THE ROYAL ENGINEERS JOURNAL

APRIL 1991 VOL 105 No 1

Guidelines for Authors

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

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

Length. Normally, chance of publication is in inverse proportion to length. More than 4500 words (5 pages of text) tends to lose most of our readers. Blockbusters can sometimes be serialised.

Clearance. Opinions are an author's own. The wise man clears an article with his boss on any policy matters. Security clearance must be obtained locally.

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

Computers. Articles prepared and sent in to us on an IBM compatible 3.25in disc would be most welcome. Text should be typed onto disc without modification ie no italics, indents etc, and a printout sent with the disc. Our computer software can read most word processing packages, or text-only files (ASCII), so long as the file has the correct extension added to the file name ie ASCII files: .TXT, Microsoft word: .DOC, Wordstar 3.3: .WS (a quick telephone call to Mrs Scantlebury on Chatham Mil 2299, will confirm the extension you will need to use).

Photographs should be black and white. Coloured photographs rarely reproduce well unless they are excellent quality with sharp definition and no red colouring.

Line drawings, if possible, should be drawn in proportion with the page (5.75in x 8.0in). Size is immaterial

Rewards, can be generous. The committee has about £250 in prize money to allot for each issue plus the valuable annual prizes. All authors receive £5 to cover costs.

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

Contributions to the Journal should reach the Editor by:

10 June for the August 1991 issue
9 October for the December 1991 issue
Early February for the April 1992 issue

Submissions before the deadline will be particularly welcome.

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4,400

1990 Corps Annual General Meeting

ADDRESS BY ENGINEER IN CHIEF

Introduction

"Chief Royal Engineer, Gentlemen,

This time last year I gave what may be described as a routine address — routine in the sense that another year had passed without anything dramatic having happened during the previous 12 months. That was on 18 October 1989. On 22 November I addressed the Royal Military College of Science at Shrivenham and dwelt for a short time on the momentous change which was taking place in Germany — a change which had hitherto seemed unthinkable during an era in which the Soviet Union had exercised a very firm grip on its Eastern European Empire since the end of World War Two. On that day I was referring solely to events in East Germany, following the exodus through Hungary and then the limited opening of the border. In the following weeks the Berlin Wall was breached and movement between East Berlin and West was eased shortly afterwards. Czechoslovakia, which was experiencing its own uprising, warned its people that they could not expect a similar solution to DDR's. By 6 December, when I addressed my own conference, the ruling order there had been overturned; and on Christmas Day the Ceausescus lay dead in Romania. Hungary and Poland had already succeeded in loosening the Soviet grip, and in the Soviet Union itself there was serious and spreading political unrest as well as huge economic difficulties. Whereas in Hungary in 1956, in Czechoslovakia in 1968 and indirectly in Poland in 1981, to quote just three examples, the Soviet Union had acted quickly to put down these uprisings, in the latter part of 1989 it stood back and allowed events to take their own course.

"These events, which I have only paraphrased, are well known to you all and I have no need to dwell on them. Suffice to say that they have marked a turning point in history — the moment when the Soviet Union no longer had the energy to hold down the peoples of Eastern Europe against their natural wishes — the safety valve had been opened and all the pressures, pent up for so long, were released. The changes were quick and remarkable. There were dangers too, but by and large everyone was overjoyed.

Options for Change

"People were saying that the West had won the cold war, and pundits started to make noises about the "peace dividend" which could be expected to follow. It is worth remembering that before these events we were already engaged in the Conventional Forces in Europe (CFE) negotiations, which aimed at reductions on both sides to about 15 per cent below current NATO equipment holdings. But the new events gave rise to greater expectations as momentum for change developed.

"It was in late July, following work by a small team on a subject entitled "Options for Change", that the Secretary of State for Defence was in a position to announce the future size of the Armed Forces. He had himself earlier referred to a "Services Dividend", by which he meant that he intended to take advantage of this opportunity to correct the structural inadequacies which had taken root some time before, and which were daily getting worse. CGS had also referred, in his own "Design Determinants" to a "smaller but better" Army, by which he meant that whatever followed would eradicate the faults with which we had been living for far too long. In a nutshell, the root of the problem was one of resources, and the hope was that with smaller armed Services it would be possible both to make the programme balance and maintain proper unit establishments.

"In June I set up a small "think tank" and tasked it to start preparing some thoughts about the changes we were likely to face. That team has been working practically nonstop ever since. It is responding to a whole raft of studies conducted on behalf of ACGS. I meet them together with my top team about two or three times a week in order to finalise and approve our responses. The overall aim announced by the Secretary of State* is to reduce the Army to a ceiling of 125,000, with a trained strength of 112,000. BAOR is to be reduced to about half its present strength. Royal Air Force, Germany, will reduce from four to two main operating bases. We are deeply engaged in providing the Corps' response now and I will not be in a position to announce the outcome for some time yet.

* Editor's Note: These strength ceilings have changed since the Engineer in Chief's Address.

"Whilst we are bound to take a share of the cuts, we are working to ensure that the Corps will be able to continue to meet both its peacetime and operational commitments. ECAB is expected to consider this issue next month, so that the Secretary of State can set out the new position in the White Paper next spring.

The Gulf

"Hardly had the Secretary of State made his options announcement, than Saddam Hussein invaded Kuwait. Within days the Prime Minister announced that the British contribution was to come from the Royal Navy and the Royal Air Force.

"Nonetheless, a small team was assembled in my Headquarters to start thinking about the engineering problems which might be encountered and to start gathering intelligence. Shortly afterwards the leader was able to provide an impressive briefing to ACDS(L) on the water situation in the region. Reconnaissance and advisory teams visited the area.

"By mid-September President Bush was pressing Mrs Thatcher to make a contribution to the Land Forces and it was duly announced that 7 Armoured Brigade would be going. The Sapper contribution to this is significant with 21 Engineer Regiment, reinforced by 26 Armoured Engineer Squadron, providing the forward combat support, and an engineer group under CO 39 Engineer Regiment, with Field, Field Support, EOD and Topo Sappers included. There is also a CRE (Works) and a Postal & Courier unit. You will have seen newspaper and television coverage of 39 Regiment at the time of their departure.

"We now wait to see how events unfold. It does not require me to tell this audience what the political and economic stakes are, nor, should conflict start, that it will involve the largest gathering of forces for a high intensity conflict since World War Two.

"But before moving on I would like to pay tribute in this Address to the planning team which did so much work to ensure that the Sapper contribution was at the correct level and that those who go to the Gulf do so with the best possible preparation for what lies ahead.

"I have given pride of place to the two events which have had more impact on world affairs than anything I could possibly have imagined when I stood here last year. Everything else is routine in comparison.

The Pearson Scatterable Mine Clearance Device

Equipment

"The equipment programme is being held back until the size and shape of the Armed Forces are decided. Nonetheless we have been able to accelerate those items urgently required for the Gulf. I have four examples which will be of interest to you:

The first is the global positioning system known as NAVSTAR. Before the decision was taken to send forces to the Middle East the requirement for this system had not been endorsed. On 1 October 1990 an Urgent Operational Requirment (UOR) for 287 sets was agreed. The first sets are already with the Survey Training Team. Delivery of the remainder will take place from 9 November and be completed by January next.

The second is the Pearson Scatterable Mine Clearance Device. This equipment had been slipped in successive Long Term Costings (LTC's). Before the Gulf situation the in-service date was 1997. On 10 October a UOR was endorsed for an immediate initial buy of 12.

The third is the new Light Wheeled Tractor. Although the buy of Hydrema had been authorised, its production has now been speeded up and an enhanced spares package is being produced.

The fourth is the Water Purification Unit NBC. Development of these units was complete but production stopped as a savings measure for two years. We now have the go-ahead for the purchase of 20 units (out of 86).

Central Focus

"Moving now to a series of studies in progress, the first is known as the Central Focus for Doctrine, Training and the Arms. Four objectives have been proposed:

Bomb Disposal's 50th Anniversary
Memorial Service at St Paul's Cathedral

A Visit to 33 Engr Regt
by Mr Tom King Secretary of State

Objective 1 — to redraw the lines of responsibility. Commander Training and Arms Directors (CTAD) would be retitled as Inspector General (IG) with responsibility for doctrine, training and the majority of the arms directors' functions. This would involve no LTC expenditure and would be effective by 1 April 1991.

Objective 2 — to co-locate IG and his doctrine and training directorates. To be achieved as soon as practicable after 1 April 1991, but because of relocation costs, a phased approach would be necessary.

Objective 3 — form the All-Arms Training Centre (AATC). This would be set up at Warminster on 1 April 1991. A project officer would be appointed in January 1991 to plan the detailed functions and organization of the AATC.

Objective 4 — closer integration of arms directors' activities. This would be achieved on an evolutionary basis once arms directors had piloted their respective arms through the process of change and a suitable location had been established.

"This is not the first time this subject has been studied and it will be interesting to see how it develops.

ITO

"In the wake of the options studies the whole of the support area is being looked at by a team headed by the previous 2nd PUS. Whilst we may have hoped that all the work we did in 1988 and 1989 may have ended with ECAB's decision late last year — to retain cap badge responsibility for recruit training, rather than establish a number of Army training centres — I am sure we can anticipate a re-visiting of this subject in the coming months. Savings are being sought and salami slicing will no longer provide the solution. We must be constructive in our approach, whilst ensuring that the training we give our soldiers fits them properly for the tasks they may be asked to undertake.

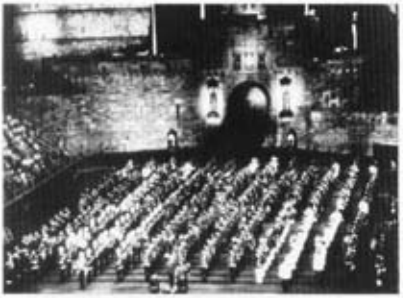
Logistic Support Review

"Also as part of the options studies there is a logistic support review which is inevitably looking at the engineer resources as well as the three major logistic services. It is easy for people to form the quick view that this part of our business can be swept up under ordnance services and produce a nice and neat solution that way. We are having to remind them that the whole of the engineer resources loop is already a fully rationalised system, and to chop off part of it and place it elsewhere has serious penalties which need to be addressed. I find it difficult to imagine, for example, a building contractor going to a vehicle parts depot or a groceries department to obtain building materials, and we will have to be prepared to articulate our responses in this way to bring home to people what it is that is being contemplated.

Regimental Affairs

"Moving on to regimental affairs, it has been a year in which we have been celebrating 50th anniversaries. The most memorable of these was the service in St Paul's Cathedral on 25 May to commemorate the formation of the Royal Engineers Bomb Disposal Sections in 1940. It was a wonderful occasion which could not have failed to move all those who attended. It was followed by a reception in the Guildhall which was given to the Corps by the City of London and attended by all ranks and their families. On 1 June Mr Tom King, the

1990 Corps Annual General Meeting (Pg 6)



The Corps Band, Centre Stage, at The Edinburgh Tattoo

The Pipes and Drums of the Queens Gurkha Engineers

Secretary of State, visited 33 Engineer Regiment in Lodge Hill Camp to round off a very happy week of celebrations. It has also been the 50th anniversary of Airborne Forces and our Airborne Sappers have taken an active part in a wide range of events throughout the year.

"The Band started off the year by achieving an excellent grading in its quinquennial inspection. Since then it has taken centre stage in two important events: at the Edinburgh Tattoo during August and at Fortress Fantasia in Gibraltar two and a half weeks ago. I was lucky enough to be able to attend the latter, which was to mark the changes taking place on the Rock, which bring to an end the Infantry and Royal Artillery involvement there. It was with great pride that I saw our Band at the centre of five and the excellence of their turnout, marching and music.

"We have been fortunate to have the Pipes and Drums of the Queen's Gurkha Engineers here during the summer months, to play for us in the absence of the Corps Band.

"Finally under regimental affairs, I mentioned last year that we intended to commission a painting to commemorate our long association with the Indian Army Sappers. The Painting was unveiled at our Corps Guest Night earlier this month.

Sport

"There has been no let up in our sporting activities and our successes have been endless. It has been particularly encouraging to see our strength being maintained in sports where we have led for some time. Significantly some of our members are reaching national level and being selected to represent their countries in world class competitions.

"At the beginning of the year we saw LCpl McLean representing Scotland at the Commonwealth Games, giving an outstanding boxing performance in overcoming his old adversary John Lyon and unluckily losing in the next round on a split decision. At minor unit level 9 Parachute Squadron RE and 10 Field Squadron won the UK and BAOR Championships respectively, and although they did not meet we can safely say the Corps are Army minor unit champions.

"Our national canoeists have kept up their drive and are achieving excellent results. Cpl Heath, the inter-services Marathon champion, paddled for the British team in an international event held in Spain this year. In a K2, with a civilian partner, he came between 2nd and 6th in all the races and stands a good chance of taking part in the 1992 World Marathon Championships in Australia. Following a different discipline, LCpl Gallagher, the inter-services sprint champion, is Scottish National Champion and a member of the Scottish squad. He is joining the British squad for training this winter and is concentrating on making the 1993 World Sprint Championships, and the 1996 Olympics in Atlanta.

"Maj McManners was one of only two service-men who were competing in the British team in the World Triathlon Championships held in Florida recently. He did extremely well in finishing 225 out of 1000, ahead of his RM colleague and in the middle order of the British team of 36. There were three Sappers in the Army team of four that won the British National Long Triathlon Course this year.

"Our fencers have been in brilliant form and LCpl Williams was the star of the Individual Inter-Service Championships. He beat international class

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Members of 59 Indep Cdo Sqn "Ski-joring"

opposition to claim the prestigious Wilkinson Sword Master Swordsman Trophy and the Champion At Arms Challenge Shield. He is keen and dedicated and one of the top 40 fencers in the country. Although he is working hard to get into the British team and has Olympic potential he is unlikely to make Barcelona in 1992. 25 Engineer Regiment won the Services six-man team event.

"Capt Pyatt is in excellent shape and has made a successful start to his Olympic sailing campaign. He won the Inter-Services Single Handed Championship, sailed in Lasers, in gale force winds at Plymouth in October; has represented Great Britain on three occasions this year at international level in Soling, three-man keel boats; and is National Dinghy Champion in the Bosun Class. His sights are firmly set on Barcelona in 1992.

"At Bisley, 69 Gurkha Independent Field Squadron put in a magnificent performance to win the Minor Units Championship at RASAM.

"On the football front, 28 Amphibious Engineer Regiment stole the show, and sealed it by winning the Army Challenge Cup 7-1 against SEME Bordon and the BFG Cup 3-2 against RAF Bruggen.

"At the World Skiing Championships, held in Minsk, Cpl Dixon achieved one position higher than his placing in the 1988 Calgary Olympics in the 20km Biathlon. He came 12th and was only 17 seconds behind the world champion, a truly remarkable result. He is on the brink of reaching the top ten in the world and with the right conditions could quite easily be in the first three. Cpl Dixon is one of eight Corps members now training with the Great Britain biathlon and cross country squads. Lt Hutchinson continues to show his worth on the Europa Cup mogul circuit. This all augers well for their selection for the Winter Olympics to be held at Albertville in France in 1992. 35 Engineer Regiment retained the Princess Marina Cup, but it was particularly heartening to see the achievements of other regimental teams who competed.

"The Rugby Club have had a successful season and their outstanding player LCpl Ryan, played for England B. They had a successful tour of the USA and made sure that we were victorious in the centenary match against the Gunners.

"It has been another excellent year for water polo and swimming. The Corps dominated the Army, UK and BAOR championships. In the Army finals for water polo we took, 1st (36), 2nd (21) and 3rd (38) places and for swimming, 1st (21), 2nd (36) and 4th (22) places.

"These are but a few examples of the way we are faring. With a number of Corps personnel shaping up so well for the 1992 Olympics and other world class competitions, there is no doubt that our prowess in sport is going to play its part in keeping the Corps in the limelight.

MS

"Now a few words on MS matters. In the next few weeks we say farewell to two of our general officers, Maj Gens Wilmott and Fagan, after long and distinguished careers. Next year Brig Kelly retires following a four and a half year tour as Director DPCS. We wish them, and all others leaving, well and thank them for their achievements and service. Brig Wood steps up to DG Military Survey later this year and Col Browne succeeds Brig Kelly. Also Brig Grove is to be promoted when he becomes DGPS in the New Year.

"Brig Oliver hands over command of the Berlin Infantry Brigade in December and moves on to the RCDS next year. At about the same time Col Elliott assumes command of 6 Armoured Brigade and Col O'Donoghue becomes CCRE, both on promotion.

"Our three students at RCDS this year leave to assume influential appointments, whilst we are due to have three students on next year's Higher Command and Staff Course, assuming that is, that John Moore-Bick gets back from the Gulf in time.

"It's an encouraging picture overall and it is particularly good to see two students at the Staff College moving on as Armoured Brigade Chiefs of Staff, one of them a PET graduate. That pleases me for the health of the Corps enormously.

World Tour

"The last section of my talk this afternoon is a short tour around the world to the places where Sappers have been deployed for projects and training

in the last 12 months. I will start in the snow in Norway and finish in the ice of the Antarctic.

"Every year 59 Independent Commando Squadron deploy for winter warfare training. This year they spent January to March at Isfjorden. The photograph, (opposite left) shows four members of the squadron moving on skis. The contraption between the last two is a "pulk", used for carrying equipment. These men are "ski-joring", a standard method of moving on skis. They are being towed behind a Volvo over-snow vehicle. This, as you have no doubt guessed, is demolition training.

"Now to Canada where there is an annual exercise *Waterleap* which combines construction work with military training. A different squadron is deployed each year, this time it was 69 Independent Gurkha Field Squadron, its first visit to Canada as a Squadron. At the training centre at Aldershot, Nova Scotia, they constructed a steel framed supply building and renewed the camp sewerage system.

"They refurbished two wings of the Officers' Mess, including plumbing and electrical fittings.

"33 Independent Field Squadron remains our permanent Sapper unit in Northern Ireland. The province is reinforced by a roulement squadron, which includes a high risk search troop, coming under the operational control of 33 Squadron. The Sappers have carried out many small projects and have devoted a great deal of effort to strengthening buildings against mortar and small arms attack.

"The annual cycle of training, exercises and projects continued in Germany much as usual until the decision to dispatch 7 Armoured Brigade was taken. The photograph (top right) shows the in-service management committee in front of the new M3 Amphibian alongside the old M2 at Upnor-Hameln in July. It shows how much larger the M3 is than the M2. M3 trials were conducted on the River Leine in August.

"52 Field Construction Squadron's principal role is airfield damage repair at RAF Bruggen, which is the only one of the clutch airfields to have its supporting squadron resident in peacetime. The Sappers can offer more than ADR support.

"I also visited Cyprus in September, though I had to cut it short because of pressing events elsewhere. One of the many tasks of 62 Cyprus Support Squadron is an annual commitment to maintain the communication tracks within the UNFICYP Buffer Zone. I had the opportunity to meet many members of the Squadron and other Sappers and to dine with the officers, warrant officers and sergeants. I was also given very interesting tours of Squadron projects and the UNFICYP Zone.

The in-service management committee in front of the new M3 Amphibian alongside the old M2

"An adventurous training expedition was mounted by the Junior Leaders Regiment, involving permanent staff and junior soldiers to Kenya. As I mentioned last year *Ex-Larchpole* has ended, but a new series known as *Oakapple* starts early next year.

"In March this year we deployed a second nine-man contingent to Pakistan on *Operation Salam*, an operation which we started last year, to assist in the United Nations rehabilitation project for Afghan refugees, by training them to deal with the mines, booby traps and other unexploded explosive ordnance likely to be encountered when they return home. The RE contingent formed two four-man training teams and provided the Chief of Staff in Quetta. The Chief of Staff was responsible for coordinating the work of the UK, Italian and Turkish training teams. The training programme achieved its target by training 1088 "De-Miners" and 54 unit and section leaders before our team returned in September.

"In the Far East the Queen's Gurkha Engineers have continued their active combination of training and projects. As an example of the latter they are constructing a three kilometre all weather road over difficult terrain in the Castle Peak Range. They started in January and I was able to go and see them there in February. (I was one of a posse that apprehended three illegal immigrants!)

"Another task was the construction of an internal security camp training facility based on 20 ISO containers enclosed by a 5.5m button-on steel fence.

"67 Gurkha Field Squadron deployed to Sabah in East Malaysia to rebuild Camp Brunei.

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constructing five accommodation blocks, an administrative block, other buildings and two improvised bridges.

"A troop of 68 Gurkha Field Squadron deployed for a month to Thailand. They carried out field firing as well as providing engineer support to 6 Gurkha Rifles. They also refurbished a suspension bridge in Khao Tai National Park.

"*Cyclone Ofa* struck Western Samoa in early February 1990 and caused considerable damage to crops, roads, buildings and water supply. A recce team of three officers from the Queen's Gurkha Engineers deployed at short notice from Hong Kong to establish what the Corps could do to help. Consequently a team of 20 flew from Belize and arrived in Western Samoa on 28 February 1990. They repaired water supplies, power supplies for the morgue and carried out essential work in Tuasinin hospital. They also repaired and enhanced the sea defences. The team returned to Belize on 28 March.

"My last point on my tour is Antarctica where members of 39 Engineer Regiment supported the British Antarctic Survey in a six months deployment.

Conclusion

"Chief Royal Engineer, Gentlemen — that concludes my review of the Corps.

"I am conscious that there are a number of subjects which I have not covered during my address — it would be impossible to cover everything and do justice to them all. Last year I gave special attention to the TA and the DWS Organisation. This year, therefore, I have not covered them — they are no less important for that.

"Similarly I have not covered Manning, Women in the Army, MACC Tasks, Belize, or the Falklands. Instead I have, as I said earlier, given pride of place to the two main subjects on which we are concentrating so much of our effort at present: The Gulf and The Future of the Corps."

Operation Vantage

MAJOR GENERAL EDWARD FURSDON CB MBE DLitt FBIM

Correction

Please note that the photographs on page 205 and 208 of the December 1990 *Journal* were inadvertantly reversed. The photograph on page 205 shows SSM Quicke at a Troop desert trench position and the photograph on page 208 shows 34 Independent Field Squadron Headquarters. We apologise for this error.

Field Company Commander Responsibilities

Two short anecdotes written by
COLONEL S M HOLLOWAY OBE MC TD DL

A brush with a booby-trap

In the early part of 1941, 245 Field Company, as part of 5 Division RE were stationed in Ramsbottom, a small Mill town in East Lancashire: my wife and I had arranged a billet in the mansion belonging to the owner of the Mill and which was adjacent to the cotton mill around which the Company was billeted. The owner had been killed in France with the BEF but the house, which was very comfortably furnished, was in the care of a housekeeper and a cook. These two ladies looked after us as if we had been related to the owner and for the short time we were there we lived more comfortably than at any other time during the war.

One morning the Orderly Officer awakened me at about 2am: The Rochdale police had telephoned for help; there had been an explosion in a house in the town and one policeman had been killed and another seriously wounded. The room in which the incident had happened was stated to be booby-trapped and would we please send someone to deal with it.

2am is not the best time for clear thought and in any case there was probably not much that could be done in the dark, so I sent my 2IC off to Rochdale with instructions to make a recce, get more detail but on no account to do anything more: we would deal with the problem in daylight.

He returned with an astonishing tale!

1 Kings Own Yorkshire Light Infantry had reported the theft of grenades and small arms ammunition and in the course of investigations the police had arrested a young civilian employed by the Unit as a storeman. He had been stealing the ammunition and had secreted the loot in a cellar. He had packed the stolen property in an ammunition box and had stowed the grenade in such a manner that when the box was opened the safety pin was drawn out and the firing lever flew off and so fired the grenade. The unfortunate detective had got the full blast and been killed, whilst his colleague had been wounded. The young thief escaped with minor injuries and gleefully told his captors that there were several more booby-traps in the cellar.

When I got this report I decided that there was nothing useful to be done before daylight and the police were told that we would return later.

As I had only recently taken over the Company I decided to deal with the situation myelf. It was before the time when sophisticated switches were much used and I had come to the conclusion that if the police had got in and out without incident then so could I. Accordingly, on arriving at the scene I, somewhat nervously, negotiated the cellar stairs without incident and found a room which had been fitted up as a workshop, with wooden shelves and a wooden workbench. There was a good deal of damage as a result of the explosion but a detailed search revealed nothing that could be a booby-trap. With much relief therefore I left the place in the hands of the police and the perpetrator was subsequently given a long gaol sentence.

Aid to the Civil Power

One morning in Northern Ireland I was sitting at my desk when the CSM came in and said that the Sergeant in charge at the RUC Station in the village wished to speak to me. When he came into the room he looked at my 2IC who was present and asked to speak to me alone as his problem was highly confidential. I assured him that Captain W... was completely trustworthy and that he could speak freely.

With some hesitation he explained that he had come with a rather unusual request. The previous night one of my men, Sergeant S..., had been out with the local vet who, having drink taken, had crashed his car. The incident could not be ignored and if the vet, who had a record of drink-driving, was prosecuted he would undoubtedly lose his licence: as he was the only vet in the district his immobility would be a severe blow to the farming community. In the circumstances therefore Sergeant S... had agreed to say that he was driving but before proceeding further the RUC man wished to be assured that Sergeant S... would not suffer a severe military punishment.

I was able to assure him that, having due regard to all the circumstances, I would take a very benevolent view of the misdemeanour.

And so it came about! Sergeant S... was brought before the local Magistrate (who was a prominent local farmer) and as it was a first offence he was let off with a caution. When he appeared before me he was admonished.

Sergeant S... was a very fine NCO who later distinguished himself in action.

Sanitation in the Sand and Other Tales

MAJOR J M HERON BSc(ENG)

Major Max Heron was commissioned into the Corps in 1975 and served with 21 Engineer Regiment in BAOR and Northern Ireland in the Infantry role before going to Shrivenham to read Civil Engineering for three years. He was posted to Waterbeach for two years, one each in 53 Field Squadron (Construction) and 60 Field Support Squadron before two years as Adjutant Junior Leaders Regiment RE. This was followed by six months watchkeeping at Headquarters Northern Ireland and then 18 months as a Whitehall Warrior in MO2. Following another year at Shrivenham on Division I of the ASC and a year at Staff College he returned to Nienburg to assume his current appointment of OC 1 Field Squadron in December 1988. By rights he should have handed over the post in December 1990 and be languishing as SO2 G3 (O&D) 1 (BR)Corps. Instead he is deployed with the Squadron in Saudi Arabia as part of 21 Engineer Regiment in support of 7 Armoured Brigade.

BACKGROUND

ON 1 November 1990 1 Fd Sqn deployed out of the Gulf port of Al Jubayl into the Saudi Arabian desert. For the Squadron it was a return to the desert environment which had been left by our forebears in 1943 when they embarked from North Africa for Italy having taken part in most of the major desert battles of the Second World War. No doubt we were to re-learn many of the lessons that they had learnt 47 years before us.

The origin of the present deployment lay in the invasion of Kuwait by Iraqi troops in the early hours of 2 August and the subsequent occupation of that country. This precipitated the largest deployment of troops to be seen since 1945. The vast majority was provided by the United States of America with the United Kingdom initially providing sea and air forces along with limited land based support elements only. By mid-September it had become clear that a very large force was to be assembled in Saudi Arabia to defend that country from any further aggression by Iraq. Against this background the decision was announced by the Secretary of State for Defence on 14 September 1990 that 7 Armd Bde Gp would be despatched from BAOR to provide the British land contribution to the multi-national force deployed in the Gulf. 21 Engr Regt would provide the engineer support for the force. That evening 1 Fd Sqn held a Sqn Offrs and SNCOs Dinner which had been planned to coincide with an exchange visit by a troop of Italian Engineers; the Squadron had visited Italy for two weeks in July. It was a splendid dinner and one that those present will remember for a long time to come.

The Regiment was to be reorganised to provide the engineer support for an independent brigade operating in a country with little infrastructure away from the main industrial areas. 1 Fd Sqn was reinforced by elements of 7 Fd Sqn to take it near to war establishment. The Squadron was earmarked as the general support squadron for the Regiment with an ORBAT of three field troops, each of four field sections, and a support troop of six combat engineer tractors (CET) and three light wheeled tractors (LWT). 4 Fd Sqn was reinforced from 26 Armd Engr Sqn to give it an ORBAT of two armoured troops, two field troops and a support troop. 45 Fd Sp Sqn, normally a divisional asset, was reinforced by a tipper troop from 54 Amb and Engr Sp Sqn. A HQ Sqn was formed under the Technical Quatermaster (TQM) to combine the normal Regimental A Echelon with the Armoured Echelon required to support the armoured vehicles RE (AVRE) and armoured vehicle launched bridges (AVLB) in 4 Fd Sqn. In the end there were few Regiments or Squadrons in BAOR which did not provide someone as an individual reinforcement for the Regiment. By the time 21 Engr Regt finally deployed into the field in early November, it included 49 (EOD) Sqn in its ORBAT as well.

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Preparation

The next few weeks passed in a frantic whirl as men, vehicles and equipment were prepared for deployment. The first priority was the vehicles and equipment which had to be ready for embarkation in two weeks. Everything that the Regiment owned was inspected, conditioned and cannibalised to ensure that all left Nienburg in prime condition. The MT lines resembled a massive workshop area as production lines were set up for all types of vehicles. An air of purpose descended upon everything and there were many happy faces as the spares started to flood in to make good all the deficiencies and frustrations which are normally associated with BAOR soldiering. Quartermasters throughout the brigade group took advantage of the authority to use O1 demands and three months later some of the items which were demanded in those first few days were only then coming through; it was rapidly discovered that O1 was useless if everyone was using it. O1 demands were then prioritised! New kit started to arrive including CETs straight from Royal Ordnance and a new fleet of Hydrema LWTs. There were also commitments to be rearranged. At the time of the Secretary of State's announcement the advance party from 3 Troop for their Exercise *Medicine Man 6* just arrived at Suffield; they returned four days later, surely the shortest ever BATUS deployment, and 37 Fd Sqn took on this commitment at two days' notice! Others were recalled from leave, courses and adventurous training, whilst postings for all corporals and below were automatically cancelled.

The preparation of the men was not forgotten and a punishing PT regime was started in preparation for the rigours of the desert heat. Muscles that people did not know they had were flexed and just when they were aching most the Medical Centre moved in to turn them into pin-cushions with jabs for every imaginable ailment. Individual training on the threat, nuclear, biological and chemical (NBC) defence, recognition, weapon handling, shooting, first aid and more fitness training, was woven around the requirement to have the vehicles and equipment ready to load at Bremerhaven by the end of September. Squadron 2ICs produced, amended and constantly re-amended what appeared to be a daily changing ORBAT as everyone up the chain of command wanted a justification for why this or that post was essential or tried to impose an unwanted capability upon us. The CO went on the preliminary reconnaissance with Comd 7 Armd Bde and returned a week later with an outline concept of operations so that initial thought could be given to likely tasks. A stream of visitors passed through the Regiment to inspect our preparations and wish us well.

Meanwhile the whole barracks was rapidly turning light brown as vehicles and equipment changed from their accustomed black and green European paint scheme to the desert version. Finally the last splash of paint was applied and the Squadron's vehicles departed for the docks on 1/2 October to sail finally on 3 October. Training was now expanded to include collective and special to arm training. We brushed up on minefield breaching and minelaying skills which were identified early on as likely general support tasks. Demolition training also featured strongly in the programme. However, it was difficult to plan ahead as the Brigade plans for forward mounting bases and collective training were in a constant state of flux. Dates for advance and main body moves changed regularly; the latter were optimistically taking into account the speeds of some of the rather uncertain chartered shipping.

Following the CO's reconnaissance the Squadron was tasked with providing all the logistic engineer support required to establish the brigade maintenance area (BMA) and the brigade administrative area (BAA). The BMA was equivalent to a divisional administrative area in BAOR terms although it included a number of Corps level assets. Water was clearly going to be one of the major considerations and large quantities were the order of the day.

Deployment

The deployment of the Brigade Group was spread over nearly three weeks. Advance parties deployed on 11 and 13 October but because of delays to shipping the main body of the Regiment finally arrived in Saudi Arabia between 24 and 30 October. 1 Fd Sqn manpower was complete in theatre by 28 October and the vehicles and equipment finally

1 Fd Sqn vehicles line up on the dockside.

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Accommodation at Al Jubayl was spartan!

Sp Tp 1 Fd Sqn on the dockside

arrived on 30 October, some nine days after the promised arrival date. Despite this, vehicles were quickly serviced, personal kit was loaded and we deployed into the desert on 1 November. The overriding impression on arrival was of the vast scale of everything in Saudi Arabia. An extensive port facility was conveniently available at Al Jubayl for the US and British forces. It was built some ten years ago but it had never been used to its capacity. The scale of the military operation was also brought home; the might of the 3rd Armoured Cavalry Regiment, a brigade sized formation in 3 (US) Corps, arrayed on the dockside dispelled any doubts that this was very much for real. The build-up of military hardware which has gone on since September has been both awesome and impressive.

Logistic Engineering

Water

Water has already been alluded to and the provision of water in the desert prior to the deployment of the Brigade Group became the main concern on arrival in theatre. Before deployment all units had had extra jerricans and water carriage packs (WCP) issued to ensure that all could hold one day's supply in unit echelons. Bottled water was also available to supplement that held in the water points but this source of supply could not be relied upon and was not taken into account for planning purposes. In our view there was only one way in which water could be stored in these quantities and that was using the 136,000 litre tanks fabric collapsible (TFC) normally associated with bulk fuel installations. After a certain degree of scepticism this solution was accepted and 64 CRE (Wks) designed a water point set using a mixture of bulk fuel equipment and conventional water supply equipment. Prior to deployment it was envisaged that we would have to draw water from boreholes and so the design made allowances for this. In the event the brigade water points became a holding and storage facility. Water was collected from civilian sources in and around Al Jubayl and transported to our storage facility by specially procured 14,000 litre tanks mounted on the new demountable rack offloading and pick-up system (DROPS) prime-mover. Contingency planning was also made to tap into spare capacity at a US Marine Corps reverse-osmosis (RO) facility should the civilian system fail or become over-loaded. In addition procurement was in hand to acquire our own RO facility and this became available in December.

The civilian source water was delivered to the water point chlorinated at approximately one part per million (PPM). On arrival it was automatically dosed up to 4 PPM. This figure was determined in conjunction with RAMC advice because the heat on the tanks caused the chlorine to evaporate. Trial and error had proved that water taken in at 4 PPM had reduced to 2 PPM by the time that it was issued to the consumer. At that level of chlorination there was still a taste of chlorine but it was acceptable; the Americans had had considerable problems with chlorination levels of 5 PPM because soldiers were unwilling to drink it thereby accentuating the heat stress problem. There had also been fears that the heat of the later summer, temperatures were up to 40 degrees C at this time, would cause algae to form in the tanks. This problem was alleviated in two ways. First all water was circulated and tested at least once every 48 hours and secondly wet hessian was placed over the tanks to cool them by evaporation. In the event there was no algae problem. To maintain confidence in our water supply the section commander running the water point tasted the water personally every 30 minutes and the RAMC carried out their own independent testing every 12 hours.

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DROPS water tankers offload at the first water point

DROPS and a US Marine Corps 'TRAM' at the water point

Work began on establishing the first water point on 22 October, one week before the bulk of the Squadron's manpower arrived in theatre. This task was an excellent example of sapper flexibility and ingenuity. 2Lt Fuller, Recce Officer 1 Fd Sqn, and SSgt Buckly cobbled together an *ad hoc* troop of 12 assorted drivers and signallers from the Regiment reinforced by 24 pioneers from 518 Pnr Coy, a plant sergeant and fitter petroleum from 53 Fd Sqn (Const) and plant operators from 45 Fd Sp Sqn and the 1st Combat Engineer Battalion of the US Marine Corps. None of the Regiment's plant had arrived in theatre so this was also borrowed from 53 Sqn and the US Marines along with tentage, G1098 and vehicles. 2Lt Fuller rapidly became the Squadron's water point expert as he encountered and overcame numerous problems on the way to producing the first operational water point in Saudi Arabia. The design was amended as a result of his experiences and it set the template for the water points which were to come. For this first one the requirement was simple; the Joint Commander, Air Chief Marshal Sir Patrick Hine, was to visit the water point for lunch on 24 October and he was to be given a glass of water from it! This aim was achieved and the visit was so successful that from then on every visit programme to 7 Armd Bde included a stop at the water point (it was visited by all ranks from five star to private soldier in the space of two weeks!). It served a secondary aim of highlighting the diverse role of the Corps in support of any operation of this nature and was the first occasion in which the media had taken an interest in the Regiment. The media would have the world believe that the Challengers of the Queen's Royal Irish Hussars were the first to deploy into the field; as any sapper would appreciate that would not have been possible unless the Corps had provided the infrastructure first. It was in fact 2Lt Fuller and his *ad hoc* troop on that first water point who comprised the first operational deployment of Brigade troops into the desert.

By the end of December, a number of waterpoints ranging in size from three to five TFCs had been constructed and operated to maintain supplies for the Brigade in the field. As a planning guide a troop was needed to build a water point and, depending on the availability of DROPS to fill it, it could be operational within 48 hours. Thereafter a section was required to run, maintain and guard it.

A smaller water point was also developed as a forward water storage facility. This was based on two TFCs and two cuplock towers each with 6800 litre tanks. The intention was to provide one day's water supply for the Brigade after a move forward. Provided that the stores were held on wheels then such a facility could be established by a field troop in about six hours. The design was such that it was a straightforward task to upgrade the water point to its full capacity when time and resources permitted.

Sanitation

Much of the first two weeks of the Squadron's deployment was taken up with providing sanitary facilities for the Brigade Group. This was an aspect of logistic engineering which does not merit consideration in BAOR with its well developed infrastructure. It was necessary to consider latrines, ablutions and shower facilities for an extended deployment in the desert. Clearly some units were more mobile than others and their requirements were different. However, hygiene in the desert takes on great significance and was one of the key areas in which soldiers had to be educated when they arrived in theatre; disease of all types spreads fast in hot climates and it could easily have become a serious limitation to our operational capabilities.

Two forms of field latrine were developed, one for static units and one for F Echelons. The static

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View of the water point including 5 TFCs

one was based on Pedisan units. This used caustic soda to break down the sewage into a harmless and odourless effluent in much the same way as the well known Elsan unit. These were grouped together in five man units and connected together with soil pipes which ran to a soak-away. The whole arrangement was enclosed in a wooden frame which was covered in fly-proof netting. The primary reason for selecting these units was that they were immediately available as part of the camp stores which had been outloaded at the start of *Operation Granby*. In practice it was not a good system. The units themselves were designed for domestic use and did not stand up to the wear and tear of field use. They required constant attention and an orderly detailed off to look after them to ensure that the correct quantities of chemicals were added for optimum operation. Although they were designed to be assembled and dismantled for subsequent moves, in practice they did not stand up to this and by the end of the first two months had to be replaced. The Americans had found that daily burning of excrement was the best method of disposal to reduce the spread of disease. A simple bench design with four seats on top of removable buckets was used to satisfy the requirement for the F Echelon latrine. The first version had one bucket per seat but this was later adapted to a tray covering two seats. Smaller two seater models were produced as they were more easily transported on Echelon vehicles. In all cases the disposal method was the same; the soil bucket was removed, fuel was added to it and the excrement was burnt off. Deep trench latrines were considered but had to be discarded as the nature of the loose, shifting sand made this method unsuitable.

The more static units and echelons were provided with an ablution stand suitable for washing and laundry use. This might appear to be a luxury but when faced with months in the field anything that could be done to make life easier was worth doing. Again these were supplied as a package which was assembled by sappers; the more tactically aware did not attach the mirrors but kept them face down when not in use!

Showers might also appear to be a luxury item but as anyone who has lived in the desert would vouch they are a great morale booster. The aim was that every member of the Brigade should have the means to have a shower daily. Again a different system was used for static and F Echelon units. The static shower unit was a five man locally produced gravity feed system. In hot weather everyone was quite happy with cold showers but as winter approached sapper ingenuity came into play again. Showers were quickly adapted to run hot and cold by the addition of the G1098 "Puffing Billy", a WCP and a hand pump. In this way a hot shower was available daily.

The F Echelon solution was even more simple. The camp stores previously referred to included hundreds of fire buckets. A hole was drilled in the bottom, a shower rose was attached and you had produced a shower that lasted for precisely 50 seconds. By using the ship shower routine (wet the body, water off, soap on, wash off) 50 seconds worth of water provides an excellent shower. F Echelon showers were produced in sets of eight which could be hung off the sides of a B vehicle when it went forward for the nightly replenishment run. A simple but effective means of ensuring that all had access to a shower.

The final aspect of logistic engineering was for the support helicopter force initially with Puma only but subsequently with Chinook. There was a requirement to establish helicopter landing sites (HLS) near the various dressing stations for casualty evacuation. Initially stores were not available so the HLS were prepared using plant only. Subsequently various methods were used to attempt to keep down the dust caused on take-off and landing. Water proved to be a too short-term solution, oil required enormous quantities in loose sand and bitumen did not bind well with the coarse sand. The best method was to use a Class 60 pad or an AM 2 mat when that became available. It was impossible to limit dust in the open desert but overall oil spraying was the most effective.

Combat Engineering

The Squadron was faced with a number of mobility and counter-mobility problems which

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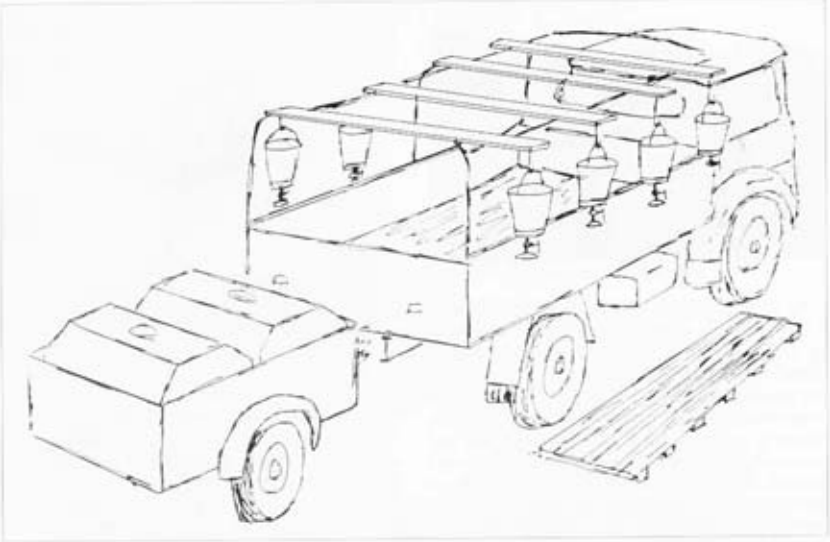

The F Echelon shower bucket system

were likely to come to the fore on any break-in to the Iraqi obstacle belt. We had trained for silent deliberate handbreaching of minefields before deployment and this aspect of training was stepped up in theatre. This may seem strange against the capability of the Giant Viper for assault clearance; however there is still no satisfactory explosive or mechanical method of completely clearing a minefield especially when plastic and blast resistant mines are likely to be encountered. Because of the nature of the Iraqi mine threat it was decided that the standard drills should be adapted. We could not afford to lose surprise by pulling mines during the breaching operation; a system was devised in the Squadron such that each mine was prepared for destruction *in situ*. Each charge was connected to a maximum firing circuit and the demolition was fired at H-hour for the operation. The resultant safe lane was easily trafficable without the need for any further work.

Assault breaching, booby trap clearance and the clearance of unexploded ordnance are often paid scant attention in normal training but we were faced with an enemy who had a proven ability to produce complex wire obstacles, bunkers and booby traps in profusion. Throughout the training it was instilled in commanders at all levels that they must always have a secondary method of attack available for whenever the first one failed. Whilst it will normally be preferable to use AVREs and mechanical breaching methods, with the protection that their armour affords, there will be occasions when field engineers will be required to dismount in the face of the enemy in order to deal with obstacles. Consequently troop battle runs were devised which required the troop commander to control a variety of equipment and use different breaching methods.

Early mobility problems

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Christmas Day on the beach

The final mobility asset was the development of a lane marking system. The obscuration caused by tanks moving in the desert was sufficient to make it very difficult for commanders to locate the breach line through a series of obstacles. A simple lane marking system was devised using the standard military shapes as the basis: Lane one was marked with blue triangles, Lane two by red squares, Lane three by yellow circles and Lane four by green diamonds. These started at least 500 metres back from the first obstacle and were clearly visible through optics, image intensifiers and thermal imagers.

On the counter-mobility side the Squadron has developed a method of rapid minelaying on the flank of any advance in order to support counter penetration operations in the event of an enemy counter attack. There is a marked similarity between this tactic and those of the Soviets with their flank protection minelaying detachment.

An unwelcome visitor

Conclusion

The first three months of *Operation Granby* have been immensely stimulating and challenging as solutions have been demanded to new problems. Many may indeed have been old problems to which modern technology could be applied for a more appropriate solution. This article has not attempted to portray a blow by blow account of the Operation to date but has attempted to highlight some of the hurdles which have been overcome and the solutions which have been found. It has proved once again that Sappers are able to adapt the environment to suit their needs and make it work in their favour. At the time of writing the only certainty about the future is that it is uncertain; time will tell whether we have been right.

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Chink

GENERAL SIR CHARLES RICHARDSON GCB CBE DSO BA(H)

General Sir Charles Richardson was commissioned in 1928. Seven years as a Bombay Sapper and Miner; then Assistant Adjutant at Chatham. On outbreak of war in 1939 went to France as Adjutant 1 Corps Troops Engineers. After a war course at Camberley in 1940 joined Headquarters 4 Division for advance into Belgium. Returned to UK from Dunkirk beach by naval sloop; after four months, posted to Haifa as instructor Middle East Staff College. Ten months later promoted Lieutenant Colonel as Head of Operations of SOE in Cairo. June 1942 joined Headquarters Eighth Army as GSO1 (Plans); responsible for planning and supervising deception plan for Battle of Alamein, and immediately after the battle became Head of Operations Branch, predecessor having been captured by the enemy. Remained in that position through Libya, Tripolitania, Tunisia and Sicily and promoted temporary brigadier at age of 34. For Anglo-American assault at Salerno, posted to Headquarters United States Fifth Army as Deputy Chief of Staff (British), and in April 1944 summoned to rejoin Montgomery's Staff as BGS (Plans) for Normandy assault. After VE Day, became Chief of Military Division of British Control Commission, responsible in Berlin for administering the demilitarisation of Germany in cooperation with Russians, Americans and French. In 1946 posted to Cabinet Office Whitehall to form a special Future Planning Staff with Captain Charles Lambe RN and Air Vice Marshal Hudleston to write a paper for the Chiefs of Staffs on future strategy, 1946-1961. In 1947, applied to relinquish rank of brigadier to command an engineer regiment in BAOR. In 1948 promoted substantive brigadier as BGS(SD) in the Middle East Command. IDC 1951. Command of the infantry brigade of 6 Armoured Division 1953-54; Commandant Royal Military College of Science, Shrivenham 1955-58, then GOC Singapore. Director of Combat Development 1960, followed by Director General of Military Training (Lt Gen) in 1961. GOCinC Northern Command 1963-64. Quartermaster General 1965-66. Master General of the Ordnance 1967-71. ADC General to HM The Queen 1967-70. Retired at the age of 63. Chief Royal Engineer 1972-77.

To Royal Engineers commissioned in the nineteen twenties, and to their few surviving seniors then at Chatham, the name "Chink" will recall a clever, amusing but strange young Irish Captain in the Royal Northumberland Fusiliers, who was at that time Instructor in Tactics at the School of Military Engineering. The life story of Eric Dorman-Smith has recently been brilliantly revealed, with warts and all, by Lavinia Greacen*, an English free-lance journalist married to an Irishman in Dublin. Chink's war-time career had a tragic outcome which still carries a warning to military men even of today's generation and, as the tale has now been told in this excellent biography, some comment may be appropriate from one who observed him at close quarters at significant periods of his life.

*Chink: A biography. Lavinia Greacen. Macmillan, London 1989. £18.95

Mrs Greacen writes, somewhat inaccurately, "in 1929 he had become the first infantry man to hold the coveted post of instructor in tactics at Chatham, *the Sapper's equivalent of the Staff College*" (sic). Later she states: "After TEWTs, he held uproarious post-mortems over lunch in the local pub, where he was admired for his style". It was in that setting that I first met him in 1929, and found that his sharp intellect, already recognised in the Army, well supported by Irish blarney, made him an outstanding instructor to young officers. He lacked pomposity, and had no difficulty in getting down to our level; in the "Leather Bottle" public house, his chairmanship of the "post-mortems", forceful, witty and stimulating, created a strong interest in minor tactics amongst the second-lieutenants of 20 YO Batch, one of whom until then had been far

General Sir Charles Richardson GCB CBE
Chink (p19)

from enthralled by the subject. We had no experience by which to judge the practicality of his adventurous theories, nor did we appreciate then that his brilliant intellect was seldom controlled by self-discipline. Some senior officers at Chatham at that time, though impressed perhaps by his debonair performance as Master of the RE Drag, looked more deeply and found him shallow and unattractive, though many admired his charming wife.

His career developed rapidly after leaving the SME: a strained contact with Montgomery, as both were writing training manuals, brevet promotion to major and later to lieutenant-colonel, appointment as Brigade Major of the 6th Experimental Brigade commanded by Wavell, then the Staff Duties Branch of the War Office with at that time General Dill as Director of Military Operations, and in the Military Secretary's Department, Chink's school friend Colonel Horrocks, who disclosed to him that he was rated as a star performer; this was followed by a period as instructor at the Staff College Camberley, and then a return to his regiment in Egypt — a less successful phase. Finally as a brigadier he became Director of Military Training at GHQ India, under Auchinleck as Commander-in-Chief.

It was here that I again met him in 1937. I was commanding thirty Mahrattas of the Royal Bombay Sappers and Miners in Chitral in the Hindu Kush, and having applied to take the Staff College examination, I was sent on a backward boys' course at Simla. There, General Auchinleck opened the proceedings with a sensible but uninspiring speech, and was followed by Chink; it was no surprise to me that he engaged in intellectual fireworks, but to many of us his severe criticisms of the British peacetime Army and his nostrums for improvement seemed overdone. Thereafter he lost interest in the students, leaving the instruction to more junior officers; nevertheless we enjoyed ourselves greatly in the rarefied atmosphere of Simla, with the sophisticated luxury of the Simla Club, and the experience of dining at Viceroy's Lodge as the guests of Lord Linlithgow.

In 1938 I tore myself away from India after seven exciting years, and became Assistant Adjutant at Chatham under Kit Woolner as Commanding Officer. He and his wife had been very good to me in India, and I admired him immensely. Under his direction I was responsible for mobilisation; and after Dunkirk, expecting England to be invaded, I was disgusted to be ordered to Haifa to instruct at the Middle East Staff College, which I had never heard of. I now learn from Mrs Greacen's book that Chink, a very reluctant commandant of the College, had applied to fill an instructor's post with a young Sapper officer who had caught his eye years before at Chatham. It seems that in 1929 he had noticed Lieutenant Richardson, and eleven years later demanded him, particularly because of his "topical battle experience" in France.

At the College, I at once took pains to explain to the students, including two future field marshals, Carver and Baker, that from my Dunkirk experience I was well able to disclose how not to conduct battles but, as for the converse, I had only a meagre menu to offer. This did not surprise Freddie de Guingand, the senior instructor, who I soon realised played a very large part in leading and organising the college.

The performance of Chink as Commandant has been variously assessed. To many, including myself, his narcissism, exhibitionism and intellectual arrogance were distasteful; yet Shan Hackett, another student, is recorded with a complimentary comment on the amount he had learned, although much of this might legitimately be attributed to Freddie de Guingand. However it soon became abundantly clear to us instructors that, in Chink's personal priorities, the Staff College took second place, and that his primary objective was to become involved in the operations against the Italians in the Western Desert and achieve fame as a battle commander, gifted with a modern understanding of armoured warfare. This ambition, "to get to the front", could hardly be criticised; but why, we wondered, should he meanwhile masquerade intermittently as the leader of a training establishment which had a priority task closely related to defeating the Germans in the Middle East campaign?

His absences were frequent and lengthy; the object, so he told us, was to "get lessons from the battlefield"; but when he returned, the harvest was meagre. We did not know then that Wavell, his old master whose patronage he exploited, had actually ordered him to examine the possibilities of an offensive against the Italians. Chink had then consulted another old friend, General Dick O'Connor, Commanding the Western Desert Force, and had made a favourable recommendation, with the result that Operation *COMPASS*, intended as a five-day raid against the Italian forces on the western frontier of Egypt, was launched, and eventually reached Agheila over five hundred miles from Mersa Matruh.

It was at Agheila that shortly afterwards I visited

the King's Dragoon Guards (as they were then) with the Deputy Commandant, Colonel Tiarks of that regiment, to obtain my own "lessons from the battlefield", in imitation of our Commandant. Fortunately, Tiarks and I withdrew to Haifa some days before a German general then unknown, called Rommel, launched an attack, which had a disastrous impact on the Western Desert Force.

Throughout that campaign, Chink had been in touch with O'Connor and I now learn that when Western Desert Force had reached Sidi Barrani, Wavell had officially authorised Chink to observe and report on the operation. However, many of the old hands in the Desert resented the sudden appearance of this *soi disant* "master of the battlefield", whose responsibilities appeared to be so nebulous. This phase of Chink's career, as the absentee Commandant of the Staff College and the superfluous adviser in the Western Desert, was further complicated by a love affair with a young lady in Cairo, which led eventually to divorce.

My next contact with him occurred four days after the fall of Tobruk. After my stint as a teacher, I had become head of the Operations Branch of SOE in Cairo; regrettably the activities of our courageous agents, despatched to Yugoslavia, Libya and Greece did little to counterbalance the disasters inflicted on our regular forces on the main front, and it was there, after ten months, that I met Chink once more. I was posted as GSO1 (Plans) to Eighth Army at their darkest hour, and by the time I had "packed my bags", the headquarters in full retreat was a hundred miles nearer Cairo. I landed after dark from a Lysander aircraft and was surprised to be met by Chink: "So glad you've come, Charles; we're having a marvellous time here" was his typical greeting, in a situation which could only be described as desperate. Auchinleck, C in C Middle East had taken over the additional function of Commander Eighth Army from Ritchie, who had failed, and Chink, installed in Ritchie's old job of Deputy Chief of the General Staff in Cairo, had "attached" himself to Army Headquarters.

I have now learned from the biography that Auchinleck's intention was that Chink should undertake at Army Headquarters the staff work arising from Auchinleck's responsibilities as Commander-in-Chief, but this was not the function that Chink chose to perform. Once again he became a supernumerary high-level personal adviser to Auchinleck, in his role as Commander Eighth Army.

Some seven of us, including the C in C, Chink and Brigadier Jock Whiteley (late RE) the BGS, would assemble at 9 pm every evening in Auchinleck's caravan to review the operations of the day and consider plans for the future. It was here that the outpourings of Chink's imaginative but undisciplined mind, tolerated by his friend Auchinleck, were given full scope. The official BGS, Jock Whiteley, who had borne the ghastly responsibilities of the previous disasters, was pushed aside by Chink, the unofficial adviser, now conveniently dressed as a major general in his Cairo capacity; and far too often Chink's nimble mind and all too fertile imagination overcame the more practical suggestions of the exhausted BGS. For the four lieutenant colonels present, including the planner who could foresee nothing but defeat in the weeks ahead, the meetings would often end with no certain ideas as to whose instructions we were to follow.

The situation improved greatly when Freddie de Guingand, whom Auchinleck had previously made Director of Military Intelligence in Cairo, was appointed BGS Eighth Army in place of Jock Whiteley, who was moved to another post in London, with some prospect of recuperation. At Haifa, Freddie and Chink had become friends partly because Freddie, with his brilliant but disciplined intellect, was such an admirable assistant to Chink, and also because at that period the two Roman Catholics had exchanged confidences about their "girl friends" in Cairo. At Eighth Army Headquarters, the uncertainties regarding staff direction were quickly resolved by Freddie, and Chink's domination of the scene was gradually diminished.

The final eclipse of this extraordinary man took place during Churchill's visit to Eighth Army. We, some dozen or so, were all located at Auchinleck's tactical headquarters, a most unsuitable location at a junction of camel tracks, liberally supplied with dung, absurdly far forward for a defensive phase, and miles from our supporting RAF headquarters. The headquarters was a very "matey" set-up, and my personal relationship with Chink, after an acquaintanceship of thirteen years was still amicable; moreover the ambience of our spartan surroundings, including the spectacle at dawn of four colonels and two wireless operators, sponging themselves from top to toe outside their slit trenches, with their half-pints of water, introduced an unusual informality. The two rival brigadiers had caravans, as had the Commander-in-Chief, but he insisted on sleeping outside in his bedding roll to share the "tribulations" of his soldiers.

I well remember a discussion Chink had with me then of his plan to meet Rommel's anticipated "final" attack. It went like this: the forward infantry divisions of Eighth Army, battered morally by repeated disasters, would immediately withdraw seven miles, regrouping *en route* with armoured units with whom they had had little opportunity to train; other infantry units meanwhile would be withdrawn to occupy as "defended observation posts" the "pimples", the sugar-loaf hills, which lay along the axis of the coastal road. The newly formed British battlegroups, supported by artillery controlled from the defended observation posts, would then engage Rommel's victorious armour in Chink's selected "killing grounds". This absurdity was recorded in notes on the back of an envelope in his schoolboy's handwriting. I can see it still; to me it smelt of disaster, and suggested that another plan, which, on Whiteley's order, I had made to withdraw Eighth Army to Khartoum, was perhaps not as theoretical as I had at first supposed.

Very soon after Churchill's arrival at our headquarters, I met Chink again over a whisky and soda; "I'm for the Star Chamber tomorrow" said Chink, and the next day he left. His dismissal, for that was what it was, coincided with a report drawn up by Brigadier Ian Jacob who had accompanied the Prime Minister as a member of his defence staff. Many of Jacob's contemporaries at Camberley were then in key positions in Eighth Army, and he had visited some of them to form an opinion on why the Army had failed so disastrously; in many interviews, Chink's influence and activities had been severely criticised.

There was no doubt in my mind at that time that had the Auchinleck/Chink combination not been swept away, the battle of Egypt would have been lost, with incalculable repercussions on the whole war. But far more significant is the fact that Churchill took the same view.

The last phase of Chink's life was little known to me until I had read the biography. The disposal of him, after his removal, was a difficult problem for the CIGS and the Military Secretary: too many commanders had heard too much about him. He was posted to command an infantry brigade in the UK, which in due course was visited by Churchill. At lunch in the Mess, Chink saw fit to be magisterially critical of some of Churchill's propositions, talking to him as if he was a dim-witted student. It was not a successful posting, and was followed by a period on half-pay, and finally the command of an infantry brigade in the Anzio bridgehead. There, his three battalion commanders became appalled at the prospect of an offensive operation under Chink's command, and eventually when this became officially known he was relieved; he retired, an embittered man, to Eire, but not before he had made a prolonged, emotional appeal against the adverse report which had followed the Anzio incident.

If anyone supposed that Chink would then disappear quietly from the scene, they would soon be proved wrong. Never lacking confidence in his own abilities, he chose to stand for Parliament in 1945 as a Liberal, in competition with Selwyn Lloyd, the future Conservative Foreign Minister, and it was in that context that he resurrected his "League of Angry Men", of which we had heard at the Haifa Staff College. In a relaxed moment, some of us had asked him what fields he would set out to conquer after the war was won:

"I shall lead 'The League of Angry Men'!" was his reply. None of us at that time was able to discover precisely what he meant, but at the post-war general election he presented himself as the leader of "disillusioned conscripts": these were "the angry men". His election campaign was not successful.

Meanwhile his family life was in a mess; eventually in 1949 he was married for the second time at a Registry Office. It was in that year also that he changed his name to O'Gowan, a name originating from an East Ulster Clan, which had been given to him as a nickname at the Staff College, Camberley.

The torrent of war memoirs, which by then had emerged, enraged him further, and he set out to magnify the results of Auchinleck's pre-Alamein operations and his personal contribution to them, while seeking to belittle Montgomery's achievement.

A notorious incident in that long battle of the historians was Chink's attempted libel action against Churchill, arising from the fourth volume of *The History of the Second World War, The Hinge of Fate*. Chink's case was that the text inferred that he had had a major responsibility for the failures at Gazala and Tobruk, and had been at fault in his capacity as Deputy Chief of Staff at GHQ; Chink also reacted against the "slur" cast by the talk of withdrawing Eighth Army to the Cairo delta, maintaining, despite my Khartoum plan, that there had never been any doubt about holding on to Alamein.

This incident produced the final link between me and the witty persuasive Irishman who had fired

my imagination in "The Leather Bottle" in 1929. In 1953 I was commanding the infantry brigade of 6th Armoured Division in BAOR and was surprised to receive from Sir Hartley Shawcross, with whom at that time I had had no personal contact, a letter in the following terms: he had been instructed by Sir Winston Churchill to act for him in a matter concerning a Brigadier E E Dorman-Smith: he understood that I had served with this officer... would I be prepared to assist Sir Winston Churchill? Naturally I replied in the affirmative. I then received an immediate summons to Sir Hartley's London office which, due to training commitments, I had to decline; later by telephone I heard that the case had been settled out of court.

The intricacies of this extraordinary case are described in detail in the biography, including the participation of Liddell Hart, whose friendship with Chink, his contemporary and intellectual crony, had begun in 1935. The case was eventually settled by Churchill agreeing that an explanatory footnote should appear in subsequent editions of *The Hinge of Fate*.

Chink's turbulent retirement was to be marked by one final incident, the most remarkable of all: his activities with the IRA, with whom he had previously been involved as a British Army Officer in the "Black and Tans" situation of 1921. Immediately after the conclusion, still unsatisfactory to him, of his libel suit, he stated in anger, that as he lived in Eire, there was no longer any call on him to act 'against the Queen's enemies', and declared publicly that his purpose was to remove the Border between Eire and Northern Ireland. Soon, IRA officers called on him in his home, and working relations were openly established, the adaptation of a cellar as an "operations room", the conduct of tactical studies on a sand table in the house, and the tendering of advice to IRA leaders on objectives for their future operations.

It was a concidence that the GOC Northern Ireland at the time was the Royal Engineer General Sir Ouvry Roberts, a contemporary of Chink both at Chatham and later in India, where he had set some store on Chink's tactical expertise. Ouvry Roberts, aware of some of Chink's extraordinary activities with the IRA, concluded that he had gone mad.

A few more bizarre incidents enliven Mrs Greacen's final pages: a serious attempt by Chink's brother, Sir Reginald, at one time Governor of Burma, to have him reinstated as Major General Sir Eric Dorman-Smith KCB; the official reply, while admitting that Dorman-Smith might have been "unlucky", did not accept that the changes in staff leading to his removal were wrong at the time.

In 1961 Chink, aged 66, mourned with tears the death of his best friend Ernest Hemingway. It was in November 1918, eight days before the Armistice, that the writer aged 19, dressed in the uniform of the American Red Cross had first met Major Dorman-Smith, MC and Bar, also 19, in the Anglo-American Club in Milan. From that moment they had become firm friends, constantly corresponding and taking holidays together in Europe. His other great friend, Auchinleck, far removed in Marrakesh, had maintained his friendship with equal constancy, and out-lived Chink by 22 years, dying at the age of 92 in 1981.

It is a tragic tale, food for thought for a psychiatrist. How was it that a courageous, highly intelligent young officer, promoted in World War I to the rank of major at the age of 19, with a Military Cross and Bar, soon to win approval as a brilliant military thinker, could end his career in such a disastrous fashion, and then spend his last embittered years in futile and even treasonable activities?

When 22 years later in 1940, he stood poised for a great career, he had found himself in a teaching job, which stupidly he spurned; then, fired with excessive ambition and helped by illustrious patrons, he sought to escape with the aim, certainly legitimate, of joining the battle. In that process, he repeatedly insinuated himself into short-term activities, lacking official sanction other than from his military patrons, who mistakenly believed that his advice would be valuable even if tendered to reluctant recipients, whose practical experience in the desert battle was greater than his.

These "advisory" missions culminated at Eighth Army Headquarters, where at a time of dire crisis his chosen activity, different to his allocated function, exemplified disastrously the dangers of power without responsibility. How could such a situation occur when Britain was fighting for its life?

For the answer we must look to Chink himself and, more profoundly, to the circumstances which permitted such strange departures from official military procedures with their built-in safeguards.

Even the admirers of Chink could not dispute that he suffered from intellectual arrogance, and that his mordant wit was kept instantly ready for merciless use against what he regarded as "second-raters". He was driven by excessive ambition which, even in war, led him to mark the progress of his competitors, and suffer depression from

their successes. His obsession with "never going along with the crowd" blinded him even when the crowd was manifestly going in the right direction. Was this crowd of his contemporaries really composed of the slow-minded, orthodox second-raters referred to in the biography? Were Harding, Templer and Horrocks second-raters? These men also had ambition and quirks of character, but they were content with appointments offered by the system and, once there, devoted all their energies to their defined responsibilities.

Let us therefore stick to the rules. However brilliant an officer may appear, and however strong may be his persuasive influence with seniors in high places, let his career, even in war, develop through the orthodox procedures which exist for the purpose. Unofficial advisory functions should not be manufactured for him, since it must be accepted that he will exercise influence disproportionate to his rank, and thus create the dangers arising from power without responsibility.

If there are Chinks around today, they must not be permitted to follow in the footsteps of Eric Dorman-Smith.

Editors Note: General Richardson's biography of Lieutenant General Sir Ian Jacob GBE CB DL will be published by Brassey's in the autumn.

Lateral Thinking in HQRE 4 Armd Div

COLONEL C C GALLOWAY BSc(ENG), MAJOR L W CHAPMAN,
CAPTAIN N C R G SMITH BSc(ENG), CAPTAIN J A D HOWARD BSc(H)

INTRODUCTION BY COLONEL C C GALLOWAY

EXERCISE *Summer Sales* 1990 marked a major change of direction for 1 (BR) Corps. Timed as it was in an era of political uncertainty in Central Europe, it was planned as a two-sided free play Command Post Exercise (CPX) with no reference to real plans, but designed as ever to test Divisional HQ staffs. In simple terms 1st and 2nd Divisions defended the normal Corps area, but facing West with the Forward Edge of Battle Area (FEBA) on the general line of the River Weser. 3rd and 4th Divisions attacked from the West with the objective of seizing Braunschweig. In his initial orders the Corps Commander encouraged wide ranging manoeuvre within boundaries, in order to discourage an attritional slogging match and the inevitable computer generated arguments.

In a typical British compromise neither side won, but with two major river lines to cross (the Weser and the Leine), long Main Supply Routes (MSRs) to maintain and well trained enemy engineers, Exercise *Summer Sales* became one of the best Engineer CPXs I have known. During its course a number of new ideas were generated, either in an attempt to beat the exercise controller or in pursuit of personal thoughts, and these are described below — I will leave the reader to guess which category the articles encompass! The illustrations and diagrams are all original or direct copies of the originals produced in the field.

IMPROVISED FLOATING MEDIUM GIRDER BRIDGE (MGB)

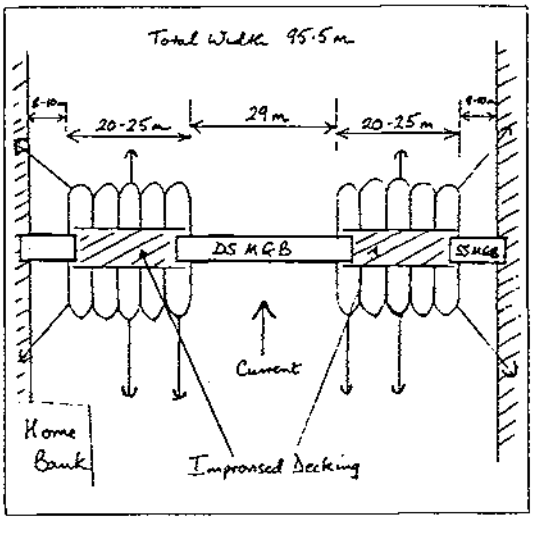
Colonel C C Galloway

BY Day Three of the exercise, with most of 4 Division's combat troops across the River Weser, enemy interdiction of the M2 bridges had been unbelievably successful! Air strikes and Multiple Launch Rocket System (MLRS) salvoes, guided by stay-behind Observation Posts (OPs), had taken out bridge after bridge. The "peace-time" bridges had all been destroyed as part of the FEBA battle, and repairs were being equally hampered and delayed. Thus the Division's Lines of Communication (L of C) were beginning to look very fragile.

There was an urgent requirement for an MSR bridge in the area of Bodenwerder, to replace a very badly damaged and unusable M2 bridge. From reference to microfiche, start states, and local knowledge, the following factors were agreed with the lower controllers:

- There were at least three sets of MGB available, and a Field Squadron with normal equipment.
- The river Weser beside the old Bodenwerder bridge is 95.5m wide, with a flat bottom and a normal depth of 3m. The banks are well built and revetted, with an average height of 1.5m above normal water level.
- The barge construction and repair yard just upstream from Bodenwerder was operational, and there were at least ten barges in the vicinity. The assumed dimensions of the barges were 4.5m wide and 3m keel to deck.
- The timber yard in Bodenwerder was well stocked.
- The wrecked M2 bridge had some usable ramp sections and, of more importance, anchor sets.
- The river flow in late June was well below average, and thus the current was not a major problem.

From these parameters, a design was produced which is illustrated diagrammatically below.



NOTES

1. Landing Bay Rafts. Barges close-coupled with wire/tirfor jacks, moored and anchored using anchor sets from M2 bridge. Decking is improvised using timber, M2 ramps or MGB sections.
2. Centre span is standard MGB Set (Cl 70). Construction standard, but booming achieved by winching far landing bay raft across the river.
3. Side spans are single storey MGB, or double storey if gap greater than 9.5m (gaps depend on barge width).
4. Once bridge is complete, barges should be sunk by explosive means to ensure stability (Divers to check river bed?). Spans should then be flexibly attached to the rafts (SWR restrainers?).
5. Planning timings:

a. Rafts - close couple and deck barges	- 6 hours
b. Centre Span 4 hrs, Side Spans 1 hr,	- 5 hours
c. Mooring, adjusting, sinking, approaches,	- 4 hours
Total	-15 hours*

*+planning factor! (Controllers accepted 20 hours!!)

Doubtless this solution will offend many combat engineer pundits, attuned as we are to peacetime soldiering and all the restrictions and safety margins imposed upon us. However in times of war and during intense war games when the Commander wants a solution, extreme measures are required. To quote from a recent E in C(A) paper, "It is in the very nature of the Engineer to improvise".

Engineer Staff Duties — The Use of Graphics

Major L W Chapman

Introduction

During the last year HQRE 4 Armoured Division has trialled the use of graphics to pass on orders/warning orders and planning maps to the Division's engineers. The move to the use of graphics was prompted by the time wasted in typing and distributing formal engineer orders. The quickest means of passing written orders down to the Brigade Field Squadron is by the use of FAX which is now readily available on the Ptarmigan network. By hand writing the orders and producing a sketch of the operation all on one A4 piece of paper, HQRE can give the Squadron Commander all the key information he needs, normally before the Division's Operation Overlay reaches the Brigade. The quality of the FAX transfer is usually good enough for the smallest writing to be legible. If required, and normally it is desirable, two sheets of A4 can be used. The content of the orders obviously depends on the type of operation, the number of phases and the requirement for regrouping. The need to optimise on space has led to some strange, irregular, abbreviations whose meaning is hopefully self evident! For those purists amongst you who have mentally discarded this already, be assured that our current GOC (ex Commandant of the Staff College) believes this is a splendid way of doing business!

Orders

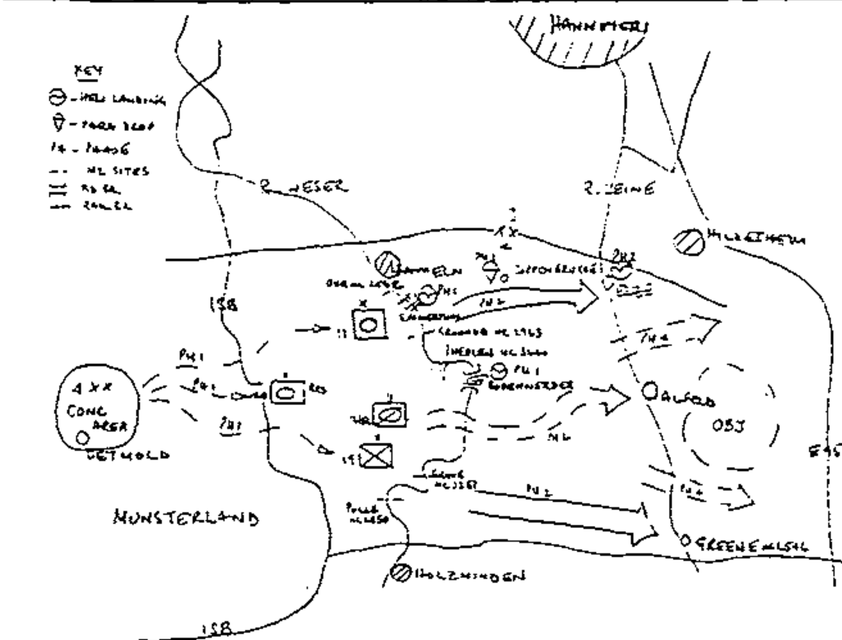
Most orders split into the following parts (see the example opposite).

First, Title blocks, distribution, locations etc are all grouped as tightly as possible around the periphery.

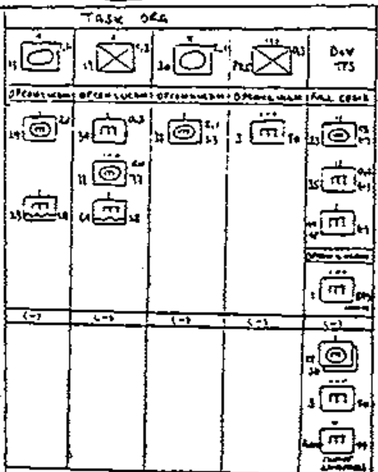
Second, about a third of the page is used to display graphically the proposed operation. This is very similar to the gunners AB545B. Typical items of information shown in this section are the division/brigade boundaries, major terrain features, objectives, phases, engineer Rendezvous (RV) and park locations and basic enemy information (formations and likely axes).

The third component of the order is the Task Organisation. The new command relationships are now used and we normally group engineers "under operational control" and "under command for daily maintenance" of brigades as we issue new orders for each divisional operation. As the sapper headquarters colocated with brigade headquarters is responsible for all the sappers in that tactical area of command, we show the engineer assets held by a particular brigade as two numbers by the top right hand corner of the squadron symbol. The first number gives the number of armoured or later Close Support troops assigned, and the second the number of field or General Support troops assigned. Although we avoid regrouping unnecessarily and retain troop/battlegroup affiliations whenever possible we recognise that certain operations and combat losses will demand regrouping. The flexibility of our squadron headquarters to absorb and manage additional sapper assets is

FM: HQRE 4 ARMD DIV	TO: SEE DSTR	ENGR OPO 1/90	DTG EFF: 230600B JUN	OP: TRINITY
REF OPO 1/90	RESTRICTED	TIME: BRAVO	LOC: LUCKHAUSEN MC 874642	



Distr:
Engr Plans
Engr Ops
Engr Ops (Fwd)
Engr Log
Engr Int
27 Armd Engr Regt (Excon)
35 Engr Regt (Excon)
29 Fd Sqn
37 Fd Sqn
44 Fd Sqn
875 Movement Con (V) } Excon
HQRE I (BR) Corps
CRE



1. SITUATION

a. En. No response to NL ultimatum to reopen. Main En and likely to be E of R. LEINE.

b. Fr.

US I Corps ..... to seize ..... gap and then .....

(2) I Corps aim is to find and contain en posns, exploit round them to fix their res to allow ..... res to take ..... This will prevent ..... of .... by 7 (Bde) Div.

2. MISSION

4 Div is to find and contain the en ..... before exploiting E to force the committal of the en res.

3. EXECUTION

a. Concept of Ops. 4 Phases:

(1) Phase 1. Initial ops to seize WESER Xings.

(2) Phase 2. Breakout and seize LEINE Xings.

(3) Phase 3. Loc and contain en .....

(4) Phase 4. Exploit E to force commitment of en res.

b. 29 Fd Sqn. Sp Bde ops.

c. 38 Fd Sqn. Sp Bde ops. Armd Sp TBC.

d. 37 Fd Sqn. Sp Bde ops.

e. 44 Fd Sp Sqn

(1) Sp. ..... Flank ..... to ..... Corps Sp Sqn ..... Corps Rear Area tasks.

(2) Tasks.

(a) .....

(b) Be prep to ..... to ..... 23 Jun.

(3) Mob Equipt Pnts:

(a) 34 Fd Sqn

(b) 29 Fd Sqn

(c) 35 Engr Regt.

f. 35 Engr Regt Tasks:

(1) Upgrade ..... by 232000:

(a) MC 10285132

(b) MC 15795419

(2) ..... FRG to ..... WESER .....

(3) Maint div MSRs.

g. 23 ..... Sqn. Be prep to ..... Xings over R. WESER at ..... and ..... during Phase 1.

h. 64 ..... Sqn. Be prep to ..... Xings over R. WESER at ..... and ..... during Phase 1.

i. 875 Mov Lt. ..... with Engr Pk. Be prep to ..... plan.

j. Coord Instr

(1) NBC Threat low

(2) STAP. A3 B3 C2 D3 E2 F3 ..... 37 Fd Sqn which is on A1 B2 C1 D1 E1 F2 until committed

(3) Timings

(a) 4 hr 240315

(b) ..... complete 232000.

(4) Locs

(a) Engr Pk MC 8753

(b)

4. LOG. See Admin O 1/90. ..... are critical items. Release ..... from Engr Plans only.

5. COMMAND & SIGNAL

a. Locs

(1) Main MC 874642

(2) Rear MC 706751

(3) Fwd MC 912910

b. Alt Comd. Brig J. ..... / Fwd 4 Armd Div

c. CES. To fol.

d. Password. ..... 231400 XX CC

Acknowledge.

C.C. GALLOWAY
Col
Comd Engr

Authentication: [signature]

L.M. CHAPMAN
Maj
SO2 Engr

an interesting aspect of our *modus operandi* which deserves separate analysis. We firmly believe that a graphical Task Organisation is superior to a written version even though the latter would undoubtably use less space.

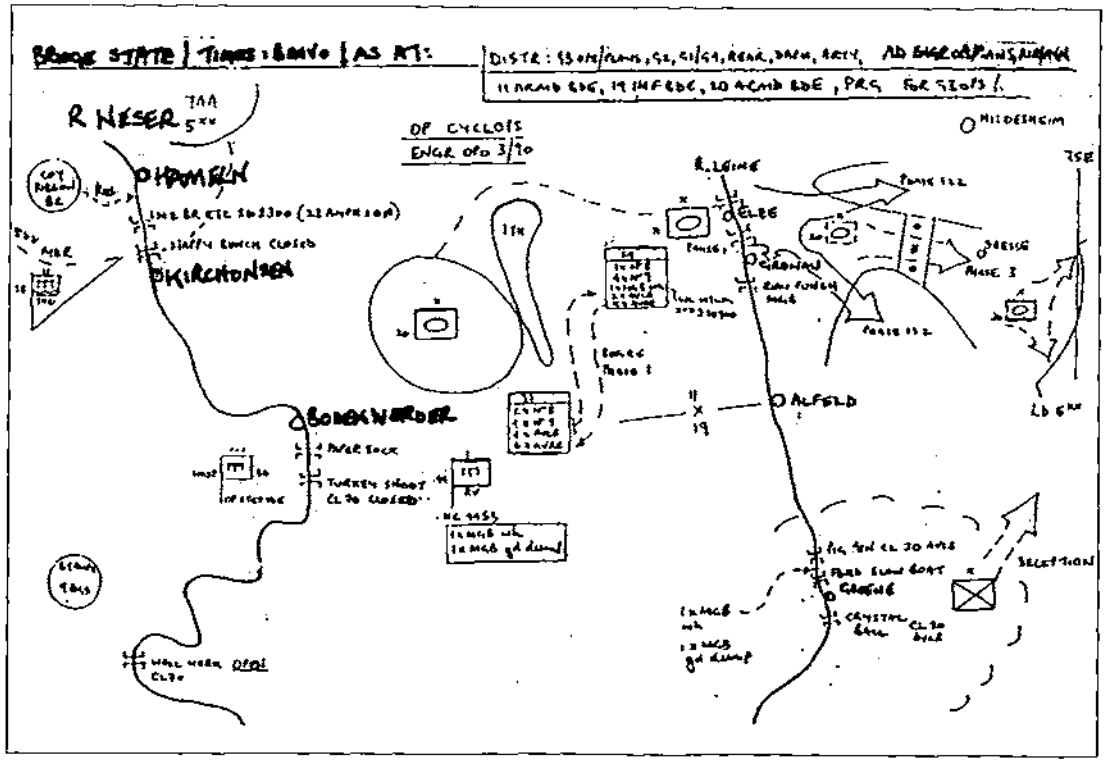
The last component of the orders is the script, hand written with maximum use of official and unofficial abbreviations. The content is largely a personal matter but should encompass the divisional plan, the sapper plan where this differs in terms of phasing, orders to all divisional sappers and coordinating instructions. Regrouping engineer logistic assets is another important function of this part.

Planning Maps

The planning maps produced proved particularly useful during Ex *Summer Sales* where the division was split across two river lines (Weser and Leine) and the attrition rate on bridging became phenomenal. An example is shown below. The advantages of a simple graphic display with, for example, bridge states, location of main bridging assets, Maximum Load Class (MLC) of open bridges, opening times if applicable, distribution of armoured bridging assets, nicknames of sites, allocation of bridges to brigades or divisional logistics all marked on together with boundaries and Forward Line Own Troops(FLOT) if required, are obvious. It can be updated every 5-6 hours and is a very handy planning and briefing tool. Having produced and photocopied the master drawing for a particular area the update can be produced in about half an hour. To do the above it is not essential that the watchkeeper is a Michelangelo although a sure hand, neat handwriting and a 0.5 propelling pencil are "musts".

Conclusion

The examples below and on page 27 show that the use of graphics is by no means the only area where this tool could be employed. Planning maps could also be useful in brigade defensive areas to keep tabs on bridging equipment or plant support. It is also hoped that this system could be incorporated into the new Automated Data Processing (ADP) systems being planned for the Army.



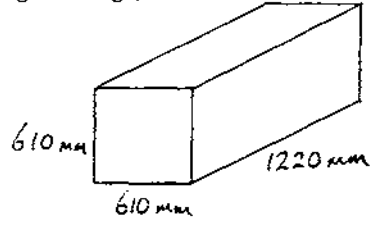
Improvised Trestle Design

Captain N C R G Smith

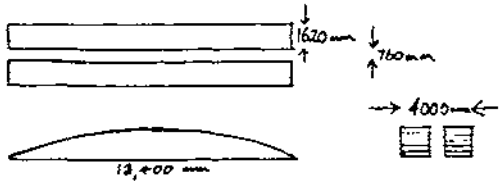
After the attrition on the River Weser, it was inevitable that we would have problems at the river Leine. Sure enough the exercise controllers systematically reduced our armoured bridging assets until we had only a limited supply of No 9 bridges left, not enough to achieve the three Leine crossings we would need — or rather not enough using conventional combination bridging techniques. However some quick mathematics revealed that if we could keep the bridges almost horizontal, using a pier or trestle, we had sufficient for our crossings. A quick check of the Support Squadron's loading lists revealed that sufficient stores were available, and from the RE Pocket Book (REPB) we knew that the No 8 Bridge weighs 3.86 tonnes more that the No 9, so we had an idea of how much we could hang on to the No 9 toe, and still launch the bridge conventionally.

As a result the following design evolved:

1. Dimensions of 50t crib
   (Weight 104kgs)



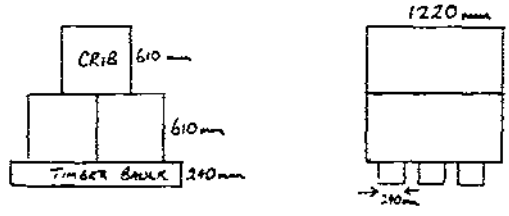
2. Dimensions of No 9 Bridge
   (Weight 8.84t)



3. Loading
   Max loading on a crib is 50t
   Max loading on a track is 40t $\left(\frac{\text{MLC 80}}{2}\right)$

4. Depth of Water
   Max depth 4ft = 1220mm.

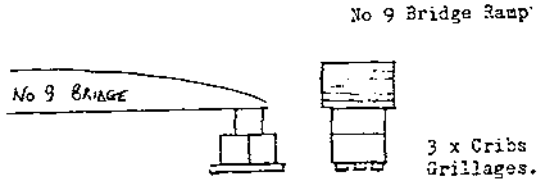
5. Design
   Cribs must sit on some form of grillage either 240 x 240mm or 240 x 150mm timber baulks. Design is for a single trestle. Two trestles required per No 9 bridge, one for each toe.



   Total weight of trestle approx 0.4t : Load on end of bridge = 0.8t.

6. Construction
   - Make each trestle up separately. Ensure central webs in cribs are vertical.
   - Lash grillages to base of trestle using SWR. SWR tightened using tirfor jacks and held in place by bulldog clamps driven into timber.
   - Invert trestle and lash using SWR to No 9 Bridge. Method of lashing dependant upon lashing points on No 9 Bridge.

7. Sketch of Final Construction of a Single Trestle



PILOT TERAS EXERCISED

Captain J A D Howard

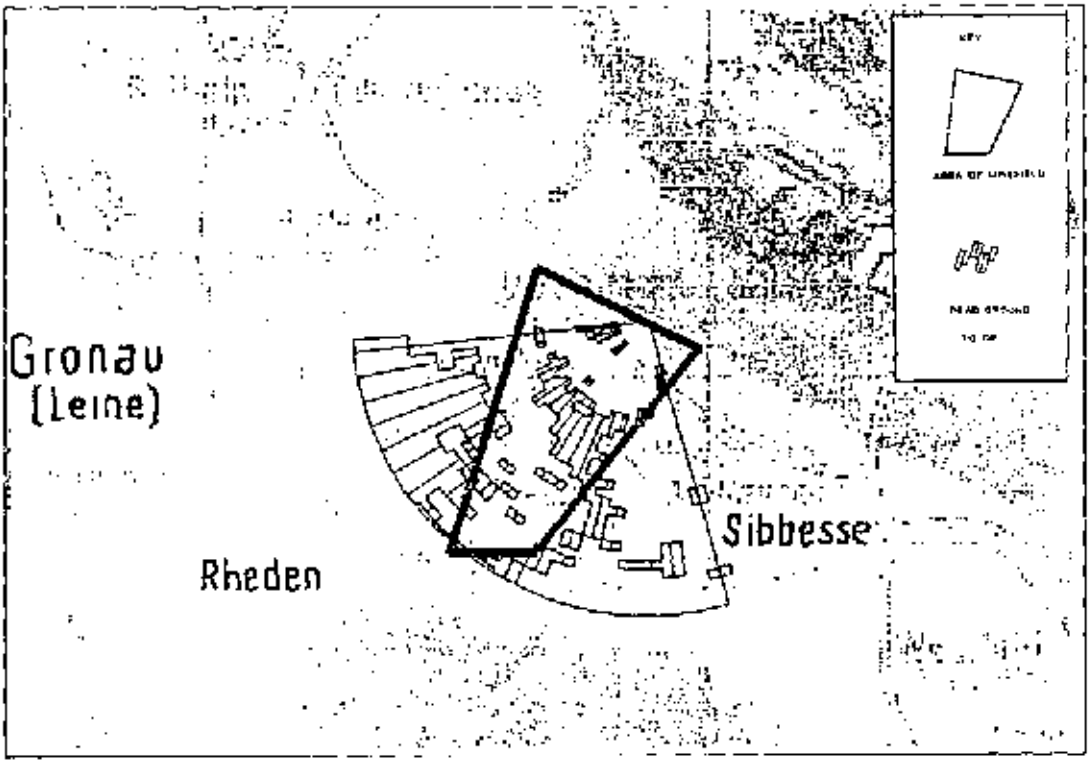
PILOT Teras, the Corps prototype terrain analysis computer, has been in BAOR for over a year now undergoing preliminary trials, demonstrations and data capture at HQ 1 (BR) Corps. The computer is capable of producing a wide variety of terrain information products (eg cross country movement assessments) and solutions to terrain questions (eg line of sight problems) for a specific map coverage within the Corps area. During *Summer Sales*, and for the first time since its arrival in BAOR, Pilot Teras was set a problem appertaining to a 'live' tactical environment which was subsequently validated on the ground.

During Day Four the battle saw 4 Armd Div attacking through the Sibbesse Gap including a minefield breach. The 4 Armd Div Engineer Intelligence Cell was tasked to produce various terrain analysis products whilst Pilot Teras was asked to produce a prediction of dead ground within the Sibbesse Gap. The specific problem was set thus: "What is dead ground to two enemy OPs based either side of the gap at specified grids?". These grids were selected as likely OP positions from the Map. An observer level of 2 metres above ground was used (to simulate the case of the observer standing up). The printouts shown were the result. These products gave the planning staff a guide to what could be the best approach in the assault and for breaching the minefield. However rather than just leave the analysis at a theoretical stage a simple practical validation of the dead ground predictions was carried out.

Lieut Colonel R A Dudin (CIS(Army)) and Captain J A Howard (HQRE 4 Armd Div) with the assistance of 4 Regiment Army Air Corps carried out this simple validation by standing at the designated OP locations and following the Lynx, with strobe flashing, as it flew just above ground level through all possible dead ground in the area of interest. This validation revealed the following:

- Generally Pilot Teras identified most areas of dead ground well.
- The coarseness of the terrain data in the computer data base (ie height information at every 100 metres) meant that distorted results were occasionally achieved. Where dead ground was less than 100 metres wide it could be missed by the computer analysis and similarly where it was just over 100 metres wide it could be predicted wider than it really was (ie up to 200 metres).
- Good correlation of specific details was noted. In one example the computer predicted a road junction was visible from the northern OP whereas the ground immediately to the South of it was dead; this was observed.

The Pilot Teras dead ground analysis provided a useful guide to potential enemy observation of the Sibbessse Gap. Whilst some specific details were accurate the overall accuracy with respect to the perceived dimensions of dead ground was limited by the accuracy of the data base. Narrow swathes of dead ground suitable for unobserved dismounted movement were missed. To improve this a finer mesh of ground heights in the terrain data base would be required. In summary Pilot Teras provided a useful and rapid insight to a terrain problem that could not have been executed manually in an appropriate time frame.


Gronau
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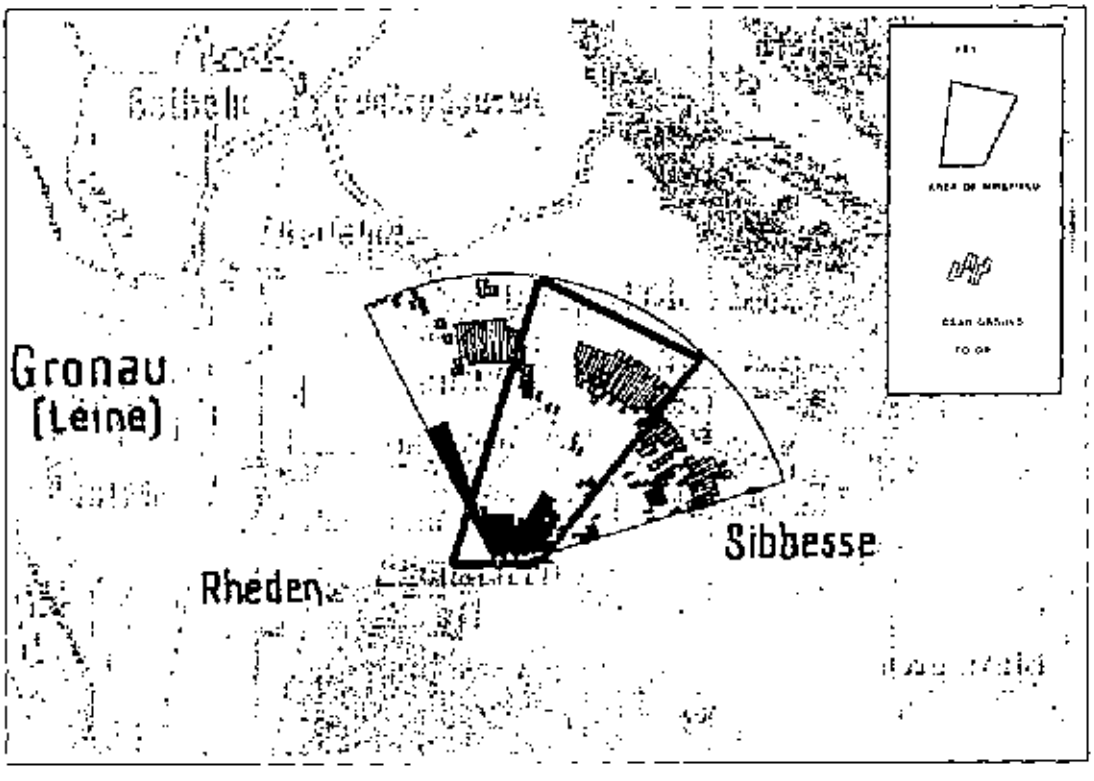
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The Royal Engineers in the British Forces Arabian Peninsula and the Middle East Command 1958-1967 — Part II

BRIGADIER (RETD) H W BALDWIN OBE CEng FICE FIStructE

Defence White Paper February 1966

In February 1966 the British Government announced in a new Defence White Paper that it no longer proposed to maintain defence facilities in South Arabia after granting independence in 1968. Unfortunately, by this time, the new cantonment in Little Aden for a Brigade had already been built!

It was hoped that after the British Government's announcement attacks against the British would stop. In theory nothing more would be achieved by killing British soldiers. Unfortunately, the reverse was the case. The attacks from adherents of both FLOSY (Front for the Liberation of Occupied South Yemen) and the NLF (National Liberation Front) steadily increased in an endeavour to prove that each was the stronger and the rightful heir to the Federation at Independence.

Terrorist incidents, strikes and riots became more frequent and the British Army had to assume greater responsibility for internal security. On 5 June 1966 Major General J E F Willoughby had the appointment of Security Commander added to that of GOC Land Forces.

Upgrading of Chief Engineer

It was decided that, to meet the increasing Sapper responsibilities including the deployment to the Gulf, the appointment of Chief Engineer should be upgraded from Colonel to Brigadier. The implementation coincided with the end of Colonel Drake-Wilkes' tour. In the event, Colonel Drake-Wilkes and I swapped jobs. He took over Colonel Engr 1(A) in the Ministry of Defence and, on 1 September 1966, I became Chief Engineer.

Wadi Matlah 1966

My immediate concern was with the road in the Wadi Matlah. When 48 Field Squadron had taken over responsibility for its construction it was hoped to complete this section by the end of August 1966. However, dissident attacks on plant and the limited infantry available for security protection restricted work and made this date impracticable. Unfortunately in August and September a series of exceptionally violent rainstorms hit the area causing flooding in the Wadi up to eight feet deep. It was appreciated that the new road was vulnerable to flooding but it was unlucky that these storms, which were the worst for thirteen years, should have happened in 1966. In fact the sections washed out aggregated less than a mile but this included the loss of culverts, Irish bridges and extensive embankments.

The Federal Government voted £5000 to cover the remedial work and opportunity was taken to make some realignment and redesigning, including river training, to minimize future damage.

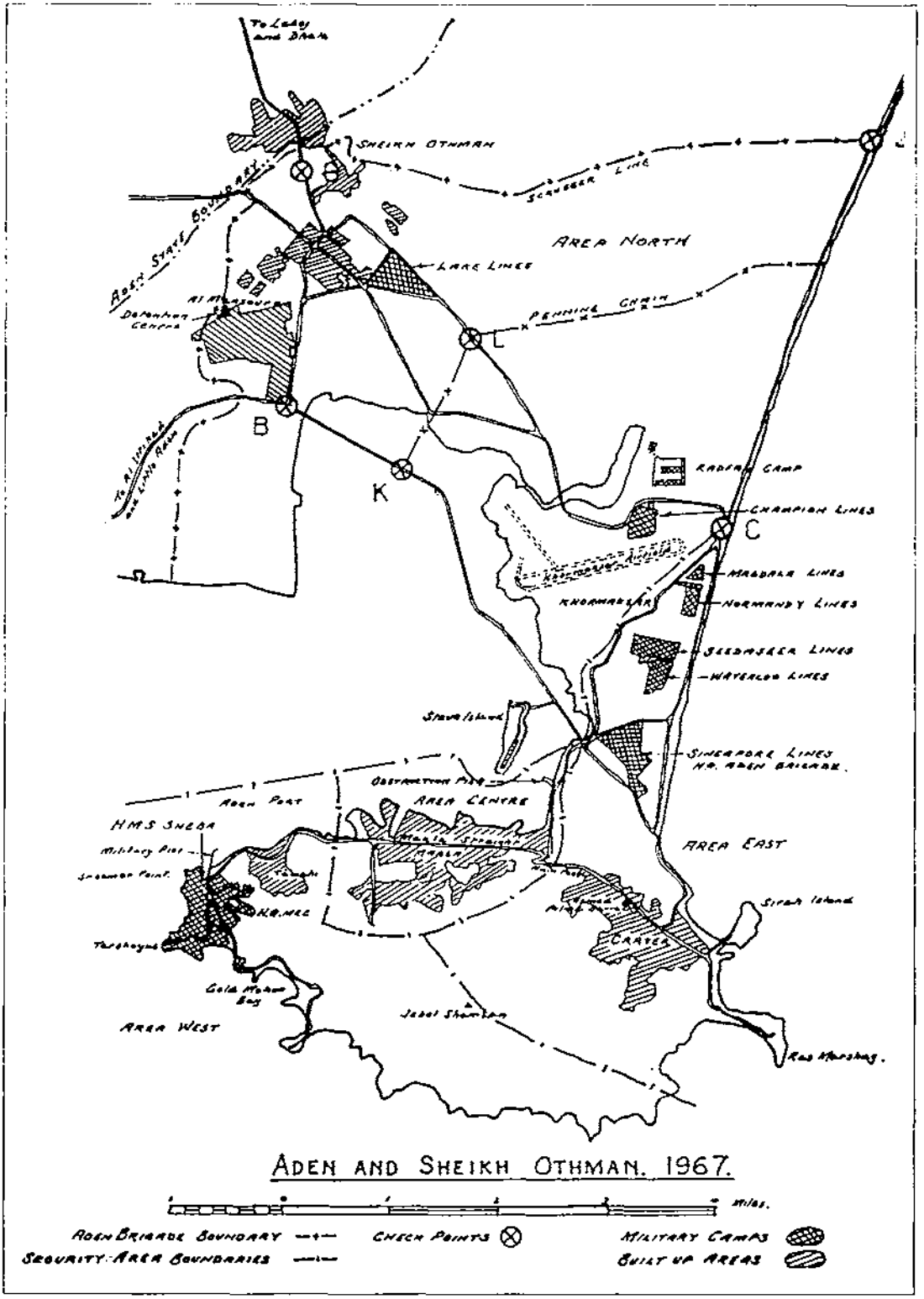
Some damage also occurred on the fourteen mile stretch of road between the north end of the Wadi Matlah and Habilayn. This, too, had to be repaired.

Another factor affected the work programme. The Al Milah camp had grown from a Sapper construction camp to an all Arms garrison. The deteriorating situation in Aden required more British troops for security duties and these could be found only by withdrawing them from the Federation. It was decided, therefore, to close the Al Milah camp by the end of October and concentrate all the remaining troops in the area in an expanded Habilayn Garrison camp.

The expansion was carried out by 523 Specialist Team using a civilian contractor and a Section from 20 Field Squadron.

By the end of October work on the Wadi Matlah was nearing completion and the closure of Al Milah camp gave the CRE the opportunity to withdraw to Aden the majority of 48 Field Squadron which had suffered a very gruelling time. To complete the remaining work in this section and the repairs to the Northern Section the CRE left a reinforced troop from the Squadron in Habilayn.

Dissident tribesmen continued to harry the working parties and this included the destruction of some culverts. To discourage this sort of damage the culverts were not repaired but filled in and resurfaced to maintain the 'mine-proofing'.


To Lahej and Dhala
SHEIKH OTHMAN
SCHNEIDER LINE
AREA NORTH
LAKE LINES
PENNINE CHAIN
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NORMANDY LINES
SEEDASEER LINES
HAVERLOCK LINES
Shaw Island
SINGAPORE LINES H.Q. ADEN BRIGADE
Aden Port
AREA CENTRE
HMS SHEBA
AREA EAST
Sirah Island
CRATER
Jebel Shamsan
AREA WEST
Ras Marshag.
ADEN AND SHEIKH OTHMAN. 1967.
Miles.
ADEN BRIGADE BOUNDARY
SECURITY AREA BOUNDARIES
CHECK POINTS
MILITARY CAMPS
BUILT UP AREAS

Formation of joint repair teams with the Corps of Royal Electrical and Mechanical Engineers (REME).

A growing major headache was the backlog of the repair of engineer plant. Apart from the damage caused by mines, sabotage and dissident attacks, plant throughout the Command had suffered the ravages of intense operational use. The terrain, heat, sand, salt and floods made working conditions very severe indeed.

I agreed, therefore, with Deputy Director Mechanical Engineering (DDME) that, with effect from 2 January 1967, a new system of repairs to C vehicles and Royal Engineer (RE) plant would be operated. All plant fitters of both CRE (Operations) and 10 Field Squadron (Airfields) were attached to 22 Engineer Equipment Workshop REME which became responsible for all echelons of repair. The Workshop provided joint forward repair teams at all major plant locations and the difficulties of back loading from 'up country' sites were avoided. This local expedient was very successful and brought the problem under control.

Hearts and Minds

As Chief Engineer I found that I served, in various ways, five masters, — the High Commissioner, the Commander in Chief, the GOC, the AOC and the Flag Officer Middle East. In addition I had to maintain close liaison with the Regional Director Ministry of Public Buildings and Works (MPBW) as the Royal Engineers had increasingly to act as his agent. The MPBW was responsible for "meeting the construction needs, including operational work, of the Armed Services". This became increasingly impossible where operations, dangerous environment, remoteness of work or shortness of time precluded MPBW staff from carrying out the work.

Work for the High Commissioner was the implementation of his policy to win the 'hearts and minds' of the tribesmen in the Federation. From the time the Independent Troop had constructed and improved roads in 1958 the Sappers had continuously carried out work that would benefit the local people.

Sappers from succeeding Squadrons and the Specialist Teams had drilled and deepened wells, built roads, installed piped water supplies, constructed water storage tanks, blasted and deepened irrigation channels, built culverts to carry irrigation water under roads, constructed a new main drainage system in a township, set up workshops for the Agricultural Department and even surveyed, designed and built a new souq.

Road from Habilayn to the Wadi Taym

In 1966 a major hearts and minds project was the construction of a road from Habilayn to the Dhanabah Basin and the Wadi Taym. This area had been the centre of the Radfan revolt two years earlier. Traditionally, the tribes had lived by raiding and, in particular, they levied protection money on convoys, both military and civil, which passed through their tribal area on their way north to Dhala. They did this despite the fact that the Wadi Taym, around and in which they lived, was one of the largest and most fertile valleys. What it lacked was a motorable road along which produce could be carried to the markets of Lahej and Aden. It was the hope of the High Commissioner that the construction of such a road might induce the Radfanis to develop their valley and learn to live on the produce grown there. Such a road would also enable the quick return of troops to the Radfan in the event of further trouble.

Accordingly, the Colonial Office authorized, through the Federal Government, the sum of £60,000 for expenditure on the employment of civil labour and materials.

A detailed reconnaissance of a route, generally following the tracks constructed earlier by 3 Field Squadron through the Wadi Lossum, was carried out by 73 Field Squadron in September/October 1965. Based on this a number of culverts and drifts was constructed by a Troop of 3 Field Squadron which returned to Aden from November 1965 to May 1966. This work was continued by a Troop of 48 Field Squadron until July 1966 when an increase in dissident attacks and the problem of guarding working sites forced a withdrawal from the project until further resources could be made available.

The impending withdrawal from the Federation and Aden put further progress in doubt but, in September, the High Commission instructed that the project should continue.

30 Field Squadron (Major M P C Nottingham) arrived from BAOR in October on a six months tour and was tasked with the project. It moved into the enlarged Habilayn Camp supported by a detachment from 63 Middle East Land Forces (MELF) Park Squadron, a tipper troop from Royal Corps of Transport (RCT) and a section of Royal Pioneer Corps (RPC).

To ensure that the Squadron had a clear and comprehensive technical brief Major M G Hunter, my SORE2 (Airfields), a qualified civil engineer, carried out a detailed reconnaissance. His report formed the basis of the work carried out by the Squadron and its early availability ensured that the Squadron lost no time in planning the execution of the work.

The Squadron Commander appointed Captain R J C Meston as his Project Officer. It was fortunate that he, too, was a professional civil engineer and all the detailed designing of the reinforced concrete work, retaining walls etc was carried out at Habilayn.

From Habilayn the first three and a half miles of the route wound round the contours and followed a fairly undulating course parallel to and north of the Wadi Rabwa. It crossed several Wadis, including some quite wide ones.

The next mile and a half was through a cultivated part of the Wadi Rabwa. It had been hoped to obtain a route through the cultivation well above the river bed. However, it would have been difficult to persuade the owners to give up good fertile land and the Political Officer considered the route must follow the river bed despite its vulnerability to flood damage. The river bed was therefore followed until the wadi became a gorge and was too narrow and congested with large boulders and rock outcrops.

The gorge section was about a half mile long and the road was obtained by blasting a rock ledge and the construction of four large culverts.

From the gorge the route crossed the Wadi Lossum and then climbed up the wadi to the Dhanabah Basin following the track constructed by 3 Field Squadron in the Radfan Campaign of 1964. Here the route was again a side cut in the hillside and included the crossing of the wadi twice more.

From the entrance to the Dhanabah Basin to the top of the Wadi Taym escarpment the route rose steadily across a sloping plateau.

The 1964 jeep track down the escarpment was very steep with a slope of up to one in three-and-a-half. It was, therefore, unacceptable for commercial vehicles. A maximum slope of one in eight was set for the new road and, on a new alignment involving considerable blasting, a slope of one in ten was achieved. This part of the route included the largest retaining wall the Sappers constructed in the Radfan.

The whole route was about eight miles long and undoubtedly the most difficult part was the section around the gorge. The Squadron, therefore, started this at the same time as the Habilayn end.

Adequate plant was convoyed into the gorge area on a one time basis and thereafter was laagered there at night guarded by Federal Guards. Because of the mine risk in transporting working parties by road, they were taken in daily by helicopters of the Army Air Corps (AAC) and Royal Air Force (RAF).

Helicopters were in great demand in the Federation so this means of transport could be used for only a limited period. As soon as possible the Squadron used road transport and, to reduce the mine risk, surface dressed the section from Habilayn as it was constructed.

The Federal Guard provided the protection for the working parties and the plant laagers and this was as effective as possible in the very difficult conditions. Despite this there were constant attacks by the dissidents who had little interest that the road was for the benefit of the Federation and not the British military.

The attacks took the form of:

- mining by night, with anti tank and anti personnel mines, the alignment of the road, the gravel pits, vehicle turn round points and construction tracks.
- ambushing working parties by day
- attacks on the plant laagers
- the demolition of culverts.

These attacks greatly aggravated the problems of construction and added to the work.

The task force had about seventy pieces of plant on the project and about twenty tippers. In the six months the Squadron was employed, mines and dissident attacks accounted for two compressors, five ten ton tippers and a three ton lorry written off and a light wheeled tractor and a Saracen beyond repair.

The Squadron was extremely lucky in that on the occasion their camp at Habilayn was mortared the bombs landed in open areas between tents and not within the protective walls of the tents.

Despite all the problems the Squadron successfully achieved its target dates and, as it neared the end of its tour, little work remained outstanding. It was disappointing, therefore, that, in the last few days of March and early April, South Arabia was struck by rainstorms of a severity never before recorded and certainly in excess of those previously experienced in the Radfan in August and September.

Some sections of the road were washed away, particularly where it was known to be vulnerable. Nevertheless, the engineering in general had been

sound, most of the bunds and river training had worked, and the damage was less than might have been expected.

MELF Air Troop RE

I have mentioned the great demand for helicopters in moving to and around the Federation. On 19 October 1966 the MELF Air Troop RE was formed from the Air Troop 1 Royal Tank Regiment (RTR). It was commanded by Captain M G Little RE but the other two pilots were from the RTR and Royal Artillery (RA). The ground crew element was provided by the Royal Engineers.

The Troop was equipped with three Sioux Mk 1 helicopters and 3 Wing AAC exercised technical command and control and responsibility for other aviation matters such as flight safety.

Its initial term of reference was to support CRE (Ops) but, to obtain maximum efficiency in the use of helicopters in the Command, the CO of 3 Wing AAC formed a combined tasking cell to include the operation of the Wessex helicopters of the RAF and the Scouts and Sioux of the Army. Helicopters were then allocated by size and type appropriate to the individual need. However, as it happened, most of the RE Air Troop's sorties were on Sapper recces and liaison.

The Troop was the first Sapper Unit to be deployed to the Gulf. This took place at the end of November/beginning of December 1966. It was based with the RAF at Sharjah and its role was to support the Trucial Oman Scouts.

10 Field Squadron (Airfields) 1966-7

By September 1966 a more flexible use of Sappers was dictated by operational necessity. With the agreement of the Air Officer Commanding (AOC), 10 Field Squadron (Airfields) was released from his operational control, and support for the RAF was drawn from the overall RE resources in the Command. This enabled the Squadron to take over, as part of its responsibilities, support of the Aden Brigade when 20 Field Squadron returned to the UK.

Tasks in Aden became an increasing commitment due mainly to the increased dissident mortar and rocket launcher attacks, particularly those directed at the check points where additional security precautions had to be effected at short notice.

The Squadron continued to support Aden Brigade until 21 April 1967 when the situation became such that a complete Squadron was required. This then became the responsibility of 60 Field Squadron (Major F G Barton) which had recently arrived to relieve 48 Field Squadron in Little Aden. On taking over responsibility for the support of Aden Brigade 60 Field Squadron moved into Normandy Lines near Khormaksar and came under my direct command.

During the period that 10 Field Squadron provided support to Aden Brigade it continued to be committed to support of the RAF, mainly in acting as the agent of the MPBW.

On withdrawal of the RAF from Lusaka and Ndola in Zambia a detachment of the Squadron dismantled, for shipping back to Aden, the huts no longer required.

Storms heavily damaged the jetty at Raisute on the Oman coast and disrupted the road between Raisute and Salalah, one of the RAF route stations. MPBW asked for Sapper help and a troop of the Squadron was sent to carry out the work.

At Masirah, an island off the coast of Oman, the RAF had an important route airfield. Here the Squadron constructed a bulk fuel installation. Another interesting job on this airfield was the installation of a Rotary Hydraulic Arrester Gear. This had to be completed at short notice in connection with the flights of Lightning aircraft to the Far East. The permanent installation was quite sophisticated and involved heavily reinforced concrete anchorages. It was impracticable for the MPBW to complete these in the time allowed and the Squadron installed the gear with 'operational' anchorages.

To assist in enforcing sanctions against Rhodesia the RAF patrolled the Beira Straits. To do this it was necessary to establish airfield facilities at Majunga in Malagasy (previously Madagascar). Extensions were required to the existing airfield and additional buildings were needed. The MPBW had no resident staff in Malagasy and the urgency of the work necessitated immediate action. The Squadron therefore completed the work and continued to provide maintenance tradesmen.

By March the Squadron had two troops committed on airfield construction in the Trucial States and Muscat and Oman. With the increased commitment in the Gulf and the fading out of the Beverley it was necessary to build and and improve several airfields to take Argosies or Andovers. The majority of these airfields were in remote locations and this made it very difficult to execute the work by local labour. The Squadron therefore acted as agents for the MPBW. The Squadron had considerable difficulties in getting plant to these remote sites.

The situation became aggravated with the passing of the Beverley as only certain items of the plant held would go into the Argosy.

On 8 May 1967 Major P W Hutchings took over from Major Wheatley as OC 10 Field Squadron (Airfields).

Major Wheatley's outstanding work in support of the RAF throughout the Command was recognised in the award of the MBE.

Expedition to Socotra

In March 1967 a most interesting scientific expedition to Socotra Island in the Arabian Sea was mounted from Aden. The expedition comprised 25 members from the Royal Navy, the Army and Royal Air Force, 11 civilian scientists and four soldiers of the Hadrami Bedouin Legion. Its purpose, in general terms, was to continue the work begun by the 1964/65 Services expedition to Socotra and, in particular, to make selective scientific study of the island and its people. The timing and duration of the expedition (17 March to 1 June 1967) was determined by the need to complete the expedition's work between the north-east and south-west monsoon periods and, in view of the situation in Aden and the imminence of South Arabia's independence, the desirability of carrying out the expedition while it was politically possible to do so.

A diverse number of surveys, studies and projects was undertaken by the expedition. In broad terms these were: Survey, Arabic Studies, Archaeology, Botany, Entomology, Geology, Linguistics, Meteorology, and Social and Medical.

The Sapper members of the Expedition were concerned mainly with Survey. This comprised projects by two organizations — a Military Survey Team and No1 Beach Survey Team. The Military Survey Team, — Corporal C R Osborn, Lance Corporal W E Mathew, and Lance Corporal F M Forster — were from 13 Field Survey Squadron. Their task was to establish a second order planemetric control of the eastern half of Socotra and the 'tie-in' of the survey work of the western half of the island, previously completed by the 1964/65 Expedition. In conjunction with this, a complete glossary of Socotra place names was to be made and authenticated.

The terrain and climate made their task most formidable and the outstanding way in which they successfully completed it was recognised in each being awarded a Commander in Chief's Commendation.

The Beach Survey Team was required to undertake surveying of the shore and the offshore areas. During the course of this surveying rough weather caused a member of the team to be flung into the sea where he was severely injured by the boat propeller. The accident happened off a remote part of the island and Major R Emery RE, the second in command of the Team, and Corporal P B Paskell RE made a dangerous passage by sea to collect the Expedition's medical officer. Their courage was recognized by the award of Queen's Commendations for Brave Conduct.

Deployment Camps in Bahrain

The decision to increase the Forces in the Persian Gulf, announced in the White Paper in February 1966, led to the MPBW being given the task of constructing an appreciable amount of additional accommodation very quickly. It was considered impossible within the required time to carry out all the work by contract even though normal procedures were short circuited. MPBW, therefore, asked for Royal Engineer assistance in the building of a new Army camp at Muharraq in Bahrain.

A small Sapper planning team was loaned to the Regional Director and planning started in April.

In May a troop of 20 Field Squadron was hastily deployed from Aden to Bahrain to start work on site. Its purpose was to build adequate accommodation for the main Royal Engineer construction force. This included the erection of twenty five Twynham huts which were to be part of the final camp.

During August the main construction force arrived in Bahrain. It comprised the CO (Lieut Colonel J N Holden) and part of RHQ 36 Engineer Regiment, 24 Field Squadron (Major M L Turner), an under-implemented 524 Specialist Team (Construction) (Major P R Ingram-Johnson), a composite Troop of 61 Field Park Squadron and two Sections of Pioneers from 23 Group RPC.

Lieut Colonel J N Holden became, for the duration of his tour, CRE Persian Gulf Project and was responsible to the Chief Resident Engineer MPBW for technical and financial control.

The main work in the project was the erection of Coseley, Marston and Twynham hutting. Good progress was made and by February the back of the work was broken. Lieut Colonel Holden returned to the UK on 31 January and reassumed command of 36 Engineer Regiment. The force was then reorganized into 24 Field Squadron, a half section of Pioneers and a detachment of 61 Field Park

Squadron. Major Ingram-Johnson and a Clerk of Works (E) were integrated into the Chief Resident Engineer's staff and the remainder of the force returned to the UK.

In February it was found unacceptable, on security grounds, for the MPBW to employ local civilians in the construction work in the Communications Centre at Juffair, Bahrain. 24 Field Squadron was therefore tasked with this work. It was not possible within the Command to meet the entire bill for tradesmen without prejudicing other urgent work and ten electricians were sent from the UK as emergency reinforcements.

The RE commitment on the Muharraq Camp was completed by the end of May 1967, ahead of schedule, and 24 Field Squadron and the detachment of 61 Field Park Squadron returned to the UK. The work in the Communications Centre at Juffair was taken over by 10 Field Squadron.

The storms in Aden, April 1967

Meanwhile, the storms which had struck the Radfan at the end of March arrived in Aden on 1 April. It was the highest rainfall ever recorded and subsequent floods were quite unbelievable for Aden. The situation was aggravated by the storms coinciding with a general strike called to demonstrate against a three man United Nations Mission that had arrived in Aden. (The Mission's purpose was "to recommend practical steps for implementing previous United Nations resolutions on South Arabia".)

The storms and flooding caused much damage to security lighting, public utilities, buildings and roads. Sapper support to deal with the chaos fell into four categories:

- Aden and 24 Brigades during and after the floods
- Public Utilities — water, electricity and sewage disposal
- PWD for roads
- MPBW

The immediate problem in supporting the Brigades was that much of the security lighting, including that at check points, was put out of action. Emergency lighting was installed in several places and many installations had to be rewired. To achieve this it was necessary to fly out ten extra electricians from the UK under a previously arranged emergency plan.

There was widespread pumping of floodwater and releasing of water damned by walls and buildings. Once the floods had subsided breaks in security fences and walls were made good. Rocks, debris and sand were removed from roads in the area to prevent mining and to facilitate movement. In the Crescent area alone some 2000 tons of debris were removed.

To assist the Sappers of 10 and 60 Field Squadrons it was necessary temporarily to divert a troop of 30 Field Squadron, some tippers and wheeled plant, from the Wadi Taym project.

Support to the Public Utilities was of a more specialisted nature. I exercised liaison with them through Lieut Colonel J A Robinson who had arrived in February. He had the dual function of SOREI and CRE (Construction) — an invaluable combination in the circumstances. For this emergency he had a team of three technical officers — my SO2 (Projects) dealt with water and the two E&MOs from 10 Field Squadron and 63 Field Park Squadron dealt with electricity and sewage disposal respectively.

Water supply was the least problem and consisted mainly of pumping out flooded installations and the building of sandbag and blockwork protection walls.

The main Aden power station was seriously flooded and some vital equipments were drowned. Only one steam turbine out of four could be kept going. Sapper fitters and electricians helped to dismantle, dry out, clean and reinstall these equipments. It was also necessary to provide continuous assistance in the pumping out of floodwater. Considerable debris was removed from the area to provide road access to the power station for the fuel tankers.

Much of Aden Municipality's sewage disposal system depended on pumping and several pumping stations were put out of action. Silt blocked long lengths of sewer pipes and debris covered manholes up to a depth of two feet. The Sewage Disposal Department was not functioning as all its members were on strike and the Sewage Engineer was unavailable. The Sappers took over responsibility for the rehabilitation of the system in Maalla, a civilian area almost entirely occupied by military families. This was a major effort but by the end of the strike the utility was in working order.

Similar conditions prevailed in the sewage disposal system of the Municipality of Sheik Othman but the security situation prevented action being taken immediately after the storm. The main outflow

station was flooded and the pump out of action. Sappers rehabilitated this as soon as time permitted and in addition over 1,000,000 gallons of floodwater were pumped from the ejector station near the main checkpoint and RE fitters rehabilitated the drowned equipment.

For security and other reasons it was vital that the causeway between Little Aden and Aden should always be available for rapid deployment of troops. Erosion from the heavy flooding caused undermining and collapse of one side of the road for about half a mile, causing grave danger of a major breach. The PWD were on strike and it was impossible to contact the Road Engineer. Sappers repaired the road sufficiently to maintain single line traffic, and a culvert was constructed under the road to release 8,000,000 gallons of water backed up against the road.

Serious erosion also took place on the road from Tarshyne to Gold Mohur and again emergency repairs were carried out.

The RE also met a large number of MPBW requests for Sapper tradesmen assistance to deal with electrical and plumbing repairs and pumping in military areas. In addition, three shifts were provided at Khormaksar Power Station and engine attendants were provided at the Steamer Point Power Station.

Wadi Taym Road — 39 Field Squadron

Returning to the Wadi Taym, in mid April, 30 Field Squadron was relieved by 39 Field Squadron (Major R G Bellam) from 25 Corps Engineer Regiment in Osnabrück on a six month's emergency tour. Its tasks were:

- To repair the storm damage and make the road from Habilayn to the Wadi Taym fit for Class 12 vehicles. The work to be completed by 22 June.
- To repair wadi crossings and renew washed out sections of the bituminous surfacing on the Dhala Road from Habilayn to Nawbat Dukayn to facilitate the withdrawal of British Troops from Habilayn.
- Raze to the ground the Sapper camp at Habilayn and move the Squadron from Habilayn to Little Aden by 30 June.
- Assist in the withdrawal of British Troops from Aden by packaging and disposal of RE stores and engineer plant during July and August.
- To complete Engineer security tasks in Aden State in July and August.

Despite a continued threat from dissidents, an ambush, a number of mining incidents, some blindicide attacks on engineer plant and further rainfalls between 1 and 5 May which washed away more of the Dhala Road, the work on the two roads was completed by 13 June. The High Speed Road Surfacing Unit again proved its worth and greatly contributed to the speed of completion.

Mines accounted for the write-off or damage to three ten ton tippers, a LWT, a DC4, a dump truck, two landrovers, a Saladin and the write-off of a Beverley aircraft on Habilayn airstrip.

On 30 May a troop with plant, REME fitters and RCT tippers moving in convoy along the Wadi Matlah were ambushed by a strong force of dissidents. Despite a steady return of fire the convoy remained pinned down. Lieutenant M J Conroy, the troop commander, although wounded, was able to signal details of the attack and give the location of the enemy. A section of Royal Marines was landed by helicopter on the dissident position and, together with some additional Saladins and Hunter strikes, the dissidents were driven away.

Sadly, Corporal D W Price and Lance Corporal V W Ince were killed and ten men were wounded. The Troop acquitted themselves very well and this was recognized by the award of a Military Cross to Lieutenant Conroy, a Military Medal to Sergeant I Scott, and CinC Commendations to Lance Corporal P A Robinson RE and Corporal Robson of REME.

The Corps was to suffer one more casualty in the Wadi Taym before withdrawal. A troop of 60 Field Squadron supported 39 Field Squadron for a short period and, on the 4 June, Sapper T F Alchin, a member of the troop, was killed by a booby trap placed in a stores tent.

The Rebellion in Aden

In May Sir Richard Turnbull was replaced by Sir Humphrey Trevelyan as High Commissioner. It was hoped that Sir Humphrey's previous association with Egypt would enable him to bring together the leaders of the nationalist movements and the Federation rulers to form a caretaker government to which power could be transferred and, hopefully, having the approval of Egypt and the Yemen.

Unfortunately, succeeding events made this impossible. Between June 3 and 9 the Six-Day War occurred between Egypt and Israel in which Egypt suffered an humiliating defeat. Nasser accused Britain of being involved. The Egyptian Air Force was almost destroyed and Nasser concocted the story that there had been a British aircraft carrier

off Aden. This further incited anti-British feeling among the Arab population and lowered morale in the South Arabian Army (SAA) — the new name for the FRA from 1 June. The selection of an Aulaqui Colonel to succeed the British Commander of the SAA and the suspension of four other Colonels caused considerable dissension. Rumours were rife and these, together with misunderstandings, had most tragic consequences.

On 20 June the police in the South Arabian Armed Police Camp, just north of Khormaksar airfield, mutinied and shot at passing trucks. Eight members of the RCT and a British employee of PWD were killed and eight RCT were wounded. The mutineers then opened fire on the nearby Radfan Camp, which housed a British battalion, killing an officer. The Federal authorities asked for British help to suppress the mutiny and the 'standby' Company was sent from Radfan Camp. Before it was able to debus it was shot up losing one killed and eight wounded but it managed to restore order in the camp.

Meanwhile, the unrest had spread further and a rumour reached the Armed Police Barracks in Crater that British Troops had attacked Champion Lines and were on their way to attack the Armed Police in Crater. Patrols of 1 Royal Northumberland Fusileers (RNF) and the advance party of the Argyll and Sutherland Highlanders (A&SH) were ambushed and, by the end of the day, the total British casualties had mounted to twenty three officers and men killed and thirty one wounded.

The political situation was very sensitive and it was decided to surrender Crater to the terrorists and mutineers for the time being. In the Federation there were still about a hundred British personnel and these included members of the STRE and Sapper tradesmen. They all depended for their safety on the Federal Forces, and if the security situation deteriorated throughout the Federation, reprisals would almost certainly have been taken against them. It was essential, therefore, that there should be no direct clash between the British Army and the Federal Forces and that the situation should be allowed to cool before Crater was re-entered. The possibility of not reoccupying Crater was considered but was rejected primarily because Khormaksar Airfield was within mortar range of Crater.

On the night of 4 July, 2 Troop of 60 Field Squadron supported the A&SH in their re-entry, carrying out mine and booby trap sweeps and the erection of roadblocks and strongpoints.

Before the rebellion the British battalions in Aden Brigade lived in their barracks and patrolled from them. After the re-entry the troops occupied requisitioned buildings in Crater and Sheik Othman. A considerable amount of work was required and 60 Field Squadron provided essential services and security installations and construction. MPBW provided the stores where necessary.

Withdrawal of 523 Specialist Team (Construction) from the Federation

In January 1967 the Regional Director MPBW proposed that wef 1 April 1967 the responsibility for works in all military camps, including British Camps, in the Federation should be transferred to the Federal Government and that 523 STRE (now commanded by Major D F Morgan) should be agents of PWD.

At that time the STRE was acting as agent for the MPBW for all new work and maintenance in British Camps, the maintenance of airstrips and the minor new work and maintenance for the SAA. The latter was on repayment through MPBW. It also carried out works services at Mansoura Detention Centre in Aden where the security situation prevented the MPBW from operating.

The STRE also acted directly, (ie independent of MPBW), as the PWD agents for the construction of five major projects — the construction of permanent barracks for the SAA battalions at Ataq, Beihan, Mukeiras, Dhala and Habilayn. This included design, preparation and letting of contracts, supervision, financial control and the provision of stores.

It was eminently sensible for the STRE to deal direct with the PWD for all work required for the SAA and this was implemented on 1 April. However, the OC STRE continued to act as Area Officer MPBW for work for the British Forces as there was no point in putting another link in the chain of control.

Work became increasingly difficult to execute. The Team was anxious to complete the new barracks for the SAA as quickly as possible and at the same time ensure that the civilians employed would be capable of taking over the work on withdrawal. Work was held up many times due to labour trouble. Strikes in Aden usually resulted in sympathy strikes up country, especially in Dhala. Great difficulty was experienced in getting stores transported from Aden to the respective work sites. Many of the lorries were held to ransom or shot up. On one occasion a vehicle despatched

from Aden failed to arrive in Habilayn sixty nine miles away. In another incident two Somali employees in a mine plated landrover were held up and the vehicle taken from them at gunpoint.

The STRE also encountered the rising anti-British feeling, particularly following the Egyptian-Israeli six day war. On 11 June there was a demonstration in Ataq camp by local nationalists, including the SAA, during which the building in which the British element was located was stoned. On 21 June, as a result of disturbances in Dhala town and the SAA camp, the STRE detachment, together with all other British personnel in the area, was withdrawn.

This set the scene for the next three months. With the exception of Beihan, all the up country stations were evacuated at short notice.

Following the withdrawal from Dhala the Garrison Engineer was unable to visit again until late July. Thereafter he made two more flying visits and handed the project to the PWD in early August.

At Habilayn, following the main British withdrawal from the Radfan on 27 June, the STRE detachment was reduced from ten to four personnel; those remaining being absolutely necessary to maintain essential services and complete the training of local nationals to look after the electrical services, the running of the generators and the wells.

The interim period was not without incident. One of the wells was attacked and put out of action.

On 3 July the 1000 gallon tar distributor struck a mine whilst spraying the airstrip. The explosion blasted an Arab operator to the ground and blew Corporal J Burnett of the STRE forcibly against the towing vehicle. The oil distributor was split open and blazing, endangering the unconscious Arab operator. Corporal Burnett dragged the operator clear and supervised the release of the three ton towing vehicle preventing its destruction. Corporal Burnett's bravery was recognised by a Queen's Commendation.

On 21 August the Clerk of Works, WO1 A Hume, was withdrawn as an emergency after receiving a threatening letter signed by "The Court of the Radfan". Fortunately, the plot to shoot him was discovered.

The detachment at Beihan, Mukeiras and Ataq were withdrawn on 14 August, 26 August and 5 September respectively. The Federation Area was formally handed to the PWD on 15 September. I have nothing but praise for the way the Garrison Engineers, Clerks of Works and a handful of key Sapper tradesmen worked in these isolated stations. They were under constant threat of attack from dissidents and never really knew how much confidence they could place in the South Arabian troops on whom they relied for protection.

On return to Aden the members of the Specialist Team, commanded by Major R F H Cole from 23 July, were attached to MPBW in preparation for a Military Works Area.

Planning towards a Military Works Area

It was appreciated at a very early stage that Sappers would be required to support the Public Utilities and the MPBW in the event of strikes or other emergencies and it was accepted that this might require more tradesmen than would be available in the Command. Accordingly, an Operation was set up to earmark technicians and tradesmen that could be flown in at short notice.

In February 1967 there was, in Aden, a political general strike in which the Public Utilities were a major target. At that time it was possible to meet, from local resources, the fairly wide range of requests. This included providing shifts in the MPBW power station at Khormaksar to fill the gaps in absentee Arab labour. From a political viewpoint the strike was considered to be a failure but it did bring out very clearly to the Staff the vulnerability of the various utilities.

A Committee was set up to coordinate planning and support for the Utilities in time of emergency. It included representatives from the MPBW, all the Aden State Utilities and the three Services. As Chief Engineer, I chaired it and Lieut Colonel Robinson was invaluable in coordinating its work, codifying technical details of all the installations and arranging for selected Sappers to familiarize themselves with them.

In April the storms and subsequent flooding combined with the general strike demonstrated further the necessity for the Sappers to have the ability to step in and maintain essential services when civilian organisations were unable to do so.

Perhaps this event also demonstrated to the dissident organisations how the disruption of essential services exposed the general public and themselves to hardship. Certainly, thereafter there were no deliberate attempts to sabotage the water, electricity or sewage services. Nevertheless, support to the Public Utilities remained under constant review and a very large number of technicians and tradesmen from Germany and the UK continued to be earmarked until final withdrawal.

Support to the MPBW was in a different category. It was responsible for "meeting the construction needs, including operational works, of the Armed Services". I felt experience had shown that a very real problem would face the MPBW if the later stages of the withdrawal took place in operational conditions presenting considerable danger to its civilian staff. It would be unacceptable in such conditions for pockets of RE to work under civilian supervision without a military chain of command.

The publication in February 1967 of a Ministry of Defence letter setting out the conditions in which a "Military Works Area" could be adopted appeared to provide the answer.

Initially, there was relutance to accept that this would be necessary. However, by the end of June the implementation of a Military Works Area effective from 15 November was accepted. This required a reinforcement of some technicians and tradesmen. As the power house at Khormaksar contained some rather old and temperamental generating sets, it was agreed that a few key MPBW staff should remain to supervise power generation and distribution.

Visits of TAVR

Our problems provided valuable experience for the TAVR. Colonel Harrison, the Commander of the Sapper Logistic Units in the Army Volunteer Reserve (AVR), paid a visit and this was followed by two week visits of the OC's of most of the Specialist Teams who were able to study, under operational conditions, the sort of jobs that they may have been called on to do.

Valuable experience was also gained by the AVR Petroleum Specialist Team and the Well Drilling Team who spent their two weeks camp in Aden and the Federation.

Project *Forsdale*

Project *Forsdale* was MEXE's tropical testing station in Aden. Its main task was to test various components of the Limited War POL (Petroleum, Oil and Lubricants) System from the tanker to the fuel tank of an aircraft on an airfield up to 25 miles inland. It started testing in February 1965 and completed tests at the end of March 1967 when the installation was dismantled prior to withdrawal.

Packaging and Disposal of Engineer Stores, Plant and Equipment

63 (MELF) Park Squadron (Major M C Arber) started shipping surplus stores back to the UK early in 1967. An important task was the sorting and running down of the large quantity of stores that had been dumped in Little Aden (the dump became known as Steptoe's Yard) when the RE organisation in Kenya was closed down.

When Lieut Colonel J W Reed relieved Lieut Colonel P C Shapland as CRE (Ops) in May 1967 the packaging and disposal of stores, plant and equipment became his main commitment.

39 Field Squadron moved from Habilayn to Little Aden in June. One troop had to continue to support 24 Brigade in its internal security duties but the other two troops were fully employed on withdrawal tasks. One of these assisted 63 (MELF) Park Squadron and the other carried out several tasks such as dismantling and packaging Twynham huts and removal of about 130 three ton and five ton air conditioning units, all for use in the Gulf.

The Field Park Well Drilling Troop was withdrawn from Beihan on 11 August.

All holdings of RE Stores and the Engineer pool of plant and C vehicles were cleared from Little Aden by the end of August and 39 Field Squadron flew back to Germany having completed a very successful tour.

At the same time 63 (MELF) Park Squadron moved from Little Aden to Normandy Lines in Aden where it ran down to a composite Troop that was required in Aden until withdrawal. The Squadron had carried out a quite remarkable job in evacuating its holdings and clearing its books to the entire satisfaction of the Command Secretary.

The last of the British Garrison in Little Aden withdrew on 13 September and an impressive ceremony took place handing the Cantonment to the SAA.

Build-up in the Gulf

The Sapper organization to be built up in the Persian Gulf Command was a CRE in the Headquarters commanding a Field Squadron with airfield construction capability and a Field Park Squadron on a special theatre establishment. Both Squadrons were designed to be strong in tradesmen and the Field Squadron had an inbuilt technical supervisory staff.

On 1 June 1967 10 Field Squadron (Airfields) changed to 10 Field Squadron (Gulf) establishment and was due, in September, to withdraw to various stations in the Gulf. It already had small detachments on various tasks at Fujaira, Bahrain, and Sharjah. However, the situation in September was such that it was necessary to retain Squadron

HQ, one Field Troop and workshops and plant elements in Aden until final withdrawal.

63 (Gulf) Park Squadron (Major J French) started forming in Anzio Camp, Little Aden on 1 July 1967 and, in under-implemented form, moved to Sharjah towards the end of August. Its build-up was completed when the composite Park Troop finally withdrew from Aden and moved to Sharjah. Lieutenent Colonel Reed, having completed the evacuation of all Sapper material from Little Aden and the rundown of his organization, moved to Sharjah in early September and assumed his new appointment of CRE Land Forces Persian Gulf.

To serve the forces in the Gulf the strength of the Postal staff was increased and a Deputy Assistant Director Postal & Courier Communications (DADPCC) (Major E J M Worthington) was established in Headquarters Land Forces Persian Gulf (HQ LFPG). Field Post Offices were located at Bahrain, Sharjah, Masirah and in HMS *Juffair*.

Aden port and POL Supplies

The general strike following the six day Egyptian-Israeli war in June had two serious inter-related effects on the Services that lasted to final withdrawal.

The first effect was that the working of Aden port was paralysed. It was essential both for the Services and civil community that supplies continued to come into Aden and it was vital that the evacuation of military stores and equipment should not be interrupted. The port was, therefore, taken over by the Services on 19 June and a Military Port organization was set up. It consisted of a Headquarters, headed by a Port Commandant and controlled by Colonel G W Shepherd (late RE), the Commander RCT at HQ Middle East Command (MEC). Under him, the staff work was carried out by the Joint Services Port Unit and the port was operated by 57 Port Squadron RCT and 518 Company of the RPC. This organization ran Aden docks right up to withdrawal.

Prior to the Egyptian-Israeli war all fuel for the Services was obtained from the Combined Petroleum Company (CPC) at Little Aden. This was a petroleum marketing organization getting its products mainly from the BP refinery in Little Aden. Fuels for Service use were collected and distributed by road tankers under the direction of the RAF. Dieso for the MPBW power station at Khormaksar was the only product supplied by direct pipeline.

During the Egyptian-Israeli war and subsequently, the Arabs in the refinery and the CPC refused to supply fuel to any British ship or organization and the normal fuel supply to the Services ceased on 6 June 1967, except for the dieso which was supplied in the pipeline at intervals.

It was necessary, therefore, to bring fuel into Aden by sea tanker. This presented the problem of unloading and, on 22 June, Major W F Howard Jones, the OC of 516 Specialist Team (POL), arrived in Aden to advise on a bulk fuel jetty installation at Obstruction Pier, south of Khormaksar, to discharge into road tankers from dracones or barges.

516 STRE (POL), together with the necessary stores and equipment to set up an installation, arrived on 8 July. With the help of a small working party from 10 Field Squadron, and by working very long hours, the installation was ready for use on 10 July. It provided for the unloading of two products at the same time each with the facility of two road tanker filler points. Approximately a million gallons of fuel a month were discharged through the installation and the maintenance of a correct balance between the various types of fuel required careful calculation.

Initially, two British Petroleum (BP) barges were used to carry the fuels from the sea-going tankers to the jetty installation and there was considerable reluctance to use dracones. However, Major H D Vernon Betts, the Technical Staff Officer Grade 2 (TSO2) at the Royal School of Military Engineering (RSME), flew out and overcame the mistrust of the Chairman of the Petroleum Supplies Committee. Four 'D' type Dracones were flown out. The first was rigged by 516 STRE and the other three by 473 Lighterage Troop RCT who became responsible for operating them.

These were not the only difficulties with fuel. The dissidents appreciated the value of sabotaging oil supplies and made several attacks on the storage tanks and pipelines. To sabotage the tanks explosive charges were fixed at the outflow valve ensuring that, when successful, the holed tank emptied its complete contents. One sabotaged tank was adjacent to the main Khormaksar-Steamer Point road which was flooded with the fuel. Vehicles had to stop, cool down and then be towed through the fuel by a light wheeled tractor (LWT) to obviate the danger of ignition from hot exhaust pipes. Fortunately, for this purpose, the LWT had a high level exhaust pipe.

In early August the airfield at Khormaksar was mortared by an 81mm weapon and serious doubt was cast on the feasibility of the final forces evacuating by air. Consequently, it was decided to

increase the shipping capacity of Obstruction Pier and Slave Island near Khormaksar. This decision came within three weeks of the total Sapper force being cut by nearly 50 per cent and just before most of the plant was due to be shipped. A landing hard was built at Slave Island, Obstruction Pier was widened and existing hards, slipways and access routes were extended. The completion before resources were reduced was a close run thing.

The possibility of the construction of exits over the beach was examined and it was decided that this would be done, up to high water mark, by the Sappers (detachments of 59 Field Squadron) in the Amphibious Force if required.

Employment of 60 Field Squadron in Aden, April-September 1967

From the time 60 Field Squadron moved from Little Aden to Normandy Lines near Khormaksar in April it was entirely employed in Aden except for a three weeks spell when it was necessary to send 1 Troop to assist 39 Field Squadron on the Wadi Taym road and at Dhala.

Terrorism in Aden had increased rapidly and by June there were more incidents in the month (over 500) than there had been in the whole of 1966. By July there were seven battalions operating within Aden State and the equivalent of an eighth supplied by an independent Infantry Company, two RA Batteries and a Squadron of 5 Royal Tank Regiment (RTR) acting as infantry.

Aden Brigade was deployed into four security areas. Major Barton affiliated each of his troops to one or more battalions allotted to the security areas. This enabled the Troop Commanders to know and be known by their battalions and to know their areas well — factors that were essential in the internal security situation. The OC, of course, reserved the right to employ troops elsewhere on tasks of higher priority or tasks, in the port area, related to evacuation.

Much of the work was construction and electrical installations and, to assist the OC with the technical management, two Clerks of Works, one E and one C, were attached to the Squadron. Many new roadblocks and strong points were required, fields of fire had to be cleared, windows and doors had to be closed with breeze blocks, weapon slits had to be cut in buildings and many buildings had to be protected against blindicide, grenade and small arms fire.

Blindicide attacks were proving to be particularly effective and the Squadron experimented and confirmed that a chain link fence suspended like a curtain in front of a wall gave considerable protection. This was installed on several buildings and strong points.

Particular initiative was shown in protecting an observation post in the tower of the Police Station in Sheik Othman. A prefabricated framework of tubular scaffolding, about 100 feet across, with a skirt of suspended chain link fencing and weighing about 1000lbs, was lowered into place by an AAC helicopter.

XPM anti-grenade screens were installed on many buildings and to prevent grenade throwers from escaping into small side roads and passages these were walled up. Living accommodation near perimeter fences was also walled up for protection.

To give some measure of protection to tractor operators rapidly removable cages were fitted to the machines.

The evacuation of all Service families in May, June and the beginning of July left vacant some 1700 rented flats and 1400 married quarters. Most of the flats were in Maalla Straight and these had to be occupied by troops to ensure that this vital route was kept open. The 'get you in' work for the battalions and the security measures that had to be taken were major tasks for 1 Troop.

I have already referred to 2 Troop's support to 1st A&SH in their re-entry into Crater. Apart from the 'get you in' plumbing and electrical work, sangars had to be constructed and other defence works carried out.

In May the 1st Battalion Parachute Regiment (1 Para) took over from the 3rd Battalion The Royal Anglian Regiment the twin hot spots of Sheik Othman and Al Mansoura. Sheik Othman, the ramshackle township on the Aden State border through which ran the main route to the hinterland, was probably the most notorious trouble spot in Aden. The dissidents very much wanted to gain control of this town and here, and in Al Mansoura, there was open warfare with small arms fire, rockets, mortars, grenades and mines on a scale not met anywhere else in Aden.

The plan for withdrawal from Sheik Othman and Al Mansoura was to move back to a previously prepared defensive line across the Isthmus north of Khormaksar. It was a line of trenches, gun positions, roadblocks and Observation Posts (OPs) and was known as the Pennine Chain. According to 1 Para the task required 216,000 sandbags. For security reasons work was not started until 18 September and the Battalion, assisted by

3 Troop; completed the construction of the line by 21 September.

Sheik Othman and Al Mansoura were handed over to the SAA on the 23rd and the Pennine Chain was manned until final withdrawal. This was necessary, not only to control the three roads leading into Aden from the north, but also to keep Khormaksar Airfield out of 81mm rocket range.

At the beginning of September, 1 Troop carried out a rather symbolic task. A statue of Queen Victoria had stood in Scott Gardens in the centre of Aden's Crescent shopping centre since 1911. The High Commissioner was concerned that on Independence it might be damaged as an act of prestige. He therefore instructed that it should be moved to the site of the future British Embassy at the bottom of Command Hill. There were several unknowns in planning the task which had to be carried out at night for security reasons. With the aid of a six ton bridging crane and oxyacetylene cutting plant the statue was removed. The removal of the marble slabs supporting the plinth required a great deal of careful and painstaking work as they were weathered and brittle. The whole operation took about two weeks and the re-erected and cleaned marble statue was unveiled on its new site on 20 September.

To give a finishing touch the RSME was able to cast a replica of the original laurel wreath which had been broken for some time.

It had been intended that 50 Field Squadron should return to Aden at the end of September to relieve 60 Field Squadron. However, in the event, one troop of 50 Field Squadron changed with a troop of 60 Field Squadron on 23 September and the remainder of 50 Field Squadron was held on call. 60 Field Squadron therefore left equipments, vehicles and plant with 10 Field Squadron for use and in reserve in case the rest of 50 Field Squadron had to be called out.

The rest of 60 Field Squadron returned to the UK on 10 and 12 October having handed over the Aden Brigade support role to 10 Field Squadron (Airfields) on 6 October. The troop of 50 Field Squadron, under command of 10 Field Squadron, remained in Aden until final withdrawal.

It had been a tough and dangerous tour for 60 Field Squadron but a very successful one.

The Military Works Area and final withdrawal

Lieut Colonel R M Hutton arrived at the end of August and assumed the appointment of CRE (Ops) on 1 September. Lieut Colonel J A Robinson handed over his responsibilities as CRE (Works) to Lieut Colonel Hutton and left about mid September.

Clearly the time had come to disband the Chief Engineer and his staff. All forces had withdrawn into the Aden perimeter, CRE LFPG was established in the Gulf, Lieut Colonel Hutton was in post as CRE (Ops) and preparations had been made for the implementation of a Military Works Area. I, therefore, left Aden on 25 September and relinquished my appointment two weeks later in the Gulf. Lieut Colonel Hutton became CRE (Ops) MEC and retained Major J L Booth and Major H R Tudor as his GSORE2 and SORE2 respectively.

The CRE's tasks were to:

- Provide support for Aden Brigade
- Operate a Military Works Area
- Cover the Public Utilities and, if necessary, take steps to run them.

His forward planning of Sapper resources was complicated by the uncertainty over the date for withdrawal. When I left Aden the date for Independence was still 9 January 1968. However, the political situation was very confused. All South Arabian Ministers had left the country and government was being carried on, as well as possible, by officials of the High Commissioner's staff. During October the traditional leadership of nearly all the States in the Federation was replaced by revolutionary councils of either the NLF or FLOSY. These two organizations met in Cairo at the end of October but failed to reach a compromise. This was followed at the beginning of November by a fierce battle between the two factions in Sheik Othman. There was no hope of conciliation and the Arab Army was unable to control it. The breakthrough came on 7 November when the Arab Army declared for the NLF. From then on negotiations were conducted with NLF leaders for the handover of power.

During October it appeared possible that Independence Day (I Day) would be between 20 November and 1 December. This was confirmed on 2 November when the Foreign Secretary said that Independence would be granted during the second half of November. On 15 November this was defined as 20 November and withdrawal day (W Day) was later brought forward by one day to meet legal objections to its coinciding with Independence Day.

With this as the background it was decided that the implementation of the Military Works Area should be brought forward by a month to 15 October.

The main tasks of the Military Works Area were the essential maintenance of buildings and services of all Service property in Aden and the operation of static installations (Cold stores, pump houses etc). A work load of some size was the removal of installed equipments including over 250 airconditioning units.

The organization was based on 523 STRE personnel enlarged by attachments of individual officers, Clerks of Works, and tradesmen from 10 Field Squadron, the Troops of 50 Field Squadron and 63 Park Squadron. Emergency reinforcements of electricians and engineer fitters were obtained from the UK to work in the MPBW power station at Khormaksar. The total military strength of 102 comprised six officers, 14 Warrant Officers and Sergeants (including ten Clerks of Works) and 82 rank and file tradesmen.

137 civilians were taken over from the MPBW but this gradually reduced as areas were vacated and handed to the PWD. Most civilians were keen to work and did so. However, to achieve more output and to cover the contingency of the non-availability of civilian labour, two sections of RPC were employed for some weeks.

To fulfil his responsibilities in the event of a breakdown in the operation of the Public Utilities the CRE kept regular contact with the civilian heads of the Water and Electricity Departments and the PWD.

The plan (Operation *Differ*) to bring out 241 all ranks of all Services in the event of a total breakdown of Utilities still operated but physical emergency steps were also implemented. Extra standby generators were given to the PWD to improve the reserve pumping capacity at the main wells. Arrangements were made to be able to import fresh water from ships. Spare mobile generators were retained for power supply to some vital communication and pumping installations. Mobile drainage pumping sets and sullage bowsers were kept available until withdrawal.

In the event no major breakdown of Utilities occurred. Security incidents, however, often caused a local breakdown of electricity supply as insulators and overhead lines often were targets. When this occurred in Sheik Othman in the interfactional fighting the supply to the main well was cut. Pumping was then only possible on a reduced basis of 25 per cent of the normal rate and water rationing had to be enforced on civilian and military areas. During the final fight in Sheik Othman between 2-7 November full water supply was impossible for a week and stocks fell to ten per cent of the normal. Water rationing was imposed for two weeks but not severely.

Towards W day responsibility grew less as areas were handed over to the SAA. At this stage sufficient services were provided for military camps without dependence upon the Public Utilities for electricity or water.

Meanwhile 10 Field Squadron, with under command the Troop of 50 Field Squadron and the composite Park Troop, supported Aden Brigade in the continuing requirement for the construction of check points, maintenance of accommodation in areas outside military camps and improvements to the 'Pennine Chain' defensive line.

In addition 10 Field Squadron undertook some tasks for the Military Works Area such as the dismantling and movement of Twynham huts and the larger airconditioning units.

Tasks from the CRE included the construction of an emergency water distribution system at Obstruction Pier and the building of a slipway at Slave Island which could have provided a vital exit for evacuation by sea had Obstruction Pier become untenable.

Other important work, mostly effected by the composite Troop of 63 Park Squadron, was the packing and shipping of engineer stores to Bahrain and Sharjah. Operation *Millet* (the POL pumping and distribution system at Obstruction Pier) was dismantled and all stores and equipment were shipped to Masirah. For the RAF, assistance was given in dismantling flexible fuel tanks, building blast walls to protect sensitive installations and demolishing one Britannia which overshot the runway on 13 October (a Friday!) and collapsed into soft tidal salt pans.

As well as the land based Sappers the Naval Task Force included a detachment of 59 Field Squadron under command of 42 Commando RM. They did some work for the CRE and could have been called on to do more had there been the need.

By 27 November (W-2) the British Forces had withdrawn into the Khormaksar enclave and the Sapper strength had reduced to 33. On the 28th Lieut Colonel Hutton packed his papers into one file and finally left his office leaving behind 23 key appointment Sappers. These flew out on the following day having handed over their responsibilities to Arabian staff.

Conclusion

In South Arabia the Sappers had faced engineer demands that called for an almost complete cross-section of the resources of the Corps — Field, Transportation, Air, Airfield Construction, Survey and Postal Units, Specialists and Specialist Teams. It demonstrated that given the right combination of Units and Specialists the Corps could meet any challenge. Perhaps this is best reflected in the Engineer in Chief's Address to the Annual General Meeting of the Corps in June 1968 when he said:

"I had reports in the most glowing terms from the General Officer Commanding in Aden about the efforts of the Sappers, and the thing that impressed him the most was the enthusiasm with which his Sappers could turn their hands to widely differing tasks at no notice at all. This, of course, is our stock in trade."

NOTES

(a) The work of the Troop is described in Colonel R L Clutterbuck's articles *Strategic Reserve Regiment* and *Military Engineering as a Weapon in the Cold War* in the March 1961 and September 1964 issues of the Royal Engineers *Journal*.

(b) The detailed story of the *Construction of Deployment Camps* is given in Lieut Colonel D N LeGassick's article in the June 1967 issue of the Royal Engineers *Journal*.

(c) Major J P Groom, in his article *The Radfan* in the September 1965 issue of the Royal Engineers *Journal*, describes the tasks which were undertaken by the Sappers.

(d) The execution of the project, with its many vicissitudes, is described in Brigadier P C Shapland's article *The Dhala Road* in the June 1969 issue of the Royal Engineers *Journal*.

(e) Major F Moseley paid a further visit in April 1967 and the reports of his two visits are recorded in articles in the June 1966 and September 1967 issues of the Royal Engineers *Journal*.

(f) Major D I Knight has described the operation of the Specialist Team in his article in the September 1967 issue of the Royal Engineers *Journal*.

Later ranks of officers referred to:

(1) Major General R L Clutterbuck CB OBE
(2) Major General F W E Fursdon CB MBE
(3) Colonel E B Peel
(4) Colonel R W Bird
(5) Colonel M W Jenkins MBE
(6) Lieut Colonel D P S Wilson MBE
(7) Lieut Colonel A C James MC
(8) Major General C R Grey CBE
(9) Major General J P Groom CB CBE
(10) Major I B Stevenson
(11) Colonel P G Rosser MBE
(12) Brigadier R Wheatley CBE
(13) Colonel J F Ashworth
(14) Brigadier E P J Williams CBE
(15) Major General E W Barton CB MBE
(16) Major General M Matthews CB
(17) Colonel J S Fowles
(18) Major General P C Shapland CB MBE
(19) Major General W N J Withall CB
(20) Lieut Colonel R J C Meston
(21) Lieut Colonel M G Little AAC
(22) Brigadier F G Barton CBE
(23) Brigadier J N Holden
(24) Lieut Colonel R F H Cole
(25) Brigadier W J Reed
(26) Lieut Colonel J French
(27) Colonel J L Booth

A Farewell To Dharan
The End of An Era

MAJOR J T YERBURY BA MICE

John Yerbury was commissioned into the Corps from RMA Sandhurst in 1964. After reading for a degree at Peterhouse, Cambridge, he was lucky to be posted to Singapore where he commanded a troop from 59 Field Squadron in support of 42 Commando RM. A posting to Berlin was followed by a staff appointment in HQ 2 Division, then came a chance to see the New World from a posting to Canada.

After attending a Long Civils Course he commanded 45 Field Support Squadron, followed by a brief tour with Military Works Force and then a weapons appointment at Royal Armament Research and Development Establishment (Christchurch) RARDE(C). After a Regimental tour as Second in Command 3 Training Regiment came the somewhat different experience as Technical Adviser to the film "Sappers in Support". A return posting to the Far East as DWO/OC Military Engineer Services (MES) Nepal made this article possible.

In the late afternoon the view across the sparsely covered ridge to the Himalayan range in the distance was truly magnificent. We had spent two days trekking to reach it and below us lay the hill village where we were to spend the night. The smell of burning wood from the cooking fires rose up to greet us.

Balbahadur Rai, a one-time Warrant Officer and now for some years an employee of the Property Services Agency (PSA) District Work Office, Dharan, had volunteered to show me something of his country and to meet his kin in a short trek through the lower foothills of the Himalayas in Eastern Nepal. Although I had only been in Dharan for a few months I jumped at the chance to see something of the country when the first opportunity arose, so when Balbahadur let it be known that he was taking leave and asked if I would like to accompany him it provided the excuse I needed.

As we walked ever upwards or so it seemed for hours on end than down again Balbahadur proved a constant source of information; in particular, his knowledge of the early days after the creation of Dharan was fascinating. I listened aware that it would be useful to record the detail on my return.

I had read before my arrival in Nepal that after World War Two many people thought that there would be no further military Gurkha connection after Britain had handed over power to India in August 1947. But the twenty regular peace-time battalions were divided between Britain and India, both countries integrating them fully into their army's Order of Battle. Events in the early days of the guerilla campaign against the Malayan communists might have been very different had the Gurkhas not been there — their jungle skills, their tenacity and their superb sense of duty were far more than any Chinese guerilla was capable of sustaining. The emergency provided the reason to continue to run recruiting depots in India, Nepal being virtually a closed kingdom in those days.

It soon became apparent though that India did not want a "foreign" power recruiting non-Indian troops on its soil, so it was in 1952 that she asked the British Government to select a British Gurkha depot in Nepal and vacate those which they had used in India for the past 76 years. The Nepal Government agreed to this proposal and in 1953, Brigadier C C Graham CBE DSO (late 10 GR) set out with a recce party to look at four areas in the Terai, Bhairawa — Butwal (West Nepal), Birganj — Amlekhganj (Central Nepal), Sirha (East Nepal)

Maj J T Yerbury
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and Biratnagar — Dharan (East Nepal). They came to the conclusion that only Paklihawa and Dharan were suitable locations to establish Depots and since it would be too expensive to build two small Depots it was decided to build a large combined Depot at Dharan and a similar single function Depot at Paklihawa in the West.

Balbahadur told of many visits to the site and spoke about the scheme to prepare for a cantonment at Dharan. He described how fortunate we were at that time to have Major D Spain, 2 GR as the British Embassy Liaison Officer to help with the problems of establishing good community relations and how his considerable tact and patience won over much opposition to the building plans. "Why, Sahib" he said, "There was an old lady who owned a plot of land right in the middle of the site where your Mess is now. She sat on a tree stump with a kukri, prepared to defend her land against all comers". Not for nothing was Major Spain affectionately known as "Deeplomat Sahib" for eventually he managed to persuade her to take the offered compensation and leave her land.

Dharan Cantonment, was planned in several phases, the first being the construction of the road from Jogbani (the India/Nepal Border crossing) to Dharan. Work to improve the original mud cart track to a 9 ft wide carriageway started in 1955. This soon proved to be inadequate and it was widened to 12 ft in 1957 using a local labour force supervised by Captain R Wheatley RE. The first bridges over the Dhubi River (steel beam/timber piers) and vented causeway over the Seoti River were built at the same time.

The site of Dharan Cantonment then called the British Gurkha Recruiting Depot (later the word "Recruiting" was dropped since many other functions were carried out) was handed over in December 1956 and let to contract in five phased construction periods. Initially Calcutta based consultants were to supervise the work but in July 1957 it was agreed that the Royal Engineers would take over and supervise all construction from a temporary camp at Phusre, two miles to the north of Dharan.

The title of the appointment in those days was that of CRE British Gurkhas India with Lieut Colonel H W "Stanley" Baldwin RE as CRE and an establishment of 19 officers, 23 SNCO's, 13 OR, 11 Gurkhas and 158 locally employed civilians.

Construction of the main buildings took place between May 1957 and May 1960. Work on the final phase, amenities such as swimming pool, squash court, cemetery and Pattan Bazaar continued into 1961. In September 1960 when the Cantonment was nearly fur occupation, HQ British Gurkhas India moved to Dharan from Barrackpore near Calcutta. The Phusre construction site was handed over to the Nepalese Army in March 1961 and one month later the CRE was reduced to a DCRE.

Sometime later as we drove along the Dharan-Jogbani road on one of the frequent inspections, Balbahadur told me something of the maintenance commitment the PSA had to the 35 miles of road from the Indian border to the Cantonment. Of particular interest were the two bridges along the route.

"It was in the July monsoon of 1964" said Balbahadur "that the flood waters washed away the central section of the large armco arched bridge". We stopped and looked at the bridge and I heard how floods following a period in which fifteen inches of rain over a 24 hour period had piled up trees and boulders against the upstream side, blocking nine of the ten sections of 12 ft openings. One wing completely disappeared into the river bed and four sections were badly damaged. It seemed unwise to "put it back as it was" so it was redesigned by replacing the damaged vents with two reinforced slab spans lowering the river bed in the process by 6ft and protecting it by a concrete apron either side of the bridge.

The Sgt Clerk of Works had previously been posted without replacement and the local Indian draughtsman, having been attacked by a drunk Gurkha with kukri, had gone home to India so the DCRE Major Townsend-Rose produced the drawings himself. The design was based on a Scammell and 20 ton trailer combination loaded with 25 tons of cement — what seemed a suitable load type at the time. By various reverse design methods the result turned out to be about the same strength as the steel joists in the Dubi bridge nearer to the town of Biratnagar.

Demolition started in December 1964 and opening ceremonies were held on 13 and 14 June 1965, the first, held by the work force with suitable sacrifices and the second, a formal cutting of the tape by the DCRE's nine year old daughter. On 17 June it rained, the river filled and quickly silted up over the apron under the new spans to about a 3 ft depth.

Over the years this bridge has remained much as it is today. Each post monsoon period is followed by reinstatement to the damaged apron caused by stone and boulder erosion. For example in 1984 although much of the protection works were washed

The Seoti Bridge

away the bridge survived intact despite flood water flowing over its deck.

By the winter of 1964/65 the wooden decking of the 110m long Dubi bridge was found to be rotting. An examination of the sub structure showed that many of the trestle piles were also in poor condition above low water level. The piles were spliced at or just below low water level; below the splices the wood appeared sound. The whole wooden deck and all the piles which showed signs of rot were replaced during the next dry season.

In the winter of 1965/66 as soon as the river level fell after the monsoon, a temporary diversion over armco culverting was made up-stream of the bridge and the timber deck stripped. The first two spans of steel work were jacked up on timber cribs and the trestles dismantled down to the splices and replaced as necessary. In this way the bridge was refurbished and a complete new timber decking laid with a full wearing course of timber and a layer of sand/bitumen mix added in an attempt to delay rotting of the new deck.

By the late 1970's it was decided to replace the bridge — it had tilted slightly and even floated! during the monsoon flood periods — with a reinforced concrete bridge on deep caisson foundations. The funding for this £0.5M project was provided by Overseas Development Administration (ODA) as part of an aid programme for road development in Nepal, the District Commanders Royal Engineers (DCsRE) at the time, Majors Verschoyle and Tomlinson, acting as Resident Engineers for the project manager of the Dharan — Dhankuta road development.

Women and children formed part of the work force who laboured on the bridge. "They were very shrewd, Sahib", said Balbahadur describing how a mass pour of concrete would last up to 12 hours or so with the concrete being carried and placed using head pans. "They once struck for more pay in mid pour after a few hours work. Because it was not possible to recruit a new band at short notice they got their pay rise". Such are the problems of working in a developing country.

Back in the PSA/DWO Office I discovered more about the Cantonment water supply which flows from several sources developed over the years (in a catchment area) in the hills about 9 km away.

Walking around the treatment plant, I heard how the pipeline was built during the construction phase of the Cantonment and, after the failure of two bore holes, it was extended to provide a permanent supply. Fully developed the catchment provided a minimum of 250,000 gal/day in the dry months of April and May. Given, though, that the average daily consumption was about 300,000 gal/day rationing had to be imposed in dry weather. The exceptionally high consumption of about 300 gal per head was due to the association that Nepalese made between clear, running water and purity and thus the difficulty of imposing any strict water discipline.

Water supply, I was told by the RE Clerk of Works (M), is a steady maintenance task with a crisis thrown in every now and then. It is a fact of life that during the monsoon when it is everywhere, restrictions on drinking water have to be imposed because the vast amounts of silt which are washed

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The Dubi Bridge

down the pipeline prove too much for the candle filters to cope with.

The Indian Clerk of Works, Mr Bose, then said "It is quite common, Sahib, for a section of the hillside to slip during the monsoon taking the pipeline and access path with it". I was then treated to a story of how the maintenance team turn off the water above the break to prevent scour and re-route an alternative source from the catchment area to keep the pipeline full. The slip is then dealt with either by excavation and building gabion stabilizing walls to reinforce slipped soil or by re-routing the pipeline.

As I looked around the treatment plant I saw where the raw water from the hills passed through the large sand filters and chlorination vesels and up into the twin high level 100,000 gallon storage tanks. At ground level were two further 100,000 gallon underground tanks forming an emergency water reserve for the Cantonment. I heard how former DCRE officers used to ride out across Dharan Bazaar up into the foothills on Saddle Club horses to inspect the pipeline in the days before the Dharan — Dhankuta road was built only ten years previously. Delving back further I discovered how we had helped with the development of a separate water supply for Dharan Bazaar. Work had started on a 300ft span suspension bridge to carry the water supply in 1969, funded by ODA and completed two years later. The floods of 1974 demolished the structure and caused extensive damage throughout Dharan and to the Dharan — Jogbani road. After a temporary connection was built, a more permanent replacement was installed and remained effective until the supply was replaced by a borehole financed by a Chinese aid programme some years later.

That other vital service to the Cantonment, the electrical supply was generated by four 480 KW Mirlees Dorman diesel electric generators installed in 1985/86 at a cost of £1.4M. The low throb of the exhaust could be heard throughout the Cantonment as a gentle reminder to everyone that we all depended for creature comforts so much on its functioning day and night.

To begin with power had been provided by four English Electric 300 KW generators but over the years the load had steadily increased with the installation of air conditioning in offices, hospital and married quarters. Sitting in the cool control room of the power station with the Indian operators at the main switches, it was difficult to imagine

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life a few years earlier. Until the early 1980s I was told, ice blocks were produced on a central basis for distribution to the 80 or so messes and married quarters on the distribution list. In 1982 when the ice plant was due for major attention, it was decided that the purchase of domestic refrigerators and deep freezers would be a more economic alternative and be seen as a move in keeping with the times.

In the days that followed, I looked round the Cantonment in a new light, seeing how it had developed over the last 30 years. Since the Corps lost the works responsibilities for its military estate to MPBW and then the PSA, the District Works Office, as it eventually became known, came under the direct control of the Regional Headquarters PSA in Hong Kong. Unusually for Nepal, though this particular District Works Office was unique in many ways, we had additional responsibilities for the design, planning and execution of all Part II Works Services and Part III Maintenance Services. The work force varied in size across the years from a maximum of over 1000 in its heyday of the late 60s down to about 300 in the period prior to closure. In recent years the emphasis changed from employing direct labour to using local contractors — a policy which worked well providing the degree of supervision was constant. In passing I picked up interesting snippets here and there, for example, the building of ten new married quarters in 1974, in a former mango orchard, which reflected a policy towards increased accompanied service. At a stroke it altered the balance towards a more even distribution of married and single personnel so in that tranquil and ordered environment, the sort of scandals which Kipling could have used to his advantage were less likely to occur.

From the old "Gurkha" hands I learnt of the plague of small flies that appeared as if on cue each October. They swarmed at night round every light, beating and burning themselves to death against the glass. The only way to be comfortable was to sit either in the dark indoors with the verandah lights on, or outside in the dark with the inside lights on. It lasted about two weeks and each morning in the open corridors of the hospital the flies were swept up by the bucketful.

Delving back into the past, I discovered that 1956 was the year of the last tiger shoot when the King of Nepal got together about 40 elephants in the Dharan area. On several occasions in years afterwards they were "borrowed" if in the neighbourhood, especially if a visiting senior British officer was present. Once, when the CinCFARELF visited he was offered what must have been a rather uncomfortable seat in a large brown leather armchair strapped atop an elephant. At the same time the senior ladies were sandwiched together on another beast four in a small metal box.

Occasionally a rogue elephant would walk through the perimeter fence usually at night, to help itself to a crop of bananas growing in the area of the Resettlement Farm. Tucked away in one corner of the Cantonment, the farm was used as a training centre for Gurkha soldiers prior to retirement. Here they would learn agricultural skills to take back with them to the hills and thus improve the communal way of village life. As a spin off the farm produced eggs, milk, pork and fresh vegetables which were then sold to the messes and families.

In off duty hours there always seemed plenty to do with floodlit tennis court, squash court, plunge pool, 9 hole golf course, saddle club and chalet up on a nearby ridge for weekends away from it all. For those with a taste for running their own radio programme there was the chance to become a Disc Jockey on the local BFBS network.

In many ways over the years the British community provided a focal point for development in the region. Dharan Bazaar grew to become a self-supporting town in its own right given the impetus from the Cantonment. At the same time upwards of 2500 local people came to live within the boundary fence to enjoy the benefits of pure drinking water and a safe electrical supply. In addition, for the local community and people in the surrounding hills there was the drawing power of the British Military Hospital probably the best equipped and certainly the best run hospital in Nepal for its size. To walk round this 70 bed complex was to see one of the reasons why the British Army was held in such high esteem. Although its primary role was to treat entitled patients, because their number was relatively small care could be offered to pensioners, ex-servicemen and their families, locally employed civilians, members of the Nepalese Army, Police Force personnel and a few hill villagers. It was difficult to quantify the patient loading but over 2000 surgical operations, 1300 in-patients and 3500 out-patients were treated annually. Altogether about 200 children were delivered each year in the maternity wing.

The hospital really came into its own though in 1988 just before I arrived. At 0545hrs on Sunday 21 August, Eastern Nepal was shattered by an

earthquake which left thousands homeless and at least 700 dead. In Dharan Bazaar about 140 people were killed mainly by being crushed to death as they lay in bed whilst the brick and mud mortar houses collapsed on them. In the Cantonment no buildings other than an open sided shed collapsed; many were cracked but remained safe and habitable. The water pipeline was fractured in many places and there were several land slips. The Dharan — Jogbani road was damaged in places though the Dhubi Bridge suffered only very slightly.

To compound the damage from the earthquake, the monsoon rains added their contribution to the overall misery. Fortunately immediate assistance was on hand from the BMH which virtually quadrupled its capacity overnight with medical teams flown in from Hong Kong and the United Kingdom together with nursing assistance provided by wives from the Cantonment.

The fact that enormous help was provided at very short notice in this emergency did not of course go unnoticed by the local community, so it was with disbelief and despair that the news was received in December 1988 that the Cantonment was to close on 31 December 1989. How could such an investment in Eastern Nepal be disregarded so easily? This and many other questions were to form the main topics of conversation in the ensuing months as plans to make several hundred people redundant went ahead.

It was during this period that I became involved with the closure of the District Works Office in Dharan and aspects of its relocation to Katmandu (to the newly built HQ British Gurkhas Nepal, which was completed in 1989). By now the MES element of the District Works Office had evolved into an OC, a major, two captains (a GE and a Stores and Finance Officer) and four SNCO's (Military Plant Foreman (MPF) and Clerk of Works (C), (M) and (E)) who led locally employed teams of their respective disciplines.

Developments in 1989 concentrated on the run down of the Cantonment and future organisation of the Gurkhas in Nepal. At the beginning of the year and to add further problems to our closure plans, India and Nepal became locked into a border trade dispute which had been rumbling on for some years and was finally brought to a head after the announcement of an arms deal between Nepal and China. At a stroke all supplies from India were cut off; amongst the most important commodities were fuel oil deliveries and building material demands crucial to the move. Somehow or other we struggled to acquire supplies at vastly inflated prices playing a 'cat and mouse' game with contractors. Life for that last summer in the Cantonment was certainly not the idyllic, well ordered existence of former years. It was very uncomfortable to work with either restricted or no electric power limiting the use of air conditioning and fans especially throughout the long, sultry tropical nights. To compound matters even more, all of the locally employed civilian staff, led in the main by the PSA work force, let it be known that they intended to mount a "silent, non violent" protest against the closure effective from 1 May 1989.

At the heart of the matter was the desire to acquire improved terminal benefits prior to discharge. These would establish a Provident (Pension) Fund and gratuity system — all points raised by the work force for the last ten years but apparently passed unheeded by anyone capable of taking action.

Against this background, planning for the closure proceeded. Several major works services funded by the ODA had to be undertaken as part of an agreement with the Ministry of Health, Nepal before we left. They included making connections to the local mains electricity, thus rendering the five year old generators redundant, and to the local water mains removing the Cantonment's dependence on the pipeline link to the catchment area (still to be achieved). Improvements to the BMH involved the addition of pitched roofs to all the remaining flat roofed buildings and the provision of a replacement Autoclave (steriliser).

A UK based contractor was to take over the PSA building and Plant Yard at the same time undertaking the commitment to maintain the road from Jogbani through Dharan to Dhankuta. Fortunately the PSA road maintenance gang of 34 men were to be handed over too and negotiations were began to sell or hand over the PSA plant holdings.

Because of the many frictions between the agencies with vested interests in our future, life was far from tranquil. It became a challenge to accomplish so much in such a finite time. As the Cantonment gradually emptied so the last of this and last of that type of function was held. The horses from the saddle club were ridden off in an epic trek across country to their new owners at the Tiger Tops Lodge. The last school children flew out - one became aware now of a silence throughout the Cantonment, no more were laughing, high pitched voices heard about the quarters and beside the pool. Little things altered the tenor of life, certain

foodstuffs were no longer obtainable from Poddar's Canteen, the church closed, quarters vacated and the last of the remaining families centralised in the Officers' Mess with the last of the hospital doctors and nursing staff to celebrate the final Christmas.

I have many memories of Dharan; the flash of a golden oriole darting between the scarlet tresses of the Flame tree in our garden, the unusual call of the Himalayan Cuckoo, the Hoopoe strutting on the lawn with its comb proudly displayed. Elsewhere sounds of grass being cut by hand swung sickles formed from scrap iron forged in the kukri factory behind the Paltan Bazaar — a sort of Dante's Inferno by night where hunched figures hammered away in the flickering light, beating out razor sharp knives from old railway lines.

I recalled the selection tests, a peculiar Gurkha rite to choose a handful of soldiers for the next generation from hundreds of hopefuls. I remembered the sad faces of those who I had to make redundant, many of whom had given their lives in service supporting us within the Cantonment. These and many other events all left their mark. What cannot be forgotten is a unique experience of an all too brief period spent in Nepal, memories which will stay with me forever.

And so to the new Headquarters of British Gurkhas, Nepal in Katmandu. Our world is ever-changing and we must alter our ideas too. Cantonment life is gone forever within the British Army. We were all privileged and at the same time proud to have taken our part.

Easter Cruise 1941

MAJOR GENERAL SIR GERALD DUKE KBE CB DSO BA FICE

In the winter of 1940/41 the planners in GHQ Middle East had been busy preparing plans for the move of a British Force to Greece to help the Greeks resist a German invasion from the north. Fortunately a section had also been considering, with the Royal Navy, the possibility of an enforced withdrawal. As the GII Plans concerned with this I became a member, in early April 1941, of a small team to be attached to General 'Jumbo' Wilson's headquarters in Athens to assist with the evacuation. Before leaving Cairo I put a couple of charts of the Western Aegean, and a RNYC burgee, into my bedding roll, just in case. Our party, under command of Admiral Baillie-Grohman, took off from Alexandria in a Sunderland flying boat, and had the interesting experience of circling round Piraeus watching two inshore mine sweepers complete the clearance of a safe path for our landing, as the *Luftwaffe* had mined the harbour approaches the night before. The next few days were spent in reconnaissance of the east and south coasts to select suitable points for embarkation.

On returning to Athens on 23 April I found Force HQ in the Acropole Hotel in a state of organized chaos. Papers were being burnt and office equipment destroyed to deny it to the enemy. In the HQ I met the Chief Engineer, Brigadier H P W Hutson, who told me that he intended to hire or buy two or three caiques which would lie off the south coast of the Peloponnese to pick up stragglers, and he was looking for sailors to man them. He had already despatched his SORE, Ralph Carr, to the Command Paymaster to collect some cash for this venture, and Ralph had found that they were so keen to get rid of their surplus that they had given him a suitcase full of 100 and 200 drachma notes, so ready cash was not going to be a problem. I was to report to the Brigadier at Argos the following evening, and if I met any other Sapper sailors I was to bring them along. I had already arranged with Tommy Thompson to have a seat in his truck the following day, so he was enrolled into the scheme. Being in Survey he drew all the maps and charts we needed from the map room, and he insisted also on bringing with him two brand new Tavistock theodolites which he could not bear to destroy.

Our journey to Argos was uneventful but slow, as the road was littered with brewed up vehicles and, sadly, a few dead mules, and occasionally an aircraft would shoot up the traffic on the road. As we approached the bridge over the Corinth Canal half a dozen Stukas were forming up to attack, but the Bofor Gunners saw them off. One Stuka was hit and plunged into the sea, and the others sheered off in search of an easier target. It was dark by the time we reached Argos where there was an impressive traffic jam, but we made our way through and leaguered for the night by the roadside about a mile beyond the village. As we were having breakfast Ralph Carr appeared looking for us, the Brigadier's party having spent the night half a mile further down the road. Here we met the other SORE, one Chris Bailey. A hotel keeper in Cyprus before the war, speaking fluent Greek, he had been commissioned into the RASC and posted to a mule company. But Brigadier Hutson had met him during the campaign, and realizing he was wasted in a mule company had persuaded General Wilson to let him join the RE staff as an interpreter, a brilliant if unorthodox move.

The Navy had selected Nauplion and Kalamata as the embarkation ports in the Peloponnese, so we decided to try our luck at Githion, a small fishing village halfway between the two. We set off with me travelling in the back of the staff car and the rest of the party in two 15cwts behind. All went well until we had passed Tripolis, and were enjoying the majestic scenery in the mountains of Arcadia. We did not notice that the driver was dozing off until, having rounded a re-entrant on the mountain road he failed to steer round the following spur. Instead he went straight on, through some bushes which fortunately turned the car sideways. We then rolled over sideways down the steep hillside until coming to rest, on one side, on a providential tomato patch which some industrious Greek had levelled out. The Brigadier and his driver had been comparatively cosy during our three and a half slow rolls, and clambered out surprised but unharmed, the driver now fully awake. I on the other hand had been sharing the back with a case of tinned damsons and a wooden case containing two 4-gallon "flimsy" petrol cans, uneasy bedfellows. However I got away with a cut lip, and a bruised side which made laughing painful. We immobilised the vehicle, having resisted the temptation to set it on fire and thus attracting the attention of the *Luftwaffe*, and clambered up to the

road where Ralph, who had seen the disaster, was waiting for us.

We then drove on to Sparta, where a doctor at the hospital put a couple of stitches in my lip, and diagnosed a cracked rib which he immobilised as best he could with what I suspect was the last of his store of sticking plaster.

While this was going on the Spartans had decided to entertain us to lunch. People brought chicken and other meats, salads, bread and cheeses, and then joined us in a feast set out in the board room of the hospital, washed down with copious supplies of retsina. Fortunately, thanks to Chris Bailey, we were able to thank them properly for all their kind hospitality. We were very touched, and left promising (hopefully) to return as soon as we could. On arrival at Githion we sought out the mayor, who soon collected several boat owners and their relatives and friends, for a meeting in a waterside taverna. While the Brigadier and Chris were doing some hard bargaining the rest of us became involved in another cheerful party.

Things were going well, and a deal had nearly been clinched for a large motor caique and another small one, when there was a noise of heavy vehicles in the village square. We rushed out to find about twenty large lorries from some RAF Admin Unit who had not read their orders and had headed south regardless. The Brigadier gave them a rocket and despatched them post haste back to Nauplion. But they had brought with them a sense of panic, and when we returned to the taverna there was a subtle change of atmosphere. The owners were still friendly, but one suddenly remembered he had promised to visit an aunt on a nearby island, and another had a brother-in-law who was coming the next day for a fishing trip, so their boats were not available after all. This frustrated our plan, and put us in rather an awkward position, but we eventually found an owner who would sell us his boat, and we trooped down to the jetty and loaded our stores on board before he could change his mind, including the Tavistock theodolites, and a couple of Lewis guns off the 15cwts.

The *TASOS* was a beamy boat, about 40ft water line, with a large loose-footed mainsail and a headsail set to a stumpy bowsprit. Aft there was a doghouse sheltering the engine, an ancient single cylinder diesel. George Panyotis, the owner, explained that this was started by compressed air from a cylinder in the engine room. What he did not tell us at the time was that the valve was leaking and the cylinder was empty. Having agreed a deal with Panyotis we repaired to the taverna for a farewell drink, and as a fortunate afterthought remembered just in time to buy a rowing boat from another owner as a dinghy. We were all aboard just before midnight, when the REYC barges was hoisted, the full complement being:

Brigadier H P W Hutson	Owner
Major E H Thompson	Navigator
Major G W Duke	Skipper
Major H R Carr	First Lieutenant
Major C Bailey	Bosun, Cook, Interpreter
Sappers Capel, Cod, Docherty and Photy	Hands
G Panyotis	Paid Hand

It was when we told George to start the engine that he had to confess the cylinder was empty. We soon found that there was nowhere in Githion where the valve could be repaired, and we eventually got under way, under sail, bound for Elea some twenty miles to the east, across the Gulf of Sparta. The wind was light NW and we ghosted along in the dark over a flat calm sea. At about 0400 a rattle and splash told us that a slight roll had unshipped the Lewis gun, mounted on its tripod on the foredeck, and fifty per cent of our anti-aircraft armament had gone over the side. We kept the other one secure below. All day we made exasperatingly slow progress with little or no wind. We saw many enemy aircraft but none took any notice of us. Our only diversion was when we saw a Sunderland in the distance. It appeared from behind a headland and was desperately trying to come unstuck from the glassy sea. It succeeded after taxiing for about a mile, and we wished it luck as we watched it, obviously grossly overloaded, gain height and lumber away to the south. With no prospect of reaching Elea, we anchored that evening in a small cove, near Cape Xyli, and went ashore for a meal on the beach, conditions for cooking on board being primitive. Here our luck turned, a motor boat came in and anchored, and the owner on hearing of our problem offered to tow us to Kithira Island where we could get the cylinder mended. After a night tow we arrived at Agia Pelagia, on the island, at about 0500.

Our arrival caused considerable interest, in spite of the early hour, but we held off the crowd while Chris cooked an excellent breakfast. Willing hands then helped us haul the offending cylinder out of the engine room and ashore, nearly sinking the dinghy in the process. It transpired that there was

a blacksmith in the village of Potamos about a mile away at the top of the mountain, so the cylinder was lashed on to a protesting mule, and a cheerful procession wound its way up the track to the blacksmith's shop. By late afternoon the blacksmith had mended the valve and re-charged the cylinder, which was brought down in triumph to the harbour and put back into *TASOS*' engine room. However before we were allowed to leave the locals insisted on us joining them for a farewell supper party in the taverna. Even on this small island there was at least one Greek in each family who could speak English, usually with an Australian accent, and it was a cheerful party assembled on the quayside to see us off at midnight, under power at last. We headed north, with the intention of looking in at Elea (which we had failed to reach the previous day) and make our presence known there, and then return to Githion until the Germans arrived within striking distance.

All went well until about 0400, by which time we had brought Elaphonisos Island abeam and were nearly halfway to Elea, when the engine suddenly stopped. It defied all our efforts to re-start it, and once the air bottle was empty there was nothing more we could do. We had memories as YOs of starting the old Ruston in the workshops at Chatham by swinging the flywheel, but this flywheel was in a well and we could not get a grip on it. There was then nothing for it but to abandon the mission, hoist our sails and make for Canea about 90 miles to the southeast. Fortunately the wind was westerly, force three to four, and we made good progress along the east side of Kithira Island. The Brigadier decided to put in to Kithira harbour, on the southern tip of the island, for a breather before attempting the 75 mile open sea passage to Canea, so we sailed in and secured to a large caique lying by the jetty. To our surprise it was full of soldiers, and we were hailed by the Naval Officer in charge, who offered us a lift to Crete. He was engaged in the ferry service from Nauplion to Canea and had put in to Kithira for some undisclosed purpose, and was about to sail again. Our crew, having got so far, were in favour of completing the journey to Crete in *TASOS* under our own steam, or rather sail, but the Brigadier wisely over-ruled us. We then transferred ourselves and our kit, including the remaining Lewis gun and of course the theodolites, to the Naval caique. It should be mentioned that Ralph Carr in addition to his personal kit, was carrying his faithful shot gun, which had accompanied him all the way to Mount Olympus and back. Just over a year later I was to watch him shooting sand grouse with this same gun, on the banks of the Euphrates between Raqqa and Deir ez Zur. We said goodbye to George Panyotis and *TASOS*, and left him with his boat and the "unconsumed portion" of our rations; he could hardly believe his luck.

On arrival in Canea the following morning we were loaded into trucks and taken to a reception centre in a villa just outside the town. As Ralph was giving his "name and number" to the "A" rep, an officer at a table on the other side of the hall looked up and said "Are you the Major Carr who drew an imprest from our Paymaster in Athens?" Ralph had to admit this, and said he would hand in the balance when he had had time to make out the account. Our party was taken off to the 42 Field Company, commanded by Teddy Parker, who made us very welcome in their olive grove. We had one final dip into our treasure chest when we entertained Teddy Parker and Hugh Finch to dinner in a modest restaurant in Canea that night, which we reckoned was a fair charge on the account. Ralph handed in the balance next morning. A few days later the officers in the party were returned to Egypt by "Grey Funnel Line" (*HMS Hasty*) from Suda Bay. We had failed in our mission but we had done our best and it had been a lot of fun. We carried away an abiding memory of the remarkable warmth of welcome and goodwill shown to us by all the Greeks we had met on our journey, given in spite of the fact that we were leaving them to the tender mercies of the Germans.

The Testing and Validation of Combat Engineer Training

MAJOR I G HITCHCOCK

The author was commissioned from the Royal Military Academy Sandhurst in April 1979. After attending 68 Young Officer Course, he was posted to 32 Field Squadron as a Troop Commander where he served in Kenya, Germany, Denmark and Northern Ireland. On completing the Regular Careers course and a short period as an Assistant Instructor at the Field Engineer Wing, he was posted to 1st Field Squadron as Troop Commander and Operations Officer, where he also saw service in the Falkland Islands. After a tour as Operations/Training Officer and Adjutant of 28 Amphibious Engineer Regiment, he served as a Platoon Commander at the Royal Military Academy Sandhurst. Before taking up his present appointment as Officer Commanding, 55 Training Squadron he spent six months as a member of the Mozambique Training team.

Introduction

The effectiveness of the Army today depends more than ever before on the quality of our training organization. The increase in the quantity and complexity of our equipment has been dramatic, particularly in the Royal Engineers and therefore our soldiers must be trained, right from the start, in exacting skills to the highest of standards. It is a major challenge and there has to be a system to meet it. It is axiomatic but for all the very good political, fiscal and demographic reasons that this training system and its organization must work effectively, efficiently and economically (E^3). And yet, though it is almost a contradiction, the largest problem is one of restraint in that the system must balance the two evils of over-training on the one hand and under-training on the other! With this in mind it was clear early on, that there was a basic need for a prosaic and practical approach. The problem was passed to the scientists! Spurning their slide rules and doffing their white coats, they worked out and then applied a scientifically devised formula and approach to the process of learning and the design of training systems. They derived, from their approach to Instructional Technology, the Systems Approach to Training (SAT). This system is designed to ensure the constant development of the training organization by forcing it to adapt to the changes and variations in roles, equipments and situations which are characteristic of this age. SAT itself is a wide and all embracing approach to training but is more relevant, vital and alive in the area of Individual Training. It is aspects of this system, as shown opposite top left, that I wish to examine.

Background

The history of SAT in the British Army has been extensive. It began in 1966 when Brigadier Mellor following a study of American Army Training methods, recommended the introduction of SAT to the Army Board. This was accepted in July 1967 and by 1972 Regulations for Army Employments were issued advising implementation of SAT. The RE Training Development Team (RETDT) was then established by the EinC to implement SAT in the Royal Engineers. However in parallel and by 1970, a pilot scheme for testing Combat Engineers had already been introduced at 3 Training Regiment RE. By 1973 this 'Quality Control Cell' had expanded to apply validation and testing methods to all combat engineer employments. Somewhat later RETDT took over this cell and it is now responsible for monitoring RE training standards worldwide. A Training Validation and Testing Detachment (TVTD) (the old cell) remained established at

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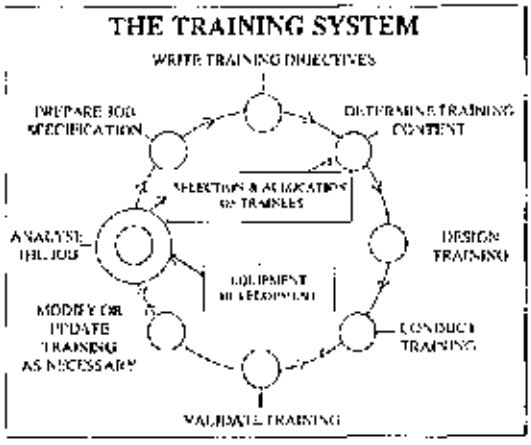


11 Engineer Group to act as a Testing Authority for Class 3, 2 and 1 Combat Engineers. In April 1989 SAT became mandatory for all-arms and service training establishments throughout the Army. Its implementation was made mandatory by the Director of Army Training (DAT) in AGAI Volume 1 Chapter 17 for all training.

SAT is with us at all levels. It is, as the above system shows, interactive and interdependent and comprises the following components:

- Job analysis
- Preparation of job specifications
- Preparation of training objectives
- Course design
- Conduct of training and TESTING
- VALIDATION of training (internal and external)
- Modification or updating of training

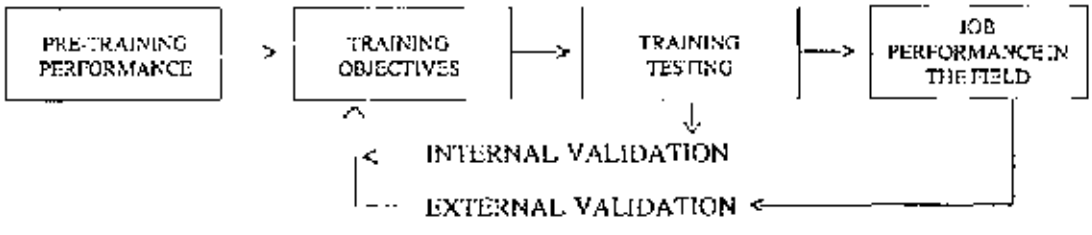
Purpose

I intend in this article to consider two elements of the whole cycle — those of testing and validation. Their study in isolation is fraught because SAT sees training as a closed loop. Any modification or change in the job specification or course design for instance, provokes the same inter-active systemic effects on the other facets. Nonetheless, the importance of testing and validation is paramount and can be separated to some extent. Its importance is highlighted in a recent quote by Commander Training and Arms Directorate (CTAD), "Testing and internal validation systems are perhaps the weakest link of all."

The relationship between testing and validation is shown at the bottom of this page. Feedback on the results obtained is essential to ensure continued improvement of the training. Though organizations may develop sound training systems, there is always room for improvement!

Testing

At the end of training, tests are necessary to check progress and confirm that individuals have reached an acceptable standard. The tests are based on the training objectives which have been derived from job and task analysis. SAT is a loop! There are two fundamental types of test available to instructors — criterion-based and norm-based. Norm-based tests judge trainees against each other, sorting out the more from the less able. This is usually inappropriate to SAT as the "training" is set to achieve required standards not to set individuals in competition. In criterion-based tests, trainees' performances can be assessed against a required standard — the training objective. Training objectives are definable and thus demand either knowledge, skill or attitudinal performance. In combat engineer training, knowledge and skill of a particular subject can be practically tested. One appropriate method of assessing a trainee's knowledge of the syllabus is a multi-choice objective question (MCOQ) test. This is a knowledge test primarily, but for large numbers in a limited time frame is probably the most effective method. The test normally occurs at the end of phase 2 recruit training and pass or fail confirms the status of the Class 3 Combat Engineer. Practical tests are used to assess skill and knowledge on a regular basis as the training progresses and are extremely significant, but have limitations as we shall see at the end of a large syllabus.



VALIDATION

VALIDATION is simply determining whether one has done what one set out to do. The validation of training is a process in which a series (and other means) of assessments are used to determine whether:

- A course of training has achieved the training objectives specified for the course (internal validation).
- The training objectives for the course are realistically based on an accurate identification of the current requirement of the job (external validation).

For Combat Engineer Training TVTD is responsible to the Testing Authority, 11 Engineer Group, for internal validation by maintaining question books, setting and correcting tests, evaluating the results, providing data for the selection criteria and advising training units on the meeting of training objectives. External validation is a continuous process involving all concerned, not only the trainees but also the future employers.

TESTING COMBAT ENGINEER TRAINING

The Present System. The employment testing of Class 3, 2 and 1 Combat Engineers is based on the following factors:

- The Training Objective to be achieved
- Pre-training performance
- Tests (Norm-based or criterion-based)
- Experience
- Overall resource requirement

At present the Standing Committee on Royal Engineer Employments (SCOREE) is responsible for job analysis, specifications and training objectives. Its sub-committee on combat employments dictates what is a training objective and therefore what has to be tested. Class 3 Combat Engineers are required to pass practical tests at the end of ten modules. Only on completion of all of these, are they then allowed to take the MCOQ test. Class 2 Combat Engineers gain their qualification after completion of a period of service in a unit (continuation training) and successfully passing another MCOQ test. The Class 1 Combat Engineer has two practical testing periods (halfway through the course and at its end) before taking an MCOQ test. (Though this is slightly different at Combat Engineer Training Centre (CETC) for establishment reasons.) For the purposes of clarity the practical testing of Class 1 and 3 Combat Engineers will mainly be considered. It should be remembered that the learning strategies for different courses will vary greatly. This is determined by the required performance (a precise statement of what the trainee must be able to do to carry out a particular task, which is part of the job for which he is training), with or without supervision and given an expected level of retention. For example, Junior NCOs on a Class 1 Combat Engineer course would be expected to have a sound grounding in a particular subject, whereas soldiers starting their Combat Engineer training clearly would not.

Testing is organized with the following factors foremost:

- Trainees are marked on performance of a set task, not on a verbal explanation of what he should do, ie Action not words (though not the MCOQ).
- The allocation of equipment is adequate for the number of soldiers under test.
- Instructors do not test their own soldiers and when two or more testing NCOs conduct the same test, the marks are moderated by a supervisor.
- Tests are selected at random not involving the training staff so "teach to test" is avoided.
- Criticality (ie Critical, essential action that must be achieved irrespective of produced knowledge) is observed based on safety and achieving the task.
- That individual practical tests are carried out at such locations that interference, or the possibility of gaining help from neighbouring practical tests is minimised.
- Practical testing is scheduled at intervals to allow instructors and trainees to monitor progress.

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- The final MCOQ test (after a broad revision period or exercise) is at the end of the course.
- Retraining and retesting is only carried out after a reasonable period of revision and remedial training, where necessary.

Problem Areas. Practical tests, because of their very nature, generally demand considerable supervisor/examiner and trainee time and resources. Compromises therefore will sometimes have to be made, but the following is possible:

- Each practical test takes between five and ten minutes. Usually three practical tests are taken for each subject. This means that for an average sized Troop of 40-48 strong it takes at least half a day (per subject) to test using three to four test instructors. (Clearly not practical on the final morning of the course — a plus for MCOQ!)
- As, ideally, instructors do not test their own trainees, instructors from other Troops have to be found, making large demands on the whole unit.
- Testing for instructors can be monotonous and repetitive. To save time (and sometimes out of resource necessity) instructors may have to supervise two or three trainees being tested at the same time. This further increases the likelihood of subjectivity in their assessment. However, in some tests this is recognized as an aid to learning/productivity, but requires very experienced instructors to carry it out successfully.
- The trainees themselves may experience inactivity between tests due to the difficulty of introducing concurrent activity (because the instructors are busy testing).
- The use of large combat engineer equipments in practical testing is obviously desirable but the management and availability of these resources often proves to be a problem. Tests calling for the identification of parts of, say, the Medium Girder Bridge require the presence of, all of, or parts of, the bridge — this is not always easy to achieve. Models can help, but if the soldier trained on the real thing then failed on the model with which he is not familiar, is it a fair test? Should training with models be introduced and if so at the expense of what other subject (time is short)?
- The setting for tests should be as realistic as possible. Artificial situations (models?) tend to create indifferent tests. The manpower and logistic burden required may also tend to make it counter-productive to the other students.
- It is not unusual to find a situation in which a whole test can be passed according to the allocated pass mark, and yet within the test a critical sub-task or area of knowledge can be failed (or not tested). The use of criticality is now being applied to areas of safety as they relate to combat engineering. Failure in a specific highly important area means failure overall. The "60 per cent pass and that's it" syndrome as it applies to practical testing should be avoided.

If a Training Objective is specified then it should be tested. In the ideal world, we must test all that we teach but time and resources preclude this. Yet if we do not test why include

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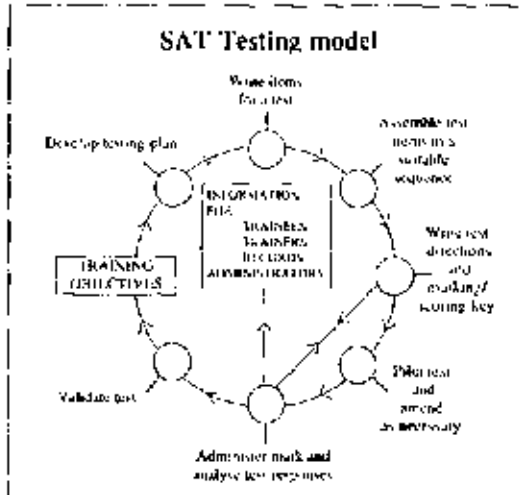
the subject and what is the importance of the subject? We attempt to overcome inherent difficulties with this by allocating training levels to be achieved ranging from level one — very high priority, to level five – low priority. (Most combat engineer Class 3 training objectives are level two to four.) This may lead to a "jack of all trades but master of none" situation, though the tests are aimed at the higher priorities. Bearing in mind the need for Class 3 Combat Engineers to be supervised, perhaps we try to test too much!

- "The Training Gap" is identified in SAT as the disparity between what the job specification dictates and what the training objective requires an individual to achieve. If we train and test such subjects, accepting that the job specification standard will not be met, then the "Training Gap" is widened, not narrowed. The inevitable consequence is the Units of the Field Army receive from the Individual Training Organization (ITO), a product that may not meet their bill as it was they who defined the initial job specification but were not present to see how the training objectives modified it. Yet so many other factors impinge, that closing the gap is extremely difficult.

Alternatives to Testing

It is relatively easy to ring TVTD and tell them to send another test. One can then carry it out, mark it and repair to the bar satisfied with a good day's work! However, as trainers we must examine not only what we teach and how we teach it but also how we confirm it. SAT offers the testing model shown below:

The testing is geared to the Training Objectives and not the method. There must therefore be



alternatives and I have summarised them in the table below.

A cursory inspection of the table shows that it would be difficult to apply SAT to these alternatives. The loop breaks and personalities become paramount. The norm-test wins. The yardsticks crumble with the result that standards will vary but no check or feedback will happen. Can it thus be that on the other hand our current system of testing Combat Engineers does work? I would agree

METHOD	ADVANTAGES	DISADVANTAGES
CONTINUOUS ASSESSMENT	No resource, administration or manpower problems. More time for training (but less for the supervisor).	Very difficult and subjective, the yardstick of performance. Little guide to progress for the trainee. No feedback from outside. No Field Army assumption of competence
PRACTICAL BATTLE RUN (Individuals or groups progressing through a series of Combat Engineer Tests)	Realism Variety	Difficult and time consuming to set up. Resource intensive. Takes a long time to assess individuals. Logistically unfeasible. Set up at end of training to ensure all subjects covered — retraining and retesting difficult. Retention of knowledge can be will be poor. Individual assessment difficult in a group. More appropriate as in-unit consideration
ASSESSMENT EXERCISE (Combat Engineer orientated Field Exercise)	Relatively easy to set up. Fewer demands on instructors and resources.	Subjective assessment dependent on instructor. Poor confirmation of individual achievement. No standardisation between instructors. Attended performance and not knowledge or skill. No feedback
NOTHING	Easy to do.	No feedback. No measurement or incentive. Unaccountability. Not acceptable.

though that it could be enhanced, possibly by the following:

- Increase Training Time. (And hence testing time.) Though the number of trainees entering the system would have to be reduced, the demographic trend, political temperature and trainee selection criteria makes this an attractive option. The introduction of new equipments such as the new range of shaped charges, the Platform Access Under Bridge (PAUB) and new bridging equipment for the '90s may also have a bearing on this.
- Reduce the Number of Training Objectives. With fewer Training Objectives, training and testing can be concentrated on critical areas. However, the Job Specification for Combat Engineers would have to be re-written. With fewer level two performance training objectives, the ones on collective training in a Unit would increase.
- Eliminate Class 3 Combat Engineer. Training to Class 2 Standard from the outset would see a corresponding increase in time spent in the ITO but continuation training in a unit would be reduced. Testing time would have to increase. Combat Engineer Class 2 continuation training for some specialist units is difficult to achieve anyway.
- Induction Courses. The running of periodic induction courses, by units, for recently qualified Class 3 Combat Engineers, enables units to ensure a common standard that can be built on, once critical training objectives are achieved in the ITO. This has already been introduced in some infantry units with considerable success.
- Work Books. Training and testing of critical Training Objectives, only, is done quickly in the ITO, and then Class 3 status is granted. Subsequent training and testing of the remaining training objectives can be achieved as collective training permits in units. These are "ticked off" in a work book until completion when Class 2 status is awarded. Work books are now being increasingly used in other Services and in Foreign Armed Forces. The main problem with this system is that it penalises those not posted to units that regularly carry out Combat Engineer training. It also imposes more on the receiving unit.
- Use of Simulators. To optimise further the use of time, manpower and resources, the use of simulators, Audio Visual Aids and videos could enhance the training and testing process. It has the advantage of broadening a test (without resources) and is totally objective. It is however, the antithesis of practical work — lifting an MGB panel by computer button does not test a man's strength!

The Validation of Training

As previously mentioned, the validation of Combat Engineer training is well established. The recent Review and Monitoring Programme (RAMP) by CTAD's Inspectorate, of Combat Engineer training in 12 Engineer Group commended its validation method, but it would be unlike Sappers to be complacent.

Internal Validation. Internal validation must be designed to determine whether the trainees on a course are being given the opportunity to achieve the training objectives for that course. The following aspects should be considered:

- The need to assess training as it progresses so that any problems can be identified and dealt with as they arise.
- Measurement of the overall success of the course, in case some further remedial action is required.
- The identification of course weaknesses, so that they may be eliminated

Data Sources. The main sources of data for internal validation come from the following:

- Trainee Opinions. As a course progresses, trainees can give a good indication of how the training is received. Too often trainee opinion is dismissed as the instructor/trainee differential is maintained. As long as objectivity and perspective remains, valuable information can be gained at the end of a course to improve it in the future. Content will rarely be changed but timings, sequence methodology and administrative aspects can be enhanced by canvassing ideas and comments from trainees. The main sources of data would be questionnaires, debriefs and interviews. However, to ensure that they are of value they must be specific and comprehensive. General questions will invariably elicit general answers giving limited feedback and information.
- Instructor Opinions. The efficiency and effectiveness of training will depend, to a large extent, on the motivation and calibre of instructors. As the selection of instructors is done with care, they are usually fully capable of contributing to

the management of their course. Perhaps greater emphasis could be placed on their views and recommendations as they are a major part of the organization. It may even help enhance their perceived status and let them make a positive contribution to the system.

- Commanding Officer/Chief Instructor Opinions. Whilst the chain of command has a considerable part to play in internal validation, caution must be exercised if the 'creep' or 'Yet Another Bright Idea' (YABI) input into a course is not synchronized with SAT. The content of training is established through analysis of training needs and the introduction of new equipment. It is confirmed through external validation. The stabilization of training, that is limiting the tampering with a course by commanders and instructors, can be helped by the wider publicity of Training Objectives. Trainees are then aware of what they are expected to be capable of achieving. However, and far too often, trainees are denied access to training objectives and YABIs get introduced into a course. As the training period is finite, every YABI in, equals a subject already sanctioned by the relevant Authority, out.
- Test Documentation. TVTD provides a stringent internal validation of test results and data. This provides quality control as previously outlined. It is further enhanced by quality control of the instructors testing, (by the QMSIs) and selection of the tests used. Even so there may be scope to introduce an external team of NCO instructors attached to TVTD whose main purpose is to test training (trainers?) but independent from instructors and trainees. Establishment difficulties and the "No spies in my camp" approach will militate against this.
- Instructor Assessment. This is currently particularly well established in the Training Regiments and the instructor monitoring plan is regarded as an essential element of the quality control programme. The debriefing and counselling of instructors maintains an element of feedback.
- Miscellaneous. Relating results to past internal validation course critiques and observations may help the whole process. The annual Combat Engineer conventions for example, provide an excellent forum for QMSIs, Training Officers and interested parties to air their views and give some feedback on the validity of training.
- External Validation. External validation seals the SAT loop. CTAD regards it "... in the absence of anything else, as the one great corrector of weak links". Theoretically, the conduct of a job analysis and production of a job specification should ensure that the training objectives do reflect the requirements of the job. However, jobs change in terms of equipment, techniques and the context in which they are performed. Job analysis is not an infallible process. It is essential therefore, that the ex-trainees who have passed the course are assessed to discover how successful they are on the job. It is important to know when training objectives need changing.

Unfortunately, external validation is a major undertaking, but it can be made easier by computer analysis of the data. For Combat Engineer training this is the responsibility of RETDT. The major sources of data for this are:

- Ex trainee opinions
- Supervisor opinions
- Commanding Officer opinions

} in combat engineer units

- Work records
- Work performance
- Incident reports (validation of training procedures for safety)
- Passage of information (conferences, discussions, visits etc).

As a general comment, the importance of external validation has perhaps not yet been given its correct emphasis. Although within SAT it occurs towards the end of the process it is no less vital for that. It is common to hear derogatory comments from the 'employer' as those in Sapper units lament to themselves or the world in general over the inadequacies of their recently arrived 'Class 3s'. The sources above are thus vital in passing information on techniques and inadequacies. Units may be ignorant of their part in contributing towards external validation, but as SAT becomes more widely understood, so also will units appreciate the considerable part they must play in moulding future Combat Engineers.

Other Options for Change

As political, demographic and financial constraints impinge on the Army of the nineties, including the effects of "options for change" we will have to make best use of our recruits and manpower resources. E^3 will be the foremost consideration of the ITO. Within SAT there are many improve-

ments that can be applied to Combat Engineer training such as:

Remedial Work. At present a remedial system for combat engineer training is largely organized on an *ad hoc* and internal basis.

Progress tests for those with problems, so that they can be identified and brought back on course, will help. However, we must be prepared to separate weaker members into an organization that can take time to bring on the individual at his pace until he is ready to return to the mainstream. The Scottish Division runs Bannockburn platoon and has saved many a potential PVR. Perhaps, as the quality of trainees is unlikely to alter, this may become essential and Halidon Troop will become a reality. (All English readers should, after reading about Bannockburn 1308, look up Halidon Hill 1332.)

Learning Methods. We must turn the teaching telescope upside-down and examine our learning methods of which there are three:

a. Mass instruction techniques (one instructor to numerous trainees such as a lecture or presentation).
b. Group learning techniques (small groups of trainees work together to achieve a collective 'solution').
c. Individual learning techniques (trainees tackle problems on their own at their own pace).

The Army has concentrated in the past on mass instruction techniques. However, educational and industrial experience has moved towards group and individual learning techniques with some success. Indeed some of our young recruits will have experienced mass instruction techniques only infrequently at school. Group and individual techniques do not initially seem entirely appropriate to the military application, especially as there are trainer implications. But groups of trainees do not start and finish a course with the same level of knowledge. We should acknowledge this and pace the training accordingly. The days of the convoy approach may be over. In the past individuals failing to make the grade have been rejected — this may not always be possible in future.

Modern Instructional Technology. The increased use of Instructional Technology (IT) could have a direct application to both a. and b. above. The

following are examples:

- Inter-active video
- Computer assisted learning
- Programme learning packs

The emphasis is on the individual going at his own pace. Instructor manpower resources are not tied down and training may become more cost effective. The increased use of audio-visual aids and computers through IT will lead to E^1 in most (but not practical) training situations. What for the Royal Signals may be relatively obvious is less reconcilable for a practical, hands-on organization!

SUMMARY

THE testing and validation of combat engineer training are vital aspects in the Systems Approach to Training. Testing is a laborious and resource intensive exercise; however, it allows the correct assessment of our Training Objectives. There are clearly possible areas for improving our current system. SAT is an inter-active and systematic procedure and it must be borne in mind that any changes have implications to other areas of the loop. As trainers we must be self critical and prepared to try new methods.

Internal validation processes are well established within Combat Engineer training and appear to be working well. Where we must not be complacent is in the effort directed towards

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external validation. We ignore it at our peril and face the possible deterioration of the combat engineer capability of the Corps. All units have a part to play.

Technology will have a greater part to play in the application of our training to meet the resource and manpower requirement of the future. Individual training will become more relevant in a shrinking Army, and so more time should be devoted to training the individual. We must be ready to pace the training to suit the recruit and not force the recruit into following the training.

"SAT is now a well tried philosophy for the Army and for many sections of industry and commerce. There is however still a long way to go before we can be confident that it is being thoroughly applied throughout the Army's training organization" (DAT). SAT is here to stay and the management of change to testing and validation in Combat Engineer training will need careful control. It is always easier to control self generated policy decisions rather than react to externally induced forces beyond our control. We must be ready to move now.

RE Museum News

COLONEL G W A NAPIER MA, DIRECTOR RE MUSEUM

THE December 1990 *Journal* contained a comprehensive article on the RE Museum, based on the Director's official 1990 report. The Trustees Steering Committee felt this was appropriate so that the situation at the start of the development programme should be recorded for the benefit of all. We are grateful to the Editor for allowing the space. The annual report will continue to be produced in time for the first quarter meeting of the Council of the Institution. It will be distributed to all relevant Corps committees and copies can be made available to individual Institution members. Rather than repeat the annual report in the *Journal*, however, we plan to offer a brief summary of the latest news from the Museum for publication in each issue. This article is the first such account.

PROGRESS ON DEVELOPMENT

THE completion of the courtyard roof was the highest profile event of 1990 and perhaps the most significant step forward. The work was finished on time by the contractors, Arnold and Nathan, a Kent-based firm who had won the design-and-build contract. The task of setting up the new displays in the Courtyard will take both time and money. Some £300,000 will be needed for this part of the project and while that is being raised certain preparatory work will be under-taken and as much use as possible made of the covered area, a useful arena for events, at least in the summer months.

The other major step forward was the introduction of sound effects in the galleries. Produced in very high quality and using accurately researched material the sounds are automatically triggered when visitors interrupt an infra-red beam.

A highly successful reception was held in the courtyard on the evening of 16 November 1990 to celebrate the completion of the roof and the introduction of the sound effects. The Chief Royal Engineer was host at the party and the Lord Lieutenant of Kent, The Right Honourable Robin Leigh-Pemberton performed the ceremony with some appropriate words. Over 200 guests, most of whom had been associated with the roof in some way, enjoyed a special viewing of the galleries.

Less high profile but critical to the future of the Museum, the offices and stores have been relocated within the Ravelin building. This has been a complicated operation which has included the incorporation of special measures to satisfy fire safety considerations. From the Museum's point of view the great gain has been a very satisfactory set of new offices located together in the corner of the building above the medal rooms, and a series of store rooms with improved racking and environmental control to give the small stores in the reserve collection an adequate standard of protection.

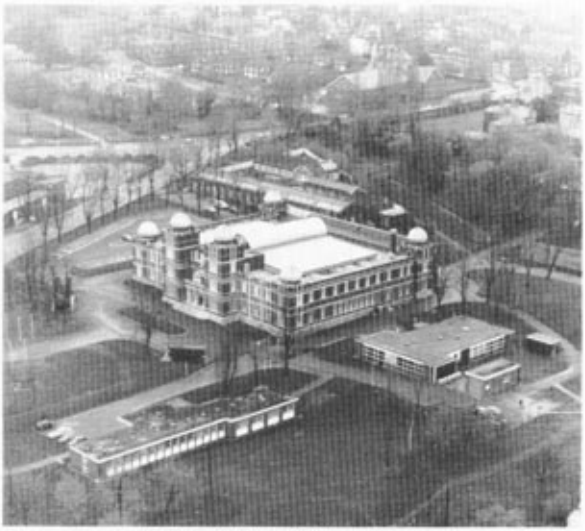
The immediate next steps in the development plan are improvements to the public amenities by upgrading the toilets and setting up a coffee room to provide a much-needed facility for visitors. Work will then start on the improvements to the pre-World War Two galleries recommended in the Feasibility Study report, a long process which will improve visitor appreciation enormously as well as providing better conditions for the items on display. Unfortunately there will be some disruption during this work with closure of some sections, but there will still be plenty to see and it will be worth it in the end.

One special project in hand, however, is the production of a wooden ramp at the entrance to the Ravelin building to facilitate access by wheelchair users. This is one measure in a gradual programme of improvements for disabled people we propose to introduce as and when we can. The ramp is being partially funded by the ADAPT fund (Access for Disabled People to Arts Premises Today) part of the Carnegie United Kingdom Trust. In the autumn of

Guests gathering in the courtyard of the Ravelin Building at the reception to celebrate the completion of the roof and the introduction of sound effects

RE Museum News (p67)

1990, a representative from ADAPT paid the Museum a visit in her wheelchair. As a result of this we were able to appreciate the need for some improvements in the arrangements we had made so far, albeit with the best intentions, for disabled people.



The Ravelin Building in 1990 showing the new roof

Acquisitions

Items continue to be offered to the Museum every week and we are most grateful to current and ex-members of the Corps who are alert to the needs of the collection. We do now have collections and acquisitions policies agreed by the trustees giving us guidelines as to what to accept. It is not often that an offer is turned down but limitations of space or the need to avoid duplication dictate that we do have to decline items from time to time.

The most exciting of recent acquisitions that have come to us are some 400 items connected with General Charles Gordon, offered on long term loan by Gordon's School in Woking. This collection covers the whole of Gordon's career including his time in China and the Sudan. Particular items of interest are fine examples of rare Taiping and Imperial Chinese court dress which complement items already in the RE Museum collection and a splendid lacquered bureau and games table presented to Gordon by the Chinese Emperor in recognition of his services. The Sudanese material includes an interesting variety of flags, weapons, armour and more unusual items such as musical instruments. The School collection is also rich in personal memorabilia of Gordon such as the teapot used at his Ragged School in Gravesend and many letters, sketches and portraits. Readers of the *Journal* will remember the article by the Curator in the August 1990 issue describing Gordon's manuscript journal which we had acquired in 1989. This new collection will mean that the RE Museum will house one of the best reference points in the world on Gordon material and on 19th Century Chinese court dress of the rank to which he was appointed (Titu or field marshal).

The Museum staff now have a major task sorting all these items out but in due course we hope to mount a special exhibition. Some items will appear in the refurbished galleries this year. We are extremely grateful to Gordon's School for entrusting us with their unique collection which they have done on the grounds that a lack of specialist staff makes it difficult for them to maintain the items or display them properly.

Staff

An important step forward has been the addition to the staff of Mr Philip Dutton in the post of Registrar. His work entails the detailed accounting for the collection and will lead to a computer record which it is intended to initiate this year. The Registrar will also act as Deputy Curator. The full staff is listed in the front of the *Journal*. Institution members are very welcome to get in touch with any queries.

Visitors

1990 saw a small increase in the number of visitors to the Museum over the previous year from 12,414 to 12,691. Because of the disruption in the galleries we are going to have to work hard to keep up the numbers in 1991. However there will be some special exhibitions and events which will be regularly announced in the Supplement and there will always be something new and interesting to see. The Museum's greatest need is for more visitors to enjoy what is already a fascinating display which we are confident will become of national interest in the future as it develops. We hope all Institution members will spread the word and encourage visitors. Special arrangements can be made for parties, preferably with advanced notice.

The Wasted Years — Part I

MR H W ASHTON

On 1 September 1939, Second Lieutenant Harold Ashton, a Surveyor with Derbyshire County Council and a member of the Territorial Army, reported to the Royal Engineers Depot at Chatham. He went to France with 242 Field Company on 28 October, was wounded and captured near Arras on 24 May 1940 and spent the next five years in eight different prisoner-of-war camps.

Derrick Vernon has abridged Harold Ashton's memoir of over 40,000 words (to be published in two parts), and the full text with numerous sketches is lodged in the Corps Library.

Home Service

The first job was to erect air raid defences. The method was to use timber boxes about six feet high, eight feet long, and three feet wide, filled with gravel, to protect buildings against bomb splinters.

The next day, Sunday, I was detailed to lead fifty boy soldiers on church parade. I thought of Rugeley Grammar School Cadet Corps; they looked just the same. At 1100 hrs war was declared, Germany having ignored our ultimatum to withdraw from her invasion of Poland. An air raid warning sounded by mistake. This was the first time ever and everybody went round in circles.

There was another strange happening that day. A despatch rider returned to the guard room at St Mary's Barracks, parked his motor cycle, walked into the guard room, picked up a rifle leaning against the wall, took a bead on his best friend and shot him dead.

The day before there would have been nothing up the spout.

Why that soldier should have fooled around with a rifle no one will ever know. If it had happened the day before there would have been a coroner's inquest, now a few hours after a state of war had been declared, there would be a military inquiry.

For six weeks it was training in demolitions, bridge and field works. We slept in the officers' married quarters, now bare and empty. The Mess at Brompton, one of the finest in the British Army with that marvellous long black sideboard which Gordon brought from China, was now all khaki; the scarlet and navy uniforms would be in wardrobes for the next six years.

There were 26 in our training group, commanded by a major of the Madras Sappers; and what a good chap he was.

Twice I got weekend leave to see Kath and baby John, now living with her parents at Hallow, near Worcester. Poor Kath. What a devastating blow to our married life. Yet, looking back, neither of us would have taken any other line.

After four weeks 24 volunteers for India were called for, I declined; I wanted to be with the BEF in France.

In October I joined 242 Field Company in the 52nd Lowland Division. The OC was Major V Z de Ferranti MC, he had won his MC in the Dardanelles in 1915. A reserve officer, he had left his desk as head of one of the top armament firms, but was subsequently recalled to his prior responsibilities.

The other officers were Captain Fraser and Lieuts Eason, Laird, and Kirton; three Scottish officers, all architects, and three English officers, civil, mechanical and electrical engineers respectively. It became apparent in our after dinner talk that these two groups had quite different ideas, we engineers were absolutely sure that engineers did all the real stuff and architects merely added the decoration! The CRE, Colonel Keeling was reputed to be a martinet, but I did not see that side of him. On my first evening in Mess a bottle of Drambuie came round the table, I asked for the bottle again and the room fell silent; nobody had told me this was the Colonel's evening treat for his officers!

We moved to Bordon, and after a few days leave crossed the Channel to Cherbourg and entrained for Orchies near the Belgian frontier; we were seventeen hours on that train!

France, Belgium and Prisoner

242 Field Company were then engaged in a variety of tasks in Northern France and Belgium culminating in bridge demolition and defensive mine laying against the German Blitzkrieg of May 1940.

In the early hours of 24 May the Company was ordered to leave Arras and make for Douai; showing no lights; I was to lead. As we passed over the St Nicholas Bridge, already prepared for demolition, I wondered who would be the last man out to blow the charges.

On the outskirts of the city was a military policeman, directing traffic. I went along the route the policeman

pointed, towards the Douai road. I learned from Major Abraham, after the war, that this "military policeman" was, in fact, a German in British uniform. He was caught out after my company had passed and dealt with; which means he was taken round the corner and shot.

This is the certain fate of any soldier captured wearing enemy uniform.

It was a great strain, driving in the dark without lights and aware of the near presence of the enemy almost surrounding the city.

Somewhere near Fampoux I stopped at a road fork, the remainder of the Company halted in line behind. The correct road for Douai was to the left but just at that moment a young woman appeared. *Le pont est saute*, she cried, in great excitement. I left my vehicle and walked along to the bridge. There was no bridge, it had been demolished by dive bombers or the German engineers.

So I headed to the right, followed by the Company's thirty odd vehicles. The truck immediately behind me carried our explosives. From time-to-time I told Sapper Endean, my driver, to stop whilst I left the truck and reconnoitered ahead on foot.

We moved on slowly, still in darkness. Then, two staff cars overtook us. Great relief, someone else to take the lead.

I told my driver to follow but almost immediately they stopped and we did likewise. And there, on our left, was a column of German infantrymen, some armed with Tommy guns. I could have touched them. For a few seconds no one moved. Then pandemonium.

A Very light went up. There was shooting and hand grenade throwing. The road had an earth bank on each side; no hedges.

The Germans dived over the bank on the left. We, those of us not knocked out, dived over the bank on the right. I felt something like a brick hit me on the left shoulder. I fired my revolver at a German moving away from me. And behind the shelter of the bank I found myself lying on the ground in the company of a Signals lieutenant and an Infantry sergeant. The shooting kept on over our heads. Two bullets passed through my clothing but did not touch me.

Soon there were German soldiers all around. An officer with a sub-machine gun disarmed me. The sergeant put a field dressing on my shoulder and then I looked for my batman, Sapper Colin Fowler. There were about a dozen dead British soldiers lying on the roadside and some German dead too.

I looked into the back of my vehicle, and saw Fowler lying there. I told him he could get out but there was no movement. A couple of German soldiers lifted him very carefully out and placed him on the ground. He had three bullets through the chest and one through the neck. But he spoke, and the first thing he said was, "I heard ye order me to get out but I couldna move sir." Endean, my driver, was dead, his face shot away. He could have known nothing. Corporal Duncan McKellar, one of two men in the vehicle following me, was also very badly wounded by three bullets through the chest. The Germans lifted McKellar placing him next to Fowler and put field dressings on them both.

A German soldier had orders to guard me. We did not speak but he seemed to read my thoughts. He led me over the field, gathered a few bunches of straw and placed them on the ground. I dropped on them and fell asleep.

Next about twenty German infantrymen approached, yet keeping at a respectful distance. It seemed this was their first encounter with British troops. One of them, acting as a spokesman asked if I was an officer. British battledress does not have much difference from the troops except for the shoulder pips and collar and tie. I explained this and pointed to the single pip on my epaulet.

He translated and the young soldiers listened with great interest. I thought they were more respectful than my Scots sappers! The English-speaking German then said, "For you the war is over." As things turned out for me the war was not quite over.

He asked me why England was at war with Germany; why could not Churchill be friends with Hitler? As he talked his political sophistication amazed me for so young a man. I replied that it would be a long war but that Germany could not win; America would come in sooner or later on our side. When he again translated the soldiers listened in silence. They were part of the German Sixth Army. I wonder how many of those young soldiers listening to me on 24 May 1940 surrendered at Stalingrad three years later or, if they survived until then, how many returned to their homeland. My talk with these soldiers was interrupted by a German officer who asked me if I had any military documents. All I had was my field service notebook. He looked through it and was much interested in a sketch of the bridge I had demolished at Eichem. He asked me my regiment. He tore out the page with the bridge sketch and politely handed back the book. I noticed a horse being led onto the

scene. It carried a mortar encased in leather, the barrel on its left side and the support on its right. The mortar was set up and quickly in action. The target was the column I had been leading, now taking another route which lay past a British First War cemetery. Eleven years later I was in that very cemetery looking for Endean's grave and I saw headstones damaged by the shells fired that May morning.

I walked over to the seriously wounded, my guard shadowing me. I gave my attention to McKellar and Fowler who were lying on their backs quite conscious. They both urgently wanted water which I gave them. McKellar said "I got two of them with my rifle" I believe Corporal McKellar and I were the only two who fired a shot.

I walked along the battlefield among the dead, looking for Sapper Cox. I did not see him but it seemed he had attempted to get back to the Company halted behind and was killed by machine gun fire. In time an ambulance arrived, I wanted them to take McKellar and Fowler first as they were in much greater need, but our captors would not agree and with the other wounded Officers we were taken to a casualty station. The doctor quickly cut away my shirt and vest, removed the field dressing, gave me an injection and bandaged me up. I asked him what had hit me and he said it was a bullet. I had my doubts at the time and later I knew it was a few bits of a hand grenade. Some of them worked their own way out during my time in POW camps. I was wearing a thick greatcoat at the time and I was lucky being hit on the lapel giving me double protection. Later that day they transported me to hospital in Cambrai; staffed entirely by civilian doctors and orderlies. I never saw any women nurses but during my four days there I saw several times the French matron tour the wards escorted very respectfully by German officers. Every bed was occupied by British or French wounded so I had to lie on a mattress on the floor. I was quite ill for two days and remained asleep most of the time. Once an orderly wakened me up to take my temperature. I took the thermometer to put it in my mouth but the orderly, with a great laugh, snatched it from my hand. He had just taken it out of a soldier's bottom in the next bed!

When I recovered I looked for McKellar and Fowler, who were on the top floor. To my surprise and great pleasure they were now out of danger. The seven bullets they had received between them had passed right through doing no vital damage. I knew we should not be together for long. I asked them if they had any money. Neither had so I shared what cash I had, something like three thousand francs.

Except for the one page from my field book, the Germans made no attempt to take anything from me until I arrived at a permanent prison camp where they confiscated my camera, a slide rule and a wristwatch. Another watch, an army issue Rolex, they allowed me to retain. I still have it.

One morning we were ordered, all who could walk, to parade in the courtyard. I went for a farewell chat with McKellar and Fowler. Afterwards, as I paraded with others down below, someone nudged me and pointed above. There was Fowler calling my name; and a twenty packet of Gaulois came flying down from the top window.

There were about a hundred of us going, under heavy guard, eastwards toward Germany. That first night, we were marched into a field. It was not long before a German officer came amongst us enquiring if there were any wounded. Someone pushed me forward. The German looked inside my tunic and was quite satisfied when he saw a bloodstained bandage and so it was not long before I was seated in a motor coach along with other wounded officers. The man who pushed me forward was Lieut Perrins of the Worcestershire Sauce family.

The next night we spent in a village church. There were others besides us. I did not get any sleep, sitting bolt upright in a hard-arsed pew among French and Belgian soldiers. There was one big laugh. Then the Germans counted us before opening the church doors there was one man missing. There was another count; and another. We were wondering when this was going to end when suddenly a young Belgian soldier, someone like Fatty Arbuckle, popped up in the pulpit where he had been curled up all night. Even the Germans had a good laugh.

The next day we were in the city of Luxembourg. Some of the civilians pushed cigarettes through the coach windows when we stopped in traffic. A German officer walking in the street saw this and officiously took the name and address of one of the offenders. During the afternoon I was taken to another casualty station. The German doctor examined me meticulously and asked if there was any blood coming from my mouth; there was a piece of hand grenade in my left side.

We travelled on in the motor coach, a soldier was at the wheel and another, with a loaded rifle, at the

coach door. They were not unfriendly. The driver stopped to consult his map, which he could not find. I had seen one of the French officers pocket it when the driver put it down after the previous stop. Several French officers helped in the search. The officer who seemed most concerned about its loss was the one who had pinched it. After a while, to my great surprise the driver gave up the search, thought it was lost, and drove on in the most good natured way.

As we travelled eastward, military traffic was going the other way towards the front. Something quite unexpected was the extraordinary quantity of horsedrawn transport moving steadily in one long line as far as you could see, keeping close to the near side out of the way of motorized vehicles continually overtaking. The coach ride ended at Trier in a modern barracks on the Moselle. We were accommodated in a large room with thirty beds, the *waschraum* was also large and spotlessly clean. When we used the *waschraum* German soldiers came and went, passing through a steel grid door which clanged to and self-locked after them.

One morning Lord Arundel and I were washing, heads down in soap suds. Several Germans walked behind us and we heard the steel door shut with its usual bang. When Arundel opened his eyes his soap had gone. German soap during the war was of very poor quality and the soldier who took the soap was one up over his comrades. One day all this changed. Several hundred British officers arrived, force marched from Cambrai, a journey of about one hundred and seventy miles, the dreadful march I had been so lucky to miss through having a few bits of a hand grenade in me!

Later, at Laufen, a young officer told us something he had witnessed on this march. A Captain stopped by the roadside to tie a loose bootlace. He took his time over it for a breather and a German NCO ordered him to get going at once. The Captain answered him back and promptly received a revolver bullet in the head, killing him on the spot.

The most distinguished prisoner here was Brigadier Somerset, wearing the DSO, MC and all the 1914 ribbons. I happened to be nearby when a high ranking German asked the Brigadier where he was taken prisoner. The reply was very brief, "Somewhere in a ditch." After a few days, we moved to another barracks at Mainz.

Now it was the regular POW diet; about an ounce of black bread and two watery soups each day. Per week, two ounces each of the following; meat or fish, margarine or dripping, sugar or honey, cheese and jam. This diet never changed throughout my five years as a prisoner.

There was tragedy at the barracks. A French general hanged himself, it seemed he could not live with the disgrace of the French surrender. At Mainz I became ill, and I was put in the hospital wing. I knew nothing for some days and when I came round the medical orderly told me my temperature had been 104 Fahrenheit; touch and go. There were eight or nine in the ward and opposite me was one Lieut Sir John Lindores Leslie, a cousin of Sir Winston Churchill.

Laufen

Laufen, Upper Bavaria, is a village on the River Salzach, dividing Germany from Austria. We marched from the railway station to the prison camp, a big square building, one time the palace of the Archbishop of Salzburg, now anything but palatial, just bare walls and floors. There were hundreds of British officers in the place all with heads shorn. This happened to everyone in my batch. It was not done for humiliation, although some thought it was, but for a quite different reason. In every war in history, from the time of Alexander the Great until the 1914 war, armies have been decimated by typhus, caused by infection from lice, so heads were shaved. Later in the war this practice was discontinued.

A disc with a number was given to each of us. It was done with the usual German method, alphabetically. My number was 747; I already had an identification disc issued at Mainz, number 430. I threw this one away. On one occasion, some time after, this double identity baffled the interrogating German officer after an escape but I never explained.

With others I was directed to room 81. There were ninety six of us in the one room with thirty two triple decker beds, later the top decks were removed and the room population reduced to sixty four; a great relief although still crowded. The room had a large heating stove of the kind quite common in Germany. There were three windows, two overlooking an inner courtyard and one looking over the River Salzach. Very close by is a suspension bridge. On the bridge portal on the German side is a Hohenzollern crown and on the other Austrian side, a Hapsburg crown. And there also on the other side is the village of Oberndorf where was born the hymn, 'Silent Night'.

Every POW I knew always said Laufen was the worst of all camps. There were over a thousand British officers in the place. The Germans, after the French defeat, were quite certain they would win the war and at Laufen their attitude was very severe.

In addition to the head shave we were deloused; one by one we went naked into a hot cupboard. As it turned out there was not much illness all my years in POW camps. A British army doctor lectured us on the subject of our very low diet and said it was adding years to our life span!

In the washrooms it was cold water, but once a week everyone had a hot shower. After a few months on that diet we used to have a good laugh during the weekly shower. Reduced to sixty four officers we formed into eight messes of eight each. Among those in my mess were Armstrong, an Oxford graduate who was teaching English in Cairo when the war began, another Oxford graduate whose name I forget, a bank clerk named Scott from Newcastle-on-Tyne, a solicitor from Chichester, one from the film world and one or two more whose names I cannot recall.

Mickey Sturton was in this room. During a later camp move he made an escape attempt by hiding under the train, hoping to get away when the train moved. But he was detected and, coming out with his hands up a German guard shot him dead.

Ronnie Simmonds, who stroked Cambridge to victory three times running was there too. But the outstanding officer in the room was Mike Sinclair. He was already planning escape though he never escaped from Laufen. As time went on Sinclair escaped seven times, was recaptured every time and finally sent to Colditz. There in September 1944 he made a suicidal bid at escape and was shot dead. Lieut A M Sinclair's name is on the War Memorial at Winchester College.

One day Second Lieut Edward Dees of the Durham Light Infantry was making a sketch of the suspension bridge from the window of our washroom. There was an order from the Commandant forbidding prisoners from sticking their heads out of windows. This was because Polish officers before us had thrown beer mugs at German soldiers on the ground below. There were bullet marks on a wall where they had shot a number of Poles for doing this.

A sentry in a watch tower outside the camp on the river bank shouted at Dees but Dees, not understanding carried on with his drawing. The sentry fired at Dees and killed him with a bullet in the head. A friend of mine, Norman Cooper, happened to see the sentry being escorted into the camp, white as a sheet, immediately after. At this time I was one of a class being taught German by a German NCO. His class ended, no one would attend.

There was a commotion as new arrivals entered the main gate. Chaps in neighbouring rooms were looking out of the window and the guards shouted to them to get their heads in. They did not respond to the satisfaction of the guards and one officer got a bullet through the arm.

It would be three weeks before I could write home, to my wife and mother, it was another two months before I received a letter from home. They had believed me killed. Kirton had visited my wife. Every member of 242 Field Company except the five of us killed, wounded or taken prisoner safely reached England. Kirton said there was no hope of my survival because my sergeant had seen me blown up with the ammunition truck. I could have emulated Mark Twain and written that the reports of my death were greatly exaggerated!

For three months there was no reading matter at all. Here and there an officer might have a book but none came my way. It was a strange experience to have nothing to read; lectures were organized on numerous subjects.

Morning *appel* was at eight after a large container of *ersatz* tea or coffee, without milk or sugar was brought to our room. The coffee was just about drinkable, made, I think from some cereal. I do not know what the tea was made from but it was absolutely undrinkable. We were paraded twice a day for counting, sometimes three times. So I was counted over four thousand times!

Salzburg lies five miles south of Laufen. One could see its spires clearly. Once, when I was looking out of a window, the same window where Lieut Dees was shot, Colonel Morris joined me and spoke admiringly of the view. I said I would rather be looking over Cannock Chase and thereby immediately formed a link with him; he was a doctor in Lichfield. Colonel Morris was about fifty, he was repatriated in the autumn of 1943 and very soon paid a visit to my mother at Cannock to her very great pleasure.

Major General Fortune, Commander 51st Highland Division was also at Laufen, sadly two of his three brigades were captured at St Valery. Later on Brigadier Nicholson whose surrender of Calais haunted him ever after met his death by jumping from a third floor window.

Now and again a Colonel of the Manchester Regiment, lectured us on personal hygiene, so important in these circumstances. He always stressed the special need to use soap and water on one particular part of the anatomy, and so he became known as Colonel Cleancrutch!

One afternoon I was in one of the captains' rooms, all rooms being set for one rank. A captain emerged from a lower bunk and, a minute or two later, returned whence he had come, almost out of sight. Someone said, "That's the Dormouse, he sleeps twenty two hours a day."

After a time our Senior British Officer applied to the Commandant for officers to take parole walks. They were granted later at several other camps but never at Laufen. The Commandant, said that if he were a prisoner of war in England he would consider it his duty to break parole and try to escape.

Lieut Hugo Ironside, a nephew of General Ironside, and Peter Douglas were in our room. One very red faced officer O'Hara, could pick any lock; his red face resulted in the nickname 'Scarlet'. One time a German staff car was parked in one of the courtyards and O'Hara purloined a road map from this car right under the nose of the guard. Later he was one of several who tunnelled from the east block and escaped; but they were all recaptured.

In our room there was an old Etonian, an old Harrovian and an old Wykehamist. Soon after we arrived there I heard the one from Winchester talking to the other two.

"We three are from the best schools in England, we must all stick together."

The first Red Cross parcels arrived in November. There was one parcel between eight officers. Each parcel contained six pounds of high protein food; butter or margarine, milk powder, sugar, cheese, tinned meat etc. There were also two ounces of tea and coffee; if ever you have been without real tea and coffee for five months you will understand.

It was at Laufen in 1940 I heard the only two whispers of losing the war, but never, in my five years in Germany, did I hear anyone else talk of defeat.

For a period in the winter there was an issue of skimmed milk. From the courtyard a man from each room collected one bucketful and the first thirty who queued up in the frosty air got half a pint. Our milkman was Lieut Durlacher of the banking family.

The Red Cross were only permitted to send food parcels and they were addressed to the Senior British Officer. Next of kin only could send private parcels. My wife sent a letter describing the contents of the first one, but it never arrived.

In March 1941 it was announced that 150 of us were to be sent to Posen in Poland, to be accommodated in the Polish equivalent of Sandhurst. We disembarked at Posen railway station after three days in cattle trucks. It was a march of three or four miles to Fort Eight, one of those magnificent defences built by Bismarck when Poland was divided. All the way our guards on horseback kept us moving. I had few personal belongings, and carried them easily in a stitched up blanket.

At the fort we knew it was not the Polish Sandhurst, somehow the Germans had played a trick; most of us had been detailed for this move; but several had volunteered.

Fort 8 (Posen — Poland)

After some delay we marched into Fort Eight, along its dark brick arched passages and upwards into the daylight among grass covered hillocks and hollows. We ended in one of the hollows, a sort of mini-amphitheatre, all one hundred and fifty of us. And there, on the surrounding high points were machine guns, each manned by two steel helmeted guards. No one said a word, I know what we were thinking.

A German officer made an announcement what it was all about.

A German prisoner had written home describing his conditions in Canada. There was a foul sewer smell near his quarters; there was insufficient light to read, day or night; and, greatest indignity of all, he and his comrades were guarded by Canadians carrying rubber truncheons.

We were now to be subjected to similar conditions until things were put right in Canada. The German officer requested us to write home and complain, nobody did. General Fortune paraded us the next day and asked us all to say nothing. I have no doubt that the Germans sent General Fortune along with us for their own ends. I think sending him must have gone against the grain with some of them for they had high regard for high ranking British officers. There was a comic example of this on our train journey from Bavaria. At one large station the train stopped briefly. We needed drinking water but with armed guards around no one got out. General Fortune did and walked about the station platform ordering German soldiers, including the armed guards, about as though he were on a British parade ground!

The Germans with an astonished look, obeyed.

I have never seen anything like these long outdated forts. From two hundred yards distance nothing could be noticed except a low flat mound of grassland. On the German side, was a drawbridge over a dry moat about twenty feet wide with eight feet, brick sides and a stone paved bed. The west face of the fort displayed two storeys of windows, about forty all told.

The wash basins and showers, cold only, were in the underground passages, you were never sure there was water, it could be cut off without notice. Sometimes you would see an officer naked and covered with lather and suddenly no water whatever!

We were 30 to each small room and general conditions fitted those of German prisoners in Canada. Our window was barricaded from the outside leaving little light. The guards did indeed have a rubber truncheon hanging from their belts as well as carrying a rifle. They did not like carrying truncheons and always had a sheepish grin.

For sleeping there were three beds, each one a double decker of five beds up and five beds down. If you were placed at one end or other of the five there was no problem. If you were one of the other three, sleeping head to toe, you emerged with difficulty when getting up to visit the bucket in the corner. That is how it was, with the door locked at night, a sort of one extra over Canada.

There was no dining room at Fort Eight, we ate our two meals a day, soup and bread, in this one small room. There were scarcely any seats so we sat on the edge of a bed, head down to avoid the top bed, or we stood up.

After a couple of weeks the reprisal performance ended. I never heard the reason for this.

The shuttering was removed from the windows and we were no longer locked in at night, but rations remained the same.

One evening an officer near me was peeling a boiled potato when in walked a guard. He was horrified at seeing the potato peel removed and gave this officer a friendly lecture explaining the outside skin was the most nutritious part.

Educational groups were formed just as at Laufen and you could study almost anything. One of my great mistakes was in not learning German; but I never wanted anything to do with them more than I could help. But, some German rubbed off on me and after the war I found I could get around in Germany without much difficulty.

It was from here that Peter Douglas made his complete escape, the first from any prison camp I was ever in.

He and another officer were with others being marched to hospital in Posen city a few miles away. They slipped away unnoticed. One of them was quickly recaptured but Douglas managed to board a goods wagon on a train bound for Danzig.

We heard nothing more until the end of 1941 in another prison camp.

I was called to the parcel hut to collect a parcel personally addressed, a long hut with a sort of shop counter running the entire length, Germans unpacking parcels the one side of the counter, British officers awaiting their turn on the other.

Next to me was Captain Philip Taylor. He whispered, "they are doing my parcel. It's from Sweden. I think from Peter Douglas. Look, there's something in that jar of marmalade. Don't stare."

The Germans did not spot it and when Taylor fished it out, there was a message in small print screwed up inside. Even now, after all the years, I can remember what it said.

"Chicken arrived safely Sweden. Jump train bound for Danzig. Stow away Swedish ship. Do not ask captain. Polish farmers provide food and drink."

I believe Peter Douglas was awarded the Distinguished Service Order. There is no doubt he reported the continual movement eastwards of German tanks and guns which we all saw, something which British air reconnaissance could not have done at that stage of the war. I know British intelligence warned the Russians, but were not believed, of the impending attack in June 1941. Could Peter Douglas' information have played a part?

Some time after I saw a letter he sent to a comrade in the same camp I was in. It described London and ended up. "Thought about you and had another brandy. Best wishes. Peter."

A month after arriving at Posen we were once more on the move, this time to Fort Fifteen at Thorn, ninety miles north east of Posen.

Fort 15 (Thorn — Poland)

We met up with several hundred RAF officers.

Life now was more comfortable.

We were only ten to a room and Red Cross food parcels arrived with regularity.

Fort Fifteen was almost a replica of Fort Eight. I was in a room on the second storey, overlooking the dry moat but well above it. Squadron Leader Eric Foster made a very good shot at escaping. When it happened we witnessed the entire operation.

As always one knew nothing about anyone else's attempt to escape until it happened, if you were there you just watched. Here, after dark a ladder was put through the window bars of the room below then Foster got out of our window, hung by his hands from the sill and dropped about six feet to the hard floor of the dry moat. Like a shot he was on the other dark side near the opposite wall.

But the noise he made in his fall alarmed a guard who came along to inspect. We saw him, through the night, standing on the other side of the iron fence at the top of the wall right over the head of the unsuspecting Foster now at the bottom of the wall trying to erect his flimsy ladder.

But whoever calculated from a distance the total height of the wall and the surmounting fence did not get his trigonometry right. The ladder reached only to the top of the wall. So when he got to the top of his ladder and struggled to make a foothold on the narrow strip of masonry coping there he was staring up the muzzle of a rifle on the other side of the fence about a yard away. The guard called out and was immediately joined by another guard. These two then argued whether they should arrest or shoot him on the spot.

Foster spent the next twelve days in solitary behind one of the cell doors in the wall he had climbed. We watched his food taken to him and being exercised twice daily, all according to the Geneva Convention. Now and again his face appeared behind the bars of his window.

Arthur Walker was at this camp, a sapper Lieutenant later to become the Borough Engineer of Chatham. Not long after we arrived at Thorn he asked if I was interested in an escape scheme. "You bet." He led me in a small hallway to a large padlocked wooden double door each with two long strap hinges.

Some of our chaps had unscrewed one of the lower hinges, cut through the entire width of the door, and replaced the hinge with nothing out of place. The door led clearly to the inside of the fort, all verboten. All one had to do to get in was to remove the bottom bit of the door and squeeze through this twelve inch high space. Someone replaced the wood afterwards.

I had a hammer and bricklayer's chisel, (acquired unlawfully of course), a candle made of dripping and a bootlace in a small tin; I was guided to a point where some other officer had already begun to chisel away. There were many turnings and no windows anywhere. I thought I should have been given a ball of string.

I did my stint of 2 hours a day hammering away at brickwork, always alone; it was very eerie.

In time we were allowed to spend part of the day on the grassy top of this fort, on the same level as the ground around the fort itself. We soon worked out, by our methods of surveying without surveying instruments, that if our scheme succeeded we should emerge on the top of the fort but still inside the moat.

So ended my first try at escaping!

A guard visited our room on inspection tour every morning, always saluting on entering. Often he brought bits of news. One morning towards the end of May 1941 he had two very special news items, Hess had made a solo flight and landed in Scotland and the German navy had sunk the *Hood*.

When he left we gave him a four ounce tin of real coffee, which no German had seen for eighteen months. This tin was from a Red Cross food parcel, very precious to us but like gold to this young soldier. He saluted and thanked us. He would not open it, it would go to his mother in Hamburg.

At Thorn I met Captain Ted Beckwith, who had started a POW magazine named *The Quill*.

Everyone was welcome as a contributor and there was a wide variety of drawings, water colours, verse and prose writings. Writing and drawing paper were very scarce indeed and some contributions were offered on toilet paper. Ted Beckwith went all around the camp raising subscriptions for the final printed copy of *The Quill* after the war, whenever that would be. We all paid in *lagermarks*, I forget how much, and thought no more about it. A few months after the war ended a copy of *The Quill* turned up at my home in Staffordshire, to my very great surprise and pleasure. It contains the best of all the hundreds of drawings and writings Ted Beckwith collected, and somehow got back to England. Whenever I look into *The Quill* I see the names of many old comrades now no longer with us.

Mail to and from home was always random. You might get a reply in six weeks or six months; sometimes a batch of letters.

One chap wanted a pair of boots and sent several letters to his mother asking. They never came. So he sent a special letter saying — "My dearest Mother, Boots, Boots, Boots, Boots ..." filling the entire letter.

He got his boots.

On June the Fourth there was an Eton v Harrow cricket match on the grass on top of the fort. I think

We tried to alter a signal to red. They were all locked

there were about three players on each side, all in fact from Eton and Harrow!

Escape and Capture

We left Thorn in June 1941 by train for Biberach near the Swiss border.

Lieut John Wallace, of the Royal Scots Fusiliers, and I thought up an escape. It had to be at night, that night in fact: the next night would be too late.

The coach had two doors, one at each end, with a central corridor and seats either side. There was an armed guard by each door.

When it was dark John Wallace and I elected to sleep right by the door. The guard objected but somehow we got over that one and were "asleep" in no time. With one eye we could see he was satisfied, and the moment the guard's attention wandered we were out through the door; the lights of the train disappeared in the night.

John Wallace came out after me. When I picked myself up from the track I could not find him anywhere. He had heard my boots crunching on the ballast and thought I might be a nightwatchman. I found him hiding in long grass.

I had a needle I had magnetized and, with a length of cotton we ascertained that the railway was pointing southwest, just the right direction for Switzerland some 150 miles away. We hoped we had crossed the Danube. Later we found out.

We had been given half a Red Cross parcel at the beginning of the journey, to last us three days. Now, what was left would have to last for perhaps two weeks. We settled on eating about three ounces per day.

We set off, walking on the sleepers of this single track railway.

It was a reasoned guess that Switzerland was the destination of some of the trains. Why not alter a signal to red and board a wagon?

We tried it. They were all locked.

As daylight approached we settled down in a thicket nearby. Next morning it turned out to be at the end of someone's garden and soon small children were playing around for much of the day.

We consumed our food in this tiny cramped space and at nightfall set off again.

We walked through several stations and in one of them our footsteps were heard. We lay low and watched men searching among the rolling stock. One of the searchers was a soldier in uniform. In the end they gave up and we moved on.

The Challenge of the Mount Pleasant Complex Swimming Pool

LIEUTENANT COLONEL C E ZIMMERMANN BSc(Eng) CEng MICE

Lieutenant Colonel Carl Zimmermann was commissioned in 1970 and spent his early years playing rugby and on Regimental Duty in Northern Ireland, Cyprus and Buckingham Palace. He is probably the only RE Officer to spot dust on the top of a Guards Officer's Bearskin during the Changing of the Guard!! Later years found him on the site of a nuclear power station as part of the PET course. As a Squadron Commander he worked with the RAF at Wildenrath in between trips to Australia, the Falkland Islands and Cyprus. His ADR experience and a supportive CO persuaded PB7 to send him to the United States Air Force Engineering and Services Centre in Florida for two years for which he will be eternally grateful. He returned to the fold in 1989 and has spent two years with 519 STRE (Wks) compiling the Design and Planning Report for the new swimming pool at Mount Pleasant. He assumed the appointment of Chief Instructor at the Civil Engineering Wing in February 1991.

Introduction

There is no doubt that the readers will fall into a number of groups after just one glance at this title. Many may feel an overwhelming desire to yawn or put the cat out. Thrusters, while secretly giving thanks for not being involved in the project, may see a career interest and continue to read, hoping to glean advantage from the anticipated trouble and tribulations of others. Doubters may see the spectres of past projects gone wrong looming large. The Curious may simply want to become an authority on what should have been done. Finally, there are those in the Ministry of Defence, the Military Works Force (MWF), Engineer Branch at United Kingdom Land Forces (UKLF) and Engineer Resources for whom the project has been a reality and a continual source of design work, headaches, frustration or worry for the last 18 months and have therefore had what the military always delightfully refer to as "a challenge". The challenge has been the design and planning of the Mount Pleasant Complex Swimming Pool (MPCSP) which is probably the most ambitious project undertaken by the Corps in many years.

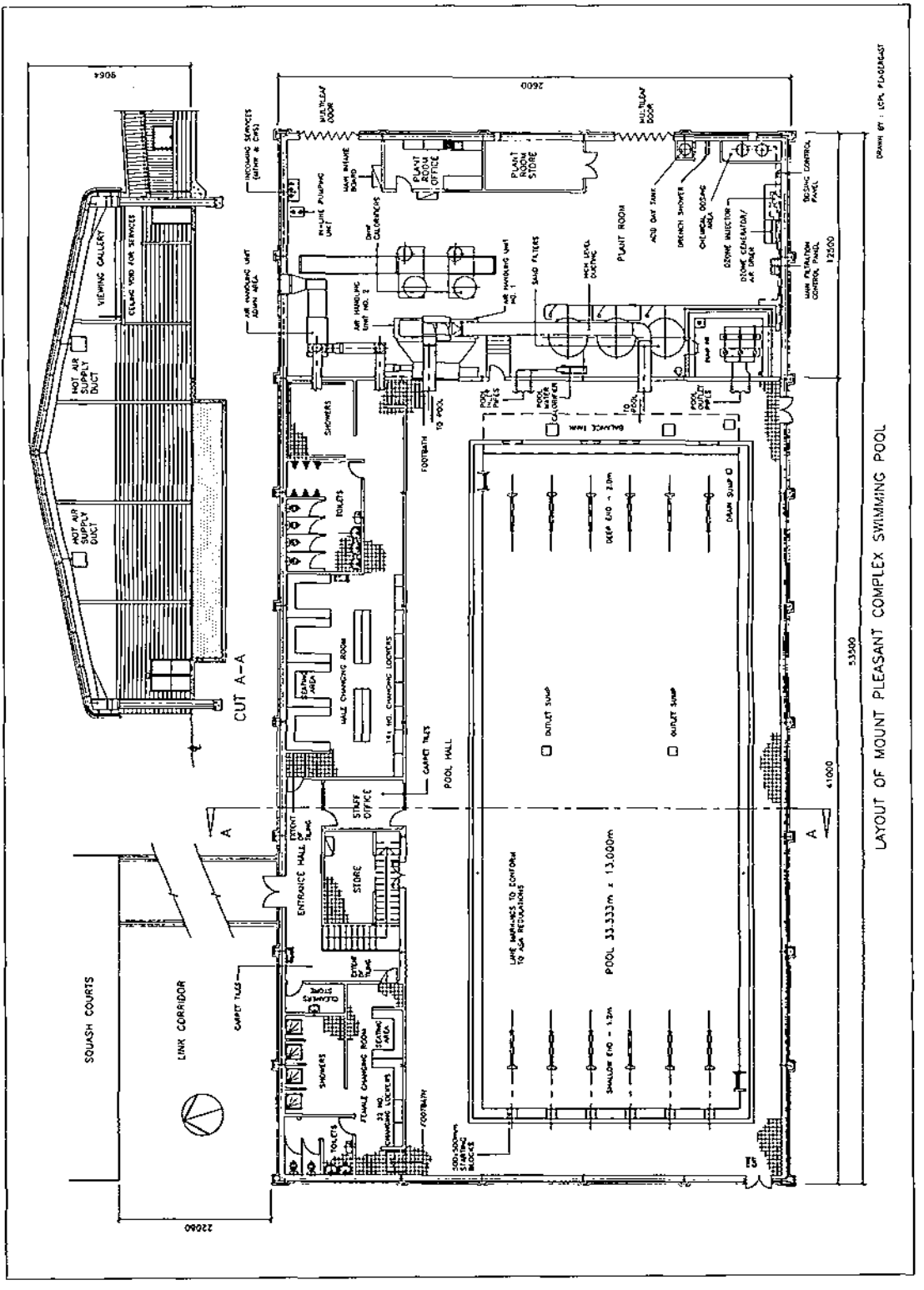
The Conception of the Challenge

The challenge was conceived in 1985 and remained in the embryo (defining) stage for a number of years, much to the chagrin of all who served at Mount Pleasant throughout the period and recognised an obvious need for a swimming pool. Inevitably money was always the problem, but in October 1987 a team from MWF deployed on an Initial Reconnaissance (IR) or feasibility study to determine a minimum cost solution using RE tradesmen. Once this cycle was put in motion it was proposed that the Detailed Reconnaissance and Planning Report (DRPR) would be produced in mid 1988 with construction to start on site in late 1988! An impossibly tight schedule for such a complex project and not exactly in line with time scales suggested in ME Vol 1 Part 3! However this is the stuff that all good challenges are made of.

The client, HQ British Forces Falkland Islands (HQ BFFI), expressed requirements for a pool as:

Length 33m desirable, 25m minimum
Width 16m desirable, 10m minimum
Deep end depth 3.5m desirable, 2m minimum
Shallow end depth 1.5 desirable, 1.1m minimum
Fixed 3m diving board and 1m springboard desirable
Entrance hall, office, store and cleaning room
Changing rooms, toilets and showers for both sexes
Filtration system, heating and lighting

The Challenge of the Mount Pleasant Complex (p78)


LAYOUT OF MOUNT PLEASANT COMPLEX SWIMMING POOL
CUT A–A
POOL 33.333m x 13.000m
PLANT ROOM
PLANT ROOM OFFICE
PLANT ROOM STORE
POOL HALL
MALE CHANGING ROOM
FEMALE CHANGING ROOM
ENTRANCE HALL
STORE
STAFF OFFICE
SQUASH COURTS
LINK CORRIDOR
VIEWING GALLERY
SHOWERS
TOILETS
CARPET TILES
FOOTBATH
DRAIN SUMP
OUTLET SUMP
DEEP END - 2.0m
SHALLOW END - 1.2m
41000
53300
22060

The IR team was directed to study the feasibility of using package designs from specialist pool manufacturers and the use of "spare" resources such as hydra-glas (cf "Braithwaite") panels already in theatre. It was also suggested that the pool might be located within an existing building: The relative capital, maintenance and running costs of these options were to be compared against the price of constructing a new building with a conventional reinforced concrete pool. The team's conclusions were that the pool must be of a permanent construction and could be built for a capital expenditure in the order of £500K (including the shipping of materials), by a reinforced troop of 50 tradesmen in around 16 weeks. The estimated running and maintenance costs were estimated to be £1300 per day ie £475K per annum.

Following discussions on the viability of the project and the recommendations of the IR, a further visit was ordered to review the costs associated with the construction and subsequent maintenance and running of the pool. Following this visit the "final" requirement was defined as: Length to be 33m, width to be 13m and depth to vary from 1.2m to 2m.

The pool and all facilities to be housed in a steel framed building similar to the rest of the Mount Pleasant Complex which should be built on the green site adjacent to the gymnasium.

The Water Filtration and Treatment System (WFTS) to be ozone based.

Changing facilities matching JSP 315 Scales for a Garrison of 2450 to be incorporated.

The estimated cost of materials was £474K including the use of a civilian tiling contractor. Transport costs were estimated at £63K. The running and maintenance costs were reduced to £125K per annum.

The in-place FI Fd Sqn should carry out the earthworks from September 1990 and the major construction should take place in the austral summer 90/91.

Acceptance of the Challenge

Once the final requirements had been staffed, acceptance of the challenge was signalled in May 1989, by the dispatch of a Detailed Reconnaissance (DR) team from 519 STRE(Wks). The challenge was to produce detailed plans and confirm the estimated cost indicated in the second IR.

Meeting the Challenge

The execution of the DR was straightforward. On its return however, the team established, long before any detailed design was carried out, that meeting this challenge was going to be nothing less than a real test of logic, common sense, humour, straightforward engineering, practicality and coordination. The design (once three changes in Codes of Practice and five years worth of rust in the author's brain had been defeated!) and the detailing appeared to be the only part of the problem that was relatively straightforward! The final layout is shown on the previous page. As always the major problem was the inter-relation of finance, time, resources and the availability of skilled manpower.

Finance

The problems that were to be faced soon became evident with the receipt of budget prices from likely suppliers of the various systems. Examples of these (with the initial estimates in parenthesis) are:

	£	£
Steel Frame and Cladding	130,000	(150,000)*
Filtration System	135,000	(59,000)
H&V System	86,000	(34,000)
Civilian Tiling Contract	70,000	(46,000)
Balustrade for the Viewing Gallery	(15,000)	(-)
Pre-cast Concrete Floor Planks for the Viewing Gallery	(6,000)	(-)
Domestic Hot Water Calorifiers	25,000	(2,500)
	467,000	

*The only one to be reduced!

The history of funding for this project is a minefield to describe. Suffice it to say that following the DR and receipt of these budget prices, the Falkland Islands Government (FIG) confirmed that they would provide up to £400K in EACH of the two financial years 89/90 and 90/91 (ie a maximum of £800K) rather than £400K over two years as had been an earlier understanding. This made life a lot easier but the slight sting in the tail was that this money would be released to an agreed profile, with no carry over being allowed between FIG financial years which run from 1 July to 30 June!

As the reader will appreciate, the normal sequence of events in developing the cost of a military project is that initially a detailed drawing package is compiled. This then forms the basis for a bill of quantities to be drawn up which, when priced, enables the overall cost of the project to be established. In our case the suppliers' layouts had been received, which could not be demanded until

the contracts had been let, which could not be risked until sufficient funds to cover the complete project could be guaranteed, which could not be given until the overall cost of the project was firmly established etc; a real chicken and egg situation! To enable the project to move on, it was decided to obtain as many individual item prices as possible, and then make an allowance of 10 per cent in each Phase of the work for "unmeasured items" in addition to the standard "general" contingency of 10 per cent. Where a formal tender price or quotation had been received, it was considered a "measured" item.

After weeks of brain storming and encouraging the imagination to work overtime, the capital cost was estimated to be £800,400 with a further £120K for shipping costs, making a grand total of £920,400. This was still well in excess of the sum to be provided by FIG. To put things in perspective however, the equivalent cost for a civilian contractor to build a similar facility in UK was found to be £1.8M and £4M for the FI!! The RE cost represented 45 per cent and 23 per cent of the equivalent civil cost respectively: a very good deal on any account.

No one appeared able at this stage to guarantee the balance of funds and so many cost reducing concepts were produced to try and bring the Grand Total back within £800,000. These included reducing the pool size to 25m (which had a surprisingly large knock on effect in terms of the Water Filtration system cost), reducing the facilities provided initially (eg hot water, pool furniture, etc) anticipating that quartering money would be found later to upgrade them, and the removal of the viewing gallery, etc. All of these were totally unacceptable to the client and an impasse arose.

An anomaly had arisen in that, because the source of the money was ostensibly private then shipping costs would be charged. In reality the FIG were giving the money to the MOD for them to use, thus it became a military project and was in no way one being undertaken on behalf of the FIG. It is a subtle but very important difference and ensured the shipping costs charged to the project would be minimised. At this point the "go ahead" was given.

Works Programme

Once it became apparent that this was more than just a reinforced troop task, the works programming became fairly complex. The overall programme had to be split into specific, clearly identified and achievable blocks of work for each squadron with no handover of partly completed sections. Account had to be taken of the "planned working period" of the FI Fd Sqn within the tour, to allow for other projects, in theatre operational training and handovers. This varied from sixteen to ten to fourteen weeks! This programme then had to be coordinated with a variety of production lead times for major systems, general stores procurement times, shipping programmes and an acceptable financial expenditure profile. (The intention was to have the stores on site well before the user squadrons were due to arrive so that they could be checked for damage and replacements ordered and dispatched if necessary.)

Once the dust had settled, the programme of work was split into four phases each of up to 14 weeks duration. The outline content of each was planned as follows:

Phase 1. Setting up the site for a 16 month project including the establishment of site offices, a concrete batching plant and the provision of site power. The site works including the major earthworks and sealing of the exposed rock with blinding concrete to prevent further weathering and to provide a good working surface.

Phase 2. Construction of the pool shell, the building foundations and the Plant Room floor. Erection of the steel frame and placing of the precast concrete planks to form the Viewing Gallery floor.

Phase 3. Cladding of the building and the construction of all blockwork walls. Installation of the M&E systems including water filtration and treatment plant, heating and ventilating plant and domestic hot and cold water systems in the administration area. The fitting out of the Administration Area and Viewing Gallery. This Phase includes the commencement of the civilian tiling contract.

Phase 4. The conclusion of the tiling contract, the final fitting out of the various areas including the fixing of benches, lockers, sanitary ware etc. The commissioning of all the M&E systems.

Design

Some of the interesting engineering factors which helped to shape the engineer plan and works programme are described in the following paragraphs:

Ground Conditions. The 12 trial pits revealed a tillite which was fractured and weathered to a depth varying from 2.8m to less than a metre. This very quickly orientated the deep and shallow ends of the pool for us. The ease with which the back

hoe of a Light Wheeled Tractor excavated the weathered rock was reassuring. The unweathered rock to be removed could be broken out with the Montabert hammer. The sound bedrock, once sealed with blinding concrete to prevent further weathering, was considered to provide an excellent foundation for all construction.

Water Table. No water table or ground water was found despite the red herring of a (non existent according to PSA!) burst water pipe found with unnerving skill by the back hoe operator. Previous ground surveys in the Mount Pleasant Area showed that any ground water would have a high ph value and sulphate content.

Material. Initial investigations by the Materials Laboratory staff showed that firms, as a rule, do not produce Sulphate Resistant Ordinary Portland Cement (OPC). To meet our needs this would require a special order resulting in very high overhead costs. Micro-silica was introduced to provide a measure of sulphate resistance and improve the impermeability of the concrete. In addition to these properties, the use of micro silica gives concrete a high early strength which reduces the time formwork requires to be left in place or before loading of an element can occur. This assisted in reducing the programme time required for the protracted test of the pool shell for watertightness.

Design of Reinforced Concrete. Knowing of the persistent problems of achieving consistent, good quality, workable concrete and the pressure of time that each squadron would be under, two principles were applied to the design of the pool shell: simplicity of construction and under no account let it leak!!! BS 8007 "The Design of Concrete Structures for Retaining Aqueous Liquids" was the bible. Inevitably with such a shallow pool, the amount of reinforcement required was dictated by the need to restrict shrinkage and thermal cracking to 0.2 mm rather than a need for strength. With the availability of mix and deliver trucks rather than a bank of 400 litre mixers, it was possible to build the slab in larger bays and therefore a continuous construction for fully restrained structures was used. This allowed bays with no reinforcement across the construc-tion joints to be specified to simplify the making of formwork and increase speed of construction. Both traditional bulb waterbar and a water activated expanding material known as "Hydrotite" were incorporated to provide watertight joints.

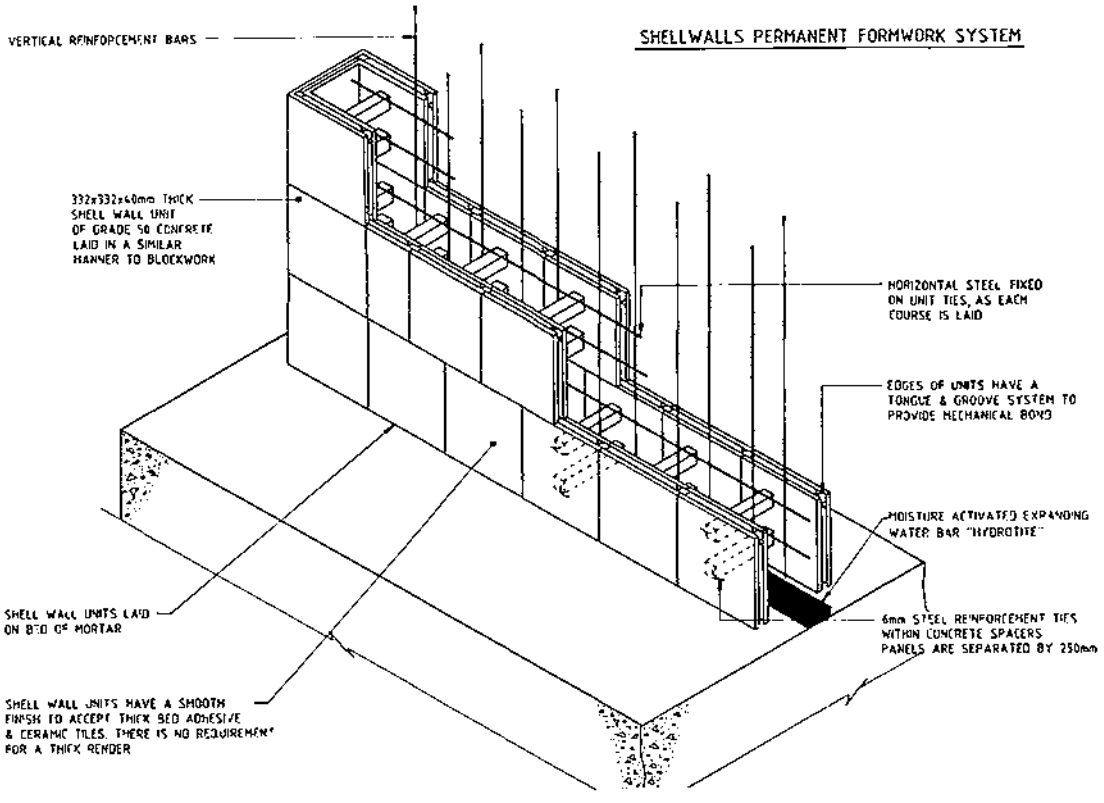
Formwork. To minimise the number of Carpenters and Joiners required to build and set up formwork and to ease the problem of aligning it within very tight tolerances over long distances, a permanent formwork system known as "Shell Walls" was incorporated. The system is illustrated in the attached sketch. Although manufactured of high strength concrete, the system does not form part of the structural design. The high quality finished surface of the wall will allow the tiling contractor to set the tiles on a thick bed of adhesive rather than a render. Although slightly more expensive than conventional timber formwork, it was hoped that it should prove easier and faster to construct, require fewer tradesmen and keep the cost of the tiling contractor to a minimum

Water Filtration and Treatment System (WFTS). An ozone based WFTS was specified to produce the most hospitable environment, minimize heating costs by requiring fewer air changes, reduce corrosion in the atmosphere and reduce dependence on bulk chemicals. The provision of a residual chlorine content was necessary to provide an active disinfectant within the pool. The pool water is drawn off through the balance tank and injected with ozone to sterilise it. The ozone remains in the water until it reaches the sand filters which remove it and generally clean the water. The sterile, clean water then passes through the calorifiers and a residual chlorine element is introduced to the clean water prior to its return to the pool.

Pre-Project Training. Pre-project training in the basic artisan skills for each phase was to be undertaken at the RSME. The suppliers of the WFTS and H&V systems and a specialist profile sheet cladding fixing firm agreed to employ particular tradesman from the various squadrons for a period on some of their current jobs in the UK. The steel fabricators supervised the trial erection of a proportion of the steel frame.

Project Management

Three teams under the guidance of the overall Project Manager (Comd Engr UKLF) developed the plan and mounted the project in UK. This included the design "consultants" of 519 STRE (Wks) at Chilwell, the Supply Management Branch at HQ Engineer Resources and the staff of Engineer Branch HQ UKLF who covered the staff aspects of resources, personnel and money. The design consultants supervised the design and supply contracts along with HQ Engineer Resources. HQ



Engineer Resources let substantial contracts for the supply, packing and movement of the general stores. These teams had a coordination meeting every three weeks.

As construction was about to start, the FI Project Team deployed to site. The members were all under command of the OC FI Fd Sqn who was nominated as Project Commander and given a specific directive by the Project Manager. In addition to the FI Fd Sqn's integral staff, the permanent Project Team comprises:

Project Engineer (GE(C))	All Phases
Clerk of Works (C)	Phases 2, 3 and 4
Project Engineer (GE(M))	Phases 3 and 4
WO resources	All Phases
Class 1 Svyr	On call from MWF

Conclusion

This has always been recognised as an ambitious project for the Corps. A high level of management has been required to coordinate a variety of factors such as the duration, the distance from the mounting base, the fixed cost ceiling, the high overall profile and the variety and quantity of tradesmen.

Accurate cost estimating and forecasting remains a great problem in the initial stages of a project. Rather than working up a cost which requires far too much detail for a concept stage, an equivalent civilian cost from the many commercial estimating publications should be taken and then reduced by some factor for labour and profit. This would provide a greater cost buffer and more flexibility for the design team.

It has been a great advantage to have direct control over the money, particularly as the Command Secretariat has now allowed it to be invested in a bank and earn interest rather than sit in a suspense account in Bath.

From the author's point of view, it has been a marvellous project for the design team. It has absorbed most of them for the whole duration of their tour, allowed them to use their imagination liberally and apply all the skills learned throughout their careers. It has allowed many to see a multi-discipline engineering project develop from scratch for the first time. Whether we have been as successful as I seem to think, only time will tell, but we did meet the challenge head on!!

Engineer Aptitude Testing — An Interim Report

LIEUTENANT COLONEL I M DANIELL BSc

The author was a troop commander in BAOR, Northern Ireland, Canada and UK before becoming the adjutant of 35 Engineer Regiment. He was training major of the Royal Monmouthshire Royal Engineers (Militia) for a year after which he attended the Army Staff Course at Camberley. He was rewarded with a busy tour as DCOS of the Logistic Support Group before commanding 7 Field Squadron in Nienburg. For the past three years he was Engineer in Chief's Recruiting Liaison Officer and takes over command of 33 Engineer Regiment (EOD) in April 1991.

Introduction

The Corps needs to recruit 76 officers each year from a wide range of educational backgrounds, from the equivalent of "O" level passes to arts graduates and qualified engineers. The main criterion for selection, over and above the normal officer qualities, is that a candidate should show a flair or aptitude for practical engineering. However, this aptitude has never been defined and is not assessed for Corps acceptance at the Pre-Regular Commissions Board (RCB) Briefings or at the Corps Selection Board at Sandhurst.

The implicit assumption in the Corps' policy is that whilst we need suitably educated officers to become professionally qualified, an engineering or scientific background is not essential to becoming a useful Royal Engineer. This further suggests that there must be other inherent abilities or skills, separate from those learnt in studying sciences, which make a candidate suitable. Thus, this aptitude should be practically based, separate from formal academic qualifications, and would not necessarily be a predictor for suitability for professional engineer training. It is this aptitude that we need to be able to assess. In the same way that RCB only seeks to "identify those qualities which with training will produce an adequate platoon or troop commander" so this test would only assess a candidate's suitability to become an adequate troop commander. Such a test needs to be developed in four distinct stages:

- Identification of key skills
- Test selection
- Testing a representative sample
- Validation and retesting as necessary

The first three stages are now complete and the fourth has begun. The aim of this article is to discuss progress so far and to outline the next stage.

Key Skills

When considering the attributes required of a troop commander it is difficult to separate the leadership and organisational skills from practical or engineering ability. The aptitude for the first two is assessed at RCB but the third is special to the Corps and is our responsibility. An attempt at job analysis to identify the key skills required by a troop commander over and above those identified at RCB emphasised this difficulty and was abandoned.

From discussions with practising engineers and occupational psychologists working in this area it was concluded that the key skills were probably a combination of:

Numeracy. The ability to handle numbers and mathematical concepts to derive solutions to arithmetic problems.

Mechanical Comprehension. The ability to see how unfamiliar structures or machines function.

Spatial Awareness. The ability to conceive and solve problems in three dimensions.

Test Selection

To be of use to the Corps any test of engineering aptitude would need to be used as part of the arms selection process and would be administered at the Pre-RCB Briefing or at Royal Military Academy Sandhurst (RMAS) prior to the Corps Selection Board. The tests would need to be easy and quick to administer

Lt Col I M Daniell
Engineer Aptitude Training (p84)

and the results should be able to be correctly interpreted by a serving officer with little extra training.

This led to the consideration of psychometric tests which aim to "maximise objectivity by standardising test conditions, instructions, time, content, scoring and interpretation." (Saville and Holdsworth Limited (*SHL*) 1987.) These types of tests meet the Corps requirements and are suitable for testing the skills identified. Tests of this nature can be developed and the Army Personnel Research Establishment (APRE) at Farnbrough have done this for the selection of soldiers for specialist trades. However, due to the constraints of time and cost, instead of developing tests, three were selected from SHL existing Applied Technology Series (ATS).

Examples of each of the tests are shown below by permission of SHL.

NUMERICAL ESTIMATION (NTS2)

Test 2 Numerical Estimation

This test consists of numerical problems to which you must estimate the answers. Note the word ESTIMATE. For each question you are to choose the answer, from the five answers given, which is nearest to your estimate and blacken the appropriate circles A, B, C, D or E on Answer Sheet 1.

	A	B	C	D	E
1 24 × 0.8 = ?	16	220	19	24	140
2 76% of 156 = ?	120	160	140	100	180

MECHANICAL COMPREHENSION (MTS3)

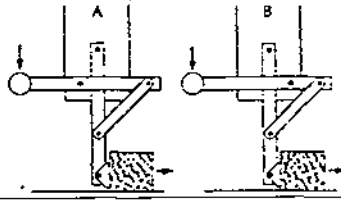
Test 3 Mechanical Comprehension

This test is based on mechanical principles. Each problem consists of a question which refers to a drawing. You have to choose the best answer to each question and blacken the correct circles A, B or C on Answer Sheet 2.

1 Which screw is more likely to pull out of the wall when a load is applied to the hook?

Is equally likely, mark C.

2 Which apparatus requires less force to begin moving the block?



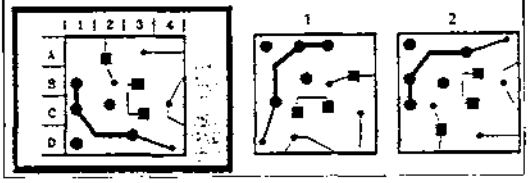
If equal, mark C.

SPATIAL CHECKING (STS5)

Test 5 Spatial Checking

In this test you are given a master layout with its own grid co-ordinates. To the right of this master layout are two copies, each of which differ from the master in one respect. Your task is to identify this difference and, using the co-ordinates shown on the master, indicate the grid reference by fully blackening the appropriate pair of circles on Answer Sheet 3. Note that copies are either rotated or flipped on the page.

MASTER



TESTING

SINCE the tests are to be used prior to or during officer training at RMAS it would have been ideal to have tested all candidates at Pre-RCB over one year and then have monitored their progress. However, since only about half of those attending Pre-RCB are eventually commissioned into the Corps and the lead time may be anything up to five years before they eventually reach a unit, this approach would be impracticable.

It was therefore decided to test three successive Young Officer courses in the first month of their training. The tests were conducted under as similar conditions as possible and the courses were tested in batches of up to ten giving a total sample of 67. This sample is smaller than is ideal but is large enough to produce significant results.

The raw scores from all three courses are summarised in modified Stem and Leaf Displays below. (ASW 1990)

NTS2
Range 17 - 37
0 - 4 0
5 - 9 0
10 - 14 1
15 - 19 1 xxxx
20 - 24 2 xxxxxxxxxxxx
25 - 29 2 xxxxxxxxxxxxxxxxx
30 - 34 3 xxxxxxxxxxxxxxxxxxxx
35 - 40 3 xxxxxxxxxx
40 - 44 4
45 - 50 4
Mean 29.2836
Standard Deviation 5.2795

MTS3
Range 10 - 29
0
0
1 xxxx
1 xxxxxxxxxxxxxxxxx
2 xxxxxxxxxxxxxxxxxxxxxxxxx
2 xxxxxxxxxxxxxxxx
3
3
4
4
Mean 20.7941
Standard Deviation 4.1594

STS5
Range 3 - 37
0 - 4 0 xx
5 - 9 0 x
10 - 14 1 xxxxxx
15 - 19 1 xxxxxxxxxxx
20 - 24 2 xxxxxxxxxxxxxxxxxxxx
25 - 29 2 xxxxxxxxxxxx
30 - 34 3 xxxxxxxxx
35 - 39 3 xx
40 - 44 4
45 - 49 4
Mean 22.3284
Standard Deviation 7.1782

Having completed the tests the data was sent to the test suppliers who then calculated the T-score and Percentile tables for the sample. These tables can be used to convert the raw scores into more useful standard scores and are of great use at a later stage.

SHL were also asked to look for differences in the performance between non-graduates, art graduates and graduates with an engineering or related degree. Interestingly on the MTS3 and STS5 tests no significant differences were found between any of the groups. However on the NTS2 graduates performed better than non-graduates but the type of degree made no difference. A caveat was added that this may be due to the smallness of the divisions within the sample.

These early results were encouraging since the educational standard and background were largely irrelevant. Further qualitative analysis was not carried out at this stage because until the tests were shown to be a reasonable predictor of performance such work would be nugatory.

Validation

It is the test suppliers responsibility to ensure that the tests are reliable but the users responsibility to validate it. Validity can be established using empirical or theoretical techniques. For these tests the empirical approach was chosen and this in turn subdivides into concurrent and predictive validity.

Concurrent validity is the relationship between the test scores and some measure of job or training performance obtained at the same time. Predictive validity is the extent to which the test correlates with some measure of future performance. The major problem with both is establishing objective measures of job performance. Both of these methods of validation are relevant to the Corps; the first can be established using the results of training on the YO course and the second by using some measure of success as a troop commander. The results for the first YO course have been received and these have been used to start the validation process.

Performance Indicator

The course report in its present form is detailed and comprehensive. It is divided conveniently into three parts. The first two are tabular and cover personal qualities and technical ability/performance in a format similar to the confidential report forms. The third section is a report by the commanding officer.

The second section relates most closely to engineering aptitude and in order to derive a crude performance indicator the grades awarded for each of the nine subjects were scored as follows:

Well above average 7
Above average 6
Average 5
Below average 4
Well below average 3
Weak 2

These scores were then summed to give the initial performance indicator. For the initial analysis neither the final course grade nor the CO's report were considered. The results are summarised in the Stem and Leaf Display below:

YO COURSE RESULTS

Range 33-52

30-34	3	xxx
35-39	3	xxxxxxxxxx
40-44	4	xxxxxxxxxxxx
45-49	4	xxxxx
50-54	5	x

Mean 40.7097
Standard Deviation 4.3373

Correlation

The stem and leaf display shows that the results seem to conform to a normal distribution around a sensible mean. Since the test results are also of a normal distribution it is reasonable to look for a relationship between them. Scatter diagrams, plotting the performance indicator (PI) against the individual raw scores suggested that for the bulk of those tested (20/28) the PI increased as the test score increased. The eight outliers, four above and four below, were the same for each test and by ignoring these a relationship could be identified in each case by simple linear regression.

Once it seemed likely that there was a relationship between the individual raw scores and the PI, a multiple regression analysis was carried out using the DATANALYST software programme which complements the ASW book (see bibliography). The analysis produced a relationship which improved once the outliers were removed but because of the size of the sample it could not be considered significant.

Way Ahead

When all three sets of course reports have been received the obvious outliers will be rejected and another multiple regression analysis carried out. A similar analysis will be carried out using the T scores derived from the tables developed by SHL to see which gives the most useful model.

A qualitative analysis of the outliers will then be conducted to see if they can be explained and if necessary the PI will be refined and the regression analysis repeated.

If the concurrent validity of the tests can be established then a further analysis of performance in the first tour as a troop commander will be carried out to establish predictive validity. If this final stage is successful then the test may be of some use.

Conclusion

Since it is not necessary to have a degree in engineering to be a successful junior officer in the Corps, success must be dependent on some other skill or attribute. This quality has been defined as engineering aptitude and is separate from the leadership and management skills expected of all troop commanders.

The basic hypothesis is that engineering aptitude if it exists, is a combination of three skills: numeracy, mechanical comprehension and spacial awareness. These skills are independent of educational attainment and can be assessed by commercially available psychometric tests.

Tests carried out on three YO courses showed little difference in the raw scores between graduates and non-graduate except in numeracy, suggesting that one of the test requirements may be fulfilled. Relating the performance of one set of YOs to their test scores suggested that the higher the raw score the better the performance in most cases. This is again encouraging but not significant because of the smallness of the sample used.

Once all three courses have finished their training it should be possible to see if concurrent validity can be established. If it can then further research will be carried out during the same YOs first tour to attempt to establish predictive validity.

This article is only an interim report. This much has been done in one year and it will take another year to establish concurrent validity. So far the early results are encouraging but there is a long way to go.

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Memoirs

MAJOR R S S (MICHAEL) LOW MBE MC

Born 24 June 1912, died 13 April 1990 aged 77

MICHAEL Low was born in Wimbledon in 1912, but, as he used to say, hurried over the border to be christened in a God Fearing Country — ie Scotland. In 1917 the family moved to Oxford and Low attended the Dragon School. From there he went to Rugby School and on to Balliol College Oxford where in addition to gaining an engineering degree, he won a rugby blue.

Low was a descendant of James Carmichael of Dundee, under whose direction the first steam locomotive, The Earl of Airlie, was built in Scotland. It was appropriate therefore than on leaving Oxford, he should be drawn to railways and served a pupilage at Crewe Locomotive Works. For a short period he was a representative of the Superheater Company.

Low joined the Sappers at the outbreak of the 1939–45 War. He took part in the evacuation from Dunkirk and subsequently served with distinction in North Africa and Italy. As OC of 7 Field Company he was awarded the MC for his part in the construction of the Rapido Bridge - an operation commemorated by a painting in the HQ Mess. On the second night of the operation Low was wounded and subsequently evacuated to the UK. There he became an instructor at the RE OCTU at Newark. Those who served with him will recall his outstanding ability to handle all ranks, his engineering ingenuity and above all his impish but never unkind sense of humour.

After the war he returned to his chosen career finally retiring as Engineering Director of British Rail Engineering Ltd in 1972.

Michael Low had a great love of sailing and mountaineering. Even in his 70s he still enjoyed remote camp carrying walks in Scotland. He was also a talented cartoonist. His expeditions were faithfully recorded in his logs, illustrated with rapidly executed pen and ink sketches. He had an inspired touch when capturing the essential elements of a mountain scene or evoking the mood of his companions.

He is survived by his wife, three daughters and seven grandchildren.

PH PSB

Maj Michael Low MBE MC p88

BRIGADIER A B D EDWARDS CBE MC

Born 29 April 1898, died 4 August 1990, aged 92

BRIGADIER ARTHUR EDWARDS was born and educated in Portsmouth, entered the RMA, Woolwich in 1915 and was commissioned into the Royal Engineers on 16 May 1916. A year later, aged 19, he joined 4 Field Squadron of 4th Cavalry Division in France. In the ensuing months, he served a wide-ranging apprenticeship in field engineering in the buildup for Cambrai; improving field defences, erecting winter quarters for men and horses, bridge building, siting water points, planning and improving cavalry tracks for the proposed follow up and finally going forward with the lead tanks to grapple the German wire. In the German counter-attack which followed, his troop charged with the Inniskillings in an attempt to recover lost ground. Later in the German offensive of March 1918 he found himself commanding a platoon in the Royal Engineer Battalion hastily contrived to fight as infantry to help stem the German break-through at Albert.

After some leave and a dose of "Spanish Flu" he sailed in June 1918 for India to join the Madras Sappers & Miners, of which he was to command 61 Field Company on active service during the insurrection in Iraq and where he was awarded the Military Cross.

On return in 1922, he was required to complete his military education at Chatham and St John's Cambridge before beginning some fifteen years service with Searchlights; first with a TA Survey company at Kingston then at Blackdown with 1st AA Searchlight Regiment and finally, from 1935 to 1939, commanding 24th Fortress Company in Malta, where the searchlights contributed to the seaward defences of Grand Harbour.

During mobilisation in 1939 he was SORE at HQ Southern Command, then at a small hutted site in the middle of Salisbury but by March 1940 he was once again in France with 291 Army Troops Company, whose initial task was to construct a bakery near Rheims. Caught up in the *Blitzkrieg*, the company carried out a series of mining and demolition tasks before withdrawing intact through Cherbourg, each man embarking with his weapon and equipment. He was mentioned in despatches for his part in the withdrawal.

By November 1940 he was off by sea to join the Military Mission in Greece, then under attack by Italy. Passage through the Mediterranean was in the cruiser *Southampton* and included a sharp engagement with an Italian Squadron off Sardinia. Fortunately he was recalled from Greece to Cairo by the Chief Engineer before the German invasion and became CRE, Lines of Communication during Wavell's withdrawal from Libya. Ordered out of besieged Tobruk, he left by sea in April 1941 having been once again mentioned in despatches. For the next sixteen months he was CRE, Army Troops for the Western Desert Force and Eighth Army during General Auchinleck's advance and the subsequent withdrawal to El Alamein, which earned him a further mention in despatches and the OBE. The citation reads "... it was primarily due to Lieutenant Colonel Edwards' foresight, ability and energy that throughout the operations between November 1941 to February 1942 the right engineer stores have always been forthcoming as, when and where required by formations. This task was of exceptional difficulty owing to the fast changing engineer requirements of the campaign, but there was never a failure..."

On 8 November 1942, as the Battle of Alamein entered its third week, Brigadier Edwards flew into Malta to become Chief Engineer on the island, still besieged. As the situation improved and Malta went over to the offensive the problems facing him in the run up to the invasion of Sicily are summed up in the words of the citation which brought him the CBE: "...he was called upon to

Brigadier Arthur Edwards p89

prepare accommodation for AFHQ, HQ Eighth Army and to assist in the provision for RN-RAF HQ. Camp sites had also to be provided for 30,000 troops staging through Malta. Shortage of materials and labour and the difficulty of finding suitable camp sites made the task a particularly arduous one. Brigadier Edward's unfailing cheerfulness, ready co-operation with RN- RAF and the manner in which he overcame what at times seemed insuperable difficulties were an example to all who served under him. All the tasks set him were completed to time and it was to a large extent due to this officer that the staging through Malta was successfully carried out."

He left Malta for a brief tour in Turkey as Chief Engineer for a programme of infrastructure before returning to England as Engineer Adviser to Anti Aircraft Command, then engaged in combating attack by Flying Bombs and V2 Rockets. It was not long before he was back on the Continent where he stayed for the next four years as Director of Works to 21 Army Group and its successor, BAOR. For these services he received a fourth mention in despatches and was made a Commander of the Order of Orange of Nassau.

His final appointment was as Chief Engineer Eastern Command which he relinquished in 1951, although serving for some time in a civilian capacity as DCRE Larkhill District.

Brigadier Edwards was a keen sportsman, playing hockey, soccer and golf in his time. He was an accomplished horseman, playing polo and captaining the successful Army team in Malta in 1939.

He wrote an account of the operations of 61 Company (Madras Sappers & Miners) in Iraq and a history of 24 Company, extracts of which were published in the *Journal*.

He married in 1925 and was predeceased by his wife; he leaves three sons; seven grandchildren and three great grandchildren.

BLE

MAJOR J F MAYO-PERROTT MC TD

Born 28 April 1908, died 27 October 1990
aged 82

JACK PERROTT was one of the last of his generation of Territorial Sappers who fought with distinction in World War Two. Working in Liverpool after leaving St Edward's School, Oxford, he joined the 2nd (Cheshire) Field Squadron as a Troop Officer. The 2nd Cheshire at that time was a mounted unit giving engineer support to the Yeomanry Division, and Jack was very happy with his horses. In 1938 he was asked to form a Field Park Troop to support the Squadron. He was given an office in Chester with not much more than a desk, a chair and a telephone, but such was his energy and enthusiasm that within a short time 141 Field Park Troop was taking shape with over a hundred Sapper tradesmen, and Captain Perrott in command.

On the outbreak of War the Yeomanry Division was mobilised and ordered to Palestine, and in early 1940 the Squadron and Field Park Troop disembarked at Haifa. From there they soon moved to Buq Buq in the Western Desert as Divisional Engineers to the newly formed 7 Armoured Division. At this time the TA OC of the Squadron handed over to a regular, Major E C W Myers, Perrott remaining in command of the Field Park. They then took part with 7 Armoured Division in General Wavell's campaign against the Italian Army, from the battle of Sidi Barrani through Bardia, Tobruk, Benghazi and Beda Fomm and on to El Agheila. By this time the Italian Army had been completely destroyed, and the Squadron and Field Park were withdrawn to Egypt, handing over to 4 Field Squadron and 143 Field Park Troop who had recently arrived from England. In Cairo Myers was posted, and he had no hesitation in

Maj Jack Perrott MC TD

recommending to the Engineer in Chief that Jack Perrott should succeed him as Squadron Commander.

The 2nd Cheshire then rejoined the Yeomanry Division (now 1 Cavalry Division), and with them took part in the brief campaign against the Vichy French in Syria. They then moved to Iraq for the relief of Habbanya and the defeat of Rashid Ali in Baghdad. While in Iraq the Squadron was deployed to Mosul, Kirkuk and Khanaqin to prepare the oilfields for demolition. In 1942 they returned to the Western Desert and joined 10th Armoured Division. At the battle of Alamein Perrott was awarded the Military Cross for outstanding gallantry and leadership in clearing the minefields. He remained in command of the Squadron through the rest of the North African campaign as far as Tripoli. From there they moved to Syria with the Division, after which Jack Perrott returned to England and was posted to the RE OCTU at Newark as an instructor.

After the War he was largely instrumental in forming Old Comrades' Associations for both 2nd (Cheshire) Field Squadron and 141 Field Park Squadron. Both Associations hold annual meetings in Birkenhead and, except for a few years when he was in Ireland, Jack Perrott never missed a meeting until this last year, even though he lived in Kent. He was a great Sapper, much loved by all ranks, and by all who knew him.

FGC writes: "I had the good fortune to serve as a Subaltern in the 2nd (Cheshire) Field Squadron almost throughout his time as Squadron Commander. It was a very close-knit unit with the majority of the men coming from Birkenhead where the local TA drill-hall was located. Jack Perrott understood them well and it was always a very happy Squadron with very good old-fashioned *esprit de corps*. This served it well at the Battle of El Alamein where it was in the 8th Armoured Brigade part of the 10th Armoured Division. Not required on the first night of the battle it was allotted a major task on the second night when it was planned that 8th Armoured Brigade should break through the half-cleared minefields on the key Miteirya ridge and be over the ridge and clear of the minefields by daybreak. Mine clearance went quite well on the centre (Boat) and right hand (Bottle) routes and they were cleared by 10 pm when the barrage was due to start, signalling the advance through the minefields.

Unfortunately just before the advance, B Echelon of the Sherwood Rangers containing all their petrol and ammunition was hit by enemy fire. There was an enormous conflagration and the sky was lit up for two to three miles around. Jack Perrott with his command vehicle was situated just in the rear of the entrance to Boat route and in a very exposed position. There was great confusion and the attack was halted. He knew that the one thing he must do was to keep in touch on the radio with Brigade HQ which he did. Eventually in the early hours of the morning he personally lead the 3rd RTR and Sherwood Rangers through the right hand Bottle route checking the minefield lights as he went. He was awarded a very well deserved Military Cross for his work that night.

Jack Perrott had style and a strong feeling that while work had to be done and done well, life also had to be lived and to be enjoyed. He managed to communicate much of this feeling to his Squadron and it was a wonderfully happy unit to serve in."

GWD ECWM FGC

BRIGADIER D E O THACKWELL, CBE, BA, FRICS

Born 18 March 1909, died 5 November 1990, aged 81.

DENYS Edward Thackwell was born at Poona, the only son of Brigadier General O M R Thackwell, who was himself a Sapper. After education at Rossall he followed family tradition by passing into the "Shop" and being commissioned into the RE in January 1929. There followed the YO courses at RSME and Corpus Christi Cambridge, with an honours degree in engineering in 1931.

Postings to India were restricted at that time of financial stringency, and he served at home with 59 Field Company until 1933 when he secured a vacancy in the Survey of India and joined them for training at Dehra Dun. This completed, he gained experience with drawing offices and field units in India before being posted to the Burma Party at Maymyo. His tenure of this appointment was to be rudely interrupted by the Japanese invasion; this necessitated the evacuation to Assam of the Indian survey personnel by the rough tracks in existence, later to be transformed to serve the advancing 14th Army. He survived this trek and joined the Geographical Section (GS) at AHQ Delhi.

With the invaders driven out of Burma, Denys was able to return to Rangoon as Director of Survey under the Government of Burma, faced with the task of digesting into his programme the changes of a war-torn countryside and the wholesale additions of war maps, but it was not to be his responsibility for long. British officers had supervised the Survey of India for more that 150 years (India has just celebrated the bicentenary of Colonel Everest's birth) but with Independence for India and Burma their days were numbered: faced with the choice of retirement or reversion to UK, Denys chose the latter and was posted to Ordnance Survey as Divisional Officer, Edinburgh.

His routine employment at home was varied by a spell of two years as Chief of the Geographic Board, Allied Forces Central Europe at Fontainebleau, but he returned to the Ordnance Survey in 1957 as Deputy Director Field Division. In 1959 he became Director of Map Production and Publication, a post which he held until he retired from the army in 1963 and was appointed a CBE.

His retirement in no way lessened his commitment to the services of cartography; he was appointed first President of the British Cartographic Society in 1963, having been a founder member, and from 1964 to 1968 he was President of the International Cartographic Association. The Survey Training Centre also kept him fully employed in drafting manuals, a task for which his experience made him invaluable.

He had made his home in Brockenhurst, and the local community will always be grateful to him for his many and varied interests on their behalf: the District Council, the Parish Council, with two stints as chairman: active support for the sports clubs, and for a new retirement home. It was a sad day for him and his friends when, with health deteriorating after the death of his wife Patricia in 1986, he had to leave Brockenhurst; but he returned to join her in the churchyard of the parish church, of which he had been church warden.

He leaves two daughters, a son, Major W T R Thackwell RE, eleven grandchildren and two great grandchildren.

CAB

Brigadier Denys Thackwell (p92)

BRIGADIER D M RYCROFT OBE

Born 29 November 1901,
died 10 November 1990 aged 88

BRIGADIER DAVID MAXWELL RYCROFT was born on 29 November 1901, the son of a Gunner officer. He was educated at Portsmouth Grammar School and the Shop, and was commissioned on 13 July 1921, joining 5 YO Course at the SME Chatham later that year. On leaving Chatham, Rycroft was posted to the 22nd Fortress Company at Haslar; this period was perhaps the only time that he served with an all British RE unit.

Brigadier Rycroft considered his next posting to 40 Fortress Company in Hong Kong (from 1925-28) as one of the high points in his life. Perhaps this rosy retrospective view of that tour was influenced by the fact that it was there that he met Catherine Shaw whom he subsequently married in 1932. He was less enamoured with his stay in Woolwich from 1928-29 as a Garrison Engineer. That period is remembered partly as a time of skirmishes with wives of senior officers seeking unauthorised improvements to quarters.

Successful completion of the Advanced Mechanical Course in 1930 dictated the direction the rest of Brigadier Rycroft's career was to take and this was reinforced by attendance at the E&M Course in 1936-38.

In the run up to the 1939-45 war, Rycroft was involved in the design and acquisition of military vehicles. During war service in Egypt, North Africa, Italy and Ceylon the development and improvement of A vehicles continued to occupy him. For his work he was appointed OBE in October 1943. By the end of the war he had reached the rank of Brigadier.

Brigadier Rycroft's experience during the war, lead to a post-war tour at the Fighting Vehicle Proving Establishment at Chobham. He was in his element in command of the establishment and was involved in the initial development of the Centurion and Conqueror; the 'Champ' and Humber 1 Ton also passed through his hands.

A final military tour as Deputy Commandant at Shrivenham was a bit less to Rycroft's taste. Nevertheless the Sapper in him came to the fore and he designed and supervised the building of the 9 hole golf course in the grounds of the College.

On leaving the Army in 1953, Brigadier Rycroft continued to work on equipment development at MEXE Christchurch and in St Christopher House in London. He finally retired to his golf at Barton on Sea in 1963 remaining there until he and his wife moved to Lindfield in 1984 to be near his family.

Max Rycroft was a very modest man, tending to play down his considerable achievements during a long and distinguished career. On being asked about his sporting achievements he wrote in typically modest fashion "A complete duffer. Sixty years of golf produced nothing better than a 14 handicap and one hole in one!".

Those who worked with Max Rycroft spoke of him as an extremely pleasant, stable and wise companion. He imparted his extensive knowledge of tanks and vehicles to his colleagues in a very unassuming way.

He is survived by his daughter Mrs Ann Stewart and son Lt Col (Retd) David Rycroft.

DGFR

Brigadier David Rycroft OBE (p93)

Correspondence

Christmas Island 1957-58

From Major General R W T Britten CB MC

Sir, — In 1957-58 25 Field Engineer Regiment, under the command of Lieut Colonel Jack Gatford, was part of the Joint Services Task Force preparing the airfield, base camps and observation posts on Christmas Island (part of the Gilbert and Ellice group of islands in the South Pacific) for the first British H bomb tests known under the code name of *Grapple X*.

Stores ships arrived at odd intervals and had to be unloaded with Sapper labour and supervision, just as I imagine similar ships are being unloaded in Red Sea ports at this moment.

As a 'Q' staff officer at the HQ of the Chief Engineer I found myself supervising one such ship lying off Christmas Island named *Somersby*. Looking back through my diary I realize that this must have been quite an impressionable time, as all I appear to have had time to record is the following little ditty:

SOMERSBY

This is the ship that brought our kit,
The beer and tents and tins of fit,
And all the junk that clutters the decks
And litters the quays to stop the breeze
That fans the guns of Gilbertese
Who polish the nuts
That go in the huts
That Jack built.

— Yours faithfully, R Britten, *Birch Trees, Fernden Lane, Haslemere, Surrey, GU27 3LA.*

Pre-War Quetta, Baluchistan

From Major N S Miller

Sir, — The enclosed print and negative were given to me by a member of the Corps whom I met from time to time in London after the War, we both being members of the same organization. They have come to light during clearing up operations.

The photograph, (below), was taken at Quetta, Baluchistan before the War where the officer concerned was GE (E&M). He is standing in his 'Yard' with this mighty array of steam traction engines and rollers. One can identify a Fowler cable ploughing engine, Marshall and Aveling & Porter steam rollers quite easily.

The puzzle is why was this great concentration of steam road engines assembled at Quetta. Was it the construction of the Bolan Pass or what?

Whatever the works were it seems that the engines were 'transferred to Quetta GE Yard for storage' and lined up in true military order!

I fear I have left it a bit late to draw any information from surviving members of the Corps but it may stimulate someone to do some research.

I always seem to have had so many irons in the fire!

My best wishes. — Yours sincerely, Nevil Miller, *Kew Collins House, 282 Longmarket Street, Pietermaritzburg 3201, RSA.*

Recollections of an Amateur Sapper

From Major I C Roberts

Sir, — Colonel Foster's article in the December *Journal* brought back memories. As an "amateur sapper" I, too, had some experience of what he refers to as the "Hanbworth torpedo". Actually it was the Hanworth torpedo, named after its inventor who was attached for a short while in 1940 to 105 (1st Corps) Field Park Company at Mission, near Bawtry. With all due respect to its inventor, the torpedo was indeed a "Heath Robinson" contraption. We experimented with several prototypes, using dummy mines. The "gun" barrel, a length of iron pipe, had to be secured to a heavy baulk of timber to restrict its recoil. The first torpedo we fired barely left the gun; the charge necessary had been underestimated. So we tried again with an increased charge. This time the torpedo shot out and disintegrated some way away. Unfortunately at the same time the gun shot some distance backwards — it had not been sufficiently secured to its mounting! Luckily there was nobody in its path.

A few months before this, 105 Company set up and operated a highly successful Molotov Cocktail factory at Saxilby, near Lincoln. The factory was manned by a few sappers and up to forty or so ladies from Saxilby and the surrounding villages. During its one month operation we manufactured over one hundred thousand bombs, which were distributed, I believe, to Home Guard units. The factory set up would have horrified any factory inspector, but the need was urgent, we adopted such precautions as were practicable in the circumstances, and there were no mishaps. — Yours sincerely, I. C. Roberts, *1 Musgraves, Dulverton, Somerset, TA22 9EB.*

From Brigadier D J N Genet

Sir, — May I point out two inaccuracies in recent *Journals* which should be corrected.

Volume 104 No 1 (April 1990) Page 80 Line 8.

I believe Brigadier 'Nap' Bonney's last appointment was CE Far East Command and not CE Eastern Command. CE Far East Command, based in Singapore, included almost all RE responsibility East of Suez which is a very different job from Eastern Command in UK which by then might not even have been a Brigadiers appointment. I happened to command 54 Indep Fd Sqn at the time and I think I took the photograph of him standing on the bridge at Tai Po which if I remember correctly was built by a promising young Troop Commander by the name of Willmott.

Volume 104 No 3 (December 1990) Page 288.

Colonel Eddy Peel belonged to King George V's Own Bengal Sappers and Miners. As the Institution may not now include any staff who served in Sappers and Miners it may be helpful to remind the Editor of the proper titles of the three Corps.

King George V's Own Bengal Sappers & Miners were based in Roorkee.

The Royal Bombay Sappers & Miners were based in Kirkee.

Queen Victoria's Own Madras Sappers & Miners were based in Bangalore.

All three Corps had attached RE Officers, who quickly learned to be fiercely loyal to whichever Corps they joined and very seldom changed cap badges — except that the Bengal Sappers seem to have provided Commandants for the other two Corps occasionally. The soldiers were recruited from quite different parts of India and there was a very healthy rivalry in terms of work and sport and in every other way whenever field units met. Uniforms were different and within the old Indian Army each Corps was regarded as being as different as (say) the Greenjackets are from the Black Watch in the Army today. Before 1947 any confusion of detail would have raised a storm of protest.

In case I have stimulated unquenchable thirst for further knowledge of the subject — I refer you to Colonel E W C Sandes' excellent book on *The Indian Sappers & Miners* which is no doubt in the Corps Library. — Yours faithfully, D J N Genet, *Bramford, Sherbrook Close, Budleigh Salterton, Devon, EX9 6DB.*

Correspondence (p94)

Fort Cautley, Devonport, Auckland, New Zealand

From Major P E Edmonds

Sir, — I am trying to find out whether plans exist in any archive in the UK of a typical coast defence fort similar to one which was built at North Head, Devonport, Auckland, New Zealand in 1886.

The fort was named after its designer, Major Cautley RE, who worked under a Sapper colonel, (Scratchley RE later Sir Peter) based in Australia. Colonel Scratchley designed a similar fort at Newcastle New South Wales. Such designs would presumably be based on UK practice.

Fort Cautley was originally equipped with 'disappearing guns'. It was remodelled in 1895, again in the Great War period, and again in World War Two.

Plans are available of the surface layers of the World War Two installation, including the expense magazines. What are missing are plans showing the deep underground system which is believed to have housed accommodation and reserve magazines. North Head is an extinct volcano, and underground chambers could have been excavated from the basalt rock. Convict labour was customarily used for such work.

After 1945 the fort was de-militarised and handed over by the Defence Department to a Park Board who later handed it over to the Department of Conservation. During these handovers in a period of 45 years the plans of the deep tunnelled system appear to have been lost. Access to the tunnels was blocked off.

An acquaintance of mine is trying to establish that the deep tunnelled system actually existed. He has accumulated a formidable dossier of eye witness accounts and family memoirs of people who worked in, or visited these tunnels.

Any information which your readers, or the staff of the Corps Museum could furnish would be gratefully received. — Yours sincerely, P E Edmonds, *2/62 Milford Road, Milford, Auckland 9, New Zealand*

50 Years of Bailey

From Colonel J H Joiner

Sir, — Recent articles and letters in the technical press concerning the centenary of the Forth Bridge have reminded me that 1991 sees the 50th anniversary of the Bailey. Much has been written of the bridge, including a recent article in the *Journal*, and so I would not presume to recover familiar ground.

Suffice to say that the prototype of the Bailey Bridge was tested in May 1941, full production started in July 1941, and the equipment came into service by the end of that year. Over 490,000 tons of Bailey were manufactured during the last three years of the war, this vast production including almost 700,000 Bailey panels, enough to build a single bridge girder from Christchurch to Leningrad. The extreme value of the equipment to the Allied war effort was best expressed by Field Marshal Montgomery, who wrote in 1947: "Bailey Bridging made an immense contribution towards final victory in World War Two. As far as my own operations were concerned, with the Eighth Army in Italy and with 21 Army Group in NW Europe, I could not have maintained the speed and tempo of forward movement without large supplies of Bailey Bridge". The bridge is still in use in many parts of the world today and is still manufactured, in a modern version, by Thos Storey (Engineers) Ltd and Mabey and Johnson Ltd.

It is also noteworthy that the home of Bailey Bridging, first set up in Christchurch in 1919, still flourishes and RARDE(Christchurch), as it is now known, is providing excellent support for our troops in the Gulf. — Yours faithfully, J H Joiner, *19 Seaway Avenue, Friars Cliff, Christchurch, Dorset, BH23 4EU*

Recollections of an Amateur Sapper

From Colonel J H Frankau MC

Sir, — The December issue of the *Journal* shows, on page 274, a Hamilton Bridge being launched across the Medway in 1940 by 221 Field Company. (56 (London) Division RE). I have Major K J Heaney's permission to point out that he was not commanding the Company as implied by the caption. The OC was a most redoubtable TA Sapper, Major I D Scott.

However, Major Heaney did participate but as Section Sergeant (Modern equivalent Tp SSgt). He continued to serve with the Company throughout the War, including combat operations in North Africa and Italy. Finally he had the distinction of becoming the first Commissioned Quartermaster of 56 (London) Division RE. — Yours faithfully, J H Frankau, *Querns, 2 Powis Lane, Avening, Tetbury, GL8 8PA.*

From Colonel I S Mercer

Sir, — I am a regular and appreciative reader of the *Journal*. I am currently serving away from the Corps but nevertheless maintain many close ties. To my mind the 1990 *Journals* were a vintage crop and I have had occasion to use many articles for reference and other purposes. In the current crisis General Fursdon's article on *Operation Vantage* has been much sought after as has Major Prain's article *Beam me up Scotty*. Indeed the latter has I understand provoked the purchase of some of the hand held position indicators.

It is very heartening to see our *Journal* in the forefront and being appreciated by a wider audience. My congratulations to the contributors and the Editor. Keep up the good work. — Yours faithfully, Ian Mercer, *Ministry of Defence, Metropole Building, Northumberland Avenue, London WC2N 5BL*

The Gordon "Journal"

From Major (retd) R D Malden MBE

Sir, — I was most interested to read Caroline Reed's article in last August's edition of the RE *Journal* giving the background to the Gordon "Journal" manuscript which the RE Museum has been so fortunate to obtain.

While stationed at Chatham in 1963 I became interested in what Gordon had been doing in China, a subject on which most Sappers, including myself, are desperately ignorant! A few weeks ago I came across the notes I made at the time. Among these is a copy of an article by Gordon in Volume XIX (1871) of *The Professional Papers of Corps of Royal Engineers* entitled *Notes on the operations around Shanghai in 1862-63-64*. This is no doubt still in the Corps Library but as it was not referred to in the article, I wondered whether the author knew of its existence.

Can one assume that Gordon used the same source for the 1871 paper as he did for the Gordon "Journal" manuscript? Is this source the same diary which he appears to have destroyed (presumably after writing the professional paper in 1871). It would be interesting to compare the two for style and content. The amount of detail and dates in the 1871 paper reinforce the notion that Gordon must have used a diary or some other notes written at the time to check both documents.

One other item I found was a map entitled *Sketch of Taitsan and Quinsan* copied from Andrew Wilson's *The Ever Victorious Army*. This makes the campaign in May 1863 easier to follow than either Gordon's primitive single line sketches or those in other books on the subject!

I would be most interested to hear the views of readers of the *Journal*. — Yours sincerely, Bob Malden, *3 Mulberry Court, Windsor End, Beaconsfield, Bucks, HP9 2JY.*

The Gordon "Journal"

From Ms C M Reed BA AMA

Sir, — I thank Major Malden for drawing my attention to Gordon's article in the 1871 *Professional Papers*. On study, the article does not appear to draw on the same source material as the manuscript "journal" acquired by the Museum in 1989. There is much more military detail, although Gordon skirts personal and political issues even more adroitly than in the manuscript, but there are slight discrepancies on, for example, dates and casualty figures. — Yours faithfully, Caroline Reed, *Curator RE Museum, Brompton Barracks, Chatham, Kent, ME4 4UG.*

Reviews

HANDBOOK OF MICROSTRIP ANTENNAS
Professor J R James and Dr P S Hall

Published by Peter Peregrinus Ltd, Michael Faraday House, Six Hills Way, Stevenage, Herts, SG1 2AY — Price £150
ISBN 0-863411500-9

Professor James has carried out extensive research in Electromagnetics at the Royal Military College of Science where he directs the Wolfson R F Engineering Centre. Dr Hall is Reader in Electromagnetics at the same establishment.

The book presents a wide ranging coverage of principles, state-of-the-art design and up-to-date applications of microstrip antennas. Application areas covered include antennas for satellite terrestrial and mobile communications, confornal and aerospace antennas, phased arrays, hyperthermia applicators and millimetric antennas.

REJ

RAILWAY DETECTIVES
Stanley Hall

Published by Ian Allen Ltd, Shepperton, Surrey — Price £16.95
ISBN 0-7110-1929-0

Stanley Hall is ideally suitable as author for this book. He was a senior Railway Operating Officer and eventually became Signal and Safety Officer at the Board and is thus in a unique position to see the whole picture.

His book is a splendid tribute to this brilliantly conceived Railway Inspectorate and, without exception, the dedicated and thorough ex RE officers who served in it for 150 years.

The subject of the book is essentually the existence of the Railway Inspectorate, its work, authority, successes, frustrations and limitations together with details of the individual officers.

The relationship between the Inspectorate and the Railway Boards is described where the former is investigative and advisory while the latter have the duty of deciding what is actually done, keeping a sensible balance between cost and scale of provision. This is a very clear discussion on a quite sensitive and complicated relationship between the two which is still true to this day.

The author narrates the growth of the railways in size and complexity with many statistics over the 150 years together with the growing need for safety measures. Simultaneously he illustrates how the Inspectorate identified particular safety needs out of accident enquiries and has woven this aspect into the general story. Also, by an elegant device he has given thumb-nail sketches of the individual officers concerned with the particular times, needs and current disasters.

This chronological form of presentation is bound to be of use to the student or the researcher and makes fascinating reading for the uninitiated.

Altogether it is a very well researched and presented book and it is a worthy and clear recognition of the great service the Railway Inspectorate and its dedicated, impartial and meticulous officers have given towards developing safety on the railways of Britain for 150 years.

For those interested there is much to learn in this book which is well worth reading.

AWM

PLYMOUTH'S DEFENCES
A Short History
F W Woodward

Published by F W Woodward, South Torr, Cornwood, Ivybridge, Devon,PL21 9RB — Price £4.95 Plus 70p p&p
ISBN 0-9516393-0-7

MAJOR Woodward is one of the acknowledged experts on the fortifications around Plymouth and an eloquent advocate for the cause of establishing a conservation policy for them. In his Foreword he makes the point that the lack of such policy is in sharp contrast to the situation in Portsmouth and to some extent Chatham and Dover.

As *Plymouth's Defences* tells us there is a remarkable collection of fortifications in the area, dating back to the 15th Century. The book is laid out with admirable clarity and a generous number of photographs and maps is provided. A summary at the end of the book gives useful historical notes with dates of the main events, a list of the 70 fortifications covered and details of how to visit 17 of them in five suggested trips. Major Woodward plans two further books which will effectively expand on these summaries: *What to see* giving more detail for the visitor and *The Last Hundred Years* covering the great expansion of defences from the 1850s threat of invasion from France, up to World War Two.

The story in *Plymouth's Defences* is told very much from a Gunner's point of view with much detail about the guns themselves. For the sapper there is a disappointing shortage of information about the architects (Du Cane and Denison both spent formative years in Plymouth). Nor is there much construction detail or indication of what life was like for the occupants. The Brennan torpedo stations and submarine mining are mentioned but only in passing.

However, these are parochial quibbles. The main point is that the book is an admirable contribution to the cause of describing and maintaining Britain's fortifications heritage, required reading particularly for anyone visiting the area and excellent value for money.

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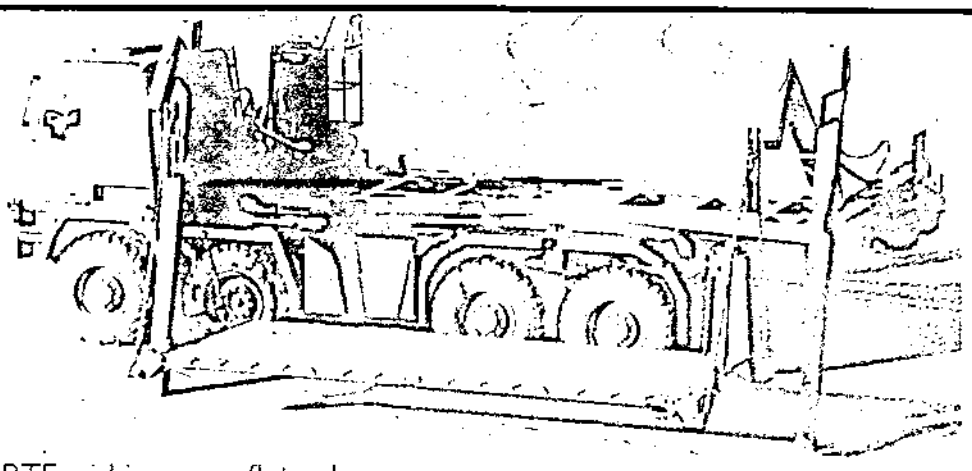
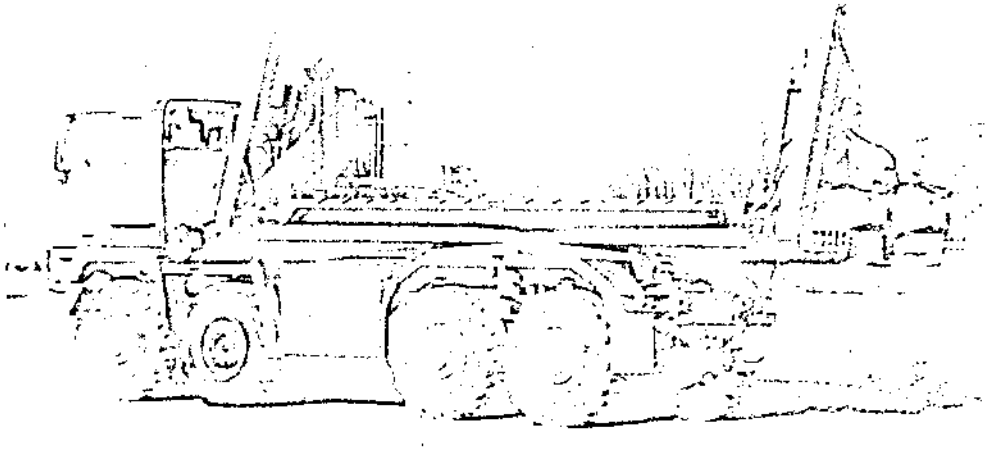


SRTE picking up a flatrack



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