



# THE ROYAL ENGINEERS JOURNAL

Vol LXXIII

DECEMBER 1959

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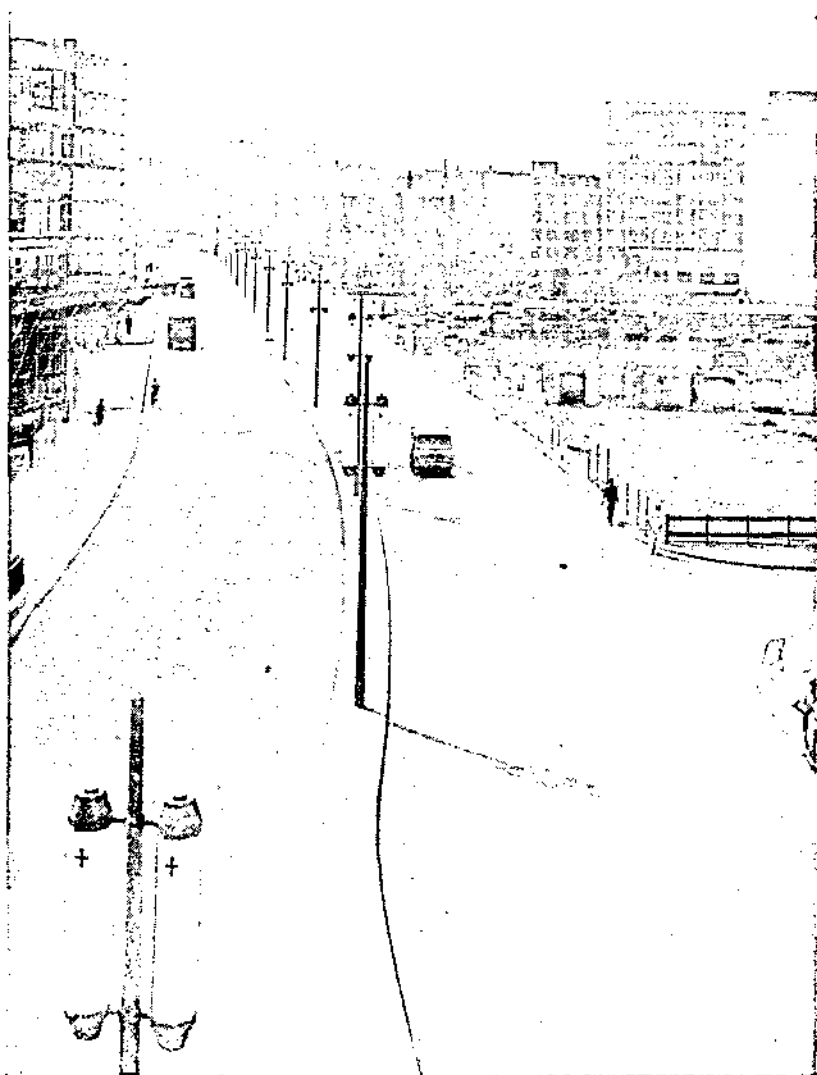
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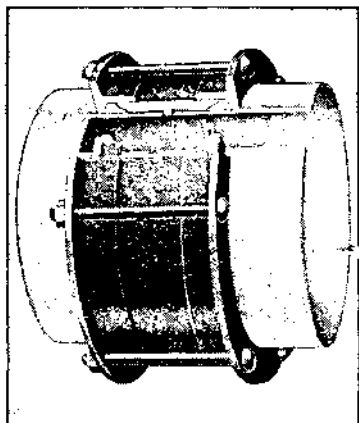
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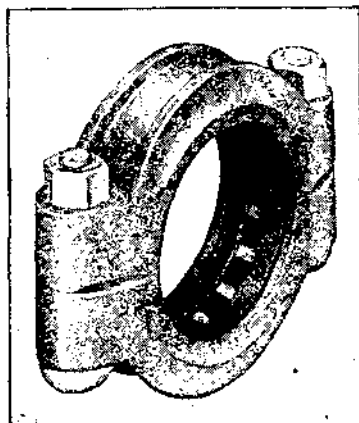
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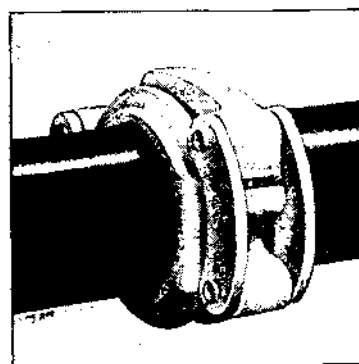
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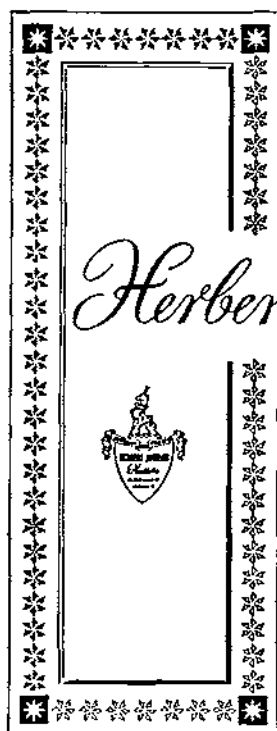
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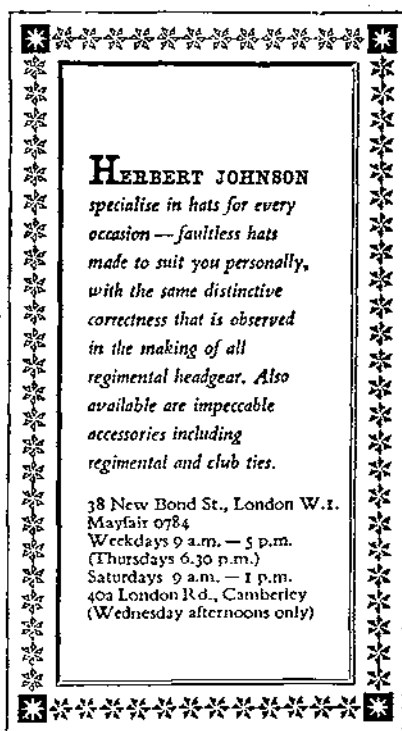


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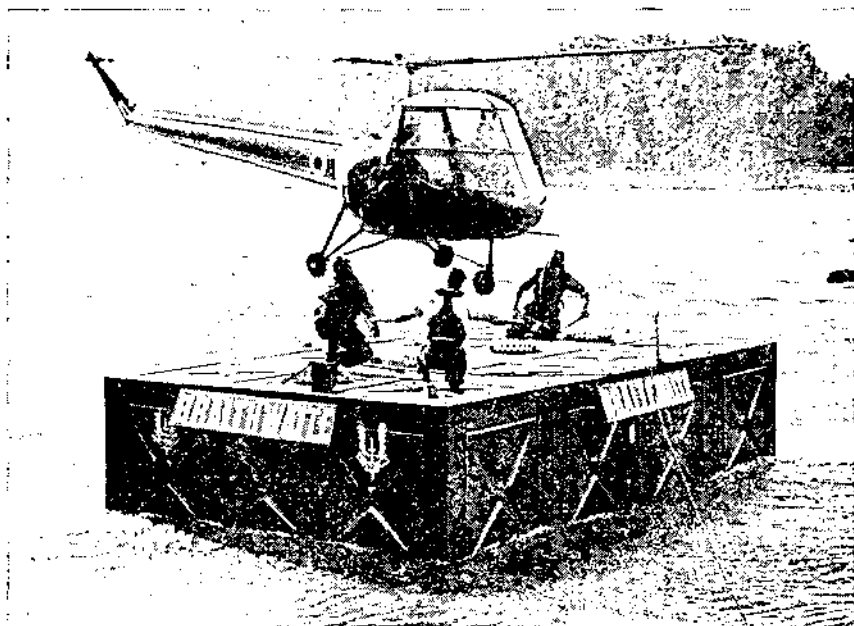
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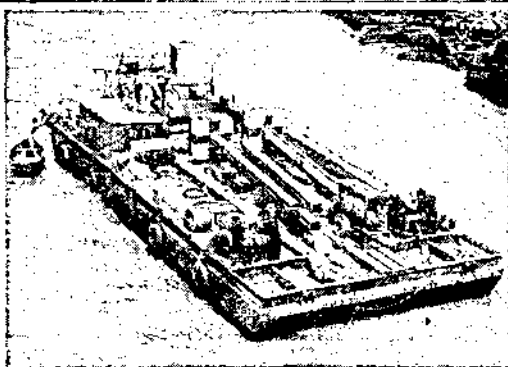
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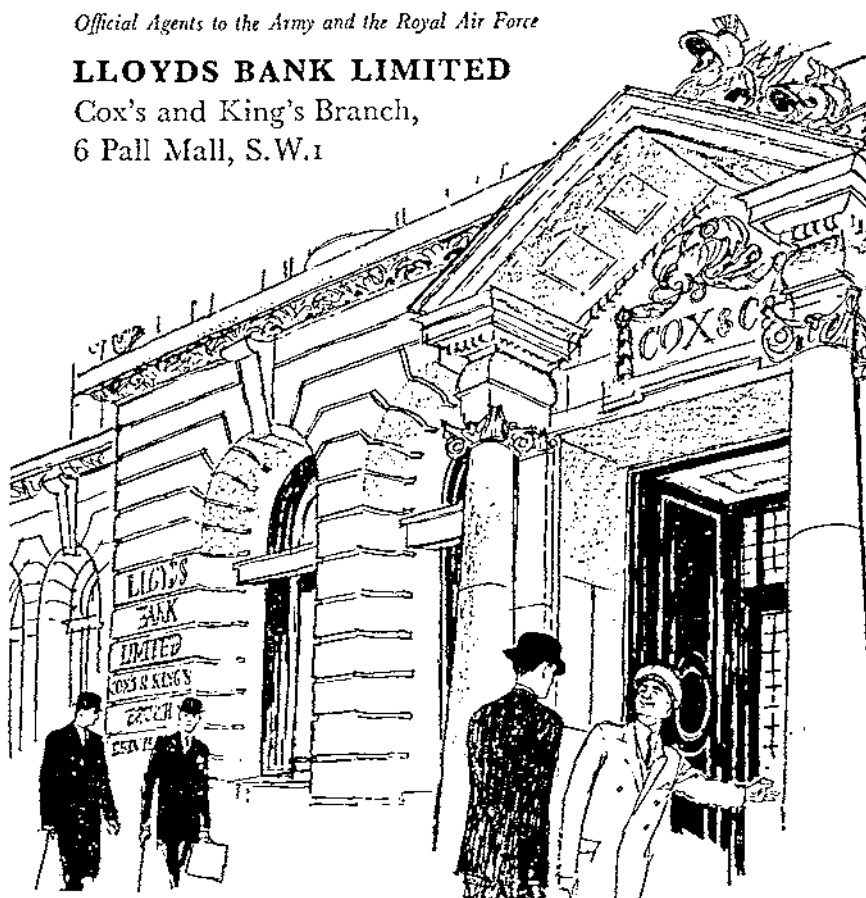
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## Corps Notes

IT HAS been suggested that notes should appear from time to time in the *Royal Engineers Journal* on matters of general Corps and professional interest to keep everybody, particularly retired officers, informed of what is happening. This is perhaps particularly necessary in a Corps with interests as wide and diversified as our own.

The main problem facing the Corps at present is the run down to its final size and structure in the All Regular Army. The disbandment of units continues, recent casualties being 37 Field Engineer Regiment and 89 Field Survey Squadron. We have received from 37 Field Engineer Regiment for the RE Museum, Chatham, a really splendid and comprehensive collection of EOKA exhibits which is a testimony of the Regiment's service in Cyprus. 89 Field Squadron was disbanded last July at a ceremony held at the Field Headquarters, Survey of Kenya, the Squadron having completed from air and ground surveys the production of the 1/100,000 maps of Kenya. The ceremony was attended by Sir Evelyn Baring, Governor of Kenya, and Major-General N. P. H. Tapp, DSO, General-Officer-Commanding East Africa Command.

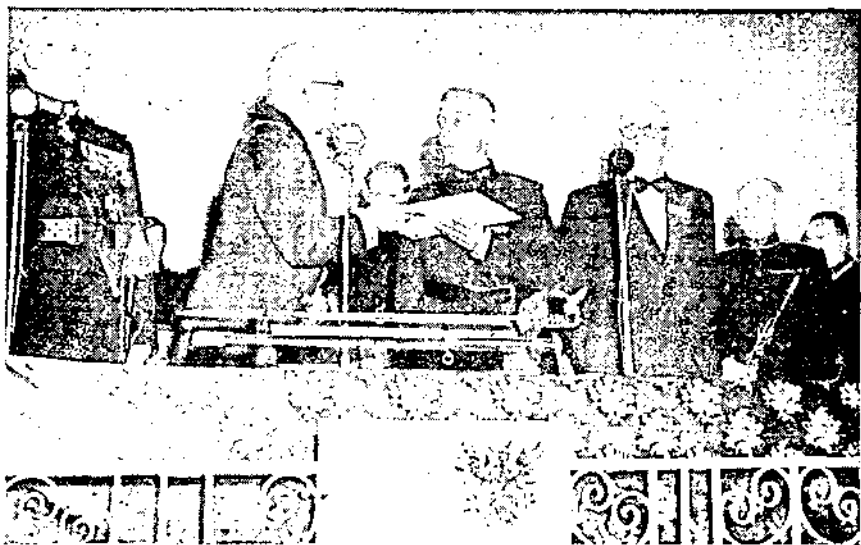
Meanwhile the civilianization of the Works Service is gathering pace, being already complete in Western Command and well on the way in the Middle East. The need for a Royal Engineer Works Organization will, however, still exist in operational areas.

The fifth Engineer Tripartite Conference has recently been held in the United States. These conferences have taken place every year since 1954; their location alternates and they are attended by military engineers of Great Britain, Canada and the United States. Current and future problems and concepts concerning engineer tactics, techniques and equipments are discussed and much benefit is obtained from the exchange of ideas and information. The British Delegation was headed by the Engineer-in-Chief, who was accompanied by members from the War Office, the School of Military Engineering and the Ministry of Supply.

# Presentation of the Freedom of Seaford to 210 (Sussex) Fd Sqn RE (TA)

By W.J.A.

On Saturday, 23 May 1959, at the Queen's Hall, Seaford, before a large invited audience the Freedom of Seaford was conferred upon the Squadron by the Chairman of the Urban Council, Mr F. N. B. Johnson. He handed the Illuminated Scroll of Freedom, together with a handsome ceremonial sword bearing the town's coat of arms, to the Officer Commanding the Squadron, Major H. Lucas. From the Squadron the Council was presented with a silver shield—a gift from all ranks "to mark their appreciation of the honour conferred upon them".



*By courtesy of the Sussex Express & County Herald*

**Photo 1.**—The Ceremony: Right to left: The Chief Royal Engineer, Councillor F. N. B. Johnson and Major H. Lucas, RE. On the table is the ceremonial sword.

Mr Johnson, in tracing the history of the Squadron, said the 1st (Sussex) Royal Engineer Volunteers were formed in 1890 and saw service in the South African War. During the 1914 war the unit became 577 Army Troops Company and served in France. In the dark days of 1940, 210 Field Company did much to hold up the German advance through France by destroying twenty-five major bridges. The unit later served in the Middle East and in North-West Europe.

The Guard of Honour was inspected by the Chief Royal Engineer, General Sir Kenneth N. Crawford, KCB, MC, who said: "This presentation from the people of Seaford is a clear indication that here, at any rate, the close association between the Territorial Army and the citizens has been cemented."



*By courtesy of the Sussex Express & County Herald*

**Photo 2.**—The Inspection by Councillor F. N. B. Johnson, who is accompanied by Major H. Lucas, RE, and Colonel F. H. Foster, DSO, OBE, TD (Hon. Col. of Regt.).

The climax to the Ceremony was the Parade on Sunday morning following a service at the Parish Church. The parade was inspected by Mr F. N. B. Johnson and the Honorary Colonel of the Regiment, Colonel F. H. Foster, DSO, OBE, TD, with the Commanding Officer, 119 Field Engineer Regiment (TA), Lieut-Colonel G. H. Pannett, TD.

Headed by their Regimental Band, the Squadron then exercised its privilege of marching through the town with bayonets fixed and drums beating.

# 101 (London) Field Engineer Regiment (T.A.)

By COLONEL A. R. MAIS, OBE, ERD, TD, DL

*(On 6 February 1960 this historic Engineer unit celebrates its centenary.)*

THE 1st Middlesex Volunteer Engineers—founders of the present Regiment—were raised in January 1860 and their descendants are thus the senior Territorial Royal Engineer Regiment. The first volunteer to be enrolled was Colonel McLeod of McLeod on 6 February 1860.

Original headquarters were at White-Heads Grove and at Kensington Museum. The Volunteer Unit moved to new headquarters in College Street, Fulham Road, Chelsea, in December 1865. Volunteers served in the Egyptian War of 1882. Two sections of the Middlesex Volunteers RE, made up from volunteers, served in the South African War. In December 1910 the unit moved to Duke of York's Headquarters to become the Divisional Engineers to the 2nd London Division, formed under the Territorial Act of 1908—the unit was composed of the Headquarters RE, the 3rd and 4th London Field Coys and a Telegraph Coy which in 1913 was renamed 2nd London Divisional Signal Coy RE.

On the outbreak of war in 1914 a third field company was raised and named 2/3rd London Field Coy RE, the unit then becoming the Divisional Engineers to the 47th Division, as the original 2nd London Division was then renamed. In the early part of 1915 a second line was raised—consisting of Headquarters RE, 2/4th, 3/3rd and 1/6th London Field Coy RE which formed Divisional Engineers to the 60th Division—later a third line was raised but only formed reserve units and was stationed at Esher, partly for reinforcement purposes.

The 3rd London Field Coy RE proceeded overseas in January 1915 and served with 28th Div BEF, being one of the first Territorial Army units to proceed overseas. The 2/3rd Field Coy left 47th Div in January 1915 to join the 60th Div. The 4th London Field Coy RE and Divisional Signal Coy RE proceeded to France with the 47th London Division in March 1915 and were rejoined by the 3rd Field Coy RE and 2/3rd Field Coy RE between April and June 1915.

On 1 February 1917 the companies were renumbered as follows:—

3rd Field Coy	517th Field Coy RE
4th Field Coy	518th Field Coy RE
2/3rd Field Coy	520th Field Coy RE
Signal Coy	47th Divisional Signal Coy RE

The 47th Divisional Engineers served throughout the war in France and took part in the Battles of Festubert, Loos, Vimy Ridge, Somme, Messines, Ypres, Cambrai, Ancre and advanced into Artois. The units of the 60th Division served overseas in Palestine and the Middle East. Total number of rank and files to lose their lives in the war was one hundred and seventy-seven.

In June 1919 the units returned to Cadres and were brought home and disembodied, the men being placed into "Z" Reserve.

On the reconstitution of the TA in 1920, only two London Divisions were formed—47th and 56th—originally it was decided to form a RE Battalion, but after one camp in 1921, this was abandoned and a normal Divisional Engineers, the 47th, was formed to include Headquarters RE and two field companies, later a third Coy RE was raised, the companies being renamed 220th Field Coy RE, 221st Field Coy RE and 222nd Field Coy RE. The Signals Coy had left on the formation of the Royal Corps of Signals.

In 1935 the two London Divisions, 56th (1st London) Division and 47th (2nd London) Division, were broken up. Selected units were taken to form the London Infantry Division and the unit then became the Divisional Engineers of this new division.

Following the Munich crisis the London Division formed a second line and the two divisions then became known as the 1st London Infantry Division and the 2nd London Infantry Division, and these two divisions were rapidly brought up to full war strength. 220th, 221st, 222nd Field Coys and the 223rd Field Park Coy provided the key personnel for the following duplicate units, 501st, 502nd, 503rd Field Coys and 504th Field Park Coy. These latter companies became the Divisional Engineers of the 2nd London Infantry Division.

Immediately after mobilization 221st and 222nd Field Coys left the 1st London Division to join regular formations with the BEF in France, the former joined 1 Corps and the latter 2 Corps, and later came under command of 3rd Division. Shortly afterwards they were joined by 223rd Field Park Coy who became part of X Force in France. Upon 221st and 222nd Field Coys proceeding to France with the BEF, 501st Coy was transferred from the 2nd London Division to the 1st London Division. Early in 1940 the designation of the 1st and 2nd London Divisions was changed to the following—56th (London) and 47th (London) Infantry Divisions. Following the evacuation from Dunkirk 221st Field Coy returned to the 56th Division and 222nd Field Coy to the 47th Division.

In 1942, 56th Division proceeded overseas and saw service in Persia, Irak, North Africa, Sicily and Italy and were at the landings at Salerno, where they suffered heavy casualties. The 47th (London) Division did not serve overseas as a formation but 502nd Field Coy joined the 78th Light Assault Division and 222nd Field Coy became a Squadron of the 79th Armoured Division.

In May 1947 the Regiment was reformed under its new name and the 101st Field Engineer Regiment became the Divisional Engineer Regiment of the 56th (London) Armoured Division. It reformed at its old station at the Duke of York's Headquarters, Chelsea, and was composed of 220th, 221st, 222nd Field Squadrons and the 223rd Field Park Squadron, together with RHQ. In 1954 the title of the Regiment was amended to include "London" and is now known as 101st (London) Field Engineer Regiment. In 1957 the role of the division was changed from an Armoured Division to an Infantry Division and considerable reorganization took place but the Regiment remained as the Engineer Regiment to the division in its new role.

## Lord Kitchener's Coach

By MAJOR A. N. STACEY, MBE, RE

THE rolling stock of the Shoburness Military Tramway has, for many years, included a vehicle known as "Lord Kitchener's coach". It is an eight-wheeled non-bogie saloon which has the appearance of being constructed about the 80's and the bodywork, with overhanging eaves which bring it slightly out of gauge for general running over British Railways, suggests that it was intended, or adapted, for service in a tropical climate. The initials "TVR" (? Taff Vale Railway or something or other Valley Railway) on the luggage rack brackets, however, give cause for thought.

The coach has a plate showing that it was built by the Metropolitan Carriage and Wagon Co for the *S and B* Railway. It has also another plate inscribed "This coach did service on the Suakin-Berber Railway. It is reputed to have been the saloon used by Lord Kitchener". When and why the latter was affixed is not on record. Study of many books about K of K and military railways in the Sudan has not produced any positive evidence for the association alleged or, indeed, that Lord Kitchener had anything to do with the Suakin-Berber Railway.

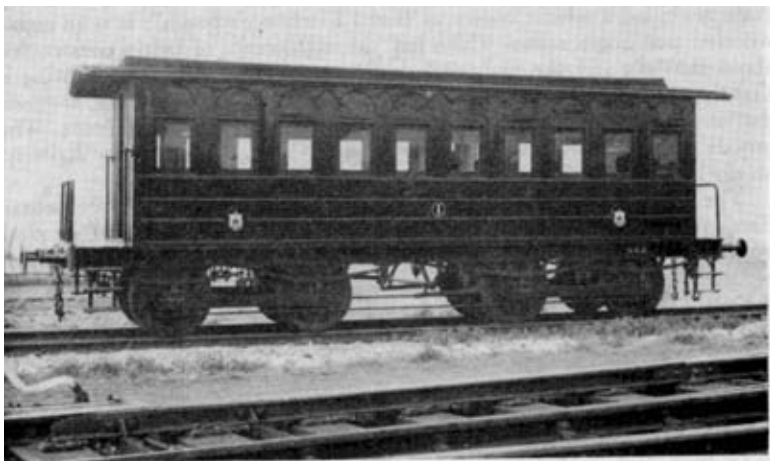
That 200-mile standard-gauge line was projected in 1884 as part of the general effort to relieve Gordon. Considerable quantities of permanent way and rolling stock (including six saloons) were ordered to the tune of £2 million, mostly second-hand ex-various railway companies in UK and of various unmatchable types, e.g. square fishbolts for round holes. Some reached Suakin and was used, some was never unloaded at that place, other items were diverted to Egypt and the rest never left England.

The full tale of this still-born scheme and its political and financial repercussions is another story which contains something of topical interest in regard to the relative responsibilities of RE and civilian works services, also the need for a comprehensive military railway organization.

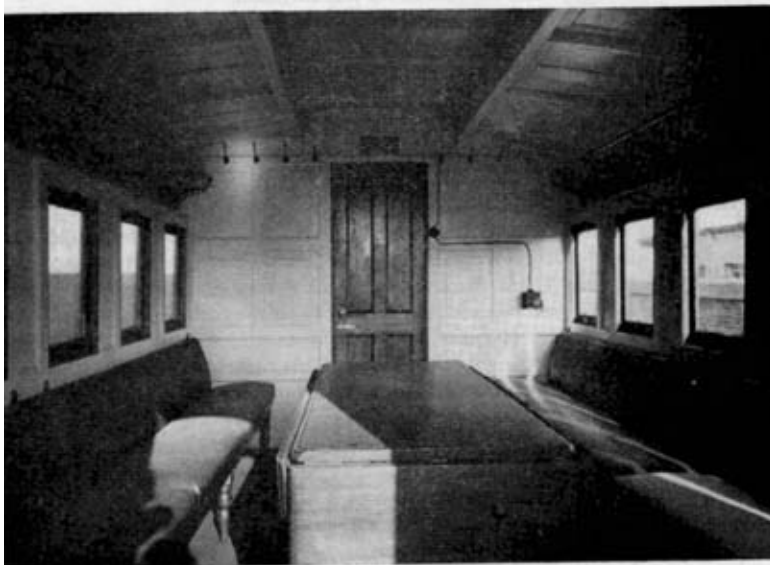
Work actually started in March 1885 and was then, following the fall of Khartoum, regarded as contributing to the campaign to punish the Mahdi. Construction was stopped, on Wolseley's orders, in May when only 19 miles had been laid, as a result of the withdrawal of the Suakin Field Force. The line was then abandoned to the desert and to the Arabs who found the metals very useful for conversion to weapons and other purposes. It is doubtful whether any trains ran over the track except contractors' locos and wagons and an armoured vehicle improvised to protect the workmen.

The S & B Railway is quite different from the existing Atbara-Port Sudan branch (3 ft. 6 in. gauge) of the Sudan Government Railways. This was opened in 1905 to Suakin, the Sallom-Suakin portion being taken up some time after the Sallom-Port Sudan section was laid in.

In the early part of 1885 Major Kitchener was DAAG in Egypt and he returned to England in July. Whilst he may have visited Suakin during the construction period there is no mention of it and it is doubtful whether the saloon would have reached Suakin, let alone been allotted for use by one who was not then a very senior officer. He might, of course, have accompanied the local commander, General Sir Gerald Graham, on a trip over the embryo railway.



**Photo 1.**—Kitchener's Coach.



**Photo 2.**—Interior of Kitchener's Coach showing inscribed plate above door.

## Lord Kitchener's Coach 1,2



The first direct reference to Kitchener at Suakin is when he was appointed Governor of the Red Sea Littoral in August 1886, by which time the S & B was history and history that many people wished to forget in view of the furore in the House about something like £1 million "nugatory" expenditure.

Wolseley is reported as asking whether the unused stuff at Suakin should be returned to UK and it is known that some items were taken over by the Egyptian Railway Board. Common belief is that much did return home and found its way to Shoebury and, later, to Longmoor. On the other hand it is recorded that materials still in War Office hands were hidden away at Woolwich and in time, quietly disposed of, perhaps by transfer to Shoebury.

Lord Kitchener's coach may have been in any of these lots but there is a note that 500 tons (presumably shipping weight) of rolling stock *en route* to Suakin was diverted to Egypt and consigned to the O i/c Railways at Wadi Halfa. What use it would have been on the 3 ft. 6 in. desert line is a moot point but this may have been an attempt to demonstrate that, after all, the money had not been wasted.

If the saloon was in this batch it may well have been retained for operation on the Egyptian (standard-gauge) lines and allotted for use by Colonel Kitchener when he became AG in 1888 or Sirdar in 1892, but not on the S & B. In this event the question remains as to why and when it was returned to England.

Shoebury show the vehicle as arriving from Woolwich in 1898. Had it been running on the Arsenal lines or was Woolwich (? Crossness Pier) used as a convenient place for disembarkation? It might have been part of the gear parked at Woolwich out of the public eye as already described.

Is the tradition firmly based or is it something of a nice legend? Any information or suggestions leading to more definite clues would be welcomed. In the meantime Lord Kitchener's coach will continue to be treated as a valued Sapper museum piece under the care and custody of RE (Transportation).

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An account of the ill-fated Suakin-Berber Railway project is given in Chapter 3 of *The Royal Engineers in Egypt and the Sudan* by Lieut-Colonel E. W. C. Sandes. The railway was to be a rail link from the Red Sea to the Sudan. It started from Quarantine Island in Suakin harbour and early in 1885 sidings were prepared and a line laid across the causeway to the mainland. By 30 April of that year the line had reached Otao, the limit of the protection of the outer defences of Suakin. In May, however, the Government decided to abandon the project of continuing the line to Berber and the Suakin Garrison was greatly reduced. Most of the material and rolling stock shipped out for the Berber Railway project was sent back to England; nevertheless the cost of the 18½ miles of railway from Suakin to Otao had amounted to £865,000.

Lord Kitchener was Governor-General of the Red Sea Littoral from 1886-1888 and it is possible that he may have used the coach described in this article to journey to and from his headquarters at Suakin to the limit of his territory at Otao. The journey would have been faster and more comfortable than by horse. There were no staff cars in those days.

Nothing now remains of the Suakin-Otao Railway. The present line runs from Port Sudan to Berber.—EDITOR.

# The Employment of Regular Sapper Officers in Movements

By LIEUT-COLONEL D. E. THACKERAY, OBE, RE

AFTER, no doubt, savouring the cruelty caused by inflicting my brutish and unskilled regimental approach on to the impending demise of the Works Services, the career planners hastily decided to improve the shining hour by posting me ("selecting" is the euphemistic phraseology, I think) to an appointment in Movements. This time I really felt that they had put me out in the backyard with the brass monkeys! Who was Movements? What was Movements? If it came to that, why was Movements? In the words of a well-known character in *South Pacific* "Who can explain it, who can tell you why"? As usual, no one I knew!

Since, to miscoin a phrase, investigation is the thief of time, and an increasing number of regular officers may now find themselves destined to acquire the mistique, a few words about this little-publicized branch of the Staff, seen as usual from the bottom upwards, may be of interest.

Movements staff at varying levels of command are found from officers of all arms, but Movement Control officers, who carry out Movements duties on the ground, are nearly all Sappers. The intention is to put an increasing number of regular officers into these appointments. Is it ghastly? Is it unbearable? These are generally the big queries. The answer is that, providing the sap is flowing fast enough to allow what Sir Winston Churchill called the flower of transport to bloom rapidly, it is great fun, and your job will be to keep the sap bursting forth as quickly as possible.

Much of Movements is routine; but only in so far as that the kind of work is the same. No two days pass without variations of the theme being necessary and from time to time radical changes must be planned, and rapidly put to the touch, if this initial aspect of all military life is to function smoothly and efficiently. Most of Movements work is unknown and the majority of it is taken for granted. The work is, however, entirely factual and if anything goes awry its importance is at once seen and felt in all sorts of odd places, including possibly one's own posterior.

Movements Staff Officers are hybrids and require to be reasonably hardy annuals. On the one hand they are members of the formation or higher HQ to which they are posted, and on the other belong to the staff of the Director of Movements in the War Office. In addition, they wear a third hat (to use a well-known NATO expression) as at Command level they may also command the small Movements units which do the work on the ground. It is, therefore, important for the right hand not only to know what the left is doing but for it to show clearly, and express frequently, what its intentions are. If this is not done a measure of discord may result and recriminations develop.

The Movement Control Officer working on the ground must be all things to all men, and at the same time get the job done quietly and efficiently. If he can tactfully be a junior air line executive, a railway official, a recce party for LST hards and an organizer of 3,000 cadets to and from camp in the course of, say, a week, then he will do very well. Generally it is not open to him to not do very well or someone will be put out! At all costs he must

literally keep the wheels turning whether they belong to aeroplanes, railway trains, lorries or what we term, with the usual British flair for understatement, awkward loads. Given energy, tact and common sense these things can be achieved, but they require a full measure of these qualities to be expended to achieve the necessary results. Further, officers are required to work alone on most of the day-to-day tasks, and the standard they set is their own. They owe it to themselves to keep it high.

Perhaps the most interesting aspect of present-day Movements work is the air side. Here Movements are now responsible not only for routine air trooping, largely handled directly from the War Office, but also for all air-transported moves of units on a tactical basis including those of the Strategic Reserve. With the recent emphasis on the use of the UK based Strategic Reserve this facet has assumed considerable importance and provides an unusual and stimulating addition to more routine activities. Intimate liaison with the Royal Air Force is the keynote of success and both Movements Staff and executive officers have the opportunity to learn and implement joint procedures to a much greater extent than any other agency involved. The operational nature of the majority of the work emphasizes the need for speed, and consequent accurate clear thinking and decision. It is thus of admirable value in training officers and other ranks at all levels, and is particularly satisfying in that the responsibilities involved are often far reaching and urgent. For recreation there is the opportunity of appearing on television newsreels and of the odd day in the Mediterranean if one is lucky.

Much of routine Movements work involves liaison with such non-military bodies as British Railways, Charter Airline Operators and Shipping Agencies. All these provide an opportunity of keeping in touch with activities beyond the purely military field and are useful in showing how the other half lives. Many helpful contacts can be made for later life, and at the very least an overall picture of certain civilian activities can be built up.

Form filling is not so bad as it at first sight appears. Many of the forms are similar to those used by civilian agencies for movements and shipment of goods and these can provide useful points of interest.

In all these activities both the staff and executive officers in Movements are in constant touch with almost every Arm and Service of the Army, often the Royal Air Force as well, and even from time to time the Royal Navy. If the approach is enthusiastic and willing much can be learned in a short time, not only of units' peculiarities and equipment, but of their role and tasks as well. Like so many jobs that look superficially odd or dull the game is the thing—and you can play it in Movements as hard as you like. The keen player has every chance of finding himself playing in the big league with commensurate remuneration. If you feel you have the air, or sea, in your blood, you will probably get the opportunity to test their qualities more frequently than you think.

At present there is a tendency to post regular majors only to Movements (apart from Staff appointments). The need, in my opinion, is to try and recruit a number of relatively junior captains for short tours as soon as possible. These officers can then return in the more senior grades, with basic knowledge in their possession, when required. Much of the work, certainly in the UK, may involve considerable travel by land, sea or air and a younger mind will appreciate the novelty and fun of this possibly rather more than those with half a life's travelling already behind them.



**Photo 1.**—A corner of the Strategic Air Movement Transit Camp at Ogbourne St George through which most units pass.

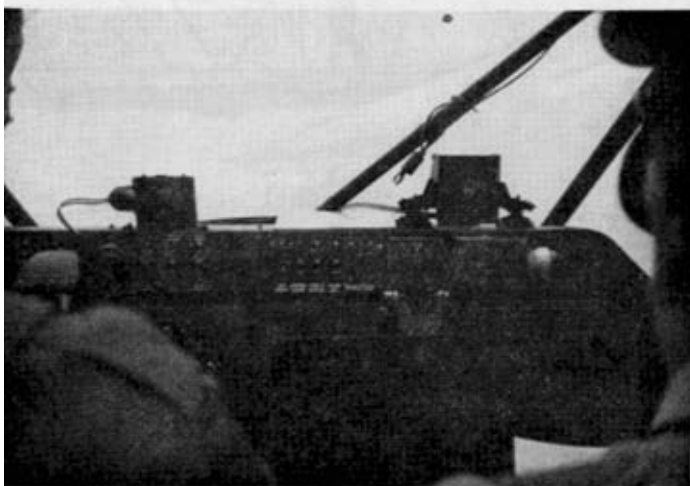


**Photo 2.**—In the shadow of the "Whispering Giants" at Lynham.

## Strategic Air Movement 1,2



**Photo 3.**—The tail end of an orderly emplanement.

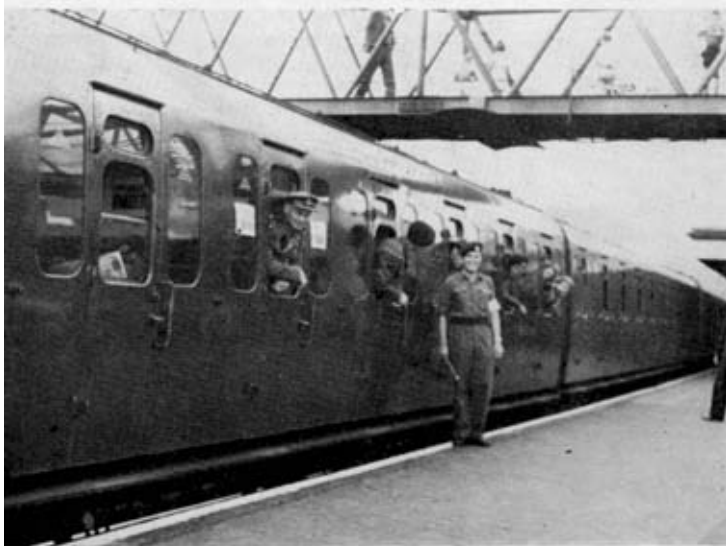


**Photo 4.**—Keeping in touch by Auster aircraft.

## Strategic Air Movement 3,4



**Photo 5.**—Supervising an entrainment ("Oh, Mr Porter, what shall I do?")



**Photo 6.**—All aboard! (Movements will ensure that he doesn't get off at Crewe!)

## Movement By Rail 5,6



**Photo 7.**—Routing abnormal loads with civilian police and county authorities. Five hundred instructions are issued each year in Southern Command. The picture shows a Corporal missile erector *en route*.



**Photo 8.**—Will it or won't it? Disembarking vehicles from LST on return from training in the Hebrides.

## Miscellaneous Tasks 7,8





**Photo 9.**—Southern Command Movement Squadron RE won the Command Safe Driving Competition 1957-58 and 1958-59.



**Photo 10.**—Training Army Emergency Reserve Units at Abingdon Airfield 1959.

## The Lighter Side 9,10



The photographs try and give a cross-section of the life in one UK Command. It's not all gain, and leave may be difficult since the Army never stops moving. When there is a train or bus strike it has to keep moving and help a lot of other people to do the same as well. When there is a full-scale flap overseas it is necessary to do what my batman calls "get your skates on" with a vengeance. But it is all what Field-Marshal Montgomery calls "good stuff", so don't be despondent if opportunity takes this particular turn in the career planners' maze.

The author is indebted to Captain E. W. Webb, RE, for the majority of the photographs used to illustrate this article.

## The Junior Leaders' Regiment, Royal Engineers

By COLONEL R. L. FRANCE, MC

THE Junior Leaders' Regiment, Royal Engineers is now established in its permanent home in Old Park Barracks, Dover, a fine modern barracks on the outskirts of the town.

This short article sets out to relate something of the way of life and methods of training which have been developed, and which may be of interest to those officers not acquainted with the Regiment, particularly those in units which receive the young soldiers shortly after they leave. The article may also help those concerned in recommending and selecting Officers and NCOs for service in the Regiment.

The Regiment aims to train boys to become future Warrant Officers and senior NCOs in the Corps, particularly on the regimental side.

A more even and higher standard of boy is now coming forward for entry through the recruiting organization. Apart from having to pass certain physical standards boys are now selected with a minimum SG grading of 3 plus, an assessment of strong or adequate NCO potential and a good headmaster's report. In the September intake of 109 boys, sixty were SG1 or 2 and 9 had GCE in up to nine subjects—a great improvement in standard. Boys normally join after their fifteenth birthday but older boys with higher SG gradings are accepted. Although the older boys are unable to do the full course the syllabus is designed to ensure that they cover all the important ground.

The Regiment is still building up from its present strength of 480 boys to a target of 580, although between 1961-4, the "bulge period", it will rise above 600. Termly intakes are built up into troops up to sixty strong under an officer and sergeant, and four such troops in progressive stages of training form a squadron. There are three squadrons whose prime concern is character and leadership training as well as instruction in drill, weapon training, games and personnel administration. Most of the administration in the Regiment is centralized. The regimental headquarters co-ordinates all training, and also is responsible for training in education, field engineering, trades and physical training.

Boys complete their training in the Regiment when aged between 17½ and 18 years. At present they go to 1 Training Regiment RE for a month's continuation training. Those possessing NCO potential in varying degrees (at present about 60 per cent) then stay for a JNCO Cadre Course before joining

units, while the remainder go to trade courses or direct to units. In spite of intake selection most of the latter show no leadership potential at all but should make good sappers or tradesmen. With the improving entry and as the system of NCO training develops in the Regiment it is hoped that more boys will be recommended for early training on JNCO Cadre Courses. It is likely in future that boys so recommended will be selected for such a course as soon as they have got the necessary experience in a field unit.

Sights are set high in the training carried out in the Regiment and the following aims are given to all members of the instructional staff on a card set out as below:—

The Junior Leaders' Regiment RE aims to develop:—

#### QUALITIES OF A GOOD SOLDIER

*Self confidence* by learning and mastering new skills.

*Self respect* by demanding highest standards of behaviour, dress and quarters.

*Sense of responsibility* by unsupervised and self-imposed tasks.

*Endurance* by increasing stamina and mental robustness.

*Alertness* by practice in observation and prompt action.

*Team spirit* by friendly co-operation in achieving a common aim.

*Discipline* by taking orders, acting on them and uniting with others in obeying orders to produce results even without a leader.

#### QUALITIES OF A LEADER

*Skill* by acquiring knowledge and mastery of his training greater than his soldiers', applying it with confidence, clarity and calmness.

*Character* by learning to be honest, fair and straightforward, unselfish, sympathetic and understanding towards others.

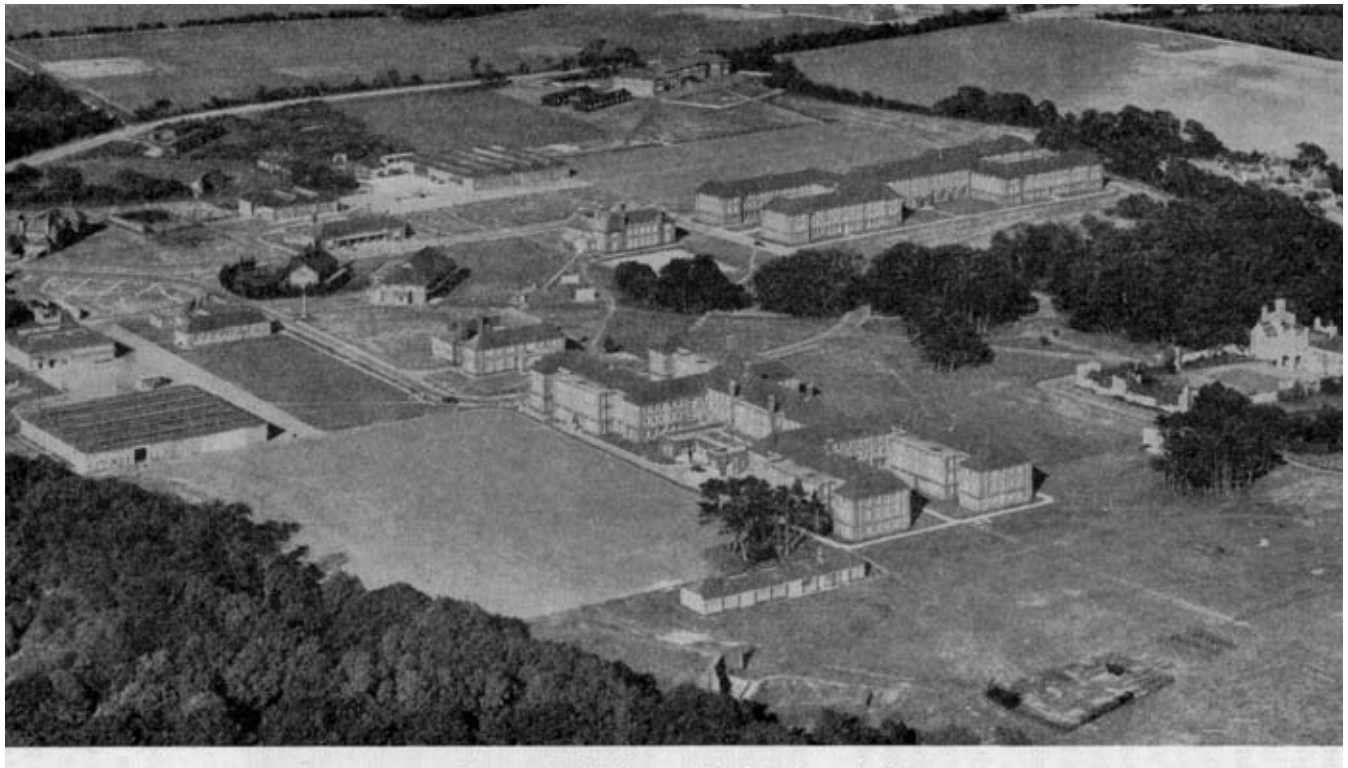
*Action* by learning to take initiative without prompting; to make considered decisions; to urge on tasks to completion, with enthusiasm and determination.

The example must be set by the staff but the senior boys, in particular, are coming more and more into the picture as a tradition is built up. Great strides have been made in this direction during the last year.

Leadership training teaches a variety of useful and simple skills including camping, expeditions, patrols, fieldcraft, improvised bridging and watermanship so that boys can be given responsibility for small numbers of other boys in varying circumstances and so exercise the qualities set out above. Exercises of increasing scope and severity are set when boys in small parties are sent off to find their way by planned routes, with hazards to overcome. They have to carry their supplies and tentage and must fend for themselves. Observation, field sketching and the preparation of simple reports are also practised. Initiative exercises are also set to small parties of boys. Confidence in talking in front of others is given by plenty of informal discussions and lectures.

Throughout all leadership training the squadron staffs are encouraged to exercise their own initiative and ingenuity to devise interesting training. The best insight into a boy's real character is often obtained when he is up against it on some expedition and it is important that Officers or Senior NCOs can accompany parties as observers.

All boys now joining the Regiment take part in the Duke of Edinburgh's Award Scheme, the aims of which coincide with many of the Regiment's



**The Junior Leaders' Regiment, Royal Engineers 1**

training aims. Already some twenty-four silver and thirty-one bronze awards have been obtained and the first gold awards (presented by the Duke himself at Buckingham Palace) do not seem far away.

The gold award standard of cross country expedition has also been made the target for the expedition part of the leadership training. This entails boys organizing themselves in small parties and making their way over a course they have set themselves of 50 miles of mountainous country and sleeping out for three nights. A high standard of organization and campcraft is demanded. Good practice for this is obtained in courses at the Army Outward Bound School which boys attend. The country around Dover is too easy but leadership exercises at weekends help in working up and this year's Summer Camp on Dartmoor gave excellent practice.

Hobbies have always been part of boys' training and almost thirty hobby clubs have now been developed in the Regiment. At least one evening a week is spent on hobbies and boys are being encouraged to do them in their own time. The boys' drum and trumpet band, a most popular hobby, has reached a high standard and is invaluable on ceremonial occasions. It is also an excellent recruiting agent. Other popular hobbies include sailing, canoeing, judo, woodworking, metal working, painting, .22 shooting, photography and the Regimental magazine, which is also of a high standard. Hobbies also form part of the "award" scheme.

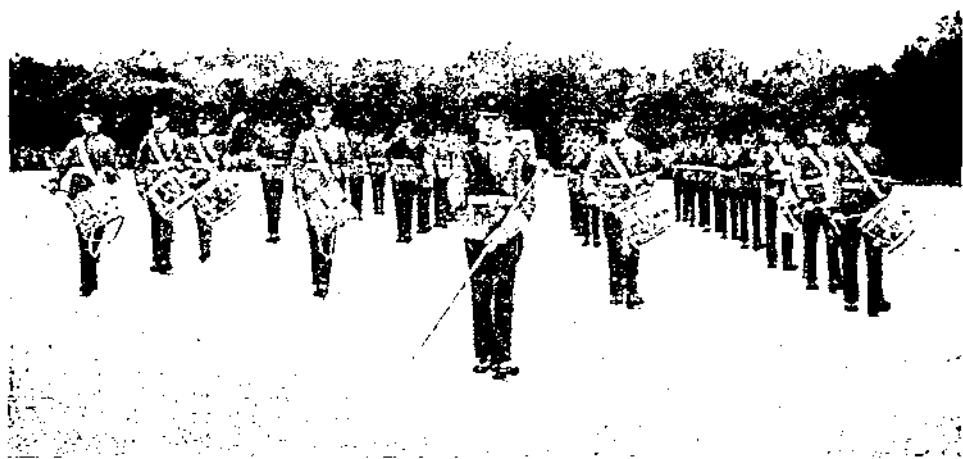


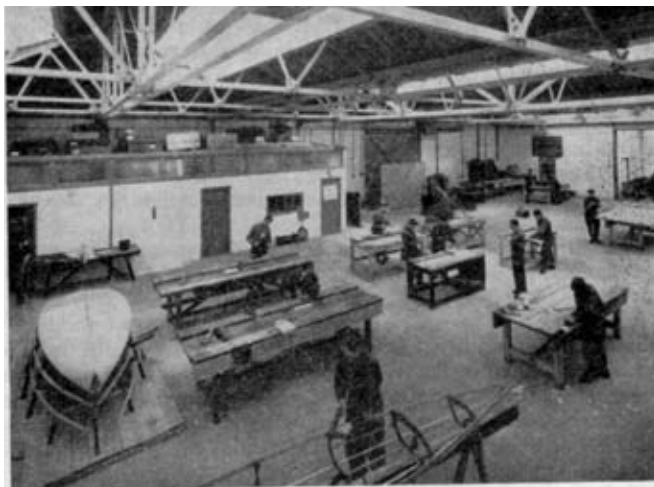
Photo 2. The Band

Boys also train for civilian life saving or first aid certificates and this also forms part of the "award" scheme. This form of training also awakens their ideas on citizenship which are developed as a by-product of the general life of the Regiment.

A good standard of drill and turnout is soon achieved, but the more complicated movements and arms drill are left to the last term. Practice is given to boys in moving their fellows about barracks between classes and on



**The Junior Leaders' Regiment, Royal Engineers 2**



**Photo 3.** Group of boys at their hobbies in the Carpenter's Shop



**Photo 4.** Instruction on a model—Fitter IC and Pump

**The Junior Leaders' Regiment, Royal Engineers 3,4**

parade. Boys are keen on weapon training which starts with .22 shooting and aims to cover the Recruits Course.

All boys are encouraged to take part in all Army games and sports at least twice a week and the Regimental Staff take an active part in coaching and refereeing. The boys are made responsible for entertaining visiting teams. Swimming is taught to all boys who are allowed to use the baths of the Royal Marines and of the Duke of York's Royal Military School. The latter is one of our main games opponents.

There are special PT tables for boys which lead up to the recruit standard. They are a great assistance in building up physical strength, endurance, confidence and team work and emphasis is put on activities which develop these qualities.

Education occupies an important and continuous part of the training programme and occupies nearly a third of the average boy's training time. An increasing number are achieving a senior certificate (slightly above first class A.C.E.) and the majority expect to get some subjects towards it. The education syllabus has been closely integrated with the rest of the training programme and authority has now been given to investigate the inclusion of a great deal of the basic theoretical instruction in certain trades into the mathematical, drawing and physics sections of the various certificates of education. This should produce a saving in the trade training times of these trades and lead to a greater number of Class III classifications.

Each boy gets a good grounding in two trades—field engineer and one other. Field engineer training is introduced in the early stages to assist in initiative training but the complete recruits' syllabus less rafting and bridging is covered in the last term and culminates in the FE B III test which is judged by instructors from the Training Brigade, RE. Rafting and bridging are covered and tested at 1 Training Regiment, RE.

For their second trade the boys will shortly have the choice of trades as follows: bricklayer\*, carpenter and joiner\*, clerk\*, electrician, painter and decorator\*, welder\* or signaller, or else basic training either as surveyor\* (to lead on to survey trades) or as fitter (to lead on to a variety of "A" trades such as engine fitter IC and pumps\*, engine fitter plant, fitter machinist, refrigerator mechanic, vehicle mechanic, as well as to certain "B" trades, driver, driver operator, driver AFV and plant operator.) The trades starred are taught at present. Training starts normally in the third term when each boy now visits the Trade and E and M Workshops, Plant Squadron and Signal School at the SME Chatham to get a good idea of various trades. He now gets a chance to try his hand at each and also receives talks on the part they play in the Corps. He will be given a choice of trade as far as possible but some selection is necessary because of numerical limitations of the yearly trade output and also because of the educational limitations of some boys. This wide choice is a great advance, for only fifteen months ago the choice was restricted to the three building trades, with the consequent frustration and waste of time of a boy being forced to learn a trade in which he had no real interest and which he frequently changed as soon as he reached man service.

It is important to watch each boy's progress and co-ordinate his education and trade training by early selection and "streaming". A unit trade and education selection board considers all cases out of the ordinary run. On this board sit the Chief Instructor, the Senior Education Officer, the boy's Squadron Commander, the O i/c Trade Training and a PSO. Some boys are



**Photo 5.** Leadership Training—boys making an aerial ropeway

inevitably found to have reached their educational ceiling when they have achieved their Intermediate Certificate of Education (equivalent to Second Class ACE) and are switched to trade training when their fellows are still at school, and these boys may then reach a Class III Standard at their trade, particularly in the trades of bricklayer, carpenter, painter and welder. Other boys achieve their Senior Certificate of Education early on through their course and then they also may be switched on to extra trade training, if the selection board consider they should not continue at school. There will be an increasing number of such boys and many should attain a third class trade classification. Boys whom the selection board consider might benefit from education beyond the Senior Certificate are given the opportunity of further study for GCE and should, in the future, be able to sit for other appropriate examinations such as the City and Guilds which would give exemptions from the Senior Educational Certificate and Class III trade tests.

Religious teaching also forms an important part of the training. The padres of the four main denominations hold normal padres' hours, and in addition to morning prayers most boys go to church two Sundays in three. A choir has been formed and this counts as a hobby in the "award" scheme.

The boys lead a fairly strenuous life and work about a twelve-hour day on four days a week, although this includes the lunch and tea breaks and such activities as hobbies, make and mend and conservancy. There are voluntary





**The Junior Leaders' Regiment, Royal Engineers 5**

games and other activities on the other three days as well as the occasional weekend exercises. To offset this, normal school holidays totalling ten weeks a year are enjoyed by the boys and the majority of the staff.

Outstanding boys are selected for Junior Leader NCO ranks fairly early on in their careers and in the senior terms they are progressively promoted. There is a boy RSM and each squadron has a boy SSM. The training of boy NCOs occupies a big part of squadron and troop commanders' and NCOs' time. In addition to the special attention they receive in the leadership training outlined above boy NCOs are given responsibilities in squadron and troop administration.

Boy NCOs cannot punish other boys but they bring their misdoings to notice for official punishment. Punishment meted out to boys consists mainly in the withdrawal of the various privileges of dress, leave, passes out of camp, and so on, which the boys are given in increasing degree as they achieve NCO rank or greater seniority.

Periodical proficiency tests in all subjects are taken and Junior NCO rank, plus the passing of these tests, qualifies boys for increases in pay which may rise from 5s. 6d. to 7s. 6d. a day. All this does not go into pocket money. Boys are encouraged to save and there are compulsory stoppages to "credits" from which track suits, football boots, blazers and grey flannels are bought. On reaching 17½ years their pay jumps to 17s. 6d. or 18s. 6d. a day if they enlisted on a six- or nine-year engagement respectively. At present about one-third extend their service to twenty-two years immediately on leaving.

As boys get to the "middle school" they are now taken to Chatham, Longmoor, Liphook and Newbury to see something of the activities of the various branches of the Corps. In addition they see the RE Demonstration at Chatham and have talks on Corps history and activities which in addition to stimulating their pride in the Corps gives them some idea of what they would like to do in man's service. Recommendations on their future employment are made on the final report which is summarized in the AF B 2066 now prepared for each boy leaving the Regiment. Final postings are arranged at 1 Training Regiment RE by the PSO in accordance with the needs of the Corps but it is hoped that with the wider variety of trades to choose from and better selection most boys will get what they want.

Receiving units should read these AF B 2066 reports carefully and follow them up if the best is going to be got out of some potentially good material which will be coming into the Corps in increasing numbers. A proper officer and NCO relationship should be established with ex-boys and their training should be continued and watched for some time in their new units. Special attention from SSMs or good troop sergeants will pay dividends.

Finally, it must be evident from this article that in order to achieve the aims and to keep up and develop the right spirit much depends on the standard of the permanent staff of the Regiment. As already stressed their standards must be high, as they, and particularly the officers, must set the example at all times. A real enthusiasm for and belief in the Army is necessary. Involved as they are in man-management, instruction in class, games and hobbies in addition to normal administration they must have good powers of organization, not least of themselves. This and the long hours require a constant wholehearted effort. But it is both interesting and rewarding.

## Frost-Bite in Africa

By CAPTAIN T. R. M. PULVERMAN, BSc, RE

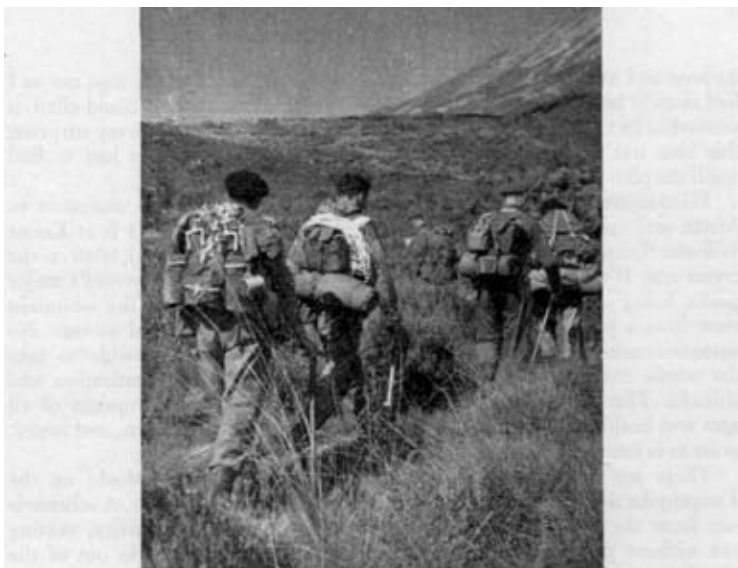
As soon as I heard of Mount Kilimanjaro, I wanted to get to the top, but as I had already had my fair share of leave this year, the only way I could climb it seemed to be to do it on duty, taking my troop with me. Much to my surprise, this idea was approved by everyone who mattered, so I then had to find out if the plan was possible, and work out the necessary details.

Kilimanjaro, 200 miles south of the equator, is the highest mountain in Africa and the highest solo peak in the world, rising to 19,565 ft at Kaiser Wilhelm Spitz, and to 18,600 ft at Gilman's Point (our objective), both on the crater rim. It does not stand particularly high in a list of the world's major peaks, being only two-thirds the height of Everest, but since the mountain rises from a plateau at 4,500 ft, it is one of the highest actual ascents. No mountaineering skill is required or it would have been impossible to take the whole troop; the only major problem is that of acclimatization and altitude. The mountain has frequently been climbed by Europeans of all ages and both sexes, but always with porters, often with oxygen, and never, as far as is known, by a complete military unit.

There are two approaches to the mountain; one from Moshi on the Tanganyika side, the other from Loitokitok on the Kenya border. A scheme is run from the Moshi side by some hotels there for small parties, costing £18 without porters, and much more with porters, so that was out of the question. As we were already in contact with the Outward Bound Mountain School at Loitokitok, and as the approach from that side is shorter, although steeper, we decided to base our attempts from there. The Outward Bound School very kindly allowed us to use their camp as a base, as they had no course running during the time we wished to make our assault. Two reconnaissances were done; one to discuss the project with the Outward Bound experts and tie up details, the other to check that radio communication back to the Squadron camp at Gilgil was possible. A representative from Public Relations was to have come with his camera, but unfortunately on a medical check the doctor "grounded" him. We, therefore, had to take our own photographs, and I was saddled with two cameras.

The troop consisted almost entirely of reinforcements, recently arrived from UK, and by the time the Squadron employed had been extracted, was forty-one strong. Only three weeks could be spared for training, and even those weeks were frequently interrupted by "external forces". The aim in training was to get the men as fit as possible, used to carrying heavy loads, and to sort out any weak men early on. The actual training consisted of a variety of five-to ten-mile marches and runs, alternating with some longer schemes. On one occasion we climbed Longonot, a near-by volcano, and scrambled around its 5½-mile rim. Other schemes included a 40-mile march carrying all our kit, sleeping out at the half-way point. This nearly crippled the troop, as the route was along a disused railway track which was very hard on the feet.

The only special equipment obtainable in East Africa was "44 pattern" webbing, sleeping bags, windproof anoraks and boots CWW (mostly without insoles). The Survey Squadron in Nairobi lent us six Bergen rucksacks, and the Outward Bound School offered us ice axes, sun goggles and balaclava



**Photo 1.**—At about 12,000 ft vegetation is still fairly thick on the moorland . . .



**Photo 2.**— . . . but at 14,000 ft, on the climb to the Kibo hut, little grows and the climbers are carrying wood for the night's fires.

## Frost-Bite in Africa

helmets. The four climbing ropes came from the Squadron Climbing Club. The only problems were to break in the boots in time, and to find room in the 44-pattern equipment for all that had to be taken up the mountain.

For rations, half was fresh, and half came as *compo*, which was broken down; out of troop funds came boiled sweets and glucose tablets to supplement the rations on the mountain. Using a lot of dehydrated food, and selected items from the *compo*, the rations for five days weighed 19½ lb. Raisins were probably the best food, as they could easily be eaten on the march. Dates would have been good if obtainable in large enough quantities.

The plan was for the troop to climb the mountain in two parties of twenty each on consecutive days, so another officer had to be found. There was no shortage of volunteers, but Ted Warrick, 2IC of the Squadron, somehow managed to get the OC's permission to join the scheme. It could not have been a better choice, as he is a very skilled and enthusiastic mountaineer, and was able to guide and advise from the technical point of view right from the start. Without his encouragement, the project would not have been so successful. As there were to be two parties, two lance corporals were sent to the Outward Bound School a week in advance of the main body, to learn the routes and techniques of high altitude climbing, and to prepare for the troop's arrival—a somewhat doubtful reward for passing out first and second on a recent JNCO Cadre.

The troop left Gilgil, some seventy-five miles north of Nairobi, in troop transport at 0700 hrs on Sunday, 19 July, reaching Loitokitok by 1630 hrs, and were met by the two guides, full of alarming tales about mountain sickness and the ruggedness of it all. The Outward Bound instructors gave them high praise for their courage and enthusiasm. They allocated the troop four ten-man huts, one of which was turned into a store. The remainder of that evening was spent sorting out rations into individual loads both for the acclimatization period, and for the assault itself. Several Sappers who had found the School Rope Assault Course and were trying to kill themselves with gay abandon, had to be disciplined. This assault course is far stiffer than any Army course, although composed entirely of ropes, and having less variety than usual.

The first few days were spent on acclimatization as far as possible. Party A, under Ted, went up to 10,500 ft on the Monday, returning to base the same day. Their trip was not uneventful, as they got lost in the forest, and covered about nineteen miles before getting back—a very easy thing to do, as the light is poor under the canopy of vegetation. Party B (mine) went up to the caves 11,260 ft, spending the night there. The cave used is 30 ft long, and 20 ft deep, with a low arched roof and rock floor, sloping to a foot high at each end. It was really very comfortable, although prevailing wind blew smoke into the cave no matter where we put the fire; it was not helped by some socks drying on an improvised spit. Someone had a pack of cards, and a mouth organ kept the singers round the camp fire more or less in tune. The following morning L/Cpl Cumming and I went up to the Kibo hut at 15,320 ft to check on the route and accommodation available. The party then returned to base for a day's rest and preparation for the final ascent.

The rations taken for the first two days on the mountain proved to be insufficient, although the calorific value was ample, the bulk was not enough and so, in response to a popular demand, the rations for the five-day climb were increased. Each man carried between forty-three and forty-eight pounds

of kit and rations; the heaviest pack weighed 56 lb, but included extras like climbing rope and first-aid equipment.

I shall tell the story of the ascent as seen from Party B; Party A's story is very similar, except that they were a day in advance of us. The first day's march up to the caves took seven hours. The first three hours were through a real Hollywood type forest, with gigantic trees festooned with creepers almost as thick as the trees themselves; all gloomy and damp with weird "noises off" from the birds and monkeys we disturbed on our way and with recent elephant, buffalo and rhino droppings on the track as a reminder that anything could happen. Once out of the forest, the slopes became moorland, with patches of bamboo, 9-ft bracken and plenty of heather and coarse grass. There was cloud at 9,000 ft, which made everything damp, but fortunately kept us cool. The route crossed several streams of crystal clear water, icy cold from the glaciers. Out of the forest the views were stupendous; dominating all were the twin peaks of Kibo (our destination) and Mawenzi (17,500 ft); the latter a much older volcano now eroding away rapidly, and only to be tackled by skilled mountaineers. Kibo is permanently covered with an ice cap, looking as if icing had been poured on a cake rather badly; it looks just like a textbook volcano, or, as some soldiers pointed out, a nightmarish slagheap.

A day was spent at the caves to get used to the height. Six men went up to the Kibo hut carrying water, firewood and rations for the next day as the caves were the highest point at which water was readily available at that time of year (the dry season), and the hut is well above the vegetation line. Both parties were in the cave together for one night, so it was a little crowded. I never knew that soldiers talked in their sleep so much. Party A went off to a battery of cameras and ribald remarks, glad to have the chance to be at the top first.

The climb to the Kibo hut the next day took six hours, carrying the minimum of kit, and travelling as slowly as possible so as to arrive fresh. On the way there Party A were passed on their way back, full of hair-raising stories about their ascent. There had been two RAF gatecrashers in the Kibo hut when they arrived; on the final ascent these two gave up after a couple of hours, which raised our soldiers' morale no end! The vegetation soon petered out, and the route meandered over a desert of sand and larva, littered with vast outcrops of rock. There was a cold, gusty, biting wind that blew sand everywhere, and yet the sun was very strong and sunburn was a danger. At this height the clouds were well below most of the time except for ones that appeared over Kibo and Mawenzi at about 1000 hrs daily.

The Kibo hut is an old GCI and timber building, some twelve feet by eight feet, containing six bunks, a stove and a table. In addition there are three porters' huts, draughty leanto's of CGI. There is also a rather shallow and very draughty DTL some way off, and a pit into which empty tins are thrown. This pit is permanently inhabited by ravens, who are not above stealing anything left unattended in the hut or caves.

The party went to bed as soon as possible, but no one got much sleep—evidently oxygen is needed to sleep well at that height. Several men in a porters' hut nearly asphyxiated themselves by lighting a fire to keep themselves warm; the hut was evacuated in hurry. Four men in the party were suffering from the altitude either with headaches, or from vomiting (although some of the latter insisted it was caused by too many doses of "all in



**Photo 3.**—Some of the climbers at the caves (11,250 ft) where a day was spent getting used to the altitude. The caves were the first night stop.



**Photo 4.**—At 18,600 ft Sergeant M. McKenzie and Corporal T. Woods stand inside the crater rim.

## Frost-Bite in Africa 3,4

stew"). The pills produced by the doctor in Gilgil did very little for either complaint. The hut was very stuffy and hot until the fire went out, when it became extremely cold. The firewood was consumed at a prodigious rate, and very little smoke went up the chimney.

Reveille was at 0130 hrs, and after a snack of stew and cocoa laced with rum, the party started off up the scree of the final climb. Although each man was wearing every stitch of clothing possible, in the biting wind the cold very soon got the upper hand. Within fifteen minutes of starting water in our water bottles had turned to ice; a thermometer outside the hut registered 23 degrees of frost. For the first half-hour the going was fairly easy, but it soon became steeper and steeper. There was fortunately a bright moon to illuminate the surface of the scree, but not so bright as to show the horrors ahead. As the slope got steeper, the scree became looser, and three or four steps were necessary to move forward one; it also became difficult to avoid dislodging stones on to those below. Some tried to go up the rocks on either side of the scree, but they were so rotten, breaking off at a touch, that it was no easier. To make matters worse, the altitude started to affect everyone, and after eight or ten steps it became necessary to stop for breath. As quick movement was impossible the blood circulation could not be kept going, and hands and feet very soon got cold. Hell must be very much like that! Three men in my party needed drastic treatment to their feet to prevent them getting frostbite. The scree, over 3,000 ft of it, took four and a half hours to cover—and the distance is under one and a half miles. The party kept together well for the first hour, but then started to spread out as the altitude affected some more than others. I sent back four men who were obviously suffering badly, coughing and trying to vomit although they had emptied their stomachs long before. As time went on it became difficult to stop men collapsing on to the scree after each few paces, and even more difficult to get them back on to their feet again. A few continued on their hands and knees; quite a good method as they did not slip back so much, but their knees became so cold that it was not worth it. Several soldiers were weeping from pain and frustration, and I learnt more about their characters in those few hours than in a month of training. I wish there had been someone there to shout at me once or twice, it was all I could do to get myself up, let alone encourage anyone else.

And then, thank God, there was Gilman's Point. The sun was just rising as the first man arrived, and on looking down, it was a wonder that anyone dared to climb up. That is the main reason why the final climb is started in the dark; the other is that if there is any moisture in the scree, it will be frozen, and hold the stones together. Looking down on Mawenzi, it looked like a mere heap of stones. Gilman's Point is the only place on the rim where there is a break in the ice, and all around were enormous glaciers and fantastic ice formations. Although the sun was up now, and dark goggles were necessary, it was still bitterly cold in the wind, and no one stayed any longer than it took to sign the book there, and take photos with a RE flag as background. Two soldiers tried to smoke a cigar but found the rarefied air too much for them, while two others found a sheltered spot in a crevasse, and were found asleep ten minutes later. Ted carried a tin of caviar up to the top, but forgot to eat it! It was a pity no one was in a fit state to appreciate the view, one of the most widespread in the world.

The journey down the scree was too easy; it was only necessary to start a small avalanche and stand on top of it. Everyone was exhausted on reaching



the hut, but some more rum (with cocoa added) worked miracles. Those suffering from mountain sickness were sent straight down; one of them so weak that he could hardly walk. The remainder cleaned up the hut, and then followed. Going downhill is not as easy as it sounds (although always preferable to the converse) with continual jarring on the feet, and bumping of equipment with each step. Those who felt fit enough continued down to base camp, while the others stayed the night in the caves. Those suffering from mountain sickness recovered after about two hours in the denser air, although they still felt very weak.

Special mention must be made of Cpl Francis, who with Ted took two other sappers around the rim to Kaiser Wilhelm Spitz, a feat requiring mountaineering skill, which is why the whole troop did not do it. L/Cpl Cumming, the B Party guide, covered 104,080 ft on the mountain (up and down) during his fortnight; he escorted an injured man down to base, as well as taking me up to the Kibo hut twice and doing the whole climb before we arrived. And the Troop cook, Pte Andrews, who was undoubtedly the most unfit man in the troop, reached Gilman's Point on sheer guts, covering the last 400 yds on his hands and knees.

And that is really all there is to tell. Twenty-six out of thirty-four who started the final climb reached Gilman's Point, so the scheme can be called a success. There is now a terrific troop spirit, and the rest of the Squadron is sick of the word Kilimanjaro. The following has been learnt:—

*a.* How to move for long distances at high altitudes carrying heavy loads—in particular how incredibly slow the pace must be up slopes.

*b.* Acclimatization is essential. The troop climbed almost 15,000 ft in 72 hours, which is far too quick, and suffered accordingly. Outward Bound students spent at least three weeks at high altitudes before attempting the final climb.

*c.* Soldiers do not lose their appetites at high altitudes, at least not until altitude sickness hits them.

*d.* Rations should include plenty of sweets, chocolate, raisins and dates. Dehydrated food is good up to a point, but the food must be appetising and have variety. Tinned fruit is good despite its weight, and "Biscuits Service Plain" are wonderful!

*e.* Ice axes are not crowbars or axes. Five were broken by misuse!

*f.* Despite having boots CWW, feet still got cold and wet. Wearing two pairs of socks and having insoles made no difference.

*g.* "44 pattern" webbing has the following faults:—

*i.* The pack does not hold enough; with five days' rations there is no room for anything else, so the bedding roll outside the pack has to hold all the clothing.

*ii.* The shoulder straps cut into the flesh.

*iii.* The "D" buckles (for want of a better name) kept coming undone.

*h.* Windproof smocks, sleeping bags and compo are all excellent.

*i.* With a large number of soldiers on a mountain, constant vigilance is needed as they easily go wandering off on their own and get lost.

None of the troop have ever had any previous mountaineering experience, nor had any idea what to expect; it is not quite clear what their attitude is now, but they certainly believe all mountaineers to be slightly crazy. It is nice to look back on, but they have no desire to repeat the performance.

Our advice to anyone trying a similar scheme is to spend as much time on training and acclimatization as possible. If it had been possible to spend three weeks training on the actual foothills of Kilimanjaro instead of at Gilgil, it would have made a lot of difference. And the best of luck to them—once is enough!

*After the climb the Troop Commander received a message of congratulation from Field-Marshal Sir Gerald Templer, President of the Army Mountaineering Association, on their achievement, which read as follows: "I was absolutely thrilled to read the account of the Troop's expedition to Mount Kilimanjaro. I do congratulate you all on a really splendid effort. Please give them a kind message from me and tell them that I am quite sure that it is an experience which they will value very much indeed as they get on in life."—EDITOR.*

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## Bomb Disposal in the United Kingdom 1959

By MAJOR A. B. HARTLEY, MBE, RE

*"Good Heavens!—d'you mean to say that you are still digging up German bombs?"*

BOMB Disposal Unit (UK) RE is a unit of which little seems to be known in the Corps. It has three principal functions:—

- (a) Bomb disposal and minefield clearance operations.
- (b) The Joint Services Bomb Disposal School.
- (c) HQ/AER for Bomb Disposal Regiments RE (AER).

The unit is operationally responsible for the disposal of all ex-enemy UXBs and other missiles above high water mark, except where these are found in RN or RAF installations. It is also responsible for clearance of beach minefields, pipe mines, flame fougasses, UX AA shells, and dangerous defence works.

My purpose here is to describe very briefly the operational problems and work involved in the disposal of old German UXBs.

### REPORTS

All reports of suspected UXBs are received by the unit at Horsham. They are sometimes reported direct by the police, or, more correctly, by the Regional Home Office, Civil Defence Office, who issue the UXB report form.

Emergency reports are received by telephone from the police, and the paper work follows after. An emergency incident is one where the bomb is visible on or near the surface. For example, when one is uncovered during excavation at a building site; this usually occurs late on Friday, or on a Saturday morning.

### RECONNAISSANCE

Reconnaissance can be intensely interesting or utterly boring. It all depends on the character of the incident and upon the evidence available. Quite often before deciding even upon exploratory investigation much

inquiry is inevitable. Such inquiry becomes not dissimilar to that of routine detective work. Conversely, it is sometimes not easy to explain to a nervous householder that the hole which has appeared in the garden can be safely attributed to an earth fault, an old land drain, an old well, or even a collapsed dog's grave, without doing some wasteful digging or using the bomb locator. Either method can of course lay waste to a trim garden. It is vital, however, that the householder, or other person involved in the report, should be convinced that their bomb does not exist.



**Photo 1.**—"Satan", 1,800 Kg is hauled out. This UXB was originally discredited as "a small one gone off". The house it hit was completely demolished and an EWS tank was built on the site. Twelve years later the incident was investigated and the bomb recovered.

Very rarely does a hole in the ground in 1959 indicate the presence of a buried UXB. A better indication is a shallow crater. Yet the sudden appearance of a hole in the ground will inevitably produce a UXB report, and every report must be investigated. During 1958, a total of 233 reports of UXBs were received, from this total twenty-one actual bombs were located and disposed of.\*

During the war selected police and wardens were trained at Bomb Disposal

\*The 233 reports referred to concern only conventional HE bombs weighing more than 114 lb.

Other reports concerned mines and miscellaneous explosive or incendiary missiles. Ninety-five mines and 413 miscellaneous items were dealt with in 1958.



**Bomb Disposal in the United Kingdom 1**

Training Centres as Bomb Reconnaissance Officers (BROs). As such they had authority to discredit incidents, and in this way saved many wasted journeys by BD personnel. Today they no longer exist, and many needless though necessary journeys are done by unit personnel.

Many of the UXBs recovered today are of 1940 or early 1941 vintage. This is because during that period there were no trained BROs, and even BD personnel in those days were often mistaken in discrediting a large UXB as "a small one that had gone off". Quite often disquieting reports are received from individuals, who, writing to the police or Civil Defence, describe an incident of 1940 which bears all the evidence of a large UXB.

On visiting the site one finds a five-storey block of flats built upon it—without further evidence who would be courageous enough to ask for evacuation of the flats for further investigation?

Sometimes the evidence is conclusive enough. Old bombs have been recovered from underneath new buildings.

Before practical investigation, either by digging, or by using the bomb locator, the responsible officer must be satisfied that the evidence is convincing enough. In a built-up area such work can cause public uneasiness, claims for reconstruction and, if the search is unfruitful, little credit to the unit. On the other hand the morale of the troops is at its highest when a bomb is located and recovered.

A reconnaissance can be considered positive when in a "splash" crater, now a depression in the ground, some superstructure of the bomb is recovered, and this still happens. Mr Hardie of Snodhurst Avenue, Walder-slade, near Chatham, was last year bringing order out of chaos in the long sloping back garden of his new bungalow. Down the slope was a crater, full of rubbish. Poking about in the rubbish Mr Hardie found a piece of Kopfring. (German for retarder ring.) Mr Hardie is an ex-Sapper and he informed the police. Subsequently we recovered a "Hermann" 1,000 Kg UXB some twenty-five feet below the crater.

A great number of incidents are discredited upon reconnaissance, but also there are many earmarked for investigation to prove or disprove the presence of a UXB, and this brings the bomb locator into the picture.

#### LOCATING THE BOMB

The Bomb Locator No 1 Mk III is an instrument designed to measure deflections in the earth's magnetic field. Deflections are caused by ferrous masses buried in the earth. It is, therefore, not selective to bombs as such; for instance a steel barrel buried at a depth of 20 ft will give reactions and readings as those for a medium or large bomb.

The equipment is in two parts—a control unit from which magnetometer readings are obtained, and a detector unit (DU), a sealed tube which houses internally two balanced Mu-metal elements.

Investigation, using the bomb locator, commences by jetting non-magnetic pipes down into the ground by means of high pressure water pump. The water is forced down the pipe and through a nozzle leader forcing the pipe down to a depth beyond the anticipated depth of the bomb. The DU is then lowered down the pipe, and at foot intervals the magnetometer readings are recorded.

Large bombs give greater deflections than small bombs, but experience has shown that old buried bombs tend to become polarized in the earth's

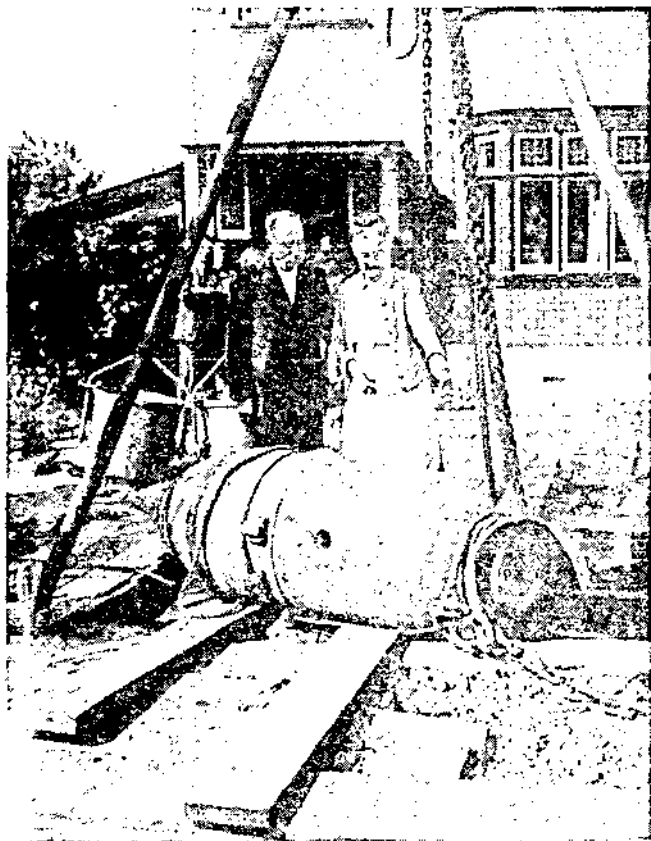


Photo 2.—“Hermann” is lifted out of the front garden, another “small one gone off”.

magnetic field and recordings, therefore, are becoming smaller. In 1946 it was customary to jet down the pipes for a 250 Kg bomb at five to six feet centres. Today 4 ft cannot safely be exceeded, and for a 50 Kg—3 ft.

When readings are recorded from three separate pipes, the bomb can be plotted in depth and position, and excavation follows.

#### THE BOMBS

GERMAN UXBs found in the UK today can be divided into two types:—

(a) The small A/personnel type containing up to 8 lb of HE—SD.10, —SD.2 —SD.1, and incendiaries, etc.

(b) The conventional HE bomb containing from 50 lb up to a ton of HE. (A few of these may contain phosphorus incendiary fillings as opposed to HE).

The (a) variety can, and should, be destroyed *in situ* (after protective works have been done) whenever possible. They were designed as mobile booby traps, and still remain so.

Variety (b) are another kettle of fish. There would be little military future for the individual who deliberately detonated a 250 Kg bomb (say 220 lb of



**Bomb Disposal in the United Kingdom 2**

TNT) anywhere in the UK in 1959! I would venture to say that at any subsequent inquiry he would also add nothing to his reputation should he allow the bomb to detonate of its own accord.

There are two ways of dealing with such bombs:—

(i) to render the bomb safe for movement to a site suitable for demolition or cleaning out, or

(ii) complete disposal of fuses and explosive contents at the site.

In determining which course to adopt consideration must be given first to the safety of all concerned, to the disruption of public services, and then to the technical convenience of the method of disposal.

German fuses used in these bombs are all the electric condenser resistance variety, the current passing through the interior circuits of the fuse during fall from aircraft to earth. Impact then either explodes the bomb, or secondary circuits are brought into operation either for booby trap devices, or for actuating deliberate delay action switches. It all depends on what type, or types, are found fitted in the bomb. In the impact type of fuse no electric charge exists now, it has all trickled away, but other elements of danger exist.

The designed chain of detonation of a German bomb starts with a flash pellet in the base of the fuse to a penthrith wax gainc. The gainc explodes the picric-filled fuse pocket which is amply forceful enough to explode the main filling of the bomb.

These explosive components deteriorate with age, and deterioration increases sensitivity, particularly where chemical change takes place.

It is not safe simply to extract a fuse today without precautionary measures. Similarly, it is not considered safe to transport a bomb containing a fuse which has locking sensitive detonating initiators in the bomb. It has been the practice since 1946 to evacuate the fuse pocket of air, using a vacuum pump, and to allow water to fill the vacuum. The intention is to dissolve any picrate crystallizations, and also to act as a lubricant during withdrawal of the fuse. This technique is now under review—there are signs that aged picric is becoming increasingly solvent resistant.

With the clockwork delay fuse no extraction is possible because the Germans fitted an anti-withdrawal mechanical device behind a high proportion of these fuses. Whenever such a fuse is identified the magnetic clock stopper is applied, and the cast TNT explosive content of the bomb is steamed out. The fuse pocket is then blown *in situ*.

The disposal of an old powder-filled bomb today presents problems. The Germans used an aluminized powder filling containing ammonium nitrate and aluminium powder. Both these constituents deteriorate and chemical changes take place inside the bomb.

It is not uncommon to find that the powder has solidified and contracted around the steel wall of the bomb forming dark brown layers against the steel, lightening in colour towards the centre. A void is apparent down the centre which contains a gas pressing at about 100/110 lb per sq in. This gas must be vented, and the powder/solid soaked in water. This causes a loud crackling from the aluminium powder, and the bomb heats up. Water must be kept flowing inside as a coolant.

An additional problem arises with the UX "Hermann", which has a composite filling. The large bulbous nose has a filling of cast TNT, the remainder of the filling is the aluminized powder. Both fillings deteriorate



in contact with each other and a brown compound is formed at the joint. Theoretically, this compound can ignite at 70°C. The coolant requirement therefore is even more a necessity. The solid TNT cannot be steamed out because of course the wet steam greatly exceeds 70°C.

It was a "Hermann" which was uncovered at the South Bank in April this year.

Each bomb that is found presents its own problems, either by its situation, its condition, or the ground condition in which it lies, and incidentally when referring to condition I would like to correct a popular fallacy that "these bombs will gradually rust away"! They won't. I have never yet found a buried bomb which shows the slightest trace of rust. When the clay or spoil is cleaned off them the steel case is bright steel, as good as when they were dropped. The same can be said of a high percentage of the fuses. We have recovered German ECR fuses which have been buried for a minimum of fourteen years, which, when recharged from a source of 140 volts, have reacted perfectly.

On 1 July this year Council workmen dug a shaft in the road at Putney to discover why a sewer was not behaving as it should. The cause of the inefficiency was due to a 250 Kg SC UXB which had broken through it and was lying somewhat obliquely, but in approximate prolongation of the 12-in earthenware pipe. Since October 1940 sewage had flowed along the bomb towards the outfall of the main sewer. The bomb was in good condition and the fuse head markings were not corroded. Both fuses were of the clockwork (17) series type. The interior of the bomb was in perfect condition. The TNT was liquefied by steam and cleaned out. The fuse pockets were detonated *in situ* because of the German habit of inserting anti-withdrawal devices behind clockwork fuses.

I have attempted to present a broad picture of post-war BD and cannot attempt to describe in greater detail the techniques or the equipment used in the disposal of old UXBs. These techniques have been evolved by adapting standard BD equipment to whatever requirements arise. The principles of bomb disposal are the subject of a four-week course at the Joint Services Bomb Disposal School, to my mind a well-spent fascinating four weeks.

#### CONCLUSION

Some weeks ago the Home Secretary replied to a question in the House on the subject of old abandoned UXBs known to be buried in the UK. His answer was that 509 were known and plotted. At this unit we hold records of each of these incidents. I believe that the unknown UXBs exceed that number. It does not seem, therefore, that any complacency or relaxation associated with a completed task is likely for some years to come.

# Aerodrome Construction in a Capital City

By LIEUT-COLONEL J. H. FYSON, MBE, MC (Retd)

THE London to Paris air race organized by the *Daily Mail* was an interesting study, besides providing lively news for several days. Competitors found it necessary to use several different forms of transport—motor cycles, helicopters, jet aircraft among them. Why was this? Because they could not mount the fastest vehicle at the Marble Arch—or even the next fastest. First catch your hare! This inability to arrange air travel from the doorstep is common to most cities—and naturally enough: the cities have grown, and the aeroplane is a late arrival—and in any case he is *persona non grata* among the houses.

Wellington, New Zealand, is one of the world's newer capitals, but in her hundred years or so of growth she has come to occupy as much land as places ten times her size in the more crowded countries. That being so, she was fortunate at this late hour to be able still to decide to have an airport close at hand. The manner in which this came about is worth telling briefly as it shows how the course of bold decisions is beset by the cross winds of controversy. Fortunately the story ended happily and you can now emplane close to the bright lights of the city—in fact, among them. Some account of the construction and its problems will then be given.

Plate 1 is a remarkable lithograph of Wellington in 1840, drawn in London at that date, by someone who had never seen it, and who relied solely on charts and descriptions. The view is from outside the harbour mouth, looking slightly west of north. The city today is well to the left of the picture. The isthmus in the foreground was once sea, later brought up by an earthquake—probably only a few centuries ago, as the Maori has a memory of it handed down. Photo 2 shows Wellington in 1955, from roughly the same angle though from nearer in to land.

This isthmus, which we can call Rongotai—though strictly speaking that is the more easterly part—was to contain the future aerodrome.

An enthusiast called Schaeff flew a few yards as long ago as 1911 on the southerly beach which fringes Lyall Bay. In 1921 part of the area was licensed as an airfield, but even then arguments were taking place as to the suitability of the area generally, and little progress was made. In 1928 the first trans-Tasman Sea flight by Kingsford-Smith and Ulm gave a great fillip to enthusiasm for flying in New Zealand; and during their travels the two were taken to Rongotai to which they gave their blessing as a future airfield. It was opened as Wellington Municipal Aerodrome in 1929. Unfortunately in 1933 Kingsford-Smith let fall some remarks about down draughts and turbulence which have given ammunition to the opponents of Rongotai ever since. An effort to evaluate the problem with a model and wind tunnel was inconclusive.

For the next few years there was a controversy over where to have Wellington's airport. A commission in 1936 recommended a runway right across the isthmus, a proposal which met with the strongest objections from residents, secondary school and golf course—all affected.

What alternatives existed? The surroundings of Wellington are fairly rugged, and the main possibilities were:—

(i) Coastal flats some thirty miles farther north at Paraparaumu—and this was to be Wellington's airport for several years.

(ii) Certain valleys somewhat nearer, but having bad approaches.

(iii) The razing of suitable hilly land to form a plateau airfield.

(iv) Reclamation into the sea.

Failing a flat area nearer than Paraparaumu with good approaches, it became increasingly clear that to have an aerodrome near by meant expensive construction, involving a combination of alternatives (iii) and (iv).

After the war another committee gave much the same recommendation as that in 1936. A three-man UK Mission headed by Sir Frederick Tymms was also brought in: their verdict was disappointing—Rongotai was the best of a bad lot, and would never be suitable for large aeroplanes. So, in spite of the arguments, eventually in 1950 the present place was adopted.

Photos 3 and 4 are taken looking south-west, showing the area before starting work and when nearly complete. They reveal the effect of this decision on the topography and on the built-up area. Whole streets have disappeared, together with the considerable hill on which they ran. Of the 180 or so houses which were there, about half had to be demolished; but the other half were removed bodily and can now be seen in two rows along the road behind the reclamation, to the right of Photo 4. The removal of houses is not unusual in this country—they are usually of timber with iron roofs; and with a few steel joists cunningly placed they can be uplifted and taken away.

More remarkable was the moving of two large hangars from about the middle of the new flight strip to west of the runway near Lyall Bay. These buildings are each about 10,000 square feet in area.

That the hill itself was large can be more clearly understood by looking at the reclaimed area it produced—some 140 acres, of which the portion at the runway north end is 40 ft above sea level and placed in 30 ft of water. The earthworks quantities were some four million cubic yards, moved by trucks, scrapers and belt conveyor roughly in the proportion of 1.5 to 1.5 to 1.

Looking at Photo 2 you can see the work in an early stage, with an important feature under construction—the breakwater at the south end, and the sheet pile wall protecting the south-western side of the runway. This breakwater takes the full force of the southerly seas which sweep not just across Cook Strait (which is farther west) but from the Antarctic. Fifteen-ton "Tetrapods" are the outer facing to a mass concrete wall over 800 feet long. An hydraulic model of the bay under its new conditions was made early on, giving useful results in forecasting the action along the sheet piling. Tides in these waters have only a range of some four feet.

Photo 5, taken at a late stage in the work, is marked with the salient details of the aerodrome. The principal users will be the internal airline with Viscounts and Dakotas—the latter soon to be replaced with turbo-props. Bristol Freighters work across to the South Island. The service from Australia will use Lockheed Electras. The length of runway is 5,750 ft—in bitumen and concrete—with another 200 ft of grass at each end. The terminal facilities are in a conversion of the de Havilland factory—as business develops the intention is to annex the golf course to the east and build a new air terminal. Other features shown are the control tower—charmingly situated among good residential property, with extensive views; the Surveillance Radar (not manned) on Hawkins Hill which is in direct view of the control tower; the Precision Approach Radar (also unmanned); the Straits Air Freight Express



**Areodrome Construction in a Capital City 1**



**Areodrome Construction in a Capital City 2**



**Areodrome Construction in a Capital City 3**



**Areodrome Construction in a Capital City 4**



area (SAFE); and the National Airways Corporation hangar. Concrete construction is only at the runway ends and in front of the terminal building.

The author of this account did not come to the scene until early 1958, by which time the final stages had begun—an earthworks contract for the last  $\frac{3}{4}$  million cu yds, to be followed by paving using Ministry of Works forces for the flexible pavement and contracts for the concrete. Previous operations had consisted of house removals, breakwater and pile wall construction, reclamation work and building up the embankment at the north end. Apart from earthworks and paving to be completed, there were flying aids and drainage. The City Engineer undertook the latter as part contribution towards the cost of the project. Civil work for the flying aids was of some magnitude but not noteworthy, and the remainder of this account will be concerned mainly with earthworks and paving. The author was site engineer for the Ministry of Works, controlling both direct labour and contracts.

Earthmoving in the early stages had been by shovel and truck, and by belt conveyor leading from the middle of the excavation area to the main reclamation in Evans Bay on the north-west of the isthmus. In the later stages earthmoving was nearly all by motor scraper. The Ministry of Works operated three Euclid six wheelers of 11 cu yds truck capacity—excellent machines; and three Caterpillar DW 15s of similar capacity. The contractors had one TS24 Euclid (24 cu yds truck) with engines front and rear; a TS21 Euclid—one engine; two Allis Chalmers machines, one Payscraper and three Tournapulls. The Euclids were outstandingly good.

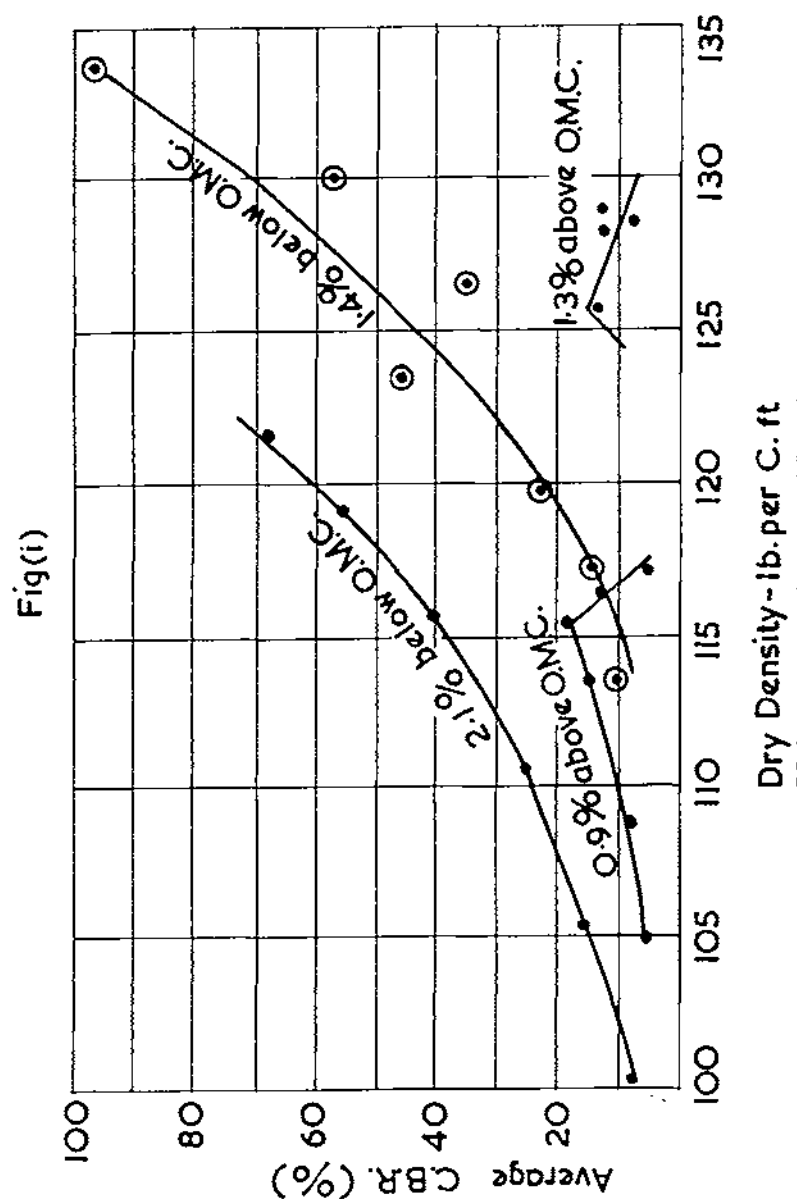
To load these scrapers, a variety of tractors were used as pushers. The department used mainly Caterpillar and Vickers—the latter not heavy enough for their power. The contractors had Caterpillars and Internationals. Hydraulically operated rippers mounted on tractors were a great asset—in particular, that mounted on a D9 Caterpillar. Though not of first grade roadstone, the hill contained a fair amount of greywacke. To move this, although blasting was used intermittently throughout, hydraulic rippers played the major part in the later stages.

For compaction there was a specified density under the paved areas—98 per cent of Proctor maximum. This was achieved by a combination of heavy sheepsfoot rollers (serving the dual purpose of compaction and of breaking up oversize stone) and heavy pneumatic tyred rollers (25 and 50 ton). Steel rollers were used mainly to finish off the top layer to the necessary tolerances, and to smooth off the fill generally in case of rain. Density was tested initially by the sand replacement method, but this was supplanted by the "Washington densometer", a water-filled balloon application of the same principle; this proved better in the rocky material.

The curve at Fig (i) taken from laboratory tests shows more clearly than any description the effect of over-watering and over-compacting this particular material. When bearing values can fall off as sharply as shown here, the importance of having first-rate inspectors cannot be over emphasized, and the two who looked after compaction at Rongotai were in the top class.

Tests were made at frequent intervals all over the work in progress. The two inspectors controlling the placing to fill were trained to judge the moisture content to within extremely close limits; and allied with the behaviour of the material in a Proctor mould it was possible to determine the moisture content to within  $\frac{1}{2}$  per cent of the true value—for values close to optimum—without having to resort to slow laboratory tests.





Curves showing sensitivity of fill material to moisture

California Bearing Ratio - compaction relationships

Another control at the finishing stages was by test rolling using the 50-ton roller. Any areas showing movement after six passes or so were rejected and given further treatment.

Finally, a plate bearing test vehicle was in operation on all paved areas. Tests were made according to the recommendations of the International Civil Aviation Organization. A 22-in diameter plate was used, and about thirty-two tons from a trailer applied to the plate through a load cell employing electric strain gauges. The general arrangement was evolved on the site, and it was possible to carry out a complete "repetition" test in well under two hours. This test purports to forecast the deflection under 10,000 repetitions of various loads, and by following the set procedure the pavement can be given a load classification number. Each aircraft also has a LCN for a given pavement thickness.

The flexible pavement follows New Zealand practice for main roads; the graded crushed stone course has one layer of  $\frac{3}{4}$ -in chippings bonded into a coating of bitumen as its wearing course. The top course, a 6-in thickness of  $2\frac{1}{2}$ -in maximum size roadstone below the bitumen, and the base course which is a similar thickness of 4-in maximum size stone from the site itself, both presented problems in laying.

The base course came from a crushing plant on the site which separated out the fines passing a 1-in screen. The object then became to re-combine the coarse and fine materials uniformly all over the pavement. The best method was found to be to spread a layer of the coarse material by truck and then grade it with a heavy grader—or by spreading accurately by scraper, even, which saved the use of a grader; fines were then spread, and rolled in with the heavy pneumatic roller, watering as necessary. This process was repeated for the second layer. The difficulty was to achieve the required tolerance with such large stone, particularly as the rolling quickly tightened up the mass and prevented further movement. This was in marked contrast with the behaviour of the top course—described below—and it is evidently important to study the particular materials being used very carefully; purely theoretical considerations based on grading analyses cannot be relied on to produce laying and compacting techniques.

The top course, of  $2\frac{1}{2}$ -in maximum size, consisted—for various reasons of local interest only—of about one-third crushed river shingle lacking in fines, two-thirds well graded quarry stone, and non-plastic fines available to add as required. The lack of fines in the shingle and its partially rounded nature made stabilization difficult. Eventually it was used only in the lower layer where it was anchored by lightly discing the base course surface to permit a degree of interlock. This layer was best compacted with vibrating rollers. Thirtyhundredweight Stothert and Pitt machines were worked in a gang of three drawn by one tractor. These vibrate at 3,600 rpm. A 3-ton Swedish Vibro-Verken which works at 1,500 rpm was also used.

The top layer was compacted partly by vibrating, but mainly with ordinary flat steel rollers. The required surface tolerances were obtained using graders and a planer, controlled by the old-fashioned and effective boning rod.

The chip coat on the top course is bonded into a heavy bitumen road oil, after priming the stone course with a light tar primer. On the chip is a smoothing coat of  $\frac{1}{4}$ -in maximum size plant mix, similar to "Fine Cold Asphalt", which provides no extra thickness but fills the interstices of the chips. Usual practice on New Zealand roads does not include this smoothing coat. Finally,



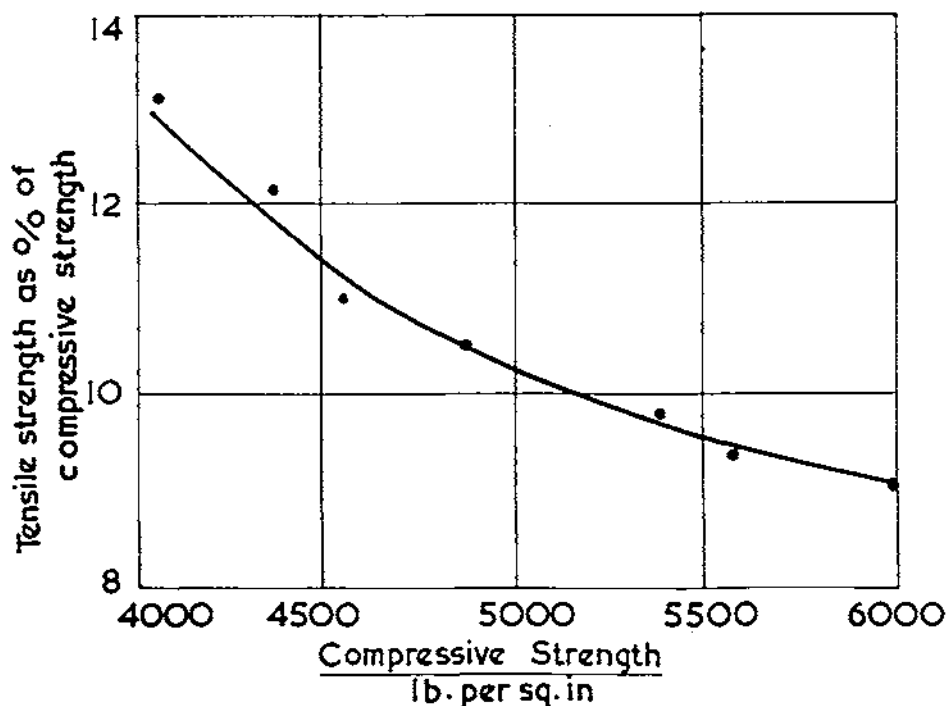
**Areodrome Construction in a Capital City 5**

the plant mix was sprayed with bitumen emulsion and given a light coat of sand. This has the dual effect of additional smoothing, and of increasing the waterproofing qualities of the wearing coat.

Spreading the road oil and chips was no problem. The plant mix then had to go on without disturbing the chips and yet with negligible thickness above them. The first requisite was an accurately finished top course, the second an even-sized chip, and the third a superbly skilful grader driver. All these were present. The sand was spread from a machine designed for top dressing with lime and fertilizer, giving an even spread of the required width. Surplus sand was then brushed off.

An unreinforced concrete pavement with dowelled joints was used at the ends of the runways—550 ft at each end—and at the aircraft loading and servicing points in the terminal area. The slab was 10 in thick, of concrete delivered by truck agitators from a central plant some miles away. Minimum design strength was 4,000 lb per sq in. No cores were taken for crushing tests, but ordinary test cylinders gave strengths from 4,300 to 5,700 with a coefficient of variation of 9 per cent. Test cylinders were also split to determine tensile strengths. A relationship found to exist between tensile strength and compressive strength is shown on Fig. (ii).

Fig (ii)



Relationship between tensile & compressive strengths of  
Pavement Concrete

Sawn joints were used for later work. They give the best end result, but present some problems during the work. The large amount of water needed for the saw disturbed the subgrade compacting and grading in progress near by. Another disadvantage was that the slight delay required before sawing the joints could occasion cracking at other than the designed joints.

The usual  $\frac{1}{8}$  in. in 10 ft tolerance was readily achieved by finishing the concrete with a long handled 12 ft straight edge worked across the concrete. The tolerance was then checked before applying the brush finish.

For surface drainage there is a slotted channel along the lower edge of all paved areas, the channel being directly over a pipe open all along its soffit. The pipe discharges into the main underground stormwater system at frequent intervals. No sub-soil drainage is provided in the design, although a small amount was used to surmount water trouble during construction.

The only other items affecting the final paved surfaces were paint markings and lights. Modern aerodrome markings include some very large white areas—as much as  $150 \times 30$  ft—and the paint used at first was found to be like ice when wet. Even on a dry sunny winter's day the white often remains wet while the adjoining bitumen is dry. This had zero skidding resistance. The last coat of paint was therefore given a liberal admixture of white sand—5 lb to a gallon of paint—from a near-by beach.

Lights for all the taxiways are placed along the centre lines. For this the precious bitumen had to be dug up. Draw wires were left in previously buried pipes, and the ends of these pipes were located by mine detector.

A non-technical mention can be made of the flying aids. The radar at Hawkins Hill is planned to be one of a chain of stations which will exercise surveillance down the length of the Dominion. It gives a display both at the Air Traffic Centre in the heart of Wellington and in the control tower. In the latter is also displayed the picture from the precision approach radar, from which from ten miles out the pilot can be given detailed instructions. There are also radio locator beacons on the hills north of the harbour and at the north end of the runway. Finally there are the usual windsocks and landing direction indicators.

Scheduled flights on a limited basis—lights and all flying aids not yet being ready—were started on 19 July 1959. The author was lucky enough to accompany a party of others who could spare the morning for a Viscount flight to Auckland for “morning tea” (that essential New Zealand social function), and back. The approach to Wellington by air can have few rivals for beauty, and placing the aerodrome so close has enabled air travellers to share the pleasure which was the prerogative of those who came by ship. It has also put the Capital City back in its proper place on the air map of the Dominion—at the centre.

The author thanks the Commissioner of Works, Mr F. M. Hanson, DSO, OBE, MM, ED, for permission to publish this article, and to illustrate it with Ministry of Works official photographs.

Lieut-Colonel Fyson has written to say that the airfield was officially opened on Saturday, 24 October, by the Governor-General and that an opening air display, postponed because of heavy rain, was held on Sunday, 25 October 1959. In this display Royal New Zealand Air Force pilots performed aerobatics in Vampires, the Royal Australian Air Force flew Canberras and the Royal Air Force produced a Comet, a Britannia, a Beverley and three Vulcans; Voodoos, Super-Sabres and large transport planes of the United States Air Force also took part.—EDITOR.

# Bailey Bridging in Kenya

By MAJOR I. C. MILLAR, RE (Retd)

AN enterprising civilian firm has obtained a twenty-year franchise from the Kenya Government, and erected a Bailey suspension bridge on the main road some ten miles north of Mombasa.

Known as the Mtwapa Bridge, it spans a deep creek, carrying the normal traffic expected on a main road. The maximum permitted load is 40 tons, and with a total span of over 500 feet, it provides a good example of the economy of bridging material that can be effected by this type of construction.

From this aspect alone it should be of interest to RE officers. In addition however, it shows how to achieve a span of some 360 feet at a reasonable load class, without the use of intermediate piers. This can be a factor of great importance when crossing rivers liable to heavy flash floods. Most readers will be well aware of the swift and impressive destruction that can be caused by this kind of hazard.

The general construction can be seen from Photo 1. There are fifty-two bays in all from bank seat to bank seat, making up a central suspended section and two ramps. At the towers, the bridge is supported on rocker bearings as shown in Photo 2.

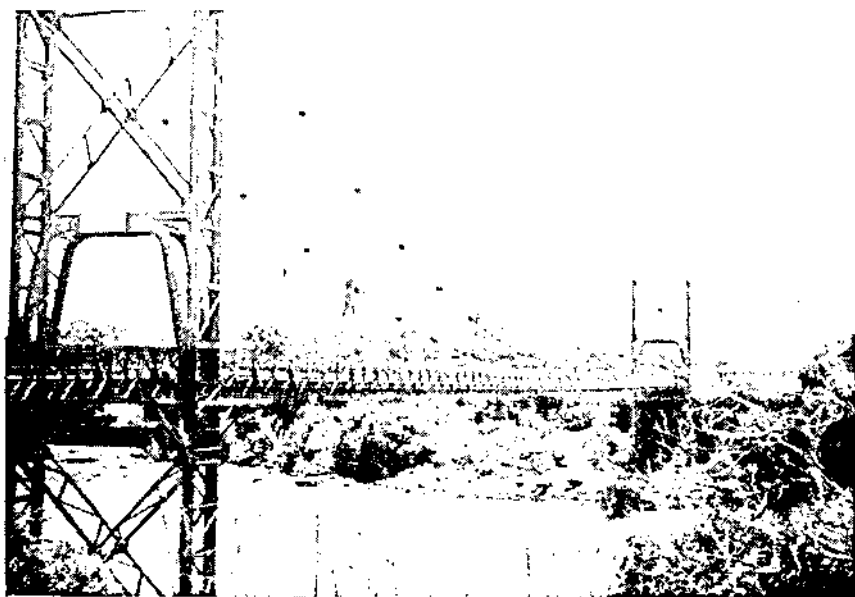


Photo 1. General view showing construction.

## SOUTH RAMP

Consists of five bays of double single. The two bays nearest to the tower have reinforced top and bottom chords. The reason for doubling the chords on only these two bays is somewhat obscure.



**Bailey Bridging In Kenya 1**



**Photo 2.** Showing rocker bearings.



**Photo 3.** Showing steel line anchor ropes.

## Bailey Bridging In Kenya 2,3





**Photo 4.** Slings and decking.



**Photo 5.** Approach from one end.

## **Bailey Bridging In Kenya 4,5**

## CENTRE SUSPENDED SECTION

Comprises thirty-six bays of single single. Every panel has reinforced top and bottom chords. Counting from each end, the even numbered bays are supported by slings. Thus at the centre, the eighteenth bays from each end are adjacent and are supported.

The suspension on each side is made up of eight 2½-in steel wire ropes firmly anchored in massive concrete blocks, as shown in Photo 3. The whole weight of the centre section appears to be carried by the suspension, as there is very little sag for the length involved. Photos 4 and 5 show the slings, decking, and the approach from one end.

## NORTH RAMP

This has eleven bays of double single. Every panel has reinforced top and bottom chords.

## TRAFFIC

The toll charge varies according to the size of the vehicle. Private cars pay 2s for every crossing. Lorries pay 10s or more. Business appears to be good. Several lorries and cars passed while the author was taking photographs and examining the structure. When heavy vehicles pass, there is a noticeable "wave" of bridging pushed ahead. It is possible that this flexibility may give trouble in high winds. Lateral stability of the towers is good, due no doubt to the splay-out of the suspension wires at each end.

Lights operated by the toll keeper control traffic which, of course, can only flow one way at a time.

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## Tented Camps and Related Works Services Problems in Cyprus

By LIEUT-COLONEL K. R. HASILDON, MA, AMICE, RE (Retd)

*A Critical Review in Retrospect written in March-April 1959*

## INTRODUCTION

TENTED camps are a very dull subject. Yet the tented camps of Cyprus should not be allowed to sink into oblivion without some mention in print. The British Army is forever building temporary camps and of all camps the tented variety is surely the most temporary. Even the Middle East theatre has failed to produce anything more so, although it must be a strong runner for the title of "tent-user record holder". Whether this doubtful privilege is in some mysterious way due to the Bedouin influence is a matter for academic speculation.

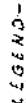
My object in this article is to draw attention to what I consider were important lessons, whether big or small, from a major task imposed upon the Works Services from the spring of 1955 to early 1959. I have not set out to write a history of the tented camps in Cyprus nor an article in the "What we did and how we did it" vein. Nevertheless, to achieve my object, I have naturally had to give an impression of what was done and to describe the background to any problems discussed. This article was written some six months after I had relinquished the appointment of CRE Nicosia, a post which I held from July 1956 until August 1958. I hope that the gap has enabled me to take a more detached view than no doubt I sometimes did in the heat of the moment. Of criticism, I have plenty to offer, indeed who could not have, but I have tried to confine myself to criticisms which may be helpful in similar circumstances in the future. Different climates and different terrains may require different solutions but the basic problems remain much the same whether they arise in a country where strong reinforcements are necessary to aid the civil power or in an advanced base established to meet a minor threat or in a communication zone at the outbreak or threatened outbreak of a global war. Inevitably I have looked at the problems as they faced a military Works Services organization, but in the future, when the Engineer Works Services no longer exist, it may well be that operational urgency will still lead to demands being made upon the Corps of Royal Engineers for assistance on similar tasks.

The construction of permanent cantonments such as those at Episkopi and Dhekelia in Cyprus, inevitably catch the eye of the public far more than the most extensive collection of temporary camps. Thus there is a tendency for the permanent schemes to assume a greater degree of importance in relation to other works than is perhaps justified. In Cyprus, before the Zurich and London Agreements but as late as January 1959, less than one soldier in ten was housed in the permanent cantonments. The vast majority still lived in tented camps of varying standards and in varying degrees of discomfort, with no prospect then in sight of any real change.

It could be claimed that Cyprus has been an exceptional case, unlikely to be repeated elsewhere. This is surely wishful thinking. No one, looking back over the fourteen years since the end of World War II, can seriously believe that there will never be another occasion when a normal overseas garrison will have to be reinforced to deal with the problems of the moment. Indeed the trend must be towards minimum garrisons overseas and a number of small advanced bases at strategic points to which reinforcements can be flown when the occasion demands and there married up with whatever heavy equipment may be necessary for their task. These reinforcements will need accommodating for a period of time which will nearly always be uncertain.

The soldier judges the efficiency of an organization by the way in which it serves him in the place where he finds himself at any given moment. In Cyprus the soldier clamoured for everything that the Works Services could give him and much more that they could not. The RE effort was judged not by what was accomplished for the lucky few who enjoyed modern amenities at Episkopi and Dhekelia—indeed these few were, in many respects, harder to please—but by much more sordid details such as the efficiency of a camp sullage system or the provision of some sort of road while those more remote from the scene were still arguing about necessity.

AUTUMN 1956



Cyprus was a station with two extreme standards of accommodation and nothing in between. From the ultra-modern barracks at Dhekelia with plate-glass doors serving no useful function except as a potential source of barrack damages, it was a far cry to the 160-lb. tents on the Yerolakkos spur, some fitted with crude doorways knocked together from old packing-cases by enterprising soldiery to provide a greater degree of protection from the dust-laden winds sweeping across the Mesaorian Plain.

It is easy enough in retrospect to claim that it was right to spend as little as possible on camps soon to fall into disuse, but was it really a wise or even economic policy? Did tented camps really give value for the money spent? In the end was not the cost greater with less advantage than might have been gained from a bolder policy at the outset? This will forever remain a burning, but probably unanswered, question posed by the Cyprus tented camps. This article contains many controversial points but, if by airing this particular one it in any way helps to prevent the same question from arising in the future, it will have contributed something towards the comfort of the British Army and that, I firmly believe, with due regard for the public economy.

#### THE WORKS ORGANIZATION AND ESTABLISHMENT PROBLEMS

Between 1955 and 1959 the Works Organization in Cyprus underwent many changes, some of which are relevant to this article.

In 1955 CRE Nicosia was, in all but name, CRE Cyprus District. There was also in the island a CE Cyprus, CRE Episkopi and CRE Dhekelia. The latter were in charge of the construction of the new cantonments at Episkopi and Dhekelia, for which CE Cyprus was directly responsible to the War Office.

During 1955-56 CRE Nicosia had become overloaded owing to the influx of troops to cope with the Internal Security situation. In the autumn of 1956 when the Suez crisis added to the works effort required on tented camps, a reduction of work in the Episkopi cantonment made it possible for CRE Episkopi to take over the Limassol and Troodos districts. The strain on CRE Nicosia was further eased in the early autumn of 1957 when CRE Episkopi also took over the Paphos district. The sketch map accompanying this article omits any details in the Limassol and Troodos areas but includes the Paphos district.

As a result of the 1956 reorganization CE Cyprus became CE Cyprus in fact as well as in name and he assumed over-all engineer responsibility for the tented camps programme. It is emphasized that statements in this article referring to work in the CRE Nicosia area do not in most cases embrace the whole island. Although the number of tented camps in CRE Episkopi's area was never large in comparison, it would be misleading and also ungracious in an article on tented camps in Cyprus not to acknowledge the part played by CE Cyprus and not to mention the considerable burden which CRE Episkopi shouldered in addition to his other worries looking after GHQ MELF.

The very fact that it was necessary in 1956 to pass part of the load to CRE Episkopi brings out a weakness in the planning of orders of battle for minor operations. Additional works personnel are essential in the first wave of any large body or other reinforcements moving into an area where they are likely to be staged for some time. Engineer Services reinforcements for Cyprus were requested in 1955 but the demand was not fully met until the Suez crisis

some twelve months later, by which time more were needed. For the 1958 crisis no works reinforcements were sent out and a situation was reached where the RE Works Establishment Cyprus had to find personnel for Jordan at a time when it was already overstretched on its own tasks. Other difficulties included arbitrarily imposed cuts in transport, unrelated to cuts in task, and that other bugbear of tailor-made establishments the absence of any element for leave, sickness or other adversities.

These are but a few of the problems met on the organization and establishment side; they form part of the background against which the RE effort during the Middle East emergencies must be judged. It is to be hoped that they will not be forgotten when plans are being made to meet future crises wherever they may occur, plans which must also take into account the effect of the transfer of the Army Works Services to the new civilian organization.

#### BACKGROUND

If history recorded such details one would doubtless find that temporary camps have been seen in Cyprus for centuries. Of permanent fortifications there are still many historical remains, one of which, Kyrenia Castle, was used by an infantry company throughout the emergency. The earliest temporary camp still in use was that built by Kitchener at Polemidhia near Limassol. This was partly occupied by 37 Field Engineer Regiment. Kitchener could hardly have believed that in 1959 a Royal Engineer unit would still be using some of the huts he constructed in 1882. Even less would he have believed that those which were used in 1959 as an Officers' Mess, whatever their shortcomings, still provided a far higher standard of Mess than any huts erected in temporary camps in Cyprus between 1955 and 1959.

There still remain traces of camps built during the two World Wars. Some were still in use during the Cyprus Emergency, including one which, until the opening of the new BMH at Dhekelia in the autumn of 1958, was the main military hospital in the island.

After the Second World War the erection of camps seems to have become part of the Cyprus scene. Unfortunately pulling them down again was equally part of it, so that when the years of crisis came, the RE Works Services were for the most part starting from scratch. One camp built for Jewish illegal immigrants formed the nucleus of a camp for Internal Security troops, but generally it was not until 1958 that there appears to have been any thought of retaining camps on a care and maintenance basis in case of future crises.

The Cyprus tented camp was really born in Egypt. When the birth took place and who presided over it I know not, but under the heading of "MELF Scales of Accommodation" are to be found three scales of tented camps christened, with the usual flair of parents for originality, A, B and C. Scale A was for short-term occupation of a transit nature and was quite simply a Middle East version of the relevant portion of *Military Engineering* Vol VII. Scale B was an expansion of Scale A for a slightly longer occupation, while Scale C was virtually for semi-permanent occupation and provided for a hutted camp excluding sleeping accommodation. This was in tents on concrete bases. Electricity was provided in conduit rising from the centre of the tent bases. Whether or not the parents of MELF Scale C really intended such camps for semi-permanent occupation even in Egypt is open to question but the effect of accepting tents in this Scale was the beginning of a disease of the mind which might well be known as "Tentitis".

It was a disease which should have been eradicated at the outset. Instead it was treated by giving the patient palliatives which at any given time were cheap compared with the cost of effecting a cure. As with all palliative treatment there comes a time when the patient gets used to the dose and it has to be increased or modified. The bill mounts and, at the end of it all, one is often still left with a sick patient. This is precisely what happened when "tenthitis" reached Cyprus, where the political uncertainty provided perfect conditions for the spread of the disease.

"Tenthitis" came to the island with the evacuation of British troops from Egypt. Units moving to Cyprus which were to become part of the permanent garrison but for which the cantonments of Episkopi and Dhekelia were not then ready were put into MELF Scale C camps. The planned life of these camps was, I believe, three years. Most of them exist after five years and I fear that some will exist still longer.

Setting aside for the moment the suitability, or otherwise, of tents as semi-permanent sleeping accommodation in Cyprus, then MELF Scale C camps were of a reasonably high standard, far superior in most respects to those which were to follow.

#### THE CRITICAL YEARS, 1955 TO 1958

On 1 April 1955 EOKA launched their campaign of violence. During the summer military reinforcements were rushed to Cyprus with the usual minimum notice. When the RE Works Services set about the task of constructing temporary camps to house them, they turned for guidance to the ready prepared MELF Scale A.

The snag with MELF Scale A, and it is also a snag with *ME* Vol. VII, is that it is not simple enough for the circumstances in which it is likely to be used. It requires a little bit of elementary mathematics and a lot of paper work on the stores side. But before even the mathematics can start certain factors, such as the number of troops to be accommodated, have to be known with rather more accuracy than they generally are. When such factors have to be guessed, there is no point at all in slowing up the operation whilst accurate calculations are made of such details as the foot run of ablution benches required. So it was that Cyprus Scale A was born. It was nothing more than a simplified MELF Scale A and divided camp structures in 80-, 120- and 150-man units. RE Workshops and Stores were geared to the same system and it worked very well indeed. Later it was simplified still further by cutting out all variations and standardizing on 120-man units. This was admirable provided that those on the site remembered that certain items required in a 120-man camp were not required to be erected in six times that quantity in a 720-man camp. A table was produced showing the different requirements for multiples of 120-man units but when camps were required in a hurry it was found simpler for RE Workshops and Stores to concentrate on 120-man units. This meant that the Garrison Engineer or Clerk of Works had a small problem to work out while the job was progressing but it was far better than delaying the start whilst more precise demands were prepared and met. Subsequent collection of surplus items avoided most of the waste which could have resulted from standardization, but time lost by not standardizing could never have been recovered. The table to which reference has just been made is reproduced at Annexure A.

The feat accomplished by the RE Works Services in Cyprus in the summer of 1955 was colossal, but it was only the beginning. Throughout the critical years they persevered with an unending and thankless task. The camps they built, added to, took down, rebuilt, added to again, improved, maintained and repaired, were not works of beauty rewarding to the eye, nor were they even satisfying to those that had to live in them. Yet without the work of that hard pressed and oft-maligned body of men, terrorism could not have been subdued, and the mounting of the Suez operation, the sending of aid to Oman and to Jordan, would all have been more complicated.

The reinforcements that arrived in the summer of 1955 were clearly likely to remain throughout the winter. Cyprus Scale A was quite inadequate for more than a few months even in summer. Accordingly no sooner was the first panic over than short term plans for improving the camps were launched. Cyprus Scale B was born. It was never possible to say exactly what the make-up of Cyprus Scale B was as it was continually changing, but I have done my best to describe it later in this article under the heading of "The Cyprus Scales and Phases of Development". It would have been more correct to christen it "Topsy" for, like Topsy, she grew.

Scale A was an operational necessity. Scale B was an administrative necessity and for some unknown reason the British Army never seems to tackle its administrative problems with quite the same sense of urgency. Nor unfortunately does the lack of a sense of urgency always result in clear sightedness.

When a decision to build is finally taken, everyone views with the greatest concern any delays by the RE, however unavoidable they may be, but the time that is wasted in reaching a firm plan and still further the time that it takes to get that plan approved with the necessary financial backing is appalling. Not entirely without justification the Army is very ready to blame the financiers for these delays. Yet often a major cause is the lack of a long-term G appreciation on which the administrative plan can be based, or, in the absence of such an appreciation, far too little allowance by the administrative planners for inevitable changes in the G plot, particularly when this is likely to be affected by political considerations.

From 1955 to 1958 accommodation planning in Cyprus was bedevilled by the uncertainties of the political situation and this was consistently put forward as an excuse for tolerating a low standard of accommodation. Was it a good excuse? Politics are always uncertain and the Army must make allowances and plan accordingly. From the outset what was lacking in Cyprus was a bold imaginative administrative plan to cover as many contingencies as possible. True, this called for a MK V Star Crystal *par excellence* but far-sighted vision is the hall mark of good administration. It is too much to hope that a plan can be made which, in retrospect, will not be proved wrong in some degree, but to have no long-term plan is surely never right. In the end the latter course nearly always proves costly with nothing to show for it.

The short-term plans, made in the second half of 1955, suffered the usual delays in the approval stage and by the summer of 1956 all the camps erected in 1955 had still not been "winterized". Nevertheless the work was easing off, and the effort was even found to pull down one of the temporary camps for which "no further use was foreseen", a task which was satisfactorily completed one week before Colonel Nasser decided that the Suez Canal belonged to Egypt.



The Suez crisis broke during the hottest summer known in Cyprus for many years with shade temperatures reaching 115°F in the Nicosia area. Troops poured into the Island including a French brigade. The RE Works Services had but seven days' warning of the arrival of this brigade for which a site was selected at Pyroi, some fourteen miles south of Nicosia.

The erection of this camp, initially to Scale A, was a typical all-out effort, at a time when the RE resources were already fully stretched by any normal standards. The camp was erected mainly by directly employed labour, recruited in a somewhat unorthodox manner by rounding up the local village buses and then, with the aid of the bus drivers, rounding up the labour until the buses were full. It was a case of the end justifying the means. In spite of curfews, work continued night and day and the camp was ready on time. Success was achieved very largely, I think, because the team in charge had the know-how. Most of them had done it before in 1955 and all of them had gained experience with the influx of British troops a few weeks before the French.

As the autumn approached and the Suez crisis marked time, thoughts turned to improvements for the winter. These were duly approved after the usual arguments but were not finished before the whole Suez affair was ended and, in addition, EOKA had declared a truce on the Cyprus front.

Although the French brigade left Cyprus and there was a considerable run down of British troops, there still remained a larger garrison than before and some of the camps built for Suez assumed a semi-permanent role. Most of the rest were sold *in situ* for disposal but a few were pulled down to recover as much material as possible for re-erection by unit self-help in other camps.

The EOKA truce proved genuine in so far as it meant that attacks on British persons were called off and by April 1957 there was much talk of further reducing the size of the garrison. Some reduction was made but it was never cut down to the size then forecast. Plans further to improve camps were hatched out during the early summer, limited to only those camps likely to be required in the reduced garrison. In spite of this cautious approach, approval was a long time coming, with the result that the programme was still far from complete by the summer of 1958. How much better it would have been for that programme to have been completed by the end of 1957 so that the troops could have enjoyed for longer the additional amenities which the taxpayer eventually provided! Such delays do not save money; they are economically wasteful because the useful life of the accommodation is shortened. When a need exists and will sooner or later have to be met, delay is the enemy of true economy. Sometimes apparent economy may be achieved because part of the need disappears during the delay, but who can measure the cost of the delay in terms of frustration, lowering of morale, damaged stores and vehicles? All these plus the reduced useful life must be taken into account before there is any joy over one penny that has been saved by delaying tactics.

The summer of 1958 brought the Lebanon crisis, a worsening internal security situation and, as a result, another rapid build up of troops in Cyprus. It also brought the Macmillan plan and with it a target of seven years in which to resolve the Cyprus problem. If subsequent events called "miracles" by some, have proved that seven years was a pessimistic view in so far as it forecast the presence of large numbers of British troops in Cyprus

for such a period, it was at least a forecast upon which plans could be made. For the moment, however, the RE Works Services were once again faced with the task of building at short notice more temporary camps to meet the immediate situation. As before the numbers for which accommodation had to be planned were constantly changing. Indeed information seems to have been unnecessarily vague on occasions, due no doubt to a misguided sense of security somewhere. It is a fact that on one occasion wanted information concerning the probable date of arrival of the future occupants of a camp already under construction was obtained by listening to the BBC news.

For the 1958 build up, camps were re-erected on no less than six sites in the Nicosia area which had previously been occupied during the Suez crisis. Three of these had been completely cleared. Two others had been so encroached upon that a considerable amount of new work was necessary, but the sixth was a gift to which I shall refer later.

The lesson was not lost this time and when the Lebanon crisis was over some camps were retained on a care and maintenance basis against a future similar build up. Alas, the lesson may have been learned one crisis too late, for some of the camps retained in the Nicosia area are unlikely to be tenable after the withdrawal of troops to the British cantonments and other enclaves.

#### THE CYPRUS SCALES AND PHASES OF DEVELOPMENT

The various stages into which camp development fell in Cyprus from the time of the Suez crisis are set out in Annexure B. The details given in this Annexure are for a 720-man major unit camp, but the pattern was the same for all sizes of camps although the number of structures naturally varied. The variations for Scale A only are shown in Annexure A.

The first stage was reasonably clear cut. It comprised the minimum "get you in", that is, ablutions, latrines, cookhouse shelters, water and drainage. Initially in Scale A, latrines were of the bucket type, but in most places deep trench patterns were substituted as soon as possible.

Scale A construction fell into two phases:

Phase I was roughly the work that could be done in a minimum of forty-eight hours and a maximum of one week according to site and the extent to which urgency had to take priority over economy. It covered the erection of cookhouse shelters, swill cages (often used for storing rations and equally suitable for that purpose), the provision of shelters with ablution benches, water points, bucket latrines with canvas screens and urinal troughs. In this phase, drainage work was limited to the simplest method of getting water off the site.

Phase II was the construction of deep trench latrines, digging of soak pits, the provision of grease traps and sometimes the erection of water storage facilities.

There was rarely a hard and fast dividing line between the two phases, but if occupation could be delayed, considerable economies were possible as intermediate expedients such as bucket latrines could be omitted. The provision of water points sometimes required the development of bore holes and the erection of storage tanks. This was one of the more expensive items of Scale A and accounts for the fairly high yardstick for calculating indications of cost.

The second stage was Cyprus Scale B and it was much less closely defined. It consisted of whatever additional amenities were considered by the staff to

be essential for the operational efficiency and morale of the troops upon the assumption that their stay in Cyprus was likely to be prolonged for six months to three years. What was provided varied according to the season of the year and different people's ideas as to the probable life of the camp. This stage was very strongly influenced by financial considerations.

During the years the different phases of development of Scale B received a variety of names. There was Scale B "Winterized" which was often approved just as summer was about to start. There was what amounted to "Summerization" approval all too frequently delayed until there was no hope of completion before the middle of winter. As always everyone underestimated the time taken to get approval.

Both the term "winterized" which was used officially and the unofficial term of "summerization" were eventually scrapped and Scale B work was divided into the phases shown in Annexure B. For the improvements carried out in the post-Suez period, there were four phases although Phases I and II became combined and there was a continuity of work between the first three phases. Annexure B may give the impression that there was a hard and fast dividing line between phases, but this was not so. Apart from the season of the year and the forecast of probable life there were imponderables such as the importance which different commanders attached to different improvements.

The Scale B construction programme in the autumn of 1958 for the camps erected for the Lebanon crisis did not conform exactly with the programme that followed the Suez crisis in 1956-57. The more important changes are indicated by footnotes in Annexure B after Cyprus Scale B, Phase I.

The hutting used in Scale B was of the Nissen pattern except for the odd Romney. In the early stages of camp construction in Cyprus when Scale B "winterized" was first approved, Nissen huts were in short supply and a locally designed hut was produced, which, it was thought, could be erected by unit labour. This was known as the Simmonds hut after its designer. The hut itself was a success but units were less successful in erecting it. Had it been foreseen that in most cases units would not erect their own huts, the design would probably have been slightly different and a better finish might have been obtained. In the Paphos district in the west of the island, the Public Works Department, who acted as agents for the War Department, did modify the design and the results were very satisfactory indeed. By the time the construction programme for the post-Suez period was under way, Nissen huts were available. It must be admitted, however, that they were not ideal structures for buildings such as messes and canteens. A local pattern building with a larger roof span and with proper concrete block walls might have proved just as quick and economical to erect and have been far more suitable.

As I indicated earlier in this article, in 1955 the ultimate for a tented camp was MELF Scale C, and the programme referred to in Annexure B as "Improvements to Scale B Cyprus" was really the beginning of Scale C. A suggestion that this phase should be referred to as "Cyprus Scale C, Phase I" did not receive official approval.

At this point I quote from my handover notes written in July 1958:

"The next stage must be semi-permanent construction and once the idea that semi-permanent camps are necessary has taken root, it is to be fervently hoped that the disease of 'tentitis' from which MELF has suffered for so long will become a thing of the past. The talking phase of this stage has been

reached. Local forms of construction should be considered instead of Nissen huts. Simple designs are required as the installation of complicated equipment or the introduction of architectural embellishments and other niceties will only delay the construction programme and increase the subsequent maintenance problem without greatly improving the comfort of the troops."

Alas, I was wrong—the next stage was not to be semi-permanent, but another phase of Scale B known as "Phase IV Improvements". It was never implemented because the Cyprus settlement changed all plans. It carried Cyprus Scale B far beyond MELF Scale C in some respects and for the first time, part of the programme was also to be applicable to MELF Scale C camps.

#### THE MAGNITUDE

Although this article does not aim to be a record of camp construction in Cyprus it would be incomplete unless it contained some indication of the magnitude of the work undertaken. A general impression can be obtained from the accompanying sketch map showing the number and location of camps in the CRE Nicosia area at the peak period in the autumn of 1956. The following table gives the totals divided into types of construction:

Size	Cyprus Scale A	Cyprus Scale B	MELF Scale C	Hutted or mainly hutted	Mainly hired or requisitioned buildings	Total
Major unit camps for over 480 men	1	15	8	1	—	25
Minor unit camps for between 120 and 480 men	3	35	14	1	4	57
Detachment camps for less than 120 men	2	12	—	2	1	17

At this time nearly all Scale B camps had been brought up to Phase II and Phase III was under way for the majority. The twenty-two MELF Scale C camps and all but one of the hutted camps were constructed prior to the Cyprus Emergency. The remaining seventy-four camps were erected either for the Emergency or for the Suez crisis. Neither the map nor the above table includes camps in the Limassol and Troodos districts as these districts were handed over to CRE Episkopi in August 1956. Camps in the Paphos district are included as they were not handed over until a year later. The Paphos district is the area to the west of the dotted and chain-dotted lines on the map.

It will be observed that there were four hutted camps and five other camps which consisted mainly of hired or requisitioned buildings. Three of these five had camp structures up to Scale B but none of the other items. Of the

huttet camps three were relics of the past and were supplemented with tents. Only one was erected during the Cyprus Emergency. That was at Kantara some 2,000 ft up on the saddle at the east end of the northern mountain range. The site was exposed and subject to driving rain and mist. Field-Marshal Sir John (now Lord) Harding, then Governor and C-in-C, visited the site and ruled that huts must be provided. Unfortunately this precedent did not break the strangle-hold of "tentitis". Yaila, a radio relay station, which was nearly 2,000 ft higher but was perhaps not so lucky with its visitors, remained tented almost to the bitter end.

Another general impression of the extent of the work can be obtained by reference to annual expenditure in the CRE Nicosia area which was as follows:

Financial year	Expenditure arising directly from the Cyprus Emergency, Suez and Lebanon Crises	Other Works Services Expenditure	Total
	£	£	£
1955/56	446,808	1,119,322	1,566,130
1956/57	939,714	418,232	1,357,946
1957/58	209,638	427,162	636,800
1958/59	271,060	515,807	786,867

A word or two of explanation about these figures:

The first column of figures relates not only to the Cyprus Emergency but also to the Suez and Lebanon crises. Whilst they are mainly the cost of camp construction and maintenance during the period of the Emergency, they also contain some expenditure on other works including such items as the construction of light aircraft strips and the erection of kennels for tracker dogs. Maintenance expenditure is only included for the years 1955-56 and 1956-57; for the years 1957-58 and 1958-59, it is contained in the second column of figures. The reason for this will appear later. Expenditure on camps in the Limassol and Troodos districts is included up to August 1956 and in the Paphos district until August 1957. Bills passed by CRE Nicosia for new construction in the Dhekelia cantonment after CRE Dhekelia had been disbanded are not included.

If camps were the major preoccupation of CRE Nicosia, they were not the only problem. The high expenditure on other Works Services in 1955-56 includes the tail end of the construction programme for the re-deployment of troops from the Canal Zone. It was as part of this programme that the MELF Scale C camps were erected. Only a very small proportion of the expenditure in the second column of figures went towards these camps after 1955/6. The remainder was spent mainly on the upkeep of WD installations and WD owned or hired buildings in the area. This was a fairly heavy commitment. In addition to this there were numerous small projects and the odd large one though none of any great magnitude after 1955/6. Nevertheless, the number and variety of such tasks did not allow for much relaxation. They had to take second place during the more intense periods of camp construction and tended to accumulate, with the result that, just when the hard

pressed DCs RE were coming up for air, they would find themselves being chased by dissatisfied customers who felt that they had been neglected for long enough, or by an irate CRE who was becoming increasingly concerned at the slow rate at which the Part II expenditure graph was rising. In the Works Services 'twas ever thus.

### ROADS

The Cyprus Scales made very little provision for roads. I consider this to have been a major omission. Had hatted living accommodation been accepted, then proper roads would automatically have been included. Our forefathers in their wisdom included them as an important item of provision in the second phase of camp construction (see ME Vol VII 1934 Chapter III, Section 11, para 2). They were included in MELF Scale C and were one of the major advantages of that type of camp compared with Cyprus Scale B. Their absence was doubtless due to the fact that many camp sites in Cyprus were passable without any roads for most of the year and a little bit of hard core made do for the rest. This was financially attractive as the hard-core could be laid by unit labour at no apparent cost. Whether or not it was a financially sound policy is open to question. The cost measured in terms of wear and tear of vehicles over these rough roads must have been very considerable and the dust was well nigh unbearable throughout the long dry summers.

### GREASE TRAPS

The standard design for wooden grease traps was found to be useless after a very short period. The surrounding ground became foul and attracted flies. Unless a camp was likely to be occupied for a very short time indeed, and by that I mean nothing longer than one month, then it was better to start off straight away with concrete or rendered concrete block grease traps. They were usually constructed *in situ*. There was a good case for prefabricated concrete traps but the Cypriots produced very poor quality concrete unless they were constantly supervised, for which the works organization had not the staff. Precast concrete traps are far less portable than wooden ones but I think that there is a case for the former type to be held in RE Stores Depots in overseas theatres as part of the stockpile of camp structures.

### SULLAGE DISPOSAL

The problem of getting rid of dirty water was sometimes as difficult as getting clean water to a camp in the first place. Soak pits proved unpredictable and at many sites failed to soak for long. Enormous sums were paid out by the Barrack Services for pumping out. It was a messy and malodorous operation and all too often because of curfews, strikes and other labour difficulties, pits were allowed to overflow, causing an even more unpleasant nuisance.

The installation of sullage disposal plants in some camps was included in "Improvements to Scale B Cyprus". In retrospect, on economic as well as on hygienic grounds, very serious consideration should have been given to their inclusion in a much earlier phase. That they were not, may have been due to the fact that pumping out, like the cost of tents, was not chargeable to Vote 8A. The false economy of soak pits was not, therefore, appreciated as soon as it might have been.

## LATRINES AND WATER BORNE SEWAGE

Water borne sewage was not included in any camp scales in Cyprus, nor is it normal to consider it for tented camps anywhere. But the Cyprus tented camps were not normal and it is for consideration whether, in the mid-twentieth century, the British Army should accept that soldiers should live for three years in camps which are without main drainage. Where there is insufficient water as was sometimes the case in Cyprus, then deep trench latrines may be the best solution, but where there is a sufficiency of water does economy justify the toleration of such primitive conditions?

Earlier in this article I referred to a camp which was a gift. This was the ex-detainee camp at Pyroi. When the French Brigade left Cyprus after the Suez affair, their camps were sold *in situ* except for a corner in the Pyroi group which was taken over by the Cyprus Government as a rehabilitation centre for detainees released during the 1957 truce. Water borne sewage was but one of the many luxuries installed and when, in the summer of 1958, the camp was handed back to the military authorities for reinforcements for the Lebanon crisis, it was, from the construction aspect, by far the best temporary camp in Cyprus occupied by British troops.

It is significant that, in preparing for the transfer of sovereignty to the new republic of Cyprus, the Army is considering plans for taking over two much larger ex-detainee camps near Dhekelia. It may also be mentioned that one of these camps and another like it near Nicosia were only constructed in the autumn of 1958. If the Cyprus Government could be so bold about temporary construction at that time, why was the British Army still clinging to a policy of improvements to tented camps with no thought of including water borne sewage among the improvements?

The Cyprus Government was also bold in its construction programme for police accommodation, but in this case a long term policy was clearly far less of a gamble and a comparison with the Army's problem would not be justified.

On the economic side it is worth remembering that a sewage scheme will usually solve also the problem of the disposal of sullage. The cost of water borne sewage would have varied according to the degree of treatment necessary. At most camp sites I think that large septic tanks and filter beds would have met the case and the cost of these would have been partly offset by reducing the number of sullage disposal schemes.

The deep trench latrines constructed in Cyprus filled up in two to three years. Their replacement became a constant source of expenditure against Part III funds. To replace them out of Part III funds was a doubtful interpretation of the provision of Regulations for Engineer Works Services, but this course was often forced upon the RE because of the exceedingly tight financial control exercised over even minor new works in the tented camps.

Much trouble was experienced in the early days in providing a latrine superstructure which was really hygienic. Eventually a very simple design of inverted funnel was developed which was fitted immediately below the seat. It should be adopted as a standard part of a deep trench latrine camp structure.

## ELECTRICITY

In a tented camp electric light is probably the most important of all amenities and it was given high priority in Cyprus Scale B. Two hundred and thirty volts AC was the standard supply and this was never really safe.

Initially supply lines were strung from tent to tent, a quick and comparatively cheap method, but very dangerous. Ultimately the standard adopted was a direct lead into each tent from the nearest pole. Usually one pole fed four or six tents but if the tent layout was allowed to be determined by the RE it was possible to feed eight tents from one pole without any line passing over a tent. Obviously even more economical pole arrangements were possible but they would have been uneconomical in tent space.

To guard against the inevitable tampering with fuses, sealed fuse boxes were normally provided for groups of tents. Nevertheless whenever there was a tent fire, an attempt was made to blame the electric wiring. It was extraordinary how many people believed that a burnt-out fuse found after a fire was proof that a short circuit caused the fire.

For the internal wiring of the tents, standard fittings were made which were screwed to the tent pole or poles. The fitting consisted of a long horizontal batten on which the electric light sockets were fixed and a short vertical batten attached carrying the switches with a 13 amp three-pin plug fused for 2 amps only. (See Photo 1.)

The use of unauthorized electrical appliances is something which can never be stopped except by extremely good discipline. Most units would not enforce this degree of discipline because their prime interest was the comfort and morale of their troops. If a power plug was not provided then every conceivable type of adapter, some extremely primitive and dangerous, soon appeared. It was better to recognize this and to provide a power plug in each tent. There were still abuses but the risks were less.

There is only one really safe answer to electricity in tents, and that is low voltages. Step-down transformers to 50 or even 25 volts should have been provided in Cyprus in large numbers. Such a low voltage would also have gone a long way towards stopping the use of unauthorized appliances. Whether or not there were reasons other than economy for not providing step-down transformers I do not know, but it was an omission that cost at least one life to my knowledge and it was very lucky that there were not more fatal accidents.

Apart from step-down transformers, there was a crying need for prick through fittings and flat TRS cable so that temporary lighting could be provided very quickly in tent lines until such time as tent lighting could be installed.

Finally Cyprus illustrated that there is a strong case for all tents to be manufactured with proper inlet points for electric wiring.

#### COOKING RANGES

Since the coal burning range ceased to be the principal Army medium of cooking, there has not been a satisfactory range which is soldier proof. In the Middle East oil is naturally the normal source of heat but the Army has not yet been provided with a good oil burner that is really simple to operate. Except for a few experimental kitchens, the Cyprus burner was used everywhere, both in cooking ranges and hot-water boilers. It was messy, often choked up or sooted up the flue; it gave too intense a heat unless very carefully controlled, resulting in a very heavy rate of replacement of burnt-out ranges; but it had one very good point—it was simple. The Army Catering Corps does not seem to give nearly enough instruction on the control of oil burners; until it does, the more elaborate and theoretically more satisfactory burners sometimes provided are a waste of public money.



The spares backing for ranges was hopelessly inadequate, even had wastage of range tops been normal. Unfortunately local casting was never able to make good the deficiency. The result was a bigger turnover of complete ranges than should have been the case.

I have no doubt that there has been considerable research on suitable cooking equipment for the modern Army, but the equipment so far provided seems to make insufficient allowance for average conditions and, in particular, the average standard of cookhouse staff.

#### FLYPROOFING

One summer in Cyprus was enough to teach a unit that flyproofing could be overdone. Apart from the difficulty of properly flyproofing most camp structures, flywire in a cookhouse very quickly became clogged with soot from the oil burners. This made the cookhouse dark and further restricted the flow of air which was absolutely essential during the hot months if the combined effect of the sun and red-hot cooking ranges was not to make the whole place an inferno. Even with every possible bit of ventilation, the heat was quite the best flyproofing medium, but it was not always easy to persuade units that this was so until they had experienced a summer.

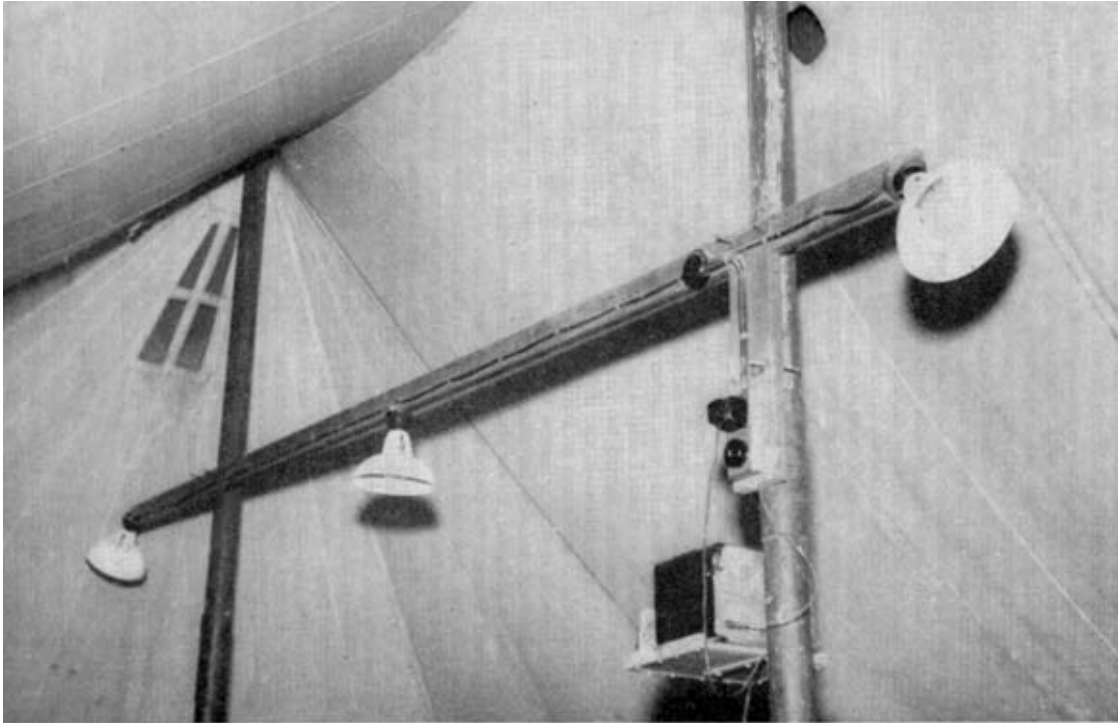
Flies were troublesome in the spring and autumn but they are not nearly such a menace in Cyprus as in many other parts of the Middle East. The best solution was to build the cookhouse separate from the preparation rooms and flyproof the latter, including food stores. In the latest camps this was carried out in Scale B, Phases I and II, but in the earlier camps it was not introduced until the phase "Improvements to Scale B".

Generally flyproofing was confined to preparation rooms and food stores. Undoubtedly the most useful structures for keeping down flies in the area of camp cookhouses were the swill cages provided in Scale A. Dining-rooms were sometimes flyproofed but there was never a definite policy on this. Units held different views on the subject and those that wanted their dining-rooms flyproofed usually managed, with RE help, to get them done.

#### LABOUR

In Cyprus, camps were erected with every variety of labour, directly employed, contract, Public Works Department acting on an agency basis, and military labour varying from infantry to pioneers and sappers. The field engineer units stationed in Cyprus were 37 Field Engineer Regiment and, until December 1957, 3 Field Squadron. The latter was under control of CRE Nicosia for work until its inclusion in the order of battle for the Port Said landings. After its return from Port Said until its departure for the United Kingdom, its role in Cyprus was operational but it continued to give CRE Nicosia valuable assistance from time to time. 37 Field Engineer Regiment formed part of the Middle East reserve and as such was always liable for duties outside Cyprus. CE Cyprus assumed responsibility for all its activities in Cyprus from the time of the Suez crisis in 1956 until the autumn of 1958, when control again reverted to CE MELF. The Regiment was called upon to assist the Works Services from time to time but for the most part was engaged in training or on operational duties.

Apart from special tasks, calls were made upon RE field units mainly for Scale A work and, to a much lesser extent, during the early phases of Scale B. If their standard of workmanship was not always very high, this was offset by



**Tented Camps And Related works services problems 1**

their ability to organize and supervise the tasks allotted to them and so relieve the strain on the RE Works Services. The standard was highest when an RE unit could be made responsible for construction work for its own formation as was the case with 9 Parachute Squadron during both the Suez and the Lebanon crises. This squadron's use of RT communications for organizing stores was a particularly valuable asset.

Although some RE tradesmen were very usefully employed on isolated jobs, unit tasks were normally allotted and it would have been a great mistake to have done otherwise. Generally I would say that help from RE field units was invaluable for the Scale A stage when time was short, but to be of real value for other work they needed to be available for longer periods than was usually possible so that the experience gained bore fruit.

518 Company Royal Pioneer Corps was at the disposal of the Works Services in Cyprus from the autumn of 1956 onwards and they were joined by 524 Company in August 1958. The pioneers were invaluable. Their services were much sought after by others, but attempts to take them off RE work were usually resisted successfully. It is important to remember that although Pioneer companies divide into sections for work, their officer strength and administrative staff are small and it is not practicable to split them into large numbers of detachments living all over the countryside.

The work which other units could do for themselves was limited. Both the Q staff and the financiers were forever trying to get work done on a no-cost basis, a matter to which I shall refer again, and the principle of unit self-help was sometimes carried too far. What a unit could do to help itself depended on its tradesmen and the extent to which it was occupied in its normal role. A static unit on a tailor-made establishment could usually do very little. If it were otherwise then there was something wrong with its establishment. Infantry battalions were able to do quite a lot, particularly those that had good pioneer platoons, but in Cyprus unit self-help was never allowed to reach the proportions which once came to my notice elsewhere when a static unit tried to justify a works section in its establishment.

Some unit tradesmen were a menace although they may have had considerable skill in their proper sphere. Of these the electrician was the one who had to be most carefully watched; an expert on vehicle wiring usually had very little knowledge of mains electricity supply.

Whatever the tasks and whatever the forms of labour employed they required proper supervision. Some field engineers were very ready to take on interesting projects on behalf of the Works Services but when their labours were directed towards more mundane tasks, they showed a regrettable tendency to take no pride in the results. This is a tendency which cannot be too strongly condemned, and I cannot leave this subject without a plea to RE officers who may find themselves concerned with camp construction, to remember that the standard of workmanship is always important even though speed may take first priority. The need for the latter at the time of construction will be forgotten soon afterwards, but bad workmanship remains in evidence and provides a ready source of criticism.

#### PLANT

Plant was always in great demand and there was rarely enough. The shortage was partly due to insufficient holdings, partly to lack of operators and partly to inadequate base repair facilities. The supply of compressors

and compressor tools was woefully short at times of crisis. Nearly every tent peg hole had to be drilled; dannert perimeter fences, of which there were many miles in Cyprus, could not be properly erected in many places without drilling; soak pits, deep trench latrines and drainage runs in rock, all competed in the demand for compressors. In these circumstances there were never anything like enough to go round. At such times, for Cyprus to be told that the theatre had its full scale of compressors, showed either a woeful lack of appreciation of its needs or else unrealistic scaling.

#### CONCRETE BASES AND PRECAST SLABS

Cyprus Scale B included a large number of precast concrete slabs. Originally these were provided for cookhouse, ablution and dining tent floors; later they were issued for living tents. Some units used them extensively for paths. Complaints that a unit had too few were common but I never heard a unit complain that it had too many.

Experience showed that slabs in cookhouses and ablutions were a mistake as they did not provide a water-proof seal and the ground beneath soon became offensive, particularly in cookhouses where the water was greasy. In 1958, when Scale B work was put in hand for the new camps erected for the Lebanon crisis, the policy was changed and cast *in situ* concrete bases were put down in all structures. Precast slabs were still used in tents. There were three reasons for using precast slabs in preference to *in situ* bases. Firstly, they could be laid by unit labour. Secondly, they were recoverable and thirdly, there were constant changes in the pattern of tents provided. All the MELF Scale C camps erected before 1955/6 had concrete tent bases for IPP Mk II tents. The IPP Mk III fitted badly on to the same base and the Korcan tent did not fit at all. The first design of slab was 2 ft square by 2 in deep unreinforced. There was a very high percentage of breakages but even the broken slabs had their uses. However breakages reduced the recoverable value. Later a 2 ft by 12 ft by 2 in deep lightly reinforced slab was produced, which, though a little more expensive, was far more satisfactory. The change in size made them lighter to handle and also avoided the necessity for half slabs when trying to lay bases for some sizes of tents. If there was any doubt as to their recoverability, proof of the ease with which they could be removed was only too well demonstrated when a unit moved into a camp from which the previous unit had departed for another location. There was not a single slab left in the camp!

#### ILLUSTRATIONS

The accompanying aerial photograph (Photo 2) illustrates some of the points I have made.

It was taken in June 1957 and shows Imjin Camp in the immediate foreground, one of four camps for three major units and one minor unit originally erected for the Suez crisis at Kermia on the outskirts of Nicosia. During the Lebanon crisis in 1958 an additional major and minor unit were also encamped in this area. Imjin Camp was occupied by an infantry battalion. In the middle distance is Wellesley Camp also occupied by an infantry battalion and in the far distance Bruneval Camp, occupied by a light anti-aircraft regiment moved in to Cyprus for its proper role but used in an infantry role during the Cyprus troubles. Near the top left hand corner not very clearly visible is a light aircraft strip constructed at great speed during the Suez emergency on a partly prepared site.

At the time of the photograph work was in hand to bring Imjin Camp up to Scale B, Phase IV. The 16-ft Nissens forming part of the Phases III and IV programmes stand out well, so also in the left middle-distance, the 24-ft Nissen amenity hut erected in Phase I. Beyond and to the right of the 24-ft Nissen is the Romney dining hall (Phase IV). The original camp structures are less obvious. The electricity distribution poles are just discernible. They are widely spaced as the practice at that time was to string the cables from tent to tent. It may be noticed that the camp already had two types of living tents, the 160 lb and the IPP Mk III.

Very noticeable is the tarmacking of a considerable part of the road network. Imjin Camp was one of the few lucky ones in this respect. The Kermia Estate had already let their contract for roadwork when the site was requisitioned in the summer of 1956. When they applied for permission to carry on with the work in the spring of 1957, it was readily granted. Would that more camps had been so luckily sited.

Wellesley Camp, which was as far developed as Imjin Camp, was vacated and completely demolished at the end of 1957. For the Lebanon crisis in the summer of 1958 the site was reoccupied and the camp partly rebuilt. A sad story.

#### FINANCIAL CONTROL

Although at times activities in Cyprus were very much on a war footing, peace-time accounting remained in force throughout. Purely from the accounting point of view this was no great trouble although at times the DCs RE and their finance clerks were grossly overworked in their attempts to keep pace. The financial control that goes with peace accounting was a more troublesome matter and at times was very unrealistic.

Generally speaking considerable freedom of action was permitted during periods of crisis when Scale A camps were under construction. The trouble arose later when, for goodness knows what reason, detailed breakdowns of expenditure were requested which could not be readily extracted from construction accounts. The Works Services simply had not got the staff to carry out some of the research which would have been necessary to answer all the queries. The demands seemed to be made without the slightest consideration for the fact that accounting for current work could not be put on one side whilst delving for details of some past expenditure.

There was need for more foresight regarding what details were likely to be required later. The accounts could then have been kept in a convenient form to produce the answers more easily. The form of the normal construction account is not beyond criticism and does not always readily provide details subsequently demanded, but the financial experts should advise and not leave the RE to guess in what way the form of the account should be amended either permanently or in any particular set of circumstances.

Most Scale A and B camps were charged to a single Part I service, although the Suez and Lebanon crises both brought exceptions to this rule. As a result, any additional work other than maintenance was in effect an increase in the scope of a Part I service and after 1956/7 the maximum powers delegated to GHQ MELF were normally £250 for any one increase in scope. Such a small limit was bound to cause difficulties and ways round these difficulties had to be found. Approvals were issued on a TAE basis instead of TCE. Services were charged to maintenance when more correctly they should have been



**Photo 2.**—Imjin, Wellesley and Bruneval Camps, June 1957.

## Tented Camps And Related works services problems 2

charged to the Part I project. (I have already instanced the construction of new deep trench latrines as an example of this.) Approvals were issued on a "No cost basis". There is no such thing and the financiers, instead of encouraging such steps, should have put things right so that the work could have been approved without recourse to such subterfuges. It was claimed that in its efforts to help, the Command Secretary's department bent over backwards. I am sure that this claim was justified, but bending over backwards is an unnatural posture and it should not have been necessary to go in for such forms of contortion.

The job of the Sappers and the Command Secretary was to provide the best they could for the troops with due regard for the public economy and if that entailed subterfuges or bending over backwards then it was a sure sign that the degree of financial control imposed was inappropriate to the task in hand.

There were two major changes of financial policy in midstream. The first concerned the keeping of separate construction accounts for each camp. When the Cyprus Emergency started this was said to be unnecessary. Before the year was out separate accounts were demanded. This happened before my time and I do not know whether the demand for retrospective action was met or not, but subsequently separate accounts for each camp were always kept no matter what was said to be necessary. The second concerned the charging of maintenance costs. Up to 31 March 1957 these were debited to the Part I Service, not such an odd course as it may seem because all expenditure arising from the Emergency was the subject of financial adjustment between the British and Cyprus Governments. Suddenly, during April 1957, it was ruled that all maintenance on camps would in future be a charge against normal Part III funds. Thank goodness this rule was not retrospective for it produced enough trouble without that. Some of the camps were nearly two years old and maintenance was becoming increasingly expensive. The Part III estimates for 1957/8 had not allowed for any maintenance expenditure on the Scale A and B camps. Yet it took time before all concerned could be convinced that this sudden change in financial policy in April 1957 meant a large supplementary estimate for Part III funds. While the argument was going on the Works Services were expected to plan their Part III expenditure upon the assumption that no additional funds would be forthcoming. Had a blind eye not been turned to this, the backlog of maintenance and repairs would have been considerable and it is doubtful whether it could have been overtaken before the end of the financial year; in this case the sum eventually allowed would not have been spent. This was not good financial provision and it was wrong that the Works Services should have had to gamble on the extra funds being made available.

The different standards adopted by different government departments drawing funds from the same Treasury is often paradoxical. There were many instances in Cyprus, but I will mention only two.

The first was in the MELF Scale C camps at Dhickelia and at Salt Lake near Larnaca. There the RE Works Services had to erect some ARCON huts and a prefabricated aluminium hut for another British Government department. The aluminium hut was air conditioned for a special reason and the type of construction was, therefore, probably justified but the ARCON huts housed only offices and equipment. The purpose for which they were built was no more a long term certainty than the retention of a large garrison in Cyprus.

Those who saw these buildings going up might well have been excused for wondering how it was that the Treasury provided money for this standard of hutting when, for the same function, the Army was limited to Nissen hutting and tents.

The second example was to be found in the Cyprus Government detainee camps. It was asking a great deal of British soldiers to live in tented camps and at the same time to do static guard duties over political detainees living in considerable comfort in fully hutted camps with water borne sewage. The detainees were not unnaturally disgruntled with their lot and in no mood to take comfort from the fact that the Cyprus Government, with considerable aid from the British taxpayer, saw fit to pay out large sums of money for their comfort while British soldiers who had to guard them were denied the same standard except for the actual period of their guard duties. The local English papers were forever full of complaints about the living conditions and treatment of the detainees but few articles ever appeared demanding a higher standard of accommodation for the British troops. These were hardly circumstances to help maintain a high morale, and having regard to the large sums provided by the British taxpayer to help meet the cost of the Cyprus Emergency and to the financial adjustments between the two governments, one may ask why a stricter degree of control was exercised over the money spent for the comfort of the British troops than was exercised over the money spent on the Cypriot detainees. It may be observed too that the excuse of political uncertainty did not stop the erection of two very high standard detainee camps as late as the autumn of 1958 which, in the event, were used for only three months.

Few will disagree with the view that many of the financial difficulties met in the Works Services spring from the annual budgetary system. There is one aspect of this that seems to me to have had a particular bearing on the Cyprus temporary camps. I believe that the annual budgetary system is not conducive to a proper appreciation of the true engineering economics of any large project. Few officers in the RE Works Services know how to present a project in this light and I fear that this is also true of many of those who have to do battle with the Treasury on behalf of the Army. The Q staff are apt to regard finance as a mysterious subject which only the Sappers and Command Secretary can understand. It should be included in the curriculum of the Staff College and I am sure that it would not be only the Works Services who would benefit as a result. I have been told that the Treasury is not interested in residual values. I cannot believe that this is true, yet it is a factor all too often ignored when considering the economics of any particular scheme. The Cyprus temporary camps offered a very good example where both probable life and residual values should have been fully considered before the expensive course of improvements to tented camps was undertaken. The life of any single camp was bound to be uncertain in the circumstances, but these very circumstances called for an appreciation in which uncertainty was a major factor. The appreciation should, therefore, have included estimates of net costs for various periods of occupation. This could well have led to a more definite policy in the earlier stages which in the end would have given better value for money.

I have given much thought as to what really is the sum total of my reflections on financial control in Cyprus and I have come to the conclusion that they amount to just this—in my opinion Cyprus offered a very good example



of a set of circumstances in which a less rigid financial control, coupled with a boldly conceived administrative plan, would have yielded handsome dividends.

#### REFLECTIONS OF A CRE

During my time as CRE Nicosia it was natural that I should gradually build up certain dictums regarding the erection of temporary camps. They were almost certainly not new; they were not a comprehensive nor in any way an orderly set of rules. Some of them may seem so obvious or insignificant that it is unnecessary to mention them but they must have seemed important to me at the time for, after two very full years of experience of the problems, I consider that they warrant inclusion as they may be of help to someone faced with a similar task and although they are based on the existing RE Works Organization, I pass them on, in a slightly modified form, for what they are worth.

1. The availability of water, or possibilities of water development, is the most important engineering factor affecting the choice of site and may overrule even tactical or strategic considerations.

2. There must be concentration of effort on the most essential tasks. There are always numerous changes in the G plot and when time is short, if the RE wait for a settled plan, it may be too late. The RE must often decide what is essential, get Q's blessing (see para. 5 below), and get on with it until it is absolutely certain that effort is being wasted. Rarely will this happen. If a camp exists an occupier will usually be found. Another aspect of this is that a great deal of fuss is sometimes made because a particular but not necessarily important detail is outstanding. The works effort must not be switched from one site to another to deal with details nor must available resources be dissipated in attempts to pacify all corners.

3. When the minimum "get you in" work (i.e. Scale A) has been completed and a camp occupied, it is better to disengage completely and concentrate available effort on priority work elsewhere rather than leave part of the team behind to start improvements. If a unit is made to settle in before improvements are started, this will give time for the real snags of the original, often hastily prepared scheme, to be ironed out before too much effort and money has been committed. A good many so-called snags are nothing more than the first reactions of individual commanders.

4. Preliminary rough estimates must not be given off the cuff even under a guise such as the Cyprus invention, "Very rough estimate", happily suppressed in the latter half of 1956. If there is not time to prepare a preliminary rough estimate (and in a crisis there rarely is), an indication of cost must be accepted. It must be based on a simple but wholly adequate yardstick.

5. Memories are notoriously short. What may seem an obvious course of action under the operational conditions pertaining, may not command the support it should in the face of criticism, usually financial, levied long after everyone has forgotten the circumstances. Some form of approval in writing must be issued by the staff before any major work starts. Verbal instructions to make costly changes in the approved scope must be confirmed in writing. Unless these rules are observed there will be attempts to blame the RE for any waste of money which occurs through changes of plan. Official blessing must also be obtained for any major departures from normal practice such as orders on the term contractor in excess of specified limits. Beware, however, of the prevalent tendency to put up too many umbrellas.

6. In the initial stages of a crisis, the available works effort is likely to be the principal limiting factor. Later it will be finance or a combination of finance and the available works effort. This usually necessitates dividing the work into stages and sometimes further sub-dividing the stages into phases. The stages and phases must be clearly defined, otherwise there will be confusion in the minds of everybody and some camps will get overlooked and fall behind the standard of others. For various reasons the actual construction work may not adhere rigidly to a phased programme but this does not lessen the need to have clearly defined stages and phases in the first instance.

7. Changes of plan and other similar forms of interference with site work must be avoided especially during the early stages when time is all important. The old adage applies that "the best is often the enemy of the good". The CRE himself must be very careful not to be the nigger in the woodpile. His job is to get things going and keep them going. He must feed his DCsRE with everything they need and anticipate their next requirement. He must protect them against interference from any quarter, and in particular from being pestered in times of crisis with demands for estimates and reports of expenditure. He must visit sites to chase laggards or to encourage the hard pressed but he must resist any temptation to interfere himself unless things are really going wrong. If the CRE's appearance at a site causes a flurry among the site staff then there is either something radically wrong with the job or else something radically wrong with the CRE.

8. The normal chain of command must be observed. In the flap to get things done, well-meaning but ill-advised staff officers and technical experts are prone to take short cuts and issue orders on site. The E & M staff need particular watching in this respect as clerks of works tend to forget that their immediate master is the GE or DCRE and not the CRE's E & M officer.

9. The same standards must be applied to all camps except where the role of the occupying unit calls for special consideration. A brigade headquarters will usually have a greater need for electricity in the early stages than a battalion, but its officers' mess has no greater need for a refrigerator than a battalion officers' mess, no matter to what extent warm beer does not suit the Brigadier's palate. Senior visiting officers are very prone to give way to particular requests from individual units. The word goes round very quickly and if 1 Loamshires get a refrigerator, then 1 Blankshires will expect the same and, quite wrongly, will blame the RE if they do not get it.

#### TENTS VERSUS SEMI-PERMANENT SLEEPING ACCOMMODATION

I have already posed the question "Did the camp construction policy followed in Cyprus give value for money?" There were many different aspects of the construction programme in which this question arose but most of all it arose from the policy of using tents for sleeping accommodation.

As a portable form of purely temporary accommodation the tent still has no equal. A large number can be carried in the same space as one small caravan. The tent is easy and quick to erect with unskilled labour although less quick to erect satisfactorily on rocky sites if compressors are not available.

After I had been in Cyprus for about six months, I suggested that the tent was out of date and that what the Army needed was a form of collapsible box or caravan without wheels, easily erected by unskilled labour. One comment on this suggestion was that the tent was exactly this. In retrospect I agree

with this comment with one reservation—it must be fitted for electricity. The tent was misused in the Middle East and its unsuitability for semi-permanent use is not a fair reason for criticizing its suitability as short term accommodation. I cannot comment on the comparative virtues of the Twynham hut or the Uniport, both of which have been mentioned as possible replacements for tents, as I have no experience of them. It does seem to me, however, that bulk and susceptibility to damage in transit are likely to make uneconomical any form of easily dismantled hut which would properly fulfil the real role of the tent. The problem must be examined in its true light and not with the eyes blurred by the effects of the Middle East disease of “tentitis”. I think that the conclusions of such an examination would be that, at present, the Army cannot find a better solution than tents for purely temporary sleeping accommodation. Criticism of the use of tents in Cyprus is not a challenge on this score but an economic challenge against the use of tents for prolonged periods.

Before passing on to the economic challenge it is necessary to consider the morale and health factors. Were the morale or health of the troops in Cyprus seriously affected by having to live in tents almost continuously for periods of up to three years? I have discussed this with many commanding officers and generally I have come to the conclusion that the morale of a good unit was not seriously affected so long as the unit was actively engaged in operations. A good unit on active service expects active service conditions. But a unit with a static role is another matter. Commanders of some static units tended to be a little more cautious in claiming that living conditions did not lower morale while others felt strongly that it was affecting their internal recruiting.

In some ways the modern soldier is unbelievably cosseted and coddled. Yet in contrast, he was expected to accept a tent as a satisfactory standard of living accommodation in static conditions for a period of three years in a country where shade temperatures varied from 2° of frost to 114°F. Can it be that the very high standards now demanded in permanent accommodation are an obstacle to a lesser standard in semi-permanent accommodation resulting in a policy of all or nothing?

In general I have come to the conclusion that if tents did not adversely affect the morale in Cyprus, then there is every reason to be thankful and proud of the British soldier's adaptability, but it would be very foolish to assume that recruiting did not suffer at all, nor that the troops would have indefinitely accepted such conditions without some stronger protest than one letter to an MP complaining of leaking tents.

On the score of health, I never heard a single suggestion in two and a half years that living in tents was responsible for any trouble at all. There may have been some ills attributed to this cause but if so they were obviously not serious ones.

When it comes to economics, the tent is a bad loser, but just how bad a loser it is difficult to determine because all attempts to obtain reliable figures of the turnover of tents in Cyprus have failed. In Cyprus some units had 160 lb tents, some IPP Mk II, some IPP Mk III and some Korean pattern. The initial cost and life were different, so too was the standard of comfort afforded. However, on the basis of units' own statements of turnover, it was calculated that simple but semi-permanent barrack rooms of single storey construction with verandahs and fittings to hutted standards in the semi-

tropics, would have been more economical for any period longer than about two years.

As the Cyprus Emergency lasted nearly four years, it would appear that a great deal of money was wasted for want of a bold construction policy. If "Tentitis" had no other ill effect this alone is surely enough reason to make certain that the British Army is never allowed to suffer from another outbreak of the disease.

To make a proper comparison between the economics of tented and semi-permanent structures the following were the main factors which had to be taken into account in Cyprus. Some are obvious, others less obvious.

- (a) Initial cost of tent.
- (b) Average tent life.
- (c) Freight costs.
- (d) Erection costs (military labour) including, on most sites, the cost of drilling holes in the rock for tent pegs and sometimes providing tent supporting frames.
- (e) Cost of pre-cast slabs for tent floor.
- (f) Cost of providing electric light and rewiring every time a tent was changed or the wiring became dangerous through chafing or exposure to climatic extremes.
- (g) Fire risk unless allowed for in (b) and (h).
- (h) High deterioration rate of accommodation stores and personal effects.

Obviously there is room for argument about the allowances to be made for many of these factors and it would be very difficult to prove conclusively that two years was the economical limit for tented camps in Cyprus. Nevertheless, the evidence should be strong enough to commend the subject for detailed economic study.

If further evidence is required, then it is to be found from calculations made at the time when improvements were being considered for Government House camp. Instead of precast slabs, this camp, although not constructed to MELF Scale C, had *in situ* concrete tent bases for IPP Mk II tents. The cost of these tents in Cyprus was £103 each excluding any extras for electricity or supporting frames. It was estimated that huts could have been erected on the existing bases for £150 each. The huts would have been of concrete block construction with corrugated asbestos roofs overhanging sufficiently to provide a measure of protection from the sun in summer and driving rain in winter; they would have had softboard ceilings for coolness and would have been fitted with electricity and ceiling fans but would not have had any frills such as verandahs. The proposed huts would, therefore, have provided a lower standard of accommodation than single storey construction to hutted standards for the semi-tropics but they would have given a much greater degree of protection from the elements than tents and would have had a much longer economic life. When weighing this further evidence against tents, it must be remembered that, starting from scratch, a more economical size of hut would have been selected than one designed to fit on an existing tent base.

One factor which must not be overlooked in the tents versus semi-permanent accommodation argument was whether the potential was available in Cyprus to carry out a construction programme of the size that the latter

would have entailed. A good deal of research would be necessary before a definite answer could be given, but I think that the potential was there provided that the programme of construction was carefully planned for different parts of the island, that there was simplicity in design and that there was a considerable degree of standardization. Complete standardization of forms of construction would have precluded the use of different materials in different localities and might have been a disadvantage.

If detailed examination of this question showed that, even with these provisos, the programme would still have overloaded the island's economy, then prefabricated structures, possibly frames only, such as the ARCON type, should have been obtained from the UK.

Another alternative which could well have been considered was that of turning over the Reema panel factory at Episkopi for the prefabrication of concrete hut frames and panels. (The Reema panel system was the main method of construction for the Episkopi cantonment.)

I am positive that had approval been given to build semi-permanent camps to hutted standards, the way could and would have been found to execute the task in sufficient time to have made it an economically sound decision.

#### MAIN CONCLUSIONS

1. To accommodate troops temporarily during an emergency influx of forces into any country, the scheme adopted in Cyprus of producing camp structures in 120-man units, although slightly wasteful in theory, is the quickest and simplest method.

2. The order of battle for any large body of reinforcements should include in the first wave, works services personnel for any area where the reinforcements are likely to be staged for any length of time. With the new Army works services it must be clearly laid down whether the RE or the civilian organization will provide the additional works personnel required and which is to be responsible for erecting the staging camps.

3. When reinforcements arrive in an area for an indeterminate stay due to political and consequent operational uncertainty, there is need for great administrative foresight. A boldly conceived plan and liberal expenditure in the early days of the Cyprus Emergency would have yielded far greater value for money for an outlay which, if a full and proper costing analysis was made, might well have been less than what was ultimately spent.

4. The Army requires a tented camp policy. It is suggested that this should be that tented camps should never be accepted as the normal form of accommodation for a period of longer than six months unless it can be foreseen with reasonable certainty that the camp will not be required after a period of two years.

5. There is at present no really good substitute for the tent for very short term camps. The tent came into disrepute in the Middle East because the Army misused it as a substitute for semi-permanent accommodation.

6. In any station where theatre reinforcements are likely to be staged at short notice, there is need for what amounts to a stockpile of camps ready for occupation except for the erection of tents. The standard requires to be up to Cyprus Scale B, Phase II.

7. There can hardly ever be justification for *in situ* concrete tent bases. If the anticipated tenancy is sufficiently long to justify *in situ* bases, then it is

also likely to be sufficiently long to justify semi-permanent accommodation on economic as well as other grounds. An exception may arise in camps erected for the purpose described in (6), as the maintenance cost of concrete bases when not in use will be considerably less than that of unoccupied semi-permanent buildings. Even so, pre-cast slabs are to be preferred so as to allow for changes in tent patterns.

8. There is need for an established standard of semi-permanent construction for occupation up to twenty years or as little as  $2\frac{1}{2}$  years. This requires the adoption of prefabricated hutting of a far higher standard than the Nissen hut. It should be of a type, such as the ARCON, which enables the maximum use to be made of local materials whilst ensuring speed of construction with comparatively unskilled labour. It should have a high recoverable value so that, should it not be required by the Army for twenty years, it is worth while to dismantle it rather than sell it *in situ* where its *in situ* value is low. It may be possible to develop a semi-portable type of hut which would meet the requirement but there is a danger that too much emphasis on portability may result merely in a less portable and more expensive form of tent.

9. As a corollary to (8), permanent construction to the standards adopted at Dhekelia and Episkopi should not be embarked upon unless the structures will almost certainly be used for more than twenty years or will have a good sales value if the Army withdraws in less than twenty years. Virtually this may well mean no permanent construction overseas.

10. Adequate powers of approval must always be delegated. In circumstances such as existed in Cyprus a dozen decisions could have been taken while one was referred. Delegation would have saved both staff and paper work and therefore, indirectly, money. Whatever the arguments in favour of centralized control for major projects, it is not the best answer for every set of circumstances. If a continuing service like the Cyprus camps is to be treated as a Part I project, then the normal rules applicable to Part I services must be specially modified to meet the circumstances.

#### ACKNOWLEDGEMENTS

My thanks are due to all those who have in some degree contributed towards this article, not forgetting

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The 1st Battalion The Royal Berkshire Regiment for always allowing me to show their camp as an example of the conditions in which the less fortunate lived and, additionally, for the excellence of their hospitality after we had sped the departing visitors.

Warrant Officer Class I A. D. Fraser and his team in CRE Nicosia's drawing office.

Major E. N. R. Batey, AMICE, AMIStructE, RE (Retd), for his excellent aerial photography.

And last, but by no means least, all those warriors and civilians who, during the critical years, were part of that now rapidly diminishing band, the RE Works Services in Cyprus, but for whose hard work, service and loyalty, these pages could never have been written.



## ANNEXURE B

## STAGES AND PHASES IN THE DEVELOPMENT OF A MAJOR UNIT CAMP IN CYPRUS

## CYPRUS SCALE "A"

*Indication of Cost—£20 per man*

<i>Tents</i>	(a) All ranks accommodation. (b) Stores. (c) Offices. (d) Dining.
<i>Structures</i>	
Cookhouses	Three-sided CGI shelters—separate for Officers, WOs and Sgts and ORs.
Ablutions	Three-sided CGI fitted with ablution benches and a minimum of one cold water tap—separate for WOs and Sgts and ORs.
Latrines	DTL or bucket. CGI roof and hessian sides.
Swill cages	Six flyproofed—at least one was invariably used for food storage.
<i>Services and Ancillaries</i>	
Water	If near to local supply, cold water to ablutions and cookhouses. If not near, then supply by water truck to high level tank. (Theoretically the scale was only one tap per cookhouse and ablution shelter. In practice as many as possible were provided.)
Duckboards	Ninety-six.

## CYPRUS SCALE "B" PHASE I

<i>Structures</i>	
Cookhouses	Structures extended, enclosed and flyproofed (to include ration stores and preparation room). Sinks, with piped water supply, cooking ranges and farm boilers installed. Concrete wash down area added.
Ablutions	Structures enclosed—piped water supply provided to each bench.
Latrines	Hessian screens replaced with CGI.
Bathhouse	Central bathhouse erected with hot and cold showers.
Nisens	One 24 ft. eleven bay amenity hut.
<i>Services and Ancillaries</i>	
Water	Piped supply to all structures where not already installed.
Electricity	To all structures.
Concrete slabs	4,500 ft super for use by unit as required but intended primarily for dining tents, cookhouses and ablutions.
Hardstandings and roads	Materials supplied for construction by unit or other military labour (quantity according to site conditions and existence or otherwise of any roads in the camp area, but approximately 650 cu yds for virgin site).

## NOTES

1. Subsequent experience showed that Phase I must include concrete floors and not slabs for cookhouses, ablution floors and swill cage areas. (The bathhouses were constructed complete with concrete floors.)

2. The latest modification to Phase I was that the existing cookhouse structure was improved to provide ration stores, vegetable store, preparation room and washup, but was not fitted out with cooking equipment. Cooking equipment was provided in Phase II when a separate cookhouse structure was built. The advantage of this was that it kept the heat away from the preparation room etc. Had the latest camps ever reached "Improvements to Scale B Cyprus" this modification would have forestalled the construction of separate cookhouses in that phase.

3. Another modification introduced in 1958 was the construction of separate bathhouses for Officers and WOs and Sgts in Phase I instead of Phase II. The necessity for providing hot water in bathhouses in Phase I depended on the time of year.

4. In a comparatively dry climate like Cyprus, CGI bathhouses had a longer life if they were constructed with the timber studding outside.



## CYPRUS SCALE "B" PHASE II

*Indication of Cost—£5 per man*

<i>Structures</i>	
Bathhouses	Separate bathhouses for Officers and WOs and Sgts with hot and cold showers. (Note: the central bathhouse constructed in Phase I became the ORs bathhouse.)
<i>Services and Ancillaries</i>	
Electricity	To all tents.
Concrete slabs	4,500 ft super intended primarily for store tents.

## CYPRUS SCALE "B" PHASE III

*Indication of Cost—£25 per man*

<i>Nissens</i>	16 ft span—a total of sixty-eight bays to provide:— 6 No five bay op/security huts 1 No ten-bay WOs and Sgts Mess. 1 No eight-bay Officers' Mess. 1 No eight-bay stores. 1 No eight-bay canteen. 1 No four-bay store.
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<i>Services and Ancillaries</i>	
Concrete slabs	2,400 ft super for use by unit as required.

## CYPRUS SCALE "B" PHASE IV

*Indication of Cost—£30 per man*

<i>Nissens</i>	16 ft span—a total of eighty-one bays to provide:— 1 No sixteen-bay welfare hut. 1 No five-bay op/security hut. 1 No six-bay NAAFI kitchen. 1 No four-bay signal/tel exchange. 1 No eight-bay JRC. 1 No eight-bay officers' mess 1 No ten-bay WOs' and Sgts' Mess } additions to 1 No 6-bay MI room with tiled floor. } Phase III 6 No extension of two bays to existing op/security huts. 1 No six-bay cleaning, drying and ironing room. 36 ft span—twelve bays to provide 1 No 95 ft long dining-room.
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*Romney or Nissen*

<i>Services and Ancillaries</i>	
Electricity	External lights (12 No), fans and refrigerators.
Concrete slabs	14,400 ft super for living tents (on scale of 20 ft super per man).
Hardstandings	Approx 600 cu yds of material for laying by unit labour.
Vehicle ramps	2 No of concrete block construction.

## IMPROVEMENTS TO SCALE "B" CYPRUS

(Suggested title—Cyprus Scale "C" Phase I)

*Indication of Cost—£15 per man*

<i>Structures</i>	
Cookhouses	Officers, WOs and Sgts, ORs. New semi-permanent structures to house cooking ranges and farm boilers. Covered way between cookhouses and dining-rooms. ORs only—servery, hot plate, potato peelers, water cooler. Existing cookhouses converted into food preparation rooms and provided with tiled floors.
Bathhouses	Officers, WOs and Sgts, ORs. Slipper baths in existing or extended structures.
Ablutions	Improved drainage and slab floors replaced by concrete (but see Note 1 to Phase I).
Floors generally	Improved as necessary using tiling where this was more economical than taking up and replacing existing floor.
<i>Services and Ancillaries</i>	
Water/electricity	Additional supply where existing services could not meet increased load due to the above proposals.
Sullage	Existing system overhauled and sullage disposal plant installed if absolutely necessary.
Roads	Improved by unit labour assisted by Engr plant.
Paths	Additional slabs laid by unit (Number varied according to site).

## CYPRUS SCALE "B"—PHASE IV IMPROVEMENTS

(This title was extremely confusing. The improvements in this phase were to be additional to those shown in the previous phase. Each camp was to be treated on its merits. The following is a guide as to what might have been expected in a major unit camp had not the Cyprus Agreement intervened.)

## FOR CYPRUS SCALE "B" CAMPS

*Indication of Cost—£40 per man*

- (a) Provision of new JRC consisting of eleven bays of 36 ft span Nissen or Romney and sixteen bays of 24 ft span Nissen.
- (b) Existing eight-bay JRC (see Phase IV) to become QM Store.
- (c) Conversion of any existing huts allotted to NAAFI to provide offices, stores and living accommodation for NAAFI staff as required.
- (d) New QM store—eight-bay 16 ft Nissen.
- (e) Drying and ironing rooms in four bays of 16 ft Nissen additional to that provided under Phase IV which many units had misappropriated.
- (f) Guard room—four bay 16 ft Nissen.
- (g) Wash basins with hot and cold water to be fitted in existing ablutions.
- (h) Tarmac roads and concrete paths.

## FOR MELF SCALE "C" CAMPS

- (a) Improvements to JRC to bring up to the same standard as Cyprus Scale "B" camps.
- (b) Wash basins with hot and cold water to be fitted in existing ablutions.

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## To Dig or Not to Dig

By MAJOR G. H. McCUTCHEON, RE

ONE of the most natural outcomes of any war is that both victor and vanquished are wiser, militarily, for having fought it. That particular platitude, however, needs qualifying; the wisdom is related almost exclusively to the war which has just ended.

Had the Second World War come to an end, as it might have done, by Christmas 1944, it might well have been followed by a bridge-table inquest on tactics as controversial as that which even now rages on strategy. In due course, from the confusion of debate, new tactics would have been evolved. In the case of the 1939-45 war, however, the dropping of the first atom bomb in August 1945 changed all that. The Second World War, in fact, came to an end with an abruptness that stunned all but a few who were able, in some measure, to appreciate what had been achieved. It overwhelmed for a time all those who might have officiated at the inquest on what had gone before.

The use of those two strategic weapons at the very end of one war, in fact, introduced military thinkers, with much drama, to the fundamental problems of any Third World War. What was immediately obvious to all was that the task of providing an adequate defence against this new weapon posed the biggest single problem ever put to those who formulated tactical doctrine. The problem, that of providing protection for the soldier in the field, is still with them.

The reason for this state of affairs, naturally, has very little to do with the scientist. He has long since specified what will protect the soldier in all circumstances. The problem is, in the main, a logistical and tactical one though there are some psychological and morale "angles" which should not be ignored.

The evolution of defensive tactics, quite naturally, has always been at least one step behind the offensive. Peacetime financial restrictions have often resulted in the gap being even wider but, with the advent of nuclear weapons, it did appear, to begin with, that the task was hopeless. The gap was at its widest. Once the first shock had passed, however, it became apparent that some of the old principles still applied. Not every commander could afford to use these very expensive and scarce weapons without being fairly certain of hitting a worthwhile target and an army which was widely dispersed and fast-moving would be a difficult target to "acquire". Equally an army which was well dug in might be easier to locate but, provided it had dug well and dug wisely, it also would be difficult to destroy.

These then were the two most promising solutions. The problem which faced—and still faces—the defence, however, is that these two counters to nuclear attack are, to a great extent, incompatible. An army's function is to fight and win, not merely to survive. To fight, therefore, it must have the highest degree of mobility and, of almost equal importance, its fighting groups must be self-contained and largely self-supporting throughout a tactical phase. The Bank Holiday atmosphere of a last-war L of C is a thing of history.

But even the most mobile of armies in the most fluid of battles must sometimes call a halt. Even if there were no logistic limits, the law of averages, at least, has decreed that no commander will "have it good" every day. One day, inevitably, he will be forced on to the defensive. If he is a commander in a non-aggressor army the chances are that he will, anyhow, start his war in a fairly static role. He will be watching and waiting. If, therefore, for some reason he is on the defensive, what then must he aim to do for the protection of his force?

The commander's task in such a phase, patently, is to ensure the survival of his force as a fighting entity. In order to achieve this there are three measures he can take which will certainly better his chances. He can disperse within the limits of control and logistic discretion; he can try to deceive his opponent as to his own location and strength; he can also decide to dig.

There is much he can do by way of dispersal and deception; neither should cost him greatly in time or labour. The decision to dig, however, poses his most acute dilemma. The more he digs the more he is committed to digging, since the longer he occupies a position the more likely he is to be "acquired" as a target. The greater that probability becomes the greater becomes also the need to provide more elaborate protection against it. Our harassed commander can decide to go on digging in order to provide cover for tiring troops. He can also decide to get out.

This dilemma which we have forced upon the commander, of course, is to a great extent unrealistic. We have assured him of a ready supply of defence stores and the transport to deliver them on site regardless of the theatre of operations. We have assured him of engineer support and advice and we have, of course, assumed that there is time enough available to do the digging before his force is "acquired". We have indeed guaranteed him a successful dig. In fact, we can assure him of nothing more than our advice.

Even if we could guarantee an unending supply of defence stores his staff would still be faced with the problem of moving them. And, if he was always assured of transport and an open L of C would our anxious commander be prepared to give timber and revetting materials a priority above food, fuel and ammunition? And what of our next senior sapper busily

engaged in maintaining a communications network? Would he be prepared to let us have the extra plant which he knew would make no more than a marginal difference to our overall digging time?

Our dilemma as engineer advisers is not nearly so great as our commander's. Our advice would have to be that our plant—assuming it could keep up—would help him with command posts, heavy weapons pits and RAPs only. For the rest it would have to be every man for himself.

It could, of course, be otherwise. Since the invention of the shovel there have been no technical problems involved in digging a hole. There are none nowadays in digging bigger holes more quickly. The problems are simply those of men and machines but these are as insuperable as they are fundamental. Given more machines with more men to drive, maintain and repair them there would be less money for weapons and fewer men to fill the gaps at "the sharp end". The tail, inevitably, would wag the dog.

There is, unfortunately, no complete solution to any military problem, but, as with so many others, this one can be solved partially and to an acceptable degree by moving in the direction of a logical conclusion. To go all the way would be to solve nothing. The fighting soldier can be given some measure of protection by mounting him in a vehicle which is armoured but not shell-proof. This will give a high degree of protection against flash and radiation to all but those in the immediate vicinity of ground zero. It will also give him some protection against blast.

Not all of its passengers will be able to live aboard this vehicle, of course, nor will those who can, always want to be confined within its protecting hull. What then can be done for these latter and for those who must anyhow remain outside to fight? They can do nothing more effective than to dig. And the quicker and deeper they do it the better their chances of survival. The man who lies prone along the bottom of a 3 feet-deep foxhole under the cover of his groundsheet—or mackintosh—will have given himself a high degree of protection against flash and blast provided he is not too close to ground zero. If he can get down to 5 ft. he will have given himself a fair measure of protection against radiation also.

There is little that can be done at present to help any individual to dig his own personal shelter. Considerations of time and the scarcity of men and machines will, it is believed, always force the individual to bear the brunt of this job himself. Some help may come his way one day in the shape of a power-operated spade driven from his section vehicle. Two or three such spades would help greatly in getting the section dug in provided the tools were small, hard-wearing, effective and, of course, cheap. He might also be helped if some spade or ploughshare attachment could be fitted to his section vehicle in order to help him break the ground at least. This, in a European theatre, is a major part of the task.

The combat soldier must, in the long run, himself get on with the job of digging in. He may get help; he may not. If he waits for it he is greatly reducing his chances of survival. Either way, if he takes too long over the job he risks being "acquired" as a target and caught in the open.

All this may very well depress the combat soldier. In an age of machines he might well have looked for some near-magical solution which would have reduced the toil and sweat of digging. It is true, of course, that in the best of all worlds he could have it. In his dream world he could, as we have said, also have all the defence stores and all the earth-moving plant he could wish for.

He could then dig himself into a condition of claustrophobic immobility from which, in due course, he might well emerge, unscathed, to become an able-bodied prisoner-of-war.

To dig then or not to dig? To dig, of course, since the risk from conventional weapons alone will justify it. But to dig just so far and in the best possible place. And then to move—and dig again! The arrival of fractional weapons into the hands of the gunner, the tank gunner and the mortar-man will leave the combat soldier no time for embellishments and no options.

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## The Anglo-French Boundary Commission, Niger to Lake Chad

By MAJOR-GENERAL C. H. FOULKES, CB, CMG, DSO

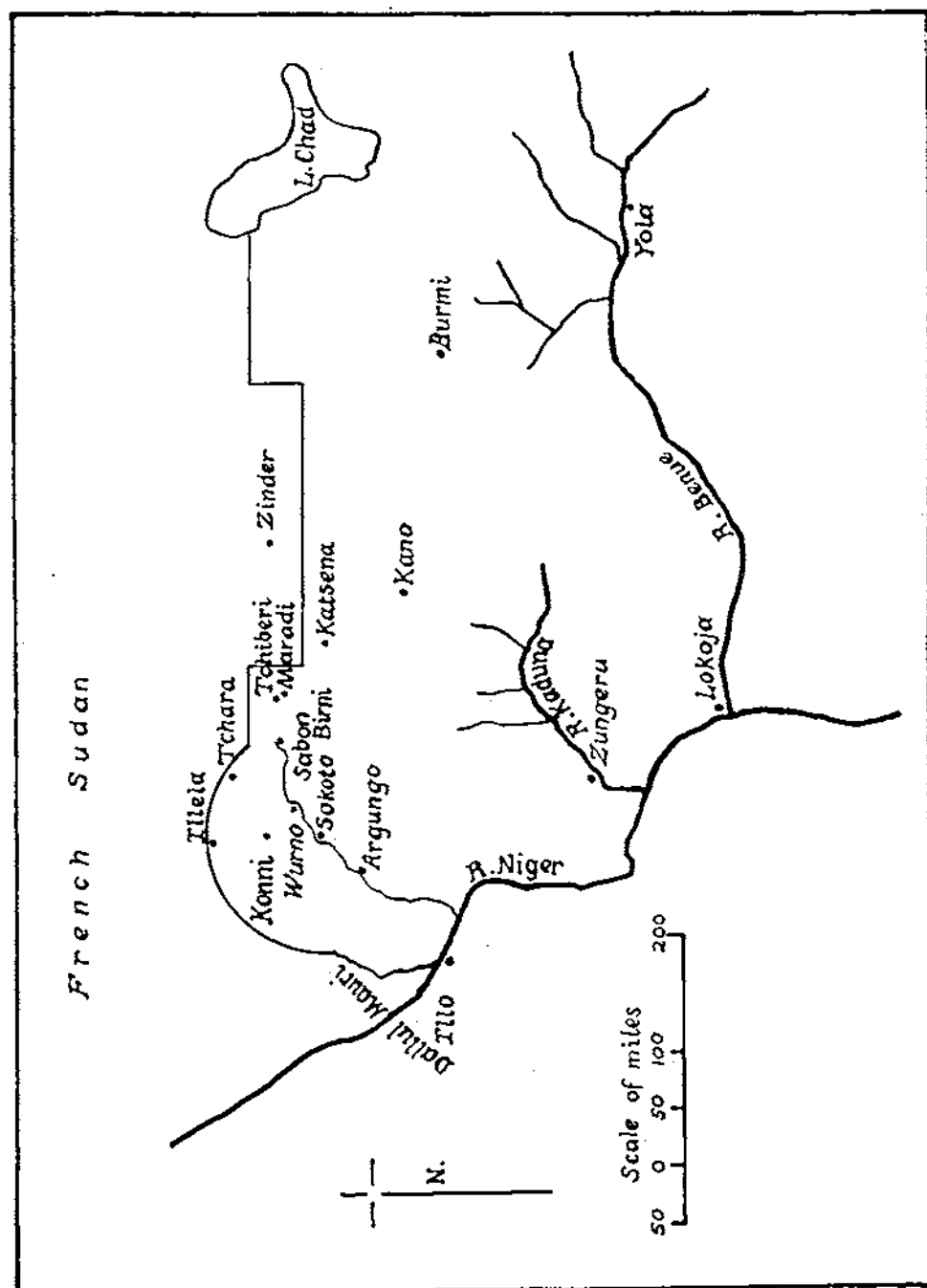
*Photographs by the Author*

LIEUT-COLONEL G. MCD. ELLIOTT, RE, was the British Commissioner appointed in 1902 to fix the Anglo-French boundary between the Niger and Lake Chad, and he was assisted by Frith and myself, then both subalterns with the local rank of captain. The line to be demarcated began at Illo on the Niger and ran along the centre of a wide depression, the Dallul Mauri, an ancient river bed, till it met the arc of a circle of 100 miles radius from Sokoto (the exact position of which had not been determined), and then followed certain lines of latitude and longitude until it reached the shores of the lake: so that the survey had to be based on astronomical observations.

There was no difficulty in obtaining exact values for latitude, and the results we got, using a 6-in micrometer theodolite, from north and then south stars crossing the meridian, often differed from each other by less than one second of arc, or about thirty yards on the earth's surface. But no telegraphic or wireless signals were then available for finding longitudes and we hoped to carry Greenwich time with us by taking the mean from seven of the best half-chronometer watches in existence, some of which had been found, when under test for the Class A Kew certificate, to have a regular variation of as little as one-tenth of a second a day; and though we treated them with the greatest care we found their "rates" so irregular under field conditions—even when they remained at rest in camp—that they were quite useless for our purpose. We had, therefore to fall back on occultations of stars by the moon; and though this method is now obsolete we obtained good results from it, and in one village we found the longitudes calculated from three independent occultations to differ from each other by less than one second of time, or about a quarter of a mile on the earth's surface.

Nevertheless, the value for longitude calculated from a single occultation is not strictly accurate, because of slight irregularities in the earth's rotation, and of variations in different sectors of the moon's outline as seen from the earth, which by itself can give rise to an error of several seconds of time.

It is interesting to note that a similar but more accurate method was suggested by Major E. H. Hills, CMG, FRS, RE, in the 1890's who designed



a moon camera by means of which the distances from the moon of a number of neighbouring stars could be measured from a series of exposures; and the most recent application of this principle is the world-wide moon camera programme of the International Geophysical Year, from which it will be possible to derive information about the lunar orbit and the irregular rotation of the earth, as well as to connect continental networks of triangulation.

Before the Commission set out on its 1,000-mile journey the late Lord Lugard had found the attitude towards him of the Sultan of Sokoto and the Emirs of Kano and Katsena so openly hostile that he was compelled to take military action against them; and he accordingly sent an expedition consisting of about 700 men, equipped with four light guns and four machine-guns, to take Kano, after which it advanced towards Sokoto. Kano city was reputed to be impregnable against assault, because of the formidable nature of its massive walls, and the Emir, Aliyu, was absent from it with the bulk of his army on a State visit of reconciliation to the Sultan, whose predecessor he had defied ten years previously when usurping the Emirate. After he heard of the fall of his capital there was some mystery as to what became of him. General Crozier, who took part in the expedition, wrote in *Five Years Hard*: "But the Emir, by flying to Sokoto, kept his flag flying for over three years"; and Captain Orr, one of the Residents in Nigeria at the time, said in *The making of Northern Nigeria* that he was found disguised as a trader. Lugard, too, reported that he had been arrested disguised as a salt merchant. But Aliyu had assumed no disguise and Lugard himself never knew the true circumstances of his capture, for reasons that will appear. Actually he believed that it was useless to oppose the power that faced him, and, instead of joining forces with the Sultan, he deserted his army at night. When this was discovered his brother, the Waziri, decided to attack a strong patrol of mounted infantry under Captain Wallace Wright which was reconnoitring towards him and had formed a thorn zareba at Zaromi. In the engagement that followed repeated charges by the Kano horsemen were beaten off with heavy loss and the Waziri was killed. For this action Wright was awarded the Victoria Cross.

At this moment the main body of the Commission was working along the Dallul Mauri and I was detached from it, with an escort of six Hausa soldiers, to a small village called Illela, 95 miles north of Sokoto, where I had to observe an important occultation from which it would be easy to fix the longitude of Sokoto itself by latitude and azimuth. I had done this successfully on the evening of 9 March 1903 when two mounted men arrived in my camp. They had been sent by the chief of a town called Tchara to tell me that Kano had fallen and that the Emir was a fugitive, sent, it was thought, by the Sultan towards Katsena to rally what was left of the Fulani empire to resist the British; and that he was likely to pass near a town called Tchiberi on his way. Also that a great army was assembling at Sokoto, where a battle was imminent.

Neither of the places mentioned appeared on our map, but Tchara seemed a long way off, and Tchiberi much farther still, while the whole country to the south, within a hundred miles radius of Sokoto, was believed to acknowledge allegiance to the Sultan.

I thought, however, that if I acted immediately, there was a chance that I might be able to intercept the Emir before he could do any harm; for there was at least one friendly chief on my route and there might be others who



**Photo 1.**—Tuareg. "The People of the Veil."



**The Anglo-French boundary commission 1,2**



would hesitate to use force against me as long as the outcome of the trial of strength at Sokoto was undecided. I sent back one of the Tchara men at once with a message to his chief, asking him to warn the Seriki of Tchiberi that if Aliyu came his way I would hold him responsible to the High Commissioner to detain him until I arrived with my soldiers; and early the next morning I set out with the other messenger as guide and four Hausas and their corporal, Musa, a tough, pock-marked little veteran, and my personal servant, Farna, mounted on horses obtained from the village. Farna was a Susu who had served me previously in Sierra Leone, and he was the most loyal, fearless and intelligent African I met during the six years of my service in all the West African colonies.

During the first part of our journey we followed a narrow winding sandy track, through low thorn bushes powdered with fine dust, for we were on the edge of the Sahara and the dry harmattan wind was blowing. Although the day temperature was 115 in the shade it caused no discomfort. We skirted past a number of strongly-stockaded villages, and out of range of the arrows aimed at us, for the pagan inhabitants of the region—the Arewas—lived in constant fear of enemies: they carried arms at all times and were often at war with each other and were continuously on the lookout for the “People of the Veil”, the dreaded Tuareg raiders, who, in their turn, had a healthy respect for their poisoned arrows. When night fell the moon was barely visible and the stars were completely obliterated by the haze. Our approach to an occasional wayside shelter was signalled by the barking of dogs and we gave reassuring replies to inquiries from their occupants as to our business.

Early on the following morning we entered Tchara, the most formidable walled city (next to Kano) that I saw in Nigeria, and here I had to leave four of my Hausas because of their serious saddle sores. The Seriki himself insisted on accompanying me with some of his horsemen on the next stage of our journey, and when we halted for an hour that night in the middle of a 40-mile-wide waterless tract Tchara pointed out to me a large mound by the side of the path, about twenty feet high, which he said contained the remains of 20,000 men who had fallen in a great battle in the past. This must have been Dagb, the location of which has been in dispute, where the Sultan, Bello, defeated and killed the Emir of Katsena and took the Emir of Guber prisoner in 1820. Tchara and his escort left me here because, I think, of the rumoured presence of a large encampment of the Tuareg in the neighbourhood.

Later the same night, when I was only half awake, I became aware of a horseman by my side who seemed to have materialized suddenly out of the darkness. He was clad in black from head to foot, except for a narrow slit across his face through which a pair of fierce intelligent eyes were visible. He carried an iron spear inlaid along its whole length with rings of brass or copper: a sword hung from his shoulder and he wore a dagger along his left forearm, attached to a leather bracelet on his wrist. He handed me a kola nut as a mark of friendship and, on hearing of our enterprise, he told me that he was King of all the Asbinawa (the inhabitants of the large oasis of Air, 400 miles away in the Sahara), and that he was my brother, because he had exchanged blood from his arm with a British officer—probably Major Merrick, then Resident at Argungo. The French were his enemies and he would always fight against them, but the British were the friends of his tribe. He warned me that the people of Tchiberi were a treacherous lot and

he offered to accompany me with 100 of his horsemen who were within call—a proposal with dangerous possibilities which I declined.

In the course of the third day we passed several large towns, their walls lined with warriors who made no attempt to interfere with us; and also met groups of "cow-Fulanis", shy gipsy people who wandered in true patriarchal style from pasture to pasture with their flocks and herds and pitched their camp shelters in secluded parts of the bush. They had copper-coloured skins, well-marked aquiline features and long straight hair, and they must have conformed more to the original Fulani type than their cousins of the ruling caste who had intermarried with the darker races they conquered. We were grateful for the sour milk they offered us in huge calabashes.

At last, towards dusk that day, after an almost non-stop ride of 175 miles which had lasted three whole days and two nights, I found myself, accompanied by the Tchara guide, Musa, the Hausa corporal and Farna, approaching a large walled town, Tchiberi, which I now learned was the historical city of Gober. News of our coming had preceded us and thousands of men armed with bows and arrows, spears and swords, were streaming out of its gates, together with several hundred horsemen, with the Seriki, Umoru, at their head. I urged my tired horse into a final canter, rode up to the chief and gave him the Hausa salute—the clenched right fist shaken above the head, to show that it held no weapon—and everything now depended on what happened in the next few minutes. But Umoru only returned my greeting half-heartedly and he seemed sullen and unfriendly. When I asked him (Musa interpreting) if Aliyu had come this way he merely pointed to a dignified figure standing a few paces to one side. This was the Emir, a heavily-built man, very dark, enveloped in embroidered robes, baggy trousers and a bulky turban; and as it seemed that I would have to make the next move I dismounted and approached him while a dense crowd pressed round us and their murmuring ceased. I noticed that he was strongly perfumed with musk when I drew him forward and handed him to Musa and said "I am going to take you with me to the High Commissioner." At this he looked inquiringly towards Umoru, but the chief took no notice and seemed to be gazing into the distance, as if wondering where were the soldiers I had mentioned in my message to him. Thereupon, Aliyu became very distressed and seemed to be on the point of tears, but mastering his emotion he said to me "I am ashamed. If it be the will of Allah that I must die, let it be now." I told him that it was not for me to decide these things; he must come with me now and a big chief should show the common people how to bear adversity.

Apparently there was no news from Sokoto and I decided that it was advisable to begin the return journey to Illela at once, but Umoru tried to delay my departure and he sent, eventually, for a grass hut which was set up on posts, after which we passed a restless night with Musa and Farna on the alert and myself stretched across the door-way, with my head on my saddle, while the Emir paced restlessly up and down inside, muttering his prayers.

The Tchara guide warned me the next morning that there were rumours that Umoru intended to prevent our departure. I declined his invitation to visit him in his house in the town, but thought it expedient to stay for a while to witness a display of his military might that he had planned for my benefit. At least 10,000 armed men from Gober and Maradi, another walled town a few miles distant, had streamed out into the plain. First a long row of archers, four or five deep, discharged continuous showers of arrows in the semblance

of the modern barrage; and then lines of horsemen galloped in succession towards the chief at a furious pace in clouds of dust, yelling and standing up in their stirrups and clashing their swords on their tough oryx-hide shields, and finally pulled back their mounts on their haunches when a few paces from him and shouted a salutation. Altogether this was a thrilling and realistic demonstration of barbaric warfare as it must have been conducted by these warlike people for centuries past. Clapperton had actually witnessed them in action on just this spot in 1826, when the Sultan, Bello, attacked Gober and was beaten off with heavy loss, though he led in person an army of 60,000 men.

We began the return journey to Illela, with Aliyu, on 13 March and the battle of Sokoto was fought on the 14th and the city occupied on the 15th, the anniversary of which event was chosen by the Government of the Northern Region, Nigeria, on which to celebrate its self-government last May. During the next five days Aliyu begged me repeatedly to kill him: he said that he could not face Lugard (to whom he had a lot to answer for) or bear his disgrace. He had lost everything worth living for, first his country and now his wives and treasure and, in particular, his favourite horse. This was a magnificent Arab stallion and I was able to recover it for him and his other personal property in the course of the next few days.

He told me of his movements after news reached him of the fall of his capital. Realizing that further resistance was useless, he "wanted to find some place where he would not be troubled by the white man", and he was on his way to the friendly chief of Sabon-Birni, Balarabi, together with four wives and two other women, and ten camels loaded with Maria Theresa dollars and guarded by six men armed with rifles, when he encountered a Tchiberi mounted patrol. They were ignorant of his identity, but his apparent wealth and the quality of his horses excited their cupidity and they attacked his party in what seems to have been a simple act of brigandage. In the fight that followed one Tchiberi man was killed and one of Aliyu's wounded, but though the caravan managed to get away to Sabon-Birni, the Emir became separated from it in the confusion and was taken to Tchiberi. There he had been engaged in bargaining with Umoru, who undertook to equip his journey to Mecca across the desert in exchange for half his treasure—now out of his reach—when my unexpected arrival put an end to the negotiations.

On reaching Illela, and before the arrival there of the main body of the Commission, I heard that the Sultan, Attahiru, had fled from the battlefield at Sokoto, and I set out again, this time with a dozen mounted Hausas, to try and intercept him as well. With some of Tchara's men acting as scouts we reached Konni and Wurno (once the capital city), but this was the Sultan's own country where the Tchara men were unwelcome and information was hard to get, so that after covering great distances in the next five days we had to abandon the search. This was, perhaps, just as well, because Attahiru had moved towards the east with 600 horsemen and gathered adherents as he went. He offered a gallant resistance for the next four months, one worthy of his heroic ancestors, Usman dan Fodio, the first Sultan and the founder of modern Nigeria, and of his son, Bello. He beat off several columns of troops sent in pursuit of him, one of which, under Captain Sword, suffered sixty-four casualties; and he was eventually cornered in a walled town called Burmi, in the direction of Lake Chad, on which 600 troops had converged to deal with him and his followers, who now numbered



**Photo 3.**—The Emir of Kano (Aliyu), in captivity in Illela.

10,000. Quite early in the battle that followed Major Marsh, the British commander, received an arrow wound in the thigh and died from the effects of its poison twenty minutes later. A breach was made in the wall by gunfire, and in the assault on the town and in the street fighting that followed all the British officers present were either killed or wounded and there were eighty casualties among the troops. About 4,000 of the enemy were said to have been killed, but in spite of careful search the Sultan's body was not identified among them, though his death was presumed on account of the white horse that he rode, and his State sword, being found under a heap of the slain. Anyhow, he gave no further trouble and was never heard of again.

When I met Elliott in Illela he expressed strong disapproval of the action I had taken, which he called a reckless adventure, an interruption of the Survey and interference with the military campaign. He refused to forward my account of the episode to Lugard and even threatened to have me sent home in disgrace. This attitude was quite out of character, for he had himself lived an adventurous life and had won a brevet in the Boer War. A few years after leaving Nigeria, when a member of the Macedonian Gendarmerie, he was wounded in the leg and captured and held to ransom by brigands; but they foolishly neglected to search him for arms, and when an opportunity



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presented itself he drew his revolver, shot all five of his captors and got away safely. But he was on bad terms with Lugard at this time, because he had invited Commandant Moll, the French Commissioner, to accompany him and both were present in the British square when it advanced across the plain towards Sokoto on the day of the battle. When Lugard arrived a few days later and found him there he ordered him peremptorily back to his own work on the Survey: the presence of a senior French officer was not welcomed and there was a question of seniority in army rank between Elliott and Colonel Moreland, the Force commander, which might have been embarrassing in case of a set-back in the campaign.

Meanwhile Umoru had time to consider how he could represent his relations with Aliyu to the best advantage to himself, and the astute chief visited Lugard when he was on his way from Sokoto to Katsena a week or ten days after I had left him, and claimed that he had enticed the Emir into his town out of friendship to the British. This story Lugard evidently believed, though he wrote to congratulate me on my "wonderful feat and on securing Aliyu".

The Anglo-French boundary was revised in 1906 and Illela, Tchara, Tchiberi, Maradi and Konni are now all in French territory. Tchara was attacked by a strong force of the Tuareg—probably led by the chief I met—soon after we had passed through it. A small party of them concealed themselves by one of the gateways, took the watchmen by surprise at dawn and allowed several hundred of their companions to gallop through it. The whole population, including my friend the Seriki, was then put to the sword by these incomparable fighters, and a French officer who visited the place a little later told me that he had found corpses still lying in the streets and had noticed, in particular, the body of one man who had the top of his head sliced clean off "like a melon" with a single sword-stroke. The town does not appear on any modern map, French or British.

Commandant Moll, the French Commissioner who was collaborating with us, became famous later in the occupation of the Western Sudan, and he would undoubtedly have risen to high rank in the First World War, as did his contemporaries in the Colonial Army, Joffre, Gallieni, Mangin and Gouraud\* if he had not been killed in Darfur in 1910. The Tuareg made one of their traditional surprise charges on the force he commanded and he was speared by them, together with sixteen white officers and more than 100 native troops.

No great harm befell Aliyu. He was pensioned off by the British Government and kept in open confinement at Yola, on the Benue River, but was moved to Lokoja when found guilty of intrigue. I would like to think that his favourite horse shared his exile. Perhaps, too, he had learned resignation and was content to gaze into his evening fire and reflect on his former greatness; for, as the Moorish historian, Leo Africanus, writing in 1526, had said of one of his Hausa predecessors, "Their king was in times past of great puissance and had mighty troupes of horsemen at his command".

\*It was Captains Gouraud and Mangin who captured the redoubtable slave-raider, Samory, "the scourge of the Sudan", in remarkable circumstances.

## Court Martial

By MAJOR-GENERAL S. H. M. BATTYE

THE Nissen serving as a court room stood a little apart from the cluster of huts which made up the headquarter offices. Its black-painted curved surface was busily absorbing the rays of the sun and inside the atmosphere was stuffy.

A group of five officers clad in scarlet and blue and accoutred with medals and swords occupied the central table. To my right sat the Judge Advocate General garbed in black gown and wearing a short wig; in front the accused, hatless and vacant of expression, with his escort.

A witness was marched in by the court orderly, a sergeant with a handle-bar moustache, whose staccato orders rattled the sheeting of the hut. As the former halted in front of the table we all rose while the JAG administered the oath. The witness then entered the witness box which consisted of sitting down on the seat of a chair, Windsor, hard.

There followed the tedious rigmarole of extracting evidence. First the prosecuting officer plied him with questions which together with the answers were laboriously taken down in long hand by the JAG. I stole a glance at the latter. The stuffiness and the effort of writing were having their effect. Little rivulets of perspiration were trickling down from under his wig to disappear into his collar.

Presently the defence counsel was on his feet harrying the witness, trying to tie him into knots, but the soldier, young as he was, refused to be shaken.

Witness followed witness. I longed to undo my choker collar, thick with gorgette patches, to unbutton my tunic and relax with a cigarette. The JAG patted his face with a handkerchief whilst still contriving to write. Listening to the evidence and the scratching of the pen had a soporific effect and I was glad to be spared the effort of writing.

Finally the accused after taking the oath took his stand in the witness box, the operation consisting of putting on his cap and transferring himself from his chair, fold flat, to the witness's chair, Windsor, hard.

The defending counsel's questioning did not take long and the prosecuting officer rose to his feet once more. I thought I could discern a sardonic gleam in his eye. A member of the Army Legal Service, he was well versed in the technique of cross-examination. He started gently by posing some innocuous questions and the answers came glibly enough, but presently he had the witness in difficulties. The questions were now causing him acute embarrassment and the answers were evasive. His pallor matched the drab colour of the curving walls of the hut and sweat was pouring down his cheeks.

"Objection," suddenly ejaculated the defending counsel from a sitting position. "You can't ask that question."

"If you wish to speak, would you kindly rise and address the court? You have no right to interrupt," barked the JAG.

"I beg your pardon."

I was taken aback at this sudden exchange but recovered in time to nod my head in acknowledgment.

The case resumed. The prosecuting officer sat down and the accused stepped wearily back to his seat. There was silence for a period but for the shuffling of papers and the interminable scratching of the pen as the JAG caught up with his record.

Finally we heard the closing speeches by the prosecution and the defence and the JAG bent over to whisper to me.

"The court is now closed to consider the verdict," I announced.

There was a scuffling and tramping as the accused was escorted outside, followed by his counsel, the prosecuting officer and, surprisingly, some ladies who had been sitting in their garden party frocks at the back of the hut. Finally the JAG took his leave and we were left, now in the role of jurymen, to decide whether the defendant was guilty or not.

We argued one way and another like any jury, finally coming to our conclusion on a majority vote.

The court was opened and everyone trooped in, last of all the JAG. He stopped in front of the table and we bowed to each other. That little courtesy over, he came round and resumed his seat at my side.

There was an expectant hush. I looked round the hut. Everyone's eyes were turned in our direction. The accused passed his tongue round his lips, then sat staring straight in front of him. I looked down at the papers in front of me.

"Second-Lieutenant Anthony Handspike," I began.

"Yes, sir," interjected the accused.

"The court finds you . . ." I continued. Everyone appeared to stop breathing and even the traffic outside had paused for the moment.

" . . . Guilty of the charge against you," I finished. There were sharp intakes of breath and the accused swallowed hard, then sat there as before, staring in front of him.

Then followed the giving of evidence as to past character and a plea in mitigation of sentence by the defending counsel, and I closed the court once more to consider the sentence. Back they all came eventually, the JAG bringing up the rear.

"The sentence of the court," I announced and again the day seemed to stand still, "is that you be severely reprimanded."

Second-Lieutenant Handspike let out a long exhalation, mopping his face with his handkerchief.

"This sentence is subject to confirmation by the Convening Authority," I finally concluded.

I thanked the defending counsel and the prosecuting officer for their help in the case and adjourned the court. The members saluted, departing gratefully to the outer air, leaving the JAG and myself to finish off the written papers. A straightforward case, but it had taken over three and a half hours.

I stepped out into the harsh glare of the sun, looking down the line of office huts drawn up like Guardsmen on parade. Beyond the huts the plain lay shimmering in the heat and I gazed away to the range of hills which thrust their ragged pinnacles into the blue dome of the sky. Stunted carob trees dotted the hillsides, the shady patches lending a curiously double-sighted effect to the scene, like a stereo-photo before it is placed in its viewer.

Standing there my mind wandered back over the years till memory conjured up a scene so like yet unlike, so different in time but similar in experience.

\* \* \* \* \*



Subedar-Major Sajjan Singh was a thick-set, sturdy Sikh of land-owning stock hailing from the Punjab. His thirty years of service sat lightly on his broad shoulders. His beard, showing hardly a streak of grey, was neatly rolled, the ends being led up his cheeks to disappear under his turban. Restlessly active by temperament, he had in his younger days been a physical training instructor, an accomplishment still evident from the spring in his gait. He paused for a moment outside the CO's office before entering to make his morning report, then lifting the bamboo matting which covered the doorway he entered and saluted.

"Salaam, Subedar-Major Sahib," I returned. There was a moment's pause before he spoke and in that moment I detected an unusual gleam in his eye. Then with a dramatic gesture he thrust his left hand in front of me. It clutched a crumpled sheet of newspaper. As he relaxed his grip the paper unfolded, revealing the pathetic remains of a man's fingers. The small brown digits had been neatly severed near their bases and now lay like the shrivelled remains of some long dead mummy.

I started back in my chair and the gleam in Sajjan Singh's eyes transferred itself to his mouth in a broad grin. His sense of the dramatic had not been mistaken.

My demand for an explanation was superfluous and he plunged into a story without waiting for me to speak.

"It concerns Recruit Gurbachan Singh, Sahib. You may remember that he recently failed part of his recruit's training and was relegated to the next squad. Last night, requiring some poles to support his mosquito net, he obtained them from the quartermaster's store and then borrowed an adze with which to sharpen them . . ."

There followed a tale of dizziness and a terrible accident resulting in the loss of the fingers of the left hand.

"Did anyone see it happen?" I interjected.

"No one, until he staggered into his barrack-room where he collapsed on to his bed. There were others in there who quickly wrapped a pugree round the wound and then took him to the hospital. The doctor sahib has sewn up the cuts and he will soon recover."

"Let us go and see the place where this happened," I suggested. What I hoped to discover from looking at the scene of the accident I do not know, but there was something at the back of my mind and I wanted to try and work things out for myself. I looked again at the evidence in front of me, probing for an explanation to this unusual accident. An adze was a common tool among the carpenters and many a man was skilled in its use but an accident such as this was unheard of. I noted the angle of the cuts on the bones and counted the fingers. It was a plausible story, too plausible perhaps, something did not quite seem to add up.

"Take good care of this, Subedar-Major Sahib," I said, indicating the contents of the newspaper in front of me. "There will have to be a court of inquiry and the fingers will be required for evidence."

"Have no concern about that, Sahib, I will look after it myself." And he screwed up the newspaper once more and stuffed it into his trouser pocket.

Outside the sun beat down and the heat bounced up from the rammed earth parade ground scorching in its intensity. The air shimmered and wavered and the dust rose in a cloud from the fields over against the village where a small boy was herding cattle. The glare made one screw up one's

eyes till they got used to it. Beyond the village the fields showed a tinge of green as they rolled away to the foothills. The deeper green of the jungle on the lower foothills gave way to a lighter, drab shade as tier upon tier they rose to the mighty outline of the Himalayas. The shimmering haze softened the jagged outlines so that mountain and sky merged into a continuous monochrome, broken here and there by some glistening snow-covered giant. It was a scene which never ceased to inspire. In the furnace of the hot weather those icy buttresses were a symbol of hope, in the winter when the air was clear the mosaic of greens, browns and glistening white thrusting into the vivid blue of the dome above was sheer poetry.

We crossed the parade ground and made our way between the barrack blocks. Presently we came to a spot indicated by Sajjan Singh. There were some wood shavings and the dark stain of dried blood.

"It was here that Gurbachan Singh was sharpening his pole when dizziness overcame him. He then went round the end of this block." And we followed a trail of drops of blood which led us unwaveringly back to Gurbachan Singh's barrack room and bed. It seemed a pretty steady course for one suffering from dizziness, and I said as much to Sajjan Singh. He paused and for the first time I think he began to wonder as I had been doing.

There was for the time being nothing more to be done but I ordered a court of inquiry to be held though it would be some time yet before Gurbachan Singh would be fit enough to attend.

In the weeks that followed I had to leave the station on temporary duty but I puzzled over the case so that by the time I returned my mind was almost made up. I hoped that the court of inquiry which had been held in my absence would confirm my opinion but it did not. I went through the proceedings very carefully but it seemed to me that one vital piece of evidence had escaped notice and the finding had been one of accident. This set me in a quandary. Should I confirm the finding or not? It was only a hunch that I had and in any case Gurbachan Singh was no more use to the service. Yet I felt my deduction was correct and that the only way in which it could be tested was by confronting Gurbachan Singh with the evidence and a court martial was the place to do it.

Gurbachan Singh had by now returned from hospital and he was marched in front of me the next day. He stood to attention the other side of the desk, his left arm bandaged and carried in a sling. I read out the charge and remanded him for summary court martial. He looked surprised and slightly puzzled but said nothing and was marched out. The law dictated that he must have a minimum of twenty-four hours in which to prepare his defence.

A summary court martial was in some ways a unique affair. The procedure was introduced into Indian Military Law shortly after the Mutiny. Before that disastrous period of history, the disciplinary powers of a commanding officer had been restricted so that the process of dealing with more serious military crimes became so laborious as to bring the whole system into disrepute. This sowed the seeds of slackness in discipline which was reputed to have been one of the contributory causes of the mutiny of the Bengal Army.

The procedure was simple and the powers of the commanding officer greatly enhanced, in fact by present day standards they would have been considered outrageously dictatorial, but if harsh in retrospect they suited the needs of the period, were well understood and undoubtedly contributed to the very high standard of discipline in the Indian Army of our day.

The court consisted of the commanding officer flanked by two other officers who took no part in the judgement but were there to see fair play. The maximum punishment which could be awarded was substantial, being twelve months imprisonment and discharge with ignominy. Quite rightly it stopped short of the death sentence, or penal servitude for life.

The court duly assembled to try Gurbachan Singh. Two Indian officers joined me to be witnesses to the fairness of the proceedings. The accused was marched in with his "friend". He was not entitled to a defending officer or counsel, nor could he object to being tried by me, his commanding officer. When all the witnesses were assembled we stood and I took the oath to administer justice truly and without partiality to the best of my ability. The witnesses were then required to take an oath of affirmation to tell the truth, the whole truth and nothing but the truth. This was done by the religious teacher of each caste, the Maulvi for the Mohammedans, the Pundit for the Hindus and the Guru for the Sikhs entering in turn and making each of his flock repeat the oath after him. In contrast to the practice in British law the oath administered in this way had a much more binding effect on the witnesses than if it had been imposed on them by a layman.

They were then marched out and the case opened. I now assumed the roles of judge, jury, prosecuting counsel and, paradoxically, defending counsel when the cross-examination of a witness so required.

There were no preliminaries and I opened with the charge.

"No. . . . Gurbachan Singh . . ."

"*Han, Sahib.*"

"Under Indian Army Act Section . . . you are accused of wilfully causing a self-inflicted wound, in that you . . ." (and here followed details of the charge) ". . . in order to avoid further service."

"Do you plead guilty or not guilty?"

"Not guilty, Sahib."

"Call the first witness, please."

The first to enter was my Subedar-Major Sajjan Singh. He saluted. He had already taken the oath so I went straight ahead.

"Subedar-Major Sahib, do you recognize the accused Recruit Gurbachan Singh?"

"*Ji han, Sahib.*"

"He is accused of wounding himself on purpose in order to avoid further service. Please tell me what you know about the matter."

"Very well, Sahib. On the evening of 3rd inst. I received a report that Recruit Gurbachan Singh had had an accident and cut off his fingers. I immediately gave orders to be taken to the spot where I found these." And with the same dramatic gesture as before he produced the roll of newspaper which he unwrapped and spread out on the desk in front of me for everyone to see. The same shrivelled digits, small, pathetic, lonely and useless lay there before us. It all seemed so tragic and unnecessary and I wondered, not for the first time, if it wouldn't have been better to accept the opinion of the court of inquiry and let the man pass sadly on his way out of the army whither he had come of his own accord, without more ado.

Sajjan Singh finished his evidence and I asked Gurbachan Singh if he wished to ask any questions.

"*Ji Nahin, Sahib.*"

Other witnesses followed, each adding his little bit to the story, but still

it could have been nothing but an accident. Nobody had actually seen the incident so nobody could provide any direct evidence as to how it happened.

Finally I turned to Gurbachan Singh. He need not give evidence on oath but he was required to answer any questions I put to him.

"Tell me, Gurbachan Singh, in your own words how you came to lose your fingers."

"It was like this, Sahib. I needed some poles to support my mosquito net so I went to the quartermastery and obtained them from the quartermaster havildar. They were bamboo poles and I wanted to place them in the ground round my bed where we sleep outside in the hot season. So I also borrowed an adze from the havildar to sharpen them."

So far, so good. The story was plausible enough and accorded with all the witnesses had said.

"What happened then?" I asked.

"I went round to the open space between two barracks and started to sharpen one of the poles. But dizziness came over me and the adze slipped and cut off my fingers." And he finished his tale by describing his return to his barrack room and collapse on to his bed.

I waited for a few seconds and there was silence in the room while I looked at Gurbachan Singh. Then I started to cross-question him.

"Do you remember just how you were holding the pole with your left hand when the adze slipped?"

"Yes, Sahib, it was like this." And he took my proffered swagger cane in his right hand, his fingers and thumb encircling it to grip it tightly.

"The adze then chopped down from above and cut off all your fingers but not your thumb?" I queried.

"That is so, Sahib, you see I still have my thumb." And he held up his stump of a left hand devoid of fingers but with the thumb intact.

"That was very fortunate that the thumb escaped when it was also gripping the pole like the fingers, wasn't it?"

"Yes, Sahib, it was very fortunate indeed that I still have the use of a thumb on that hand."

"The adze only slipped once, didn't it?"

"Yes, only once," replied Gurbachan Singh most emphatically.

I had led him to the point of no return. I felt sure now that the charge was proved but I had to make it abundantly clear both to the accused and to the officers on my right and left, so that there could be no shadow of doubt in their minds of the verdict when it came.

"Gurbachan Singh," I continued, "you have heard evidence that these are the remains of your four fingers. Do you dispute that evidence?"

"No, Sahib."

"Will you count the pieces?"

"*Ek, do teen, char . . . paunch*, five, Sahib," he concluded, and a puzzled fear showed in his eyes.

I went on without a pause.

"You have just told me that the adze slipped only once and that you lost four fingers at one cut. I suggest that that story is untrue and that you deliberately laid your hand on the ground and chopped the fingers off but you had to cut twice because the adze is not broad enough to chop them off in one cutting, and at the second chop you cut one of the severed fingers into two pieces. Is it not so?"

There was absolute silence in the room and I could feel the tenseness in the atmosphere. Gurbachan Singh seemed to be having difficulty with his breathing. Finally he croaked:

"You know all things, it was even as you say. When I failed my recruits course I could not bear the shame and laughter of my friends till madness overcame me and I cut off my fingers so that I could be discharged and sent home. The madness is gone now, Sahib, but there is little that I can do with my hand. I am very sorry."

There was silence for a moment but for the laboured breathing of the culprit. I felt suddenly flat and out of humour. Whilst the case had lasted there had been tension and excitement. Now that was over, but what had been achieved? A judgement which tore out a man's soul brought no satisfaction and at that moment justice without mercy would have cried unto Heaven.

I let him go as he would have gone but for my hunch, discharged from the service as unfit for further duty.

\* \* \* \* \*

Lance Naik Mangal Ram was a stalwart Hindu who hailed from the hill district of Almora in the United Provinces. Though rather dour of temperament he was a good junior instructor in the battalion. That was six months ago, for when I took command of the unit he had been absent for that time and had been duly declared a deserter by a Court of Inquiry sitting twenty-one days after his disappearance. All efforts to trace his whereabouts had been fruitless. The police had searched his village and the surrounding district but to no avail.

As time passed, the likelihood of his ever being apprehended grew more and more remote till at last, with many other more urgent matters to think about, he was almost forgotten. Then one day Sajjan Singh making his morning report to me produced a letter. Spreading it out in front of him he held it as though to make an announcement like a town crier. It was written in the Nagri script with which he was unfamiliar, so that his gesture of reading the letter was pure stagecraft. However, he had obviously had the letter read to him and knew it by heart, so that the exposition he gave was a fair rendering of the contents. Anyhow, the gist of it was that Mangal Ram, now a police constable in a local state police force, was on the run again since the hounds of justice were at last catching up with him and what was he to do? It purported to be signed by Mangal Ram himself. The situation was almost farcical. Mangal Ram had decided that the safest place to hide was nearest to his enemies and had enlisted in the police, under a false name of course. But he had sadly underestimated that magnificent and efficient force whose methods might be slow but they were exceeding sure.

When Sajjan Singh had finished reciting his piece, he lowered the letter and asked:

"How should I reply to Mangal Ram, Sahib?"

"Tell him to come back."

"As I thought, that in fact is the only thing we can say, Sahib."

So it transpired that about a week later an unkempt figure was marched into my office. He was unshaven and his only apparent clothing was a long sheet of country cloth wound round his body and thrown over his shoulder

in the manner of a *philimhor*. He looked sullen and obstinate and I wondered what had driven him to return in order to stand his trial. India is a large country described as a sub-continent and I had known of other deserters who had managed to evade their pursuers for years, losing themselves amongst the millions that teemed in the towns. But it was not so easy for those of country stock who had relations and probably a dependent family living back in some hill village. The ties of blood are very strong and the thought of destitution amongst his children may well have decided Mangal Ram to face the music, rather than continue his life as a fugitive, unable to send any money home lest his whereabouts be disclosed.

I remanded him for summary court martial and he was marched away to the cooler under close arrest.

The trial took place a few days later. There was nothing unusual about it since Mangal Ram pleaded guilty to the charge of desertion in order to avoid active service. This was of course a very serious crime, especially when committed by a NCO, and he was awarded the maximum prison sentence and discharged with ignominy. This sentence was duly promulgated and he was lodged in a cell in the quarter guard awaiting transfer to the nearest civil prison.

Thus began a series of incidents which eventually led from one court martial to another until I began to wonder what the end would be. But that is anticipating.

The cell in which Mangal Ram was lodged was small and bare. There was a window looking out on to the courtyard at the back of the guardroom. Iron bars but no glass graced the opening. The door was an iron grille fastened by a padlock and chain. There was no furniture of any sort and a prisoner could either squat on his hunkers or lie on the concrete floor. However, an occupant was permitted to have his bedding roll and mosquito net. The bedding roll was normally secured by a cord when travelling. The mosquito net when in use was fixed at one end to two rings in the wall provided for the purpose about three feet off the ground, the other end being tucked under the bedding mat.

Mangal Ram's bedding roll and personal effects which had been listed and kept under lock and key since the day of his disappearance were brought round to the quarter guard in anticipation of his departure. The guard commander unlocked the padlock and heaved them inside Mangal Ram's cell with a "There's your stuff" remark and chained up the door again.

The day was hot and the sentry ceased his pacing and stood at ease in the shade at one end of the verandah. It was then that he heard a loud cry from one of the cells.

"*Ram jai Ram*," or so it sounded as he afterwards related. Now such a cry is reserved for notable occasions and it says much for the sentry's alertness that he sprang into action at once. Running smartly down the verandah he came to the cell occupied by Mangal Ram to find him just about to expire, the bedding cord looped round his neck and fixed to one of the rings in the wall. Sizing up the situation in an instant, the sentry shouted to the guard commander to bring the keys. There was by now a considerable stir afoot and the guard came running up to wrestle with the padlock. The door was eventually opened after what seemed like hours, though in fact it took but a few seconds, and the sentry rushed in to cut the cords with his jack knife. But Mangal Ram remained unconscious on the floor and it was not until he had

been taken to hospital that he was brought round by the doctor. Even so he was considered too ill to return to the unit and was lodged in hospital under guard.

The guard consisted of a Havildar and three soldiers, who took it in turns to sit by the bed whereon lay the moribund Mangal Ram.

The immediate crisis over, I began to think about the legal aspects of the matter. Attempted suicide was undoubtedly a crime, but it was debatable whether Mangal Ram was under civil or military jurisdiction at the time. He had been sentenced to be discharged with ignominy and the sentence had been promulgated. Logically therefore he was no longer subject to military law. I sought to make this point when seeking advice on the case but was firmly told to deal with the matter myself. So I set the stage for the second court martial on Mangal Ram. All this took time and when the witnesses were warned to attend it was found that the doctor who had attended to Mangal Ram had been posted elsewhere and an affidavit had to be obtained. By this time Mangal Ram had recovered but was still detained in hospital and the guard had more reason to watch the bed. Eventually all was set for the court to assemble on the morrow. Mangal Ram had been pronounced fit to stand trial, the doctor's affidavit was to hand and the other witnesses ready.

Came the day and Sajjan Singh entered my office to make his morning report. His face was solemn and the usual puckish twinkle was absent from his eyes. I knew instinctively that something was seriously amiss.

"Sahib," he blurted out, "there will be no court martial today."

"Why?" I interjected quickly.

"The prisoner Mangal Ram has escaped."

"But that should not have been possible. Was not the guard mounted at the time?"

"Certainly, Sahib, but when sentry Feroz Shah took over duty from Shiv Datt he found nobody to guard."

"This is a very serious matter, Subedar-Major Sahib, indeed. Who was the guard commander?"

"Havildar Khan Mohammed, Sahib."

"How did he post the sentries?" And by continued questioning I got the gist of what had transpired. The escape had been discovered at night but at what period it was difficult to say for Havildar Khan Mohammed had been slack about the reliefs and had told the first sentry to wake up the second when the two-hour stretch was over and so on in rotation. Then only Feroz Shah, a Pathan from the North-West Frontier, had actually lifted the mosquito net on taking over duty, to see if the prisoner whom he was supposed to be guarding was actually there. It was at that point that the escape was discovered. But I suspected Shiv Datt, a co-religionist of Mangal Ram. I discounted the idea of bribery since the latter had been without pay for some considerable time and could not have produced more than a rupee or two, hardly enough to tempt a comfortably paid soldier. No, the religious motive could have been a very strong inducement. Mangal Ram was a Brahmin, the highest priestly caste, whilst Shiv Datt was of lower order and therefore bound to pay heed to the dictates of one whose caste had held absolute sway throughout India not so very long before.

First thought to deal with Havildar Khan Mohammed. I had known him for some years, a stalwart yeoman from the Punjab. There was no guile about him, the tedium of a dull guard in hospital and the heat had got him

down and he had failed. Still it meant a court martial on two counts; first for failing to post his sentries in the proper manner and secondly for allowing a prisoner to escape. On reflection I felt that this was a difficult charge to sustain for Shiv Datt was under strong suspicion of conspiring in the plot and therefore Khan Mohammed could hardly be held to blame. In the end he got the benefit of the doubt and received a sentence on the first count only, to which he pleaded guilty. He left the court with a sigh of relief, having anticipated reduction to the ranks and dismissal.

Next came the question of the sentries. Shiv Datt was the obvious target for accusation because the prisoner had been found to be missing when he was relieved by Feroz Shah. But was that the answer? What about the third sentry, Kehar Singh, a young Sikh who might have been persuaded by Mangal Ram to look the other way while the latter slipped out of bed and away? Only two facts seemed to be clear. First that the prisoner had been there when Feroz Shah handed over to Kehar Singh early in the night, and secondly that the bird had flown by the time Feroz Shah came on duty again four hours later. It had all the makings of a case that would end up with a verdict of "not proven". The only thing to do was to charge the two sentries Kehar Singh and Shiv Datt jointly and hear the evidence.

In due course the court assembled and the pair stood in front of me like Tweedledum and Tweedledee. The first witness was Havildar Khan Mohammed who, since he had already been dealt with for his part in the affair, was free to testify without incriminating himself. This he now did boldly.

"Sir, on the 10th instant I mounted the guard in the hospital on Mangal Ram at 2000 hours. I posted the sentries in spells of two hours each. Feroz Shah was first and I ordered him to guard the bed whereon Mangal Ram was lying. At the conclusion of two hours I ordered Feroz Shah to report to me so that I could post the next sentry which was to be Kehar Singh. This duly took place at 2200 hours with the prisoner still on his bed. I gave similar instructions to Kehar Singh to report to me at midnight in order to post the third sentry Shiv Datt, but the next report that came to me was from Feroz Shah at 0200 hours to say that Mangal Ram had escaped. I immediately raised the alarm and a search was made of the hospital and grounds, but there was no sign of the prisoner, sir."

Since the accused had no questions to ask, I turned to the next witness, which was Feroz Shah. His story confirmed what the Havildar had said, but with a sense of the ridiculous he went on to repeat a dialogue between himself and Shiv Datt in the language of soldiery the world over.

"At about two in the morning Shiv Datt comes and wakes me. 'Come on,' he says, 'it's your turn now.' 'All right,' I says, getting up and putting on my *safa*, 'you go and wake the Havildar.' 'No need to do that,' he replies. 'You come along quick, I want to get some sleep.' So together we go into the ward where Mangal Ram's bed is at one end. We pass by a lot of other beds with mosquito nets up till we come to Mangal Ram's. 'There you are,' says Shiv Datt. 'It's all yours.' So I lifts the mosquito net just to make sure. 'What you supposed to be guarding?' I asks. 'A charpoy?' So Shiv Datt has a look. 'He's gone,' he says horrified. 'Nice job you done here guarding an empty charpoy, better go and tell the Havildar quick, I says. So we reported the escape to Havildar Khan Mohammed, sir."

Again there were no questions from the accused. Neither were there any



other witnesses. No one else in the ward had seen or heard anything. There was exasperatingly little evidence to pin the charge. One thing had become clear, however, that opportunities had been offered for the prisoner to slip quietly out of his mosquito net in the dark when one of the sentries went to wake the guard commander. The whole method of posting the sentries had been highly suspect, but even so with the rest of the guard on the verandah just outside the ward there should not have been more than a few seconds when the sentry was not actually at the bedside.

I turned to the two accused.

"Shiv Datt," I said, "did you at any time during your tour of duty fall asleep?"

I knew that the answer would be an emphatic negative, and so it was.

"When you took over from Kehar Singh did you make sure that Mangal Ram was on his bed?"

Shiv Datt hesitated for a moment. "No, Sahib, I did not look under the mosquito net."

Here was a chance for Kehar Singh to clear himself, but he missed it.

"When you handed over to Shiv Datt did you look under the net to make quite sure that Mangal Ram was on his bed?"

"No, Sahib, I went on to the verandah which was just behind where I was standing and woke up Shiv Datt. He then came and took my place by the bed and I went and lay down on the verandah."

We had reached an impasse. There were two charges, one of negligence in handing over duties, and the other, a much more serious one, that of permitting the prisoner to escape. Both charges could have stuck to either and either charge could have stuck to each. But which was actually guilty of what was impossible to determine.

There was an expectant hush in the court while I ruminated on this Gilbertian situation. It required, I decided, a Gilbertian answer, so I pronounced them both guilty of both charges and divided the sentence between them. This highly irregular solution brought exclamations of wonder and approval from the two attendant Indian officers and the proceedings ended on a note of comic opera with the two culprits marching from the room, their faces beaming with satisfaction.

But all this still left the main criminal unaccounted for. Mangal Ram had left a trail of trouble in his wake. His original desertion had involved the police in months of activity. His subsequent court martial should have closed the account. His attempted suicide and escape had resulted in three other people being court martialled, whilst he had added another serious charge against himself which was duly recorded; to say nothing of what the civil authorities might wish to do about the matter of false enlistment in the police. All this remained on the books but as the weeks went by and turned into months no news came of the culprit's whereabouts, and I left the unit for a more active sphere of service.

That was many years ago and maybe there has long since been an amnesty for people such as Mangal Ram, who can now sit without fear with the other elders of his village in the hills of Almora and recount, with suitable variations and many embellishments, the story of how he escaped as a prisoner of war.



**Lieut-Colonel WS Traill DSO DL JP**

# Memoirs

LIEUT-COLONEL W. S. TRAILL, DSO, DL, JP

WILLIAM STEWART TRAILL was born on 28 March 1868, the son of Anthony Traill, Provost of Trinity College, Dublin. He was educated at Birney's, Gosport and at Trinity College, Dublin.

He was commissioned into the Corps on 29 March 1890 and, after passing through the SME Chatham, he was posted to India where he spent the greater part of his service.

After a year in the Military Works Department he was posted to the Madras Sappers and Miners and served with them as a Company Officer at Mandalay, Rawalpindi and Bangalore. It was with them that his love for polo was born. He later joined the 2nd Company, Bengal Sappers and Miners, commanded by the then Captain Aylmer Hunter-Weston, which formed part of the Waziristan Field Force. He was present when this Force was surprised and overrun near Wana by the Mahsuds on 3 November 1894. In the same Company he also saw service with the Chitral Relief Force.

In 1895 he was posted once again to the Madras Sappers and Miners at Bangalore and stayed with them for the next seven years, seeing service at Maymyo, Burma, with the Tirah Field Force during operations in 1897 and 1898 and in Thayetmyo.

From 1902 to 1907 he was lent to the Government of Mysore Public Works Department as Deputy Chief Engineer and Superintending Engineer of the Cauvery Power Scheme. After a period of furlough in England and a course at the SME he was re-posted to India as Garrison Engineer, Quetta. In 1910 he was lent to the Government of Indore, Central Provinces, as Chief Engineer of their Public Works Department which appointment he held until being posted as Staff Officer RE to the Chief Engineer, Irish Command at Dublin in 1912.

In 1916 he was posted to the Expeditionary Force in France, becoming CRE 47 Division in December of that year. In April 1918 he was made CRE IX Corps Troops then engaged in the Battle of Hindenburg Line. For his services with the Expeditionary Force he was awarded the DSO and the Croix de Guerre and he was three times mentioned in despatches.

In April 1919 he was posted as CRE Exeter and he retired on 4 September of that year.

After his retirement he settled down on the family estate at Ballylough farming extensively and making full use of the excellent fishing and shooting. He became a Justice of the Peace and in 1929 he was appointed High Sheriff of Co. Antrim. He took a great personal interest in the British Legion, being President of the local branch of which he was a life member.

In 1936 he handed over his estate to his eldest son and moved with his wife to Kenya where he settled with his second son. There he took up polo again at the age of 75.

He returned to Ireland in 1947 and passed his last days shooting and fishing for as long as he could see and stand.

He married in 1896 Selena Margaret, youngest daughter of Charles Frizell, Esq, of Castlekevin, Co Wicklow. They had three sons.

He died on 20 August 1959, aged 91 years.

J.

## LIEUT-COLONEL R. H. CUNNINGTON

R. H. CUNNINGTON was born in 1877 at Devizes and educated at Clifton College. He was mobilized with the 10th (Railway) Company RE, at the outset of the Boer War and served with that Company throughout the war, remaining with it during 1903 and 1904 while it was employed on the reconstruction of railway bridges in the Orange River Colony, involving tricky work during short interruptions to traffic, and later on the construction of the branch line from Bloemfontein to the military cantonment at Tempe.

Following a short period on the Woolwich Arsenal Railways, Cunningham proceeded to Longmoor in 1905 with the Company which was sent with the 8th and 57th Companies to form the Railway Training Centre and built the Woolmer Instructional Military Railway. After he married in 1910 he served again in South Africa until the outbreak of the First World War.

Cunnington was prevented on medical grounds from proceeding to the front in 1915 and was posted to the Railways, Light Railways and Roads Directorate at the War Office, where he was in charge of the personnel section then engaged in expanding the military transport personnel from a few hundred railway troops to some 80,000 railway, road construction, port and transport control personnel in all theatres of war. This involved an enormous expansion of Longmoor and the incorporation of contingents from overseas Dominions. The smooth working of this organization was a tribute to Cunningham's organizing ability and tact. Though suffering acutely from duodenal ulcer he refused to undergo the necessary operation until he had broken the back of this expansion. After some months' absence he returned completely cured to carry on this work for which he was made a Brevet Lieut-Colonel.

He was appointed CRE Weymouth District in October 1922.

Cunnington was mathematically minded with a quiet sense of humour and a keen interest in his work. He came from an archaeological family and after his retirement in 1927 his chief interest lay in the development of archaeological research in this country. He died on 5 May 1959.

H.O.M.

## Correspondence

Transportation Inspectorate RE.  
BAOR,  
BFPO 40.

10 September 1959.

The Editor,  
*RE Journal*.  
Dear Sir,

I was very interested to read Captain Knowles' excellent article "Loading and Unloading" (*Journal*, June), especially as regards the use of field units in transportation role. He has made a number of good points and there is a great deal of truth in his conclusions. I feel, however, that I must add a note of warning that the problem is not nearly as simple as might appear at first sight.

Knowles' article was presumably written as a result of one exercise which took place under special conditions—i.e. immediately after his squadron had completed three weeks intensive port operating training, using the same equipment and facilities as were used in that training, and under peace-time conditions. Further, the equipment and facilities used, although typical, were inevitably limited in scope.

A better example to quote is the work carried out by a Corps engineer regiment operating as a port regiment at Port Said during the Suez operations in November–December 1956. This was just such a situation as that envisaged by Knowles in his opening remarks. In spite of the call up of a considerable quantity of Transportation port operating reservists, there were still not enough, and a Corps engineer regiment had to help out after one month's training at Marchwood. This is a particularly good example to study as the Corps engineer regiment concerned worked alongside a Tn AER port regiment composed almost entirely of professional or ex-Tn (NS) stevedores, etc. I had the good fortune to be AD Tn 2 (BR) Corps during the recent operations and so was able to observe and compare these two regiments working under similar conditions.

First one or two facts:—

(a) Port Said is a fully lighterage port with no alongside berths except for the smallest of coasters. Thus it is not an easy port to work even when not cluttered up with wrecks, but nevertheless is probably fairly typical of the type of problem we may have to meet in any future conflict.

(b) During operations Port Said was operated as a 100 per cent military port with no civil assistance, making control and port operating much easier from the military point of view. As a point of interest, such was the importance of ship discharge to the Corps plan, that at one stage fairly early on, out of 13,000 troops ashore 2,000 were Tn.

(c) The highest rate of discharge in the early stages was essential in spite of the limited moorings for cargo ships due to blockships in the harbour and canal. The situation was further aggravated by other necessary demands for moorings by naval vessels, French vessels and personnel ships.

(d) Strengths of the units were—Corps Engr Regt, approx 850; AER Port Regt, approx 700. Each had three squadrons for port operating.

(e) A second, but very under strength, AER port regiment was incorporated into the Corps Engr Regt to give a nucleus of experience. In fact it was found that only a few individuals were really necessary; the remainder being employed on specialist duties under the Port Superintendent (CO of the AER Port Regt).

(f) Lighterage was carried out by an AER IWT operating squadron.

(g) Less than a month after our arrival we had to start back loading the stores which had not been consumed. This gave the Corps Engr Regt the opportunity of practising the loading of stores as well as discharge. I was thus also able to compare

the two units carrying out this type of work. I might add I did not make, or even think of making these comparisons at the time, but inevitably it has cropped up since when drawing lessons from the operation. Fortunately fairly detailed records were maintained.

An exact comparison of the work of the two regiments was not really possible owing to the great variety of cargoes, mostly mixed, that were handled. In general, however, the points that came out were:—

(a) The rate of discharge (dead weight tonnage) achieved by the AER Regt was considerably higher, especially in the early stages, than that of the Corps Engr Regt. This was in spite of the fact that the former was the weaker unit, and was given the more difficult tasks.

(b) Nevertheless, the non-Tn Regt was a most effective unit and carried out some very valuable work. It was surprising that they could produce the output achieved under the conditions prevailing, after only one month's training in port operating.

(c) The proficiency of the Corps Engr Regt increased as experience was gained in the varying problems, different types of stores being unloaded, etc. The operation did not go on long enough to see at what stage their efficiency might approach that of the specialists.

(d) The specialist Tn advisers, particularly a few experienced WOs, from the AER cadre attached to the Corps Engr Regt, were invaluable on several occasions when difficulties arose. On at least one occasion one of these WOs averted what might have been a very nasty accident. It is the unexpected that is apt to trap the unwary "amateur".

(e) When back loading of stores commenced the disparity between the two units became even more apparent. Loading, especially of varied cargoes including MT and awkward loads, is always more difficult than unloading. Only experience can ensure that the most efficient use is made of space available (always at a premium), and that no unforeseen snags delay the operation.

To sum up, the lessons learnt were:—

(a) The Tn specialist port unit is, of course, the answer when available.

(b) In an emergency, however, with a minimum of three to four weeks training and subject to sub-paragraph (e) below, any good engineer unit should be able to carry out loading or discharge of cargo ships alongside or in stream. In the latter case Tn IWT personnel are essential.

(c) At the beginning of an operation, when the highest rates of discharge are required, the semi-trained field unit will be at its slowest. This is a most important point and should not be overlooked.

(d) Skill and speed come with experience. After a period at this type of work (six to nine months?) such a unit as the Corps Engr Regt described should virtually be a professional port regiment.

(e) In the early stages, especially in unusual situations or if dealing with unusual stores, some Tn specialist advice and assistance for the field unit (say one officer and a few experienced WOs or senior NCOs) is vital. Without these the work may be held up by some quite small detail that the experienced man can deal with in a matter of minutes, but which may delay the "amateur" for hours or even cause a serious accident. Such an accident could well put a hold completely out of action for hours or even days.

(f) Loading is more difficult than discharge, especially for the semi-trained unit. This is aggravated if lighters are being used.

Finally, it is dangerous to draw too specific lessons from limited experience. I do not feel that Captain Knowles intended to do this, but the article inevitably is written from one angle; perhaps the above helps to show other aspects of the same problem.

Yours faithfully,

G. W. SHEPHERD,

*Lieut-Colonel RE.*

The Editor,  
*RE Journal*.

School of Military Engineering,  
Chatham.  
17 November 1959.

Dear Sir,

In his article "Vital Statistics", printed in the September *RE Journal*, "Dan" threw down a challenge—the following symbolic ballad is my answer:—

### THREE PIPPA PASSES

You should read your *RE List*:  
There may be something you have missed  
among the fascinating symbols on the cover.  
There's an *A*, a *C*, a *G*,  
and a *VERY* handsome *P*  
and a *t\**, and then another *t* twice over.

There is *m* for those who fell  
beneath a woman's spell;  
There's a *pl(i)* and *ph(i)* to boot;  
There's the useful *pse*,  
and a microscopic *e*,  
and an *I* for those who join the Institoot.

You might even have a try  
as "Captain Blank, RE R1,"  
(ARA not as "U" as it might be!)  
But what you *really* need  
for promotion with due speed  
is the very necessary *p*.

Yours faithfully,

T. W. TINSLEY, Major RE

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## The Week-End Commuter

I met a man  
As I began  
My homeward steps to trace  
He struggled with a monstrous bag  
His leaden footsteps seemed to flag  
Despite his hurried pace.  
He said he sought to catch a train  
But feared he would be late again.

I wish, he said,  
My kit was spread  
Between my home and here  
In such a way that there would be  
At either end enough for me  
Without a shift of gear.  
I envy very much the state  
Of those who live in duplicate.

H.N.O.

# Technical Notes

## CIVIL ENGINEERING

Notes from *Civil Engineering and Public Works Review*, July–August 1959

**"A Rapid Moment and Torque Distribution Method for Grid Framework Analysis":** This paper describes the combination of two different methods of structural analysis. Generalized methods are helpful in forming a "picture" of the stresses and strains involved, and can be either simplified by assumption or tabulated to avoid tedious calculation. Iteration methods, on the other hand, yield solutions to particular problems, which may involve lengthy repetition of calculations for each new problem and loading condition. The article shows how both methods can be combined to obtain both rapid and exact solutions. The errors due to the assumptions made in the generalized method can be corrected to the required degree of accuracy by means of iteration processes.

**"The Use of Substitute Frames in the Determination of Influence Lines for Moments in Rigid Frames":** This is the first of series of articles. The aim is to show how influence lines for moments induced at the joints of a rigid frame may be obtained using a substitute frame. Not only can the problem be simplified by selecting symmetrical substitute frames, but the solving of many simultaneous equations can be eliminated by the "no-shear" approach which has already been applied by several authors to the case of symmetrical multi-storey single bay frames.

**"New Swedish Method for Blasting":** The "Lindo Method" is very briefly described as a means of blasting bedrock without previous excavation of the overburden. The rock-steel of the compressed air Atlas Copco rock drill passes through a steel tube which is itself equipped with a circular crown bit. Both the tube and the bit are driven through the upper layers, with the bit leading by about an inch. When bed rock has been penetrated, the outer case is left in position while the rock bit drills to the required depth into the bed rock. The rock bit is then withdrawn, and a plastic lining takes its place. The outer tube is withdrawn and the explosive and detonator is pushed down the plastic tube by compressed air. This use of compressed air for drilling the hole, and for charging it, is claimed to save both time and manpower. The resultant explosion leaves a mixture of rock-debris and overburden which is much firmer than the latter was to start with. It is easier to remove than the original wet clay and earth.

**"A Direct Reading Hiley-Formula-Based Nomogram for Steel Bearing Piles":** A most valuable nomogram was published in September 1958 to cover the design of precast reinforced concrete piles. This new article presents the same data in respect of steel bearing piles. Considerable correspondence will probably ensue as to the limitations of the Hiley Formula, but meanwhile this is a very simple chart for speedy use.

**"The Bending of Compound Beams and Struts":** When initiated to reinforced concrete, if not before, a young engineer has to work with composite materials, and meets the concept of "Equivalent" cross sectional area. In early examples bending always takes place in a convenient plane (generally the Minor Principal Axis). There comes a time, however, when moments are applied in non-principal planes. The author shows, by means of simple diagrams, how the analogy between the second moment of area of a plane figure and the true moment of inertia of a thin plate can be extended. By showing the effect of "thickness" in 3-D, the relative inertia effects of a composite beam can be studied in any plane by means of the Mohr "Circle of Inertia".



"Soil Mechanics Approach to Frost Problems in the Construction of Roadways and Runways": The author, Mr H. R. Reynolds, has set out the causes, effects, and generally accepted methods of cure in a short, concise form. From this article one can see the type of tests which could show if frost problems are likely to occur, and several methods for reducing the effects. It is clear that if money were expended on full analysis and on precautionary measures, much trouble later could be avoided. But soil is not a homogeneous material, and water tables and drainage systems are not perfectly predictable. Experience, probably bitter, will most likely guide designers who are in a hurry more than theory and analysis. T.W.T.

Notes from *Civil Engineering and Public Works Review*, September 1959

"MODELS FOR STRUCTURAL DESIGN": A short description of the symposium recently held in London by the Cement and Concrete Association summarizes the main advantages of model analysis and testing as follows: "An accurate representation of site conditions can be achieved and varying properties of soil, strata, rocks, etc., can be taken into account. The behaviour of the structure as a whole can be considered. This includes the various interaction effects of infilling panels, slabs, and partition walls which in normal design procedure are either neglected or allowed for on a very empirical basis. The static and dynamic behaviour can be simulated not only under working loads but also at failure. This is of considerable importance in an area where earthquakes and wind forces can be major factors in design. Models can be designed so as to provide either stresses or deflections equivalent to those anticipated in a prototype and may be used as a direct means to design. In any model test the information is obtained relatively quickly and alternative designs can be tried relatively cheaply."

"THIMBLE DEVICE FOR LAYING LONG RAILS": The use of a special crane attachment is described by which means a gang of three men can position 300 ft lengths of welded rail ready for connecting up.

"CONSTRUCTING A SKIP PIT IN FROZEN GROUND": This series of articles describes the use of deep freezing as a means of excavating a 36 ft deep pit in fine sand with a high water table adjacent to existing heavy structures. The problem was complicated by the fact that these existing buildings were interconnected by service ducts and flues which were not to be interrupted. Dewatering was not a practical solution, as a movement of the fine sand would cause settlement of foundations which was to be avoided. Several interesting factors had to be taken into account: the strength of the frozen ground to act as an inverted vault from which the centre portion could be removed; the risk of this vault "floating"; the heating effects of the concrete as it set; the number and positioning of the freezing tubes. The freezing period involved was three months. T.W.T.

## ENGINEERING JOURNAL OF CANADA

Notes from *The Engineering Journal of Canada*, September 1959

"THE HUMBER SEWAGE TREATMENT PLANT": In 1953 the municipality of metropolitan Toronto was established, and its corporation was charged with the responsibility for services previously administered by thirteen different municipalities. The first part of this paper analyses in some detail the sewage disposal situation at the time of take-over, and it provides a striking example of what happens in a rapidly developing urban area when there is no over-all planning. The many factors governing the project designed to provide adequate sewage treatment and disposal for the whole area are then set out, and the last part of the paper describes the various plant units, with particular reference to a new 50 million gallons per day installation at the mouth of the Humber River, which is due to come into operation at the beginning of 1960.

"BEAUHARNOIS NO. 3 DEVELOPMENT": Situated some thirty miles west of Montreal, the Beauharnois hydro-electric development will be one of the main sources of power

supply for the Canadian metropolis. The project, initiated in 1929, involved complete damming of the St Lawrence River, and its diversion into a man-made canal, through which the St Lawrence Seaway now runs between Lake St Francis and Lake St Louis. The third and final phase of the project is now nearing completion, and by 1961 the total average daily production will be something over 34 million kWh. The design of the power house for Beauharnois No. 3 shows no noteworthy change in architecture, wall alignment, or construction of superstructure, but there are major differences in the type, capacity, and speed of turbines, so that generator foundations are quite different. General features and hydraulic characteristics are first described, followed by an evaluation of the benefits to be derived from the additional generating units, with special reference to the limitations imposed by ice-formation. Equipment characteristics and construction aspects are clearly summarized, and an aerial photograph of the completed structure deserves mention.

"A GAS TURBINE POWER PLANT FOR LOCOMOTIVES": *The Engineering Journal* for April 1959 contained an interesting paper on the free piston engine (see *RE Journal*, September 1959), in which its application to railway traction was briefly considered. This paper discusses in some detail the merits of the gas turbine, lists the experimental locomotives so far manufactured, and describes the design of a mixed cycle prime mover which exploits the potential advantages of the gas turbine, while using steam to minimize fuel consumption at idling speeds. While the modern diesel engine, employing electric or hydraulic transmission, makes a very satisfactory and economical locomotive, the gas turbine, using mechanical transmission, may before long be developed as a worthy challenger.

"LITTORAL DRIFT IN LAKE ONTARIO HARBOURS": Although this paper relates primarily to local conditions, it contains a lot of information about the theoretical causes of erosion and silting, and some practical comments on remedial measures. Engineers concerned with the construction or maintenance of jetties and harbours will find some interesting reading here. R.P.A.D.L.

## THE MILITARY ENGINEER

*Journal of the Society of American Military Engineers*

SEPTEMBER-OCTOBER 1959

"Military Missiles and Rockets" by M. K. Lutz. This is a catalogue, with brief descriptions and photographs, of the various missiles and rockets in service with, or being developed by, the US Army and Air Force. No details are given of any in service with, or being developed by, the US Navy. The fact that the Navy is equipped with more than one weapon is however mentioned.

"Mobile Minefields" by Major E. F. Fursdon, RE. This article deals very fully with the tactical aspects of laying minefields by the use of helicopters, not only for collecting and distributing the mines but for laying them in their final position. The author's arguments are supported by descriptions of trials carried out on Salisbury Plain. The article claims that the helicopter provides a means of laying minefields with the speed and secrecy essential in modern war with its wide dispersions and quick moving forces.

"Engineers of the British Admiralty" by Sir Maurice Adams, KBE, MICE. A concise account of the personnel, organization, and work of the Civil Engineer-in-Chief's Department of the British Admiralty.

"Safety in the Middle East Construction Programme" by Brigadier-General William R. Shuler, US Army. The Army Engineer Division Mediterranean with its Headquarters at Leghorn is responsible for major engineering projects in Morocco, Eritrea, Libya, Italy, Turkey, Greece, Iran, Pakistan, and Saudi Arabia. Great importance is attached to ensuring the best safety conditions for working and this article describes the safety service which has been established to ensure this. The

difficulties imposed by language, native dress and illiteracy are brought out in the text and by illustrations. A good measure of success in reducing the accident rate has been achieved. Of particular interest to the British reader, however, is the glimpse given of the widespread engineer activities of the US Army in the Middle East.

"Nuclear Power Reactors" by Captain Fred F. Kravath, Civil Engineer Corps, US Navy. After pointing out that the US Air Force and Navy are both developing nuclear-powered aircraft and that the US Navy already has a growing fleet of nuclear-powered submarines, the author gives a clear, concise and instructive summary of the various types of reactors which have been, or are being, developed in the United States and in Europe for all purposes, both military and civilian. A short description with an excellent explanatory diagram is given of each type of reactor.

"New Military Techniques" by John E. Quaille. There have already been references in the *Military Engineer* to air-supported structures produced in the US. This note describes a shelter of this kind for servicing missiles which consists of a group of five air-supported shelters, the central one 150 ft in diameter and 85 ft high at the centre, and the small ones 100 ft in diameter and 50 ft high. The light weight and speed of erection by a team of ten men emphasizes the military value of this type of construction.

"Hydraulics Through the Ages" by Captain C. J. Merdinger, Civil Engineer Corps US Navy. This article consists of four parts. Part I Irrigation and Flood Control; Part II Dams; Part III Water Power; and Part IV Harbours. The first two parts are included in this number of the *Military Engineer*, the second two will follow in the next. These two parts are entirely historical and describe the development of water control under the two headings from earliest times to the present showing how methods have changed with increased knowledge and new materials. An interesting paper which would have been much more so if there had been more pictures and diagrams illustrating the text.

"The Jumbo Truck" by Lieut-Commander Lulius Grigore, Jun., US Navy Reserve. A project of the Detroit District of the Army Engineers which involved obtaining some 1,200 sub-soil samples per year for the next three years called for a truck with exceptional cross-country capacity and good road performance. This article describes how such a truck, nicknamed Jumbo, was thought out and produced using only components in commercial supply. Of particular interest is the specification, which was worked out after considerable discussion, and the modifications which were recommended after some months' practical experience. Some of the principal features are, large diameter single tyres, all wheel drive, high ground clearance, power steering and a tyre inflation schedule on the dashboard. The latter is a guide to enable the driver to lower the tyre pressure and therefore increase the tyre ground contact area. The recommended modifications include an automatic tyre inflation control system in the cab to which great importance is attached. Its use would make it possible to continue operating the vehicle without stopping for pressure variations and would also permit continued running with a punctured tyre by the use of a built-in-air-maintaining feature.

"The Corps of Engineers: Troops and Equipment" by Blanche D. Coll, Jean E. Keith, and Herbert H. Rosenthal. This is an announcement by the authors of a book entitled *Publication of US Army in the World War II; The Corps of Engineers Troops and Equipment*, which is the fortieth volume to be issued in the Army Historical Series. From the announcement the volume covers in considerable detail the history of the organization, training, development and action of the Corps of Engineers during the last war.

J.S.W.S.

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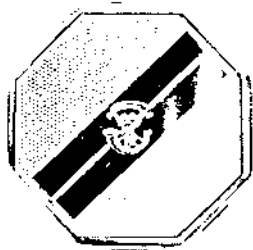
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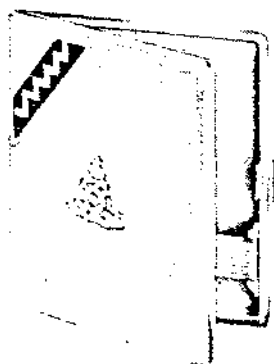
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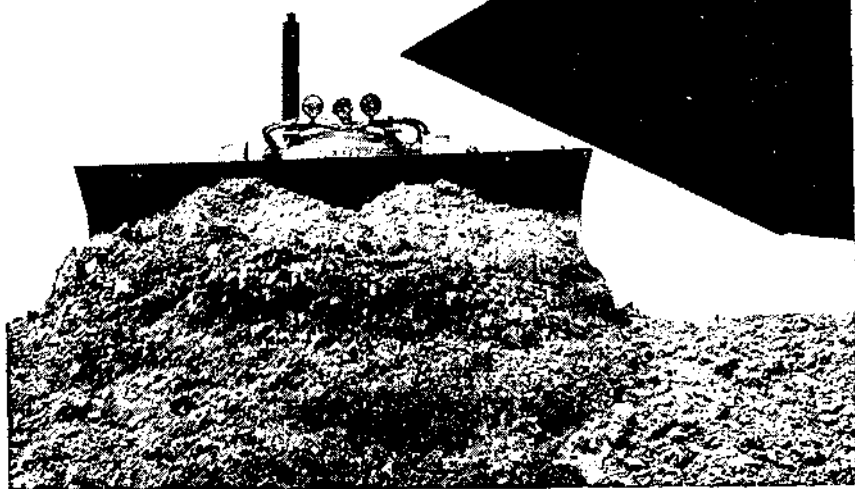


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