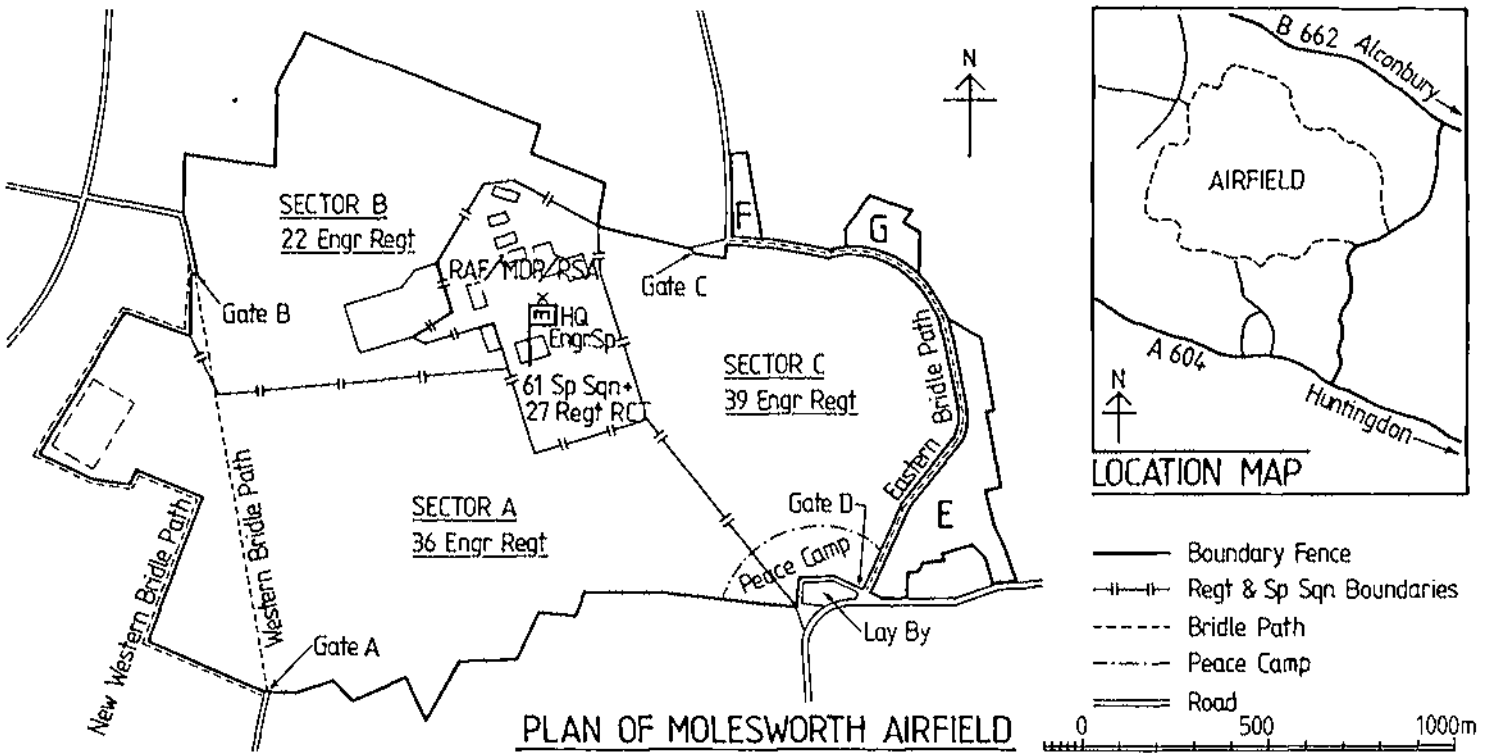
The author was commissioned from Sandhurst in February 1952. Since then he has served in Korea, Malaya, at RSME and as Adjutant 36 Engineer Regiment. He has attended the Staff College and the Joint Services Staff College and has filled staff posts in Army Staff Duties and Combat Development in MOD. He was OC 73 Field Squadron, CO 3 Training Regiment and on the staff of The Staff College. From 1979 to 1982 he was Regimental Colonel, Commander 30 Engineer Brigade in 1983/4 and since October 1984 has been Commander Engineer Support.

Background

In my handover notes there were some facts and figures about our support to RAF Greenham Common which between October 1983 and January 1984 took up a lot of Sapper effort. All this was mentioned as "the following Geewizz figures are an example of the scale of commitment which Sappers are called on to provide at short notice". We had been involved in supporting the Infantry, constructing inner fencing, erecting observation towers; and installing full perimeter lighting which Military Works Force had designed and had been made up by Engineer Resources. The last throw away line was that we might be involved in the next Cruise missile base at RAF Molesworth. Thereafter the whole subject went cold.

At the Engineer in Chief's Conference on 21 November 1984, Colonel David Corsellis was summoned to London and returned to tell me that Molesworth was on again. The Secretary of State's first request was that the Sappers should erect a full secure fence around the base overnight. He was dissuaded from this idea, which has since taken a contractor with 300 men on site over a month to complete, but it does show great faith in the capabilities of the Corps. The requirement eventually settled to the building of a fence outside the line of the final fence so that the contractor could work inside with a measure of protection.

The need for security was paramount, because any disclosure of our intentions could allow disruption of the fencing operation. So only a very limited number of


SECTOR B
22 Engr Regt
RAF/MOR/RSAT
HQ
Engr Sp
61 Sp Sqn+
27 Regt RCT
SECTOR C
39 Engr Regt
SECTOR A
36 Engr Regt
Gate A
Gate B
Gate C
Gate D
F
G
E
N
Western Bridle Path
New Western Bridle Path
Eastern Bridle Path
Peace Camp
Lay By
PLAN OF MOLESWORTH AIRFIELD
B 662 Alconbury
AIRFIELD
A 604
Huntingdon
LOCATION MAP
Boundary Fence
Regt & Sp Sqn Boundaries
Bridle Path
Peace Camp
Road
0
500
1000m

people, by name, were allowed to know what was happening; within Headquarters Engineer Support, myself and the Chief of Staff. The security locker within the combination safe came out and from our questions on resources and availability the other staff realised that something was on. We were *not* allowed to recce the site and not to make any telephone calls relating to the operation which was given the Code name *YELSTEAD*.

Planning

RAF Molesworth is a disused airfield, six miles West of RAF Alconbury and just off the A604. It stands in the middle of farm land and is an open site with only a few buildings. Although the runway and taxiways had been taken up the site was in use by the United States Air Force as a returned stores depot and disposal site. Significantly there were two bridle paths which ran across MOD land, the one to the East had to be kept open, the one to the West resited alongside the MOD boundary. As we were unable to recce we asked for large scale mapping and were rapidly provided by Military Survey with 1:5000 Scale maps giving up to date details, including contours, gridded and with the boundary of the MOD land marked on it. We also were provided with a series of air photographs which enabled us to assess the going, identify the lines of the fence and have an indication of the numbers of protestors living on site.

We did not know a great deal about the level of protest which would face us. A total of twenty thousand protestors was mentioned; there were also over a hundred people living in a camp, some in tents, others in old vehicles, or caravans on MOD land or in an adjacent lay-by. My assessment of this was that even two people could disrupt a wiring party, so we settled on a maximum number of starts (forty) so that a considerable amount of work could be achieved even if there was some protest and harassment. We did not know at this stage the size of the Cambridgeshire and Ministry of Defence Police support which would be available to us. Similarly the routes into the base were difficult to assess, could they easily be blocked, we could not turn round fully laden vehicles on country roads. As there was no road system within the airfield we needed four-wheel drive vehicles if we were to move around within the base.

We started on yardstick planning, and arrived at a requirement for 8000 metres of fencing, two gates, sixteen watch towers and twenty sets of lighting. The availability of stores and designs then became a problem, how much prefabrication and preparation could be done? We went for a simple design of the gates, settled on rough sketches and used a similar design for the lighting to that used at Greenham Common. The basic concept was to divide the airfield into three roughly equal sectors, each to be the responsibility of a regiment.

Preliminary enquiries on availability of stores presented problems with the provision of S tape; none was held by Ordnance, and 1680 coils had to be ordered from Prince Security. We asked for new wire, what are the holdings? Did Ordnance have enough other wiring stores in stock, did we have to raid the War Maintenance Reserve or use training stock? Could we hire lighting towers? What was the availability of generators, how quickly could they be supplied by the manufacturer? Were the other lighting stores available in Engineer Resources or could they be purchased by single tender? The towers at Greenham were slow to erect and with shelters on the top blew over in the wind. Could we use Cuplock towers, could they be obtained in time?

At this stage we had to ask that the number of those involved with the planning should be expanded and brought in from 62 CRE; Lieutenant Colonel Humphrey Spaight, and Major Mike Allen who had done all the lighting at Greenham Common to do detailed design work; Colonel John Hill and Lieutenant Colonel Rod Milsom from HQ Engineer Resources to deal with procurement and manufacture.

Security was still a problem as was the identification of the likely date of the operation. We realised that the whole fence would need to be completed by Easter, and discovered that PSA were preparing contracts for the main fence to be erected in

six weeks. So we deduced, knowing Easter 1985 as being 4–8 April the following: with completion 1 April 1985, going on one week cushion and six weeks for the contractor, that the operation was likely in the first two weeks of February. This then gave us a target date for preparation of the stores. We needed a cover plan for the assembly of the stores at Long Marston and put the word around that all was being assembled for the fencing of Mount Pleasant Airfield in the Falklands. All work was still done in our own hand, drawing did not have titles or any indication of what it was for. Much of the work was done after normal working hours. A secure telephone was provided for us to speak to Long Marston, UKLF and MOD.

Now that we had a likely date we could look at availability of units. Although we normally have fifteen field squadrons and four field support squadrons in the UK, nine were either on overseas detachments, on exercise, or returning to UK in February. Also no one could be recalled from leave or courses as this would break security. In the end we settled on three regimental sectors each with two field squadrons, a field support squardron to control resources and a separate field squadron construction to do the lighting. Who was to command all this? None of the units are normally under the direct command of Commander Engineer Support: HQ Engineer Resources were already very busy and are a static organisation. HQ Engineer Support would have to take the field!

Gradually the requirements settled down, there were two bridle paths across the airfield, the Eastern bridle path would lie outside the fence line and did not present a problem. The Western bridle path was to be reprovisioned on the edge of the MOD land, during the night, this led to four major ditch crossings and considerable scrub clearance and cutting. Was the pond to be inclusive or exclusive of the fence? Was the fence to go inside the concrete towers? Detailed siting of the fence to take account of kerbs and how it crossed roads was resolved. The number of gates to be built was increased to 4 to match the gates in the final fence. The more accurate length of the fence was now 7800 metres but our original stores bids stood firm. A quick staff check on the quantities of stores to be moved and the need for tactical loading showed that RE units could not provide enough transport and RCT support was requested.

We were operating on an RAF airfield and the chain of command needed to be resolved. HQ UKLF provided a tactical HQ commanded by DACOS G3/G4 Colonel Joe Thompson to deal with RAF Station Commander, MOD Police, Cambridgeshire Police, RAF Support Command and MOD. This kept everyone off our backs and enabled us to concentrate on the engineer task. 30 Signal Regiment provided radio, command vehicles and rovers so we were able to set up a proper field HQ.

How could we keep the operation secure, by coming from a long way away? As the stores were at Long Marston could we assemble everyone there, load up and drive out? What routes and timings, where would we meet up with the police? We looked at several assembly areas and finally settled on the Sea Transit Centre at Colchester, which provided good facilities and was not too obvious as frequently units moved through there. Timings, routes and movement had to be worked out. Cambridgeshire police were very helpful here and gave accurate timings, routes, and even made videos of the four separate routes to the site to help drivers.

Resources

At Long Marston wiring stores were arriving and being prepared, having been issued by RAOC or purchased. A trial of S tape delivered showed that it extended to only 10 metres, not 12.5 metres we had expected. An immediate demand for extra S tape was made. The plant park shed was cleared to give working space and two Resources Specialist Corporals set about breaking bulk and making up a tactical load for 200 metres of fencing, which comprised 210 fencing pickets, 30 barbed wire concertinas, 60 rolls of S tape and a tool box containing wiring gloves, driving pickets and small tools. All of this was palletised for easy loading. Even the free ends of the barbed wire reels were marked with fluorescent tape for ease of identification in the dark.

Electrical stores were also prepared at Long Marston many items being purchased directly from the trade. Forty 8/12kw generators were provided from CVD Ashchurch, as civilian contractors could not meet the delivery date. These generators were brand new and we asked for them all to be run for a minimum of 25 hours under load and for first oil change to be done prior to delivery. The design of the lighting system, by Major Allen, was to have the maximum prefabrication and go for speed of erection. Each lighting set was standard, with two generators and six lighting poles. All the cable lengths were cut to size, plugged and socketed and tested for continuity. The switchgear and distribution boxes and lighting leads were made up and tested. The design was to drive a short scaffolding tube into the ground, fix the main scaffolding pole and lighting head to it. Each lighting set was made up into two 8-tonne loads and laid out ready for loading in the old preservation plant. The set consisted of one vehicle carrying the stores and towing a generator, the second vehicle carried an Eager Beaver fork lift truck and towed the second generator. All this work was undertaken by one clerk of works (E) and one electrician and civilian fitters from long Marston supported by four electricians from 39 Engineer Regiment.

The gates were designed to give a six metres clear gap, using Braithwaite tanks to carry the load and support the gate posts. Initially we thought of only a double tank but overturning moment calculations and problems of stability dictated a 2:1 design. We needed to interlock the gates and developed drop bolts, slam plates and a drop bar bracing both gates together. The Braithwaite tanks were welded together, and the gate post incorporated, angle iron was also fitted to the end of the tanks to connect up to the wiring. The grillages for the Braithwaites were all cut to size and bagged fill for the Braithwaites prepared. A sergeant and four welders/metalsmiths and the workshop foreman and four civilians worked on making the gates. The gates were faced with 10 gauge XPM and had a top fitting to carry a coil of S tape. When the gates were ready we had a trial build, accuracy of levelling the gates and the need to take up any adjustments on the gates led to some excellent work in making hinge pins and required all the fitter machinists and lathes to be used on this one task alone for five days.

In addition to Cuplock towers, the 25-tonne water towers, came in from the manufacturers and had to be made up into vehicle loads. Timber grillages were required here and also ladders, rope and handrails. Timber for ditch crossings had to be cut to size, sixty timber dogs were ordered from RAOC and we had a "not available dues out" reply, in the end they were made by the Blacksmith. Concrete road blocks were required, and sixty were shipped over from Northern Ireland. Knife rests had to be made. All this presented a heavy work load in Long Marston, drawings had to be done and modified, trial builds out, and vehicle loading trialed. Each gate came in five 16-tonne which had to be test loaded, securing systems devised and false-work made.

The total figures for Engineer Resources were that they outloaded 203 vehicles, both 8- and 16-tonne, and 40 generator trailers. The major items were:-

16	water towers
132	lighting towers
737	reels of barbed wire
2590	concertinas of wire
3209	reels of S tape
14788	angle iron pickets

all of this cost:-

Fence and lights of RAOC supply:	£K 105
Off the shelf items in Long Marston:	£K 22
Electrical items purchased:	£K 140

Eventually seventeen 8-tonne vehicles were returned to Long Marston with pallets and tools and our total losses came to around £1600, for small items. In addition to the materials costs, the labour costs were £K 119 and some overtime was worked by both civilians and soldiers.

What are the stores lessons: barbed wire reels do not come in 200 metre lengths, S tape does not shake out to the length in the manufacturer's brochure, the new wiring gloves are completely inadequate and were cut to ribbons. We needed heavy monkeys for driving light supports, the old camouflet set is no longer available and we had to make them. Also within Long Marston there is a great deal of work for the Royal Pioneer Corps in preparing stores and in loading vehicles. It was necessary to carry out some training for building Type II Catwire fences in the dark. Training stores were sent out to all regiments who managed to fit in some night training under the guise of normal combat engineer training. The SNCO in charge of building each of the gates plus three men and their crane operator went to Long Marston to see the trial build and to be taken through the various difficulties which might arise in construction. 53 Field Squadron had some training on erecting the lights for their electricians.

Development of the Plan

On 19 December 1984 we were allowed to take commanding officers alone into our confidence and to give them our current planning for the operation. This led to some slight changes in the allotment of sectors, due to better availability of manpower and considerable discussion of detail. A simple colour coding system was used:

Sector A	– 36 Engineer Regiment	– RED
Sector B	– 22 Engineer Regiment	– YELLOW
Sector C	– 39 Engineer Regiment	– GREEN
Resources	– 61 Field Support Squadron	– GREEN/WHITE

Vehicles were all colour coded to match the sectors, and lettered F – Fencing, G – Gates, L – Lighting, T – Towers. The time was fast approaching when we had to go firm on our loading lists, vehicle plan, convoys and produce an operation order. We had still not been allowed to recce but did see some accurate drawings prepared by the PSA for the fencing contractor and also had enlargements of air photographs in the more difficult areas. The regiments were able to undertake some night wiring training during January under the guise of normal combat engineer training which certainly paid off.

On 23 January I attended a meeting in MOD and came back clear as to what we should do. We were still planning on the basis of D Day (the day we deployed) and on H Hours (the time we were to arrive on the site). However we did know that we were not to arrive until after the last television news of the day and thus that we were unlikely to be able to start work before midnight and that the fence was to be complete by first light. We therefore knew that the fence had to come first with the gates, watch towers and lighting to follow. In order to avoid any confusion with the team carrying out the lighting and damage to the cables which were to be laid on the ground we decided that no work on lighting should start before 0900hrs. We issued our operation order on 24 January 1985 having cleared it with UKLF but had not received their written orders, (they were not issued until 25 January) neither had they had a directive from MOD. Commanding Officers were to come in for a coordinating conference on 29 January.

On 28 January 1985 we received a telephone call that we were to alter our fence line, to wire in four saw edged areas in the South near Gate A and to wire in completely areas E, F and G and along the bridle path between them. A quick check showed that this added a further 4000 metres of wire and needed 4 extra gates. The O Group for the 29 January was postponed. There was no extra S tape immediately available, the fences could only be of dannert wire. We were also in difficulty over extra troops, only 24 Field Squadron was available and they were on Ex Drakes Drum, 83 YO Courses final exercise. EinC agreed to cancel this and allot the squadron and the YOs as an extra working force. We were also allowed extra time and were to complete the fence in areas E, F, G by 1200 hours on D + 1. Convoys had to be adjusted, further wiring stores provided for Long Marston and wicket gates made. Staff checks showed that the orginal plan still held firm and that 24 Field Squadron, which would come with four troops, could take on the extra work. This

required some additions to the operation order, and that 39 Engineer Regiment was to take the squadron under command.

We held a confirmatory O Group on 31 January, after which Commanding Officers were allowed to brief their squadron commanders. Major Rob Newns, OC 24 Field Squadron was brought in for the first time, he was very confident that his squadron could pick up the work but he did have a problem, his squadron was to play in the Army Minor Units Rugby Final on 6 February, could it be postponed? As this might alert anyone to the operation, UKLF agreed to tell their opponents, Depot the Kings Division at midnight on 5 February. What else was going on that could be cancelled or might break security? Lieutenant Colonel David Adamson was due to visit 48 Field Squadron on exercise in Kenya. He went, and 2IC Major Brian Semple commanded the regiment. 51 Field Squadron from Ripon was supporting the Combat Team Commanders Course exercise at the School of Infantry, they would have to pull out in mid exercise, what effect would this have? Fortunately they had extra plant for digging positions from 15 Field Support Squadron and the Armoured Engineer Wing from Bovington were also there, so the exercise could still contine.

On 1 February I attended, with Lieutenant Colonel Sandy Sandiford, AOCinC RAF Support Command's coordinating meeting: Cambridgeshire Police, Ministry of Defence Police, RAF, Army, PSA and Ministry of Defence were all there and gave presentations of their part in the operation. It now appeared that D Day would be on 5 February and units would come together on 4 February.

Execution

On the morning of 4 February RCT vehicles from 27 Regiment RCT began to arrive at Long Marston at 0930 and all loading was completed by 1400. Some of the gate loads were overweight and redistribution of concrete blocks and aggregate bags became necessary, but otherwise the plan held. The RCT set off that evening for Colchester. I was at Long Marston and received the execute signal at 1500hrs and also the signal placing the Engineer units in UK under command of HQ Engineer Support for Op *YELSTEAD*.

Each engineer unit moved separately to the Sea Transit Centre at Colchester where Major John Craig, Quartermaster 36 Engineer Regiment and his team had set up the reception and feeding arrangements, and 27 Regiment RCT, the refuelling facilities, during the night 4/5 February. There on the morning of 5 February units married up with their RCT vehicles, lined up their convoys and checked their loads. At 1100hrs we had a quick O Group and then all the soldiers were briefed on their tasks and the whole operation. Some rest was possible but at 1630 the first vehicles set out.

The command element of HQ Engineer Support was at RAF Brampton in the early evening with the command convoy. We had a quick look at an air photograph flown that afternoon of the area of the peace camp. More vehicles had moved into the area and were blocking the bridle path, would we face a hostile reception? At 2230 we drove out of Brampton, Cambridgeshire Police leading, onto the A1 to Alconbury and off by side roads to the base. We were not to arrive on site before 2340hrs but people came out of their houses to watch and bedroom curtains were drawn back. The convoy stopped and I walked forward to see what was happening believing the road was blocked. We were ahead of time and had to wait. Walking back I could see three of the other convoys lights moving across the country roads.

We then moved off fast, down the long approach road to Gate C, then we were in on the airfield. A great bustle, cruciform set up, Royal Signals busy and then we were through by radio to MOD. All the regiments were in on site without difficulty, we had achieved surprise. I went down to the area of the camp at Gate D, the protestors were standing around totally surprised, and MOD Police had a cordon round the camp which we rapidly backed up with a single dannert coil. I was then able to walk around the area of the lay-by with my signaller and in and among the protestors to actually look at the ground and the fence alignments. Major Brian Semple, 2IC 39 Engineer Regiment met me, we found old concrete fence posts in corners and so the

Photo 1. 51 Field Squadron placing S tape on the Catwire Fence with Gate G in the background.

fence alignment was quickly decided. Our study of the air photographs had paid off and we resited Gate D alongside the Eastern bridle path. Meanwhile 24 Field Squadron had started fencing at the bottom end of area E alongside the B660 and up the bridle path, with 34 Field Squadron working on the other side.

The large "peace convoy" around the area were very willing to move off when the Police suggested it, but they had no fuel. A quick meeting, a request to MOD and we provided fuel (1200 litres of DIESO and 6000 litres of CIVGAS) and they began to move off under Police escort to the A1. No aggravation, no dogs barking or attacking people, which we had anticipated and had brought an officer from RAVC just in case he was needed. We did find a horse quietly munching hay in a stable and also two goats. Several of the occupants were obviously prepared for a move and were quickly packed and ready to move, the Police assessment was that there were 200 people including women and children and 50 assorted dogs on site. By first light they had nearly all gone, a squalid mess remained, several vehicles would not start but contractors had been brought in to tow away vehicles and to clear up the site. We had expected the Press and within two hours the TV cameras were there with their lights, pressing in mainly in 39 Engineer Regiment's sector.

The night passed very quickly, progress was first class, once each section had arrived in its appointed sector. Generally we were only involved in carrying wiring stores over short distances and very often the fence could be build off the back of the lorry. Connecting up fencing sectors was important, the quality of the fence, correct spacing of pickets and tying together wire with Acrow ties, were done well. About 0230hrs there was a cry for more wire. The barbed wire coils, supposedly 200 metres each, were only coming out at 118 metres, they were old stock which had been given a new part number. Where do we go for more wire, WOI Stuart of Headquarters Engineer Support who was at Waterbeach went with two 8-tonne vehicles to 320 Engineer Park at Thetford where the OC Major Rawlings was waiting with his storeman, opened up the store and loaded more than 400 rolls, which had to be

broken out of their pallets. These were sent to site and then the Special Task Stores in a hangar at Waterbeach were broken open to load more wire. Where else in the middle of the night could we have found wire, other than from the Engineer Parks under our own control. There were other problems with fencing, in some areas the scrub was very thick, 36 Engineer Regiment used scrub cutters, which are normally held by 33 Engineer Regiment for their Battle Area Clearance tasks, to cut the fence line. In other areas plant had to be used to clear away thick hedge on the fence line, and there was a great deal of cutting and clearing. The siting of fences along the edges of ditches was difficult, pickets had to be set back far enough to get a good purchase. There were areas of concrete, pipe runs and road crossings where drilling and cutting had to be used to get the pickets in and they then had to be grouted in afterwards.

Gate progress went steadily on, we had made Gate A to open outwards as we expected the slope would have prevented it opening inwards. In the event it could have opened inwards but without detailed recce we could not check levels. Gate C was delayed as a large number of civilian contractors vehicles came into the site at first light and we had to insist on the Police closing the road for a time to allow us to complete the work. There were also problems here as on the actual gate position on one side of the road was a GPO Telephone Manhole and on the other a main drainage manhole. The key to erecting the gates was setting out accurately and getting the grillages absolutely level. With this done and the skill of the crane operator the gates went together well, a great tribute to the planning and design and to the pre operational training. The gates were illuminated by the lighting towers which greatly eased the work, site control was critical; the 16-tonne vehicles had to stay on the track or they would have bogged. We had to do some on site welding to fix the top wire, and used power tools to cut out the road to fit in the blocks for the drop bolts. Finally careful adjustment of the gate had to be made both to allow easy opening and to cover any small gap through which an individual could squeeze. 3 Field Squadron finished Gate B first; perhaps they had less interruptions than the others, but perhaps S/Sgt Batchelor had learnt the importance of levelling from Op Tantara last year and from the practice build in Long Marston.

By 0600hrs we did have a fence in, all around the main airfield site and had met little harassment. During the night fog had come down over the site and hampered finding your way around. In the worst areas where there was cutting and clearing, things were going slowly. As sectors were completed they were carefully checked for tying together of wire and any errors that became obvious in daylight. The attention to detail and preparing marked ropes to ensure correct spacing of pickets had obviously worked. The quality of the fencing was extremly high, the progress had been really good and it is a great tribute to every section commander and the Sappers that it went so well.

As sections became free they were put onto the erection of the Cuplock towers which were set back from the fence in the positions which we had selected from the map. In the event our planning was sound and only two towers have had to be repositioned. Cuplock goes together very easily and quickly, grillages had to be laid, in this machine age there is often a reluctance to dig out by hand to get the required accuracy and more of a willingness to cover the site in sand, which of course compacts unevenly. We had extra hand rails made by the contractor which were fitted to the towers, ladders were lashed to the side and again progress was good.

Lighting

53 Field Squadron Construction had been given the responsibility for all the lighting and came onto site at 0030hrs. They had 66 vehicles with them and went into a tight leaguer in Green Sector, wired themselves in and went to sleep. We had planned that they should start work on the lighting at 0900hrs but with the fog being so thick Major Carl Zimmerman could not start before 1000hrs as it was not possible to set out the lines of lighting poles. The site was also quite cut up in certain areas and an 8-tonne vehicle towing a generator got through with difficulty leaving deep ruts, anyone

attempting to follow in the same tracks soon bogged. Our policy of only having 4-wheel drive vehicles paid off, but RAF and MOD Police had some 2-wheel drive vehicles and wanted help. The detailed instructions written by Major Mike Allen on setting out the lights, erection, testing and running certainly paid off. The electricians were busy and there was some checking but nearly every fault could be rectified on the ground. In our stores preparation we had brought 25% spare wire, distribution boxes and lighting leads but these were not required. As the day went on generators came to life and slowly the operations map was marked in, and outside the perimeter was lit. The detailed preparation had paid off and by 1600hrs all the lighting sets were in and working. Each head had three 500 watt Sunflood tungsten halogen luminaires, in adjustable positions; over the next two days these had to be adjusted on advice from people on both the watch towers and outside the fence to eliminate any shadows.

53 Field Squadron stayed on site after D+1 to carry out these adjustments to do any other improvements to the fence, in one or two places it had to be opened to allow the contractor to start work. All the lighting was handed over to the RAF on 6 February and they have run it ever since. We even prepared for them maintenance schedules for the generators, in the first two days they had two generators go down, having run out of fuel, now they have a proper routine but it is a steady workload to continually go round the site and keep the generators going.

Support

61 Field Support Squadron looked after the whole of our on site support. They took over all the stores at Long Marston and checked that loading was correct and the contents of each load. We were restricted by the Police to eighty vehicles in each convoy so had to put our reserve stores into the Support convoy. The squadron alone mustered 79 vehicles which included cranes, cherry pickers and 8-tonne carrying Class 30 trackway, POL, Cuplock towers, knife rests, timber, aggregate and 2.4km of wiring stores. They also had six Medium Wheeled Tractors, which moved separately, and the regimental forward repair team. All these vehicles took up a lot of space and on arrival Major Ian Roberts found that the area which had been marked on the map for the squadron was so soggy that only one third of it was usable. The squadron made use of the limited hardstanding and quickly had some stores off loaded, with the majority remaining on wheels. They fed anybody and everybody who came by, the planning figure was for a hundred but easily exceeded. They set up latrines for the RAF, ran the reserve of fuel on site and as the squadrons pulled out collected in all the empty pallets, unused stores and took back the tools and other items which had been issued. The squadron stayed on site until 7 February, they handed over to the RAF the unused electrical stores, the reserve of wire and persuaded the RAF to sign for all the stores which were incorporated in the project. Returned stores to Long Marston went back on 8 February were locked away and checked over in the following week. A large number of small tools are missing, presumably troop G1098s have been brought up to scale, but if anyone reading this has seventeen hide faced hammers and a conscience I would like them back. In total our stores losses added up to £1600 which is only 0.006%.

Supporting us throughout was 27 Regiment RCT who provided 203 load carrying vehicles, Eager Beaver fork lift trucks and also towed forty generator trailers. The whole size of the operation really came to light in the Sea Transit Centre at Colchester when the vehicles assembled in their regimental columns. In addition to their motor cyclists and domestic transport if was a major operation for Lieutenant Colonel Mike Ponokowski RCT who had only taken over as Commanding Officer two weeks before. Not only did he have to assemble his regiment from Tidworth and Aldershot but move to Long Marston, Colchester, Molesworth, Waterbeach and finally return home. It says much for the performance of the RCT drivers and the state of their vehicles that they had only one vehicle breakdown over the whole five days.

Photo 2. Secretary of State for Defence talking to soldiers of 39 Engineer Regiment erecting fence in the area of Gate D.

Visits

CinC RAF Support Command insisted on no visitors and we only had on site those directly involved in the Operation. The Secretary of State came from London by helicopter and the pilot did an excellent job to land in the poor weather conditions. He was dressed for London and was provided, by the RAF, with Wellington Boots and a combat jacket. After a briefing he toured the site and spoke to many of the soldiers. The Press and TV were by then well in evidence and Corporal Watt and Sapper Mercer of 51 Field Squadron were photographed with the Secretary of State alongside the fence and featured on the front page of many of the daily papers. The Secretary of State was very appreciative of the work that had been done and that so much had been achieved in the time.

Public Relations

We had been very concerned from the outset about the PR side of the operation. The operation was obviously of high visibility and would attract a great deal of interest. We were not allowed to talk to the Press and MOD coordinated the response. In the event MOD put out a press release at midnight which made its way into the later editions of the papers, and the Press and TV arrived. Within two hours the first TV cameras were there, mainly aimed at 24 Field Squadron: Staff Sergeant Gillis worked with his troop along the fence frequently with the cameras only six feet away and as different TV crews arrived they stayed at the centre of attention.

The detachment of 30 Signal Regiment had a TV and the early TV regional news at 0630hrs stated that "the whole event had been masterminded by the local MP". This produced roars of laughter from those who were assembled in the command shelter. However the coverage was favourable but more and more reporters kept arriving. HQ UKLF had deployed Lieutenant Colonel John King of their PI staff who assembled the correspondents into two busloads by the time the Secretary of State arrived, they were taken round the site and shown what was going on. Mr Heseltine met the Press and TV informally and answered questions. The coverage on 7 February was high and favourable. Locally the eviction of the peace campers was

Operation Yelstead 2

welcomed and villagers made this perfectly clear to the reporters. We have had the arrangements in Northern Ireland when factual comment is possible, but to expose soldiers who are working to the press and particularly TV cameras for sustained periods without allowing them to say what they are doing is a great strain and it says much for the discipline of our soldiers that the orders were obeyed and candid comments were not made to inquisitive reporters or microphones. But it is wrong to place the soldier in this situation.

Withdrawal

The Royal Engineers were only committed to do construction work and had no security role. We were therefore able to disengage on my orders. Lieutenant Colonel Andrew Baines reported at 1200hrs that his sector was completed and tidied up, 69 Gurkha Field Squdron was producing curry lunch, could they help in any other sector? It was only in areas E, F and G that we were progressing slowly but 39 Engineer Regiment could manage so we obtained a gate clearance and 22 Engineer Regiment set off for Tidworth at 1400hrs.

Lieutenant Colonel Richard Oliver reported that 36 Engineer Regiment were ready to go at 1600hrs: they had had two particularly difficult areas to deal with involving scrub cutting, drilling for pickets and realigning the Western bridle path. Just as they were ready to go the first attack on the wire came in from a wood on the Western side where pickets were disturbed and wire cut. However the cohesiveness of the fence was good and MOD Police were quickly around to disperse the half a dozen protestors.

39 Engineer Regiment worked on through the afternoon, the YO troop which had worked on area F, went off to erect towers, more men were concentrated on area G and connecting F to G and E to G, finally we were finished. Around 1800hrs 39 Engineer Regiment moved out leaving 53 Field Squadron on site to carry out the continuing commitment, which by 11 February was reduced to a section on call from Waterbeach. We checked out with HQ UKLF and the RAF on site commander on the continuing work to be undertaken by 53 Field Squadron. Quick orders for the squadron commander and at 2000hrs HQ Engineer Support moved out.

Subsequent Events

The first weekend 9/10 February was the moment when any major protest against the base was likely. The reality did not match the expectations; there were very few demonstrators, an estimated seven hundred on the Sunday afternoon some of whom tried to break in. The weather was bitterly cold with high winds and sub zero temperatures. There was little for the police on site to do and the field troop had few repairs.

The contractor made a prompt start with the final fence on 7 February starting at two points and working out in both directions. The final fence is of weldmesh set in concrete and going below ground and topped with a coil of wire. As the contractor worked so some of our wire had to be removed in the Western side where major clearance was needed. As the fence was completed so the lighting towers were moved forward into the line of the fence and the generators repositioned. The original design had taken this into account and the short pickets driven into the ground were extracted and replaced.

The weather conditions deteriorated and there was a heavy snow by 12 February, temperatures were as low as minus 9°C, the wind chill factor was high and between areas F and G snow drifted to the top of the wire fence and froze. If the whole operation had been delayed one week we would not have been able to drive a picket in the ground, let alone work in those conditions without serious risks of cold injuries and exposure. We had been fortunate!

Conclusions

The fencing of RAF Molesworth was not a difficult task but one which required bringing together all the available field squadrons in the UK and a great deal of

careful planning. The attention to detail and thinking through all the problems to make the work easier, certainly paid off. The design and production work provided by Engineer Resources was outstanding. It is not just enough to provide stores, it is the manufacturing capacity, designing modifications, trial building and preparation of tactical loads that makes Engineer Resources unique. Without their work we could not have done it.

The quality of work carried out by the squadrons was extremely high, we did not achieve the planning times in the Manual of Field Engineering for construction of a Type II Catwire Fence (2 hours 20 minutes for 100 metres by night by a section). Perhaps these figures are very optimistic but we were going for a high quality fence to hold together.

We worked effectively through 36 hours with very little rest and for the majority only meal breaks. It was good to see the work going on so efficiently, well organised, and well led. The soldiers all looked smart and professional throughout which I am sure contributed to the deterrent effect on the protestors. We were not armed, were dressed in combat kit with belt order and did not get involved with the protestors, that was the Police's business, we were there to do a purely Sapper job. We only had one crisis in the shortage of barbed wire but this we were able to resolve ourselves. HQ RAF Support Command and HQ UKLF kept everyone off our backs and enabled us to get on with our work, for this we are very grateful.

We must not be mesmerised by our own planning and execution in this operation, carried out in strict security. The PSA had let contracts, assebled contractors for the fencing and construction of an 800-man camp on site, who all arrived on 6 February. Cambridgeshire Constabulary had 240 men involved in road escorts and general security outside the base and there were 350 Ministry of Defence Police involved in security inside. All this under RAF command on an RAF station which twenty-four hours before did not have a single serviceman on site.

The whole success is really attributable to the security of the operation and that we obtained surprise. The support of the local population, the approach of the local police authority and the work of Cambridgeshire Constabulary dealt effectively with any protest and gave us the right climate in which to work.

We had made a sound plan and achieved excellent cooperation and support from many agencies. The major part in the engineer planning fell on my Chief of Staff, Lieutenant Colonel Sandy Sandiford, who bore the brunt of the work, did all the detailed calculations and produced all the staff tables, vehicle lists and the operation order. Captain Kharkajank Gurung of 69 Gurkha Field Squadron put the whole operation into perspective for me when I asked him if he had been involved in wiring on the Hong Kong—China border in 1977: that he said "was twenty-six miles". Let us not be carried away by building seven and a half miles of fence overnight.

Water Problems in Today's Holy Land

LIEUT COLONEL A A TAYLOR MI Plant E MBIM

I FIRST realised that the three towns, Bet Lehem (Bethlehem), Bet Jala and Bet Sahour had a water problem when a much larger than average number of cars with blue West Bank plates began cruising round our fifty acre site. The Institute is just inside the Jerusalem municipal boundary which was redrawn in 1967 after the "Six Day War" to include the site of the future great satellite settlement of Gilo and, incidentally, ourselves and so at great expense we are hooked to the Jerusalem water supply that comes from the aquifer near Latrun in the Mediterranean plain, up through the Judean hills rising over 850 metres (m).

The West Bank cars had a shifty look. I agree it isn't possible, but these did! It

wasn't the air of caution, almost fear, so often found among those subject to military occupation. I knew it was more than that. I found the answer when beating the bounds one evening just before the end of the day's Ramadan fast; we have several stand pipes in the grounds for gardening and emergency, some hooked to our enormous cisterns by automatic pumps and some taken direct from our rising main. And there, looking even more shifty than their cars was a small group of locals filling large plastic cans with our water. What the hell was going on, I asked? Didn't they know they were trespassing? And our water costs us 100 shekels a cubic metre! (1)

So the story came out slowly through their embarrassment at loss of face. There was no water in the three towns. Hadn't been for three weeks now. A pump had fallen down a well and Major Frej was doing nothing about it, of course, and as usual. There would be no water for months. So they didn't think this great establishment would mind them taking just a little water? What could I do but let them fill up and get away with it? But I had the tap handles removed and turned off the pumps and then investigated the problem.

The Municipal Engineer, charming, heavily Leventine in features and manner, didn't know very much. "Just a temporary fault on one pumping station, you see. Have it right in days. Meantime there's a limited supply available for all. And water carts are available to supplement this. So no problem!" (2)

"But I thought the aquifer supplies Hebron and its ninety-five villages and all the Israeli settlements as well as the three towns and their hundreds of satellite villages? There must surely be enough at three quarters normal use? But the townspeople say they get an inch in their tanks a day if they are very lucky?"

"I am afraid that the local people exaggerate their misery—it is their custom over centuries of occupation—usually for political purposes you understand. The situation is well in hand. Have no fear!" And the inevitable coffee appeared and conversation became politely general.

Photo 1. No 2 Pump Station Bet el Ghoul

Water Problems In todays Holy Land 1

Well, I certainly had no fear. But I didn't feel he was giving me the full story so I checked myself.»

The water for the towns in the South Eastern part of the occupied West Bank comes from wells which tap the aquifer joining the wadis which drain from the Hebron–Bethlehem–Jerusalem watershed into the Dead Sea, 1300 feet below mean sea level (MSL). The wells are grouped around Herodion, the desert fortress of Herod, abandoned after the collapse of the Jewish Bar Kochbar revolt against the Romans in AD 135. They are Bet el Ghoul Numbers 1, 2 and 3 and Bet Fajr. Number 2 was working full speed when I visited it early the next day. From 230m an electric surface pump extracted 350m^3/hr, working twenty-four hours a day. (3) An identical pump in series boosted the supply, meant mostly for the three towns and a transformer station broke down the 5000 volt (V) input to standard 3-phase 350V supply to the two pumps. No problems here, nor at No 1 Station where a much smaller electric pump sucked 20m^3/hr and, I suspect, delivered most of it to the Israeli settlement at Tuqu.

At No 3 Station (4), meant to be pumping 360m^3/hr from 250m deep into the system, nothing stirred. A watchman snored solidly on a truckle bed in an outhouse in the heat of a Judean wilderness morning. The equipment was silent; one of the two 6-cylinder Cummins diesels had been stripped and taken away. Unlike No 2 Station both main engines, developing 650HP at 1460rpm, drove surface pumps through double universal joint (UJ) shafts and right-angle drive converters marked Amidor—probably US in origin. The main was a twelve inch welded pipe disappearing off to the Kfar Etzion Block reservoir—the same reservoir built in 1918 by the Royal Engineers to hold water pumped from the Arrub great pool and distributed by gravity to Allenby's desperate Jerusalem. So the great Etzion collection of settlements, mainly agricultural and heavily irrigated, would be depending on El Ghoul No 2, which normally supplied the West Bank towns and villages to the North West. And the settlements at El Azar and Efrata would probably take their toll. Anything left over would probably be boosted over the ridge South to Hebron and the notorious Quiriat Arba settlement, among others.

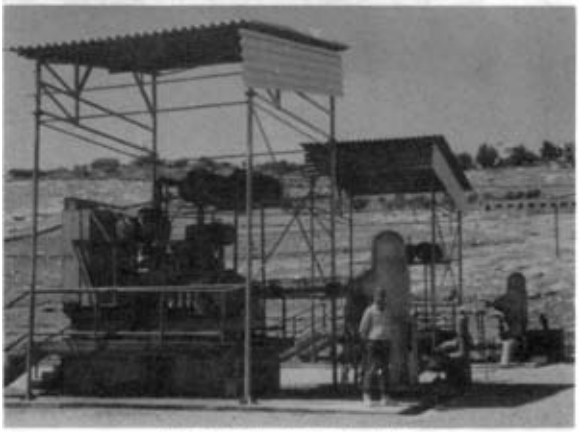


Photo 2. No 3 Pump Station Bet el Ghoul

Water Problems In todays Holy Land 2

Well, no sign yet of the mysterious "pump down the well" so it had to be at the last station in the system, if anywhere. And it was. Bet Fajr is the furthest south station and a sweating team and a mobile crane told most of the story. Someone had tried to repair the gland of the pump on the second well by freeing it temporarily from its mountings and propping it on short lengths of two inch pipe. With 250m of 6-inch pipe hanging on the end of it, the pump was a little susceptible to gravitational force and the ensemble duly "pile-drove" itself into the limestone aquifer. It took three weeks to get the specialized equipment to extract the pump section and they were now recovering 240m of pipe, all of which would need replacement (5). The system of two wells normally "produced 300m^3/hr, most of it for Bethlehem, Jala and Sahur, of course". Well, ask a silly question. My guess would be it produced about half this and the destination was a management variable!

And all the pumps and stations were owned by the Israeli water company Mekorot. The stations were run by "West Bankers"—my acquaintance who ran one of them was an Amman trained hydrologist from Hebron—but Israelis came two or three times a week to check the records, control quantities, check for quality and determine distribution. I would say he was a little under-employed and decidedly frustrated but at the same time grateful for employment in an area of high technical training and little or no employment opportunity.

So, of a normal 880m^3/hr (over 1000 if we take their estimate) only the Northern-most station, Ghoul No 2 nearest the three towns was pumping 350m^3/hr into the

Photo 3. El Farajh Pump Station—withdrawing 250m of pipe

Water Problems In todays Holy Land 3

system and the towns were not even getting 100m^3/hr a day! It seemed to merit a more general investigation of the West Bank's water resources and Israeli control of them and this needs an analysis of the hydrology of the Holy Land which I will make brief.

The great watershed is the peak of the hills of Judea and Samaria which runs Beersheba–Hebron–Bethlehem–Jerusalem–Nablus. Westwards the drainage is to the Mediterranean, the water collecting in three main levels, firstly in the Cenomanion-Turonian aquifer accessible through deep wells producing 200–1000m^3/hr, secondly in the Pleistocene layers between 20 and 40m deep, capable of delivering 120–250m^3/hr and originally motor pumped to irrigate individual citrus plantations and lastly, close to the surface in the Coastal Plain, sources 4–6m deep where low yields could be tapped by primitive pumps and other raising mechanisms. (6)

Eastwards the drainage is to the Great Rift comprising the Gulf of Eilat, the Dead Sea, the Jordan Valley, Galilee and upper Jordan. Here ground water is mainly to be found in wells at 250–350m deep, while a few springs emerge in the Rift Valley 1300ft below MSL.

The available water in Israel and the occupied West Bank and Gaza is shown in Table 1 while West Bank resources are shown in Table 2 (7). The Table does not show that a substantial part of Israel's water resources or access to such sources, is located within the 1948–67 borders of Palestine occupied by Jordan and most of this is the Yarquon–Tannanim basin (8) which has been quoted at a rather suspiciously high 750–895m^3 yr. (9) Fortunately for Israel, the current West Bank requirement for water is very small, because topography and soil conditions make most farming land non-irrigable in character. (10)

Table 3 shows that the Gaza Strip source consists only of the limited amount of ground water that comes to the coastal, near-surface levels and as this provides less than half current needs it is badly over exploited.

Table 4 indicates 1980 usage (11) which on paper appears marginally to under exploit the available sources in Table 1. There are several developments which affect the balance but do not appear in the tables. The area under investigation has been steadily growing but this has to a great extent been counter-balanced by highly efficient drip irrigation systems which carefully meter quantities to points in the surface without the enormous evaporation loss of spray systems; the latter are now used only where foliar feeding or bulk seeding irrigation is needed. The type of crop is also changing with the fluctuation of markets, particularly international ones. For instance with the accession of Greece, then Spain and Portugal to the EEC, the Israeli citrus market, a notoriously heavy user of irrigation water, is contracting rapidly, 200,000 dunams of orange groves having to be grubbed out this year, while growers concentrate on avocado and more exotic fruits which are more water and transport cost-effective.

However Table 5 is an Israeli estimate of current West Bank and Gaza usage, a projection of usage, of available supply (ignoring actual ownership) and of outstanding demand. Much of this material was presented at a symposium on resource and demography at the Trueman Institute of the Hebrew University in May 1984. The future planned demand for Samaria seems very high: it is difficult to see either such a substantial irrigation increase or such a large population demand—which would represent an increase in population of just under 1 million people! The conclusion that the figures are a Peter/Paul adjustment and must represent an overall (not just West Bank) picture is difficult to avoid. The figure of 360Mm^3 shortage in Israeli controlled territory by 1990 is not unreasonable and by 1995 this figure could be doubled (12). But individual figures and claims to internal sources apart, there is an obvious imbalance between geographic and hydrological regions and an overall shortage of water in the whole region, assuming that the sources cannot be exploited to their maximum without turning brackish. For any future expansion the area must look to external sources.

A start on the problem of internal imbalance was made as early as 1932 with the plan to distribute the Jordan headwaters, which arrive in Upper Galilee in such profusion, to the whole of the coastal plain and to Negev through gravity distribution with balance reservoirs in the Nakarob and the Negev areas. Unfortunately the reservoir areas proved too porous so Kinneret (Lake Galilee) was substituted, efficient in most respects except that it lay 210m below MSL and the water had to be pumped to 170m above MSL. The 108-inch diameter concrete pipe was installed and many developments and refinements since have given the country a coastal fresh water spine from North to extreme South with appropriate Easterly feeders.

The external source problem is, of course, a complicated one. There are three external water sources, illustrated by Map 1, which might be able, in the right circumstances, to be utilised to ease Israel's problems. The largest and most controversial of these is Egypt's Nile, yet it is in many ways the most practical, not only because of its enormous potential for supply, but also because a current project is near completion to link the Damietta-Port Said sweet supply (the El Salam project) to El Arish. To extend this link with the National Water Carrier between Gaza and Beersheva could easily provide 149Mm^3 a year to be sent to Hebron, Judea and Samaria and to pump 91Mm^3 a year to Gaza, thus providing 240Mm^3 from Egypt.

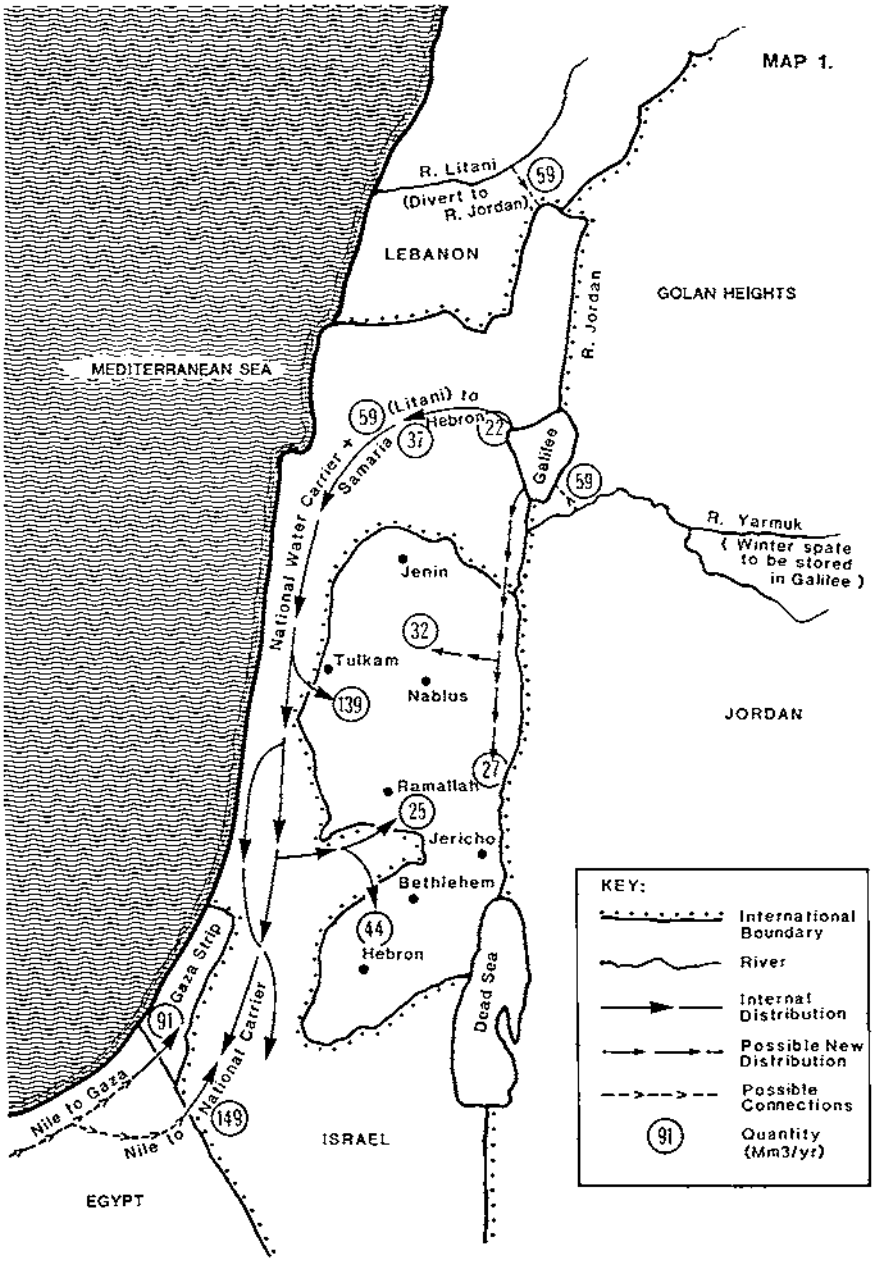
An alternative would to be accept the 91Mm^3 into Gaza, perhaps politically more easily achievable and, once achieved, the National Carrier Supply through over-exploited well sources can be reduced. The incentive to Egypt to provide 260Mm^3 a year would be the continuation of the Sadat initiative and the relief of the Gaza problem and for Israel to supply quantities to the Northern West Bank through the National Carrier in exchange for water in the arid South. So it has flaws?

Another external source—currently attractive as it is now under Israeli military control is to divert half the Litani in Southern Lebanon to the head waters of the Jordan. The solution is a cheap one as the fall would enable hydro-electric generation to pay for most of the work. 59Mm^3 is one possible planned annual diversion through one of three possible sites below Lake Karoum, the most southerly near Beaufort Castle being the most likely. It has even been suggested that control of the Litani was a major reason for the Israeli invasion of Lebanon called "Peace in Galilee" but it seems unlikely to have been a major deciding factor in such decisions and the recent spate of rumours of diversion work are probably sparked by no more than engineer reconnaissance plus anticipatory fears.

The third source is the Yarmuk, the border between Jordan and Syria, then Israel, joining the River Jordan just South of Galilee. little use is currently made of the strong winter flows and such use would prove far too expensive for Jordan, for whom storage in aquifers or reservoirs at this point (13) is not a practical solution. But a minor diversion to Lake Galilee would enable very cheap storage of large and fluctuating quantities. There are four possible diversion sites between Yarmuk and the SE corner of the lake, all short and easy engineering problems. The nominal output or use is to East Samaria and Jericho down the Jordan Valley past Beit Shean.

Now of course the whole problem has ceased to be a simple national one, or even one of limited areas. To devise a water strategy of these dimensions involves directly at least three other national entities and the status of the occupied territories of West Bank and Gaza which in turn involves, with greater or lesser commitment, all the Arab nations of the Middle East from Rabat to Islamabad. But the problem will not go away, nor can it be contained by limited actions such as increased conservation or optimising collection and pumping and it is unlikely that patterns of consumption can be made to vary enough to cure a Jordan-Israel combined 1000Mm^3 shortfall in ten to fifteen years. (12)

Will this problem of social and national survival force the region to come to some statesmanlike understanding, of which a water plan will be the underpinning for political and economic agreement? There are so many obstacles in the way. Egypt is a key, for, having abundance of Nile water, lacking only the infrastructure (14) to



distribute it, it seems her need to be part of a plan is thus minimal; but Gaza's needs affect Egypt and we have already seen one great statesman-like gesture from her leadership. Jordan's quantitative problem is not as great as Israel's but her dependance on agricultural irrigation, which will account for most of the shortage, is much greater and the only effective and cheap storage for Winter spate is Lake

Galilee in Israel. Lebanon is now occupied by Israel from the Awali River southwards but any overt, permanent, illegal expropriation of those sources would currently raise a storm in the Western world and, at the least, condemnation from the Soviet-Bloc; weak coalition government and growing internal pressure to bring the IDF home, make this course unlikely for the next few years. But South Lebanon can only use a very limited amount of its water resources and will probably be semi-autonomous after Israeli withdrawal so the temptation to trade water for other concessions will be one a Lebanese could find difficult to resist inspite of pressure from Beirut and Damascus. So perhaps in these areas there is a faint ray of hope for overall or piecemeal agreements.

The most difficult of all problems remains the one I started with, the West Bank. The water from East of the watershed feeds Israeli settlements and Arab towns and villages alike but if there is a shortage the nature of the one in charge obviously determines priorities and shortages can be engineered to serve political ends. To the West of the watersheds 90% of the water originates in the West Bank but supplies the Israeli National Carrier, and while Samaria doesn't need it, indeed cannot use it, deprivation would be a devastating weapon, for the very heart of the Zionist movement is agricultural.

Anyone who attempts predictions in terms of contemporary politics in this volatile part of the world may from that point start to number the days of his discomfiture or downright embarrassment, depending only on the scale of his effrontery. It is better suited for Cassandras than Nosferatus and even analysis itself is punishable. But even so one is drawn to the conclusion that there must arise an initiative to solve the Palestinian problem, in spite of the security implications (which have been allowed to assume indefensible bogey-man dimensions!) but which solves the demographic problem (since annexation would put well over a million more Arabs into the state and disrupt political balances for ever).

Obviously in the face of such pressures the tendency will be to try to maintain a *status quo*. But the demands of water—age old problem that it is—will inevitably disturb whatever balance there may be and my prediction is that it will lead to the conditions for wide-scale political settlement. *In "shallah"*!

NOTES

General M = million; m = metres; k = 1000 units; hr = hour; V = volt

(1) With inflation at 400%+ a year this figure is meaningless.
(2) For a West Banker and particularly a nomad, £1 a cubic metre (m^3) is a lot of money!
(3) *Photo 1*—No 2 Pump Station Bet el Ghoul.
(4) *Photo 2*—No 3 Pump Station Bet el Ghoul.
(5) *Photo 3*—El Farajh Pump Station—withdrawing 250m of pipe.
(6) *Atlas of Israel* 1970 Ch 13.
(7) As 6 above and in *Journal of Palestine Studies* (*JPS*) 8 (Autumn 1979), 97.
(8) This basin lies between the two rivers which emerge into the Mediterrannean at Caesarea in the North and Tel Aviv in the South, or roughly Jenin to Ramallah in the Northern lobe of the West Bank.
(9) *JPS* 7 (Summer 1979).
(10) Probably around 120Mm^3 and of this roughly 100Mm^3 is used to irrigate 85k dunams (21,000 acres) of citrus and vegetables. Heller in *A Palestinian State* estimates a possible further 100,000 dunams would be worth irrigating needing 100Mm^3 which, being drawn from the Tannonim–Yarkon aquifer would make some Israeli farms unworkable without help from external sources. The case made in Table 4 is much worse in effect than the above.
(11) Extracts from *Statistical Abstract of Israel* 1983 (No 34) Table XV/6.
(12) Middle East Research Unit, University of Pennsylvania. *Jerusalem Post* 2 Sep 84.

(13) Jordan was reported some time ago to be investigating the possibility of a 350Mm^3 dam at Maqarin to store Yamuk winter excess but nothing appears to have come of this idea.
(14) Although plans are afoot for a canal from the Mediterranean to the Quttara depression for hydroelectric generation and complementary sweet water system and the Damia-El Ansh sweet water project is well advanced.

Table 1

Water Resources in post 1967 Israel—Mean Annual Yield (Mm^3/yr)

Upper Jordan Basin	460
Ground water, Western drainage system	750
Ground water, Eastern drainage system	110
Coastal drainage	50
Sewage and industrial waste recovery	90
Surface run off West	80
Surface run off East	40
Lower Jordan	190
Total	1770

In Addition 1. From Eastern system 40Mm^3 saline ground water (over 2000mg chloride/litre)
2. From Eilat 2Mm^3 by desalination

Table 2

West Bank Water Resources (Mm^3/yr)

Surface run-off East	40
Ground water East drainage	110
Lower Jordan (not currently exploited for agriculture)	190
Ground water West drainage (1)	750
Total (included in Table 1 figures above)	1090

In Addition 40Mm^3 high salinity from Fashka, currently unexploitable
(1) This is one, minimal, estimate of water available in the deep aquifers inside the West Bank 1949–69 boundaries, mainly in the Tannanim–Yarkon basin (see 8). The figure quoted is 750–895Mm^3 with consumption at most 120Mm^3 (9).

Table 3

Gaza Water Resources

Ground water is the only source at around 50Mm^3/yr pumped from coastal drainage, fed by upper aquifers (included in Table 1 figures above)

Table 4

Overall Israeli Usage—1980 (Mm^3/yr)
(No breakdown by area is available)

Source		
National Company Mekorot		985
Self supply	wells	445
	surface water	135
Other supplies		135
Salt water		123
Total		1700

(Usage is 375 domestic, 90 industrial and 1235 agricultural)

Table 5

Possible Sources of Water Supply (Mm^3/yr)
(Quantities in brackets are for agricultural use)

	Current Use	Planned Demand		Rain Source	Piped Source	Outstanding demand
Gaza	140	172	(172)	60	21	91
Samaria	44	227	(141)	35	21	171
Judea	5	46	(25)	13	8	25
Hebron	6	73	(35)	17	12	44
Jordan Valley	64	83	(83)	55	1	27
TOTAL	259	601	(456)	180	63	358

Table 6

Analysis of Shortfall Plan (Map I following)
Using Full (4) Egyptian and 50% of Total Litani and Yarmuk Sources
(Quantities in brackets are for agricultural use)

Total	Gaza	Samaria (1)	Judea (2)	Hebron	Jordan (3)	Source
(91)	(91)	—	—	—	—	Nile direct
(81) 149	—	(71) 102	(4) 25	(6) 22	—	Nile through Israel National Carrier
(41) 59	—	(14) 32	—	—	(27)	Yarmuk
59	—	37	—	22	—	Litani
(213) 358	(91)	(85) 171	(4) 25	(6) 44	(27)	Total

(1) Samaria is Jenin + Tulkarm + Nablus (Map 1)
(2) Judea is Ramallah + Bethlehem (Map 1)
(3) Jordan is the Jordan Valley + Eastern Mountains (Map 1)
(4) The table shows that the full "Egyptian" supply in a plan is 91 + 149 = 240Mm^3yr. If however they only agree to the Gaza supply from El Arish (91Mm^3yr) then the only alternative is to take more from Litani and Yarmuk. The max practical Litani supply is 106, so 47 extra is available; the max practical Yarmuk is 97, so 38 is available. The total available extra is therefore 47 + 38 = 85Mm^3yr and the shortfall will be 149 − 85 = 64Mm^3yr. The only potential source is still Egypt!

The Continuing Story of Searchlights in the Corps

MAJOR R G SELBY-BOOTHROYD TD RE (V)

Richard Selby-Boothroyd earns his living as an instructor in office systems for a major computer manufacturer. His part time occupation in the Territorial Army started in the University of London OTC in 1964. He was commissioned in 1968 in the Royal Engineers (TAVR) and served in 217 (London) Field Squadron RE (V) for nine years before transferring to 873 Movement Light Squadron RE (V) in 1978. He commanded the Movement Light Squadron for three and a half years from 1981 to 1984 and is now Second-in-Command of 73 Engineer Regiment (V).

Introduction

Whilst the successful story of the anti-aircraft searchlight in the Corps came to an end in 1941 with the transfer of all the AA battalions and their equipment to the Royal Regiment, the history of searchlights in the Corps did not end there, and is not finished even now. After an interval of twenty years, the British Army's searchlights returned to the Corps in 1961 in the form of two Movement Light Squadrons. These were both Territorial Army units and were the sole survivors of the Movement Light Batteries RA formed in 1947 to provide movement light using the anti-aircraft searchlights. Today there is one remaining Movement Light Squadron, still TA and still Royal Engineers. In the March 1985 Journal, Brigadier Chichester-Cooke's article told a fascinating story of the development and manning of searchlights used in the generally well understood air defence role, and some of the valuable lessons learned along the way. The present purpose of military searchlights is a quite different one, and not so well known. Its story starts with the earliest military searchlights, continues through the period when searchlights did not belong to the Corps, and leads to the reasons why a few dozen men regularly converge on a drill hall in West London, to emerge as sappers towing searchlights off to exercises in England or Germany. This article traces the story and provides, as it does so, a brief insight into the technology of searchlights and how they can still be used in the ground battle.

Searchlights were introduced into the Corps of Royal Engineers before the end of the last century to provide light by which troops could move and engage the enemy at night. The first military searchlight was an electric arc lamp, its light focussed using a parabolic mirror and with the current generated by a steam engine powered dynamo, the whole equipment being mounted on a horse drawn cart. All searchlights still consist of the same elements: a source of light, a means of focussing that light into a narrow beam, a means of providing the power for the light source and some form of vehicle to transport the equipment. To appreciate why searchlights still exist in the modern army, and why they are still a Sapper responsibility, we need to keep in mind three separate issues. First, a basic factor which always has inhibited living, moving and fighting on the battlefield is darkness at night, and searchlights have long been one of the means of providing active white light. Second, there is a wide variety of surveillance and target acquisition systems available in today's army, alongside which the provision of powerful sources of white light does appear to be rather

Major R G Selby Boothroyd TD RE

primitive, to say nothing of highly dangerous for all concerned. Third, superimposed on these issues and, indeed, most other factors in modern warfare, is the ever present matter of economy in defence expenditure.

Principles of Movement Light

Without straying into a dissertation on night fighting tactics, we know that a night visibility plan may include the provision of white light or the use of any of several other, more sophisticated and expensive, active or passive night fighting aids. Although for tactical reasons the preference will always be for the use of passive aids to night vision, active white light has the distinct advantage that all our troops were issued free at birth, and trained to use from birth, a pair of reasonably efficient detectors. For this reason alone, active white light will long remain among the options to assist night vision. Here, searchlights are a very attractive proposition when compared with the various pyrotechnic means of providing white light. Pyrotechnics are invariably a danger to troops' night vision adaptation, provide only very limited duration of illumination over small areas and create their own expensive resupply problems. Searchlights, on the other hand, can provide varying intensities of illumination to suit requirements and cover large areas, thereby concealing from the enemy the real purpose of the illumination.

The employment of searchlights on the modern battlefield has retained in the British Army the title "Movement Light" which has been defined as "illumination provided by searchlights to facilitate all types of movement in a theatre of operations, whether it be tactical, working or fighting movement." This title and definition date from the 1940s, after the capabilities of searchlights to provide artificial moonlight had been rediscovered. In 1942, the Searchlight Wing of the School of Anti-Aircraft Artillery was commanded by a Sapper officer (coincidentally, the author's uncle) who, while training RA and ATS operators in the handling of anti-aircraft searchlights, noticed the phenomenon referred to as artificial moonlight. Some of the light in a searchlight beam is always scattered by dust particles and moisture in the atmosphere. If this were not so, we would not be able to see the characteristic pencil beam. This scattering of light is an irritation when searchlights are used to throw direct illumination on a distant object, not only because it serves to pinpoint the searchlight location and causes the beam to lose some of its intensity along its path, but also because the back scatter of light from the beam makes it difficult for the searchlight operator to distinguish the target. In 1943, extensive tests were carried out at the SAAA with searchlight beams at varying elevations and in a variety of atmospheric conditions. A fundamental result of these tests was that while there is significant back scatter of light from a searchlight beam, the opposite, forward scatter, is far greater. In practice, when searchlight beams are exposed at a low elevation, those looking away from the searchlights in the direction of the beams can see objects clearly to a distance at least three times that seen by observers looking towards the searchlights, even when the searchlights projectors themselves are obscured from direct view. Photos 1 and 2 illustrate this comparison. This rediscovery during the Second World War led to the rapid development of simple tactics for the use of searchlights in support of ground troops, and searchlights were used successfully in this role, in the face of the enemy, several times in Europe up to 1945, most notably in the Rhine crossings. On the last major river crossing operation of the war, the 15th Scottish Division assaulting across the Elbe, south east of Hamburg, arranged for movement light to, in the words of their history, "bathe the whole assault area with light."

The trials carried out in 1943 were indeed a rediscovery of artificial moonlight, for it is known that searchlights were used in this way at least as far back as the Boer War. At that time, searchlights were also used to provide light for ground troops in either of two other modes of operation. The first and most obvious is using a searchlight just like a large torch, directly illuminating a target area. The back scatter of light from the beam, already described above, has always made this mode a less than

Photo 1. Ground viewed with movement light searchlights behind the observer

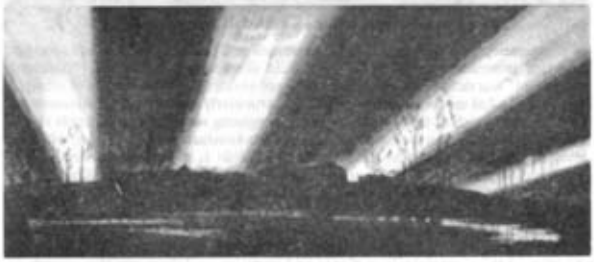


Photo 2. The same ground viewed looking towards the searchlights

immediately accurate means of achieving direct illumination of ground targets, especially at a range of illumination where the searchlight and its operators can be expected to survive more than a few minutes in war. Nowadays, in the face of an enemy equipped with modern weapon systems, this mode of operation would inevitably be suicidal and, given the small area of intense illumination it could provide, would have few practical applications. The second alternative mode of operation, and one which seems to be many officers' common misconception of the provision of movement light, is using light deliberately reflected from a cloud base. Perhaps the term artificial moonlight has added to the confusion, for searchlights used in this mode project onto the clouds an artificial moon from which light shines downwards, but in all directions with equal effect. This alternative, indirect method of illumination has a number of drawbacks which limit its potential applications. Adequate, consistent and predictable cloud cover is required, conditions not common in Northern Europe, the lighting effect favours enemy troops equally as much as friendly troops, and the searchlights themselves become more vulnerable to locating by the enemy the higher the elevation of their beams. This method was used successfully in battle in Italy, and later in the Far East, where target areas in one valley were illuminated using searchlights safely located in another, but was effective only because the cloud base was static and predictable.

So the commonest and safest means of providing movement light is by scattering or diffusion of light from searchlight beams exposed at a low elevation. Using four modern searchlights, an area of some three kilometres wide by ten kilometres deep can be bathed in artificial moonlight. This expression really describes a certain level

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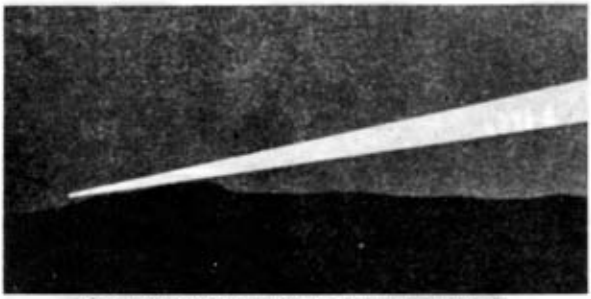

Photo 3. Searchlight positioned for indirect illumination by diffusion

of illumination and as late as 1980 it appeared in STANAG 2088 which specifies standard procedures for NATO's battlefield illumination techniques. "Artificial moonlight" was defined here as "illumination of an intensity between that of starlight and that of a full moon on a clear night." A particularly useful level of illumination, this, because much of the tactical, working or fighting movement and simple target acquisition required on the battlefield at night can satisfactorily be achieved with this level of illumination. Nothing approaching daylight is required and certainly no sudden changes of illumination are wanted which would affect troops' night vision adaptation. STANAG 2088 gives an air of respectability to the use of searchlights on the modern battlefield, describing as it does the modes of their operation and specifying conditions for their control and use. It may also suggest to us that the British Army is not alone in employing searchlights in this fashion. Indeed, the US Army used them extensively in Korea and Vietnam, and there are also records of their use in more recent Middle East conflicts. The current edition of the Battlefield Illumination STANAG replaces definitions of artificial daylight and moonlight with two new definitions which place our examination of the use of searchlights in a modern perspective. Two levels of battlefield illumination are defined: the lower level being "that required to enhance the performance of certain night viewing devices (image intensifiers)", and the upper level being "that required to permit the effective use of weapon systems not equipped with night vision aids and troops not issued with night vision aids to carry out their tasks in the night battle".

It is now clear that with the introduction of the modern range of night vision aids and weapon sights, the uses of movement light have broadened rather than contracted. They now cover not just light for movement, but for surveillance, counter-surveillance and deception. A particularly valuable contribution which searchlights may make in this scenario, and one which has been tested in successive BAOR exercises in recent years, is that of enabling or enhancing the performance of image intensifiers. On a moonless, starlit night, image intensifiers will just work. When there is cloud, though, the ambient light level is reduced and the performance of the viewing devices tends to reduce dramatically. It can be difficult to appreciate the extent of this reduction in peace time, especially on UK training areas, owing to the effects of even quite distant street lighting, but what can be seen on exercise will not necessarily be visible in war. Movement light, even sparingly used, will help other night fighting aids achieve optimum performance.

Post War Developments

Having seen a part of the continuing use of military searchlights, and its origins, we can return to the history of searchlights in the Corps, but should look first at what the

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Royal Artillery left us with. After 1945, there were literally hundreds of surplus anti-aircraft searchlights whose prime function had virtually disappeared but for which a proven, different purpose existed. Some of these searchlights became the major equipment of a new type of unit, the movement light battery, but the vast majority travelled no further than straight over the edges of the cliffs from the tops of which they had helped defend the United Kingdom. A movement light battery had an establishment of 12 officers, 4 BSMs, 20 SNCOs and 231 other ranks, all of whom manned the control, operation and maintenance of twenty-four searchlights. A series of pamphlets were written and published covering the handling of a movement light battery, the tactical employment of movement light and, not untypical of an artillery organisation, "The Movement Light Drill Book". The training of searchlight operatives, the lamp attendants and generator attendants as they were known, was of course still well documented as the searchlights and generators had not changed. The anti-aircraft searchlight, developed in the 1930s and still used at a few tattoos and pageants today, used a carbon arc to produce the intense source of light and needed a 27KVa generator to provide the power. These searchlights produced a peak beam candle power of 200 million, and had an effective range in the ground role of over eight kilometres. By 1960, the two remaining movement light batteries were TA units, providing an inexpensive means of maintaining the movement light capability and techniques within the army, so ensuring that the whole process of the rediscovery of artificial moonlight need not be repeated.

In the harsher defence economic climate post-Suez, it was recognised that the retention of movement light as an artillery capability was the anomaly it had always been, and the ownership of searchlights by the Royal Artillery, short in comparison with the full history of military searchlights, came to an end. Almost by accident, then, searchlights returned to the Corps. The committee sitting in Whitehall considering the fate of the movement light units had as its secretary a Sapper staff officer, Major P C Shapland, who pointed out that searchlights had originally been a Royal Engineers responsibility. He is, of course, now President of the Institution and also, by coincidence, Honorary Colonel of 73 Engineer Regiment (V), the unit to which the present movement light squadron belongs in peace time. So, in 1961, the Corps repossessed the carbon arc searchlights it had developed thirty years previously, together with some 300 rebadged TA gunners. A number of trials of movement light then followed in support of the developing image intensification night fighting aids and using volunteer soldiers to man the searchlight equipment. 873 Movement Light Squadron emerged from the 1967 reorganisation of the TA, alone in maintaining the use of searchlights for movement light, with an establishement reduced from over 300 officers and soldiers down to less than 80, and found itself in category IV of the TAVR with no real role to speak of. Its reduced establishment included a small squadron headquarters and one troop of 8 searchlights, the minimum organisation deemed necessary to sustain the retention of a movement light capability. The survival of even this inexpensive little organisation continued to be a matter of some uncertainty and the question of the requirement for searchlights was raised for many years with monotonous regularity. Members of a TA unit with a unique role and a unique equipment found themselves involved in a continued process of educating their superiors, not altogether the healthy pursuit for which they joined, and found the value and future of their chosen pastime continually questioned by their regular masters, not a situation conducive to high morale. The Movement Light Squadron reacted to this predicament by actively seeking employment for the searchlights. Two separate areas of activity were found. The second of these, and of continuing benefit to the army as a whole, was the participation in night fighting aids demonstrations to JDSC at Warminster and RMA Sandhurst, with regular involvement also in RE YO course exercises. These activities require TA soldiers to practise their searchlight operating skills on weekday evenings at some distance from their home base, resulting in a few tired civilians at their work the following day. The first area of employment that was found, however,

grew into an activity without mention of which no history of military searchlights would be complete. During the 1960s and 70s, the searchlight tattoo was a popular means of keeping the army in the public eye, and a few such events are staged periodically even now. As a rare purveyor of searchlights, 873 Movement Light Squadron found itself in high demand and, with apparently little else to train for, hardly a request was turned down. Cardiff, Cheltenham, Colchester, Wembley, Weymouth, even Berlin, were among the excesses willingly undertaken in the name of KAPE, and to build a reputation for indispensability come the next examination of TA establishments! After all, which brigadier would deny the "request" for the searchlights to appear at Buckingham Palace in Silver Jubilee Year? Each event found plenty of willing volunteers, even mid-week, and did provide genuine opportunities to maintain a high level of skill in operating the equipment, but this was not soldiering.

Though 873 Movement Light Squadron was alone in being equipped with searchlights for movement light, there were other searchlights in the Corps and the TA. 72 Engineer Regiment (V) in Gateshead, descended from the Tyne Electrical Engineers TA, was able to retain a part of its history by keeping a few 90 centimetre searchlights which it and its nearby TA plant squadron have also used to support a number of tattoo events. Since it held the equipment, the Regiment also practised the movement light role on occasions in BAOR and even commissioned Ken Howard, the well known military artist, to depict their efforts, much to the chagrin of 873 Movement Light Squadron. Hampered by the physical bulk of the old equipment and difficulties in obtaining spares, 72 Engineer Regiment has not continued with movement light as a part of its role, but did provide the RE Museum with its exhibit of a 90 centimetre carbon arc searchlight. Meanwhile, 873 Movement Light Squadron's more serious efforts were being recognised. Early in 1969, it contributed to a major trial of night fighting aids for the 1980's alongside the 1st Battalion The Royal Green Jackets. Their Commanding Officer, Lieutenant Colonel F E Kitson, wrote to the Squadron Commander, "I would like you to know how much we admired the efforts of those members of your Squadron who took part in the Trial, and spent a large part of each night of our seven major exercises in January, February and March on Salisbury Plain in between normal working days in their civilian jobs. I would hastily add that it was not only their stamina but their cheerfulness and competence which impressed us." Nevertheless, a further five years of insecurity faced the Squadron before its place as part of the TA engineer reinforcements for 1st (British) Corps became established, it reverted to being a Group A TA unit with a mobilisation role, and its training became an earnest endeavour to produce effective soldiers as well as searchlight operators.

Equipment

All this time, the one searchlight equipment in service was the 90 centimetre projector with its carbon arc lamp and cumbersome, trailer mounted generator. Where a searchlight position was required to provide continuous illumination for longer than the twenty minute burning time of the carbon electrodes, two searchlights were needed so that one could expose as the other doused to change carbons. Thus the eight searchlights of the movement light troop could, in some circumstances, field only four searchlight positions. Eventually, this factor, and the size, age and general state of maintenance of the equipment, all pointed to the need for a replacement equipment. Two American searchlights were procured on trial loan, together with their own trailer mounted generators. These were searchlights of the type used by the US Army in Vietnam and were mounted on a two wheeled trailer which could be towed behind a Land Rover. These 30 inch searchlights also use an electric arc, sealed inside a glass bulb filled with xenon gas under high pressure, to produce an intense white light using electrodes which do not burn away. They can produce a peak beam candlepower of 800 million and the beam from one searchlight can, on a clear night, be seen to scatter light up to a range of 15

kilometres. Simple trials with the 30 inch xenon searchlights showed that their light output and mobility made them far superior to the 90 centimetre carbon arc lights. The dimension referred to here, as with all searchlights, is simply the diameter of the projector. The American generator was not favoured as it required a second towing vehicle, and a simple concept was formulated. A generator requires an engine and so, too, does a vehicle. By mounting an alternator inside a towing vehicle, and driving this generator at the searchlight position using the vehicle engine, one whole engine and the second vehicle are saved. Ten xenon searchlights were purchased from the US Army, eight for service with 873 Movement Light Squadron and two to

Photo 4. The 90cm carbon arc searchlight

be held in war maintenance reserve, and eight Land Rovers were modified to carry British manufactured alternators driven from the power take-off supplied by the vehicle manufacturer. This generator system developed the 15KVa power needed to operate the searchlights, a little over half the power needed for the carbon arc lights and at a fraction of the bulk and weight.

In 1978, the TA Movement Light Squadron took into service the biggest new searchlights the Corps had seen for over forty years. Training with the new equipment began within days of the packing cases touching British soil. Here was a very limited quantity of a new military equipment being unpacked, inspected, mauled about and flung onto a training area by crews of enthusiastic young amateurs under the supervision of wary old amateurs whose long held skills with the gas pliers and red hot carbons now counted for little. Training progress was slow, despite the knowledge of the loaned equipment, as many of the volunteers preferred the tattoo role using the familiar old equipment. A real conflict of priorities now existed, with one of the smallest units in the army, working only at weekends and evenings during the week, trying to cope with training for war, the teething problems of a new set of equipment and the problems of operating and maintaining another aged and cumbersome set. The latter problems were simpler to solve, though caused much heart-searching at the time. 873 Movement Light Squadron returned all 90 centimetre searchlights and associated generators to Ordnance and were committed to supporting only two tattoo events each year. These are the two prestigious local events of Wembley Musical Pageant, which occurs every second year, and the Beating Retreat by the Massed Bands of the Household Division on Horse Guards Parade, annually in June. In alternate years to the Wembley event, Colchester Searchlight Tattoo takes place and the Squadron has continued to support this also, all without detriment to the higher training priorities.

With the burden of the majority of tattoo commitments removed, the Squadron was able to apply more energy to training with the 30 inch xenon searchlights. Earlier hopes for the smooth operation of this new equipment gave way to disappointment as problem after problem occurred. The bright idea of using the Land Rover engine to power the static running of the generator began to look a little suspect when engines overheated and exhaust manifolds glowed bright red in the dark. The alternators, one after another, began to throw their windings after a few hours continuous use and the power take-off drive belts would slip intermittently causing loss of generator power. Sudden losses of power caused the searchlights to shut off without allowing the coolant inside them to continue flowing for the prescribed period, leading to crystallisation of the glycol coolant and jamming of the coolant pumps. Then the searchlights would develop occasional electrical faults and a whole new set of problem determination procedures had to be taught and practised. Slowly, one by one, solutions to each problem were found and put into practice and then a mysterious wearing of the vehicle front tyres was noticed. The generator Land Rover, fitted with a heavy alternator, carrying a crew of three men and their personal equipment, jerricans of fuel and the searchlight power cable, and towing the searchlight trailer, was grossly overloaded and imbalanced. To compound this problem, the brakeless trailer was deemed to be illegally towed on British roads. This discovery caused the whole equipment set to be grounded until each trailer could be modified to correct its balance and hence the weight it applied to the towing hook of the vehicle. The mid-week, regular demonstrations of movement light to RMAS and JDSC courses continued relentlessly, using the xenon searchlights now despite their problems. The opportunities for educating tomorrow's commanders could not be missed. The presentation scripts had, of course, to be amended to explain why a handsome-looking wheeled searchlight trailer was being transported on the back of a 4 tonne truck while its generator Land Rover followed meekly behind.

Further Trials

In 1980, another short trial of movement light was mounted, sponsored by UKLF, to

assess the differences in capabilities, if any, of the new xenon searchlights and to estimate the potential uses of these lights in conjunction with some of the other in-service night vision aids. This trial not only concluded that all the known uses of searchlights in the movement light role were still valid, but also proved their use in a fairly obvious new air defence role as well as giving the lie to a long standing concern over the vulnerability of exposed searchlights to accurate location from the air. It had, as described earlier, long been appreciated that by keeping the elevation of searchlight beams as low as possible, estimating the location of well sited searchlight positions accurately from the ground is sufficiently difficult as to reduce to an acceptable level their vulnerability to deliberate artillery fire. It had been assumed, though, and conveniently overlooked, that their accurate location by reconnaissance aircraft would be a simple matter. During the trial, this assumption was tested and it was found that an experienced helicopter navigator overflying the searchlight positions, and having his exact position close to the searchlights confirmed for him, could not estimate their exact locations with an error of less than 200 metres. The simple reason for this difficulty is that when a number of searchlights are exposed, the intensity of their light output completely masks any view of the surrounding ground features which could be used for accurate navigation were the searchlights not there. While using a searchlight to illuminate a helicopter landing site, itself a valid and reliable use of direct illumination, it was seen, as would be expected, just how vulnerable a helicopter is to illumination by searchlight. The rotors form, in the searchlight beam, a brilliant halo with a defenceless target, its occupants blinded by the light, suspended and clearly illuminated beneath it. So, whilst fast fixed-wing aircraft have not been valid searchlight targets for decades, slow flying and hovering helicopters still are.

The American xenon searchlights were procured complete with removable filters for the provision of active infra-red radiation. This capability, which the US Army had used, was also tested in the 1980 trial and found to be of very limited use. Although white light scatters and can produce diffuse, indirect illumination, infra-red radiation does not behave in the same way and can only be used for direct illumination. The range at which this illumination could effectively be used was found to be too short for most practical purposes. A theoretical reason for this disappointing result derives from the properties of the radiation produced by the xenon arc lamp. All sources of light produce electromagnetic radiation covering a spectrum of wavelengths, some of which are visible and some will be in the infra-red region. The very properties of the electric arc, discharging in a xenon atmosphere, which make it such an efficient white light generator also make it a very inefficient infra-red generator. The filters which remove the white light from the searchlight

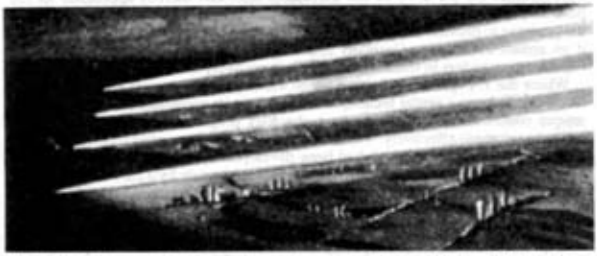

Photo 5. Artist's impression of an aerial view of movement light searchlights. Trials have shown that the ground features illustrated here would not be visible from the air owning to the intensity of the searchlight beams

beam leave little other detectable radiation because the lamp produces little else before filtering. That is not to say that there are not other discharge lamps which can generate invisible infra-red radiation efficiently, but the current service searchlight is not one of these, and though active white light has not been completely overtaken by the advent of thermal imaging techniques, the use of active infra-red equipment has.

With the training in the use of the xenon searchlight progressing into the 1980s, 873 Movement Light Squadron found that its small establishment of a tiny headquarters and one troop of eight searchlights could be better organised to provide the customers, the divisions and brigades of 1st (British) Corps, with viable and controllable movement light support. Since the xenon searchlight does not need to douse at intervals as the carbon arc lamps did, all the available searchlights could provide continuous illumination from separate positions. Two troops, each having four searchlights, were therefore formed and organised so that they could operate independently or as part of the complete squadron. With this organisation, the Squadron has participated in divisional or corps exercises every year since 1979, coming under command the Commander Engineers at Corps or Division for initial deployment, as it would do on mobilisation. A brief account of the employment of movement light on one such exercise is to be found in the Journal of March 1983 where Lieutenant Colonel D A Grove wrote in his article on Lessons from Exercise Red Claymore: "Movement light has a potential role in support of ambush operations and general surveillance, but will only be useful if brigades and battle groups have trained with it, know its strengths and weaknesses, and can build it into their night visibility plans." He went on to point out: "If movement light is worth having, and I believe it is, we must work to make the maximum use of those few days a year that the Squadron can be deployed in BAOR."

Herein lies an anomaly with which 873 Movement Light Squadron has struggled for years and should, it can be argued, continue to struggle. We have seen that artificial moonlight has had its uses for nearly a century of preparation for war and been proved in battle. We have also seen that this capability was forgotten and rediscovered almost by chance, though with hindsight we may think that its availability should always have been apparent. History has shown the wasteful repetition of basic fighting and survival techniques being discarded in peace, only to be rediscovered and frantically redeveloped at enormous cost, well after the outbreak of later hostilities. In the continuing activities of the TA Movement Light Squadron there is an economical retention of a movement light capability in the army. These techniques, which in war are themselves economical, are being maintained by a small force of still cheerful and competent volunteers whose opportunities to practise them are severely limited. So, therefore, are the opportunities for the army to use movement light and thereby appreciate its full potential. An economic balance has to be struck and the present compromise of a TA unit training to provide movement light in a BAOR concept of operations, providing it on annual exercises in Germany and committed to frequent demonstrations to regular commanders in training in the UK, is probably the most sensible option.

Where the TA squadron has been found wanting in recent years is not so much in its ability to keep a useful technique alive, but in its capacities for developing its unique contribution to the army as technology progresses and for managing its unique equipment effectively. The introduction of the xenon searchlights in the late 1970s saw an equipment which had been developed by another army some fifteen years previously being brought into service and used solely by a part-time unit. The teething problems took an inordinate amount of time and frustration to solve, partly because of infrequent use of the equipment and partly owing to deficiencies along the complex paths of equipment management procedures. When the xenon searchlights were procured and the Land Rover generator configuration was developed, not all the links in the chain of supply and maintenance planning were covered. As defects in the operation of the equipment were discovered and reported, procedures which are not common knowledge in the TA had to be learned and new disciplines practised.

Funding for contract repair and modifications had to be allocated by sponsors not fully briefed on the operational requirements. With the limited use of the equipment, the minimal spares procured with the equipment were used slowly and dwindled away unnoticed. When further spares were demanded, it was found that not only was there no funding allocated for contracts with a US supplier, but that the equipment was not even recognised by the supply system. Contracts for spares were eventually let through the US Army and showed lead times in excess of two years for most demands. A classic example of the type of crisis which this mode of equipment management can lead to found 873 Movement Light Squadron on the move to Exercise Lionheart in September 1984, with four of its eight searchlights inoperable owing to lack of one vital supply item, while a few gallons of that item, the specialised coolant fluid, was being flown to Europe on Concorde.

The Future

All these problems, and several more, have led to the inevitable conclusion that the future life of the current searchlight equipment is limited. As we have seen, the xenon searchlight was a distinct advance on the carbon arc searchlight in its higher light output, lower power requirement and ease of mobility, but most important, its ability to provide continuous operation. In fact, the efficiency of a xenon arc is no better than that of a carbon arc, lumens per watt. It is a property of searchlight projectors that the smaller the light source can be made, the more efficiently the beam can be focussed and therefore the more intense the beam can be for a given brightness of the lamp. It is also fairly obvious that the brighter the light source can be made, the more intense the searchlight beam will be but, the brighter the arc the more heat will be produced. The provision of means to cool the lamp, so that it is not damaged by the heat produced, introduces physical obstructions into the projector and also increases the size of the light source. These effects in turn reduce the intensity of the focussed beam. Since, for efficiency, the silvered glass parabolic mirror cannot be bettered, advances in searchlight technology have concentrated on producing a smaller, more intense light source using as little power as possible and hence a minimum requirement for cooling. If the heat problem can be eliminated by reducing the power input, the resulting smaller arc and less obstructed projector leads to a more efficient searchlight. Modern, civilian xenon arc searchlights can produce a peak beam candlepower in excess of that produced by the 90 centimetre carbon arc searchlight, and requiring a power input of only about 4 kilowatts. The replacement of the existing service searchlight with a modern and readily available civilian version, powered by a smaller, more manageable generator, is an avenue being explored to help overcome the present equipment problems.

In conclusion, the author hopes that the publication of this article, while bringing up to date the history of searchlights in the Corps of Royal Engineers, will in some way help to reduce the number of times his successors will be embarrassed by the ignorant, and in some cases not so innocent, remarks which plagued him during his time in the Movement Light Squadron: "I thought you lot were gunners", "Here come the searchlights, straight from Cardiff Tattoo", "You bounce it off the clouds, don't you?" and "Well, of course, with image intensifiers and thermal imaging about, we won't be needing searchlights any more!"

Royal Engineer Bomb Disposal During World War Two—Has The Wheel Turned Full Circle?

MAJOR A S HOGBEN QGM

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INTRODUCTION

BOMB DISPOSAL, or to give it its current NATO terminology, Explosive Ordnance Disposal (EOD) has in the past few years become fashionable. Perhaps as the aftermath of the Falkland Islands Conflict, lessons so painfully learnt during World War Two have been hurriedly relearnt and ears deaf to the previous cries from the EOD community have become unblocked. In the not too distant past, exercise planners whether based at HQ BAOR, HQ 1(BR) Corps or HQ UKLF tended to pay lip service to EOD problems. "Perhaps we could have a few token incidents but not too many, it does so slow up the exercise play and prevent the real lessons from being learnt". Happily this is changing and not only in our Corps, but senior staff and commanders in all Arms and Services are being made aware of the problem of unexploded ordnance. It is sad when one has to reinvent the wheel every second generation or so, but the role of RE EOD or Bomb Disposal has tended to follow closely the fortunes of the Corps.

During World War Two there were never enough Sappers nor were there enough Bomb Disposal officers and men, although in their heyday the RE Bomb Disposal organisation was commanded by a Major General and consisted of well over 10,000 all ranks. By 1951 the organisation was down to a small HQ and three regular troops together with nine Supplementary Reserve and Territorial Army squadrons who at that stage undertook just fifteen days' training a year.

Now with the standing of the Corps as high as it ever was, RE EOD together with its counterparts in the Royal Navy and Royal Air Force EOD organisations, is assuming its rightful place in all exercise and operational planning and once again the cry is "there are never enough". We are proud now to have an EOD Regiment of two regular and four Territorial Army Squadrons all of whom carry out active EOD work—but is it enough?

To save relearning old lessons, perhaps now is the time to remember the history of RE Bomb Disposal during World War Two. A number of similarities exist between the events of 1940–45 and 1980–85. This paper does not refer to individual Bomb Disposal Companies or individual incidents of bravery; that is a detailed history which hopefully will be recorded elsewhere. It does, however, show the initial lack of technical information, the emergence of new skills and techniques, the reaction to

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new threats as they arose and at the latter end of the war the preparation and training for a possible threat which did not materialise. Similarities between the 1980s and the 1940s will become obvious.

THE PHONEY WAR (3 SEPTEMBER 1939–10 MAY 1940)

Strange as it may seem, the United Kingdom entered the war without any real knowledge of enemy airborne weapons and this unpreparedness existed in spite of the opportunity of gaining information during the Spanish Civil War. It was during the Spanish War that suspicions were first aroused that unexploded bombs (UXB)

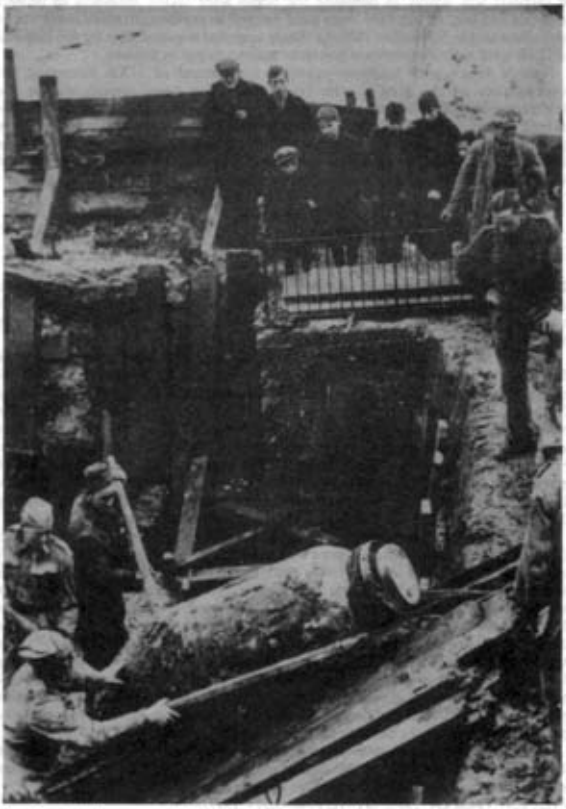


Photo 1. Typical scene around 1940/1941 "Hermann" 1000Kg bomb being dragged from a shaft after the fuse had been immunised. (London Church Yard)

might pose a problem. The Axis Powers used Spain as a trial ground for their new air forces, but the government of the day although giving "active consideration to the matter", allowed the problem of UXB to fade as lack of information nullified further thought. The German air attack on Poland provided the first confirmed information concerning the disrupting effect of UXB.

At first it was thought that UXB could be dealt with by the Civil Defence Organisation along with all the other after effects of an air raid. This was based on the idea that UXB would be found on or near the surface of the ground and the method of disposal was simply to detonate the bomb after taking measures to protect property and life. At this time there were no civilian personnel trained in the use of explosives and in November 1939 the Army accepted responsibility for the disposal of UXB until sufficient civilians had been trained to use explosives.

Here a break with tradition occured, for instead of UXB becoming the responsibility of the RAOC who traditionally had been responsible for the destruction of explosives and ammunition, it passed to the RE who traditionally are trained in demolition, the construction of fortifications and the ability to dig below ground level. By the end of November 1939, Bomb Disposal Parties RE were formed, the personnel being drawn from Field Companies RE. Each party consisted of one junior NCO and two sappers equipped with:

A vehicle (unspecified)
75lb of explosive
2 Shovels
2 Picks
500 Sandbags.

They had no information about enemy bombs and fuzes and received only an instruction which gave the method of building a sandbag enclosure around a supposed UXB of unspecified size. The parties were attached to units in the vicinity of likely targets and there awaited their fate.

During the next month, December 1939, the first UXB were recovered by the RAF on the Shetland Islands and the fuzes were sent to Woolwich Arsenal for evaluation. Meanwhile the RN and RAF had established embryo Bomb Disposal Organisations and the Civil Defence got on with training the civilian personnel who were to relieve the Army of its bomb disposal responsibilities. The expected heavy air attacks did not develop during the phoney war—Belgium, the Netherlands and France apparently providing a barrier. This apparant immunity to air attack produced a complacency in which the Bomb Disposal Parties RE tended to be forgotten. Abandoned by their parent Field Companies and used as fatigue men by the units to which they were attached, they gradually disappeared into oblivion.

In February 1940 the Home Office declared, some say admitted, that the Civil Defence Organisation could not cope with the UXB problem and passed it formally to the War Office. As a result, by May 1940, Bomb Disposal Sections RE had come into being, based on a Sterilising Sub Section and a Removal Sub Section. The strength of the Section was one officer and fifteen men. It was at this stage that the first specialist bomb disposal tool was introduced—the Two Pin Discharger. This device would discharge to earth the German electrical impact fuze similar to those recovered from the Shetland Islands in December 1939. This was a major step forward as bomb disposal had left the "detonate in situ" situation and made the first move towards thoughts of rendering the bomb or fuze inert and removing it to a safe place for destruction. It was also the first of many specialist items of equipment to be designed by some of the best scientific brains in the country.

By 26 May 1940 the first twenty-five Bomb Disposal Sections were established and it is interesting to note that of the original sixteen Bomb Disposal officers, five were subsequently to be awarded the George Cross.

THE BAPTISM OF FIRE (JUNE 1940–MAY 1941)

Early in June 1940 the original twenty-five sections had grown to 109 sections of fifteen men and by the end of the month the number had expanded to 220 sections.

By September 1940 the number of sections and the number of men in each section was doubled and so in September 1940 the total number of men employed in RE Bomb Disposal was at a peak of over ten thousand all ranks.

This rapid expansion was necessary to meet the air attacks launched upon the country following the collapse of our European allies. By August 1940 air attacks were general and the first German clockwork long delay fuze had been recovered. Between June and August 1940 Bomb Disposal Sections, although War Office controlled, had no real master. The personnel were often of low medical category and always at the end of the line when vehicles and general military equipment were being issued. Also at this time there was no Civil Defence reporting procedure for UXB and in the words of a senior Bomb Disposal Officer "the situation was very confused". In spite of their many difficulties the sections carried on heroically. Towards the end of August 1940 the number of UXB outstanding was more than two per bomb disposal man and increasing rapidly. In August the War Office realised that bomb disposal was a field operation and passed the responsibility to GHQ Home Forces who set up a Bomb Disposal Directorate (DBD). The Prime Minister, Mr Churchill, who was made aware of the mounting UXB problem, ordered the highest priority for the production and issue of specialist and general equipment to the Bomb Disposal Organisation.

In November 1940, DBD was offered and accepted conscientious objectors as a labour force. 375 members of the Non Combatant Corps (NCC) volunteered for bomb disposal work and in spite of the misgivings of some section officers they were successfully employed. Whatever one's religious beliefs there must be a certain commonality of disquiet when digginig for several days towards a bomb which may at any moment explode. As a further measure, albeit of a temporary nature, seven General Construction and four Quarrying Companies were converted into Bomb Disposal Companies and by October 1940 were heavily involved. Concurrently new bomb disposal units were being trained and formed, these replaced the eleven converted units in January 1941.

With the advent of the DBD a proper organisation and chain of command was established. The new Bomb Disposal Unit was a Company designed to control twelve Sections and the whole organisation was now one of twenty-five companies and four groups. The majority of companies were commanded by the groups which were situated in the South and South East of England, East Anglia and London. The companies outside these areas were independent. Operationally the Group HQ was static, the Company HQ semi-mobile, and the sections were totally mobile and interchangeable between companies.

Simultaneously with the Army reorganisation, the Civil Defence had put its house in order and by January 1941 there was a good reporting procedure and all bombs on civilian property allotted priorities by the Civil Defence Regional Commissioners. In addition to the Army Organisation which was responsible for the whole of the country, there were RN and RAF Bomb Disposal Units which at that time were responsible for their own installations. Subsequently a RN Land Incident Section was established which was responsible for the disposal of "Parachute Mines and other Anti-Ship weapons which came to rest unexploded on land". There were also established Auxiliary Bomb Disposal Units which were civilian factory squads trained for bomb disposal within their respective factories. These auxiliary units were later incorporated into the Home Guard and were extremely efficient.

By May 1941 there existed an adequate and efficient Bomb Disposal Organisation of volunteer personnel with excellent research and intelligence systems, successfully co-operating with the Civil Defence and Police. The latter two organisations both had by this stage their own Bomb Reconnaissance Officers, trained to verify initial reports and submit UXB reports through Civil Defence channels to the Bomb Disposal Organisations.

THE LULL (JUNE 1941 TO DECEMBER 1942)

Bomb Disposal work continued throughout 1941 and the Organisation was now an established branch of the Royal Engineers. The threat of a German invasion was beginning to fade and thoughts turned to attack rather than defence. Bomb Disposal units began to join the armies and garrisons overseas. Shortly after Russia entered the war in June 1941 Bomb Disposal was represented in a Military Mission which was sent to Moscow. By the end of 1941 there were Bomb Disposal Sections in the Orkney and Shetland Islands, Northern Ireland, Malta, Gibraltar, Malaya and West

Photo 2. 2000Kg bomb being pulled from house (Bomb incident at Gorleston, Nr Great Yarmouth, June 1941)

Photo 3. Note RE use of two steam rollers and dangerous position of spectators

RE Bomb Disposal during WW2 2,3

Photo 4. Note bomb length in relation to width of road

Africa. In 1942 the first Bomb Disposal Company had moved to the Middle East and two more were to follow in 1943.

During this period it became apparent that some UXB could not be removed without major engineering work taking place; because of this and the location of the bomb in relation to built up areas, it was decided that UXB could, in certain cases, be abandoned. In 1942 a number of units had cleared all their outstanding bombs and during this relatively quiet period were employed on works services under local CsRE Works, but this was only the lull before the next burst of activity.

THE PRE "D" DAY PERIOD (DECEMBER 1942 TO JUNE 1944)

The entry of Japan and the USA into the war in December 1942 brought about a new phase of activity for RE Bomb Disposal. Incidentially it also coincided with the recovery in January 1943 of the first German battery powered anti-handling, anti-disturbance fuze. This fuze presented bomb disposal operators with their most unpleasant task to date. As usual the research and development capability of the Unexploded Bomb Committee of the Advisory Council of Scientific Research and Technical Development was able to provide a solution, albeit one which still required a cool head and a steady nerve.

Throughout 1943 US personnel were attached to British Bomb Disposal Schools and units for training. British Bomb Disposal personnel were sent to the USA both as instructors and liaison officers. This arrangement continued throughout the war and indeed continues today.

At home it was decided that all the coastal minefields must be cleared and this task was passed to Bomb Disposal who from then on were to have the dual role of Bomb Disposal and Minefield clearance. As statistics were later to show the clearance of these minefields resulted in one third of the total deaths suffered by the Bomb Disposal Organisation during the war years. If the period is extended to the end of 1947, mines then accounted for over 38% of all deaths.

In July 1943, five United Kingdom Bomb Disposal Companies were mobilized and posted to 21 Army Group for the invasion of Europe. These units were trained in British and American bomb disposal and all the officers were trained as shallow

water divers. These officers were later to be used to remove explosive charges, placed by German underwater swimmers, on the Nijmegan Bridge and numerous other bridges in Europe. Towards the end of 1943, a number of Bomb Disposal Sections were disbanded and most Companies were reduced from twelve to ten Sections.

In the early summer of 1944 the disposition of the United Kingdom based Bomb Disposal companies under went considerable change in preparation for "D" Day. It was expected that air attacks would be made against our troops taking part in the invasion of Europe. In particular it was thought that large numbers of anti-personnel bombs would be dropped on to troop concentrations in Southern England. The Bomb Disposal Organisation had every reason to fear these weapons which, when dropped in 1943, had brought East Coast towns to a stand still. However the Germans did not appear to have appreciated the effectiveness of the SD2 (more popularly known as the Butterfly Bomb) or perhaps their lack of air superiority kept them at bay. Whatever the reason, relatively few of these nasty little weapons were dropped during 1944. 1944 did however see the arrival of the V1 Flying Bomb and the V2 Rocket. As was now expected of them, the Bomb Disposal men and their scientific back-up, initially at great personal risk, wrenched the secrets from these so called vengeance weapons.

"D" DAY TO THE END OF THE WAR

The forces taking part in the invasion of Europe were not attacked from the air on the scale expected. The five Bomb Disposal Companies which landed with 21 Army Group were however kept fully occupied. These units dealt with 939,061 UXB, mines and other missiles. In addition they were employed in a number of specialist roles, one such was their training to open safes and strong rooms for "T" Force investigators; a very useful pre-release course!

The successful European and Middle East campaigns now allowed time for serious consideration of the Bomb Disposal role in the all-out attack upon Japan, indeed some thought had been given prior to "D" Day. In March 1944 all United Kingdom based bomb disposal personnel under the age of 32, other than those in 21 Army Group, were medically examined to see who were fit enough to become divers. In October 1944, ten Bomb Disposal Platoons (Light) RE were formed from the United Kingdom personnel who had passed the medical examination held in March. Since in September 1944 all Bomb Disposal Sections had become platoons, the only innovation in the name of these new units was in the use of the word "light".

The Light Platoon had an establishment which included two officers and was designed to be the fighting equivalent of two RN Landing Craft Obstacle Clearing Units. All ranks were trained as underwater swimmers. They were also trained in Japanese, British and American bomb disposal and in addition, a very high standard of physical fitness and endurance was achieved. The officers and SNCOs received training in normal pressure suit diving and the disposal of anti-ship mines of relevant nationalities. From the trained Light Platoons a Company HQ and four platoons were formed into a single unit in April 1945. This unit moved to India in June 1945 and the remaining Light Platoons were sent to Europe and employed on general diving tasks. These highly trained units, whose principal role was beach obstacle clearance rather than bomb disposal, were never used in their intended role as the cessation of hostilities overtook other plans.

The end of hostilities brought a rapid run down of the Bomb Disposal Organisation. The continued shrinkage and eventual resurrection is another story, but all in EOD today owe much to the efforts and bravery of those bomb disposal men of the 1940s.

POSSIBLE LESSONS OR POSSIBLE QUESTIONS

All histories however shortened tend to end with a paragraph on the lessons learnt. I do not wish, nor do I intend, to list lessons learnt. Rather I question whether we the Services as a whole have learnt enough from the EOD past.

The United Kingdom entered World War Two with no knowledge of its enemy's

air dropped weapons although the information had been available in Spain and elsewhere. During the early months of the war complacency allowed bomb disposal to be forgotten, it was not until bombs fell upon the mainland that activity began. Are we today in a similar situation, must we too wait for the first bomb to fall? If so it will be too late. Are we really making the most of available information, are we sharing it with our NATO allies? Are we noting other Western nations weapon developments and considering whether our potential enemies may have similar weapons? Are we perhaps making false assumptions based upon a lack of knowledge? Or making the assumption that because we have not seen it, it does not exist? Above all, are the cries of the EOD community, who certainly remember the lessons of past years, being sufficiently heeded?

In 1940 it took a further year to establish an efficient bomb disposal organisation with its own research and intelligence system, an efficient incident reporting procedure, close co-operation with local authorities and the police and the regular exchange of information and techniques between all three services. We have had many years of peace in which to organise ourselves, but have we really got it right?

In 1941 both the Civil Defence and the Police had their own well trained Bomb Reconnaissance Officers. Should we perhaps fall in line with many of our NATO allies and train civilians and non EOD arms of the services in the skills of Explosive Ordnance Reconnaissance (EOR) and reporting procedures?

Of all the fatal casualties among bomb disposal personnel a third of them occured clearing mines. Little seems to have changed except that with modern sub munitions the division between bomblets and mines is becoming increasingly difficult to define. Do recovery plans therefore reflect the true rate of expected casualties and are repair times truly realistic for an explosive ordnance environment? Are we doing enough training to counter the effects of the as yet unseen but expected threat? If so, we shall be like the Light Platoons of the last war, trained to perfection but not needed because there is no war. Or are we back to the exercise planner who hates EOD incidents because they mess up a nice tidy exercise?

In the Introduction it was said that things were changing and that senior staff officers and commanders were being made aware of the real problems of unexploded ordnance. May this awareness be turned into action in respect of all the questions asked, then and only then can we say the lessons of old have been truly heeded.

ACKNOWLEDGEMENTS

The author wishes to express his thanks to the many bomb disposal officers of the 1940s who found time to write their unit histories and to the staff officers who were too busy to weed their files and so allowed the EODTIC to hold the fascinating details of day to day activities and correspondence within the bomb disposal world of the war years.

The Royal Engineers Draghounds

LIEUT COLONEL J A COOMBS FI Plant E, A MBIM

THE Royal Engineers Draghounds were established in 1928; the first Master was Mr J E Marsh RE, who was born in 1903, commissioned in 1923, and was thus twenty-five years old when he formed the RE Drag. He died in 1962 as a Colonel (Retired).

The Drag flourished until the beginning of World War II, when Hounds were put down. It was revived in 1950, under the Mastership of Lieut Colonel B L L Abdy Collins RE, who was Master until 1952, when he was succeeded by Lieut Colonel R A G Binny. "Nap" Binny was Master when I, very diffidently, went out with the Drag for the first time. In 1952, the SME (as it then was) consisted of three Regiments—10 Trades Training Regiment, in Kitchener Barracks, 11 SME Regiment in Gordon Barracks, and 12 SME Regiment in Brompton Barracks. In those days, the

Photo 1. The RE Draghounds 1960

Drag mainly ran Drag Lines, that is, followed a line over a series of man-made jumps; the line was laid by a soldier—or often an officer—running ahead of Hounds, trailing behind him a sandbag (more often than not) soaked in fox's stale. Each Regiment was responsible for a "Line", as were, as far as I can remember, The Cadet Squadron, then in Gordon Barracks, and 'C' Plant Training Squadron, semi-independent (as they thought) at Wainscott. Drag Lines were far faster than following the fox, which the Drag sometimes hunted in country lent by the Tickham Foxhounds.

I next hunted with the Drag in 1964, when I again returned to Chatham. Brigadier John Lacey was then the Master, and he persuaded me to be his Field Master, an appointment I filled, when in England, until he retired as Secretary of the Institution of Royal Engineers in 1972, when Hounds were put down, and the Drag went into abeyance—I hope into suspended animation!

After the end of National Service, when ample manpower was available to build and maintain Drag Lines, the RE Drag mainly hunted the fox. This was a wonderful way of keeping fit, and spending a glorious day in the open air; we did not catch many foxes, as after the War in not extreme fox hunting country, earths were not stopped, and while the local farmers made us very welcome, they too could not afford to maintain fences, or stop earths.

In my day as Field Master, Hounds were kennelled in Brompton Barracks, in what had been the old Bricklayers Shop, converted to stables during the Brompton Barracks rebuild in 1965–66, after the old stables in North Square were demolished. Bill Porter was Kennel Huntsman from 1958 until Hounds were put down in 1972. When I first got to know him well in 1964, he lived in the old pre-war stables in North Square; when the stables moved to the old Bricklayers Shop, we set up a room for him in the new stables (he would not be separated from his Hounds), but he soon had it in comfortable squalor again, and would entertain his friends there with a Navy tot. When Hounds were put down in 1972, Brigadier Lacey arranged for Bill, who had been an ERA in the Navy during the War, to go into the Home for Aged Ex-Naval Men in Gillingham, where he died some two years later, happy amongst his Naval

contemporaries. Many friends both RN and RE attended his funeral.

In those days, the Drag ran a Point-to-Point, originally at Detling, then at Hollingbourne, and latterly at Charing. It also held a Hunt Ball in the RE HQ Mess at Chatham. This was a tremendous function, attended by ex-members of the Drag, local Hunts, and Hunt supporters. We overcharged not too outrageously (by Hunt Ball standards) but earned enough money to keep the Hunt running during the next year. The last function which was jointly held by the RE Beagles, the SME Shoot and the Drag was the Farmers Dinner, also held in the HQ Mess. This also was great fun; all the farmers and landowners over whose land we hunted and shot attended. The Master of the Drag and Beagles generally wore Hunting Pink, or Mess Kit; members of the SME Field Sports who were attending wore, in those days, Blue Patrols. One farming stalwart who always attended was Archie Brunt. He must have been about seventy in 1964 when I met him again. I went up to him when he arrived in the Mess (we always had some difficulty in getting him to take his cap off when he came into the Conservatory!). Archie had been a Blacksmith before the first World War, and had been a Farrier Sergeant Major during it. He had hands like dinner plates. As he talked to me, he looked at the badges of rank on my shoulders "Wot be that, then?" he said, "Leftenant Curnel, 'en it? I used to salute they b*****s in the first War". I said "I used to last week, Archie. I have only just got made up!" I feared he was going to have a heart attack. After dinner, the Royal Toast was proposed in the traditional manner. Her Majesty was then expecting her fourth child. As is usual in the Mess, we all said "The Queen". Tap, tap, tap, went the glasses on the tables: a few said "God Bless Her". Archie stayed standing after everyone sat down—"And God Bless 'er Gracious Majesty, and may She 'ave twins". He meant it with the deepest respect.

Archie used to follow the Hunt in a Mini; faster over ploughed fields than the Field. As he got older, he was driven by one of his employees, who was always told by Archie's wife not to let him have a drink before Hounds moved off. She never won! When he died, Kent lost a great character.

One of the highlights for the RE Drag before it demised was the visit to the RSME of Her Majesty Queen Elizabeth II, our Colonel-in-Chief, on 28 March, 1968. The Queen was escorted onto the parade ground in Brompton Barracks by the Engineer-in-Chief, Major General J H S Bowring CB, OBE, MC, to see a display of Corps activities. I quote an extract from the Royal Engineers Journal, which describes the Royal Visit, and what then happened:—

Photo 2. The RE Draghounds led by the Joint Masters Brigadier Lacey and Major Holland appear before Her Majesty

"A note on the hunting-horn greeted Her Majesty as she arrived on the parade ground from the Jacknife Club and ten couple of the more steady draghounds trotted by with the Joint Masters Brigadier J H S Lacey and Major C T P Holland. Following them came Lieut Colonel J A Coombs, the Field Master, and the "field" mounted on RE Saddle Club horses and privately owned ponies, several children, ardent followers of the Drag in holiday-time, having managed to get off school for the great day. Bill Porter, the Kennelman, and John Holland each held two couple of unentered puppies, bred in the kennels and walked by the Hollands, which demonstrated how the pack is, in one way, kept up to strength."

In conclusion, it may be of interest to list the Masters of the Drag post World War II; these were:-

1950–51 Lieut Colonel B L L Abdy Collins RE
1951–53 Lieut Colonel R A G Binny RE
1953–56 Major C H C Lloyd RE
1956–58 Captain P A Gallard RE
1958–59 Brigadier J H S Lacey with Captain M B Gibson RE
1959–60 Brigadier Lacey
1960–62 Brigadier Lacey with Captain E P H Coles RE
1962–64 Brigadier Lacey with Vice-Admiral I W T Below
1965–69 Brigadier Lacey with Major C T P Holland RE
1969–70 Brigadier Lacey with Major J D Ransom RE
1971–72 Brigadier Lacey with Captain B A F Randel RE.

Will the Royal Engineers Draghounds be revived? Regrettably, Brigadier Lacey and Lieut Colonel Abdy Collins have died, but any of the above ex-Masters, and others, would, I am sure, give help, advice, and guidance to any member of the RE Saddle Club who would wish to make the attempt. If there was strong support for this revival, the RE Sports and Games Control Board would no doubt give financial guidance and might be persuaded to give some assistance.

The Officers Mess in the Modern Army

CAPTAIN M LEARMONT RE

Captain Learmont was born in 1958, the son of an Army officer, and enlisted into the Royal Artillery, carrying on the family tradition. He was educated at King's College, Taunton and Sandhurst and commissioned into the Royal Engineers (Postal and Courier Services). He has served at Mill Hill, Dusseldorf, Rheindahlen and Herford. His interests include downhill skiing and offshore sailing.

THE following article is based mainly upon my own experiences of having lived in four different messes during my career and having visited many other messes in BAOR and the United Kingdom. The majority of these messes have not been Regimental Messes but have been formation, Garrison and Station Messes. I really wonder how much of what I am writing about is applicable to the Regimental Officers Mess. Let us not forget however, that a great number of officers in the Corps of Royal Engineers do in fact live in formation Messes whilst undertaking staff jobs.

The following factors are generally accepted as the main reasons that the Officers Mess remains as an institution in our Army. Firstly, there is "Tradition" and this is probably the most emotive point in the whole argument. Ever since the Modern

Captain M Learmont RE

British Army was formed, the officers have always set up their own messes for the purpose of feeding, sleeping and socialising. Officers have always been set apart from the rest of the Army or Regiment and the Mess was a place where an officer could relax and enjoy company that was to his taste. Whether in barracks or in some far off field in Zululand, the Mess has always been there and standards maintained. It was this setting of standards that was so very important to the armies of our forebears, and quite rightly so. The officers of any army are the people who have to set the example to those who serve under them, in order to maintain discipline and morale, so therefore the Mess was a place, which by tradition, standards were set and kept.

It is always important that when a new arrival joins his Mess he is made to feel welcome and is not left to fend for himself for his first week. He is always made to feel at home, due to the cameraderie among the living-in members of the Mess. He is introduced and absorbed into Mess life gradually and ends up feeling part of a constantly changing family. The Mess is an ideal place for a unit to entertain at such functions as guest nights, balls, and lunch parties. The staff are trained, the service is second to none, and the price is always cheaper than commercial rates outside the Army environment. This counts for a great deal and a unit, unconciously, is nearly always judged, among other things, by the way the Officers Mess is run. The Mess is also an ideal place for Officer transit accommodation. By this I mean that officers awaiting allocation of quarters, officers on detachment from other units and those who are partaking in various exercises are able to find accommodation for the duration of their stay.

These then are the plus points which argue for keeping the Mess as in its present form within a unit. Next, I come to the minus points and make no apology for the vast number of them, as I believe all are noteworthy and require expansion.

The state of the accommodation within most messes that I have lived in has been, in my opinion, little better than atrocious. I do not believe that the Officers Mess is any better than that of the Sergeants Mess or that of the juniors' accommodation. All too often I have seen antiquated ablutions that are a positive disgrace to standards which we have come to expect in this modern age. The rooms on the whole have not been decorated for years and the wiring facilities are so old, it is of constant amazement to me that we do not trip the fuses in our messes more often. The average officer's room is adequately furnished with the basics, a bed, a wardrobe, a chest of drawers, a desk and various other sundries, but normally has only one power point. In this technical age we live in with videos, television, hi-fi, clock-radios, home computers and lights it simply is not enough! Luckily the majority of us live in larger accommodation than we are in fact entitled to. I, for example was lucky enough to live in two rooms in my last mess. Quite frankly, I needed both rooms for all my clothes and personal possessions and even then my rooms were bursting at the seams. My present mess now provides me with a single room which has so many possessions in it that I can hardly move, in fact half of my worldly goods are still in MFO boxes in a store room. The average officer and even the average soldier, is starting to accumulate a fair amount of his own possessions in order to make his somewhat spartan existence more pleasurable.

I believe that it is necessary and desirable that officers and men are allowed privacy, albeit somewhat restricted, and living in a mess the only way they can obtain that is by having their own rooms with adequate space to live comfortably. The present entitlement for each rank is somewhat outdated and I believe that we must bring ourselves into the twenty first century. This need for privacy is not in my opinion an unhealthy one. It can be argued that the mess provides an ante-room (living room), a dining room, a TV room and a bar for the use of those people living in. This is ideal for those who want to be in company at all times, and the Mess isn't being used for one of the many functions for which it has been booked by outside agencies. It appears that a Garrison/Station Mess this occurs with alarming regularity. We are constantly reminded that the Mess is, our home and it is somewhat galling to find that we are frequently invaded by scores of people not necessarily,

members of the Mess. Therefore it is desirable to have somewhere where peace and quietness can be obtained.

It is my own personal belief that the Mess, and the Army way of life encourages excess drinking and in some cases borders on semi-alcoholism. It can be argued that it is entirely up to the individual whether he goes into the bar or not and it is an argument that I accept and abide by. There is no doubt in my mind that, should people require company they will find it in the bar. This then occasionally leads to drunken, rowdy, behaviour which all too often leads to other people being disturbed and privacy intruded upon. This however is usually put down to "high jinks" when in all reality it would probably be true to say that Breach of the Peace and Criminal Damage would be nearer the mark.

In Garrison Messes that incorporate regiments there appears to be a constant political battle as to whom the Mess belongs. I for example lived in a Regimental Mess that also incorporated the officers of a Divisional Headquarters and various other units within the Garrison. Because the Mess is a Regimental Mess then the staffing levels are based upon those required for a Regiment. The fact that membership is approximately 60:40 against the Regiment gives an idea of how inadequate the situation is. Works Services similarly are given a lower priority. Once again I accept that a Regiment should have a mess for the reasons outlined at the beginning of this article, but whilst all the political battles carry on, the people who really suffer are those who are living in the Mess. I have lived in a mess where there was a proper complement of staff and it was a pleasure to have been a Member of that particular mess.

This article may sound like a severe dose of sour grapes and ungratefulness. It is not intended to be. The comment that can be most readily levelled at me, is that I must have known before I joined the Army that I would be subject to living in a mess. This I wholeheartedly agree with; what I did not realise and understand at the time was the complexities, the political wrangles and at times, the Victorian attitudes and facilities that are in operation. There is no way that on entering the RMA Sandhurst one can have any comprehension of what we are likely to be subjected to. This only comes with experience and time. Therefore, whilst the Mess in itself is a sound idea and institution, is it not time that we scrutinised the position and options open to us?

Firstly, single and unaccompanied officers could be given the option of living in hired accommodation. This would given them the privacy and space that would be appreciated by some officers. Obviously this would cost the individual concerned money and consequently bring less money into the Mess. This would appear to be a non-starter because the rules at present expressly forbid any single officer living out in BAOR, yet in the United Kingdom it appears to be at the discretion of commanding officers whether an officer is to be allowed to live out. Secondly, we could change to the BOQ (Bachelor Officers Quarter) system used by the Americans, this is also a highly contentious move as it is levelled against the Americans that it completely destroys any sense of unity, and the clubs they have in lieu of Messes totally lack any tradition. Thirdly, the messes could be reorganised, made larger and modernised to take care of the needs of the modern British Army Officer, this would obviously require a great deal of money.

It is my own serious belief that the British Army is going to encounter a severe morale problem amongst bachelor officers in the not too distant future, if something is not done to improve the living conditions within our messes. We are positively Victorian in some of our attitudes towards these officers, and I believe that we need to update this particular sphere of Army life and bring it more into line with the modern British Army of the nineteen eighties. The majority of officers joining the Army these day are people who have either been to university or worked prior to joining the Army. Many of these people are used to living in their own flats and houses and find it difficult to adjust to having just one room to call their own. Officers in today's Army are sensible young men and able to manage themselves and their affairs in a proper manner. Therefore why not allow them should they so wish, to be

masters of their own destiny when off duty.

I have written mainly about Garrison/Station messes and not about Regimental messes where tradition must be maintained, but perhaps even they could benefit from the third option of my recommendations. Tradition is important, let us keep it, however we must ask ourselves how much longer can we continue to live in pre-war buildings, not designed for the 1980s Army and will we still be living in them in the year 2000?

We Was Done, Ref!

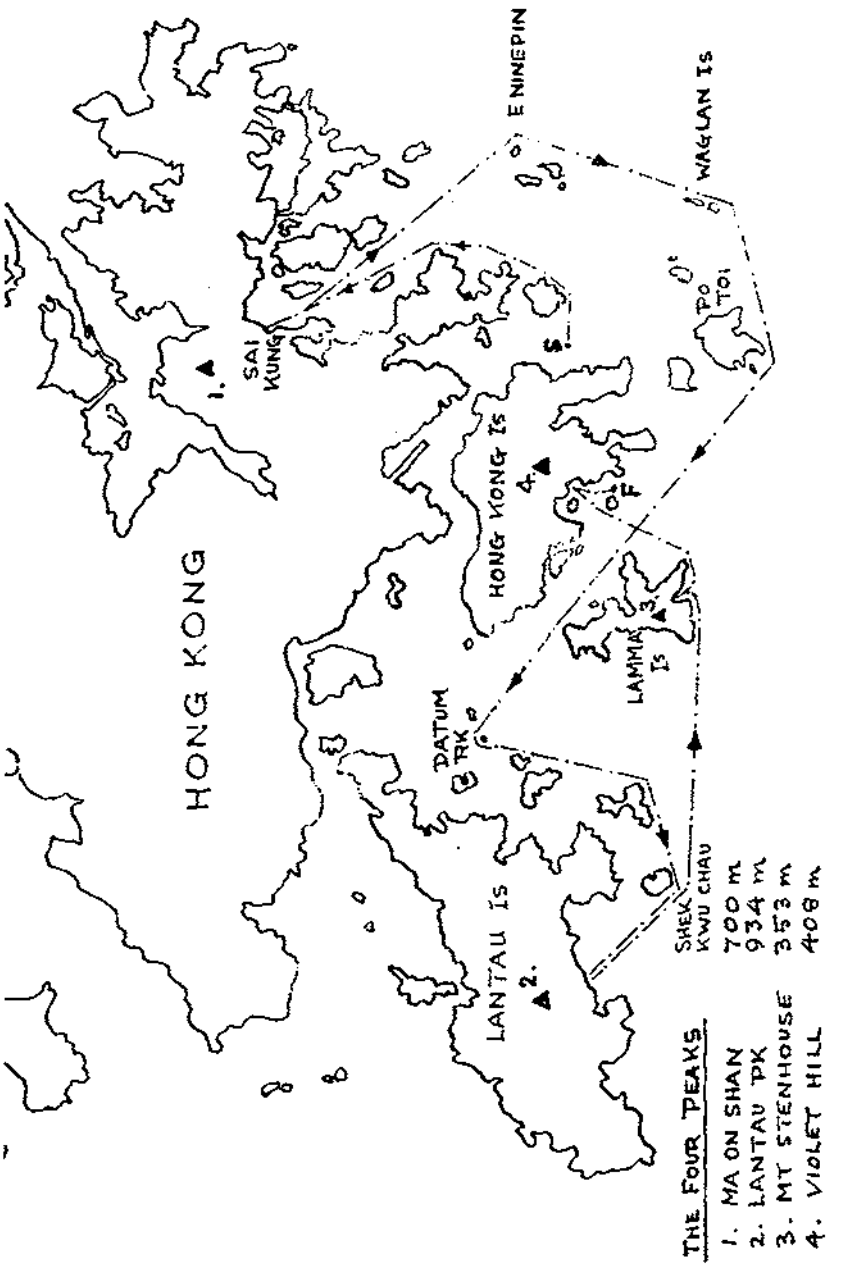
MAJOR M G le G BRIDGES B Sc, MI Mech E

Major Meryon Bridges was commissioned into the Corps in 1965 and is now serving with MES (Works) Hong Kong. This tour and a previous one as OC 1 Fortress Squadron have enabled him to notch up about five and a half thousand miles of sailing in the last six years. This is an account of a race sailed in his own yacht a 28 foot Hunter Impala.

THE Three Peaks Race is now a well known event in the UK sailing calendar and is a hotly contested sailing and hill running race. During 1984 it was decided that a similar event should be staged in Hong Kong, and so over the weekend of 26/27 January 1985 the Hong Kong Four Peaks Race took place, set up by the Aberdeen Boat Club. Recognising the tradition that the Corps has been represented in sailing events of every kind, a private entry, manned entirely by Sappers, was put in by MES (Works) and QGE combined. A subtle change in the rules for the Hong Kong event was that all members of every crew should reach the top of at least one hill. This ruled out professional racing sailors who couldn't get up three flights of stairs, carrying round a small group of super fit hill runners who didn't know one end of a boat from the other, and opened the competition up to serious amateurs like ourselves. A weakness in the rules was that no handicapping was to be applied to the sailing part of the race, thus the larger boats started with an almost unbeatable advantage.

The course followed is shown on the map and was so defined as to leave little room for clever strategy in choosing routes or landing points. The race consisted effectively of a straight competition in which the fastest combination of boat and runners would win. The Sapper entry was one of the smallest boats in the fleet of fourteen which started at 1400hrs on Saturday 26 January. The largest was a 42ft two tonner called *Bugis*. Next to her came a 40ft boat called *Bimblegumbie* which had represented Hong Kong in Hawaii and competed for a place in the Southern Cross Series Team. At 28ft our Hunter Impala, *Interloper*, owned by the Author, was very much taking on the big boys. The crew, however, was as good as any. Skippered by Meryon Bridges from MES (Works), the rest of the team came from QGE and consisted of the Adjutant, Captain Hamish MacLeod, two Troop Commanders Lieutenants Mark Freeman and David Francis, and the RQMS, WOI Don Felton.

Major M G le Bridges B Sc MI Mech E



Despite cutting it fine to reach the start in time, we got away in pole position at the windward end of the line and there followed a beat up to Port Shelter and Sai Kung. Inevitably *Bimblegumbie* and *Bugis* went right away from us but the 40ft *Shibumi* and 35ft *Leuta* made little impression. After an initial fresh NE blow, the wind fell very light inside Shelter Island and these two reached Sai Kung only about ten minutes in front after some very tense light wind sailing. Our extensive preparatory recce and training period paid off here since while all other boats put their runners

ashore in rubber dinghies, we sailed alongside the jetty, dropped the runners and sailed off again thus saving vital minutes.

Leutu's runners did very well and she was away about fifteen minutes ahead of us. We followed in company with Shibumi at about 1915hrs, it now being full dark. The very light conditions persisted all down Port Shelter and at times we were without steerage way. With eight to ten hours sailing ahead of us, Mark and Don, who had run Ma On Shan, were sent below to sleep as they were to run Lantau Peak as well. Hamish and I shared the driving, with David as deckhand, and we three took turns to grab what sleep we could. We held off *Shibumi* all the way to East Ninepin with the wind freshening from the East, and on rounding it at midnight we had a wild spinnaker run down past Waglan Island to Po Toi. There we dropped the spinnaker and reached up the East Lamma channel with the wind easing. However it moved a little further astern and we got another spinnaker flying very shy as we crept up the channel at two to four knots, gaining steadily on *Shibumi*. By the time we reached Datum Rock we were right on her stern and there was evidence of growing agitation amongst her crew!

Daylight found us off Shek Kwu Chau in a light breeze which was again failing on us. *Leutu* was about twenty-five minutes ahead and *Shibumi* about ten minutes ahead. Behind us in the red glow of dawn the sea was empty. Between there and Lantau Island beach we overtook Shibumi but *Leutu* retained her lead. Again, detailed recce paid off and we put our dinghy over the side only twenty yards from the beach knowing we had enough water to float in, whereas other boats had stopped three times that distance off. David rowed Don and Mark ashore and Hamish and I dropped sails and anchored a little further out.

Sunday had dawned a clear, bright day and Mark and Don put in an excellent time on Lantau Peak, returning to the boat one and a half hours after going ashore. Then we were off in pursuit of *Leutu* once again, now twenty minutes ahead of us, leaving *Shibumi* at anchor with two other boats which had arrived as we were leaving. We used different tactics to *Leutu* at Lamma; she using separate drop off and collection points for her runners, we using just the one. However by running the hill in forty-five minutes we maintained our position with her and on the leg across to Repulse Bay she was still only twenty-five minutes ahead. Both *Bimblegumbie* and *Bugis* had put their slowest runners up Mt Stenhouse so we had gained a lot on both of them, *Bugis* only leaving Lamma as we arrived.

Hamish and David took on Violet Hill, going ashore at 1730hrs on Sunday. *Bimblegumbie* set off for the finishing line as we arrived in the bay, with *Bugis* about twenty minutes behind her. Hamish and David completed their run in a very creditable fifty-three minutes and then we were sailing for the finishing line only half a mile away. *Leutu* was lying stopped in the water with no wind as we crept onwards on a faint air in the gathering dark. However we couldn't quite catch her and she edged over the line just eight minutes ahead of us. We crossed the line a little after 1900hrs, after twenty-nine hours of sailing and running—and just half an hour's sleep.

So we finished fourth. Had handicaps been applied to the sailing time of approximately twenty-three hours, we would have won the race by nearly two and a half hours and beaten Leutu, which was in our class, by one hour ten minutes. As it was we halved the five hour advantage that the winner, *Bimblegumbie*, should have had over us in seventy-seven miles of sailing. Needless to say we were pleased with the position we had gained. *Interloper* had put in a superb performance—I've never had her sailing so well—and our runners were as good as the best. Inevitably there were wrinkles to be ironed out in the first event, and hopefully next year smaller boats will be able to compete on a more equitable basis. Morally we reckoned that we whitewashed the lot, and at the prize giving later all the other competitors were kind enough to recognise the fact—even to the extent of a bottle of bubbly as a special prize. By application of any handicap we actually led the race from beginning to end, but as far as the official results went—we was done, Ref!

Correspondence

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Falklands—Mount Pleasant Airfield

Sir,—I feel sure that many Sappers will have read the article in the New Civil Engineer of 31 Jan 85 reporting on the Committee of Public Accounts discussions on the costs of the Falklands base. I quote: "MP Eric Deakins wanted to know why the Royal Engineers did not get the airport contract nor were even allowed to bid for it. He was told that the Army had been ruled out in February 1983 because it did not have the management or trained people".

As one now retired for many years and therefore out of touch with possible manpower problems, I proffer apologies for intervention, but nevertheless express surprise at the reasons given for ruling out the Royal Engineers.

Whatever is the Corps coming to?—Yours sincerely, Maurice E Ménage

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Falklands—Mount Pleasant Airfield

Sir,—Lieutenant Colonel Maurice Ménage is not the first of my friends from former times who has questioned why the Corps did not take on the construction of the new airfield on the Falkland Islands. The quintessence of the answer is that the size and shape of the Corps has changed greatly in the last twenty years. It is smaller, lacks much of its former "Engineer Services" strength and flexibility, has different priorities, given to it because of changes in defence policy, and operates on much shorter unaccompanied overseas tours in peacetime as part of Army policy.

Today, there are very few in the Corps who have the skills in producing and placing such material as pavement quality concrete or marshall asphalt; our expertise and capacity in the electrical and mechanical aspects of the airfield complex are very limited; and we would have a very large shortfall in the technical supervision required by such a project.

Of course, these shortages could be put right, but with the turnover of units every four, or at the most every six months, the training problem would have been immense. When one added the airfield project to the tasks we already had in the Falklands in 1982 it became clear that we could not take on the task without a major increase in manpower. If we had added two complete Engineer Regiments to our order of battle, it was calculated that the known tasks in the Falkland Islands would take four to five years to complete and would involve every field squadron in the UK returning to the South Atlantic less than seven months after its previous tour there, and every field squadron in BAOR returning after nine months.

The combined effect of the individual training requirement, the need to keep the skills learned "on site" at a reasonable level before a squadron's return to the Falkland Islands (to avoid the problems of a steep "learning curve"), and the calculated tour intervals, would have been to withdraw Royal Engineers from support to the rest of the British Army and the Royal Air Force in Britain and

Europe for an unacceptable period, and to subject the Corps to a degree of turbulence never before contemplated (with all that that implies).

The Corps today can be justly very proud of the tasks they have carried out in the Falkland Islands and the work they did on the feasibility study, reconnaissance and initial design for the new airfield; but we could never have hoped to equal the expertiser in tradesmen and chartered engineers that the civil contractors' consortium has brought to bear on the task.—Yours sincerely, G B Sinclair

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Falklands—Mount Pleasant Airfield

Sir,—Lieutenant Colonel Ménage may not be aware of the part played by the Royal Engineers in the early stages of the Mount Pleasant Airfield project. I took a small reconnaissance team down from the Military Works Force in July 1982 to select the site for the new airfield and do the feasibility study, and we sent a large joint RE–PSA (mainly RE) team down there a few weeks later to do detailed topographical and soils surveys of the airfield and its associated roads and harbour. It was on this initial work that the design of the project was based, and the final layout of the airfield and the roads to Stanley and Mare Harbour is substantially the same as that which we proposed in our detailed report.

I should therefore have been as keen as anyone for the Corps to construct the airfield if we had thought that this was practicable. Regrettably the size of the Corps has shrunk considerably since Lieutenant Colonel Ménage's day—and indeed since the day that I joined it—and we no longer have the men or resources to take on a project of this magnitude. The contractors had a labour force of over 2000 at its peak, including about fifty chartered engineers, and the Corps could never have sustained these sorts of numbers down there on four or even six month tours. We could probably have coped with the technicalities of the project with some outside assistance, but the sheer scale of it would certainly have been far beyond the capability of the Corps at its current strength.—Yours sincerely, Robin Jukes-Hughes

Lieutenant Colonel C P R Bates RE
33 Engineer Regiment (EOD)
Lodge Hill Camp
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Royal Engineer Bomb Disposal

Sir,—Major Arthur Hogben was kind enough to show me his draft article on Royal Engineer Bomb Disposal before publication in this volume of the RE Journal. I commend the article as providing much food for thought. What Arthur does not mention is that he, as Custodian of the NATO-sponsored EOD Technical Information Centre, has done a great deal to foster co-operation between the NATO allies in EOD matters. The ever-helpful staff of EODTIC have an amazing ability to identify obscure items of ordnance ranging from antique to the most up to date. Their historical files are fascinating but also frequently put to good use; as an example, a few weeks ago EODTIC were able to identify some rusting cylinders which the Regiment had unearthed at Woolwich as Hales War Rockets first introduced into service in 1867. The value of EODTIC is well appreciated in this country and abroad, as is evident by the ever-increasing number of requests it receives for information.

Since I arrived at Lodge Hill, I have become very aware of the extreme bravery of those Bomb Disposal men who ventured into the unknown with virtually no equipment in the early stages of the Second World War. I have been fortunate enough to meet some of them, both at the Annual Joint Service Bomb Disposal Dinner, and also more recently when a party from the Bomb Disposal Branch of the REA visited the Regiment. I was also honoured to be present at a ceremony at St Paul's Cathedral in November, when the George Cross awarded to Sapper George Wylie was presented to the Cathedral. This had been awarded for Wylie's work in removing a 1000kg bomb which had buried itself beside the Cathedral in September 1940. The bomb had the new No 17 clockwork delay fuze for which there was then no render-safe procedure. The official instruction was to destroy such bombs in situ, but after three days of digging, the team brought the bomb to the surface and destroyed it safely on Hackney Marshes. Wylie and his Section Commander were awarded two of the first George Crosses to be Gazetted and two other members of the section were awarded the BEM. This was but one example of actions which were repeated time and time again by some exceptional men, many of whom did not survive.

Although there is no doubt, as Arthur states, that senior officers and other Arms and Services are now aware of the EOD problem, I am equally sure that we still have a long way to go; I can cite as an example my own almost complete ignorance about EOD until I was told a year ago that I was posted to command the Regiment. It is still very difficult to get enough realistic EOD play included in FTXs. Too often, staff are not prepared to accept the disruption to an exercise pink that would be caused if an EOD incident was played out properly. It is noteworthy that on the recent Exercise *LIONHEART*, no EOD incidents were played in the 1 (BR) Corps area which had a serious affect on other player units. As a result the EOD Sections deployed were not fully exercised, and we had to set up a number of our own tasks for them which had no effect at all on exercise play. I would look to all Engineer Staffs in Formation Headquarters to consider whether they need to jog their Commanders into incorporating EOD play on any exercises planned. The Regiment will be more than happy to participate where possible.

One other lesson which we might draw from Arthur's article is the need for EOD staff. As Arthur reports "the situation was very confused" until a Bomb Disposal Directorate was formed in August 1940. Today there is no specialist RE EOD Staff; this is in marked contrast to our colleagues in RAF Bomb Disposal and in RAOC EOD. My RHQ has to combine the functions of running a Regiment, which has a wide variety of fascinating and well dispersed tasks, with the functions normally associated with a staff branch; these include liaison with EOD agencies in the other Services, NATO Committee work, the development of EOD equipment and of course the evangelistic task of spreading the EOD message. In my opinion, a small RE EOD Staff Branch is needed to relieve RHQ of the above functions so that it can concentrate on running a Regiment.—Yours sincerely, C P R Bates

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"Ubique—Versatility"

Sir,—Brigadier Jarrett-Kerr's letter on Bailey (*March 1985*) prompts me to add a comment or two if I may. It is interesting to note that some of the early prototype Bailey panels that he mentions, that is with 4" × 2" channels in one chord and 3" × 1½" channels in the other, are still in use today at Christchurch. Twelve of the panels are being used to form a short foot-bridge over the Moto Tug harbour at what was MEXE, became MVEE (C), and is now of course RARDE (Christchurch). Two

further panels were treated at the preservation plant at Long Marston a few years ago and were sent to the Royal Engineer Museum at Chatham, to form the centre piece of the Bailey Bridge exhibit there. These early panels included vertical members, forming diagonals to the two diamond bracings in each panel. These vertical members were eliminated at an early stage, once testing had proved that the stiffness of the welded joints was adequate, but the early panels still in existence show clearly where the verticals have been flame-cut away.

The production of Bailey was indeed vast, as Brigadier Jarrett-Kerr mentions. Eventually some 650 UK firms of all types became involved in its manufacture; besides the more conventional engineering firms, the list included confectioners and even football pool proprieters. In the last three years of the 1939–1945 War over 490,000 tons of Bailey Bridge was manufactured, representing over 200 miles of fixed span bridge and 40 miles of floating bridge, for use in all theatres; manufacture included almost 700,000 Bailey Bridge panels, almost enough to build a single bridge girder from Christchurch to Leningrad! Although these quantities are truly enormous, one can put it in perspective if it is remembered that by May–June 1945 the strength of the Corps was in excess of 280,000 all ranks including almost 22,000 Sapper officers, somewhere about twice the size of the whole of the British Army in 1985.

Sir Donald Bailey, who will be 84 later this year, lives in Christchurch to this day, having come south in 1928, to become designer at the Experimental Bridging Establishment. Unfortunately he has not been in best of health recently, and I am sure all readers join me in wishing him all the very best in his late years.—Yours sincerely, J H Joiner

(*Current regular strength of the Corps is 1300 officers and 11,000 soldiers—Ed*)

Lieut Colonel S R Gilbert RE
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The Cadre—Is It Time for a Change?

Sir,—WO1 (RSM) Hamilton should be congratulated for his imaginative proposals about Junior NCO's Cadres in the Corps. I hope that it will be helpful if I give a little more background to the whole matter of cadres and, while this is by no means an authoritative HQ EinC view, it does I think reflect the views of many in the Corps.

Following a proposal by Maj Gen Grey, the then Commander Engineers BAOR, a Working Party was set up in January 1983 to consider, inter alia, whether cadre courses would best be divided into two parts. In the first part, to be attended by virtually unlimited numbers, the NCO potential of Sappers would be tested: the second part, which would be limited to the number who could be promoted, would be a lance corporal qualifying course with a grading awarded.

In Autumn 1983 the Standing Committee on Royal Engineer Employments (SCOREE) accepted the recommendation of the Working Party that regimental Junior NCO Cadres should continue to be run as they had been within any guidelines that COs may wish to lay down and that RETDT should produce, for those units who so desired it, an advisory training package for Junior NCO Cadres. This guidance, having been staffed to units for comment, is now available. The thinking behind this was that unit cadres are very much a matter for Commanding Officers, usually with considerable advice from their RSMs, and that it was up to them to handle this most important step in a soldier's career in their own way.

The Royal Engineers do not compare well with the other Arms in promotion speeds through the ranks. If this is to be put right, it is particularly important that the

potential NCO should be spotted as soon as possible. The potential leader should be put on a cadre ideally in his first year. I cannot subscribe to the proposal that sappers are promoted for a three month trial period with a strong expectation that they may be reduced in rank and returned to the bottom of the pack. Of course, this was the system in the past and our predecessors clearly did not like it either; the rank of Lance Corporal is a difficult enough one to hold and I believe that it needs all the backing that permanence can give it.

Most of the statements in WO1 Hamilton's article are right but I should like to correct two points: firstly, HQ EinC policy is that a soldier should spend two years, not eighteen months, in a unit before attending his trade course and, secondly, the Senior NCO's course is mandatory for all Corporals selected for promotion to Sergeant. Many of the points raised will be rectified when SCOREE approves the rewrite of the RE Career Structure. Command courses, such as those for Corporals, the Senior NCO's Course, the Field Sergeant's Course and QMSI Courses will be mandatory before appointment. It is planned that this will be effective from April 1986. However, at the end of the day, I believe that Commanding Officers would not be satisfied, and indeed would not be doing their jobs, if they had not fully trained their Sappers to be Lance Corporals before promoting them. This training is best done in a cadre. I would agree that testing their ability is subordinate to this.—Yours faithfully, S R Gilbert

Major D M R Batterham ARICS, MBIM
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Sir,—I should like to comment on two articles. Firstly:

The Squadron Sergeant Major

Tony Boyd-Heron has made a strong, if not irrefutable, case (*RE Journal Sep 84*) for the introduction of a short course for SSMs shortly before taking up their appointments.

Maj Jack Cheeseman (*Correspondence Dec 84*) believes that the potential SSM should pick up the knowledge and skills he requires during his career. One of the principles of the Career Employment Structure is that "Training should prepare soldiers for their next appointment". The SSM, despite what he may have picked up along the line—and there is no guarantee that he will have attended all the courses Jack Cheeseman mentions—starts his job "cold" and must pick up the skills and knowledge he needs "on the job".

It is interesting that the Gunners are at present preparing a course for their potential BSMs. Surely, Sir, we should be leading the way, not trailing behind! Secondly:

The Junior NCO Cadre

WO1 Hamilton's article (*RE Journal Dec 84*) mentions some of the difficulties facing the young soldier hoping for promotion, and argues for the abolition of the JNCO Cadre course. But his case is based on a false premise that there is a proposal to introduce a Cpl's course prior to the Field Section Commander's (or equivalent) course. This is not so. The soldier who misses out on a JNCO Cadre may never have another opportunity to learn the lessons normally taught on these courses (incidentally, the aim and outline syllabus for JNCO Cadre courses are contained in ME Vol 1 Part 4 Engineer Training). Used with imagination, this can be an excellent and invaluable part of a Sapper's training.—Yours sincerely, D M R Batterham

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A Post War Gamble in Mogok

Sir,—Your readers may be interested to know that the Mr Mann referred to in the article A Post War Gamble in Mogok by the late Lieut Colonel J J D Groves is still to be found in the Military Department of Garrards some forty years on. Hopefully waiting for another bottle of champagne from a Sapper officer no doubt!—Yours sincerely, L P Bennett

Captain N V R Oak-Rhind B Sc RE
Headquarters 19 Infantry Brigade
Goojerat Barracks, Colchester

What's in a Name?

Sir,—Captain D W Taylor's letter to you on "units that repair damage to airfields" (*March RE Journal*) falls short of true insight. It is just the tip of a massive iceburg of mumbo-jumbo which is awaiting rationalisation. The whole business of designing regiments and squadrons by words is too confusing for the Army in the modern computer age. Modern man likes numbers, not words. The US Army realised that some time ago and our Army followed their lead. Our totally confusing references to General (G), Administrative (A) and Quartering (Q) divisions were rapidly replaced by soothing, meaningful numbers: G1, G2, G3, G4 (and G5). How much better all this is! Everyone knows exactly where they stand.

Now, the keen, thrusting staff officers reading this letter will have already surmised the drift of my argument—Engineering designations should be reduced to a simple and common numerical format, easily understood by all (including the computers). So simple. Why has no-one thought of it before? I have not yet worked out the system in detail, but, for instance, the straight unadulterated field (or combat) engineers would be designated by the figures "01". Specialist units of armoured, amphibious, bomb disposal, commando and parachute etc could be given numbers from "10" to "20" say. Any further variations such as construction (or airfields), well drilling, topographical, training, etc etc, could be categorised by numbers between "30" and "40" perhaps. By grouping numbers, allowance is made for future expansion of terminology. The TA could be given a number in brackets such as "(50)" for independent units and "(51)" for sponsored ones. There is no end to the flexibility available here.

In case there are any old fashioned, non-computer orientated officers reading this letter and are lost by the argument, let me give an example. An independent TA parachute squadron, temporarily attached to armoured engineers and capable of field (or combat) engineering would be designated:

Squadron number (01)/Temp + 10/15/(50), where:

(01) – Capable (brackets could denote this) of field (or combat) engineering
Temp + – Temporarily attached
10 – Armoured Engineers
15 – Parachute Engineers
(50) – Independent TA Unit

This is, of course, a complicated example. But see how simple and totally flexible the system could be. It explains the role of any unit with absolute precision. The Sappers could, in fact, lead the way for the rest of the Army. Any comments?—Yours sincerely, Nigel Oak-Rhind

Memoirs

COLONEL THE HON R G H PHILLIMORE OBE

Born 23 September 1913, died 18 May 1984, aged 70

A memoir appeared in the December 1984 RE Journal. This additional note records the personal impressions of a few of his old friends in the Corps.

BOBBIE PHILLIMORE was commissioned into the Corps in August 1933 from Winchester and The Shop, and joined No 30 YO Batch for the Chatham and Cambridge Courses. He had great personal charm and a puckish, but never unkind sense of humour. He had a slight hesitation in his speech, but what emerged was always worth waiting for; shrewd and to the point, and usually witty. He was a good horseman and sailor, and an expert fisherman and shot. He sailed a great deal with his friends, in his little Blue Duck, in Teresa and in Ilex, and joined the RORC in 1935. He was very generous, always ready to lend his car, his gun, or even his horse to a friend. At Trinity, he occupied what had been a don's library, and the high empty shelves presented a problem. Relays of hand carts brought three tons of books from the Market Square—total cost £4.10.0 for an impressive result that astonished his visitors. His great sense of fun lit up any event he took part in, and he loved a good-natured argument.

After a short spell with the 1st Division in the 1936 Palestine Emergency, he was posted to 2 Field Company in Egypt which supported The Cairo and Cavalry Brigades. He commanded a half-company with distinction and found two other equally enterprising unmarried subalterns Myers and Duke. Together they contrived a full and hilarious life, with the high spots in Cairo, polo at the Gezira Sporting Club, (he was in the RE (Egypt) Team), and snipe shooting in the bogs around Tel-el-Kebir and in the Fayoum Oasis.

In early 1939 his car was run into by a drunken driver, resulting in back injuries that troubled him for the rest of his life but in no way impaired his high spirits.

Shortly after the outbreak of war, he was appointed, as a very young Major, as SORE to the Chief Engineer Western Desert Force, together with his life-long friend, Ralph Carr. His good humoured and calm efficiency at some very critical moments sometimes at much personal risk, were a tonic to those with whom he had to deal.

Later, he was selected to join as a Lieut Colonel, General Eisenhower's staff at Algiers during the Sicily and Italy landings. When the General took over the allied invasion force for the Normandy landings, Bobbie was one of the officers brought back to serve in the new headquarters. One imagines this was as much to do with his tact and gift for friendship in an integrated HQ, as to his professional competence. Certainly he was much appreciated by Ike, with whom he served till the end of the war in Europe, finishing as a full Colonel with a number of Allied decorations and with his good legal brain having played a large part in drawing up the final surrender terms.

In December 1944, he married Sheila Macleod who had been a WRNS officer in Algiers, and thus began a most happy and close-knit family life.

After the war he had a spell in the Secretariat of the Army Council where his style and wit had much scope, and in 1950 became second-in-command of 32 Assault Regiment on Salisbury Plain, under his companion of Egypt days Eddie Myers—a

Colonel The Hon R G H Phillimore OBE

splendid combination. A Saddle Club, pheasant shoot and trout fishing were quickly organised. He set himself to train the young officers in deep sea sailing and had some hair-raising moments with totally inexperienced crews. However, he skippered *Avalanche* to victory in a very rough and wet Southsea to Harwich Race, with a crew of officers of the Regiment.

In 1953 he retired from the Army to Oxfordshire in order to manage the large Phillimore Family Trust, including many acres in hand; no mean task in itself. Inevitably, his abilities were quickly recognised in the county, and he became involved in a large number of county organisations—in many cases becoming Chairman—including the Land Drainage Committee, The Thames Valley Cereals Co-operative (which he founded), the Agricultural Executive Committee, The Thames River Authority and the national Executive Committee of The Country Landowners Association. In addition, he was locally active as a Parish Councillor, Church Warden, and a JP.

With his usual modesty, he did not seek these appointments but was pressed into them, and would never refuse if he thought he could help. All this left him precious little leisure, and in the end it took its toll in a serious heart complaint, severely restricting his physical activity. It was a trying time but he made light of it, and with the support of Sheila and his four devoted daughters, and the grandchildren, he remained his usual cheerful self. He radiated warmth and happiness to those around him, and he is sadly missed by so many whose lives were enriched by his friendship.

GWD ECWM PNMM AFMJ HRC JHSB

BRIGADIER L O CLARK OBE

Born 29 March 1898, died 24 October 1984

Brigadier L O Clark OBE

LAURENCE OWEN CLARK was born in Ceylon, educated at Victoria College, Jersey, the Shop and Caius College, Cambridge and commissioned into the Corps in 1917. He saw service in World War I and was Mentioned in Dispatches in 1919 and 1945. He was awarded the OBE in 1943.

He is probably best remembered for the years in the 1930s in the King George V's Own Bengal Sappers and Miners and later as Commandant of the Royal Bombay Sappers and Miners. Of these years SHMB writes: "He immediately impressed with his kindliness and general sympathetic attitude to a 'Griffin' such as myself. He already had an impressive record as a young Captain in World War I, then as a subaltern and a company commander in India. As a subaltern he was selected for the much prized appointment of commanding the Chitral Section, some sixty or so all ranks from the Jemadar to Sapper. This was a two year assignment and independent it certainly was. Chitral was cut off from the rest of India during five or six months of the year depending on the snow conditions in the Himalayan passes. Each year a relief column started out from Nowshera arriving at Chitral about a fortnight later. Everything required for the ensuing year had to be carried up on pack transport. Woe betide a Section Commander who miscalculated his list of engineer stores or other requirements for the well being of his unit. LO was not a person to make such mistakes. He was painstakingly and essentially practical in his outlook and nothing was left to chance."

During this time he became a First Class Interpreter in Urdu, one of only about twenty in the Indian Army at that time. Late in the thirties he attended the Staff College at Camberley.

In May 1945 he was appointed Commandant of the Royal Bombay Sappers and Miners. He succeeded a distinguished life-long Bombay Sapper and mixed feelings were raised at the idea of a Bengal Sapper taking over, particularly among the subadar major's union. CHC writes: "In the event he charmed the subadar majors within minutes and in very few months had secured a grasp on the corps in what must have been one of the most difficult times in its history with all the problems of demobilisation, examination and rehabilitation of returned prisoners of war and the rapid Indianisation of the officer cadre. LO was immensely respected and liked. He had so many talents; with his pre-war Camberley training he had an uncanny speed and accuracy at work; and the rare talent of saying much in few words. On the hockey field he could stand up to the subadar majors on the New Year's day match and he rode well to hounds."

Later in his career many had cause to be grateful for his time as AAG AG7. On retiring he became an RO3 in Headquarters South West District before finally settling in Budleigh Salterton. In his later years his own health deteriorated as did that of his wife, Lorna, who survived him by only a few months. Their two sons will hold proud memories of a man who "incapable of any mean or unkind action was liked and respected by all, British and Indian, who served under him, a real leader of men".

GCC, GGSC, PAC, EENS, RAB, SHMB, DJNG, EFEA, CHC

COLONEL SIR JOHN S FORBES Bt, DSO, DL, JP

Born 8 January 1901, died 23 July 1984, aged 83

Colonel Sir John Forbes Bt DSO DL JP

JOHN STEWART FORBES was educated at Wellington College and the Shop. He was commissioned into the Corps in 1920. His early service was mostly in India as a Madras Sapper including a time as OC 16 Army Troops Company which was heavily involved in the aftermath of the Quetta earthquake in 1935. His wife and newly born daughter were amongst those evacuated from damaged married quarters.

During the war he served initially in the Norway campaign where he was awarded the DSO for gallantry. He later returned to India and went to Burma where he was involved in airfield construction during the reconquest of that country. He was on secondment to the Indian Government as Commandant of the Indian College of Military Engineering from 1947 to 1948, returning to engineer command in the UK. Although offered a Brigadier's appointment in 1953 he chose instead to take in hand the farm on his estate at Allargue in Aberdeenshire where he remained until his death.

Having inherited the baronetcy on the early death of his father in 1927 he was now able to fulfil the function of Laird for which he was so admirably fitted and in which he was widely respected and loved. JPF writes that "he was among the few who lived all the year round as a Laird should, among his tenants and friends for whom he had a

real love. He took an active part in Local Government and the Kirk, although he was an Episcopalian. The Lonach Society, a Friendly Society founded by the first Baronet was amongst his most cherished responsibilities—he would never miss a Gathering unless his duties as a soldier made it impossible, any more than he would miss a Twelfth of August. It was particularly appropriate that the Highlanders should have been led by a soldier whose career was of such distinction."

CF writes: "He was equally at home with all strata of society, be it keeper or fellow gun, shepherd or Royalty. He had a particular affinity with the Queen Mother. They were all the same to Sir John and all to be respected for themselves and not for what they were. He had a quick sense of humour which could destroy pomposity and turn the awkward moment into one of laughter.

He served the community at all levels as a Deputy Lieutenant for over 30 years and Vice Lord Lieutenant from 1973, as a Justice of the Peace and as an Alford District Councillor for many years. These are but the bare facts of his career. We shall remember the man. I and many others will remember him on the moor—impervious to any weather and loving it—at the Games, at a party. He was always good company and the arrival of John and Agnes made the day. He never complained and just a few weeks ago in hospital after his fall, his thoughts were all of getting home to Allargue and how were the crops and the grouse and what did you think of the photographs of the last snows. He bore old age with dignity." He remained in close touch with the Army and was Honorary Colonel of 51 Highland Division Engineers (TA) from 1960–67. He is survived by his widow, five daughters and sixteen grandchildren. His eldest daughter Zilla, whose name is the Pushtu word for earthquake, married a Sapper.

FMKT, FWLMP, JPC, HEMN, CF

COLONEL R L WILLOTT DSO, OBE, TD, C Eng, MI Mech E

Died 1 August 1984, aged 72

ROLAND LANCASTER ("WENDY") WILLOTT was educated at Wellington, Somerset and The University of Wales. On graduating he became a college apprentice with Metropolitan Vickers Electrical Company. In 1938 he joined John Summers and Sons as Assistant to the Chief Engineer. By this time he was in the TA and by the outbreak of war was already a major.

In 1939 he was in command of 201 Field Company, 42 East Lancashire Division which he took to France in April 1940. In May they went up to the Escaut with III Corps and started on the demolition in and around Tournai. They then fell back through Lille and Armentiers to Dunkirk. He was awarded the DSO for his part in the operation which included the successful firing of some 30 bridges.

In 1941 he became CRE 42 East Lancashire Division. This became 42 East Lancashire Armoured Division under Major General Dempsey and, after its disbandment, he was appointed CRE 42 Assault Regiment. In May 1944 he left suddenly to take over as CRE 50 (TT) Division, a D-Day assault division, a remarkable selection so soon before the operation, and finished the war as a full Colonel commanding 11 Army Group Engineers. For his service at this time he was awarded the Croix de Guerre, the Order of Leopold and in 1945, the OBE.

After the war he returned to engineering as Chief Engineer John Summers and Sons and was Chairman of the Industrial Administration and Engineering Production Group, North Western Branch Institute of Mechanical from 1954 to 1957.

Of his time in the Army REW writes: "He was my first company commander in 1940 when I was 19. He was brave, brilliantly clever and inventive and a natural leader, and ran a very efficient company. He also had humour, was a great leg puller

and very good company. He also did some remarkable experiments. One of his inventions was "The Wurlitzer" or "Wendy's Organ", a device whereby a number of pipes were hung on to the outside of a tank and fired forwards about twenty yards into a minefield" (*see photograph*). JCW writes "with his industrial background he saw the problems of a war-time army more clearly than those of us who had come from all-Regular units. For instance, the junior emergency commissioned officers tended to be unsure of themselves and to leave too much to their senior NCOs. "Wendy" insisted that in all operations, such as bridging, the junior officer concerned would take personal charge, using his own voice. He also understood the need to make the problems and potential of the Sappers clear to all ranks in the Division, and arranged with the Divisional Commander for parties of all ranks from other arms to visit us on training.

His self confidence is illustrated by an incident at Halton Bridging Camp. The subaltern had been set the task of designing a Mark V Pontoon bridge on a certain site, which would then be built that night, when the Divisional Commander was to visit us. The design was chosen by drawing the names out of a hat, but on checking the design (the equipment had certain limitations) it was found that the bridge would not meet in the middle, the CRE was told, but his reply was to let it go ahead. In the early hours of the morning, when it became clear that the only way to get the bridge to join up was to move the bank seats, Wendy turned to the Divisional Commander and said "That young man will never get his calculations wrong again".

To his wife, Elizabeth, we extend our warmest sympathy.

REW, JCW

Colonel R L Willott DSO OBE TD C Eng MI Mech E

Book Reviews

THE PROFESSION OF ARMS

GENERAL SIR JOHN HACKETT

(Published by Sidgwick and Jackson, 1 Tavistock Chambers, Bloomsbury Way, London WC1A 2SG)

THIS book was first published by Sidgwick and Jackson in 1983 in a hardback edition, though the volume under review is a republished version from the same publisher in 1984 in a "Limp Bound" format. It is an unusual book by an unusual kind of author; for General Hackett, who was born in Australia, read both Greats and History at Oxford before joining his grandfather's Cavalry Regiment in the inter-war years. He saw much active service in World War II: in the Western Desert, in the Italian Campaign, and at Arnhem. He was three times wounded and ended his military career as a four-star General with three decorations for gallantry, plus a GCB and the CBE. For seven years after retiring from the Army he was Principal of King's College, London; while there he was also President of both the Classical and the English Association of the United Kingdom. He is now visiting Professor at King's in the Department of Classics. No ordinary soldier!

From the pen of such a versatile Author, writing in a subject covering 4000 years of military history, your reviewer expected to be confronted by something of a cross between Gibbon's *Decline and Fall*—1500 pages—and Thucydides's *Peloponnesian War*—written by a retired Athenian General 400 years BC. But the reviewer's task did not prove laborious. There are only 228 pages of letter press in it, many of which are taken up by fascinating illustrations culled from art galleries and museums all over the world. Moreover, General Hackett's prose style—unlike that of Thucydides—is delightfully simple and easy to read. Above all, *The Profession of Arms* in the "Limp Bound" edition costs under £8, compared with Gibbon's *Decline and Fall* at about £20 today.

The General gives the aims of his book in an Introduction to the work, which may be summarized as follows:- "There must never be a nuclear holocaust, for that might destroy the human race; but it is impossible to conceive of human existence without conflict, and in consequence of the existence of conflict there is a universal need for professional men-at-arms to manage it.

"What sort of professional men do we need? The answer to this question demands a study of how the profession of arms came into existence, and this in turn demands a journey of exploration into a distant past where the roots of Western culture lie". We therefore set forth on a scholarly search over the ages with a thoroughly capable guide to lead us.

This, as far as your Reviewer can remember, is more or less the Author's Introduction to his erudite set of Lees-Knowles Lectures given in Cambridge in 1962. But in his lectures he could rely upon satisfying his audience by answering their oral questions; whereas in the present work no such opportunity exists; so the Author must have either greatly expanded the printed book or relied on over 100 footnotes to indicate where readers must look to find the answers to his questions for themselves. The Publisher (one imagines) insisted on this latter course (to save money); but is has the drawback for today's military student namely that there are very few libraries, even in the great cities of Britain or its seats of learning, where the references can easily be found.

Thucydides managed in his day without any foot-notes, which may be why his history still seems to fulfil his claim that his was not a piece of writing merely to meet the tasts of an immediate public, "but was done to last forever". In contrast, Gibbon, who had a great sense of humour—and twelve years over which to spread the costs of publishing his several volumes—preferred to enliven his text with what Churchill described in *My Early Life* "as many naughty jokes". Alas, General Hackett, who I

am sure could have provided these jokes as easily as Gibbon had to satisfy his publisher by rigorous economy and many short notes. But he has written a very worth-while book.

As a Sapper, your Reviewer has a minor complaint. He wishes the General had recorded exactly how Julius Caesar's Chief Engineer—if such a man existed—did the kind of sums required by his logistics. If a boat will carry XIX men, how many boats will he need to ship DCDXXII men across the English Channel? Did he—like Pharoah in Genesis XLI—have to hire a man like Joseph, capable of manipulating Arabic numerals, or is long division still possible with Roman ones?

Your Reviewer must now peg out the footpath along which the General would have his readers follow him from the days of Pericles up to modern times. Sparta with her laconic warriers makes a first and obvious peg; followed by Athens as a second one. In Athens lived a garrulous citizen, backed by sculptors, artists and poets and this chapter leads the way to the Knights and Mercenaries of Medieval Europe. Here we come to an era where mounted gentry in armour led their tennants and pressed men—little more than familiar servants—as the rank and file of their private armies. Their bands of men-at-arms were mainly concerned with supporting various conflicting beliefs and interpretations of Holy Scripture on the various routes to Heaven rather than on any economic or imperial interests.

Gradually, as the Hundred Years War ground its way into the 17th Century the nature of conflict changed. From being caused by conflicting religious dogmas they became national clashes for the survival of belligerent nations. Frederick the Great reverted to a Spartan pattern supported by a fierce discipline, and instituted an almost invincible military system until a new revolutionary spirit in France led to Napoleon's days and Napoleon's personal mystique of leadership. He soon made himself master of Europe from Madrid to Moscow. He met his match in a Russian winter and a few years later in Wellington's pattern of professionalism. Every schoolboy knows it was a "close run thing" in 1815; and that Waterloo was won "on the playing fields of Eton" of all unlikely places. More likely, however, it was a better professionalism that did the trick.

From the 19th Century our Author guides us to the 1914–1918 era when the link between nation-states and their men-at-arms became so strong that it was common for the fighting man to render unconditional subordination of his own interests to the needs of the group in which he served. This leads us to the First World War in Flanders, where on the 26th September, 1915, in under three and a half hours no less than 385 British Officers and 7865 men were mowed down by German machine-gun fire during the Battle of Loos with no casualties at all to the Germans. Nor was this the only occasion when gross misjudgements by our military leaders were paid for by the lives of eager, willing troops. In four years of warfare, we see similar follies repeated again and again. General Hackett sums it up in these words: "The Generals were not all wicked men nor always stupid men and they were very rarely cowards. Their errors were more those of blindness than malignity. Where they failed us was in understanding the techniques of their time," Mankind must avoid such blindness today.

Today the professionals have armaments many times more lethal than those of our forefathers and we must learn to manage affairs better. Knowing that conflict is inevitable, we must not make the grossly mistaken judgements that they did. It is fashionable today to refer to the Generals of 1914–1918 as "donkeys". They did not read correctly the signs of their times. We must not be equally blind, hence the need to study this book.

In a final Chapter the author gives us an essay on leadership. Here your Reviewer entirely agrees with the Publisher's opinion, given on the back cover of the book. "A brilliant essay".

MCAH

A HISTORY OF THE 7th FIELD COMPANY RE 1939–1946

THOMAS M J RIORDAN

(Published by T M J Riordan, The Cottage, Oak Tree Close, Strensall, York YO3 5TE. Price £6.50 in UK including postage and packing)

TOMMY RIORDAN served in the "Shiny Seventh" (also known as the "Blackhorse" Company) from 1939 to 1944. He was awarded the MM at the Rapido and only left the Company on being posted to OCTU. He has painstakingly researched the available material and, with the aid of a few helpers, has put together this extraordinarily interesting account of the life of a Field Company in the Second World War. His devoted work greatly deserves our thanks.

The publication will be welcomed not only by those who served in the old company and its lineal successor (7 Field Squadron) but also by those who served in the other units of 4 Div RE and who marched with the "7" in NW Europe, North Africa, Italy and Greece and who shared the dangers and achievement of these campaigns including at least two memorable Sapper exploits of WW2—the Div RE counter attack at the Ypres—Comines Canal and the bridging of the Rapido.

The account should additionally be of interest to a wider readership, giving, as it does, an excellent portrayal of the variety of tasks faced by a field company in war and the versatility, human and technical, needed to succeed. It brings out well the extent to which Sapper units are always busy and always stretched.

The format adopted follows the general lines of a War Diary and thus provides a comprehensive account of useful value for reference. However the bare narrative is enlivened by short anecdotes and the occasional quotation of Sapper humour. Furthermore the reader is from time to time appropriately reminded of the overall strategic picture and events occurring elsewhere which were to affect the unit's activities.

The 7th Spike Island Company RE was formed in 1805 and had a long and varied history prior to 1939. It is therefore most pleasing that a few historical vignettes have been included and the opportunity taken to reflect on the experiences of the old "Blackhorse" Company when the WW2 narrative crosses the path of earlier campaigns.

To keep costs low and to assist timely publication a tight budget and timetable were wisely imposed at production stage. Inevitably some economies had to be made and this is particularly so as regards presentation of maps, diagrams and illustrations. Nevertheless an attractively presented and very readable book has resulted and it is available at reasonable cost. It is recommended as an excellent "buy" for anyone with interest in Corps history.

It is to be hoped that completion of this work will encourage other companies (who have not yet done so) to prepare their own unit histories whilst memories are still fresh. A large corpus of unit histories of this type would provide a very valuable supplement to more official histories and other records.

ADEC

THE FIGHTING TEN

EVELYN DESIREE BATTYE

(Published by the British Association for Cemeteries in South Asia (BACSA). Price £7.50)

THIS is the story of the Battye brothers; ten members of a Victorian family who became celebrated for their deeds of valour in British India and Afghanistan. Exploits at Delhi and Lucknow during the Indian Mutiny of 1857 involving six brothers, are succeeded by encounters on the North-West Frontier in the latter decades of the century when one brother after another, in the Guides Cavalry or the Gurkhas, fought their way to glory and sometimes death.

This is not only an account of the heroism which created a unique legend of courage and service in the Indian Army but also a history of the Battye family, their home, upbringing and the influence of their forbears.

Published by BACSA, the book is obtainable from bookshops or directly from the publishers (please add 50p for postage) through the Secretary BACSA, 76½ Chartfield Avenue, London SW15 6HQ. Proceeds from the sale of the book go towards this charity. Two of the fifty illustrations in the book are published by permission of the Institution.

The Author is the wife of Major General S M Battye (late RE) a grandson of one of the brothers. Members will recall her first book, "Costumes and Characters of the British Raj" which was reviewed in the *RE Journal (Vol 96, No 2)*. This book is equally fascinating but is also a gripping tale of "adventure". Your reviewer read it twice: the first time as a straight story which held his interest throughout and then a second time because, with ten brothers he found that he was confused over "which was which". This was not the fault of the author but ten brothers do create problems! The author should be congratulated on her diligence in researching the family records and letters and presenting them in a style which recreates the excitement of those stirring times. The book was featured in the BBC2 programme "*Timewatch*" in October 1984.

The book is well worth reading in its own right and the financial advantage to the charity BACSA should not be overlooked.

EEP

THE BATTLE OF THE BULGE

JEAN PAUL PALLUD

(Published by "After the Battle", 3 New Plaistow Rd, London E15 3JA)

THIS book tells the tale of the German offensive in the Ardennes which took place in the winter of 1944–45. A massive tome, weighing in at just over 3kg, it is hardly a pocket book for a reseacher revisiting the battlefield. By no means heavy to read, however, it should certainly go into the suitcase on such a trip. It is a painstakingly researched chronological account of the battle but crammed full of personal stories which bring it to life.

The overall effect of the book is to leave the reader marvelling as ever at the high state of morale, courage and professional skill of the Germany Army embarking on this final fling when the result of the war could no longer have been in doubt. This book does not set out to analyse the question of national motivation but leaves the reader to make his own judgement.

The presentation will be familiar to those who know the "*Then and Now*" style. It contains some 1200 photographs, both contemporary action shots and pictures from the area today. A great many of these are carefully taken from the exact locations of the original action shots, producing a fascinating juxtaposition. The maps, mostly half-tone overprinted with symbols representing the battle situation are adequate for a casual read but would need supplementing for an explorer on the ground.

At £29.95 this book is more likely to be bought by the specialist or collector of military history than the man-in-the-street. It is well worth a browse by anyone and the attractive presentation could be a temptation.

GWAN

DATA BOOK FOR PIPE FITTERS AND PIPE WELDERS

E H WILLIAMSON (REVISED BY C M J SUTHERLAND ASSOCIATES)
AND
BUILDING SERVICES RESEARCH AND INFORMATION ASSOCIATION
(Published by Bailey Bros & Swinfen Ltd. Price £3.95)

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DWT

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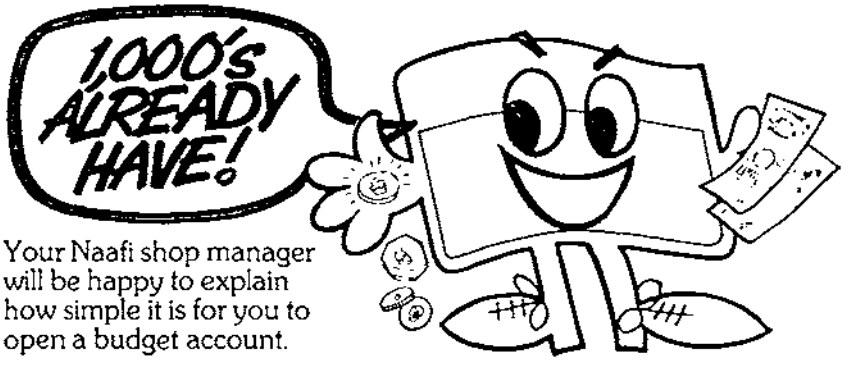

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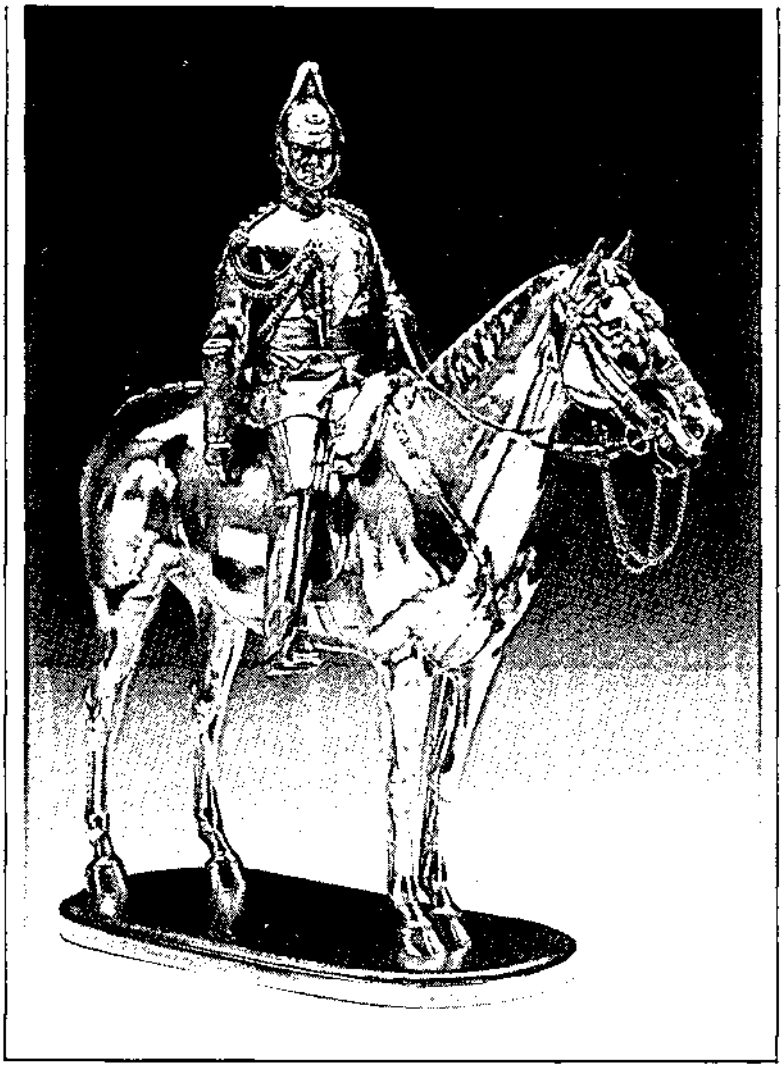

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