ARMY JOURNAL

No. 271 DECEMBER 1971

ARMY JOURNAL

Editor C F Coady

Staff Artist D E Hammond

Printed and published for the Australian Army by Renown Press (Aust.) Pty. Ltd. and issued through Base Ordnance Depots on the scale of one per officer, officer of cadets, and cadet under officers.

Contributions, which should be addressed to the Editor, Army Journal, Directorate of Military Training, Army Headquarters Canberra, A.C.T. 2600, are invited from all ranks of the Army, Cadet Corps and Reserve of Officers.

$10 will be paid to the author of the best article published in each issue. In addition, annual prizes of $60 and $20 respectively will be awarded to the authors gaining first and second places in the year.

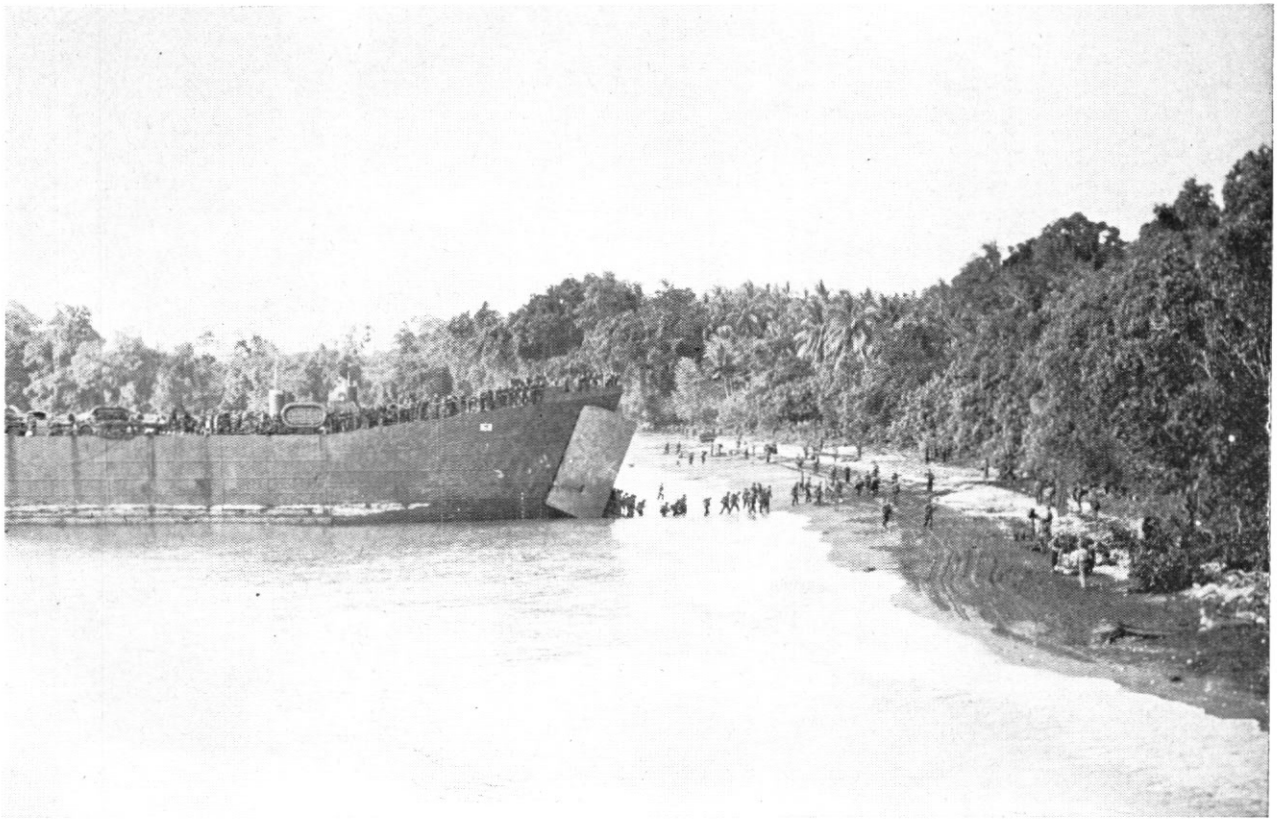
Cover: Detail from war artist G. R. Mainwaring's large canvas 'The 18th Brigade attack on Cape Endaiadere, Buna, December 1942,' at the Australian War Memorial.

ARMY JOURNAL

A periodical review of military literature

No. 271, DECEMBER 1971

Contents



(Australian War Memorial)

An L.S.T. landing troops of the 9th Division at Scarlet Beach, near Finschhafen, New Guinea on 22 September 1943.

I Like SYSTEMS ANALYSIS But...

Colonel D. G. Osborne
Royal Australian Engineers

Introduction

ALTHOUGH Systems Analysis has been the subject of numerous articles in many journals, most have either been directed to specific audiences other than the Australian military community or have been quite comprehensive in nature. This article, it is hoped, will fit somewhere in between.

As the environment in which we operate becomes more complex it is certain that the use of Systems Analysis as an aid to decision makers will increase. It would be most regrettable

---

Colonel Osborne is a graduate civil engineer: he joined the Militia in 1941, the AIF in January 1944 and was commissioned into the RAE in March 1944. He served with the 7th Division Engineers in Queensland and Borneo in 1944-45. He attended a technical staff course in the UK in 1953-54, was an instructor at the Army Staff College 1963-65, attended a Management Systems course in the United States in 1970 and the Joint Services Wing, Australian Services Staff College in 1971. Recent appointments have been: Chief Engineer, HQ PNG Command; CI School of Military Engineering; and TSO 1, Australian Army Staff, Washington. His present appointment is Project Officer, Directorate of Army Development, AHQ Canberra.

however if the stage was ever reached where no decisions were made without support from an analysis by systems analysts: this is an ever present danger.

There are indications that the true meaning of the term 'Systems Analysis' is not fully understood by some who use it in conversation or writing. This could be partly due to the attitude of some academically inclined proponents of Systems Analysis who appear to want to preserve the mystery which still partially surrounds it.

In addition, the average military officer, who by training and experience is a practical sort of fellow, tends to resist getting too involved in areas he considers best left to the 'boffins'. The result is that when some officers find themselves in policy decision making positions, their reaction to systems analyses is either acceptance without question (because they are unable to question) or rejection based purely on their own experience and intuition. Either approach is seldom the best one.

The aim of this article is to assist the military executive to understand the meaning of Systems Analysis and to encourage him to make use of it in an effective way.

Background

The introduction of the term 'Systems Analysis' and the impetus given to its application have undoubtedly stemmed from the period in the 1960s when Mr McNamara was Secretary of Defense in the United States. During this period Systems Analysis was built up almost to the stage of being an infallible scientific computerized method of analysis of future systems, usually but not necessarily weapon systems of one kind or another.

This view was not always shared by the system analysts themselves, but appeared to be accepted by many decision makers and by many persons who were able to influence decision makers. It was not until the failures of several major military projects to reach their forecast performance level, or to stay even near to their forecast costs, that it began to be acknowledged that Systems Analysis was neither a science nor infallible. The Australian defence organization does not have to learn the

same lesson the hard way, as it should be forewarned by the American examples. Only time will tell whether we make the same sort of mistakes.

What Systems Analysis Is

Systems Analysis lacks a clear definition but is generally recognized as being analysis directed towards the solving of complex problems requiring a look well into the future.

Operations Analysis, a term more familiar to most, on the other hand is the analysis of narrower problems in the more immediate future, for example, how to improve the performance of an existing weapon system. Although there is no clear cut line of demarcation between the two forms, Operations Analysis, because it usually deals with data which can be substantiated and costs which can be estimated fairly accurately, can be more scientific, and therefore more reliable, than Systems Analysis.

This is really another way of saying that the immediate future is more predictable than the distant future; obvious but nevertheless fundamental to this discussion.

Systems Analysis is a method to put before the decision maker the relevant data, assumptions, costs and conclusions organized in the way most useful to him. It is analysis directed towards defining the issues and alternatives clearly. It cannot solve complex problems by itself but sharpens the intuition of the decision maker by presenting information relevant to alternative solutions.

Some of the information presented may be in a quantitative form, but this should occur only when the probability is high that the figures are reliable. There are numerous techniques available to the analyst to assist in the production of quantitative results; statistical analysis, parametric analysis, linear programming, Monte Carlo, and game theory are common examples. While their use may frequently be justified in Operations Analysis, their wide use in Systems Analysis should be viewed with some suspicion for the reasons mentioned above. It is possible for figures to indicate a degree of certainty where none exists.

Any good systems analysis should state clearly and openly all the assumptions used in the analysis; any analysis which does not do this is not worth using as a basis for decisions. Further, any worthwhile analysis should show the effect of varying the more important basic assumptions. The decision maker can then himself decide, on the basis of experience and judgment, which of the assumptions are the most realistic. The implication here is of course that the analyst, to avoid waste of time and effort, should clear important assumptions with the originator of the study before going very far.

A systems analyst should not attempt to quantify things which cannot be rationally quantified. There is a temptation confronting an analyst to reduce as many of the imponderables as possible to figures because it is easy to manipulate mathematical models, and it speeds up the analysis by reducing the amount of conventional discussion. Therefore the decision maker should look very carefully at an analysis which manipulates figures representing for example an enemy threat, or compares purely numerically the effectiveness of one type of military unit with that of another.

Problem Formulation

An analysis should of course have its origins in a need for a decision to be made. The decision maker must retain the responsibility for the formulation of the problem to be analysed. He may seek advice from the analyst in doing this. He should be aware of the most serious pitfall of all — of not clearly defining the scope of the problem or study. It should be clear that the wider (or looser) the scope, the greater becomes the number of alternatives, the longer is the time taken for the analysis and the greater is the difficulty finally in making a good decision.

The correct formulation of the problem is often the most difficult part of the whole process. The following guidelines for the formulation of a problem for analysis are suggested:

- Define the objectives of the proposal or requirement.
- See what these objectives could lead to in areas other than the prime one.

- Decide and describe the limit guidelines and parameters.
- State the present position, capabilities, trends and deficiencies, with the emphasis on fact rather than opinion.
- Request the analysts to produce viable alternative solutions or options, including the effect of marginal changes in important parameters.

Why Systems Analysts?

The reader may now have reached the stage of saying to himself: 'Systems Analysis is really no more than logical thought. Anybody could do it.' This is of course true to a degree. Anybody could do it, but few would do it well and most would make a complete hash. Just as in any field of endeavour, the best results come from those who are trained for the job and who develop their talents from experience in their particular field. In addition, in the area of Systems Analysis, it is necessary to have a knowledge of mathematical techniques and analytic methods appropriately developed along specialist lines.

There is considerable expertise required in producing a timely, comprehensive and presentable analysis in a form suitable for immediate use by the decision maker.

The Responsibility of the Decision Maker

Makers of military decisions carry a large burden purely by being what they are. Their decisions usually affect the lives and sometimes the deaths of many people, as well as involving the nation in large expenditures of public money.

Decision makers in the military profession are a transient lot. Many decisions are made by persons who know they will not be in the same job when the full impacts of their decisions are felt. Perhaps it is not too unfair to say, human nature being what it is, that a few important decisions or non-decisions have been affected by this factor.

For these reasons, and many others, it behoves a decision maker to make full use of the analytical resources available to him. Just as importantly, he must be able to gain full benefit from the results of analysis. As well as being able to formulate the problem, he must understand what the analyst has done. He needs to have at least a background knowledge of the various quantitative techniques which may be used.

For example, it may be convenient for an analyst to use a statistical term which has an explicit meaning and which could provide a link in the chain towards the decision maker making a better decision. If he doesn't understand it correctly then the value of that particular part of the analysis is reduced and he is unable to question that part of the work.

Anyone who is to evaluate analyses properly should be able to distinguish between the use of fancy mathematical techniques as window dressing for a possibly bad analysis, and their use as critical ingredients of a first rate analysis.

Most libraries have books explaining the various techniques in language which does not require more than a high school knowledge of mathematics to obtain good comprehension.

Conclusions

Systems Analysis is not a science and should not be a mystery.

It is a method of analysis in depth to produce alternative solutions for consideration by decision makers.

It does not rely to a great extent on the use of mathematical techniques.

Systems Analysis is not synonymous with the application of computers.

It is not a substitute for judgment, only an aid.

The systems analyst is not the decision maker.

Systems Analysis does not provide a cure for pigheadedness, or allow for politically motivated decisions.

The formulation of a problem is one of the most difficult parts, and is the responsibility of the decision maker.

The system to be analysed should be restricted in scope if a useful and timely result is to be produced.

Assumptions made must be explicitly explained in the analysis.

Decision makers cannot make the best decisions unless they understand the techniques of the analyst.

In the final analysis, a decision maker makes his decision from information held only in his head. □

PLUS CA CHANGE

This was written in 1683 by Vauban, the French equivalent at the time of our Director of Fortification and Works, to Louvois, his Secretary at War in the government of Louis XIV. Vauban was then engaged in fortifying islands off the Brittany coast.

Monseigneur,

There are several unfinished works, outstanding over the last few years which will never be completed, due to the confusion caused by the frequent reductions in scope ordered by you, because it is certain that all the breaches of contract, all breaking of works and renewing of adjudication only result in attracting contractors of the lowest grade, the rogues and the illiterates, and to drive away those who are capable of carrying out our project.

I will go as far as to say that they delay and cause a considerable rise in the price of the works, which are of a very low standard, because these reductions and such seeking after cheap materials are purely imaginary; the more so because we can compare an unsuccessful contractor to a drowning man, in other words a man who clutches at anything, which in this case means non-payment for his materials, cheating where he can, underpaying his workmen and only employing the cheapest and most unskilled labourers and continually complaining about them.

Enough of this, I think, Sir, to make you see the error of your ways. Abandon them and in the name of God, restore good faith; pay fair prices and wages, and do not refuse an honest salary to a contractor who knows his work; it will be the cheapest way in the end.

JAPANESE COMMAND CRISIS IN BURMA, 1944

Major J. H. Moore, ED
Royal Australian Infantry

Renya Mutaguchi

IN 1956, when Field Marshal Slim wrote his admirable record of the Burma Campaign, *Defeat into Victory*, he covered in considerable detail the repulse from March to June 1944 of the Japanese before Kohima and Imphal, highlighting in the account the realization that, in his plans to counter the imminent Japanese offensive, he had overlooked the strategic importance of the main British supply base at Dimapur. This caused him to set about belatedly garrisoning the place with a feverish haste because he saw only too clearly that if the Dimapur supply base fell, he would lose all hope of maintaining road resupply from India to his IV Corps, which was then located forward around Imphal. This would force him to place the corps on air resupply which probably would cease as soon as the imminent monsoon broke. It was no wonder then that Slim's dilemma and apprehension were acute.

A consideration of the enemy's intention confirms that Slim had every reason to be alarmed because his opposite number, Lieutenant General Mutaguchi of the Japanese 15th Army,

---

Major Moore was commissioned in 1958 in the 45th Battalion. A senior ancient history master at The Scots College, Bellevue Hill and OC of its cadet unit his present posting is GSO Trg (CMF) HQ Eastern Command. In the last few years Major Moore has been involved in the coaching of candidates for military history examinations.

had also seen just as clearly that Dimapur ought to be the real Japanese objective as its capture would probably seal the fate of the British corps once and for all. Yet in spite of this accurate appreciation, it stands as fact that the Japanese never took Dimapur. Whilst it is true that Mutaguchi did order Major General Sato's 31st Division to exploit to Dimapur, the division fortunately never reached the place. For this failure, Slim incorrectly blames Sato, although his error is understandable when we realize that at the time of writing *Defeat into Victory* he did not have the full facts relating to Mutaguchi's role in the Dimapur operation.

However, in recent years military historians have had access to material not available to Slim, and they have closely investigated Mutaguchi's conduct of that major Burmese offensive launched by the Japanese on 15 March 1944; which had as its object the invasion of India via Imphal and Kohima. Pre-eminent amongst these recent writers is Arthur Swinson, whose book *Four Samurai* is the most gripping account of Japanese generalship I have read. Other accounts dealing with Mutaguchi in lesser detail have been written by Geoffrey Evans in his *Slim as a Commander*, and also by Colonel Tsuji in his book *Singapore: the Japanese Version*. It is largely on these accounts that this article is based. Let us trace therefore the whole Dimapur affair because its incredible results are not only fascinating as a piece of military history, but are also integral to an understanding of why Mutaguchi suffered such an appalling defeat in the Imphal offensive.

Renya Mutaguchi was born in South Japan on 7 October 1888, of a once notable aristocratic family whose waning fortunes he felt it his destiny to restore — and the key to his personality was that this potent conviction was his dominant motivation. With it he coupled considerable courage, tenacity, and military ability.

His father died early in the boy's life and the death was followed shortly after by that of Renya's only brother. Now left as the sole surviving male of the family, Mutaguchi's determination to succeed became a passion with him, and he determined to make his mark through the army.

He entered the Military Academy in 1908, and graduated as sub-lieutenant in 1909. He then entered Staff College in 1914, and commanded a battalion in the famous Guards Division in 1925. After appointment as an instructor at Staff College in 1927, he joined a military faction group, called the Cherry Society, but when it failed in 1930 to grab political power for the army, he left it and joined the Imperial Way Group — a military faction which aimed to set the Emperor above cabinet and to establish a military rule directly under his control. As with Yamashita, Mutaguchi developed a child-like obsequiousness towards Hirohito. However, in 1936 the Imperial Way Group was also to fail in its abortive military plot of 26 February, and although only associated with the plot in a quite minor way, Mutaguchi was punished by being sent away to Peking to command the First Regiment.

Disenchanted with the Imperial Way Group as an organization which could not now foster his ambition, he sought membership of yet another military faction, and so joined Colonel Tojo's Control Faction, an extreme military group of officers from Tokyo's First and Third Regiments who despised the politicians and avaricious industrialists of the day, and saw that Japan's chance for greatness lay not in the stagnation of peace, but in the prizes from war. Thus they advocated war with China and even with Britain and the USA if it became necessary. Mutaguchi was selected to be the Control Faction man who was to incite war with China. This he did quite successfully on 7 July 1937 in the famous Peking Incident. As a result, Tojo became a Minister and Mutaguchi, his associate, was rewarded with general rank. After a period in 1938 as chief of staff to Yamashita's Kwantung Army, he was appointed commander of the 18th Division which, as part of Yamashita's 25th Army, moved with such notable success down the east coast during the Malayan Campaign. Finally, in March 1944 Mutaguchi was appointed commander of Japan's 15th Army in Burma at a time when his friend Tojo, now Prime Minister, was having a distinctly tough time because his grandiose plans for a Japanese Co-Prosperity Sphere in Asia were not living up to the remarkable success earlier performances had suggested. Failures at Guadalcanal, New Guinea and Midway had brought this about and had caused

the deterioration of the whole strategic situation. Consequently, Tojo's popularity was distinctly on the wane and any plan which might show signs of success could be expected to receive his warm and grateful approval. Such was the situation when Mutaguchi's plan was placed before him.

Very briefly, the plan was as follows: whilst a Japanese army held Stilwell and the Chinese Armies on the northern front, and another army drew off General Slim's reserve from Imphal to face an offensive from Arakan in the south, Mutaguchi would launch his 15th Army into the main offensive against Imphal on the central front . To Mutaguchi it all seemed so possible. The more he reflected on the plan the more it fascinated and excited him, even to the extent, as he himself records, that in 'private speculations' he saw himself riding on a white horse through Delhi in a Roman style triumph. The fervour of his enthusiasm was fanned by the influence of Subhas Chandra Bose of the Indian National Army, who claimed that India was seething with opposition to the British and would enthusiastically welcome Japanese deliverance. To Mutaguchi the plan could not fail — such an idea was utterly preposterous — and he bulldozed the plan right through to Tojo via General Kawabe, who as commander of Burma Area Army was Mutaguchi's next superior officer.

Now Kawabe and Mutaguchi were as different in temperament as chalk and cheese. Kawabe was quiet, thin, sickly, abstemious, humourless, and loathed geisha girls and prostitutes. Mutaguchi was just the opposite — he was a lusty man with a considerable appetite for drink: he was the extroverted, bustling type who hated opposition and generally steam-rollered it; he was physically big for a Japanese, and though his fellow generals disliked him, they respected him. It is not to be wondered at then, that in the passage of time, relations between Kawabe and Mutaguchi quickly deteriorated.

Mutaguchi, right from his appointment as commander of the 15th Army, never liked Kawabe's Burma Area Army staff. Going even higher to the next command level of Count Terauchi's Southern Army Headquarters at Singapore, Mutaguchi there found both himself and his Imphal plan loathed and derided. In

fact, it is recorded that one of Terauchi's staff officers snarled, 'Mutaguchi would fling his troops anywhere if he thought it would bring him publicity and promotion'.

Nor did opposition to Mutaguchi's Imphal plan come only from Kawabe's and Terauchi's staffs—it came also from both his own chief of staff, Major General Obata, and the commander of his supporting air force, Lieutenant General Tazoe. Major General Obata condemned the plan on the very wise appreciation that resupply in that type of terrain would be well nigh impossible, but in spite of Obata expounding the soundest of reasons to support his conclusion, Mutaguchi's reaction was simply to replace him with the more pliant and docile Major General Kunomura. This was a serious error, because a man with Mutaguchi's ebullience needed the counter of a thoughtful and restraining influence from his chief of staff in order that a wise balance might prevail (as was the case with Alanbrooke and Churchill). Tazoe's opposition was to come later — right on the eve of the operation.

Mutaguchi realized that resupply would be difficult, so he decided to follow Genghis Khan's example and take his supplies 'on the hoof' by 'training' 15,000 cattle and goats to march with supplies (there being no roads in that inhospitable area). Many officers thought the plan preposterous, and those suddenly switched from training troops to training goats, thought the scheme the craziest one they'd heard. But Mutaguchi insisted, and based his insistence on the presumption that it would take only three weeks for Imphal to fall and its supplies utilized. It can be seen the magnitude of the logistical risk he was taking.

When details of the whole Imphal plan reached Imperial General Headquarters at Tokyo they were viewed with the gravest doubts, but when the headquarters referred the plan to Tojo he gave it his support, merely counselling Kawabe, 'not to be too ambitious' — advice which, because of his timidity and distrust of Mutaguchi, Kawabe was only too inclined to accept.

But somebody on Tokyo headquarters must have had nagging second thoughts because both Terauchi and Kawabe, on 7 March 1944, received a signal saying, 'C-I-C Southern Army

may occupy and secure *vital areas* of North East India *in the vicinity of Imphal* by defeating the enemy *in that area* at the appropriate time'.

This order was a bad one because it was vague, and yet upon that order and its vagueness was going to rest the whole Japanese operation. No wonder a debacle ensued. Consider the order in detail. Where exactly were the *vital areas of North East India,* and what were the geographical boundaries and limits of the area vaguely described as *vicinity of Imphal*? The critical question is, does *vicinity of Imphal* include Dimapur to which Mutaguchi ultimately wished to exploit? Mutaguchi felt it did; Kawabe felt it didn't; and on that disagreement the 15th Army foundered because, had the main British supply base at Dimapur been taken, then the British 14th Army would have been isolated and very possibly annihilated. To do Kawabe justice, it looks as though Imphal and not Dimapur was the limit of exploitation envisaged by Tokyo. I have never liked the term 'vicinity' in military operation orders — it is too vague and subjective — and can too easily lead a commander into unintended trouble, and I believe the sooner it is disallowed or abolished the better. Certainly it led the Japanese 15th Army into disaster.

But to return to the famous order. To a man of Kawabe's timidity it spelt caution; and when it further warned that the whole operation was to be kept under the firmest of control, and that a firm defence line was to be established once Imphal was taken, Kawabe interpreted Tokyo's jitters as being an injunction to apply the reins to Mutaguchi's designs. He therefore ordered Mutaguchi to seize Imphal and to establish strong covering defences at Imphal and Kohima.

Mutaguchi, in accordance with Kawabe's orders, detailed Sato's 31st Division to take Kohima. When Sato asked him what his task would be after taking the place, Mutaguchi told him to then take Dimapur. Now Kawabe knew of this commitment but made no comment at the time, merely noting the enlargement of Mutaguchi's ambitions and resolving to curb them if the need arose.

Sato's worries about the 31st Division's resupply difficulties remained, and when he confronted Mutaguchi by querying

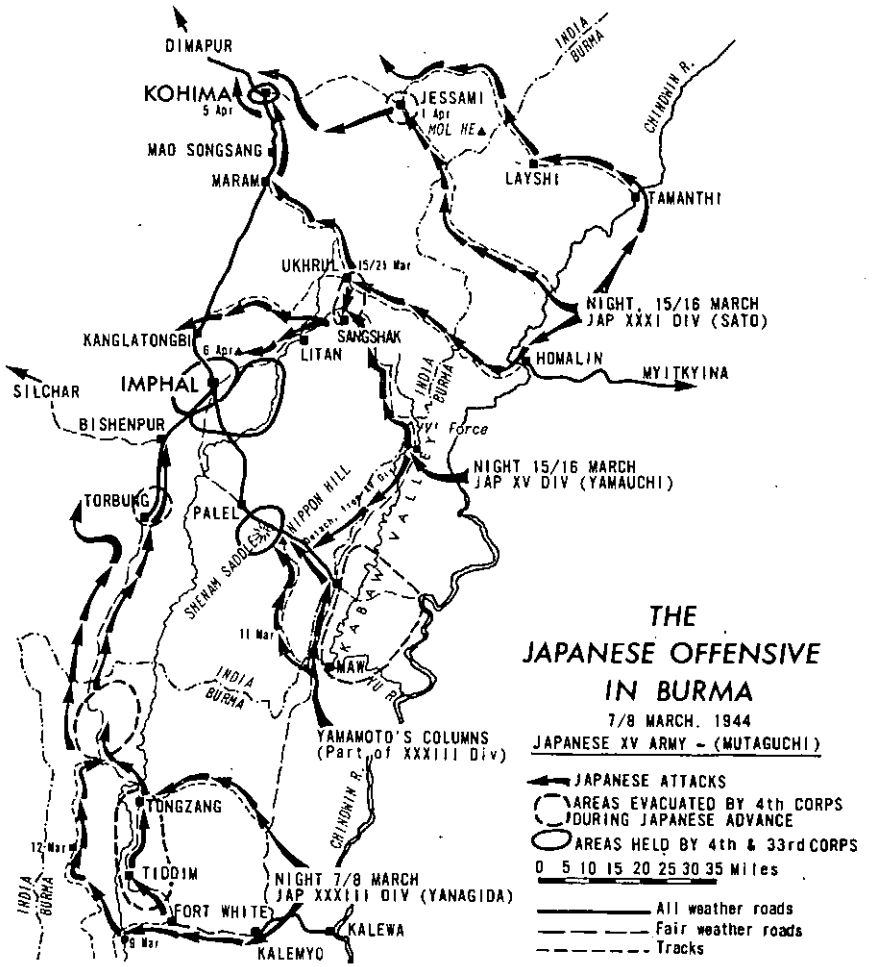
the lack of administration units, Mutaguchi peremptorily brushed aside the thought by telling Sato not to worry — that 15th Army would supply 8 tons of ammunition and 250 tons of food during the first 25 days (i.e., from D day on 15 March to 8 April), and that even if this failed 31st Division with its cattle could handle its own supply for the first 20 days. By then the Imphal base and its supplies would be in Japanese hands and resupply problems would vanish. But Sato was far from assured. However, objections from Sato were somewhat derided because his standing in the Japanese Army was not high. He had the reputation of being a plodder and rather mediocre. Certainly nobody ever doubted that he could be talked down by a man like Mutaguchi. But how erroneous an assessment that turned out to be!

D Day for Mutaguchi's offensive was 15 March 1944. His two other divisions, the 15th (Major General Yamauchi) and the 33rd (Major General Yanagida) would cross the Chindwin and strike for Imphal — the British reserves from which, Mutaguchi assumed, would have been previously rushed away to stem the Japanese advance in the Arakan. So confident of victory was Mutaguchi that he arranged for the full strength of 15th Army's geisha girls to be flown in on D+10. He didn't show a care in the world, and occupied his time by tending the roses around his headquarters.

But in addition to the resupply risks in his own command, things were not going too well on either the northern or southern front, because, first, Stilwell's advance from the north had not been contained; secondly, Wingate's Chindits had cut the Myitkyina-Mandalay railway and were harassing Mutaguchi's line of communication; thirdly, the Arakan feint had gone unexpectedly badly and had failed to draw away Slim's reserves from Imphal. However, in spite of these reverses Mutaguchi remained unperturbed and would not permit the changing situation to alter any of his plans for the forthcoming offensive. One week before D Day he was visited by Lieutenant General Tazoe, commander of the 5th Air Division, who pointed out that British air strength had revived and was destroying his own planes on the ground, whilst Wingate was threatening the rearward line of communication. He thus urged Mutaguchi to postpone the whole operation against Imphal.

Mutaguchi haughtily refused but Tazoe, now worried to the extreme, went to Kawabe. However, he again failed to secure the postponement he saw as being so essential. With an air of resignation and apprehension he gave up, and 15th Army began crossing the Chindwin three days later.

The operation began well enough. For Slim, it was a matter of concentrating his whole corps on the Imphal Plain and to this end he was endeavouring to retract the 17th Indian Division from Tiddim to Imphal when it was suddenly cut off by a Japanese



road block, established from Yanagida's 33rd Division astride its withdrawal route. The situation was grave because unless Slim's corps could be concentrated it would be defeated piecemeal. Slim's problem however was to be resolved by Yanagida. Yanagida never had shared Mutaguchi's enthusiasm for the campaign, and when he received a misleading message from the road block commander he immediately feared the worst and ordered that the block be abandoned — thus permitting the escape of 17th Indian Division to Imphal. Whilst Slim breathed a sigh of relief Mutaguchi was furious and ordered Yanagida to hold the block. Yanagida signalled that this could not be done and suggested that 33rd Division 'be given alternative orders so that some failure does not occur elsewhere'. Mutaguchi resolved to handle the situation by bringing his overbearing brashness into play and bully Yanagida by transmitting to him a whole series of acrimonious signals, in reply to one of which Yanagida accused his boss of talking 'bloody nonsense'. Mutaguchi saw that his method of managing this general had failed, so he began by-passing Yanagida by signalling direct to Yanagida's chief of staff (Colonel Tanaka) and keeping Yanagida uninformed. Mutaguchi then went so far as to burst into Yanagida's headquarters and inform Tanaka not to obey him any further because Yanagida's sacking was imminent. Thus Yanagida as the divisional commander became a mere spectator of his division's activities and his divisional staff splintered into factions. His division had failed to prevent the British concentration on the Imphal Plain, and had also failed to provide support for the drive to Imphal by Yamauchi's 15th Division.

Yamauchi, however, was another one of Mutaguchi's increasing headaches because his 15th Division lacked the required aggressive spirit. This was largely caused through Yamauchi being critically ill with tuberculosis and daily becoming more and more emaciated.

But let us return to Sato's 31st Division where the real fun was about to begin. Sato had done quite well for a general who had no great stature in the Japanese Army. He had cut the Imphal/Kohima Road as ordered and had pushed on to Kohima itself, doing all this on his own resupply resources because Mutaguchi's promised sustenance had failed to materialize. At this

stage Mutaguchi decided to really stretch 31st Division to its utter limit by ordering it to take Dimapur, and so force the British Army at Imphal on to an air resupply which, in the imminent monsoon, it would be impossible to maintain. How thrilled he must have been at this very real prospect. With what anxiety Slim viewed the possible loss of his main supply base. Perhaps Mutaguchi would make Delhi after all and the family name would be great once again. Mutaguchi, in order to provide close air support to Sato's division as it emerged from the jungle, requested Kawabe to obtain from Terauchi the required maximum air cover. But Kawabe felt that Mutaguchi had advanced far enough and that the moment to restrain his careerism had come. He therefore refused to send the request. Mutaguchi was appalled but Kawabe stood firm offering as his reason that, on the basis of the Tokyo signal of 7 March 1944, Dimapur was outside the sphere of 15th Army's responsibilities. Kawabe's decision was the beginning of the end. The opportunity to take Dimapur was gone forever and with it the opportunity, quite probably, to destroy the British 14th Army. Rebuffed, Mutaguchi had no alternative but to recall Sato's advance. The basis of Kawabe's decision was a combination of personality clash coupled with vagueness in orders he had received from Tokyo. Certainly, Sato's failure to take Dimapur was not Sato's fault, as Slim has written.

When things begin to go wrong in a campaign — or on general army exercises for that matter — they usually don't go wrong singly; rather does the 'Law of Increasing Calamities' move into full swing and nothing seems able to stop it. Such a train of events was now to overtake Mutaguchi. He decided to visit the forward areas and again stormed into Yanagida's headquarters where, quite publicly, he ignored the divisional commander and conducted private conferences with the divisional chief of staff. Having destroyed Yanagida's power of command he then went on to Sato's headquarters, where he found this usually submissive officer very rebellious indeed, as Mutaguchi's failure to keep his resupply promise was resulting in 31st Division being on the verge of starvation in a merciless jungle and terrain. Sato felt he had been grievously misled and didn't hesitate to say so. A few days later, in the interests of his

dying troops, Sato refused to carry out Mutaguchi's order to send troops further afield — to Kanglatongbi. Mutaguchi was appalled that this hitherto meagre little man should suddenly show such spunk and he signalled Sato saying, 'Are you in your right mind? Do you realize what you are doing?' But Sato's division was starving by the thousand and he, as their commander, was angry to the point of recklessness. Accordingly he replied, 'I captured Kohima in three weeks; when are you going to capture Imphal?' Never before had Mutaguchi struck such impertinence. Normally he would have sacked Sato but his hands were tied — of his three divisional commanders, one was dying, one was under suspension, and the third now in rebellion — clearly the army commander was having man-management problems as well as tactical ones. All that he could do was to cancel the Kanglatongbi order. His arrogance had failed him, because he had used this as a cover to mask a risk he had taken — namely the resupply to 31st Division, and resupply is risked only at a commander's peril. Mutaguchi's resupply failure had caused 31st Division to cease as a fighting force. As he was now surrounded by calamity, Mutaguchi began looking for a scapegoat and Sato knew that he would qualify unless he moved decisively and courageously to have the blame put where it belonged — squarely on Mutaguchi's shoulders. He signalled Mutaguchi on 30 April stating, '31st Division at end of endurance', to which he received no reply. He therefore bypassed Mutaguchi and signalled Kawabe direct on 4 April accusing 15th Army of not maintaining supply schedules. Kawabe forwarded the signal to Mutaguchi who was flabbergasted that the nondescript Sato should have so violated the chain of command. He ordered Sato never to do the like again. But Sato was now working on the Gilbertian theory, 'In for a penny, in for a pound,' and he went the whole way and resignalled not only Kawabe, but also Terauchi, and even Tokyo itself, accusing 15th Army of criminal negligence toward his now decimated division. Mutaguchi, who by now was almost sure that anything was possible, formed the opinion that Sato had gone slightly mad.

On 15 May 1944 Mutaguchi held an army conference from which some of his senior commanders were missing — Yamauchi had died; Yanagida was in disgrace; and Sato said he was too

busy at Kohima to attend. However the VCGS from Tokyo, General Hata, did attend and not being blinded by Mutaguchi's bombast saw the strategic position as being critically dangerous. Upon his return to Tokyo he reported accordingly. But Tojo now was fighting for his political life and could not afford this type of publicity. Hata therefore was silenced.

This much must be said for Mutaguchi — he was both tenacious and optimistic. On 2 June 1944 he decided on one supreme counter-attack to break into the Imphal Plain. He urged the utmost courage. Troops were 'to regard death as something lighter than a feather'. He informed 33rd Division that it would be almost annihilated. Bravery was to be rewarded on the spot, as was punishment, for commanders 'were not to hesitate to use their sword as a weapon of punishment by decapitating offenders'. Troops were to 'continue in the task till your ammunition is expended, then fight with your hands. If your hands are broken, fight with your feet. If there is not breath left in your body, fight with your spirit'. The ultimate in human endurance was the only effort which would be acceptable. His outbursts became more frequent and more terrifying so that at his headquarters his staff tended to keep bad news from him, thus denying him the real picture. His abuse and threats to subordinate commanders were vitriolic causing his Chief Signals Officer to shrink from sending signals in which subordinates were told to 'Get off your fat arse' with distressing frequency.

Any further effort from Sato's 31st Division however was impossible for his force had disintegrated into mere parties of fugitives. Instead of attacking therefore, he decided to withdraw to a resupply point, but Mutaguchi ordered him to remain in location. Sato again refused and Mutaguchi a second time ordered him to stand fast. On 1 June 1944, Sato signalled in desperation, 'Propose withdrawing Kohima and leaving rearguard.' Mutaguchi replied that if Sato moved he would be court-martialled, to which Sato sent two signals in reply. The first said simply, 'Do as you please. I will bring you down with me'; whilst the second unloaded his opinions, long held, about 15th Army Staff: 'The tactical ability of the 15th Army Staff lies below that of cadets.' And with this, Sato closed down his set.

Mutaguchi had to do something. His force was reduced to a rabble after having suffered, as the war correspondents were saying, 'the greatest defeat in military history'. Sato was now dangerous for he had gone beyond the point of no return, so Mutaguchi sent his Chief of Staff, Kunamura, to Sato's headquarters to remonstrate with him as Sato had refused to receive signal liaison officers from Mutaguchi. Poor pliant Kunamura. When he arrived at Sato's headquarters, Sato attacked him without mercy, refusing to accept any admonition from Mutaguchi, and informing Kunamura that he intended pressing for a full scale inquiry at which he would charge Mutaguchi with negligence and incompetence. Reluctantly Kunamura passed on this reply to Mutaguchi who, appalled by Sato's indiscipline, sacked Kunamura for not having delivered Mutaguchi's orders more strongly. A shouting match then ensued during which Kunamura told Mutaguchi the true facts about 31st Division no longer existing as a fighting formation. Mutaguchi had to bury his pride and ask Terauchi for permission to withdraw.

He had lost 53,000 men out of 85,000. But his most immediate personal worry was Sato's intention to have him arraigned before a full scale inquiry in Tokyo. Tokyo was the last place where he wanted an inquiry in the present circumstances. He tried therefore to seek some means of avoiding this. First, he ordered his legal officer, Colonel Ainai, to prepare two Summaries of Evidence against Sato and Yanagida, but Ainai did not want to be involved so he demurred by expressing the opinion that as the Emperor had appointed the generals any court martial would reflect on the Emperor's wisdom. Mutaguchi then asked Kawabe for permission to court martial them for dereliction of duty, but Kawabe refused though he suggested a trial by Imperial Headquarters in Tokyo. But Mutaguchi feared any Tokyo-based trial. He then was told that Sato had completed a large and incriminating dossier on him and that he had sent this to Tokyo. Many officers right through 15th Army — including officers on the headquarters staff itself — had agreed to testify.

However, Mutaguchi was not the only officer who did not relish a Tokyo trial. Terauchi at Singapore felt the same way in view of his own failures in New Guinea, the Solomons and the

Philippines. Eventually between the two of them the whole thing was hushed up by legal officers holding that no case existed against Yanagida, and the senior medical officer testifying that Sato was suffering from a nervous breakdown at the time he disobeyed Mutaguchi's order in not attacking Kanglatongbi.

Mutaguchi was relieved of command in December 1944 and returned to Japan where he died in 1966. Sato took his defeat much more deeply than did Mutaguchi and he eventually *died of cirrhosis of the liver in 1958.*

The whole Japanese debacle was caused by many factors, but three amongst these predominate. First, orders from Tokyo were vague; secondly, Mutaguchi took undue risks with resupply and this is always fraught with danger; and finally, whilst the man-management of troops is never an easy thing, the management of generals is often an infinitely more difficult activity — as Mutaguchi discovered to his sorrow. □

> I have spent some uncomfortable hours at the beginnings of battles, but few more anxious than those of the Kohima battle. All the Japanese commander had to do was to leave a detachment to mask Kohima, and, with the rest of his division, thrust violently on Dimapur. He could hardly fail to take it. Luckily, Major-General Sato, commander of the Japanese 31st Division, was, without exception, the most unenterprising of all the Japanese generals I encountered. He had been ordered to take Kohima and dig in. His bullet head was filled with one idea only — to take Kohima. It never struck him that he could inflict terrible damage on us without taking Kohima at all. Leaving a small force to contain it, and moving by tracks to the east of Warren's brigade at Nichugard, he could, by the 5th April, have struck the railway with the bulk of his division. But he had no vision, so, as his troops came up, he flung them *into attack after attack on the little town of Kohima.* I have said I was saved from the gravest effects of my mistake in underestimating the enemy's capacity to penetrate to Kohima by the stubborn valour of my troops; but it needed the stupidity of the local enemy commander to make quite sure. Unfortunately, at the time, I did not know this was to be supplied, or I should have been saved much anxiety.
>
> Field Marshal Slim, *Defeat into Victory.*

ORIENTEERING

Captain R. G. Dempsey
Royal Australian Infantry

DURING the past forty years there has been no significant change to map reading instruction in our army. Time has been lost and unnecessary accidents have occurred because of poor map reading and navigational ability.

One of the main weaknesses shown on every sub-unit training report at Jungle Training Centre is map reading and navigation. This is because our army spends much of its map reading training in classroom theory. Map reading exercises are conducted from static positions overlooking magnificent panoramas and insufficient time is spent on practical map reading and navigation in the field, on the move, by officers, NCOs and soldiers.

Captain Dempsey graduated from OCS in 1966 and was posted to the SAS Regiment. He served with 2 SAS Sqn in South Vietnam in 1968-69 and was then posted to 9 RAR in 1970 where he currently holds the posting of 10.

The Swedish Army has adopted a map reading programme which ensures that minimum time is spent in the classroom. The soldiers navigate on the move as opposed to map reading from a static position. Use of the sport of orienteering enables the soldiers to enjoy map reading and improve their individual skills through competition. Because of this training programme the Swedish Army has some of the best orienteers in the world.

What is orienteering? Orienteering is a competitive sport requiring the participant to find his way with speed and accuracy across rough country from check point to check point. This sport requires a combination of map reading skill and physical fitness, in which infantry should excel.

Orienteering competitions are trials between individual soldiers and teams. Each soldier or team is issued with a map of the area over which the exercise is to be run, an event card and a description of each control point.

They are sent from the starting point at intervals, the time of start being recorded on the event card. The soldiers then run to a master map approximately 150 metres from the starting point and copy onto their own maps the position of all the control points and the order in which they must be visited. Once this is done they select the route which best gets them to the first control point quickly.

The control points are positioned about 400 to 800 metres apart and should be visible from 25 metres in all directions. They can be made out of tins painted red with a white bar. Each control point has a code letter in it. When the competitors find the control point they insert the code in the correct numbered box of their event cards to prove that they have found it.

Once this is done they make their way as quickly as possible to the next control point and so on until they have found all the controls copied from the master map. At the finish they hand their event cards to an official who marks down the time in minutes and seconds. The official then checks that all the controls have been visited by comparing the code letters with his own master code.

The soldier or team who is the fastest round the course and who has visited all the controls is the winner. This is the principle of orienteering but it has many variations. The Swedes use the following practical exercises to ensure that the soldiers reach a satisfactory standard to compete in these competitions.

The First Practical Exercise (Pin Prick Orienteering)

Before the competition an officer marks out a route along tracks through timbered country with red or white tape tied to branches. The soldiers are issued with a map (with cardboard backing), a compass and a few map pins. The start is marked on all maps. Initially the soldiers walk in groups of four to six with a DS (officer/senior NCO/corporal) along the marked route. Each soldier must work out where he is the whole time by counting paces and associating map to ground. When the soldiers come to a flag they must pin prick the exact location of the flag on the map. The DS checks each soldier's pin prick with a ruler and deducts one mark from a total of ten for each deviation of a millimetre. They continue down the course and again pin prick their maps at the next flag. When they come to a different coloured flag they will find a sighting stick pointing in the direction of an object which is located within 1,500 metres. The soldier looks along the sighting stick, then pin pricks the location of the object pointed out. Again, one mark is deducted for each millimetre of error. Once the soldiers have completed this type of course a few times in a group, they are sent off individually at regular intervals. The fastest soldier around the course with the minimum deductions is the winner.

The Second Practical Exercise (Compass Marching)

Prior to the competition, four control points are placed to the north, south, east and west at a distance of about 200 to 400 metres from the start/finish point. Two soldiers are dispatched every minute on the course. The soldiers will be given grid bearings to the four control points, but not the location of the control points. They will be told to collect the code letter of each control point they find on their compass legs. The soldiers work out their own bearings and paces for the march. The sol-

dier who is fastest round the course with the most code letters is the winner. Initially this should not be made a competition as accuracy may be sacrificed for speed.

The Third Practical Exercise (Route Choosing)

The soldiers line up at the table in fours. Every two minutes four soldiers are issued with maps, compass and event cards, then sent to one of four master maps. The soldier who is sent to master map A for example copies the control points marked on the master map onto his own map and completes the course as quickly as possible. He then returns to the master map and explains his route to the DS. Once the DS is satisfied that the soldier has found the controls by checking the code letters, he analyses the route taken. He can then advise the soldier on route choosing and improving his compass skills. When satisfied that the soldier has learnt the necessary lesson he sends him to master map B and so on in a clockwise manner. The control locations are set out by an officer who makes them more difficult with each successive exercise.

Once the soldier has successfully completed a few of each type of these exercises he is ready to compete as an individual in an orienteering competition.

Orienteering Competition

Orienteering competitions are divided into four basic types:

1. Point to point event or free orienteering.
2. The line event.
3. The score event.
4. The night event.

Point to Point or Free Orienteering Event. Each competitor is given a copy of a map and a list of descriptive clues of all control points. The competitor's start time is written on his event card (competitors start at one minute intervals). From the start he runs to the master map about 150 metres away which shows his exact location and the location of all control points in the

order in which they must be visited. These he copies onto his own map. He must then make a quick decision as to the fastest route to the first control point and then runs as quickly as possible to all the controls in the correct order. His event card must be marked at each control point. The competitor who completes the course in the shortest time and who can show the code letters of every control point is the winner. The course should be made simple at first then progressively more difficult.

The Line Event. This competition is similar to a point to point event. In the point to point event the locations of each control point are marked on the master map leaving the choice of route open to the competitor. In the line event the situation is reversed. A line is marked on the master map of the whole route from start to finish. The competitor marks this onto his own map and follows the route on the ground in the direction indicated. Along the route there are hidden control points which the competitor will find only if he is exactly on the route described on the master map. When the competitor finds the control point he marks his event card and spots the exact location on his map. The competitor who completes the course with all the code letters of the control points on his event card is the winner. The markings of the locations on the map can be used to break ties.

The Score Event. In a score event the area chosen for the competition is dotted with a large number of control points. The near control points to the location of the start/finish point carry a low point value, whilst those that are further away or which are more difficult to find carry a high point value. The competitor is given a time limit in which to find as many control points as possible. He can select any route he wishes to find these control points, thus gaining the highest score possible in the time available. The course must be designed to ensure that there are more control points than can possibly be visited in the allotted time. Each control point has a code letter inscribed on it which the competitor marks onto his score card as proof that he has found it. It is most important that the competitor make a sound time appreciation in order to arrive back at the finish

within the allotted time. If he fails to do so five points are deducted from his total score for every minute late. Time for the competitor should be from one to three hours.

Night Event. The control points are sited in well defined locations over simple terrain. They are marked by small red lamps which can be seen in all directions from thirty metres. The code letter is marked at the base of the lamp. The controls should be set up in daylight and sited in a circle around the position chosen for the start/finish point. The controls should be sited between 400 to 800 metres apart, depending on the terrain. The soldiers are split into pairs or sections and given five minutes in a lighted tent to plot the location of the six to eight controls onto their maps. The teams are then dispatched to visit all the controls in any order they wish in the time allocated for the competition. Usually two to three hours is ample. The correct code letter on their event card automatically gives them twenty points but five points are deducted for each minute they are late. The teams with the highest points is the winner. It is wise to have flares to home back any team that becomes lost. Soldiers can be dispatched on longer and more difficult events, then finally as individuals.

One of the main benefits of orienteering for map reading training is the small number of men required to man the competitions. Five men can easily run a course for up to 200 soldiers. The course judge checks competitors across the start/finish line and ensures that names, positions and times are recorded. The referee briefs the competitors and collects the events cards at the finish and hands them to the timekeeper. The timekeeper checks the competitors over the start line at regular intervals and notes the arrival time of each competitor (in minutes and seconds) and records it on the event card. The recorder marks the competitor's name and start time on the recorder's sheet and then copies the arrival times from the event cards onto his sheet and works out the total running time and points. A scorer may be used if needed.

Conclusion

Good navigation is an essential element of battle craft. It is useless to be able to plot an enemy location on a map but not be able to find it on the ground. Errors in navigation have caused restrictions in the use of close fire support on operations. These restrictions waste time and could be minimized if our navigation were better.

There is a pressing need to improve the navigation skills in our army. Other ranks should not be the only ones involved in orienteering competitions: it is essential that officers also take part to improve their skills and ability to instruct in navigation. Orienteering is one of the best methods of improving navigation and it can be organized as both a sport and part of a training programme. □

MALAYA, DECEMBER 1941

The dispositions for the defence of Malaya were fundamentally unsound in December 1941. Although they were based on the assumption that Malaya would contain an air force strong enough to inflict crippling losses on an invading convoy, such an air force was not present; yet the army was deployed over a wide area largely to protect outlying airfields. It was realised that the enemy might land on the Kra Isthmus and advance down the west coast, or at Kota Bharu and capture the three airfields there, or at Kuantan where there was another airfield, or in the Mersing area with the object of taking Singapore from the north, or on the island itself. The army was dispersed so as to meet every one of these possible attacks. In a force including ten brigades only one was retained in Force reserve. Thus it was practically inevitable that wherever the enemy made his initial attack he would be in super strength as soon as he had put his main force ashore; and that, if he gained a success in the early stages, the defender's reserves would be drawn into the battle, but only gradually, because of poor communications, and the enemy would be given an opportunity of defeating the defending army piecemeal.

— Lionel Wigmore, *The Japanese Thrust.*

Military Heraldry

Captain K. D. Nelson (RL)

DURING the 12th century the armour of knights had developed to such an extent that it completely encased the warrior from head to toe, and it soon became apparent that in battle some clear form of identification was necessary to distinguish between friend and foe. It was literally a question of life or death. First, marks were painted on the shield and crests were introduced on the tops of helmets. Later, these armorial ensigns were embroidered on the coat of silk or linen which covered the armour; hence the expression coat of arms. This coat, or surcoat, served a practical purpose in diminishing the sun's rays and also reducing the impact of a striking weapon against the armour.

Gradually, rules were brought in for the forms of heraldic emblems, symbols and devices, and the various colours to be used. The language used to describe or blazon the arms is old French because, when heraldry originated in England, the

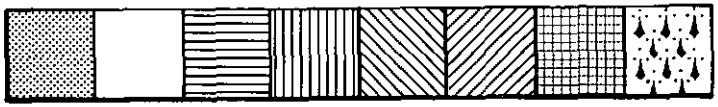
---

Captain Nelson graduated from the University of Wales where he gained the Colonel Page Prize in Engineering. He initially served with the Royal Air Force and was later commissioned in the British Army. He joined the Reserve of Officers (RAE) in 1952 and returned to the Active List in 1953 with the 22 Construction Regt RAE (SR). Captain Nelson saw active service in Burma during World War II and was at the siege of Imphal.

In civil life he is Engineer-in-Charge, Farm Water Supplies with the Soil Conservation Authority of Victoria, and has previously contributed to Army Journal.

country was under the control of Norman noblemen who were French-speaking and naturally this became the lingua franca of the English gentry.

Five colours and two metals were adopted and are depicted in black and white illustrations as follows:

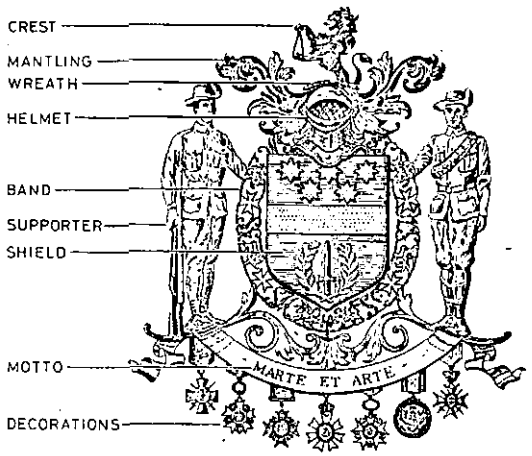


One interesting rule of heraldry is that a metal cannot be painted onto a metal, neither can a colour be put on a colour, but there are exceptions, a classic example of which is the coat of arms of the kingdom of Jerusalem, where gold crosses are painted on a silver ground.

A coat of arms consists of:

- A shield displaying the holder's arms, and is the most important component.
- A helmet that varies in shape and position according to its holder's rank.
- Mantling which is a cloth to keep the sun off the helmet.
- A wreath of twisted silk or cloth which joins the crest to the helmet.
- A crest which is used as a decoration on the top of the helmet.
- A motto.
- A band is shown around the shield if the holder is a Knight Grand Cross of an Order.
- Supporters, which are figures on either side of the shield and appear to hold it. Their use in arms today is restricted to peers and knights of certain Orders.

To illustrate these various components and to demonstrate the form of symbolism used in heraldry, the coat of arms of the Australian soldier, General Sir John Monash, is shown below.



The meaning of the main constitutive parts of his arms is as follows:

Shield. Five gold stars on a blue ground indicates Sir John's Australian birth. The horizontal broad gold band or fess across the centre of shield represents a bridge and is symbolic of civil engineering, his profession. The laurel wreath represents learning and also denotes a victor in battle. The sword signifies a soldier.

Crest. The lion is the lion of Judah which indicates Jewish origin. The compasses of Solomon held by the lion denote a builder or mason.

Motto. Marte et Arte means 'For War and Art' which shows that the holder has devoted his skills to the arts in war and peace.

Band. The band is the gold collar of the Order of St Michael and St George.

Supporters. The soldiers represent the infantry and artillery of the 1st A.I.F.

Decorations. The decorations hanging from the motto are, from left to right: French Croix de Guerre, The Belgian Order of the

Crown, Knight Commander of the Bath, Knight Grand Cross of St Michael and St George, The Legion of Honour, The American Medal for Distinguished Service and the Belgian Croix de Guerre.

Many other arms commemorate valour or deeds in battle. For example, some arms of old Welsh families are grim reminders of defeats inflicted on the hated Saxon. The arms of the Williams family show three Englishmen's heads cut off at the neck. The Lloyds of Denbigh have three dead Englishmen's heads on their shield, whilst the Lloyds of Plymog have an Englishman's head as a crest.

An interesting aspect of heraldry is the Augmentation of Honour, which is usually an addition to the holder's arms made at the command of the Sovereign for deeds worthy of being held in especial remembrance. One augmentation is the heart on the Douglas arms, which commemorate the gallant efforts of a Douglas to fulfil the dying wishes of King Bruce of Scotland that his heart be taken to the Holy Sepulchre. Edward Lake gained his augmentation for services during the Battle of Naseby when he received sixteen wounds, had his left arm paralysed but continued to fight on with his horse's bridle between his teeth. The Earl of Surrey's augmentation was for leading the English forces at the Battle of Flodden. An appropriate augmentation was granted to Sir George Pollock who forced Khyber Pass and took Kabul. Later Lord Kitchener of Khartoum received a similar honour.

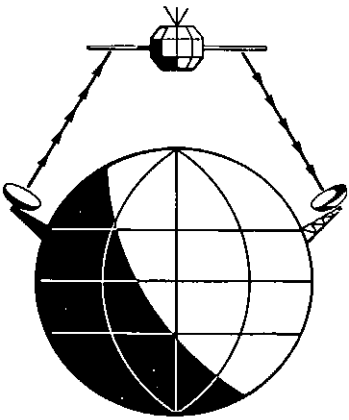
However, in ancient heraldry not only deeds of honour were recorded on arms, there were also marks of dishonour or 'conduct unbecoming'. These were called abatements and were indicated by some form of defacement to the holder's arms. Each particular defacement signified a certain dishonourable demeanour and was imposed for:

- Deserting from the battlefield.
- Deliberately misinforming or misleading his commanding officer.
- Cowardice.

- Slaying a prisoner of war who has peacefully yielded.
- Throwing out a challenge and upon its acceptance, withdrawing it.
- Behaving cowardly to his enemy.
- Boasting of his exploits.
- Licentious behaviour.
- Drunken conduct.
- High treason. This act not only involved an heraldic abatement and the death sentence but as additional deterrents the offender would have, wrote John Guillim in 1724,

> . . . not only his Coat-Armour to be razed and his Shield inverted, but also his Spear truncked, his Spurs hewen from his Heels, his Horse docked, his Sword to be broken upon his Helmet, his Crest divided, his Statues pulled down, his Blood corrupted, and his Body to death without the King's special Pardon, his Family at an End, his Possessions taken away and (for a greater terrour) given to some other family, whose profitable Service to the King and the State may better deserve it.

Fortunately for all concerned, abatements are no longer imposed by the Sovereign and, unfortunately, heraldry is no longer the sole privilege of the soldier: nevertheless pride may be taken in its truly military origin and traditions. □



INTELSAT speeds long distance links

David Wright

Increasing use is being made of small powerful earth stations for highly reliable instant telecommunications. The Intelsat System, with its network of satellite terminals, is prominent in this field and its various applications are discussed in this article. The terminals are low-priced, easy to assemble and readily transportable — particularly valuable, for example, in areas of heavy natural disaster.

RELIEF work after the cyclone disaster in Pakistan last year strikingly demonstrated the power of small earth satellite terminals to give isolated areas instant communications of high reliability.

The British part of the relief operation was controlled from the naval vessel *Intrepid,* which used a small satellite communications terminal — one with a two-metre diameter aerial — to maintain communications of reliable quality directly with Britain.

Communications during the last decade have been dominated by the introduction and expansion of the Intelsat System, with its network of large — 30-metre diameter aerial — satellite communications terminals. The development of this system has been governed largely by economic factors, and the system has proved to be effective and economic in providing long distance telephone links.

Mr Wright is Manager, Communications Department, Marconi Space and Defence Systems Ltd, Chelmsford, England.

A 21-foot (six-metre) speedily transportable earth station on location in Britain. Designed for military use, it is capable of rapid deployment in a tactical situation. Within hours it can be fully erected and carry operational traffic between the local comander and his headquarters. The stations are not for exclusively military purposes — they can provide swift communications in many fields and have particular value in situations of national disaster.

The Intelsat System has in fact gone beyond this and has demonstrated to a limited extent those characteristics of a satellite communications system which distinguish it from other types. The world-wide television coverage of events of international interest has proved that a satellite system gives wide coverage and freedom from fading. A synchronous satellite in particular can be 'seen' from about a third of the earth's surface, and the variation of the signal received from such a satellite is typically only a few per cent over long periods. When this is compared with other modes of terrestrial broadcasting, with their shadow areas due to ground contours and the extensive fades of several orders of magnitude, the advantages of satellite communications become obvious.

The other outstanding characteristic of the method is its flexibility. Again this has been demonstrated by the Intelsat System, for earth stations join a satellite network or change from one network to another, as required — a facility limited only by the maximum capacity of the satellite and the coverage it provides.

Wide Application

However, although demonstrated by the Intelsat System, these characteristics are only really beginning to be exploited with the increasing use of the small satellite communications terminal. Equipment used for military applications points the way to future systems of wider scope. Thus the British armed forces satellite system includes a number of small mobile satellite terminals, designed for easy transport by aircraft, road and helicopter to any desired location. Such terminals are entirely self-supporting and provide high quality voice links with a fixed headquarters in Britain. Satellite communications terminals with this degree of mobility are appropriate to a very wide range of non-military uses.

The fact that such a self-contained terminal can be used for information, the first need in any major disaster such as an earthquake, must inevitably lead to faster and more effective relief reaching survivors.

Less dramatic requirements for temporary communications also exist, either to meet the need of communications in areas where none would otherwise be reliable, or to supplement existing facilities. Examples of this are the data link of a geological or earth resources survey operating with a one-metre terminal or a temporary terminal with a five-metre aerial to give television coverage of an event arousing widespread interest.

As the Pakistan example shows, the use of satellite communication terminals is not confined to land. They will become increasingly important in future marine communications, for satellites allow fade-free links over a complete ocean system.

Educational Value

Small terminals will also make it economic to provide communications for areas that would otherwise be thought isolated. This is amply demonstrated in India where many small 'receive-only' terminals are being scattered over the continent. Each terminal gives a local community satellite broadcast television facilities, many years before it could be accomplished by conventional means, and at a fraction of the cost. Its educational value in the life of a developing country will be out of all proportion to its cost.

In the same way, a small terminal located at an isolated farmstead could enable such a site to be linked into the main telephone network of a country.

Small terminals for these applications vary considerably in detail as need may dictate, but the main units of such terminals are well defined. There have been many advances in design over the last few years as engineers have strained to make the terminals cheaper, more compact and more effective.

A transmitter, a receiver and an aerial system are the main units of a terminal. These, with any baseband equipment, power supplies and so on, determine the overall performance of the terminal. The units are normally selected from equipment currently available, but may be specially designed to meet stated requirements Transmission frequencies between the terminal

and the satellite are the main factors in determining design of the terminal units. For most applications these frequencies are in the microwave region, though in particular instances Ultra High Frequency (UHF) or Very High Frequency (VHF) may be used.

Increased Efficiency

For technical reasons connected with difficulties of reception, aerials in a satellite system must have a very high radiating efficiency.

By means of special feed systems and shaping techniques, the efficiency of these aerials is now about 50 per cent higher than it was six or seven years ago. This, along with advances in materials technology and novel techniques for packaging aerials, has resulted in a whole range of compact, easily transportable aerial systems.

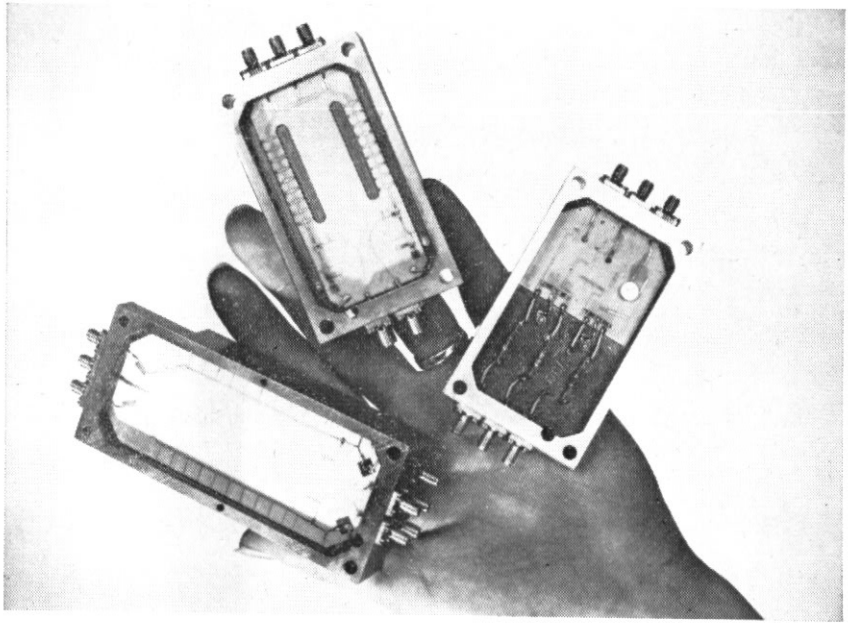
Since the antenna is pointing into space, the thermal noise collected by it is extremely low. It is therefore important in a terminal to minimize overall noise by using a microwave receiver with an extremely low noise figure. The parametric amplifier is almost universally used for this application at present, though for future small terminals transistor amplifiers will find a ready use.

The main problem of the high power amplifier in the transmitting system is its weight. The major component of weight has been centred in the transformers associated with the amplifier. Here again technical advances have reduced weight in the last six years to the point at which transmitters generating many kilowatts can in fact become part of a transportable earth station.

Cost-Saving Techniques

The use of microstrip techniques for the main microwave transmitter and receiver equipment is now becoming widespread. The value of microstrip is obvious, particularly at low micro-

wave frequencies. The microstrip method may be regarded as the microwave version of the printed circuit board. Complex microwave circuits can be reproduced cheaply and effectively



Microwave integrated circuits can be reproduced cheaply and in effective miniaturised form by techniques resembling those used for producing printed circuit boards. Thus the use of microstrip techniques for microwave transmitter and receiving equipment is becoming more widespread.

by techniques resembling those used for producing printed circuit boards. Cost-saving is considerable, especially if a comparison is made with the old machining techniques for this type of precision component.

Much work has also gone into the development of special modulators and demodulators for satellite communications. The demodulators present the greater challenge to engineers in that the modulated signal has to be recovered from a very severe noise background. This is not likely to be so important in future for the large station, but for the small terminal these constraints

are likely to apply for many years. This will require the continued use of existing threshold extension demodulators, and the development of new types.

Looking to the future, it is clear that advances in satellite technology and reductions in launching costs will bring ever-increasing use of the smaller terminal. Equally, the technical advances in manufacturing small earth terminals and the consequent reduction in their cost will make their use progressively more attractive to a wider range of potential users. □

THE NEW NATIONAL ARMY MUSEUM

The National Army Museum's splendid new building next to the Royal Hospital Chelsea was opened by Her Majesty the Queen on 11 November 1971.

The main permanent display illustrates chronologically the history of the British Army to 1914, of the Indian Army and of the colonial forces. The displays follow modern methods with the exhibits set against colourful, often symbolic, backgrounds in uncluttered cases. A narrative outside each gives the salient facts of campaigns and battles, and describes developments in the army's organization, equipment and techniques, its defeats and victories and its professional and social activities. Among the exhibits are weapons and uniforms, medals and decorations, prints and photographs, silver, glass and china, manuscripts and letters, relics of British commanders and of enemy forces, and mementos of Britain's soldiers who fought in every part of the world, from the reign of Henry VIII until the First World War. The result is a truly outstanding commentary on the history and traditions of the army.

Many of the exhibits are the fruits of the almost overwhelming generosity of many donors and lenders. Gifts and loans from Her Majesty the Queen, private individuals and regimental, regional and national museums complement the museum's own collections.

The chronological display of uniforms on the top floor shows their evolution towards comfort and camouflage. All arms of the British regular army are represented as are auxiliary forces, the Indian Army, and some colonial forces. The display is aided by material of a peripheral nature such as personal equipment, musical instruments, horse furniture. Specialized displays include headdresses; belt-plates; gorgets; and the orders and decorations of Lord Roberts, Viscount Gough, Lord Kitchener and Viscount Wolseley.

Next door, the picture gallery houses the pick of the museum's large collection of military paintings. They include portraits by Reynolds, Raeburn, Romney and Lawrence, battle scenes and pictures of Indian regiments. Other paintings of military subjects are spread through the other areas of the museum.—*Director.*

BOOK REVIEWS

DECISION MAKING, by R. J. Dudley and others. (BBC Publications, London, $2.35)

Reviewed by Major E. J. Ellis, Australian Staff College, Queenscliff

DECISION making involves a choice among alternative lines of action. It is essential to all military and civilian activity — indeed, to life itself. We are constantly making decisions throughout every waking day. Few military decisions are reached by a single person without having to rely on others for some, at least, of the information relating to the problem under consideration. Often this information is the result of the values and judgments of others, the result of decisions made by them. The making of decisions is then one of the most continuous and important functions of an army officer. All have to make decisions; some find it a difficult exercise. How then is it determined what to decide?

In this book the British Broadcasting Commission collects a number of talks prepared so as to emphasize the importance of decision making and to analyse its nature. Each chapter is the work of individual experts — philosophers, economists,

mathematicians and psychologists. Their papers, originally prepared for the BBC's 'Third Programme' series in 1966, are arranged to form a logical sequence. This gives the book the sequential quality found in single-author works and prevents it becoming a series of disjointed essays.

Decision making is revealed as a thought-compelling subject. Each essay gives the reader an insight to the theories which have determined the form, character and quality of thought involved in man's struggle to decide between that which he believes and that which he desires. R. J. Dudley presents an extremely interesting exposition of the part choice has to play in every decision made by man.

In the chapter 'Planning and Policy Making', Peter Self and Leonard Joy, eminent British economists, use a question and answer technique to examine the particular problems peculiar to decisions in the field of public administration. This is a refreshingly novel approach.

In a general way, the book indicates the necessity for a philosophical interpretation of the subject. Some chapters, perhaps because their topics are more involved, presume some prior knowledge on the part of their reader. Others do not. The result is that their topic is expounded in a simple and concrete form.

The question still remains, however, as to whether this duality in approach to explaining decision making as a whole can be made profitable to readers who have had no previous philosophical training. Modern decision theory is a complex subject and some readers may find an elementary prior knowledge beneficial; for others, it is essential.

Decision theorists inevitably refer to 'rational man' as the model for the ordinary mortal they assume their readers to be. This presents the difficulty that in comparing real man with his rational counterpart, the latter is usually studied in situations in which all relevant information about a decision that could be

available is laid out ready for use. In reality, mortal man is seldom in this happy state.

For the inquisitive officer this BBC book reveals answers to such service dilemma as how, and more importantly when, a promotion and selection committee is likely to reach its decisions, or why it is that to 'situate the appreciation' is an entirely human activity. Those inclined toward diplo-military curiosity will find Anatol Rapoports treatment, of 'International Relations and Game Theory', extremely rewarding. Those simply wishing to broaden the base of their knowledge prior to embarking on the management series at Staff College, or elsewhere, would be well advised to include *Decision Making* in their reading. □

MONTHLY AWARD

The Board of Review has awarded the $10 prize for the best original article published in the September 1971 issue of the journal to Captain G. L. Hulse for his contribution 'We're Going to the Dogs'.

ARMY JOURNAL

INDEX

1971

No. 260 JANUARY 1971 — No. 271 DECEMBER 1971

Part 1 — TITLE INDEX

Part 2 — SUBJECT INDEX

Part 3 — AUTHOR INDEX