



THE ROYAL ENGINEERS JOURNAL

Vol LXXXVIII

MARCH 1974

No 1

Published Quarterly by
The Institution of Royal Engineers, Chatham, Kent ME4 4UG
Telephone: Medway (0634) 42669

Printers
W & J Mackay Limited Lordswood Chatham Kent ME5 8TD
Telephone: Medway (0634) 64381

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Editorial

THE Padre spoke of a man on a deserted island. Although the island was wooded there was only one large tree. From it he made himself a hut, some furniture and some utensils. Not all of the tree had been utilized, "... and with the remains thereof he built an idol". The theme was not the disregard of the First and Second Commandments but that the man had placed immediate material needs before long term spiritual ones.

Are we not all guilty of over-concern with immediate solutions to problems with little regard for the long term?

It is natural to react to immediate problems with the easiest of the possible alternatives. This does not always result in the best long term solution. The side-effects of the instant answer must be weighed against the long term requirements. On occasions even the most unfortunate side-effects have to be accepted but more often either they are not considered at all or they are pushed to one side to be dealt with when they themselves become immediate problems. Instant expediency eventually becomes normal practice.

Can we really afford not to invest in the future?

How many buildings have been erected at low capital cost in the certain knowledge of exorbitant maintenance costs to come? How many of us have selfishly denied the opportunity to subordinates who wish to attend courses? The new careers and postings system for NCOs (much of the pioneering work carried out by RE Records), will go a long way to ensure that a man is given the opportunity to develop his full potential. The complexity of career planning in the Corps, a combat arm with trade responsibilities, is well known.

The need to practise skills to maintain competence is well established. In the short term, provided there is time, there are advantages in practising the skills required tomorrow. In the long term would it not be better to practise those skills which are unlikely to be required in the immediate future? It is in these skills that competence is likely to be inadequate. Many projects are undertaken ostensibly for training purposes. Are these projects primarily selected to fully employ a "formed" unit or to practise individual and collective skills? Too often we read "... the project proved to be tremendous training for junior management"; translated this means that the Troop and Section NCOs were employed properly! Are we allowing the "formed" unit mentality to over-ride the training opportunities?

At an Easter Service, the Padre spoke of a project on which there were many men. The electricians planted bulbs, the carpenters augered well and the surveyors measured drinks in the Mess. As all had to be employed the Commander looked around for work for the others, "... and with the remains thereof he built a road to nowhere". In concluding the Service the Padre took the opportunity to wish the majority of the congregation a very Merry Christmas, as he wouldn't see them again until next Easter!

In some research on another subject the Editor was fascinated by an article published in the March 1924 *Journal*—exactly fifty years ago. The Author of "Anti-Tank Mines in Mobile Warfare" showed remarkable foresight.

Both Major-General Dewing, one of our senior Members, and the Padre were concerned with the long term!

Some Members may feel that the article "Technician Engineer Status" is out of place in the *Journal*. Although a number of Members are eligible for registration this was not the reason for publication. It is important that all Members should understand the concept of, the reasons for and the advantages gained through, the CEI Charter. For Active List Members it should remind them of their duty to encourage their subordinates to work towards registration; for the non-Active List Members it should emphasize the standards achieved in the Active Corps in relation to civilian practice which in turn should assist them in assessing the employability of the ex-Sapper.

The Fixed Fortifications of the Sixteenth to Nineteenth Centuries Illustrated by the Defences of Chatham

BRIGADIER J R E HAMILTON-BAILLIE, MC, ADC, MA, C ENG,
MICE

Most sappers if asked what a ravelin is might answer that it is the name of a yacht, or perhaps that it was the old RSME fieldworks ground. The right answer however is that it is a part of the great system of fortification that was used from the sixteenth to nineteenth century. The construction of, and method of attack against, this system were the main subjects of study by military engineers for these 300 hundred years, so an elementary understanding of it should be of historical interest to us.

The system is usually connected with the name of Vauban (1637-1707), Chief Engineer of Louis XIV, but was well developed long before his time, as is illustrated by the magnificent Valetta Lines in Malta (fig 12) that will be familiar to many sappers. These were built by the Knights in 1556-70 after the Great Siege. Nearer home, Berwick-upon-Tweed has fine defences and Carisbrook in the Isle of Wight rather simpler ones, both from the time of Elizabeth I.

From the earliest times round or square towers had been used to give flanking fire along a wall. However these always left some possibility of dead ground close under the front face of these towers. The essential feature of the new system was a series of *bastions*, each *face* of which was covered by flanking fire from sides, known as *flanks* of the neighbouring bastions. The resulting pattern is shown in figs 1a and b. Fig 1a shows a continuous line, and fig 1b an isolated fort (based on Fort Pitt, Chatham), but the principle is the same. The basic element is the *curtain* with half a bastion each side of it, which forms one *front of fortification*. It is repeated constantly throughout all works in this system. A bastion with only one flank, eg at the end of a line, was known as a *demi-bastion* (fig 1b).

In early examples the flanks of a bastion were usually *retired* so that the flanking guns were given extra protection by the rounded corners of the bastions, called *oreilles* (fig 3). The Valetta lines (fig 12) show this feature. The oreilles were however found to be too vulnerable to attacking artillery fire, and the simple trace of fig 1 became more usual.

The other great change from mediaeval work was that the walls no longer remained exposed and vulnerable to artillery fire, but were protected by the *glacis* and *counter scarp* on the enemy side of the ditch, so that a typical section is as shown in fig 2. This also shows the side of the ditch facing the enemy called the *scarpe* (sometimes *escarpe*) revetted with brick or masonry. The *banquette* is a fire step. The *covered way* was a fire position for small arms on the front edge of the ditch covered in the sense of hidden, not with overhead cover, often provided with traverses much like a modern trench, and with enlargements at intervals called *places of arms* to allow the assembling of counter-attack parties, and give some flanking fire along the glacis (fig 4). The covered way also has a banquette.

This simple system was very soon elaborated by numerous outworks. There was a great vocabulary of names, usually based on French, for all the parts of a fortification. We have already seen quite a number illustrated in figs 1 to 4, but before going on we must look at more of these professional terms, particularly as applied to the various outworks.

Much the most common of these outworks was the *ravelin* (fig 5), a pointed work in front of the curtain, with ditches flanked from the faces of the neighbouring bastions. The section was like that shown in fig 2 but with a lower rampart than the main line, so that the latter could fire over it (fig 11). The rear (or *gorge*) of the ravelin

Figure 1.

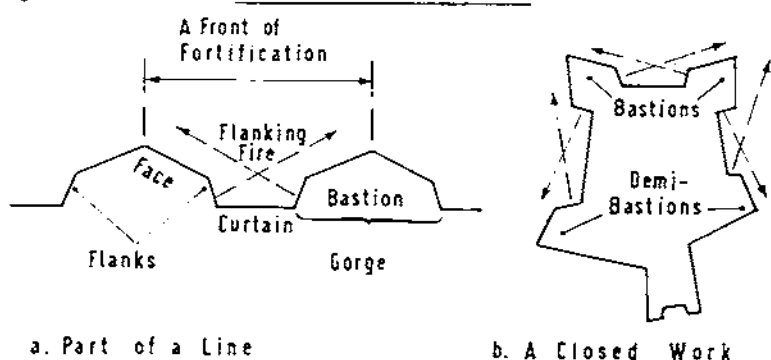
THE BASTION TRACE

Figure 2.

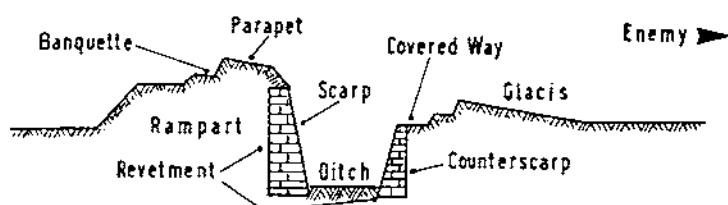
SECTION OF FORTIFICATION

Figure 3.

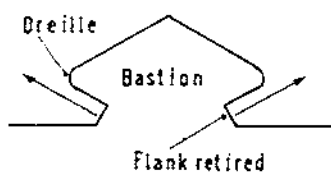
DREILLES

Figure 4.

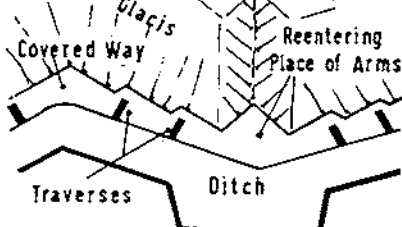
COVERED WAY

Figure 5.

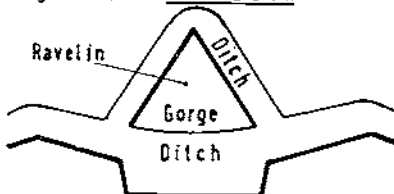
RAVELIN

Figure 6.

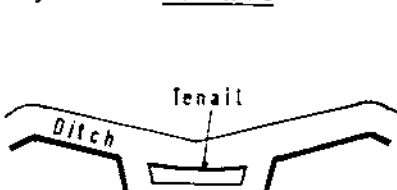
TENAIL

Figure 7 VIEW FROM RAVELIN SHOWING CAPONIER

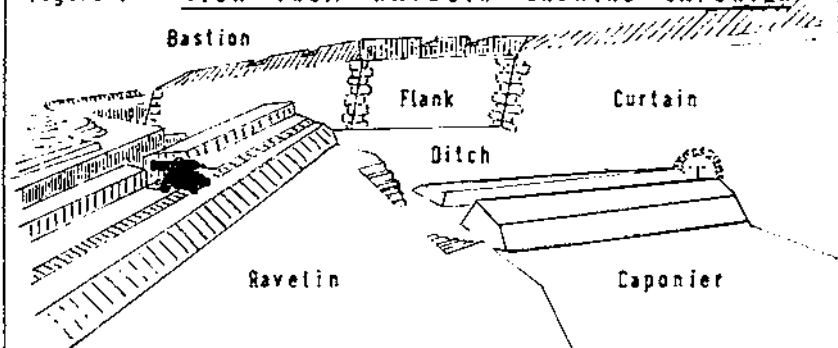


Figure 8 A REDAN



Figure 9 A REDOUBT



Figure 10 VAUBAN'S 1st SYSTEM

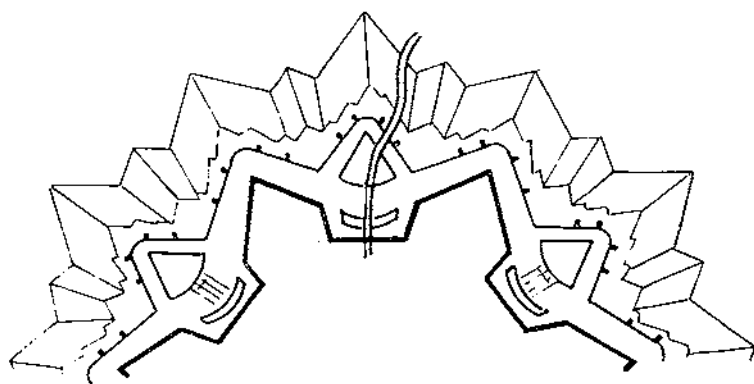


Figure 11. SECTION WITH RAVELIN & TENAIL

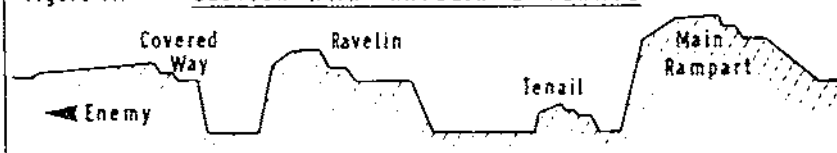
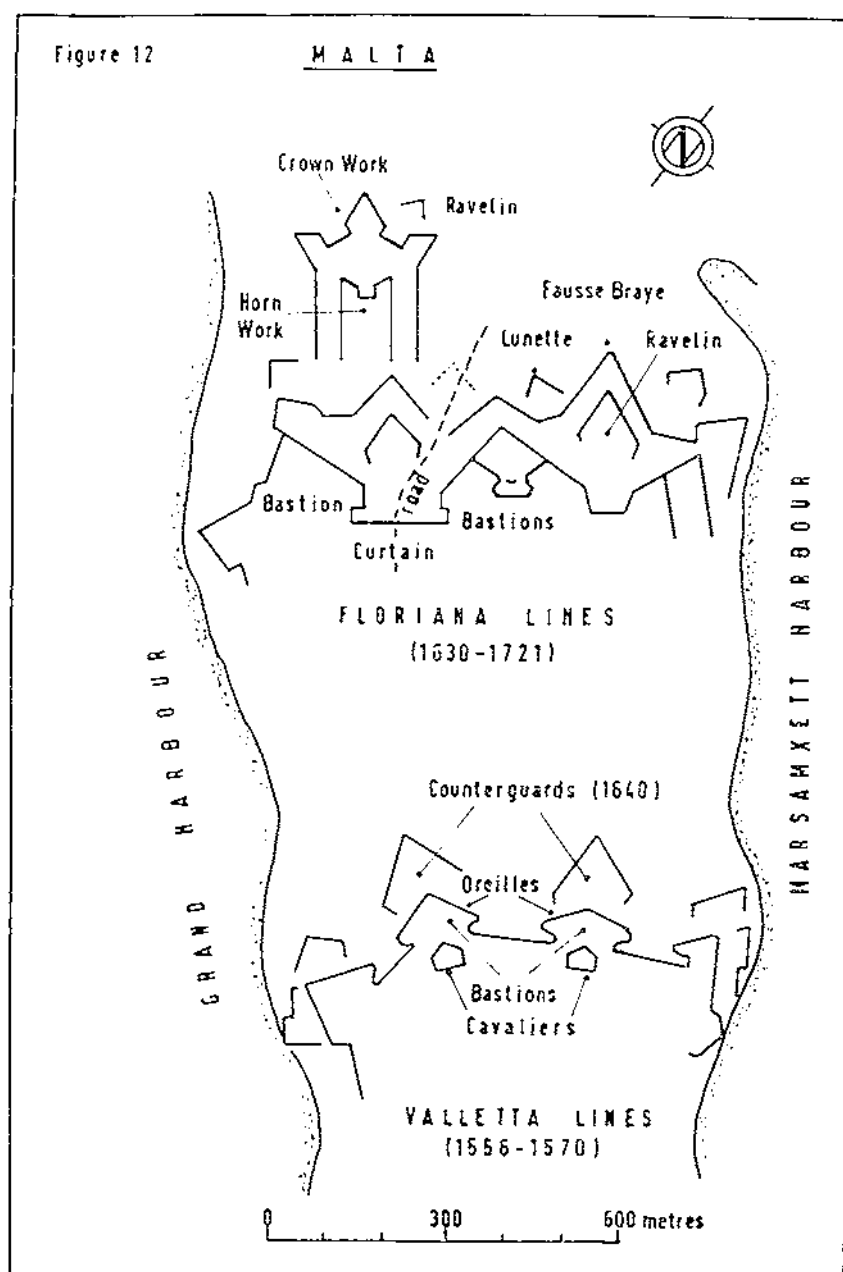


Figure 12



was always left open, so that there was no cover for an enemy who succeeded in capturing it.

Quite often another short length of low rampart called a *tenail* was added in the ditch in front of the curtain (figs 6 and 11). This was supposed to give added protection to the base of the curtain against bombardment, but it is difficult to see that it can have been of much value. Less often, a continuous subsidiary rampart was built all along in front of the main line of fortification, and this was called a *fausse braye*. The Floriana Lines in Malta (fig 12) have this feature.

To give protection to the way across the ditch leading to the ravelin, parapets were built on each side of it, which also gave fire positions for small arms covering the ditch. This arrangement was called a *caponier*, and is illustrated in fig 7, which shows a perspective view from a ravelin towards the main ramparts (there is no tennail in this example). The caponier changed its form and grew to great importance in the nineteenth century, as I will explain later. In fig 7 I have shown guns firing through embrasures in the parapet. They were sometimes mounted to fire over the parapet, called in *barbette*.

Other features that may be met are:—

A *counterguard*, rather like a ravelin but in front of a bastion, instead of in front of a curtain. These are usually additions to an earlier system where too much of the scarp of the bastions had been left exposed. The counterguards on the Valetta lines (fig 12) added in 1640 are good examples.

A *demilune*, which surprisingly is not semi-circular, but is much the same as a ravelin.

A *lunette* is again much the same but in a more advanced position and is illustrated by the Floriana Lines in Malta (fig 12) and *tenaillons* are similar outworks on the flanks of a ravelin (not illustrated).

A *hornwork* is an advanced work consisting of one front of fortification and a *crownwork* consists of two. There is a hornwork within a crownwork in front of the Floriana Lines. One of the fronts of the crownwork has a small ravelin, an example of the over elaboration of such defences.

Having added all these outworks the engineers still had not finished. A *cavalier* was a high massive keep inside a bastion, and rising above it to give yet one more tier of fire. There are fine examples in the Valetta Lines.

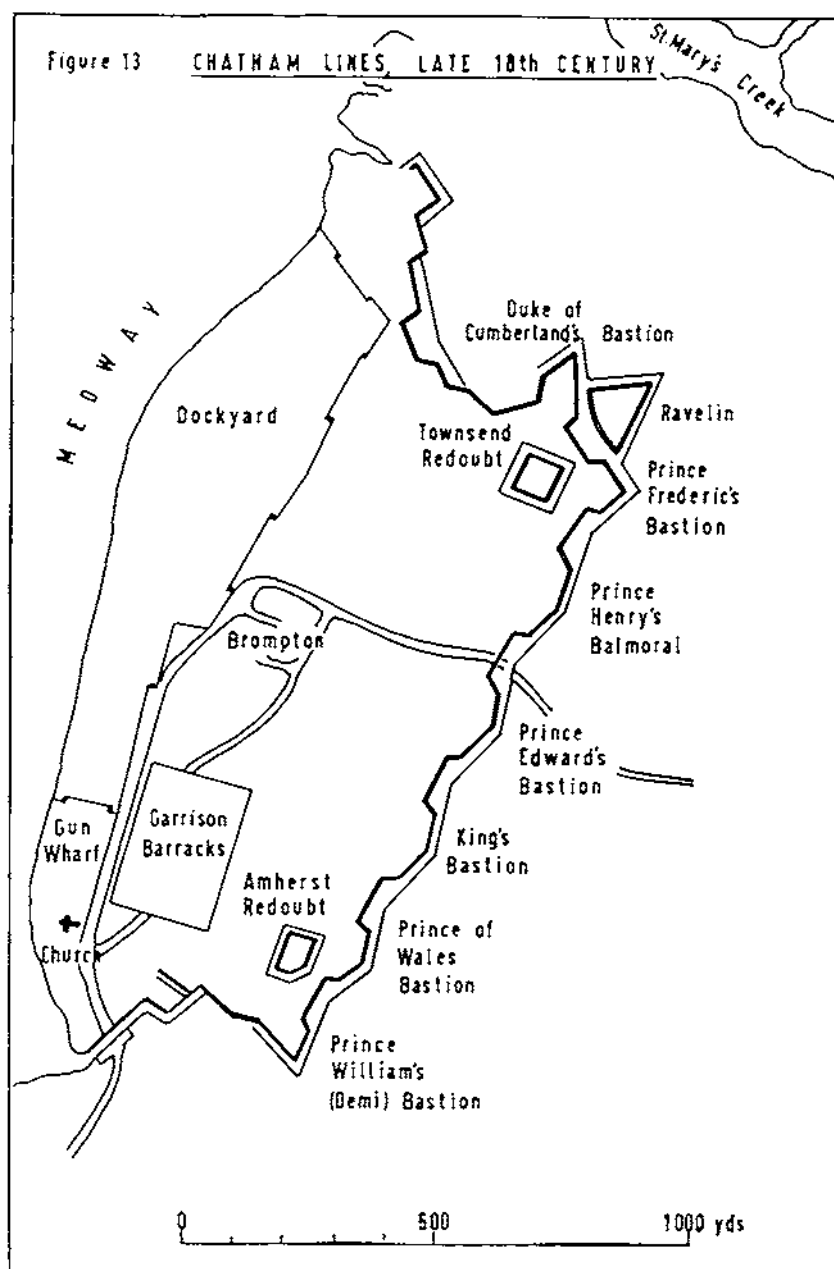
A rather simpler trace was the *redan* (fig 8). It was a point projecting from a line. A Russian redan was of course the scene of some of the heaviest fighting in the siege of Sebastopol in the Crimean War.

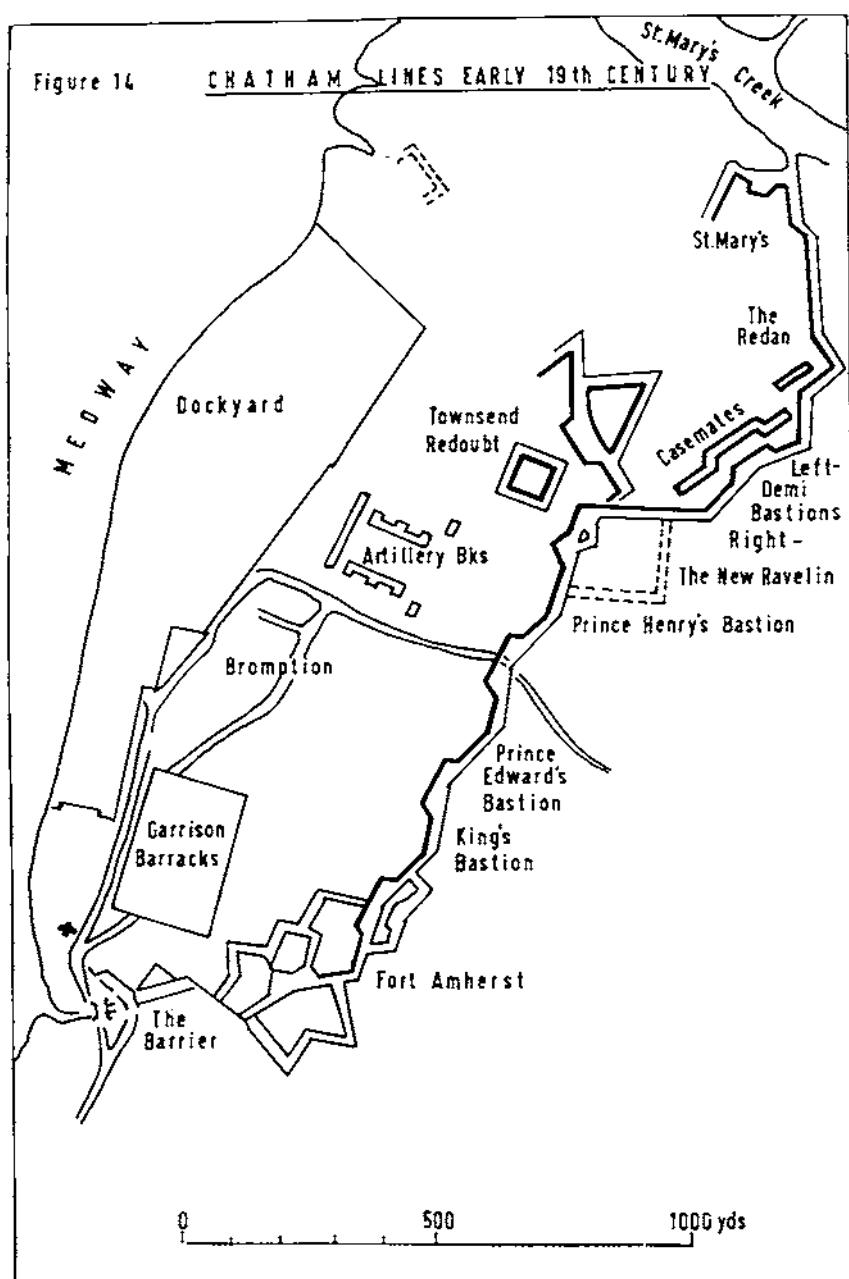
A *redoubt* was a closed work of simple rectangular or polygonal trace with ditch and ramparts, but without arrangements for flanking fire along the ditch (fig 9).

Fig 12 of the Floriana and Valetta lines is a good example of the elaboration to which defences were carried. For simplicity, only the ramparts are shown. All the works have ditches and often covered ways. Such complications were largely self defeating. No garrison was likely to have enough men to defend so many positions. With other sections not illustrated here there were some 22 miles of ramparts just around Valetta and its adjoining towns, when the British occupied Malta.

Vauban formalized this system and built numerous fortresses in France and Flanders, all on a massive scale, many of which gave a good account of themselves even as late as the Franco-Prussian War of 1870. Half of a regular hexagonal fortress to his "First System" (as taught by General Paisley at Chatham) is shown at fig 10. It will be seen that he used a ravelin, caponier and tenail on each front of fortification. This also shows how the entrance to a fort was usually through the side of a ravelin and then across the ditch at the centre of the curtain. A section of such a fortification showing the successive obstacles is shown at fig 11.

The British never got too involved in constructing such complicated works as the Malta lines or the Fortresses of Vauban, partly from common sense, but probably more because no British parliament would ever pay for them. The bastion trace was however used from the sixteenth century until the nineteenth, when General





Gordon's defences of Khartoum were still laid out on this pattern. Fort William and Fort George in the Highlands had bastioned lines. Fort George retains a good example of a "front of fortification" complete with ravelin on its land face. In contrast, however, the famous and successful Lines of Torres Vedras consisted of redoubts and batteries only and did not use the bastion system.

Throughout the period we are considering, coast defence remained a linked but rather separate art from that of land fortification. The problem here has always been rather different, in that the main object is to mount heavy guns to engage ships. Coast defence forts have usually had landward defences, but these have only been designed to resist hasty attack by naval landing parties, rather than a regular siege. They have therefore been simpler than their land warfare contemporaries. Sheerness however had a bastioned land front with a ravelin, from an early date.

This brings us to a consideration of the defences of Chatham. At the time of the successful Dutch raid of 1667 the only defence was Gillingham Fort, a battery in a redoubt built in the time of Charles I. Despite the fright that this raid gave the government little was done, though land for possible fortification was bought in 1710-14 and a dockyard wall in a very flattened bastioned trace was built in 1719, probably more for security than defence.

At last in 1755 plans were considered for proper defences. A straight trace with redans was rejected in favour of a bastioned trace, which was dug in 1756. It consisted in general only of an earth ditch and rampart, with horizontal stakes driven into the scarp to provide an obstacle. It is shown in fig 13 and consists of six bastions and a demi-bastion, named as shown, connected at each end to the river by irregular lines dictated by the terrain. An early plan shows ravelins between Prince Frederick and Prince Henrys Bastion, and between Prince Edward and Kings Bastion, but I cannot find any evidence that they were ever built. A ravelin was however made at the north east corner between the Duke of Cumberland and Prince Frederick Bastion, though I do not know at what date. Its trace is still followed by the buildings once belonging to the dockyard and now to the Medway Technical College.

Plans for improving the fortifications were considered in 1770, 1778-79 and 1783. Some of these were very grandiose showing forts on every hill in the neighbourhood, all connected by bastioned lines. All that was actually done however was that two redoubts, Amherst and Townsend, were built inside the lines as shown in fig 13. It seems a curious arrangement, but as these redoubts appear to have had properly revetted ditches and shell proof accommodation from the start they were presumably the main defences.

The next and biggest phase of work took place during the Napoleonic wars starting in 1803. The lines were remodelled, and revetted in brick throughout. At the northern end they were realigned completely starting from the right flank of Prince Frederick Bastion (fig 14). From here northwards were the Right and Left Demi-bastions, with casemated (ie bomb proof) barracks behind them, then The Redan and finally St Marys, a front of fortification facing St Marys Creek. From the left face of The Redan northwards these lines have been destroyed by the modern dockyard extension, but the remainder are in a fair state of preservation. Many readers will remember St Marys Barracks, as the casemates became called, still in occupation, but they were demolished recently.

The old northern end of the line went out of use, but the front consisting of the right face of the Duke of Cumberland and the left face of Prince Frederick with the ravelin between was retained, probably for training in the attack and defence of fortresses organized by General Paisley. It also housed a magazine.

At first there seems to have been a small ravelin between Prince Frederick and Prince Henrys, but at some later date "The New Ravelin", shown dotted on fig 6 was built in what became the SMEs fieldwork training ground. This became known to generations of Sappers as "The Ravelin". It seems possible that as, by the time it was dug, the lines were at the very end of their life, it was made primarily as a training exercise.

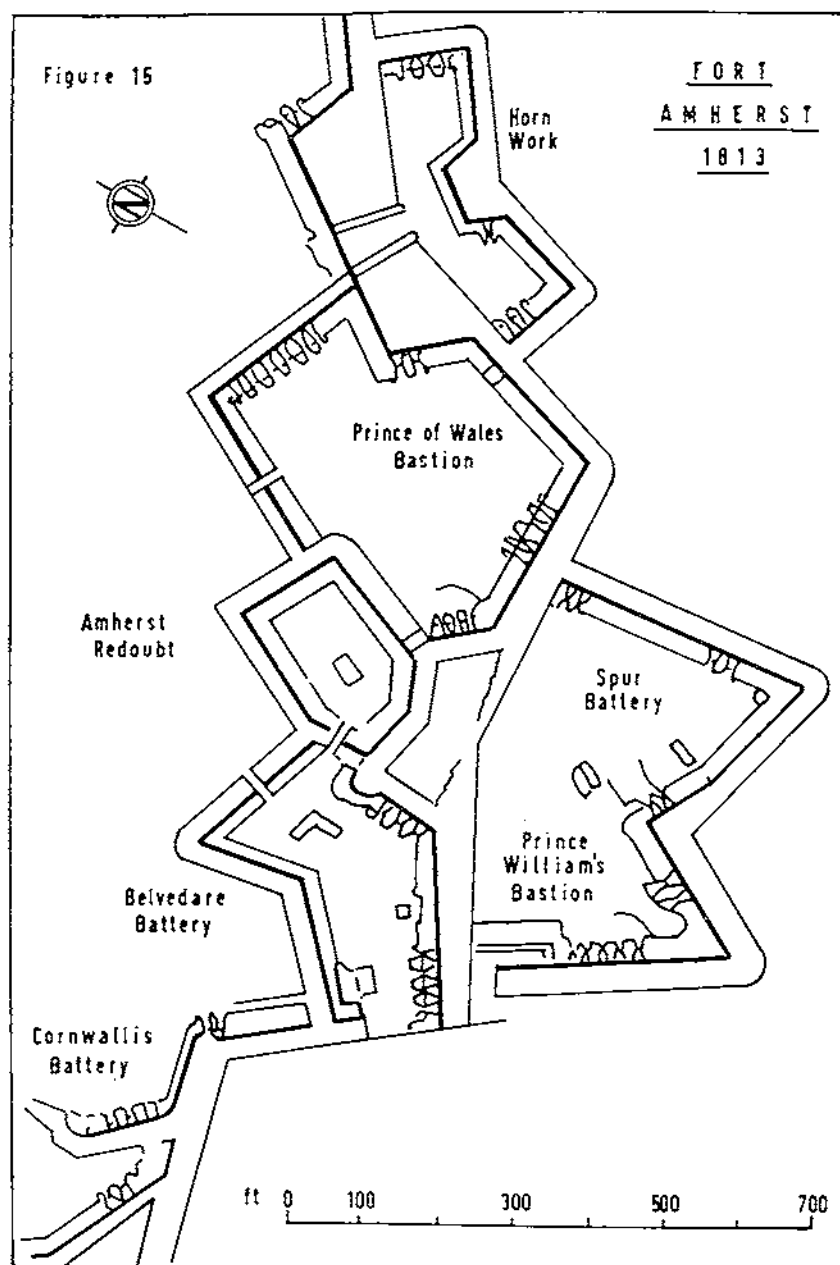


Figure 16. A 19th CENTURY CAPONIER

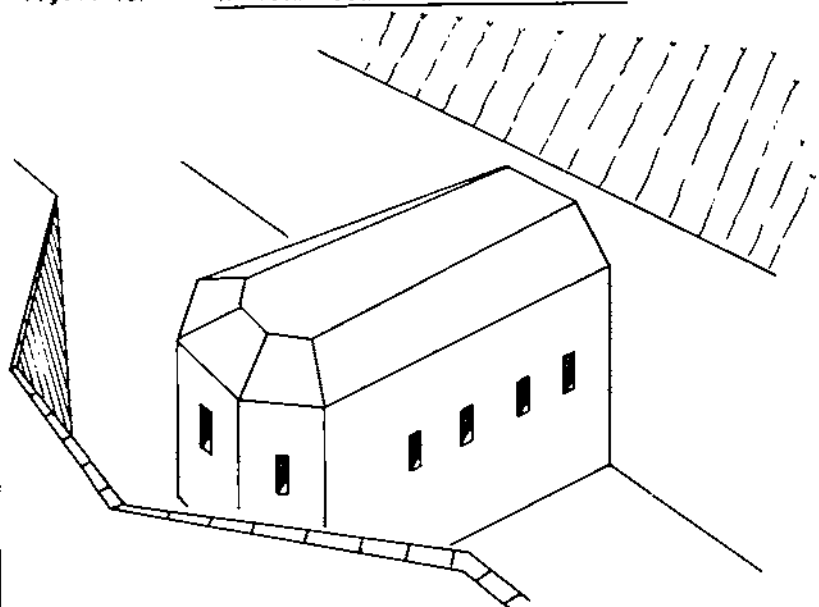
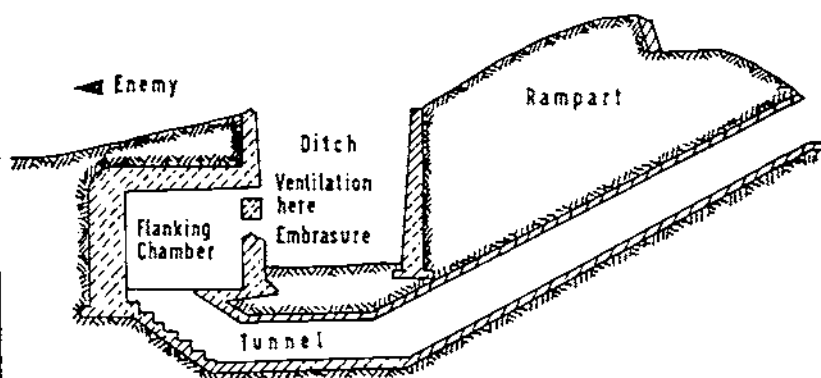


Figure 17. SECTION OF A 19th CENTURY FORT SHOWING A COUNTERSCARP BATTERY



NB. The flanking chamber is at an angle of the ditch, so that it enfilades a length of it (see fig 19).

The Townsend Redoubt became the RE Park, and its general shape could still be traced in the confused layout of buildings that were replaced in the modern rebuilding, which still remains on the same site.

Meanwhile at the other end of the lines, at the south east angle a complicated series of alterations were made (fig 15). A new main ditch was dug through the right face of Prince of Wales Bastion, and behind Prince Williams (demi) Bastion, across the corner of the Amherst Redoubt. Spur Battery was added to Prince William to make a powerful two pointed outwork, not however of a recognized form. The Amherst Redoubt was also connected on each side to the main line by rearward facing ditches and ramparts, making the Fort Amherst complex capable of all round defence. The right-hand extension mounted the Belvedere Battery, covering the previously exposed right flank of Prince Williams Bastion. In addition a hornwork was built in front of the curtain joining Kings and Prince of Wales Bastion. Half this hornwork is now under the reservoir, but its left flank ditch remains and some signs of the connecting caponier at the foot of the reservoir wall.

On the extreme right the ditch running down to the river known as the Upper and Lower Barrier was realigned and flanked by underground batteries connected to extensive tunnels under the Belvedere and Cornwallis batteries.

The original intention had been to continue the lines and enclose all Chatham and Rochester. Fort Pitt in Chatham, of conventional bastion trace (fig 1b), and Fort Clarence, a fairly short length of line running down to the Medway south of Rochester, were all that were completed.

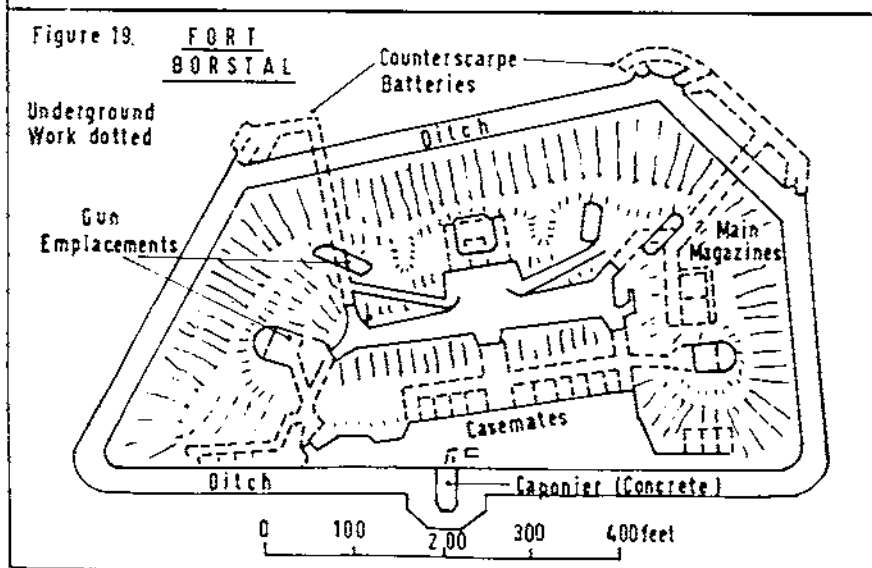
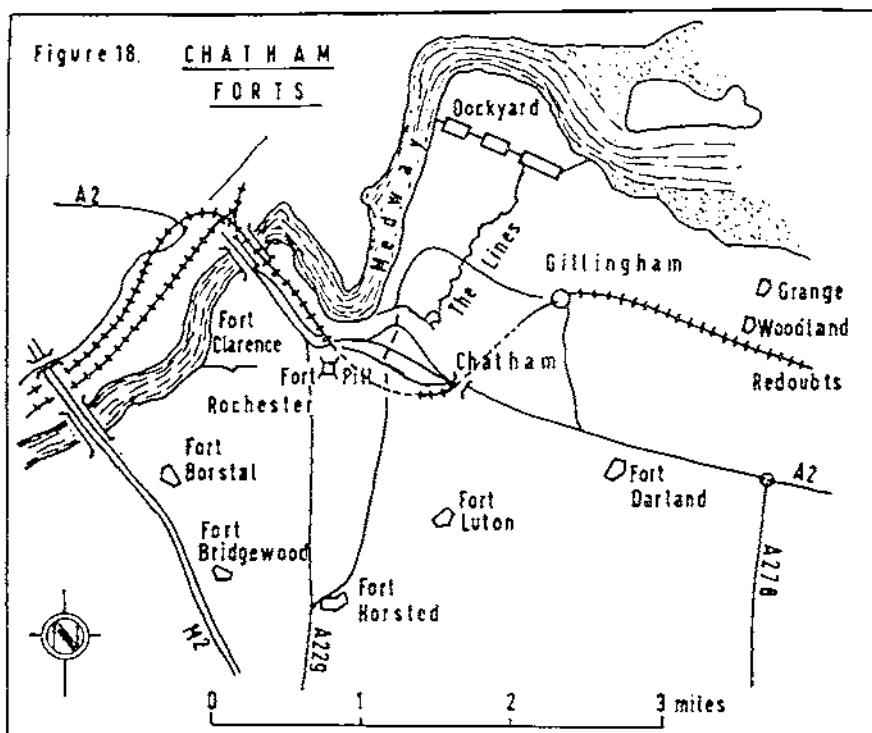
After about 1820 all work on the defences ceased for many years and the only activity was the SME training. We must now return to a general look at development in fortification during the nineteenth century. With the increasing range of guns, and particularly with the introduction of rifled weapons towards the middle of the century the old *enceintes*, as the rings of continuous ramparts were called, could no longer protect vital centres from bombardment. At the ranges now required continuous ramparts were impracticable, and were replaced by rings of detached forts, *girdle forts*. These were usually of simple trapezoidal form, but it was still considered necessary in order to make them "storm proof" for the ditches to be flanked. This was done in one of two ways, or very often by a combination of them. The *caponier* ceased to be a passage across the ditch, but grew into a loophole masonry (or later concrete) block house in the ditch firing in both directions along it, see fig 1b and compare fig 7. Sometimes, especially in German work, the caponiers became of great size with several tiers of embrasures.

The other ditch flanking system was by *counterscarp batteries*. These are casemated positions under the glacis at an angle of the ditch, firing inwards along the ditch through loopholes in the counterscarp. They are usually connected to the inside of the fort by underground tunnels (fig 17). Both counterscarp batteries and a caponier are used in Fort Borstal illustrated in fig 19.

Inside the forts, the guns originally firing "in barbette" ie over the parapet, were placed on hydraulically operated disappearing mountings, and by the end of the century in revolving and disappearing steel cupolas, or through massive steel shields. The forts all had casemated accommodation for the garrison and for magazines, under ever increasing thicknesses of earth-covered brickwork, masonry or concrete.

Usually even when the "girdles" had been completed, the old *enceintes* were maintained, to prevent infiltration between the forts into the protected town. That this had not been done at Liege was noted by the Germans in 1914, who accordingly carried out an attack by infiltration, and then reduced the forts afterwards.

On the continent vast sums were spent on building and modernizing such forts, in comparison with which the British works were as usual very modest. In Malta, because there was not room for a complete girdle, the Victoria Lines were built across the island, though as two-thirds of the coastline was covered by coast defence forts, it has never been clear why the remainder could not have been covered likewise instead of by this inland line. It did at least have an excellent natural position.



Accordingly to accepted practice the old enceintes were maintained, and even added to in the Corrodino Lines.

At Chatham a Royal Commission in 1860 considered what ought to be done to modernize the fortifications. Portsmouth, Devonport and other dockyards were also considered. For Chatham they recommended a ring of seven forts roughly as eventually built, surrounding Gillingham, Chatham and Rochester, and a continuation back to the Thames across the Grain Peninsular that was never constructed.

The names and position of the five forts and two smaller redoubts that were built are shown in fig 18. Work seems to have stopped before the forts were fully completed, sections of the ditches in the chalk being left unrevetted. Work restarted in 1892-93 when the ditches were cleared out and fully revetted in concrete, and the gun positions modernized. New record plans of Fort Darland were drawn in 1902 which may date the completion of work at that fort. This was probably the most up to date in design but little can now be seen except some banks between the modern houses. Luton, Horsted, Bridgewood and Borstal are all still substantially complete though overgrown and inaccessible. All are similar to Borstal illustrated at fig 19, though the gorge ditch at Horsted is covered by casemated flanks instead of by a caponier.

Building and the planting of trees in the field of fire of the forts was evidently controlled as the effects can still be seen in the existing open spaces. Some breastworks were raised on the right flank of Fort Bridgewood reaching out towards Fort Borstal, but there are no other sign of "Interval Works".

The ring of forts may still have been considered as operational in the First World War. By World War Two, though still army property, they were used as headquarters, barracks and stores but were not armed as forts (except for anti-aircraft guns). Curiously the old Chatham lines seem to have been recognized as still forming a good anti-tank obstacle. A sallyport leading to the hornwork is obstructed by a modern concrete block, there is a small uncompleted pill box at the apex of Prince Williams Bastion, and a number of anti-aircraft mountings along the ramparts. Connecting to the main ditch between the Left and Right Demi-bastion, and surrounding the old naval signal station is what looks like an anti-tank ditch of 1940 vintage. How pathetically small it is compared with the ditches dug in days gone by. It represents however the end of almost two hundred years of continuous service of the fortifications of Chatham.

Anti-Tank Mines in Mobile Warfare

CAPTAIN AND BREVET MAJOR R H DEWING, DSO, MC, RE

Reprinted from the RE Journal March 1924 with the author's permission

THE means of anti-tank defence at the present time comprise artillery, our own tanks, natural obstacles and artificial obstacles. *Engineer Training* specifies anti-tank defence as one of the duties which engineers may be called upon to undertake in the field, and consequently the question of the provision of artificial tank obstacles merits consideration.

Artificial anti-tank obstacles may be divided into:—

- (i) Some form of ditch impassable for tanks. If concealed, the ditch develops into a "tank trap."
- (ii) Some form of stockade. In order to stop tanks the stockade must be of very strong construction and usually entails heavy concrete work.
- (iii) Inundations.
- (iv) Land mines.

Of these various forms of obstacles (i) and (ii) both demand either more time, more labour or more transport than would be available in mobile warfare. Inundations are only possible where specially favourable natural conditions exist. Land

mines, therefore, remain the only class of tank obstacle which the engineers might generally be able to provide in mobile war.

Very little is at present laid down in our text-books with regard to anti-tank mines. *Tank Training* mentions mine fields as being a source of anxiety to tanks, but gives little further information on the subject. *Military Engineering*, Vol IV, after saying that anti-tank mines were used in the War of 1914-18, states that the most suitable form of anti-tank mine is now under consideration.

There can be little doubt that, in the event of our being engaged in a war against an enemy armed with tanks, there will be an immediate and insistent demand for every possible form of anti-tank protection. Mines alone can never provide efficient protection, any more than barbed wire alone can be a protection against infantry. The framework of anti-tank defence under present conditions must be anti-tank artillery, but mine fields may prove as important an accessory to these guns as barbed wire has proved to machine-guns.

The question deserves consideration not only from the point of view of our own defence, but also to provide security for our offensive tank forces. It is wrong to think that by exploring possible anti-tank measures we are counteracting the offensive value of our own tanks. It is only by foreseeing the probable anti-tank measures which the enemy may employ that our own tanks can be secured against them.

THE USE OF ANTI-TANK MINES IN THE WAR

The tank itself was in its infancy at the time of the Armistice. Counter measures to meet any new weapon inevitably follow behind the development of that weapon; and consequently the possible means of anti-tank defence were only explored to a very limited extent during the War.

As we led the way in the development of the tank we might naturally expect to find anti-tank measures developed mainly by the Germans. Actually, they do not appear to have treated the problem seriously until the last five months of the war, when they evinced a feverish activity in seeking counter-measures. Their extreme anxiety on the subject, combined with the rapid development of the final operations of the war, prevented any really effective treatment of the problem.

Anti-tank mines were used both by the Allies and by the Germans. They most usually took the form of shells or trench mortar bombs, provided with a special type of firing mechanism and buried just below ground level. A type of contact-firing mechanism was devised which operated when a tank passed over the mine, but which was not fired by the passage of infantry or transport.

The German mine fields do not appear to have scored any great success against our tanks; in fact, the heaviest recorded allied tank casualties from mines occurred through tanks running over one of our own mine fields laid before our retreat in March 1918, and forgotten. This disaster occurred at the end of September 1918. The mine field consisted of rows of buried trench-mortar bombs, each bomb containing 50 lb of ammonal. In spite of having been laid seven months previously, the efficacy of the mine field was demonstrated with unfortunate thoroughness. The weight of explosive used was sufficient to blow in the bottom of the machines and cause severe casualties among the crews.

NEUTRALIZATION OF MINE FIELDS BY THE ENEMY

As the use of mine fields becomes more general, methods of counteracting them will, in turn, come into prominence.

Three methods of destroying mine fields have been suggested:—

- (i) By artillery fire.
- (ii) By providing tanks with a roller pushed ahead of the machine in such a way as to detonate mines before the tank itself reaches them.
- (iii) By a form of plough pushed ahead of a tank.

The destruction of mine fields, the exact location of which is unknown, by artillery

fire would demand an expenditure of ammunition which is not likely to be possible in mobile warfare.

Though neither the roller nor the plough has yet been perfected as a mine-clearing machine, it may be expected that some form of mechanical mine-sweeper will eventually be evolved.

Such a machine is only a partial answer to the mine; and its use would not completely neutralize the value of the land mine, any more than naval mine-sweepers have been able to eliminate entirely the value of mines at sea. The necessity for every tank formation being preceded by mine-sweeping tanks whenever operating over ground which might be mined, would constitute a handicap upon the manoeuvring power of the tanks, which would itself justify the use of the mines.

THE PROBABLE TYPE OF ANTI-TANK MINE

For use in mobile warfare it is essential that an anti-tank mine should be light enough to be easily transportable in large numbers. It may be assumed that the use in mobile operations of mines, sufficiently powerful to break through the armour of a tank, and so inflict casualties on its crew, will be precluded by the weight of explosive required. The mines will, therefore, probably be designed to break the tracks of the tank and so render it immobile. For this purpose a mine weighing from 10 to 15 lbs would probably be sufficient.

Other desiderata for the mine are that it should be safe to handle, quick to lay and easy to conceal. There should be no difficulty about ensuring safety in handling. Rapidity in laying and facility in concealing would both be realized by a small mine designed to be laid just under the ground surface, and calling for the minimum of digging. These characteristics do not appear to be difficult to realize.

We may then assume that mines will be available possessing the following characteristics:—

- (i) Weight, 10 to 15 lb.
- (ii) Powerful enough to immobilize any tank whose track passes over it.
- (iii) Safe to handle.
- (iv) Quick to lay and conceal. Say one man could lay one mine in normal ground in 5 mins.

From these assumptions we can draw certain data:—

- (i) A 3-ton lorry could carry about 400 mines.
- (ii) A section of a Field Company, RE, could lay a field of 500 mines in about 1 hr, presuming the mines are dumped on the site.
- (iii) To form an efficient mine field at least one mine per yard of front to be covered is required. This allows of two rows of mines, with mines 6 ft apart in each row. It may be found that three rows of mines are desirable, requiring $1\frac{1}{2}$ mines per yd of front.

PRACTICABILITY OF SUPPLY OF MINES IN MOBILE WARFARE

The use of mines while operations are so mobile that formations are moving daily is clearly neither useful nor practicable. The demand for mines will occur as soon as a formation occupies a position with a view to meeting an enemy attack upon it. It may be anticipated that a period of from 24 to 48 hrs may be available in which to put such a position in a state of defence.

The previous operations should have given sufficient indication of the probable course of events to permit a supply of mines being available at railheads very soon after the decision to occupy a position is taken. The problem then becomes one of transport forward from railhead. The establishment of a Div M T Co includes two 3-ton lorries for RE stores, but the demands on these lorries for the carriage of normal RE stores would be too great to allow their being used for mines. The best solution of the problem would be the allocation to Divisions of lorries specially for the carriage

of anti-tank mines. Until this development takes place transport would have to be found either by the Corps or the Division diverting MT from its normal duties, or by utilizing the pontoon trailers of the Field Park Company with the Division, provided that they were temporarily available. These latter have a carrying capacity of 42,000 lb, say 2,800 mines.

The question of transport forward from railhead is, therefore, in doubt. With our present establishment of MT it would usually be possible to make eight or ten lorries available if the urgency of the need for anti-tank mines justified it.

If we consider a Division holding a front of 5,000 or 6,000 yds, faced with the probability of attack by an enemy with superior strength in tanks, and relying mainly on the fire of twelve Pack Artillery Howitzers for defence against these tanks, it seems likely that its need of additional anti-tank defence will be urgent enough to ensure transport being found for, say, 3,000 mines.

On the basis of the assumptions made, we may consider that a Division could have sufficient mines to cover about half the frontage it is holding. This quantity of mines could be laid by two Sections of a Field Company RE in about four hours; and the mine-fields should easily be completed within twelve hours of the arrival of the mines at railhead.

METHOD OF EMPLOYING MINES

The Value and Limitations of Mine-Fields.—In considering the method of employing mine-fields, their value and their limitations must be realized. Their value is twofold:—

- (i) Their physical value, arising from their power of rendering tanks immobile.
- (ii) Their moral value, arising from the effect on the nerves of the driver of a tank of the knowledge that he may at any moment drive into a mine-field, be put out of action, and remain an easy target for artillery.

The main disadvantage of mines lies in the restriction which they lay upon the movement of our own tanks, and possibly of other troops, in counter-attack.

The mines under consideration also have the limitation that, though they would be capable of stopping a tank, they would not put either its crew or its armament out of action.

Co-operation.—In selecting sites for mine-fields it is essential to consider how they may affect or be affected by the action of other arms.

Lines on which it is probable that our own tanks may be required to counter-attack must be left clear.

Areas which are likely to be under heavy concentrations of our own artillery fire in the early stages of an enemy attack are not suitable, owing to the probability of a large proportion of the mines being detonated by that fire.

The mine-fields must be sited in conjunction with the siting of anti-tank guns, and must be within their arc of fire to achieve their full effect, since the mine will only stop the tank and the gun is required to put its armament and crew out of action.

A mine-field should normally be under infantry or machine-gun fire to prevent enemy working parties clearing a path through the field, once they have located it. In order to exploit the moral effect of the mines it may, however, be useful to site a few small mine-fields in defiles well forward of the infantry positions, simply with the object of increasing the uncertainty and limiting the enterprise of the enemy tanks in their advance.

Influence of Ground.—On any front there are likely to be certain lines of approach favourable to tanks, and certain sections where woods, marshy ground, streams or railway embankments constitute natural obstacles to tanks.

Mine-fields will naturally only be employed on sections of the front favourable to tanks; and any defile confining the possible tank routes will be a particularly good site to mine.

On these sections some portions of the ground will probably favour concealment of the mine-fields more than others, and this will be a factor in the selection of sites.

There may be covered approaches constituting dead ground which it will be difficult for anti-tank artillery to cover. This may justify the laying of a mine-field which is not covered by the fire of the defence, as an enemy tank disabled in such a site could not use its weapons effectively.

The Responsibility for Siting Mine-Field.—The factors affecting the location of mine-fields and the arms affected are so various that it is important that the responsibility for determining their siting should be definite. The final responsibility should rest with the CC Infantry Brigade holding any sector; and a sound procedure would be for an RE officer to be detailed to carry out reconnaissance on each Brigade front. The Brigadier would lay down the general policy of anti-tank defence at his conference preliminary to the reconnaissance of the position. The RE officer would accompany the anti-tank artillery commander on a detailed reconnaissance of the whole Brigade front, on completion of which he would be able to submit a complete plan of proposed mine-fields for the confirmation of the Colonel-Commandant.

It is important that records of mine-fields laid should be kept systematically. The danger of our own tanks suffering from our own mines has already been referred to.

Use of Mines in Rear of the Main Infantry Zone.—The foregoing notes have been confined to a consideration of the employment of mines as part of the defences of the main zone held by the infantry, because it seems probable that it is there that their use is likely first to become general. As the powers and range of movement of tanks increase, the problem of providing anti-tank protection for Brigade, Divisional and Corps Headquarters, and important administrative centres in rear of the main zone will become increasingly important.

Anti-tank mines will play their part in these defences no less than in the forward defences.

Training and Organization.—The example of the German attempt to improvise anti-tank measures in haste during the last months of the war, should be sufficient to emphasize the importance of organizing any form of such defence during peace, and ensuring that the officers and men concerned are given such training as may be necessary.

The technical training of the RE personnel in laying the mines requires very little time; and, once the mines or dummies are available, could be carried out in a few hours.

The training of officers is more important. Officers should know what constitutes a natural tank obstacle, and what does not, as this knowledge must form the basis of any anti-tank defence. They should be able to judge whether a railway embankment or cutting is sufficiently steep to prevent the passage of tanks; whether the tree-stumps in an area cleared of wood are high enough to stop tanks; and whether the banks and bottom of a stream permit tanks to ford it.

Sapper officers should know the powers and limitations of the Pack Artillery Howitzer, and Pack Artillery officers should have similar knowledge with regard to mines.

All senior officers and staff officers should have the knowledge required to enable them to co-ordinate the scheme of anti-tank defence on a Brigade front. The transport problems that will crop up as soon as mines are demanded must be realized and considered beforehand if they are to be dealt with effectively in war.

None of this training is difficult. It is only necessary to give these questions consideration whenever troops are being exercised, or schemes and staff rides are being carried out, under conditions which lend themselves to the problem.

Overheard at 1973 Engineer-in-Chief's Conference (1)

"Is this tea or coffee?"—"Yes sir."

"I've lost eight stones since the last conference—my daughter married a Gunner!"

Colonel R J Carson, CD

FIRST COLONEL COMMANDANT CANADIAN MILITARY ENGINEERING BRANCH

As some Members will be aware the Royal Canadian Engineers ceased to exist as a separate Corps in the Regular Component of the Canadian Forces with the integration in 1966 of the former three separate services, the RCN, Canadian Army and the RCAF. Elements of the former Corps of Royal Canadian Engineers comprising Field Engineers, Military Survey, the Army Works Service and RCE Militia together with the Construction Engineering elements of the RCN and RCAF amalgamated early in the integration/unification process to form the Military Engineering Branch of the Canadian Forces. Militia engineer units still retain the title Royal Canadian Engineers. It is planned that all engineer units of the Canadian Forces, Regular and Militia will adopt the title "Canadian Military Engineers".

The Military Engineering Branch has adopted most of the RCE traditions and customs or a form of them. The home of the Branch is at Canadian Forces Base Chilliwack, typified in the CFSME, the home of the former RCE. They have adopted "Wings" as the Branch March Past and the Canadian Engineer badge of pre-1914 days is the basis of the recently approved Canadian Military Engineer hat badge. The Branch Museum is located at CFB Chilliwack and although as yet containing mostly RCE memorabilia is beginning to reflect the background of its components. In many ways the Branch is a staunch amalgam of tradition and recently has appointed the first Colonel Commandant of the Canadian Military Engineer Branch, Colonel R J Carson, CD. It will be remembered that his predecessor, the last Colonel Commandant of the RCE was Brigadier J L Melville CBE, MC, ED, CD (Retired).

Colonel (Bunt) Carson, son of the late Brigadier Sir Charles F Carson, (*RE Journal*, Vol LXXIV 1960, page 351), was born in Muree, Punjab, India in 1914. He entered the Royal Military College of Canada in 1932. After graduation from the RMC in 1936 he went on to Queen's University, Kingston, Ontario to obtain his baccalaureate degree in Civil Engineering in 1937. He returned from overseas duty in 1943 to attend the Canadian Army Staff College.

Colonel Carson was commissioned as a Lieutenant in the Corps of Royal Canadian Engineers in 1936. Upon graduation from university he was first employed on design and construction of fortifications on Canada's coasts. After serving in other various engineer appointments in Canada he proceeded overseas as a Major with 4th Battalion RCE. In July 1942 he assumed command of 14 Field Company RCE, 2 Canadian Corps Troops until May 1943 when he returned to Canada to attend Staff College. After returning overseas in late 1943 he filled various staff and command appointments including SORE Headquarters 2 Canadian Corps, Brigade Major 1st Canadian Army Group RCE, and command of 31 Field Company RCE. From war's end to April 1946 he served as Commander, RCE (Works) with the Canadian Occupation Force in Europe.

Subsequent to April 1946, Colonel Carson served in various engineer, staff and command appointments including Command Engineer, Eastern Command, GSO 1 Office of the Chief Engineer, Liaison Officer with the Deputy Chief of Staff, Intelligence, US Army, Washington. On his return to Canada he became Command Engineer, Western Command. In June 1956 on promotion to Colonel he became the Commandant RCSME and subsequently was appointed Commander Fort Churchill. In 1962 he became Chief Engineer Canadian Army, remaining until that office was disbanded in November 1964. He then served as Director of International Operations until his retirement in October 1965.

On his retirement from the Canadian Forces, Colonel Carson was associated with the Engineering Institute of Canada on the Consultant Committee on Road Safety and was the Ottawa representative for CANCON Engineering. In 1969, on moving to Vancouver, Colonel Carson joined the consulting firm of Associated



Engineering Services. In October 1972, Colonel and Mrs Carson retired to their country home on Vancouver Island outside Victoria.

Colonel Carson is an active member, and has held executive positions, in the following organizations:

- The Engineering Institute of Canada.

- The Military Engineers Association of Canada.

- The Association of Professional Engineers for the Province of Ontario.

- The Association of Professional Engineers for the Province of British Columbia.

- The Roads and Transportation Association of Canada.

- The Rideau Club.

- The Canadian Club.

Exercise Himalayan Venture III Part Two—Indrasan

CAPTAIN M W H DAY, RE, MA

ON 23 January 1973 Nepal's Foreign Ministry announced that permission had been granted for the Army Mountaineering Association to attempt to climb Mount Everest in the Spring of 1976. An expedition to Everest (29,028 ft) requires a large number of climbers, and there is every reason to suppose that the Corps will be well represented. A nucleus of Himalayan climbers with experience of high altitudes exists from our successful ascent of Annapurna (26,545 ft AMSL) three years ago, including Captain Richard Summerton RE and Sergeant Andy Anderson. A full training programme is a vital preliminary to any major climb, and part of it was a training expedition to the Himalayas before the 1973 monsoon.

Other governments controlling regions of the Himalayas were approached without success before India gave permission for us to climb in the Kulu area. Thirty climbers were selected altogether under the general direction of Major Jon Fleming (Parachute Regiment). The twenty climbers he took with him to Menthosa (21,140 ft) were primarily concerned with altitude experience. They included Captains Meryon Bridges and Peter Page RE, whose adventures were described in *The RE Journal* of December 1973. The remaining ten of us, three of whom had been on the Annapurna Expedition (Major Gerry Owens, Sergeant Andy Anderson and myself), had set our sights on Indrasan (20,410 ft), a formidable peak offering a final two and a half thousand feet of difficult rock and ice climbing. Lieutenant Simon Eskell RE, with experience of climbing big rock walls in Norway, was included in the team.

Kulu is a delightful place and the government of India is keen to promote it as a tourist area to equal Kashmir. Package tourists from London and the USA frequent the valley, as do hippies hoping to cross over to Lahoul. Our journey from UK to Delhi took three days in the belly of an RAF transport, followed by a prolonged wrangle with the customs, that delayed the main party for a week.

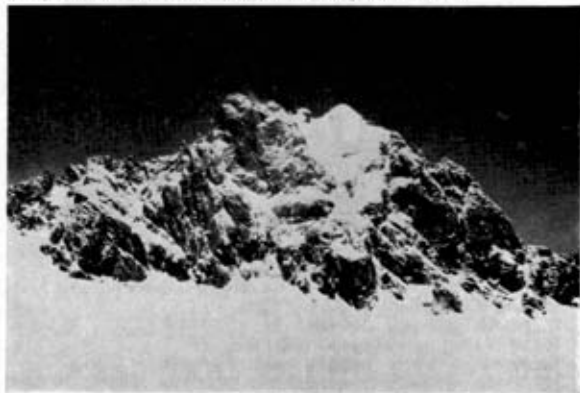


Photo 1. Indrasan (20,410 ft) from the South. It rises 2,500 ft above the plateau. Our route lay along the right-hand sky-line.

I went on with my wife—impressed by her flight with Aeroflot—to establish whether the recommended approach to our base camp was in fact passable to porters so early in May. We slept beside a large fire, mindful of the bears we heard but never saw. The Chandra Khanni Pass was covered in snow but was considered to be passable on foot.

The others arrived, and we sorted our share of the food and equipment. We left Kulu before the Lahoul party and with the help of sixty porters we marched a leisurely four days before dismissing them at the snout of the Malana glacier. Loads were ferried from there in four stages from a height of 12,500 ft, to a plateau beneath Indrasan at 18,000 ft taking until the end of May.

The painful process of acclimatization, which cannot be hurried, was experienced by all in this period. Even our two Gurkha soldiers, Sherpas by birth (one had carried to the South Col of Everest at the age of nineteen) needed the time for their blood to adjust to the reduced oxygen. This was the highest that five of the team had ever been, and all were to show that their bodies could adjust. One aim of the expedition had been fulfilled.

The more specialised aims of the expedition could now be attempted. As technology advances, and more thought is given to improving the lot of mountaineers, new products become available. The latest tents, clothing and foodstuffs were taken and sampled, only the best to be retained for Everest. The particular aspect we wished to practise was siege tactics at high altitude. Part of this would involve wearing oxygen apparatus even though the altitude alone on this expedition did not warrant it. Skis and a Greenland sledge (a pulk) were also carried up to the plateau and proved to have their uses.

Indrasan presents a large broken tooth of granite to the plateau of ice at 18,000 ft. Much of the face is threatened by ice that falls from small hanging glaciers high up. Japanese parties have twice climbed to the summit beneath them. The long ridge to the west was climbed by a young British team two years ago but we had chosen the shorter and extremely steep right hand skyline, the unclimbed east ridge.



Photo 2. (Left) Evening at Camp II after snowfall. Jagatsukh Peak (behind) was traversed by Hardie and Day. (By courtesy of *Illustrated London News*).

Photo 3. (Right) Gunson load-carrying in the De-Graaf Couloir. Ropes were permanently fixed up most of this 2,500 ft high feature. (By courtesy of *Illustrated London News*).

Exercise Himalayan Venture III (2 & 3)

The essence of siege tactics on a mountain is a rope that is permanently fixed to the rock. Once it is there, loads can be ferried up to higher camps on the backs of the climbers. The climbers haul themselves up using ratchet devices to grip the rope. The rope is also used for a sure descent which remains possible under far worse weather conditions than would be braved without such an aid. Someone has to take up the end of the rope, and we took it in turns.

On 2 June Andy Anderson and I stood uncoiling the rope beneath the lowest point of the ridge. We were to seek the route, roped together conventionally. Behind us Lieut-Colonel Dick Hardie, our doctor, and TA Volunteer Captain Pat Gunson were to haul up and attach the fixed rope. This was a non-stretch terylene rope more usually employed in supporting the White Ensign on HM ships, and ideal for our purpose.

We had been tent-bound for a week and several feet of new snow had fallen in that time. In spite of the remarkable ablation, the snow evaporates without becoming water, that occurs in the Himalayas, the rock was plastered with snow and difficult to climb. However we climbed to the crest line of the ridge that day, and suspended 500 ft of rope from the top. The skyline as seen from the plateau proved to be of such steep and compact granite that it would have required artificial aids to climb and would have taken too long, so Pat Gunson and I took it in turns to follow a line of weakness to the right filled with snow and ice, on to the cold and shadowed northern flank. We were both required to lead pitches of rock that would have been graded very severe on British crags.

On the third day Gerry Owens teamed up with Andy Anderson while we had a rest. They were faced with a nasty descending traverse over rotten snow to gain a steep snow field; very much Gerry's *forté*. They gained the edge of an avalanche chute before tying off the rope. They had found it very lonely alone on the north face all day, out of sight of anyone.

They thought that the summit should be attainable from a possible tent site a few hundred feet above their high point. Dick Hardie, Pat Gunson and I set out on 5 June with enough equipment to bivouac for the night before pressing on for the summit. The avalanche gully was in threatening shape, with slides of rotten snow triggered by small rock falls from higher up. I gained the far side and only just hammered a peg into a crack before being engulfed, fortunately with no ill effect. Two hundred feet straight up I made myself comfortable standing on a lip of ice below the rock headwall, sheeted with snow and hanging with icicles. Pat Gunson came up and led a magnificent rope's length up the wall, placing the front points of his crampons on the smallest holds of rock where the veneer of ice had melted away. He also resorted to using pegs for direct assistance where the wall proved too difficult.

Just as our last rope had run out giving us the problem of raising another from behind us, Dick called up—could one of us tell him what had happened to his face? Unbeknown to us, one of the boulders bounding down the couloir had smashed into him below his left eye and had knocked him unconscious. On seeing his face covered with gore, and he being the doctor too, I called Pat down and we all set off for Advance Base. Dick kept apologizing for holding us up; quite unnecessarily for we could scarcely keep up with him, so swiftly did he descend the fixed rope.

Back on the plateau, Andy "stitched" the injured doctor using adhesive sutures. Dick suffered no long-term damage and now sports a becoming scar.

Gerry Owens now called up our youngest member, Simon Eskell, to join Andy and himself in a second assault. After a struggle that lasted all day they reached a small nick in the ridge with just enough room for the tiny assault tent. Next day, 7 June, they reached the top at about nine in the morning. Dick and I watched them from the top of a nearby peak, Deo Tibba (19,600 ft) which we had climbed on skis. It only took us twenty minutes to descend to Advance Base; the descent from Indrasan took a little longer.

Next day Dick, Pat and myself went up to the assault tent and passed a cramped night. A lovely day greeted us and we followed the others' steps easily, enjoying



Photo 4. (Left) Oxygen trials in the De-Graaf Couloir. Gunson wears a French constant-flow set.



Photo 5. (Right) The SW face of Deo Tibba (19,600 ft). The curved ice gully had been climbed before but we were to gain the plateau behind. All twelve climbers reached the summit in various ways, Day and Hardie on skis.

the panorama to the north and west in Lahoul, which we had not seen before. We returned in good order leaving the camp and ropes in place, expecting another ascent.

It was nearly made, but not by any of our own team. Another British group were climbing in the area and had a camp near our base. Hearing that the route to the plateau was straightforward now the winter snows had melted, and being extremely competent alpinists, four of them resolved to attempt an alpine style ascent of our route, in contrast to our sieged ascent. They struggled up to the plateau in three days carrying enormous packs. They reached the crest line of the ridge—we had removed the bottom rope—before deciding that they were not sufficiently acclimatized. They had also experienced an increasing feeling of remoteness as they “pulled up the ladder” behind them, there being no camps for them to fall back on if the weather or their own resources failed. It was a sporting attempt in a style that will become increasingly in evidence as a reaction to “heavy” expeditions such as ours.

Apart from the ascent, we had been able to practise climbers in certain techniques at high altitude that would definitely be required on the still unclimbed South West face of Everest. We also experimented with oxygen apparatus, French, American and a new British set. Most interesting was a chemical oxygen generator which has great potential as a far lighter weight source than the usual metal cylinders containing oxygen under high pressure. The generator worked faultlessly while being used by climbers ascending fixed ropes at 19,000 ft, an extremely strenuous task requiring the use of ratchet devices demanding good technique to save wasted effort. An additional benefit is that the oxygen flows both warm and moist. The generators we had only lasted for half an hour but it is hoped to develop larger ones with a duration of four or six hours.

The ascent of the East Ridge of Indrasan was a memorable adventure for us all. Whether we have the chance to put the new techniques we mastered there into practice on Everest remains to be seen, but we are certain to be fully extended whichever route is attempted.

Exercise Himalayan Venture III (4)

Report on Professional Meeting

23 October 1973

LIEUT-COLONEL J C PEACEY, RE, C ENG, MICE, MIMech E

A JOINT Professional Meeting of the Institution of Royal Engineers, the Institution of Mechanical Engineers (Kent Branch) and the Society for Underwater Technology was held in the Brompton Study Centre on 23 October 1973. Major-General Sir Gerald W. Duke KBE CB DSO was in the Chair, and some eighty-nine members and guests were present.

A lecture on "Underwater Technology for the Oil Industry" was given by Mr R Goodfellow, of the Offshore Branch of the British Petroleum Company; this was illustrated by colour slides, and was followed by a film depicting the Zakum sub-sea project in the Middle East.

In introducing the speaker and his subject, General Duke reminded the audience of Royal Engineer interest in submarine affairs. In 1900 one-third of the Corps strength was in the submarine mining branch; we still retain major responsibilities for shallow water diving.

The first offshore wells were installed in 1922 on platforms close inshore on Lake Maracaibo in Venezuela; the platforms were simple timber structures. Since that time, the rate of development has been accelerating rapidly, wherever oil has been found or indicated, resulting in the need for work in deeper water and more hostile environments. The offshore discoveries in the North Sea have increased the rate of progress around our shores. The pipeline constructed in 1967 to bring gas ashore from the West Sole field was 16 in in diameter and 45 ml long in water depths ranging from 100 to 200 ft; it was considered a major project at the time. Now, however, a pipeline is under construction to carry oil from the Forties field; this will be 32 in in diameter and 110 ml long in depths as great as 400 ft. More and more semi-submersible drilling rigs, drilling ships, and jack-up barges are being built and used for further exploration; large platforms are being built and established in proven fields for production. Total offshore production is expected to increase to about 48 per cent of world oil production by the 1980s. Deviation drilling techniques allow curved wells to be sunk to cover a wide area around the platforms. Pipelines are laid underseas from special craft, and are then trenched and buried by a towed device. Where water depths are too great, offshore storage and tanker loading facilities are being built, such as the 1 million barrel concrete installation on the Ekofisk field.

Diving techniques have been improved to allow work at great depths. Saturation diving is being developed as a means whereby a diver can carry out long excursions under water, remaining pressurized for several days before being submitted to carefully controlled decompression. Oxygen content of air for breathing must be limited to prevent oxygen poisoning, and helium is used in place of nitrogen which can cause narcosis. Considerable surface support is needed in the form of sanitation modules, decompression chambers, all the communication and lifting cables to diving bells below, and expert supervision; nevertheless there are great economies arising from the increase in working time at depth. An atmospheric diving suit has been developed to avoid the problems of pressure and decompression; this is suitable when only one or two men are needed down below for a particular job. The importance of having professional engineering staff trained and able to dive was stressed. Submersibles, such as the Pisces underwater craft which was recently stranded at depth off Cork, are used for pipeline inspections and similar work. These craft have only limited submerged duration and need service support from the surface. Pipeline inspections can be made from manned submersibles, using TV, with video tape recordings for playback later on the surface.

Work on underwater wellhead structures has been carried out experimentally in the Zakum project. This included wellhead control, gas separation and disposal, and

electric power supply and distribution. Future development is planned in underwater maintenance and operations using enclosures with internal pressure equating to atmospheric, which would lock on to permanent multi-chamber installations on the sea bed. Alternatively modular systems may be developed which can be detached and surfaced automatically for maintenance, and then returned to the sea bed. Underwater structures will eventually be needed for wells in depths of water as great as 2,000 ft, where the cost of constructing surface platforms would be prohibitive.

Following the lecture, the audience had an opportunity to examine displays arranged by RE Diving School and British Petroleum. The latter included models of the semi-submersible Sea Quest and of the Forties platform. Questions were then taken. Marine growth can be a problem on underwater installations, especially at joints. A question on drilling techniques prompted the description of the proportions of a drilling string from a member of the audience, as being like a knitting needle with the length of a cricket pitch. The isotope power source for sub-sea project Zakum, codenamed Marguerite 20, used a source of strontium 90 surrounded by stainless steel and lead. The Customs in Bahrain would not allow it to be unloaded there, and it had to be kept submerged awaiting transhipment to Dubai; oysters grew on the casing, one of which was later found to contain a pearl. A submersible battery unit weighed 6½ tons giving up to 300 ampere hours capacity at 24 volts from nickel cadmium cells; an oil labyrinth was used as a pressure seal.

There was unfortunately insufficient time for a discussion on the military defence of seabed installations, isolated marine drilling platforms, etc. This subject was raised in a letter by Brigadier Crosthwait in the *RE Journal* of March 1973, and was a major reason for arranging this meeting. Perhaps the subject can now be discussed and future policy decided at Ministry of Defence level.

A vote of thanks was proposed by Admiral Sir Edmund Irving, a past President of the Society for Underwater Technology. He found the subject of Underwater Technology far more interesting than what happened on the other side of the Moon. The sea can be harnessed; knowledge has recently been acquired but there was insufficient attention to marine technology until the possibilities of commercial exploitation started to become a reality. BP have set a good example in their leadership, but it is unfortunate that so much material has had to be bought from foreign sources. The UK are leading with undersea services and know-how. The SUT was beginning to make its presence felt, now that it had been in existence for eight years. The Admiral concluded by saying that the Royal Engineers had been paddling around for some time and that we might take more interest in underwater matters; he invited Institution members to the next SUT meeting at Maidstone on 21 February 1974.

Following the meeting, an excellent buffet supper was served in the RE HQ Mess. The last Members and their guests eventually departed in convivial mood around midnight.

Overheard at 1973 Engineer-in-Chief's Conference (2)

"I agree with the views of the RSME." (Junior Officer?)

"Sending soldiers to Northern Ireland interferes with important training." (BAOR Officer?)

"Don't rock the boat, you might fall out!" (Cynical PQE?)

"There were only three things wrong with his presentation, he read it! he read it badly!! and it wasn't worth reading!!!"

"Do you think that question was planted?"

"I have a subaltern who thinks that an assault bridge exercise is an intelligent form of strip poker."

Technician Engineering Status

E A BROMFIELD

(Alex Bromfield is Secretary of the Institution of Electrical and Electronics Technician Engineers, (2 Savoy Hill, London, WC2). Founded in 1965, the IEETE is now some 15,500 strong. Mr Bromfield is also Chairman of the Engineers Registration Board's Joint Cross-disciplinary Committee for Technician Engineering Qualifications.)

IN Britain's engineering scene today, possession of authoritative qualifications, with bona fide representative initials, becomes more and more essential. Until recently, technician engineering personnel of HM Forces were without the prospect of acquiring designatory letters which could be as widely used and recognized, both in the Forces and throughout industry, as are those denoting chartered, degree-level engineers. Within the former enclave the ability to demonstrate an accredited technical qualification is seen as a matter of much importance, primarily because of its value in the field of post-Services employment.

The recent assessment of HM Forces technician engineering qualifications in relation to the standards required for enrolment with the Engineers Registration Board (ERB), with its legally protected titles and designatory letters awarded under the Royal Charter of the Council of Engineering Institutions (CEI), helps to remove a long-standing anomaly.

ENGINEERS REGISTRATION BOARD

In February 1971 Her Majesty's Privy Council approved amendments to the CEI Royal Charter to make possible the formation of an Engineers Registration Board (comprising engineering qualifying institutions and societies, individually represented) and a Composite Register (of three autonomous sections), enabling Chartered Engineers, Technician Engineers and Technicians in membership of ERB organizations to be registered, and to use the designatory letters: C Eng, T Eng (CEI), and Tech (CEI), respectively. The protected title and designatory letters "C Eng" for the chartered engineer are well established. Now, the abbreviated designation "T Eng (CEI)" connotes the qualified technician engineer holding an academic qualification not lower than that exemplified by a Higher National Certificate or a City and Guilds Full Technological Certificate in approved subjects, and meeting stipulations as to standards of training and experience.

Technicians awarded the abbreviated designation "Tech (CEI)", are those possessing an academic qualification of a standard not lower than that exemplified by an Ordinary National Certificate or a City and Guilds Part II/Final Technicians' Certificate in approved subjects, and also satisfying training and experience requirements.

When ERB opened the Permanent Register on 1 January 1973, all corporate members of the fifteen chartered bodies automatically became entitled to registration in the Chartered Engineer Section. Since that time, 26,500 technician engineers and 8,000 technicians have been enrolled, and become entitled to use designatory letters.

ASSESSING THE SERVICES

The assessment, and joint acceptance, of Services qualifications was the culmination of extensive work undertaken by an ERB panel of independent consultants and assessors who studied examination syllabuses, job specifications, career training and experience routes and who, in groups, visited Training Establishments of the three Services and an HM ship to look at levels of competence and responsibility. Throughout the survey and exercise the assessors were aided by the Services (Ministry of Defence) representatives serving on the ERB Cross-disciplinary Joint Qualifications Committee to which the panel reported, and which co-ordinated the groups' conclusions and finalized the submissions to the ERB and the Ministry.

ARMY ELIGIBILITY

Through Defence Council Instruction (General) S57(9/5/73) the Ministry has notified engineering personnel of the three Services, ashore and afloat, at home and overseas, of the Engineers Registration Board provision for the registration of eligible Technician Engineers and Technicians. Separate, complementary DCIs have also been published, these giving details of the ERB assessments for the Royal Navy, Army (S.38(4/6/73)) and Royal Air Force, and the enrolment available to specified Forces manpower classes. Listed below are the Royal Engineer assessments in the CEI/ERB Composite Register categories of Technician Engineer, T Eng (CEI), and Technician, Tech (CEI).

TECHNICIAN ENGINEER (CEI)

EMPLOYMENTS FULLY ELIGIBLE

Personnel eligible in all respects following completion of the currently prescribed Army course and one year's subsequent experience:

Clerk of Works (Mechanical)

EMPLOYMENTS ELIGIBLE SUBJECT TO ACADEMIC QUALIFICATION

Personnel in the following employments are eligible in respect of training and experience and subject to them achieving the appropriate academic qualifications, (ie HNC or FTC or equivalent), will be deemed eligible in all respects following completion of the currently prescribed course and one year's subsequent experience:

Clerk of Works (Construction)

Clerk of Works (Electrical)

TECHNICIAN (CEI)

EMPLOYMENTS FULLY ELIGIBLE

Personnel eligible in all respects following completion of the currently prescribed course and one year's subsequent experience:

Clerk of Works (Construction)

Clerk of Works (Electrical)

EMPLOYMENTS ELIGIBLE SUBJECT TO ACADEMIC QUALIFICATIONS

NCOs Class I in the following employments are eligible in respect of training and experience and subject to them achieving the appropriate academic qualifications, (ie ONC or CGCI Pt II/FTC or equivalent), will be deemed eligible in all respects following completion of the currently prescribed course and one year's subsequent experience:

Construction Laboratory Operator

Design Draughtsman

Draughtsman (E & M)

Electrician RE

Fitter Engine

Fitter Machinist

Fitter Petroleum

Fitter Plant

Fitter Refrigeration & Steam

Military Plant Foreman

Plant Operator Mechanic

Surveyor Engineering

Welder RE

Notes: a Registration eligibility is subject to one year's experience at the appropriate level after completion of the Service course.

b The initials "CEI" in brackets after the designatory letters make clear that those using them are on the ERB Register and that their entitlement is legally protected by the Royal Charter and its By-laws.

Technician engineering personnel are able to register only if in Membership of a registrable grade of an Institution or Society which is itself a member of the ERB. Through the DCIs the Government have encouraged all appropriately qualified personnel of the Forces technical arms to seek registration by joining an ERB body. Published as an appendix to DCI (General) S57 are the names and addresses of

organizations in the Technician Engineer and Technician Sections of the Composite Register.

The ERB Joint Committee is well aware of the special problem of the more "mature" people of the Forces technical arms; the older ones who have qualified for a high level of technical responsibility, through Services courses over the years, but whose technical educational level cannot be assessed against any single examination. The Committee is hopeful of being able to establish general criteria which might provide a base for a closer study of these special circumstances.

SOURCE OF SATISFACTION

Much satisfaction and pleasure has been expressed by the Ministry and the three Services over what has resulted from ERB's work, with its inter-Services close collaboration and consultation, and appropriate steps are being taken to draw the attention of all personnel concerned to the advantages to the individual of registration. In particular, the Ministry has said "... stress should be placed on the very considerable value that this registration will have in assisting personnel to find employment at the appropriate level in industry, or in Government employment when they return to civilian life". The Ministry also believes that ERB registration will facilitate co-operation between the various engineering grades in the Forces and their counterparts in design establishments and civilian firms, with whom they are required to work in the course of their duties.

Early Days

MLC

THE Ashanti Campaign—which lasted from September 1873 to March 1874, like Napier's campaign in Abyssinia, was very much an Engineer war. The military object was to destroy Coomasic, the Ashanti capital. The problem was to get about 2,000 men 150 miles inland through jungle, swamps, streams and over one major river. In most parts there was only the barest track on which to base the advance.

The Engineer order of battle consisted of four RE officers on the HQ staff and one Field Company (the 28th). The first troops landed in October 1873, but the Field Company did not arrive until mid-December 1873. By then a large proportion of the work had been done by local labour organized by the officers. The Engineer work included the construction of a telegraph along the length of the road.

During 1874 the *Journal* pursued its not very inspiring way, but, as might be expected, those articles dealing with the Campaign (not least the accounts of constructing and operating the telegraph) were among the most interesting.

An article, reprinted from the *Pall Mall Gazette*, in the April 1874 *Journal*, draws attention to the extraordinary few Engineers apparently considered necessary, and the even more extraordinary fact that the main body only arrived when the work had been largely done. All the more credit, as the *Gazette* underlines, to the "three Officers and half dozen Corporals of Engineers" who organized the work.

"Assistant Engineers had to be drawn from untaught officers of the line. Despite the fact that at home there were hundreds of subalterns, each with a long training for that work in the field."

Even so the few engineers concerned, together with such labour as they could organize, provided Sir Garnet Wolsley with all that was required, including some sort of covered accommodation for the advancing troops, at the end of each day's march. The River Prah, deep and some 170 ft wide, was crossed by constructing crib piers.

On the paucity of Engineers in the order of battle, the *Pall Mall Gazette* comments, "Possibly the Engineers have themselves somewhat to answer for, if their arm has been hitherto almost ignored in our field operations. The Corps has the

tradition of Sebastopol, if not of the Peninsula, and still seems to think war will be a long succession of sieges."

This could have been a fair statement. In the report to Parliament on the satisfactory conclusion of the War, Mr Gladstone said that "there never was a case in which a plan of campaign had been so completely laid out beforehand, or in which the execution had so closely corresponded with design". If this was really so, either the Engineer factors had been considered unimportant or, and more likely, the Corps itself had not sufficiently represented its case as regards—at the very least—the priority for landing the troops.

This is not the first time that this particular theme has been mentioned in this series. Whether engaged in a "Camp of Exercise" in India or manoeuvres on Salisbury Plain, the Corps had felt itself neglected by the Staff. And yet on the works side, in the construction of Fortifications, in Survey and in its general standing in the scientific world, as measured for instance by membership of the Royal Society, the reputation of the Corps never stood higher.

For instance in his speech introducing the Army Estimates in 1874, the Secretary of State for War, Mr Gathorne Hardy, stated that "one of the few cheerful notes was the progress made by the Fortification Vote—within 2 years all the works will be completed (readers of these notes may remember that these included most of the Victorian fortifications round our coasts) and the sea defences are nearly all armed."

This reputation was all very well but, as indicated above, not at the expense of the deference paid to the Corps within the Army itself.

This state of affairs, one would have thought, must have caused considerable concern in the minds of many officers. Although the pages of the *Journal* do indeed reflect this unease, there is no indication either in the *Professional Papers* or in the *Journal* that the problem should be squarely faced and that something should be done about it. Was there no movement, for instance, to divide the Corps into "Works" and "Field" as might well have been a similar reaction in more modern times?

The *Pall Mall Gazette*, in the same article quoted above (one assumes the article in question was probably inspired, if not written, by a Sapper officer) sounds a further note of warning. "The Germans have shown that engineering work in the field cannot be left to a chance collection of artisans—nor even a Corps of reserve Sappers. Each division must have due organic engineers. Fancy sending a field force where the engineer contingent was almost thrown together by chance. No other army would allow this. However, with the Engineers, their useful functions in peace have been allowed to override their real purpose in war. That so much was done (in the Ashanti Campaign) is a matter of real congratulations."

Perhaps there was indeed a "Field" and "Works" school of thought which never got very far. For instance, an article in the May issue expresses relief that the Corps will never be divided into an "Indian" element on the one hand and the "Rest of the World", on the other. "Although nine out of seventeen battalions comprising the Corps will be in India, it will not be so organized that certain officers will spend their whole career in India, although all officers must expect to spend half of it in that country." Furthermore, this "Indian" and "elsewhere" possibility must have given some impetus to a "Works" and "Field" outlook as another correspondent points out, "the very extensive employment (in India) of Sapper officers—often in a Civilian capacity—in barrack construction, irrigation and railways gives great scope for displaying their engineering skills."

The very great possibilities for engineering in India were well illustrated in the June issue which contained an impassioned plea (in the form of a paper read before the Society of Arts) from Sir Arthur Cotton RE, KCSI, giving very full reasons for affording priority to canals rather than railways. His reasons were, as might be expected, largely economic. Canals would give much better value for money in terms of tonnage moved for every £ (the units were in millions of both!) expended. Sir Arthur clearly had no use for railways. However, he seems to have had a trump card in coupling canals with irrigation, in that irrigated districts were safe from famine.

As indeed has been recently the case, India then had had to face a major famine. This was in Bengal. It could well have been that had Sir Arthur's advice been followed, not only might there have been less famines, but the Indian taxpayer might have been saved millions of pounds in the raising of capital and in the servicing of the operating debt, as on Sir Arthur's reckoning canals were much cheaper than railways in every respect. It was perhaps a little ironic that in the same issue of the *Journal* as contained Sir Arthur's paper, is a brief account of the building of a railway into the famine district.

The construction of this railway was the direct responsibility of Major Stanton RE, under the direction of Mr Molesworth (of Pocket Book fame). Major Stanton, it seems, received direct promotion in the PWD for his efforts. Although much weight is given by the writer of the article to the fact that this promotion was worth £200 per year, it is nice to note that the Sappers concerned were in the business not only just for the money! The author points out that it is fortunate that the Corps contains some officers skilled in this type of work and that "the Corps of Royal Engineers should be able to lay a rough military tramway at the rate of 1,500 yards per day . . . But, the writer believes there are neither the Foremen nor skilled plate layers to be found in the Sappers."

One does not have to read far into the article to guess that the conclusion—that the Corps must have specialist Railway Companies—will come over loud and clear. But in this case the specialist school of thought were to win their case. And no doubt rightly so!

Then, as now, the Editor was worried about lack of interest in the *Journal*—no correspondence, insufficient articles etc. However, there is nothing like a fairly simple mathematical problem to set a correspondence going among Sapper officers especially if there is an apparent mistake in either its setting or school solution! In the October 1874 number, a contributor sets the problem confronting "an officer" who found himself in India faced with the need to weigh a large packing case (estimated to weigh about 3 cwt), which he had filled with a variety of articles (so the centre of gravity was not necessarily in the centre). He possessed among his fishing kit a 16-lb spring balance and, of course, a fishing rod. The problem was to determine the weight of the case. The proffered solution was treated with much scorn (as indeed it deserved!) in subsequent issues. Furthermore, it gave rise to yet another problem—the measurement of the length of a piece of string suspended from an inaccessible point and just reaching the ground.

Readers jumped into action and never were the correspondence columns so full. The writer of these notes can only remember one such approach in the last twenty-five years or so. On this occasion (if memory serves) the present Engineer-in-Chief speculated on the path taken by a greyhound, which, on approaching from a flank, ran always pointing straight at a fleeing hare, rather than by attempting to cut it off by taking a waterman's course. Perhaps the correspondence columns could yet be filled by resurrecting this method! Incidentally (again if memory serves) the Tickell problem was published in the *Supplement* and not the *Journal*.

1874 was a year when the issue of the Channel Tunnel was very much alive. History does not relate whether the Corps, as such, was directly interested in the question, although the project was bitterly condemned by the War Office on grounds of increasing our strategic vulnerability. The suggested design was for twin tunnels and that "the works should be done partly by France and partly by England. To induce the two countries to press on this undertaking energetically, there should be a bonus for the one which works the fastest". The Consortium (backed by Rothschild money) were willing, but not the Governments!

Indeed the above quotation has strong undertones of the famous rowing race, when none rowed so fast as stroke. In the case of the Tunnel it seems that over the years the roles have been reversed and the crews have tended to out do a reluctant stroke!

BEF, Back Every Fortnight, Norway 1940

MICHAEL CALVERT

Editor's Foreword: The original account was written by Brigadier Calvert shortly after the events took place. It was revised in the late 1940s. The views expressed and the style of communication are of a twenty-seven year old junior officer of the time.

I STARTED April 1940 at Chatham, when for a week I commanded the Depot Company—a rather illusory company with a paper strength of about 500 and a parade strength of about five. Previous to that I had given up my job of Adjutant, London Divisional Engineers to become a guardsman in a ski battalion. After skiing in Chamonix and after various cross country travels we were disbanded before we reached our destination, Finland. I remember little of events at Chatham except that for some reason while interviewing draughtsmen, my colleague, a territorial officer, was surprised to find out how I knew whether a man was a regular, a reservist, regular with boy service, territorial or militia, before he opened his mouth. I said "by the distinctive way they salute", and managed to get the next nineteen out of twenty right. I don't know whether it can still be done.

Germany invaded Norway at this period, so I rang up AG7 and, after exaggerating my prowess at skiing, said that I wanted to go to Norway. (I was the third worst in the ski battalion. The worst had a broken leg. The second worst pretended he had walked across the Urals in snowshoes and got in that way.)

Very shortly afterwards I was appointed Adjutant No 3 Base Sub Area, stationed at Cadogan Gardens, London SW1, in one of the houses I had requisitioned for the 1st London Divisional Engineers TA before the war, much to the horror of the neighbours—Sir Samuel Hoare and Lord Samuel. General Sir Bindon Blood lived close by and was delighted at the "raising of the social tone of the district by so many members of the Corps being residents". My CRE, Lieut-Colonel Keane, did not have much time to put me in the picture as I was busy obtaining our G1098 of pencils, paper, drawing pins, etc. We received orders that meant we were for Norway. We hurried North, boarded the Polish ship SS *Batori* for a night (I had been on her once already waiting to go to Finland), then rushed to Rosyth from where we were hustled across the North Sea on one of His Majesty's 10,000 ton cruisers.

I still remember looking at the grey snow clad cliffs of Norway, in the cold dawn, whilst midshipmen took a photograph of us "intrepid warriors" thinking to myself "a minimum of six months before I can ever hope to get leave if I ever do leave". I was back in a fortnight. On arrival at Molde there was all hustle and bustle as we transferred to a destroyer and came alongside the pier at Aandalsnes—a wooden rickety thing of the type one sees in North Scotland—and went ashore. Somehow we got transport to a residential area of a few wooden houses centred around a hotel which was going to be headquarters. This was a few miles out of town. Most of the buildings were taken but with the Chief Clerk and one or two others we just managed to get into one good building before we saw the CRA and cortege pompously moving in our direction. I quickly gave orders for notices to be hung on the door, crates unpacked, paper scattered around, forms pinned up on walls, the clerk to be tapping away meaninglessly on his typewriter, and a few other adornments before the CRA entered. I held my nose to a bit of paper writing furiously. I stood up respectfully "Do you want to see the CRE Sir? I'm afraid that he has just gone out," "Oh, I thought the Camp Commandant had given me this house", "Oh no Sir, we have been here a long time. I think yours is further down the road." He moved off and that was the last I saw of him.

We had landed on 18 April 1940, at the same time as a regular brigade drawn from France. I remember being very impressed at the way the Green Howards landed, in the darkness, purposefully, silently, every man knowing his job, and with the minimum of orders. Aandalsnes is a little fishing village in a fjord about 100

again and again and so was the regular brigade in its turn, in face of tanks, air and artillery none of which they themselves had. The Norwegian ski troops, after their first failure, gallantly tried to hold the snowbound flanks of the brigades which were based on the road and railway.

The little town of Aandsnes, the base of our operations, was subject to heavy bombing. The AA of the Navy, including HMS *Calcutta*, entertained us on the hill-side and reduced the accuracy of the bombing. Days were long in those latitudes, from 4 am to 11 pm at that time of the year, but still every night the supply train went up to the front. This was mainly because the Germans bombed Aandsnes station which, although doing damage, could be quickly repaired as the equipment and labour were on the spot. One spare bomb from a Stuka returning was dropped accurately on the railway line between Aandsnes and Dombaas and this caused more delay than hundreds of bombs on Aandsnes yards. It meant reconnaissance, nobody knew quite where it was, transportation of labour and materials and finally repair, with the result that this was the only night when we did not manage to send supplies to the front. The lesson is that marshalling yards look a very attractive bombing target but bombs placed accurately on a railway line miles from anywhere are far more likely to cause delays. I was to profit by this lesson later in Burma when it was our turn to destroy railways. My railway brother had previously confirmed my opinion.

One event which I remember of these first few days was when I saw my first bit of looting. Bombing had set a sweet shop on fire. There was no hope of saving it. Men started to loot the sweets. Passing by at the time I thought this wrong, put a guard on the shop, and let it burn, sweets and all. Logically this was probably wrong, but I still think that I did right.

A second picture in my mind was when I saw a ship at the one and only wharf unable to unload as a 120-ton crane was derailed, with the result that the davits of the ship were fouled by the arm of the crane. I was down there in no official capacity that I can remember, but when I heard that the ship could not unload its most valuable and much wanted stores, including vehicles and AA guns, and was proposing to return home before it in its turn was sunk, I intervened. Fortunately, while at the RE Depot, I had heard Brigadier Hogges' stories of North China and had the honour to be Brigadier Panet's Adjutant in 1937-38 in Hong Kong, where he had continually drummed into me the physical prowess of masses of individuals when organized as a team in the way the Chinese do. I told the senior officer present that I could move the crane if I had 300 men and if I could address them first. These men were collected. I addressed them from high up in the drivers compartment of the crane—"You can move this crane out of the way and give much needed supplies to the troops at the front and for yourselves. But you must be silent and listen to me. You will all get your hands on to a part of the crane. It is no use pushing someone else's bottom. You will get your hands on some part of this crane ready to push. You will remain silent, and when I say push, push from your thighs—the strongest muscles in your body—off the ground. The crane will then move and you will keep pushing with it." After some time in the dark and with good discipline everyone got a purchase. I gave the word "push" and they very easily pushed the crane out of the way. In this age of mechanical power people forget how much the human individual, properly harnessed to do a job, can do when there is no power plant available.

Then after that we were off on our reconnaissance. Sergeant — (it is disgraceful that I forget his name but the whirl of Australia, New Zealand, Burma, India, France, Holland, Germany, Norway, gives me a bad memory—but I have often thought of him. Sergeant 22 I will call him as I knew him in 22 Company in Hong Kong when I was Adjutant Fortress Engineers)—Sergeant 22 and I were to go off and reconnoitre a demolition zone between Aandsnes and Dombaas, a distance of 70 miles.

We set off on motor bike, Sergeant 22 driving, myself on a rug strapped to the rear carrier—an uncomfortable and precarious seat. As we went along I took notes on a pad leant against Sergeant 22's back. We climbed through the gorge and often

went off to reconnoitre the railway. At the top, between Overdal and Bjorli, we stopped for a while. All this time we saw nobody at all but there were some Stukas prowling around. At the crest, after going under the concrete railway bridge, we started along the flat valley, with only the telephone poles sticking out of the flat white expanse to act as a hindrance from air attack.

We sped along the frozen road, with snowbanks on either side when, whilst clutching on to Sergeant 22's waist and thinking only of my sore crutch, I heard a noise louder than a motor bike. I looked round and just behind there was a Stuka firing at us—I could see the pilot through his perspex. I shouted at Sergeant 22—we were going along at about 60 mph—he looked round as the aircraft went overhead and we swerved into the snow—spilling the petrol. Then two more aircraft went over, their bullets making little potholes in the snow.

After a bit, when they had come round on to us again, we decided to push on. I kept rear lookout and every time the aircraft were coming near I would shout and we would swerve into the sides before taking to the ditch. Sergeant 22 painstakingly would put the motor bike on its stand to prevent the petrol leaking out, whilst I would stand around longing to be in the ditch but not liking to be first man in. We got better at it on the 45 mile run and the Germans must have had wonderful fun. We now learnt to try and go from cover to cover as the aircraft turned away after shooting us up. Once, looking over our shoulders as we jumped into a bomb hole near Dombaas I landed on something soft which cried out "My God they've got me!" This turned out to be Brigadier Morgan, later General Morgan, who at that time was commanding the Territorial Brigade. After learning some details of his brigade activities we pushed on with the reconnaissance. I remember sheltering behind the wall of a farm and being cursed by some unit we had no time to identify for bringing fire on them. We were the only people moving at all.

We got to Dombaas, a silent, lonely, wooden township with a few brick buildings. We looked around to try and find some headquarters, as I had been told to do. The town was being bombed and previous tales of the frightfulness of bombing had had an undue effect, not only on the local people, who had most wisely left, but also on our own troops and staffs. In actual fact it was not very severe.

Eventually we found Territorial brigade headquarters. This untrained brigade had fought the full fury of the Germans without artillery—without tanks—without air—without proper supplies and had done very well, but were now in a bad way. We could not find anyone in Brigade HQ. Eventually after making a lot of noise—and with some bombs going off around—a crazy chap appeared and shouted "Go away, go away, you have only brought the bombers on us. Go away or I'll shoot you." I calmed him down and went down to the cellar. The remains of the HQ staff were crouched there. One can hardly blame them. They were beaten men.

I wrote out a copy of my report and left it there. Major-General Paget (as he was then) was still fighting south of Dombaas with his Regular brigade which was to finish up after very hard fighting in a very exhausted condition. We must all remember that the first battles are always the worst and we must be mentally as well as physically prepared to withstand them.

The field company under Major Sir John Forbes, who later received a DSO, did a wonderful job holding up the Germans as far as Dombaas by his demolitions. As usual there was no relief for the sappers as they had to work with both brigades.

On our return we decided to go flat out without stops for any Stuka attacks. We did go flat out and after sitting on that rug strapped to the carrier of a motor bike riding on ice at 60-70 mph I would almost have preferred death by a Stuka. I think we were only attacked twice on that mad journey. But we did not stop and only the handlebars were hit.

I sent Sergeant 22 on down to report to headquarters at Aandalsnes whilst I stayed alone in a chalet just by the railway bridge beyond which the road and railway plunged 3,000 ft down to Aandalsnes and the sea, 60 miles away. It was eerie in that cabin that night as the telephone was on a party line and kept ringing. I thought I

heard British, Norwegians and Germans using the same line.

Back came Sergeant 22 (you will notice in this narrative that he rarely sleeps, as no good RE sergeant ever seems to in war. That is why they try to make up for it in time of peace). We were to prepare demolitions from where we were back to Aandalsnes, as I had recommended. A naval working party with demolition material would assist us.

We waited. Our morale was low. Then along came, I remember it vividly, a cheerful sprite in the name of Lieut-Colonel Turner who had served in the 1914-18 War and did not care anything for these Germans. He always carried a gun across his shoulders and when there was an air raid on, and we all took to the ditches, he would be seen standing in the middle of the road shooting at them and muttering—"Blast! That one got away." Well all I can say is that this had a magnificent effect on Sergeant 22 and me and I have told this story to sappers in New Zealand, Australia, Malaya and Burma, so his great example bore its print all over the world during the more miserable times of war.

I did not quite know who he was or what job he had. There were three CsRE at the time (CRE Force, CRE Airfields and CRE Base Sub-Area) but only one field company under Major Sir John Forbes. Lieut-Colonel Turner gave me much sound advice and said they were going to try and drop me some electrical demolition equipment as there was none at Aandalsnes and then departed. He had agreed on my demolition plan for the road and railway. There were some Norwegian Engineers pottering around on the railway. They were really railway civilians. They had prepared good charges at the best points to make the railway useless. These they handed over to Sergeant 22 and myself and then pushed off. All we had to do was light the fuses. Our responsibilities were starting to increase.

Things started to quicken up. (From the dates you will see that the whole thing occurred between 19 and 29 April 1940.) A Warrant Officer RE, I forget his name and exact rank, motor-cycled up from Aandalsnes giving more details from Lieut-Colonel Keane on my demolition plan. The Warrant Officer had been told to go straight through to Dombaas to deliver his message to General Paget who was at that time extricating the rear guard. He travelled on safely through the night and then, "General Paget cannot be aroused. He has not slept for the last three days. These are his orders."

Finally the Warrant Officer next morning delivered his signal never mentioning that it meant being machine-gunned all the way back. He told me he realized this but he did not want to make a fuss as he knew how important it was that General Paget should sleep. This again was a lesson I learned and used later in Burma. Commanders must sleep otherwise they give in, because it is they who are subjected to the greatest mental strain. The Warrant Officer was slightly wounded in the arm on his way back.

General Paget had been Commandant of the Staff College until 1939. The demolition orders I received were a masterpiece of everything wrong that a demolition order according to the book should be. I kept that demolition order stuck on cardboard in my office for a long time until it was destroyed by fire in my office in Maymyo, Burma, during the Japanese invasion. Yet it did its job. And what more can one ask?

As far as I can remember it was—
"Dear Calvert,

I am trying to get the rest of the army out of this place but I am having a difficult time. There has been a railway accident so we have got to walk. I hope to be right through to you by Thursday 2.15 pm. If the Germans arrive before this do your demolitions, but if possible try and hold them off until we get through. Otherwise, don't blow until we get through. In any case do your demolitions, but try and see that we get through as well. I must leave it to you.

Best of luck

Paget, Maj-Gen"

However Sergeant 22 and myself had our little fun. We decided to emulate Lieut-Colonel Turner. The Stukas were still stooging around so we decided to try and shoot them down. All we had were two normal .303 Lee-Enfields. We found a crack in a rock near our house "cleft for us". If we went on the road in daylight down would come the Stukas. So we used to get on to the road, wait until the Stukas were coming down, rush into the cleft in the rock and shoot at them from not more than 50 or 100 yards. Both sides were very inexperienced in those days. We tried the follow through method. We tried aiming off. We must have hit them they were so close. This went on all morning and it was good for our morale. In the afternoon the Stukas tried to hit us with little anti-personnel bombs, so we got under the railway bridge and whilst the Germans attacked us we used to fire at them from below as they flew over us. I would love to add that we shot one down but to our knowledge we did not. As I said we must have hit them as they were so close, and also because they paid us so much attention. Lieut-Colonel Turner's offensive spirit, dating back from his experiences in 1914-18, plus his terrific energy was the mainspring of our little effort.

We were told that a working party of the Royal Navy would arrive with explosives and then we would prepare demolitions in depth, down the Romsdal Gorge. They did not arrive. Once at the Staff College, after the war, I was "head boy" of my "wing" and we had to put up suggestions on alterations in the staff college course. I recommended that the last month, after all the paper perfection of the past eleven months, should be devoted to "low priority warfare" where nothing ever turns up on time or at the right place as in real war. On Lieut-Colonel Keane's staff there was an E & M officer who had been, I think, in the Brigade of Guards during the 1914-18 War and the RE sometime later and who had then migrated to Canada. On the outbreak of war he had immediately returned to England. It was he who was given the job to get us our demolitions. He managed to get a few lorries loaded with rations, depth charges and sea mines, not a popular job at that time in Aandalsnes with the bombing, and the navy having failed, he got an army working party. There were many soldiers, AA gunners in particular, whose guns had been sunk, who had no particular job to do and were wandering around the base. The tall, straight-backed, grey-haired Lieutenant put on his Guards Brigade look and said "Now you and you, what are you doing? Why aren't you doing it? Get on that lorry." They got on and that was my working party. After most of the charges were laid we allowed them to depart; they missed their unit's departure and some were posted missing.

Sergeant 22 and I had made our demolition plan. We knew nothing about mines or depth charges and neither of us had done any demolition training since Chatham four or more years ago, but I found the primers for the depth charges and where the detonators fitted. The mines we put in a tunnel for further use and in case we wanted to blow the tunnel. We then placed depth charges on the railway bridge over the road, into culverts at re-entrants where the road took a bend, on spurs where we hoped they would blow away the foundation into the gorge and make the gap difficult to bridge round a corner, and so on. Calculations were not complicated. The argument being, one, two or three depth charges. Each had about 250 lb of explosive in a comparatively thin shell. Our method was to put the big primer into the centre of the depth charge—insert detonator with safety fuse crimped on and waterproofed with elastoplast. The Army detonators did not fit so we wrapped paper around them until they did. We had no cordtex or FID and trusted that if the depth charges were touching one would set off the other. In some cases we lit safety fuses leading to the detonators on all charges so that if one failed the other would go off. We had no electrical equipment, although I believe an attempt was made to drop me some from England.

In what I considered was a very important place, after the AA gunners had left, I put in three depth charges, and had to stay for two or three hours lying in melting snow water whilst rolling them into the right place and getting them properly connected. This was about the end of our demolition zone and we got the depth charges

really beautifully fitted into a horrible place in the road from a repair point of view. I had become completely frozen fixing them whilst lying in the water. We had dismissed the lorry and escort so Sergeant 22 had the job of carrying me back to our bungalow. My fingers and toes were white and I felt finished. However he stoked up a big fire on the stove and wrapped me around it. Then with curds and a sort of raspberry wine which he had found in the cellar he brought me to life again. At that time we were out of rations. It may be of interest to know that we left money to cover all our borrowings. This may seem illogical to some and it may have fallen into the wrong hands. But I still think it was right and practised it throughout the war. The money of course came from our own pockets.

Around this time much was happening. The Norwegians had handed over their demolitions on the railway to us and retired. Then we saw the weary rearguard tottering through. Their train had been derailed 18 miles from us and they had marched the rest of the way and they were not used to marching. They went by, officers and all, weary and dejected. It reminded me of that battle print—the gassed after the Battle of the Somme.

At this time a platoon of a very famous Corps was sent up to cover us whilst we did our demolitions. I made a mistake here. I thought the Sergeant commanding the platoon knew what to do. I just pointed out the best place to defend and did little else. Sergeant 22 and I were busy checking charges—we were very short of safety fuse, and were practising lighting little bits quickly for the time when the Germans arrived. I should personally have taken more interest in the platoon which was a long way from its unit with its morale low after watching the retreat of the rearguard. The last stragglers had left. We were alone with this windy, lanky parade-ground sergeant who, until I stopped him, was telling the straggling soldiers to throw away their rifles as they would not need them any more. He kept saying that “we never should have come and we shall never get out of this, God help me, etc”. I went to sleep and I think Sergeant 22 gave him a good talking to.

At 2.15 pm on Thursday we blew the Norwegian borehole demolition charge in the rock over the railway, a lovely job and at the same time three lorry-loads of Germans arrived. The platoon sergeant, frightened by the explosion which had also started an avalanche, at once led the retreat to the lorry shouting “they’re all round us” and pushed off toward Aandalsnes. We went down to the first road charge, Sergeant 22 keeping his motor bike on the right side of the demolitions. Then we continued up to the railway and down the road. In one stretch there was rather a ludicrous situation which we had tested out in trial runs. The depth charges were under a good culvert but there was no cover and our safety fuse was small. The road curled twice round below the culvert, and practice timings of a getaway had always found me in the line of fire. So we had decided that Sergeant 22 should wait at the top of the culvert with his motor bike ticking over whilst I went down over the snow to light the fuses and scramble quickly up again. This I did and quickly got on the back of the bike. We had a hair-raising few moments round the icy bends just below the charges. Then as we rounded the last corner the whole lot went up and we sheltered behind a cliff from the shower of stones, and the usual avalanche.

Aircraft started to interfere, but in the deep gorge they found it difficult to get at us. However, having seen the height to which the debris rose from the demolition, we conceived the idea of bringing down an aircraft with a depth charge. Unfortunately we had no electrical equipment or otherwise we might have done it. We measured the safety fuse very carefully. Then timing the aircraft’s circle and run over the road, we lit it. We did not hit the aircraft but we must have shaken it because all the debris went up above the height of the aircraft just after it had passed. I always wish I could say that I brought down a German aircraft with a depth charge.

Just after the Germans arrived, but before all the platoon had got on the lorry, a very young looking Lieutenant came up on a motor cycle from the next village where his platoon was. He managed to stop a few of the men, and with a Bren gun and 2-in mortar, engaged the Germans, eventually driving them off. It was a very fine

action. His name was Lieutenant Stroud. I had time once to go and see him and we sent one man back to Lieut-Colonel Keane saying we were heavily engaged and could not hold out much longer. Keane sent a message back, which arrived about three hours later, saying, "What are your casualties?" As we had none we felt ashamed and Lieutenant Stroud stayed. By this time the Germans had retired. I have found that phrase "what are your casualties" a very good one to restore the determination of wavering officers, in battle for the first time, to hang on. The remains of the platoon were in a good position high above the road and could pick off the Germans at leisure.

The Norwegian borehole charges crashed enormous lumps of rock on to the railway, whilst our depth charges had blown the road away down the gorge in a dozen places.

The remaining mines and charges which we did not understand, we had left in the entrance of a railway tunnel just where the railway debouched from the tunnel over a high viaduct over the gorge. We had prepared the mines with detonators in and safety fuse ready to light. We hoped to blow the roof of the tunnel down and damage, if not destroy, the viaduct. We rode down to blow what was going to be our biggest bang of all only to find to our horror that the 500 men of the rearguard were sheltering in the darkness of the tunnel from aircraft—sleeping or smoking on the mines and charges. We could get no sense out of anybody, they were all too tired and only too pleased to be safe from the ceaseless bombing and strafing outside. With the aid of a match, I had no torch, and much heaving of sleeping men off the mines, we took the detonators out. We next turned our attention to a pile of depth charge mechanisms and mine detonators which we had left severely alone. The former were for setting the depth at which the depth charge would explode. There were strict instructions on them "do not unscrew". However the soldiers had unscrewed some of them in the dark to look for food. So we lifted them delicately, and, keeping them horizontal, stepped gingerly over the sleeping soldiers and threw them over the edge of the viaduct. They did not explode so they were probably quite harmless.

I then met a very tired General Paget who had been trying to arrange a train down for that night. I reported our demolitions and as much as I knew of the situation. The runaway sergeant had already told tall stories of Germans everywhere and parachutists landing behind them, so I was told to take over command of the rearguard and to put them in defensive positions "seeing that you are so certain there aren't any Germans about". I pointed out that there were Majors amongst the heterogeneous party which I was to command. He said "It doesn't matter. You are fresh and they are too tired to worry." So I put the troops in a position on the outskirts of the village and established myself in a house. Shortly afterwards Lieutenant Stroud and his men came in, glad to see that we were all right. He reported that he had driven off the Germans and the rail and road were truly blocked. Later CRE Lieut-Colonel Turner and I motored out and I showed him some of the results with pride. However he was disappointed that the depth charges had not done more damage. This was because we could not tamp the charges as there was nothing to do it with and it would only have caused the water to dam up and over our far from watertight safety fuse and detonators. The avalanches caused by the depth charges had in places done more damage than the demolitions. It had been very noisy.

On our return, Sergeant 22 and I were told to remain behind to blow the tunnel while the rearguard went off by train. We remained on the phone in contact with Aandsnes. Finally, well after dark, we were told much to our fury not to blow the tunnel but to make our way back to Aandsnes. We found that we were nearly out of petrol but fortunately after an hour or so of coasting and driving we caught the train up. We got our faithful bike on the train and climbed on after it.

In Aandsnes all was confusion in the evacuation. I was told that there were still some charges laid and bridges to be blown around the town so Sergeant 22 and myself, having got some petrol, went off to find them. Just before dawn we were called back and barely had time to get on the last destroyer before the gangway went up.

Outside the fjord we were transferred to HMS *Calcutta*, an anti-aircraft cruiser. I had been furious at not being allowed to blow up the tunnel and other bridges and thought that it was 5th Column work. It was not until very much later that I learnt what the reason was. By blowing up harbour installations we would have advertised our departure and evacuation and attracted the attention of the Stukas on to us. As it was the Force got away without a casualty. On board I met Colonel Warren in Lieutenant Stroud's regiment and told him the story about the runaway sergeant and how Stroud had saved the situation. Stroud deservedly received one of the first MCs of the War.

There was a curious and dramatic twist to the end of this story. After our arrival at Scapa Flow we were transferred to HMS *Rodney* where we were royally entertained and bathed. I will always remember the fine sight of a smart and correct Royal Marine bearing a pint of beer on a silver tray to me in my bath. This had been sent by a naval officer I had known in Hong Kong. Years later I returned the compliment by helping evacuate from China the Royal Navy survivors from Hong Kong.

But later, with some of the Namsos party, we were placed on SS *Batori* and sailed down to the Clyde. There we were kept anchored in mid-stream for a week until the debate in Parliament on Norway, which caused Chamberlain's downfall and the rise of Churchill, was over. We had no newspapers but somehow during this time we heard that there was going to be such a debate, so we helped lower two Guards officers over the side who swam ashore, made their way to London and gave some MPs the true facts of the Norwegian debacle. This may have been the deciding factor in putting Churchill into power.

Sergeant 22 and I were glad to see reported in the Press that the Germans had broadcast that General Paget's force had got away due to extensive demolitions which held up the German Army.

The main lessons which I learned and which I carried with me through the war were:

a The tremendous heartening effect of an optimistic and aggressive atmosphere in the face of depressing conditions. I will always remember Lieut-Colonel Turner's cheerful gnome-like features with his rifle slung on his back or taking potshots at Stukas.

b Parade-ground soldiers are not necessarily good in action.

c A sapper must be prepared to do anything especially in a retreat.

d Small demolitions in isolated places may cause more delays than large demolitions closer to repair shops, labour, etc.

Can anyone tell me who is Sergeant 22 and what he is doing now?

The Hook

"NOMINAL"

MANY officers will have already seen the latest painting in the Headquarters Mess, depicting "The Hook" by Terence Cuneo, to commemorate the part played by the Corps in the Korean War. For those that took part in that war, it still seems like yesterday but twenty years is a long time and the majority of serving officers had not even joined the Corps by the time that war ended; indeed some were not even born. It may be of interest therefore, especially as Korea was the last major war involving the British Army, to describe the background to Cuneo's picture.

The Hook was a hill feature jutting forward on the left of the 1st Commonwealth Division's front, some 8 miles north of the River Imjin. The Division faced Chinese Communist forces who were dug in on the hills to the north anything up to 2 miles away. Their positions converged in the vicinity of the Hook and the forward left-hand platoon was dug in less than 100 yds away. The feature was some 150 yds broad

and 300 yds deep, sufficient for only a company, but if the enemy had gained possession of it they would have been able to overlook not only the flanking positions but also all the rear areas right back to the Imjin river. A withdrawal would have been inevitable, not only for the Division but probably for the whole of I Corps, and the nearest tenable defence line to the south would have been beyond the river in the general area of Gloster Hill, the scene of such fierce fighting some two years earlier. It was thus imperative that 1st Commonwealth Division should hold the Hook and it rightly qualified for the term "vital ground". It was held through thick and thin until the war ended in July 1953.

In November 1952 the hill had seen fierce fighting and the Black Watch had fought a bloody battle in holding it against the Chinese. Early in the New Year, the Division was placed in reserve and it was not until April 1953, when the thaw had set in, that the Division returned to its old positions. As a result of continuous shelling and mortaring, the forward trench linking up the various weapon pits was virtually untenable. In place of the deep, sandbagged trench along the forward slope was a wide and shallow "V", along which it was impossible to move in daylight without attracting enemy attention. There was no other cover, the scrub and bushes having all disappeared in the shelling until the hill looked like a World War I scene. It was a thoroughly unhealthy place.

The position was once more held by the Black Watch with 1 Troop of 55 Field Squadron in support. The Troop's first task was to deepen the forward trench and convert it into a covered way, connecting up the various weapon pits. It was a daunting prospect, as the enemy could see what was going on and work was mainly confined to the hours of darkness. Progress could be seen at daybreak and mortaring and shelling were constant as soon as work started. This covered trench can be clearly seen in Cuneo's picture, with work in progress.

With so little room to dig positions, the company had two platoons forward and one in depth 150 yds further back, just behind the top of the hill depicted in the picture. The forward left-hand platoon had a good field of fire towards the closest Chinese positions along a connecting saddle to a pimple of ground nicknamed "Ronson". A dug-in flame-thrower was available to assist them at the nearest position to the enemy.

The forward right-hand platoon had a good field of fire along a bare ridge to its north-east and patrols, one is seen in the picture, could sneak out this way by night. To its immediate front, though, was a small spur called "Green Finger" with such convex slopes that it was possible for the enemy to form up unseen and launch a surprise attack. To overcome this problem it was decided to build a tunnel down the spur and to break out either side of the ridge with a machine-gun bunker which could fire down the slope. The start of the tunnel was from the corner of the forward trench and ran under the two officers in the foreground of the picture.

By April/May 1953, when the present scene is depicted, construction of the tunnel and the forward covered trench was well advanced. Shelling and mortaring were fairly continuous and all work was being carried out by night. Every vestige of cover had long since disappeared and the ground was littered with all the debris of war: tangled barbed wire, bent pickets, shattered timber, torn sandbags, scattered ammunition, enemy stick grenades and the odd dead Chinaman stuck in the wire. The individual section posts provided less and less protection for their inhabitants and it was decided to build really strong bunkers with embrasures of reinforced concrete which could stand up to the increasing weight of enemy firepower. These bunkers were dug out of the side of the forward trench, lined with heavy baulks of timber and with interlocking concrete lintels at the front, the whole covered with 3 to 4 ft of earth and rocks. These lintels, each weighing 600-800 lb, were constructed in the Field Park and had to be dragged over the top of the Hook, through the shell craters and debris, and into their forward positions. This could only be done on the darkest of nights and the local Korean labourers displayed great courage in carrying out this hazardous work. It is not always easy to teach a Korean that the safest thing to do



THE HOOK—KOREA 1953

The Cuneo painting, which hangs in HQ Mess, depicts men of 1 Troop, 55 Field Squadron RE at work on the defences one night in April/May 1953. The Troop Commander (Captain G L C Cooper) can be seen in the foreground settling the arcs of the fire with a Black Watch Officer.

when a flare lights up the surrounding area is to "freeze"—there is an almost overwhelming desire to run! With the enemy so close, this feeling was not entirely confined to Koreans.

Some 40 yds back from the forward positions was the Gunner OP, dug in on the brow of the hill with the forward platoon HQ, which co-ordinated both forward platoons, immediately behind it. By night the Forward Observation Officer moved back to Company HQ on the reverse slope. All positions were connected by deep, World War I type, communication trenches and repair work on them was a continuous night time task for the infantry, along with the repair of the wire and constant patrolling. By day, most people slept in bunkers or tunnels burrowed into the sides of the hill. After ten days or a fortnight, the company would be relieved and move into reserve for a much needed bath and rest or on to a neighbouring, quieter position. The Sapper Troop remained, plucking up its courage each evening at dusk for the nightly tasks ahead. The comparative security of the Troop rest area 3 miles to the rear made the daily journey forward seem all the more nerve-racking.

There were of course many nights when things were quiet and almost peaceful. The enemy would even broadcast from loudspeakers with messages promising freedom from the Yankee yoke for those who surrendered, interspersed with the latest Bing Crosby records. Packets of tea, with a white china peace-dove pinned on top and enclosing a message to "Have a good cup of char and forget this hellish war" would be left for our patrols to find. This form of propaganda had no effect whatsoever on the British soldier—indeed, many wore the peace dove as a cap-badge in their balaclava helmet to show that they had been at the "sharp end"! By day there would be frequent showers of propaganda leaflets and a wild rush to pick up souvenirs

The Hook Korea

would ensue. The only danger to our troops' morale came from the empty mortar canister which made the most terrifying screech as it whirled down to earth ahead of the floating leaflets!

The nights were nevertheless always busy and work would be either helped or hindered, depending on one's degree of protection, by the constant stream of flares, usually coming from the American "flare ships" flying overhead. There were also numerous interruptions from sporadic shelling, enemy movement in the vicinity and of course sudden fire-fights. Occasionally, heavier fighting broke out, usually preceded by heavy shelling for several hours. One such occasion in late April presaged a two company size raid on the forward platoons; within five minutes of the attack starting, the platoon commander and the platoon sergeant of the right-hand platoon had been killed and the platoon commander of the left-hand platoon had been mortally wounded. With no news coming to Company HQ the second in command went forward to find out what was happening but in the confusion he could not get anywhere where he could influence the battle. Things looked bleak and the company commander called for reinforcements as well as increasing artillery support. Being of such vital concern to hold the hill, the whole Corps artillery was thrown in, an exciting occasion for the FOO to be calling for an "Uncle" target. Eventually VT fire was brought down to clear the enemy, with terrifying results as all could see when dawn broke and reserve troops had swept the area clear of Chinese.

Limited armoured support was also available but was not always welcomed. Once targets had been spotted, usually by day, on the opposing hills, a Centurion tank would creep up to the crest and fire two or three rounds before retiring behind the hill and closing down against the inevitable enemy reaction. Unfortunately they rarely seemed to think about lesser mortals going about their normal routine and enemy retribution resulted in frantic dives for cover and interrupted tasks. Tanks were not popular. By night, tanks tended to operate in pairs, one with a searchlight to illuminate targets and the other to fire at them—two can be dimly seen doing just this to the left of Cuneo's picture.

By May 1953, soon after the period portrayed in the picture, the enemy had evidently decided it was time to make another all-out onslaught on the Hook. Shelling increased in intensity, heavier calibre weapons were brought up, with delayed action fuses resulting in deeper penetration of the overhead cover. In the week prior to this major attack 20,000 rounds landed on the position, half of them on the last day, and all of them on a position only 300 yds by 150! Simple mathematics shows that on the average one round will fall on about every 2 sq yds but in practice the shape of the ground, and the enemy's endeavours to hit vital strongpoints which had been carefully ranged in during the preceding weeks, made the hits, and hence the damage done, even greater in some places than others. 1 Troop of 55 Field Squadron worked frantically throughout this period to maintain and strengthen the defences.

In the ensuing attack, the Hook, now held by the Duke of Wellington's Regiment, was nearly over-run by sheer weight of numbers and the devastating shelling. Enemy satchel bombs and incendiaries helped to destroy what few defences were left after the last day's terrible bombardment but they were eventually driven off after fierce hand to hand fighting and the tremendous United Nations forces counter bombardment. At first light two troops of 55 Field Squadron went into the forward company positions to restore some semblance of fire positions for the infantry. Every open trench or weapon pit had been filled in until it was only a scoop in the ground, littered with debris and tangled wire. As a defensive position it had almost ceased to exist and every move forward across the open slopes was accompanied by immediate mortar fire; indeed so close were the enemy that their 60 mm mortar bombs could be heard leaving the barrel. Nevertheless, by nightfall sufficient bunkers and weapon pits had been cleared to enable the infantry to hold this vital feature and the enemy were fortunately reluctant to renew the contest for a while.

All this sapper work over a period of many weeks was not accomplished without

casualties but work never faltered and there is no doubt that the standing of the Corps in the eyes of the infantry has rarely been higher. Cuneo's picture is a tribute to all those sappers who died, not just on the Hook but in the whole Korean war, and is a constant reminder to all that wherever the fighting is thickest there is always a sapper to be found and that we are very much teeth arm soldiers and up at the "sharp end".

The First Month of World War I

Corps History, Volume V, pages 175-193 gives a balanced account of the engineer activities in the first month of the 1914-18 War. The period 4 Aug-5 Sep 14 included the defence of the Mons Canal, the first retirement and the start of the counter-thrust towards the Marne.

Second Lieutenant K B Godsell was a Section Officer in 17 Fd Coy, one of the two Fd Coys (59 was the other), in 5th Division of II Army Corps. We have been fortunate enough to obtain a copy of Godsell's diary covering the first six months of the War.

In this issue of the Journal we publish Godsell's account of that first month, not as a microcosm of the whole but simply as a statement in his own words of his experiences. Although he makes the story live in its own right, the comparison of the whole story and his part in it lends extra fascination.

The main characters to appear in the diary are:

5 Div; Lieut-Colonel J A S Tulloch (CRE) and Captain J R White (Adjt) 17 Coy; Major C W Singer (OC), Captain E F W Lees (2IC), Lieuts G B F Smythe, C E R Pottinger and H W Porter and 2 Lieut K B Godsell.

PERSONAL NOTES JOTTED DOWN BY THE WAYSIDE K B GODSELL, 17 FIELD COMPANY

Sunday, August 16th, 1914.

We left the Curragh on Sunday and entrained without incident to Dublin. We here went straight from the train to the quayside and commenced embarking. My batman let my horse back himself off the platform on to the rails, where he, or rather she, sat very forcibly. She was lucky to suffer no more serious hurt than two sore hocks. The local inhabitants gave us a good welcome under the circumstances, we rather expected the cold shoulder. All the men were given a packet of cigarettes, a piece of chocolate, a bun and box of matches from the "Ladies of Ireland". The Officers got 50 cigarettes and a sprig of white heather. The embarking was speedily done and we left harbour at 7.00 pm in the evening for an unknown destination amid the cheers of the populace.

Monday, August 17th, 1914.

Life on board was monotonous. Room was very scarce and there was no officers' accommodation either for eating or sleeping. I secured the sofa in the Captain's sitting room but had great difficulty in getting to it as some Boer War Heroes would insist in spinning their yarns far into the night. Fortunately the sea was very calm and the weather fine. Had it been rough the conditions would have been very bad. We were told our destination, HAVRE.

Tuesday, August 18th, 1914.

We arrived at HAVRE at 7.00 pm and were greeted uproariously by the inhabitants in spite of the fact that we were the 37th transport to arrive that day. There was a certain amount of confusion in unloading which was done entirely by French stevedores. A pontoon wagon of the 59th Field Company was dropped back into the hold by the ropes giving. This little affair killed three stevedores and injured eight others. While we were waiting for our wagons to be unloaded we put the men into the large sheds on the quayside. We were not allowed to light fires but managed to get some hot coffee. The Bugler Boy got a bad kick on the head and had to be removed in an ambulance.

Wednesday, August 19th, 1914.

We did not get clear of the dockyard until 3.30 am when we marched to a rest camp on the top of the cliffs. It was a heavy pull up and everyone was very tired. The pontoons had considerable difficulty in getting clear of the dockyard and at one time the whole of the HQ transport was cut off from the rest by a swing bridge being swung. We got to the camp at 4.30 am and went into the tents which had no floor boards. Our rations were dished out and the bread was beastly bad. After sleeping most of the morning we had breakfast and went down to the town to shop. I met Wyatt and Wilbraham. On getting back to camp we found orders to the effect that the unit would be entrained by 4.00 am the next day. This necessitated marching off at 11.00 pm. After an uneventful march we arrived at the station at mid-night.

Thursday, August 20th, 1914.

We had to wait an hour before our train came in, we very soon had our wagons on and went to the nearest shop and devoured omelettes. We did not leave HAVRE till about 7.30 am when we were given a send off by a horde of urchins screeching for "beesqueet" and "souvenirs". The first part of the journey we all slept. Our first halt was at ROUEN—as the mounted sergeant explained to his drivers "R-O-U-E-N that means water and feed"—where we had lunch (cold) but boiled some water on our primus stove. The rest of the journey was spent in reading and eating until dusk when we again slept. About mid-night we were awoken and were told we had got there, LANDRECIES, so out we tumbled. By this time the men were quite expert in manipulating the horses and wagons and the detraining was rapidly got on with.

Friday, August 21st, 1914.

Captain White, the Adjutant, met us at the station and guided us to a spot where we were bivouacked till daylight. After a nearly breakfast at dawn we marched off and continued marching all day. We bivouacked at night at AINFROIPRET, quite a small village. The march was most trying as the inhabitants would shower unripe fruit on the troops and give them bad wine and sticky drinks. The weather was terribly hot and the men, anyway the Reservists, were almost green. Boots were new, socks were new and sore feet were very prevalent. Many of the Infantry fell out, especially from one brigade. The real cause was bad march discipline. We ended the day without any stragglers.

Saturday, August 22nd, 1914.

Marched off at daybreak and proceeded via BOSSU, ATHIS, BAVAI, ST GHISLAIN. Weather again very fine, roads hot and dusty. Inhabitants still over-generous and the infantry falling out like flies. As we were approaching the Mons Canal I was sent on to reconnoitre a line of defence to the west of ST GHISLAIN by Lt-Col Tulloch (CRE). On completion I returned to my section which I found with No 1 on the canal at ST GHISLAIN. My reconnaissance was useless as it was done in the wrong area! I found Smythe with the two sections busy loop-holing houses and walls and digging trenches on the N bank of the canal. At 5.00 pm Gen Sir Charles Fergusson came round and told us not to work too hard as we should probably have a fortnight to prepare the position. We knocked off at about 6.00 pm, had a meal, and billeted in the Pottery.

Sunday, August 23rd, 1914.

Woke up and had breakfast and started work 7.30 am. Continued loop-holing, etc. At 10.00 am I received orders to prepare girder bridge (railway) for demolition. Some cyclists and "A" Company, RWK went forward at 7.30 am. Infantry did not get breakfast until 9.00 am and started work at 9.30 am. At 9.30 Major Singer arrived and moved Smythe and his section to cross roads at Maire's house in BOSSU. No 2 Section continued work. I went to see Major Buckell on the right and took measurements of girder bridge with Sergt Payne. He returned and worked out charges. Enemy's first salvo was fired at 10.00 am—made a very funny noise which we could not make out until we saw the shells burst, then we knew. Rather a short fortnight!

Sunday, August 23rd, 1914.

I left Section working and took Corpl Marsden and 5 men down to the girder

bridge and prepared it for demolition. It was jumpy work as the enemy's bullets were whistling all round us but no shells came our way. Corpl Marsden and one man were left to fire the charges, the remainder returned with me to the Pottery. While I had been away the fire round the bridge near the Pottery had become very heavy and the men had to be withdrawn from the work. The whole section was now at the Pottery so I ordered the cooks to get dinners ready. I had been suffering from a devouring thirst all the morning. We had some difficulty in getting back from the girder bridge as they were shelling one of our batteries on the canal bank. This battery who were in position below a tall chimney were soon put out of action and had to withdraw their two surviving guns. Bulteel and Lindsay were in the battery and spent the rest of the day waiting in the streets of ST GHISLAIN. By now, 2.00 pm, the shell fire had become very heavy all along our front and the infantry attack began to develop. Casualties came pouring back and had to crouch under the walls for protection from the shrapnel. At this time the CO and Major Buckell of the RWK asked me for some wire and I went to get some but was called to see General Cuthbert. He told me he wanted all the bridges blown up. I at once set to work to prepare the main bridge for demolition, it was a heavy drawbridge. It was a most difficult job as the bridge had to be raised to fix the charges and there was a continuous stream of wounded, reinforcements, orderlies, ammunition carriers, etc, going up and down. The construction of the bridge made it difficult to destroy as you could not fix the charges easily; we dropped 7 lbs in the canal. There was another similar bridge on our right so I sent Corpl Geraghty with Corpl Taylor and 2 others to prepare it which they did very well in spite of the very hot rifle and shell fire. Fortunately there was a covered way along the canal to the right. Just at this time I sent off a sapper to see how Corpl Marsden was getting on, and the enemy turned about 30 guns on to the bridge and ranging very accurately bombarded it for five minutes, at least 150 shells bursting within a radius of 150 yards. Corpl Marsden was most unfortunately killed being shot in the head while watching the attack through his telescope. This was most unfortunate and we all felt his loss very much. As regards the infantry position, at ST GHISLAIN it was very strong except on the right which was rather in the air. The enemy was passing across to our left flank all day and Major Hastings was always anxious for his left. I had to leave 2,000 yards of barbed wire in the road unused and also a sappers kit. By 3.00 pm most of the section were back at the Pottery and all the bridges prepared. Tea was got ready. The German infantry had enough and the attack was not pressed very much, but they continued bombarding doing a certain amount of damage to the town but causing little loss of life. Our guns were silenced early, the odds being about 8 to 1, infantry 200,000 to 70,000. 5th Division bore the brunt with about 25,000 men. The attack on our left at LES HERBIERES continued but it was held. About 8.00 pm I heard of Corpl Marsden being killed and sent another man out there, and I also heard that shell fire had blown our charges off the girder bridge.

There was also another swing bridge on the left to be prepared. Corpl Hunt was sent along on a bicycle to the bridge on the left and did not return for two days. At 7.00 pm Serjt Payne and 5 men prepared the drawbridge. At 11.00 pm Serjt Payne and 6 men went along and reprepared the girder bridge. I remained at main road bridge with Corpl Geraghty.

All was quiet at 11.00 pm except on the left—you could hear the Boche singing!—We were waiting orders at ST GHISLAIN, every one was happy and ready to hold on but the enemy were round both flanks and a retirement was ordered. I went round the line with Major Hastings to see if wire entanglements were practicable. I sent Corpl Geraghty with 3 men to assist infantry with tools, etc.

At 11.30 this party was recalled and brought back tools. Horses arrived and tool carts were packed and hooked in. At 12.00 midnight the infantry moved N to S across the canal.

Monday, August 24th, 1914

When most of the infantry had crossed there was a sudden burst of fire which

rather upset everyone but it proved to be a false alarm. The bridge was blown up at 1.30 am. This was the signal for the demolition of the other bridges and all went up well. The demolition parties joined the section which proceeded along the WASMES road behind the infantry. We spent the remainder of the night sleeping by the roadside at WASMES. In the morning we got what breakfast we could. At daybreak the enemy shelled WASMES and the infantry were only just moved off the square in time. Emergency rations were issued. At 12.00 noon I received orders to go to ATHIS where we bivouacked. On the way I got lost and found myself on the wrong side of the rearguard and had to take the wagons $1\frac{1}{2}$ miles along a railway to get back on to the right road. We rejoined the rest of the Company at ATHIS. We had tea and red wine, etc at a cafe on the wayside. We were joined by the light cart at midnight. A cyclist was sent off to find Singer—no luck—bivouacked.

Tuesday, August 25th, 1914.

Retirement continued through BAVAY and past the FORET DE MORNAL, fetched up at REMNANT MAUROIS—bivouacked. Boche aeroplanes were very active, also saw one or two of ours. One Boche driven down. Rumours of French Army Corps hidden in the Forest. Saw quite a lot of French Chasseurs who all appeared to be looking the other way!

Wednesday, August 26th, 1914.

Big fight from daybreak till 3.00 pm round TROISVILLE, REMNANT and LE CATEAU. We started by putting hasty head cover on the trenches in front of TROISVILLE. Trenches 3 feet wide and 2 feet deep—paralytic—tore down doors, shutters, palings, anything that would hold earth. When fighting began we came back to the village and made gunpits for artillery. I was sent to take charge of the transport which was on the TROISVILLE-REMNANT road. About 1.00 pm we were moved over to the right of the battlefield and the transport was sent to the rear to wait. We went forward and started digging a line to the right front of REMNANT. Things were looking very dicky. There did not appear to be any infantry. On the extreme right a Brigade of R11A came into action—very pretty—but they were soon spotted and had to shift. After this we withdrew and spent 20 minutes looking for transport which had decamped.

Finally we marched along the road to MARETZ and found by all appearances we were the last to leave—anyway no one else was in sight. One could see the infantry on the left streaming back across the fields under a hot shell fire, the road as far as could be seen was deserted—it looked like a perfect debacle and every moment we expected to see the Boche Cavalry appear over the crest, but they did not, and this has been one of the wonders of the War. The general retirement started about 3.00 pm. About 5.00 pm it commenced raining. After an hours marching we overtook the rest of the column which consisted of an unthought of confusion of men, guns, horses and wagons. All dead beat, some asleep, many wounded, all foot sore. In this merry state we stumbled rather than marched on to ESTREES. Here a general halt was called and an effort made to re-organize but it was pitch dark, the effort was none too successful. Our lot was a wet ploughed field—no food—no transport—no cover—damnable! I buried myself under a haystack and consequently was left behind when the Company moved off in the morning as no one could find me and it was still dark. When I woke up I was alone except for some transport which was still passing in an endless stream. I picked up a bicycle and rode like blazes to catch up the Company. It sounds as if I had had a good nights rest—as a matter of fact I had not slept 3 hours. In ten minutes time I overtook Valdo (Pottinger) who had been foraging and was carrying a basket full of food stuffs, unfortunately raw. We went on together to ST QUENTIN where we were told we should find a "rest" camp—devilish little rest camp we saw—Valdo and I wandered about and went into a house and demanded breakfast which was willingly given to us and consisted of raw eggs beaten up in a bowl, red wine, new bread and fresh butter followed by coffee—we made beasts of ourselves—the owner of the house was the local bank doorkeeper but the food was excellent, our first for nearly 36 hours. We went out and collected

12 of our men in the town and proceeded to OLLECZY some 8 miles further on. Here we found the rest of the Company and the section transport all bivouacked in a field nice and cosy and there was my bed all laid out, but I was destined not to sleep in it. Captain Lees with all the heavy HQ Transport left us the night before LE CATEAU and no news was yet heard about them. Just as I was going to get into bed the OC told me I had to go and prepare a bridge for demolition and wait there for orders to blow it up, (at SOMMEVILLE). Smythe prepared two on my right one of which he blew up at once. I went down and prepared the bridge with Corpls Geraghty and Taylor—we saw a moving star and lost our way in the swamp. It was loves labour lost as bridge was left labelled but not demolished.

At OLLECZY the infantry were able to complete their reorganization and henceforth men moved more or less as units and not individuals.
Friday, August 28th, 1914.

About 8.00 am some infantry arrived at the bridge—the outposts. At 9.00 am they were withdrawn and we followed them. We then walked—Corpl Geraghty, Corpl Taylor and myself plus a punctured bicycle—as the Company had gone on earlier. After about half an hour we went into a cottage and breakfasted off new bread and butter and vile white wine. Refreshed we continued the trek, all very tired and dirty. We finally got to NOYON and were then pushed on to PONTOISE. I got a lift in a car, Corpl Taylor rode the bicycle and Corpl Geraghty was put on an ambulance as he had gone lame.

We found the Company bivouacked at PONTOISE, where we had a good meal, a wash and a shave, and the first nights rest since the show began.

Saturday, August 29th, 1914.

Remained all day at PONTOISE and got a mail. I got a parcel of tobacco, cigarettes, chocolate and matches—all highly appreciated. At 4.00 pm we got orders to move and I went off to help Smythe to prepare a suspension bridge for demolition. The big girder bridge outside PONTOISE was successfully blown up but there was a hitch about the suspension bridge as we had run out of explosives. Pennycuik of the 59th Company was sent back in a motor car to finish it off with fresh explosives for which he got the DSO. I rejoined the Company about 8.00 pm and found them bivouacked at CARLEPOINT about 3 miles from PONTOISE.

Sunday, August 30th, 1914.

At 2.00 am we left CARLEPOINT and proceeded to MORS and then ATTICHET. Captain Lees rejoined us here with the HQ Transport (and the spare Mess gear). He had been away since LE CATEAU and had done a journey over most of Northern France, visiting Paris en route. We had a very pleasant visit, our bivouac being by the river side and the weather still exceedingly hot. Our dinner was excellent as several fowls had found their way into the stock pot and the country abounded in excellent fruit. In addition we had been given two bottles of champagne. The fact that it tasted like bad ginger ale is beside the point.

Monday, August 31st, 1914.

Continued the march and did 17 miles. We had lunch by the roadside in a beautiful wood. The route was ATTICHET-CRONTOT-ST ETIENNE-PIERRE FONDS-GILACOURT-ST BETHANCOURT. A very hot day—our thirst quenched by wine and peaches. We passed through beautiful country and saw a lovely chateau. Bivouacked for night near ST BETHANCOURT.

Tuesday, September 1st, 1914.

No partridges today. We were having breakfast 6.15 am when heavy firing broke out 300 yards to our left. Breakfast hurriedly finished and wagons packed and off again. Our rearguard had a brush with the enemy but drove them off. Our cavalry and some German cavalry went down to water at the same pool, both unarmed! Some scuffle. Proceeded to LE PETIT MOUNT and CREPY, here we stopped and dug some fatuous trenches—fatuous in that all the tools the Company could muster were 4 spades, 5 picks, and 3 shovels! We saw some Uhlands and fired at 'em much to the joy of the sappers. We continued the retirement through ORMOL. The KOSB

captured 2 MG's and our gunners got direct hits on two motor lorries full of Germans. Pottinger did one of his famous local raids and returned with all sorts of gear from trench shovels to a mess basket. Bivouacked for the night at OGNES. I was on guard—beautiful night with full moon and heavy dew.
Wednesday, September 2nd, 1914.

Started off 4.00 am beautiful morning and promises to be a very hot day. Arrived IVERNY at 10.00 am and went into billets. We all made pigs of ourselves in a topping plum orchard, the best plums I have ever tasted. Meals these days were like the dew—very heavy. At 5.00 pm I was ordered to take my section 10 miles back to block a road. Bought two ducks.

When I got there I found although the road ran through a wood, there were no trees near the road to block it with. I got in touch with Col Martyn of the West Kents and assisted the Infantry in getting into the outpost position. I got back about 12.00 midnight but missed the roast duck. Found some lace in a safe in the house which Valdo and I divided as the owners had decamped.
Thursday, September 3rd, 1914.

Route:—VILLEROY-TRILBARDOIL-ESBLY-CONDE-COILLY-COULLOMME. Started at 7.00 am and ate a remarkably fine breakfast and feeling as strong as a horse. Hope toothache will keep off. Smythe lost his diary—I shall have to invent most of mine. Awful trouble over last night. Singer had words with the CRE over the orders. We crossed the Marne at 1.00 pm. I had to take my section and work up the river for three miles and destroy all boats. This was most unpleasant, as there were a large number of rowing boats all up the river and the owners hated seeing us shove a crowbar through them. One little motor boat was a beauty, it went to my heart to sink it. The French L of C troops took over the destruction of the bridges. One amusing incident occurred when we came to a floating laundry. I sent the serjeant in and he started biffing it with a crowbar—shrieks and yells—he came out hurriedly covered with wet white clothes followed by a terror stricken mob of washerwomen. Subsequently the laundry was sunk. Artists house—we caught a goose and got some very good pears. Having completed our work of destruction we rejoined the Company at COULLOMME where we bivouacked.
Friday, September 4th, 1914.

Remained here for the day. Beautiful scenery especially near the river. Weather very hot—very good nights rest. Impressed leather in the village—great success. Great excitement over aeroplane. Good news in a General Order, a Cavalry Division had a success at GUISE. This is the first day's rest we have had since we left HAVRE except for half a day at PONTOISE. We had to stand by all day ready to move but the order did not come until 10.30 pm. Pottinger went off out to the outpost line and came back with a wonderful luncheon basket, Serjt Payne had a tooth out but the result was not good. Food excellent, we procured some first rate tomatoes and were given a rabbit and a hen.

Saturday, September 5th, 1914.

Started a night march at 11.00 pm (4th) by breaking the pole of one of our tool carts. Staff arrangements for the march were very bad. Checks were long and frequent. At CRECY three Divisions crossed one piece of road at the same time! I was sent on with a billeting party but in error followed the 3rd Division and then the 4th Division instead of my own. I had great difficulty in getting along as men were lying asleep all over the road. The night was cool but thundering. We marched on through TOURNAN to a small place VILLE GENARD, altogether about 6 miles, but pace was slow and very trying for the troops. I went to the wrong billet but found Valdo and the Company bivouacked by the side of the dusty road. All in very bad tempers and two miles to go to the nearest water, bivouac in an arid plain. After an enormous breakfast we all went to sleep and were all the better for it. Am writing after an enormous lunch—bully beef—jam—bread—butter and tea. Life seems to consist of eating, sleeping and marching. My poor old horse was rather done-in this morning after the nights march but I hope we shall soon have some rest when she

will be able to pick up again, as she started green off grass and has never been given a chance.

Huge excitement, a sapper put up a hare and a most exciting chase ensued. Our forces were augmented by the RWK's but the hare was too wily. They wanted the Chatham beagles. Several men are sick, chiefly sore feet—and green apples. The country we have been going through consists of large corn fields, and for the most part gentle slopes and rises; hedges are few and far between, but there are numerous woods and forests and some beautiful Chateaux. Rows of poplar trees are the predominating landmark, and make easy objects to range on. The forests are lovely but the timber does not seem large, one we passed tonight was very like Cirencester Park. I find I can make most people understand my French and I am quite good at getting foodstuffs, etc. I think we must be champions at it in this Company as we always manage to have a full board and do ourselves well. Went and had tea with Monkey Morgan and the Gunners at a farm and came back to camp for dinner—feel very full—uncomfortably so. Have no idea of our future movements.

Sunday, September 6th, 1914.

Started off at 5.00 am—was not called and was late—Valdo and I both in disgrace—but had a good breakfast. Did a quiet little march to VILLENEUVE through the Forest. A lot of gun fire going on in the distance. Another Sunday. 3 weeks since we left Dublin—a fortnight since ST GHISLAIN. Today we made a step in the right direction. I wonder if our retreat is really over.

Autumn Circles

LIEUTENANT C J PECK, BSc, RE(V)

EXERCISE Autumn Circles was designed by the Commander Central Volunteer Headquarters Royal Engineers for the benefit of 111 Engineer Regiment (V) during their 1973 annual camp. The aim was to test the field troops of the Regiment in a variety of combat engineer tasks of the type likely to be encountered in their mobilization role. Over a period of three days and nights each of the field troops had to undertake seven typical tasks. These were grouped in two separate circuits, each to take three field troops simultaneously, under the control of a squadron headquarters. A tactical situation was arranged, involving small bands of enemy guerillas, and as an added incentive the whole exercise was run as an inter-troop competition, with a barrel of beer for the winners.

At 15.00 on Sunday 30 September the exercise started with the initial inspection and departure from camp of the first troop, while those queuing to follow were encouraging their radios into life. 3 Troop 130 Squadron had been re-numbered 6 Troop for the exercise and, with attached personnel, boasted the magnificent strength of twenty-five, which gave us about eighteen working numbers on site. We duly formed up at 15.40, all ready for war, to be inspected by Brigadier Aylwin-Foster and his team. Passed as fit, we moved out from Wyke Regis to the Wareham neighbourhood and to our first harbour area.

The Troop Commander was called to a briefing at Squadron HQ as we arrived, and by the time he returned we had found a suitable site, hidden ourselves and got a meal cooking. He then disappeared again to reconnoitre the site for an improvised raft we were to build the following morning. We had just finished supper when frantic calls came for Sunray to report for another briefing at 20.00. It was finally agreed that Sunray-minor would be acceptable in lieu. In the event, he and Sunray met on the way, and so received the welcome news together that we were to breach a minefield that night, starting at 22.00 and finishing not later than 03.00. Previous rumours had not lied to us after all.

Following the reconnoitre it was decided to send out two parties of six with the Troop Officer and Staff Sergeant, thereby leaving the rest of the Troop fresh to build the

raft in the morning. A previous attempt in the minefield had succeeded in setting out the right hand tape before disaster struck and "killed" the whole party, leaving mines and stores all in a mix. So problem number one was to sort out the mess, in pitch darkness. At the same time the first breaching party had to be organized to start as soon as possible. This being the first time in a minefield for most of us, progress was very slow at first, but gradually speeded up as the techniques were learnt. About four trip flares were met in the breach, two of which we set off by mistake and the others were set off by the umpire. Each party cleared two lanes, and then the mines were pulled. Finally all were able to stretch cramped limbs while putting up the fencing, lamps and white tape. The task was completed at 02.45, just ahead of deadline, giving us a whole hour's sleep before reveille.

The Troop Officer, to be different, decided to park his Landrover with its nose in a ditch. This revolutionary practice received no encouragement whatever as it had to be pulled out after breakfast. He also discovered how to gain extra sleep, by sleeping out under the stars. It was half an hour before anyone tripped over him.

After breakfast the Troop moved out to the rafting site, leaving the cooks to look after the camp. We arrived on site at 06.00 but then had to wait half an hour for the stores trucks to arrive from Squadron HQ. The minefield breachers were now able to catch up on their lost sleep while the rest of the Troop tackled the raft. This task was disturbed at 08.00 by a local inhabitant, who in remarkably plain language demanded to know who had given permission for the Army to roar into the car park in front of his house at 6 o'clock in the morning. Despite our assurances that the owner had, he departed muttering dark threats. A visit to our site by the Brigadier shortly afterwards enabled us to hand over that particular problem.

Our task meanwhile was to transport a Landrover and trailer, plus the whole Troop, about a mile down the River Stour just south of Wimborne Minster. The raft was constructed using two assault boats lashed together with Bailey chessexes, which also formed the deck. The first trip, with the Landrover and Troop aboard, set off soon after 09.00, leaving the Troop officer to bring the trailer later. This method, using two trips, meant that time was critical as the raft had to return, load up and be finally clear of the bank before 11.15. In fact it appeared again before 11.00, so we were able to do a swift turn around and beat the deadline. In warm sunshine this mode of transport certainly has a lot to offer. Could it be the answer to the present shortage of oil? But back to reality; having completed the task, we had to dismantle the raft and reload the stores on the trucks. Then while the rest of the Troop returned to a hot lunch in our harbour area, our gallant Troop Commander was left awaiting one of the Alouette helicopters to take him to his next briefing.

Following lunch, a general wash-and-brush-up were much needed by all, and with one solitary washing bowl scrounged from Squadron HQ most of us were able to freshen up.

Our afternoon siesta was very soon rudely broken by the arrival of our leader at 14.45 with the news that at 15.00 we were due to start stripping a Bailey bridge one hour's drive away. Retracing our steps we drove back about eight miles beyond the rafting site, finally reaching our bridge at the end of two miles of woodland track. Having hidden the vehicles we were ready to start work at 16.30. Under the masterful eye of our Staff Sergeant the working parties swung into action. In spite of our small numbers and their lack of rest, momentum was maintained throughout the task, and 60 ft of double-single Bailey soon looked much less of a problem. In fact the only real problem was the helicopter pilot, come to collect our Troop Commander for his next recce, who took off and stampeded the herd of cows on the far bank straight through the party constructing the skeleton nose. The task was finally completed to everyone's satisfaction at 20.00, in darkness. Some hot tea produced by the Stores NCO on the site was most welcome.

Meanwhile the cooks wagon had gone straight to our new harbour area and set up in a small quarry in what felt like a very damp wood. We rolled in at 21.15, all more than ready for the hot meal waiting. The Troop Commander had arrived earlier

from another briefing and recce, with a crate of beer which he had no difficulty in flogging. The raised spirits of everyone must have helped to attract the small band of enemy guerillas who attacked around 22.30 and made a lot of noise before being beaten off.

Tuesday morning started at the now usual time of 04.00, and after breakfast we moved out to our new work-site to build an aerial ropeway. This was to be more than 300 ft long and was required to transport a $\frac{1}{2}$ -ton trailer across a deep quarry. Evidence of previous occupation was provided by the presence of a Ferret scout car broken down. That was one problem at least we were glad to be without. The home bank was flat and was higher than the far bank. A track ran round the quarry but needless to say was firmly "out of bounds". Beyond the track on the far side however there was a bank about 20 ft high. By use of this bonus it seemed that no field machine was necessary on the far side. Our design therefore used one gyn on the home bank and just a plain anchorage on the far bank. Thus the stores which had to be humped down into the deep quarry and up the other gruelling side were quite manageable. The gyn was completed by 10.00 and then had to be carefully and correctly aligned with the main cable. We did not fancy seeing our machine fall over. At this point in the proceedings we received a fleeting visit from Lieut-General Sir Terence McMeekin, GOC South East District, who arrived in a helicopter. He did manage however to talk to most of the Troop. Following a short tea-break came the problem of tensioning the cable. We found ourselves unable to tension it sufficiently without the use of a Tirfor Jack or winch, and we had neither. We were therefore unable to send across the required trailer but compromised and sent across a spar, which at least partially satisfied the umpire.

Earlier in the day, unable to obtain any motor oil for one of our Landrovers from HQ 120 Squadron, we had made a very early journey to RHQ who apparently possessed the only drum of oil on the exercise at that moment. They were camped in the middle of Canforth Heath, just north of Poole. We found HQ 130 Squadron first and were redirected from there. Arriving as everyone seemed to be breakfasting, we were able to fill up with oil and take away some spare for future use. There also appeared to be a surplus of washing bowls, so we scrounged three more for the Troop. And what a most salubrious spot RHQ had chosen for their camp, high, windy and on the edge of what appeared to be the local dumping ground! Such was the penalty apparently for ensuring good radio communications. The net result of this trip was that the Troop were able to enjoy a thorough wash and clean-up over the lunch-break.

Our Warlords had now decided that a small disused railway bridge must be demolished. So after an early lunch a section of six men with "Mr Experience" (the Troop Staff Sergeant) departed for this new site to oblige. The bridge was basically a number of steel girders spanning an old railway line and had previously carried a mineral railway over it. Remarkably the old railway line had become "a deep fast flowing river", so the fixing of charges was not quite so easy as it might have been.

The rest of the Troop, having made a start before lunch on dismantling the ropeway, now continued in earnest. This task was completed by 16.00. Stopping only to fill up with water, we then drove to our new harbour area. This was in yet another wood, but in this case we were able to set up our camp in daylight and organize our defence really well. Supper was finished as it grew dark and in consequence lights were kept to a minimum. Our welcome sleep was disturbed all too soon by a rifle shot and a stand-to. It transpired that the Brigadier had walked in, well briefed as he thought with our password, and been challenged by the sentry. Greeted by the call "Uncle . . .", he eventually replied "Little Nell" and was promptly "shot". A case of non-recognition obviously. A further disturbance was caused an hour later by another band of guerillas. Intercepted by an alert sentry as they approached our camp, they dropped their thunderflashes and fled, amid a barrage of rifle fire from the four Troop members lucky enough to have blank-firing attachments, who were

making up for their inactivity of the night before. Most of us then managed a few hours undisturbed sleep.

Another unearthly reveille heralded Wednesday. However, warmed by a good breakfast we arrived on site at 06.30. Our new aim was to build 60 ft of double-single Bailey bridge over the River Piddle (or Trent) by 12.30. While the vehicles were being concealed and everyone freshened up, the NCOs prepared the site so that the whole Troop could then move straight into action. The home bank was flat, firm and about 2 ft higher than the far bank. For simplicity however a level launch was chosen. The landing rollers, only, required some packing. Warned to expect some action by enemy fighter-bombers, we were able to take appropriate avoiding action when one appeared. This was the only interruption in fact until the teabreak at 09.30. This was combined with a small rum ration on the site, which kept our high spirits high. Progress was steady and by this time the bridge was across the gap and on the landing rollers. As we worked with new vigour, the jacking down and decking went apace and the task was completed by 11.30. A triumph indeed, engineered by Mr Experience yet again. We proved our bridge in time-honoured fashion by driving a Landrover across it. With an hour still to spare, everyone celebrated with a real wash in the river. Three hardy souls even thought it worth a swim. An early lunch followed, during which the CO visited our site to record the results of our efforts on film.

Our final task was to set up a Brigade Water Point, which proved rather an anticlimax after the morning's activities. The site of this was another old quarry in which our source was a gravel pit full of water. The area provided firm ground, a good choice of sites and a good circuit. There was however a complete lack of cover which might have made it not quite so desirable. Siting of the storage tanks was no problem, thanks to a convenient bank alongside the track round the pit. A disused washing plant helped to provide convenient stand pipe positions below the bank.

Since the water had appeared to be very clear on the recce, no purification tanks were included in the design. Only storage tanks were provided, which could then gravity feed to the stand pipes. However, when a full tank of this water was inspected, the design had to be modified to include purification.

Following a miraculous recovery from his previous night's escapade, the Brigadier was unwise enough to visit us again. While talking to two rather alert officers, an unidentified aircraft approached and the blast of a whistle caused everyone to dive for cover. The Brigadier however did not react to this signal, probably deafened by it, and was once again the unwitting victim. Yet another boost to our morale!

Having by now managed to convince the umpire that we knew what we were doing and had completed the task sufficiently we were allowed to start stripping and clear up the site. At the same time we were able to check and clean up our G1098 stores and repack our vehicles. After tea and a general wash and brush-up by all, we were ready for the road back to Weymouth. We drove into Wyke Regis at 18.30, just before dark, in the happy knowledge that we were the first home. After his final inspection of the Troop the Brigadier made a few points before allowing us to disperse. Cleaning and handing in our weapons was the final duty before looking for food, drink and an almost real bed.

The feeling that we had not done too badly was confirmed the following day at the Brigadier's debrief. Although just pipped by 1 Troop 130 Squadron for the trophy, we too did well enough to earn a barrel of beer, and duly celebrated. All praise must go to CVHQ for organizing our three intensive days so well. Together with the weather, they contrived to make the whole exercise a most useful, memorable and enjoyable one. We were promised a gallop and certainly got one, but in fact by the finish we had learnt several ways of making it seem only a canter.

Ravelin

THIS oil painting of the REYC/RESA yacht *Ravelin* was bought by the Corps Committee to mark the prominent part that the REYC has played in the world of sailing and ocean racing. It was hung for the first time in the HQ Mess at Brompton at the REYC Dinner this year, since when it has been transferred to the Mess at Chatterden.

All who have seen the picture will agree that a black and white print does not do justice to its splendid colouring. Although critical yachtsmen may disapprove of the artist's licence in giving *Ravelin* a high cut foresail (in order to show off her lines and foredeck), they will surely appreciate the dramatic portrayal of a scene familiar to ocean racers, that is sail changing either shortly after dawn or just before sunset. Mr John Eighteen who painted the picture is a young marine artist who has painted many other well known yachts, among them Chay Blyth's *British Steel* (now re-christened *British Soldier* currently racing round the world with Army crews, many of whom are REYC members).

The REYC, founded in 1846, is by far the oldest of the Service yacht clubs, and is one of the oldest yacht clubs in Great Britain. It has a high reputation throughout the sailing fraternity and has set many of the standards of sailing proficiency now accepted by other national yachting associations.

The RESA was formed in 1963 to cater for the growing interest shown by all ranks of the Corps in sailing.



A Madras Sapper Returns

CAPTAIN JOHN IRWIN, C ENG, MIMECHE, FIPRODE, MBIM

THE blackout was total. I drove the unlit 1942 Plymouth sedan gingerly through the outskirts of blacked-out Bangalore after the long drive from Madurai and decided to hand the car over to a Madrassi driver. It was nearly twenty five years since I'd been in Bangalore. How strange it was to return during another war—the two weeks' war in December 1971—and to a Bangalore blacked out as I had never seen it in the forties. So black that we had to pick up a "pilot" to navigate us in the total darkness to the new Government owned Ashoka Hotel off Bellary Road, behind the Golf Club.

An unexpected business trip to visit an associated engineering company in Madras gave me the opportunity to spend a weekend in Bangalore. It was with a sense of anticipation that I arrived in the State capital of Mysore and the old Headquarters of the premier Sapper Corps of the old Indian Army, Queen Victoria's Own Madras Sappers and Miners. I had been unable to make previous arrangements to visit the Madras Engineer Group, as the old Corps is now called, but a telephone call next morning to the Group Adjutant resulted in an invitation from the Commandant to visit the Headquarters on the following day. It was a day which brought memories flooding back down the years from the morning at Wrotham Pre-OCTU when I found my name on the "pink list" as a "volunteer" to complete my training at an Engineer Officers' Training School in India.

I don't know why I should have been surprised to recognize Ulsoor Tank, the large man-made lake near Meenace Lines. After all, we had spent many happy days on watermanship training on this sheet of water and on building Bailey rafts and pontoon bridges on the Bridge Hard at Ulsoor Rock.

About half a mile round the perimeter road and we were at the entrance to Meenace Lines. Security was understandably strict as India was at war. But, after a telephone call to the Adjutant's office, the guards waved me through with a smile. A few minutes more and I was in front of the "Monkey House" as the well proportioned red brick headquarters building used to be and still is affectionately known. The Quarter Guard, with its usual precision, stood beneath the pediment a-top the square pillars along the Commandant's balcony. As I climbed the stairs, I recalled the first time I had made my way to the Commandant's office.

Colonel M M Jukes MC, the Corps Commandant, and Major E D W B Hirst RE, Chief Instructor of the QVO Madras Engineer Officers' Training School, were pronouncing judgement on each cadets performance at the end of the first part of the course. My trepidation was understandable. The reputation of the Madras EOTS for a high cadet failure rate reached our Pink List contingent during the six weeks' acclimatization course at the OTS Mhow in Indore, Central India, when we first arrived from the UK. The stories of how gun-cotton primers were tossed into cadets' quarters in the middle of the night, just to see how they reacted, was not altogether reassuring!

21 Class never experienced that particular trial, but we had our own rigours to endure. Such as the morning we were awakened at 3 am, had breakfast in the mess and within the hour set off with a bridging train for a site some fifty miles away. The gap was wide, the virgin site difficult and the Indian sun unrelenting on cadets who perspired freely as they lifted the panels and transoms into position. The Chief Instructor was also unrelenting in that he intended to withhold water and rations until the gap was bridged—"as an object lesson on how young officers should not treat their troops". Fourteen hours' hard labour without food and water through the heat of a Mysore day had its effect on the cadets of 21 Class. Touch down had still not been made and the rate of progress had slowed down to the point where clearly the Chief Instructor had made his and he signalled for the ration truck to proceed on to the site. The noticeable improvement in morale resulted in a rapid completion of the bridge and after the customary ceremonial drive across, dismant-



Plate 1. The Quarter Guard at the Monkey House, the elegant HQ building of the Madras Sappers.

ling began. A full twenty-four hours after setting off we drove back into the EOTS to a welcome meal and an expected well-earned rest. But the rest had to wait! Immediately the meal was over we were told to report to the examination rooms at 4.30 am for a four hour "Block Test" on bridge design and associated subjects. Major Hirst believed that the measure of what one had learnt was what one remembered in the heat of battle. He attempted to simulate these conditions by holding examinations after periods of sustained physical exertion combined with mental frustration. Unpleasant though this was, we conceded somewhat grudgingly to ourselves afterwards, that there had been merit in this particular form of torture.

Colonel A N Kaliandasani, Commandant of the Madras Engineering Group and Centre, greeted me warmly as I entered his office. He had taken over command of the Madras Sappers in August 1971, having previously been GSO I (SD) in Command Headquarters at Lucknow. Earlier he had commanded 9 Field Company during 1963-65 and 11 Engineer Regiment during 1967-69. By a strange coincidence he was a cadet at the Indian Military Academy in the Alamein Company of the then Major C B Sridharan who was his predecessor as Commandant of the Madras Engineer Group. Colonel Kaliandasani told me something of the role the Madras Engineer Group was playing in the Corps of Engineers and it was evident that the units of the Group were making a contribution no less significant than that which we had become accustomed to expect during the Second World War. I learned later that of the many honours and awards given to Sappers during the Emergency, Madras Sappers had been awarded nearly half. They also had to their credit the only MVC (Maha Vir Chakra) awarded to the Corps of Engineers.

On the wall behind the Commandant's desk were crossed Sapper Colours—the familiar blue and red stripes—with no trace of the white stripe which formerly identified the Indian Engineers. Around the office were photographs of previous Commandants and Colonel Kaliandasani pointed out Colonel B E Whitman, the last British Commandant of the Madras Sappers. Many changes had taken place in the Group since he had taken office in October 1947. The Madras Engineer Officers' Training School, in which engineer cadet training had been centralized following the

closing of the Bengal and Bombay Schools, was itself closed down in December 1947. Since its inception in January 1940 with Major J R S W Elkington RE as Chief Instructor, the Madras EOTS passed through a total of thirty-nine classes of British and Indian Cadets, the average proportion being seven British to one Indian; the maximum strength was reached in 1946 when 210 cadets were under training.

I can recall the tremendous esprit de corps of the EOTS during the period of 19, 20 and 21 Classes in 1944. Major Hirst—who left for another appointment in November that year—maintained a high standard in both military and engineering training. Woe betide any cadet who felt he could scrape his way through the course with a minimum of work. The intensive nature of the wartime courses meant frequent working into the small hours of the morning on a wide variety of projects from triangulation surveys to composite bridge designs and from water supply schemes to construction schemes for roads and camps.

An important part of the course was the four weeks spent in Shimoga jungle at a camp situated on high ground overlooking the fast flowing Tunga River. Colonel J F D Steedman inaugurated this camp for jungle training shortly after he became Commandant of the Madras Group in 1942. Cadets carried out major field engineering projects at Shimoga; 19 and 20 Classes built a 600-ft suspension bridge across the Tunga River while 21 and 22 Classes built two Class 24 Trestle Bent bridges across a dry gap, cutting live timber and using elephants in lieu of mechanical handling equipment. The construction of a flying ferry by 21 Class across the wide and fast River Tunga proved more congenial than the final simulated jungle battle with live ammunition in which the instinct of survival compelled us to observe the subtle techniques of jungle warfare instilled into us during our period at Shimoga.

Back in the Group Adjutant's office, I met Group Subadar-Major and Hon Captain R Valaniandan and we recalled the names of several Madras Officers and VCO's (Viceroy Commissioned Officers) who were mutually known to us in the forties. Major C R Sadasivan, the Group Adjutant broke off his duties to take some photographs of the writer with the Commandant and the Group Subadar-Major.

Plate 2. Mess Secretary and attached Sikh officer outside the Madras Sappers' Headquarters Mess. The Commandant's car is still the only one allowed to drive under the portico.



A Madras Sapper Returns 2

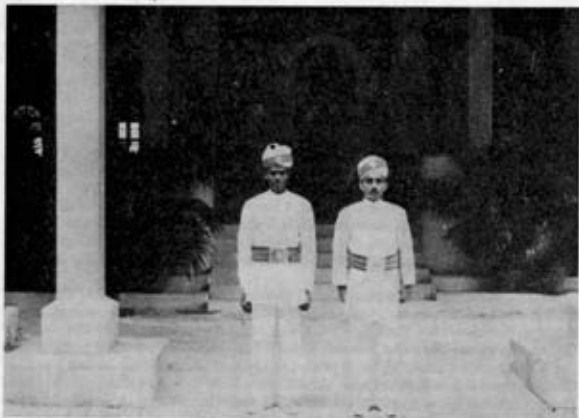


Plate 3. The Portico of the Madras Sappers' Headquarters Mess, with Mess Bearers in Sapper livery.

He also arranged for a scout car to take me around Measee Lines. Distant memories play tricks on one but I recognized quite a few of the buildings. Of one there was no doubt—that of the administrative office block of the old EOTS which was now masquerading as HQ of Depot Battalion. The Madras Sappers who were marching by must have wondered who the European was who stood with a camera on the perimeter bank of the old EOTS parade ground. Little could they know when they gave me the customary friendly thambi smile that the parade ground was as familiar to me as it was to them.

The standard of cadet turn out was expected to be and indeed was immaculate. I remembered during the first few weeks there how Major J Fone RE, second-in-command of the EOTS chided one cadet for having boots lacking the appropriate shine by saying "Good God man! How do you expect to command a platoon if you can't get round your bearer!" I remembered too the occasion when the Chief Instructor awarded me ten rounds of the perimeter at the double with my rifle at the trail for arriving fifteen seconds late for parade. Truly it was an uncomfortable experience, especially as my late arrival was due to internal disorders. Major Hirst himself was dressed impeccably at all times and in this respect was rather different from his successor, Major J E Ralph MC, RE, an Australian who had just returned from Burma where he had been OC 422 Field Company IE. He brought an air of jungle freshness to the EOTS assuring us that "There are no snakes in the Jungle!" and when you were there, "Your OCTU grading counts for nothing!"

As for most cadets, Pass-out Day for those of 21 Class was a memorable occasion. The traditional Pass-out Parade was held in the morning with the Commandant of the QVO Madras Sappers and Miners Group, RIE taking the salute. But the real highlight of the day was to come that evening. Following the toasts and speeches at the Pass-out dinner, the EOTS instructors, including the Chief Instructor, carried out tasks set by the cadets, who at last had a chance to get recompense for the months of sustained gruelling physical and mental endurance to which they had been subjected. The forty guests were equally amused to see instructors crossing a "tank" in a bath tub and the CI climbing into the rafters to track down hidden bamboo.

A Madras Sapper Returns 3

Ten minutes before midnight, led by the Commandant and the Chief Instructor, the cadets of 21 Class danced wildly round a mammoth bonfire singing the CRE. As the rousing Corps song ended, it was with relief and mounting excitement that we ripped the blue Cadet tabs from our shoulder straps and tossed them with gay abandon into the flames. As midnight was striking, 21 Class lined up in the mess for the final Commissioning Ceremony. The Commandant, Colonel Jehkes, fixed a pip on one shoulder and Major Ralph, the CI did likewise on the other. Then as each newly commissioned RE officer's name was called out he went through the ante-room door and ran the gauntlet through the gauge—a 90 ft long obstacle course of furniture, lined by Sapper Officers armed with rolled newspapers who did their best to impede the progress of each cadet. Among those commissioned from 21 Class were Officer Cadets—Atkinson, Binnie, Chivers, Davidson, Gardner-Hill, Irwin, Mitchell, Nambiar, Orange-Broomhead (JD), Pymont, Snall, Todd, Trimmer, Turner and Wollan. O C Nambiar, an outstanding Indian Cadet, was commissioned in the Indian Engineers and later served with the writer in 21(QVOM) Engineer Battalion RIE.

Tearing myself away from nostalgia, I climbed back into the scout car and set off for the Headquarters Mess. Lieut-Colonel Despande, the Deputy Commandant and the Mess Secretary (Assistant Adjutant), welcomed me back to the Madras Engineer Group HQ Mess—the same Mess to which I had graduated so many years before. For I had been fortunate in being posted to my first choice of the Indian Engineer Groups, the Madras Sappers and Miners. How little time had changed the Mess! There were the same trophies on the walls and—interesting to note—the same portrait of Queen Victoria who had given the Madras Corps the privilege of being called Queen Victoria's Own.

Colonel Despande, with a fine sense of humour, told me of a number of incidents in the recent history of the Madras Group and I had the feeling that the traditions established over 150 years were still an accepted part of the Madras Sappers. Through the billiard room Colonel Despande led me to the strong room to show me the HQ



Plate 4. RE Officer Cadets Snall, Pymont and Irwin of 21 Class outside the EOTS Mess, 1944. The old Mess building is now the Pensioners' Club of the Madras Sappers.

A Madras Sapper Returns 4

collection of Group Silver. I recalled seeing several of the fine pieces on Guest Nights but many of them I had not seen before. There was a vast collection of cups, a large number of which had been awarded for competitions now made obsolete by the passage of time. One could understand the decision to melt a number down and refashion them to meet the needs of changed circumstances and a different age. The fine new swimming pool recently constructed alongside the Mess was evidence of progress in another direction.

Bangalore itself—or rather the old civil and military cantonment—like the Headquarters Mess, has retained much of its character. South Parade, the shopping centre for British Forces in the war years has become Mahatma Gandhi Road, but Higginbothams (the booksellers), and Barton, Son and Company (the jewellers), are still there. Across the maidan is the old St Andrews Church of Scotland, now merged in the new Church of South India. On the other side of Brigade Road, horses are no longer part of the scene at the old Gymkhana Club, once the lively Cadet Club of the Bangalore Infantry OTS. It was an odd feeling to stand at the bar of the old BUS (British United Services) Club, looking very much as it did a quarter of a century ago although no longer a military club. The crossed spears and lances and the prints of bygone battles still decorating the ante-room walls pay tribute to its historic origins.

However, from an industrial standpoint, I learned that much had changed in Bangalore. Jalahalli, the old home of Institute Camp where the Madras Sapper Training Wing of three battalions was first established under the command of Lieut-Colonel W M S Lillie RE, had become the home of a major electronics industry. Bharat Electronics Ltd, employing 13,000, manufacture field artillery radars, military communication equipment and gun control equipment for Indian tanks. The nationalized Bharat Earthmovers Ltd produce 250 HP crawler tractors, 50-ton dump trucks, graders, scrapers and somewhat incongruously railway carriages. Its parent company, Hindustan Aeronautics Ltd, construct civil and military aircraft (including the Gnat fighter), and Hindustan Machine Tools Ltd, manufacture seventy types of machine tools. Both have their headquarters in Bangalore, which has now become a major centre of the Indian engineering industry.

As I made my way alongside Cubbon Park and through the familiar sandy-coloured centre of the old military cantonment *en route* for Bangalore airport, memories of the past were so vivid that I found it easy to understand what prompted J W Dunne to write his "Experiment with Time". Strangely enough, the blackout which had enveloped the airport when I got there, had no part in the past.

Promises! Promises!! Promises!!!

THE Editor suffers from three recurring nightmares:

a. The first concerns a Journal of eight pages, six of these are advertisements, one the editorial and one a virtually blank contents page!

b. The second is of a Journal full of blank Memoir pages as no one could be found to write, or help to write, a suitable tribute!!

c. The third is of the Editor writing letters to himself to fill up available space!!! Matthew 12 verses 31–32 gives the generally accepted definition of "the unpardonable sin". There are other sins! It is suggested that the seventh of the so-called deadly sins is the one most commonly practised by Members. (Articles on certain of the other six would probably make entertaining reading!)

We are always short of suitable material for the *RE Journal*. There are promises of articles, memoirs and correspondence but a real shortage of actual "copy". It is difficult to believe that nothing is going on in the world of military engineering and that our Members have nothing of importance to say.

Whether you have promised a contribution or not, please put your thoughts and ideas on paper and allow the Editor to sleep at night! Memoirs are probably the biggest single nightmare, the Editor appeals to all Members to submit tributes on those who were known to them, these will be used and will form the basis of the published memoir.

Memoir

MAJOR-GENERAL B E C DIXON CB CBE MC

Born 7 September 1896, died 9 October 1973, aged 77

R V C writes:

I first met Dicker, as he was generally known, at Chatham. He was then an Assistant Instructor in the Mechanical School and I was a member of No 12 Supplementary Course. This would have been towards the end of 1924 and we were together for about a year. Our interests as regards sports were much the same—Dicker was a keen yachtsman and he sailed in the RE Yacht *Fulmar* whenever opportunity offered. He and his wife Biddy were most hospitable and gave many cheerful parties in their Gillingham flat.

We did not meet again until 1931 when I was posted to Gibraltar. In those days Sappers were very thin on the ground with only one CRE, an Assistant and two Lieutenants plus No 1 Fortress Coy. Dicker was one of the Lieutenants while I was ACRE. We were certainly not overworked and there was ample time to take part in most sports. Dicker applied his energy to sailing the RE Yacht *Rosalind*. He was a first class helmsman and *Rosalind* was raced hard and successfully. He was also Hon Secretary Gibraltar Yacht Club; during his tenure the Club House was rebuilt and the Club was granted the title of Royal.

We next met in mid 1940. I was then CRE 4th Indian Division serving in the Western Desert and Dicker, recently promoted Licut-Colonel joined the Staff of the E-in-C MELF. Towards the end of that year Dicker was appointed CE Palestine and Transjordan and promoted Colonel. At that time Palestine was regarded as rather a back water, but shortly afterwards, due to the presence of the Vichy French in Syria and the Lebanon, it became almost as important as Egypt. The result was that the Engineer Staff was greatly expanded. The CE went up to Brigadier and I was posted from 4th Indian Division as Deputy CE—a Colonel's appointment. It was I think in 1943 that Dicker was transferred to BTE Cairo as CE and I took over as CE P and TJ.

During his stay in Palestine there was little time for social activity, however in spite of the shortage of food and drink occasional parties in his lodging, Pension Rosemary, were very bright affairs. After a short stay in Cairo he went to Italy then, early in 1944, he returned to Cairo to take up the appointment of E-in-C MELF. So for the fourth time we served together for the best part of another year.

As we had served both over and under each other we had ample opportunity to assess each others character and ability. He was exceptionally able, with a great capacity for hard work, and an equal capacity for enjoying himself. In other words he worked hard and played hard.

E E R writes:

As CE Palestine Dicker had a job with frontiers which were almost impossible to define. The unrest within, of both Haganah and the Palestinian Arabs, Christian and Moslem, made the presence of law keepers unenviable as always. Herod had found it so, as had the Turks!

At this time we were much exercised by the possibility of the Germans over-running Turkey and descending on the exiguous reserves of the Middle East. Under Ninth Army, in the Lebanon and Syria, a vast network of roads and defensive lines were constructed, largely in Palestine, and the execution fell on Dicker. Many of them figure in the news of today, like so many defences, "facing all ways". He was ever the epitome of good temper and cheerful initiative and made himself beloved by all.

Correspondence

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Hudson Enterprises
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Chiang Mai
Thailand

MOUNT KINABALU '74 EXPEDITION—LOW'S GULLEY

Sir,—I do not wish to detract in any way from the merits of the expedition to explore Low's Gulley on Mount Kinabalu, being planned by Sergeant-Major Lane (October *Supplement*). However, I wonder why this mountain is often claimed to be "the highest in South East Asia" without any qualifications.

Most definitions of South East Asia must include the political borders of Burma and Indonesia. The former country has Hkakabo Razi 19,308 ft, and Gamlang Razi 19,142 ft, whilst the latter has Sukarno Peak (formerly Mt Carstensz) 16,503 ft, Trikora Pk (Wilhelmina Mt) 15,584 ft and Mandala Pk (Juliana Mt) 15,400 ft. It is only after excluding the Burmese mountains (on the grounds that they are part of the Asian massif?) and the Indonesian peaks (on the grounds that New Guinea is part of Australasia?) that one can safely reckon Mt Kinabalu, at 13,455 ft, to be "the highest mountain in South East Asia."—Yours sincerely, E R B Hudson.

Major P D Matterson MC, RE (Retd)
Ingelstan
Falinge
Rochdale

CHARTERED ENGINEER

Sir,—Some years ago the Institution discussed the standing of its members in the above connection without result. The matter now becomes relevant again in the light of EEC requirements.

Membership of the Institution of Royal Engineers may properly be, in itself, insufficient but there is an aspect of general Corps interest. Are we to understand that a (former) King's or Queen's Commission to practise the Art of Engineering is NOT enough? "Major B Shovel RE Retd" implies some success in responsible practise of informed judgement which cannot be based entirely on knowledge unless engineering be regarded as a science, which it is NOT.—Yours sincerely, P D Matterson.

Lieut-Colonel E D Jefferiss-Mathews OBE FRIBA ARICS FIARB
91c Grosvenor Road
London SW1V 3LD

LMR

Sir,—Reading with interest, and some nostalgia, Colonel J G A J O'Ferrall's article on the demise of the LMR in your December 1973 issue, I thought it might be of some interest to record two reminiscences of a non-transportation sapper Territorial who, by an apparent error in posting on mobilization in September 1939, found himself at Longmoor.

I was surprised when my mobilization posting arrived, it said "report to Longmoor". I had expected to go to Chatham. Duly doing what I was ordered to do I presented myself at Longmoor. The Duty Officer, when he saw my papers, was equally surprised and said that they should have been for Chatham, however he said, "Well as you are here you may as well stay." As a trained Territorial (Infantry and Sappers) since being commissioned in 1926 it was not for me to argue the point, so I stayed!

A few months later I was off to France as Adjutant of a Docks Group. Other than being a yachtsman I knew nothing about docks, but it seemed that at that time the big intake of Reservist officers, experts in their various lines of "Transportation", had no experience of ordinary army administration, rules, regulations and procedures. It seemed they welcomed somebody who did!

Apart from getting the Docks Group together I found myself instructed to take two Courts of Inquiry. As an enthusiastic amateur railway man I found these both interesting and amusing (because neither was serious nor caused other than a minor injury in one case).

The first involved a "runaway" loco! It seemed that after a day's work it was the order to draw the fire from the loco's boiler when "parked" for the night on a siding (I can remember those loco sidings to this day—they were, I think, somewhere in the middle of the LMR complex). It then seemed that the "drill" next morning was for a number of ORs to go around the siding and fire the boilers. Unfortunately the driver of the previous night had left the regulator open, so, inevitably, when steam was raised the loco took off on its own, charged down the siding and came to an undignified end on its side at the end of the spur. Of course there was a great deal of exaggerated excitement (after all we were fighting a war!). I have forgotten who was "put on charge". I think it was the unfortunate driver of the previous evening.

The second Court of Inquiry on which I found myself arose from an incident where the LMR track crossed the public road (real Longmoor men will know where) without orthodox level crossing gates (or anyway not in those days). The "drill" was for the fireman to get out of the loco's cab, stop the traffic and signal his driver to go ahead. The fireman did this but unfortunately when he signalled his driver forward he still stood on the track, with the inevitable result that he got knocked over (fortunately, as I said above, with only minor damage—luckily). Again I am afraid I cannot remember on whom the "charge" ultimately landed.

So these are just two recollections of my few months at Longmoor.—Yours faithfully,
E D Jefferiss-Mathews.

Book Reviews

RELIABILITY ENGINEERING

DAVID J SMITH BSc

(Published by Sir Isaac Pitman & Sons Ltd, Kingsway, London WC. Price £2.50)

Reliability engineering is fast becoming an essential part of the expertise of engineers, particularly those engaged in the design of complex systems. It is, in fact, the rapidly increasing complexity of systems in all branches of engineering that is responsible for the awakening of interest in reliability. However, since the subject has only recently started to appear in engineering courses, the vast majority of engineers have received little or no formal training in reliability engineering. This book is therefore addressed to all electrical, electronic and mechanical engineers requiring a knowledge of reliability. It should be of particular interest to newly qualified engineers and to graduates. The military engineer will find the book valuable in improving his background knowledge. The book provides an adequate introduction to the techniques of achieving and measuring reliability, and at the same time emphasizes some of the more common pitfalls awaiting the unsuspecting designer.

It is the purpose of the book not to examine the causes of failure in specific components and systems, but to cover the necessary theory and principles required for a study of the reliability (and unreliability) of any system. A large number of formulae are developed which will assist in the prediction of system reliability, but, more important, they are presented in such a way as to enable the reader to develop more to suit his own requirements.

MJEA

AN ASSEMBLAGE OF INDIAN ARMY SOLDIERS AND UNIFORMS

From the original paintings by the late C P CHATER, written and edited by MICHAEL GLOVER.

(Published by Perpetua Press Ltd, Price £4.75, 41 Plates, 15 Illustrations, 130 pps)

"This book is called an 'assemblage' of Indian Army soldiers and uniforms and it sets out to be no more than that." This is the first sentence of the Introduction to the book which is designed quite simply to set the paintings of Chater Paul Chater in their historical perspective.

The artist, the author and editor and Antony Brett-James, who writes the foreword, have a real feeling for the pre-1947 Indian Army.

Chater's achievement is quite remarkable, he painted with great skill, beauty and accuracy, he had no formal training in art and probably never painted from a live model, he based his pictures on photographs and dress regulations, he did not serve in the Indian Army nor did he live in India after the age of twenty. Glover, who was an officer in the Sherwood Foresters, served alongside Indian troops in Italy; as a professional military historian he has been able to stand back from the subject and has ensured that a degree of balance has been retained in the selection of plates and the text. Most "Ko Hai's", your reviewer included, are unable to do this, we all loved the "jawans" with whom we served whether they be Rajputs, Mahrattas, Punjabi Mussulmans, Sikhs, Juts, Ranghars, Pathans, Dogras, Baluchis, Garwalis, Madrassis or Gurkhas.

This book will interest everyone and please most.

Each of the forty-one plates is "faced" by a one page potted history and changing role of the "Regiment" concerned with comments on the uniforms. These are the meat of the book. Particular attention has been paid to the faces in order to ensure that they were correct for the particular regiment. Indeed some of the studies or preliminary drawings of heads are reproduced in the text. It is unrealistic to expect a history of the Indian Army in a book of this nature but Glover has set the scene brilliantly; "The Armies of the Honourable Company", "Soldiers of the Queen Empress" quickly and concisely give the reader the background he needs to fully appreciate the Plates. An essay on "Uniforms and Soldiers", based on the premise that the way a soldier is dressed is determined by the inter-action of four factors—Economy, Impressiveness, Recognizability and Utility, takes the reader through the development of headress in some detail and then examines the factors individually. I particularly liked the story of the young lieutenant who, in 1849, raised the 2nd Regiment of Punjab Cavalry. He won the Victoria Cross but lost his arm. He became a General but is better known for his design of a belt with a shoulder brace. In 1904 the regiment he had raised fifty-five years earlier was officially retitled Sam Browne's Cavalry.

A useful Glossary and Index add the finishing touch to a fascinating book.

EFP

GUIDE TO THE BATTLEFIELDS OF BRITAIN AND IRELAND

LIEUT-COLONEL HOWARD GREEN MC FSA

(Published by Constable and Company Ltd, London. 309 pages. Price £2.25)

In the Introduction the author explains that this book is an endeavour to escort the reader across the battlefields on which his ancestors may have fought and made history. It is intended for two types of people. Firstly, it is for the motoring historian to keep in his car; on seeing a signpost pointing to a battlefield he may turn aside, refer to the relevant chapter and there read an outline account of the battle and what he may expect to find on site. The other reader is the more serious historian whose appetite may be whetted by what he reads in the book.

Full marks to the publishers, the book is small enough, 18 cm × 12 cm, to fit into a coat pocket or the glove compartment of a car. Full marks to whoever decided to use the insides of both the front and back covers to show an outline map of Britain and Ireland with all the battlefields referred to in the book located, numbered and referenced. The Contents Page lists the battlefields and gives the date of the battle. Regardless of the nature of the start point (driving along a road, seeing crossed swords on a map, another book, conversation at a wayside inn or a gazetteer), within seconds one can turn up the account of the battle related to what can be seen now. It is this ability to relate what is there now which endears the book to me. To illustrate the point let us take the "First Battle of St Albans—1455"; a diagram explains the disposition of the forces and the direction of attack superimposed on a map giving the current street names and landmarks, the background to the battle and a description of the encounter follow, "On the left a breach was made near Sopwell Lane, while the centre attack advanced up both sides of Victoria Street and the present London Road, reaching the market place which the present Town Hall overlooks". It is the author's ability to communicate to the reader standing on the spot which makes this book live.

The shortest account occupies some three pages and the longest nine, the fifty-two battlefields and actions stretch from AD 125, Hadrian's Wall, to 1746, Culloden, the book is well illustrated and indexed but above all, it is very readable.

The book achieves its aim. Although the serious historian may complain that it is a little shallow in places the author does say that he only intends to whet appetites—I believe he succeeds.

EFP

THERE ARE NO FRONTIERS

EDWARD FURSDON

(Published by Five Feathers Productions, Elm Tree Cottage, Ridlands Lane, Oxted, Surrey, price 95p)

Grains of Sand, Colonel F W E Fursdon's book of verse (written when serving with Headquarters Land Forces Gulf between 1970 and 1972), proved successful and he has been encouraged to produce a successor, a by-product of his current Germany tour.

As an individual who doesn't much care for poetry I was loath to review *There are no Frontiers*, but I must admit that I found myself strangely moved and involved when I first looked through it. I have now read it some six or eight times and it delights me. The poet has the ability to record in verse the thoughts and feelings which most of us would be quite incapable of arranging coherently. The very apt title comes from two of the twenty-eight poems which, to quote General Tuzo in the foreword, do "full justice to the variety, interest and occasional sadness of the military calling".

There are no Frontiers is also obtainable from all major NAAFI shops throughout BAOR.

EEP

Technical Notes

CIVIL ENGINEERING AND PUBLIC WORKS REVIEW—SEPTEMBER 1973

Progress in Fibre Reinforced Concrete. The first International Symposium on Fibre Reinforced Concrete took place in Ottawa, Canada on 11 October 1973. Research and development in this field has been carried out for approximately ten years and now represents the most significant advancement in the use of concrete since the innovation of prestressed concrete. The article in this issue presents a detailed review of the progress in this field and illustrates areas of further research as well as practical applications which have already been put to use. The advantages of greater tensile strength and ductility, reduced crack width, improved resistance to impact, thermal shock and fire resistance are now well known. The recent fatal fire accidents emphasize the inadequacy of resin based composites in resisting fire and the use of glass and steel fibres are likely to find greater application in the design of thin sectioned roof and wall panels. The problems of handling, mixing, quality control, compaction and fabrication are however practical construction techniques which require further development. The author of the article, RN Swamy of the University of Sheffield, concludes that glass and steel fibres appear to have more applications in structural work than the nylon/polypolypropylene fibres. A significant part of the article is a very extensive bibliography of the major research work and other papers published to date.

Concrete Production. The Special Report of this issue is concerned with the aspects of concrete production from mixing to placing in the civil engineering industry. There are articles on site mixing, ready mixed concrete, transporting concrete, thermal controls for large pours, underwater concreting and the use of admixtures in concrete production. Twenty years ago the majority of concrete was manufactured on site by the contractor. Today, the ready mixed concrete industry produces 26 million cubic metres annually, which is approximately half of the total amount used on civil engineering sites. The first two articles indicate that the balance between site mixed and ready mixed concrete lies in the development of a practical means of rapid analysis of fresh concrete. It is of interest to note that any future swing brought about by this development could go to either side. The article on transporting concrete on site concludes that there seem to be no immediate revolutionary changes in the field of concrete transportation. Whilst the specification and performances of machines are being improved, the costs are also increasing. The contractor has to appreciate that the method employed is only expensive in relation to the cost of not getting the job done. Perhaps the most interesting articles are those on thermal controls for large concrete pours and underwater concreting. The former describes a single pour of 1,200 cubic metres in 14 hours which by conventional methods would have taken 6 weeks and 25 separate pours. The latter gives a good account of the practical rules to follow when concreting underwater.

JTS

THE MILITARY ENGINEER MAY-JUNE 1973

Articles of interest in the magazine are:

"Proving Ground for Public Transport." This article gives information on the test programmes which are in progress. These are the Linear Induction Motor Research Vehicle (LIMRV), New York R-42 Subway Cars and the Static-of-the-Art Cars (SOAC). The LIMRV runs on a standard gauge track and has a centre aluminium reaction rail 23 in high. It has achieved a top speed of about 191 mph. The TACRV will run in a channel 12 ft wide with 5 ft high sides. The air exhaust from 3 jet engines will lift the vehicle and a linear induction motor will be used for thrust. This vehicle is planned to run at speeds up to 300 mph. Details are also given of the facilities and layout of the test centre.

"Preservation of the Inactive Fleet." Cathodic protection has been used to protect the hulls of the "mothballed" fleet for about fifteen years. This method of protection, against corrosion, has extended the periods between dry-docking from five to fifteen years. Details on cathode protection are given. Encapsulation is being used to protect the topside decks. Air supported shelters are used to enclose most of the deck, and information is given on some of the problems encountered.

"Ammonia Nitrate/Fuel Oil Explosives" (ANFO). This article starts by mentioning some of the disasters which occurred with ANFO before its potential as an explosive was realized. Details of five tests using ANFO charges ranging from 20 to 100 tons are given. These tests were carried out to compare its effects with that of TNT. The results show that the two explosives have similar effects with ANFO being safer, simpler and quicker to use. Also the cost of ANFO is less than a tenth of the cost of TNT. The article, "Recopening of Drum Inlet," is a report on the blasting of a channel through littoral deposits using ANFO. Twenty-six charges each weighing 1 ton were used.

"Self Erecting Aircraft Structure." This report is of a project to provide shelters, for F4 and F111 aircraft, capable of rapid erection. A one-fifth scale model of an arch truss has been tested. This model truss stands 8 ft high at its centre and is 25 ft long when laid flat on the ground. It gives an 18 in. length of shelter. The truss is made up flat on the ground and self erects, using a hydraulic pump to activate fifteen pistons. The model has demonstrated the feasibility of the system and development is continuing.

"Military Engineer Field Notes" contain two interesting articles. In one, a pier of a concrete bridge in Vietnam had been undermined by scour and had tilted 14 in. The pier was jacked up and a new foundation poured under the existing one. The other article is on the use of sand filled nylon bags to form groins on a beach in North Carolina.

RGO

ORDNANCE SURVEY

Annual Report 1972-73. HMSO. Price 90p. It is a pity that this Annual Report is for the year ending 31 March 1973 and the highly emotional controversy (often based on non-facts!), consequent upon the announcement in the House of Commons by the Secretary of State for the Environment on the "general obligation to supply maps at 1:1250 and 1:2500", is not included. We must wait until the next report! The first map to be produced by digital techniques, as part of the standard mapping programme, is described as an event of the greatest importance in the mapping of Great Britain. The early problems encountered and overcome are explained and there can be no doubt that the technical viability of the system has been proved. An extract from the first sheet is included in the Report. Annual Reports are not normally considered to be popular reading but I recommend this one unreservedly to all who use maps. A copy is held in the RE Library, Chatham.

EEP

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THESE nine books present a series of records of works, prepared by those who had taken part in them and whilst the memory of them was still clear. As such they are of tremendous interest and value and very readable.

The titles are self explanatory, except for "European War" and "Miscellaneous", when one remembers that they were written in the early '20s.

Although the concentration is on Europe other theatres are not completely neglected and the term "European War" would now be "World War I". "Miscellaneous", the last book of the series deals with Organisations, Engineer Intelligence, Camouflage and indeed everything not covered in the other eight, including the Training Schools set up in the B.E.F.

The books are not a "set" in the sense that Corps History is a set and can only be sold as individual books. However a 10% reduction on listed prices will be made for orders of 4 or more books, excluding The Signal Service (France).

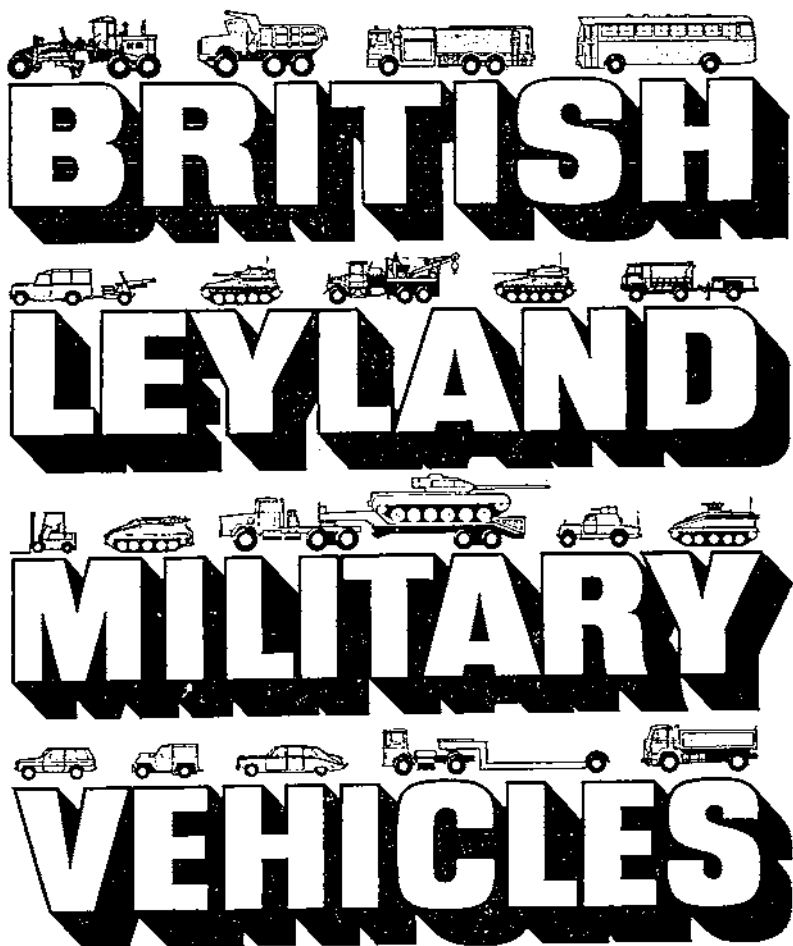
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A HISTORY OF RE CRICKET 1862-1924

THERE can be little doubt that the deeds of our forerunners are well worthy of study and this book recalls happy memories and should enlist the interest of present day cricketers if not all Sappers.

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The book can be obtained from the Secretary, Institution of Royal Engineers. Price 50p.



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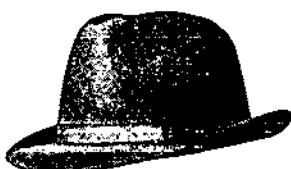
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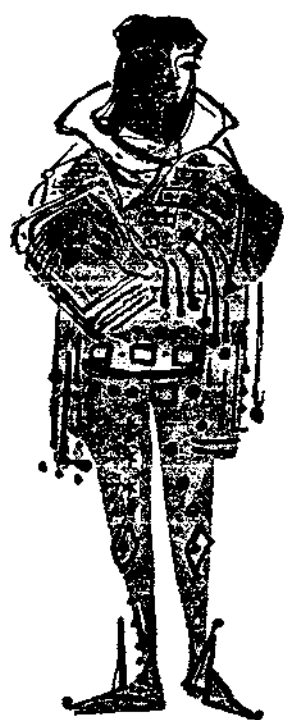
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