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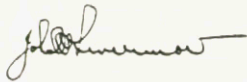
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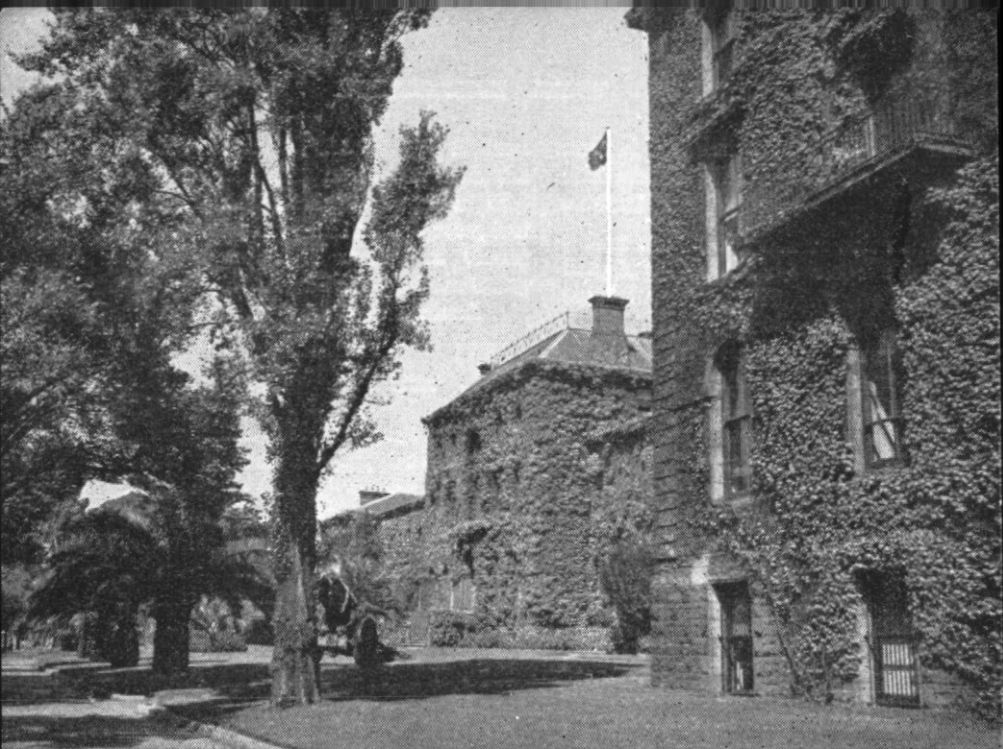
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HEADS or TAILS



Lieutenant-Colonel W. Stafford-Gaffney, A.M.I.Mech.E., A.M.I.E.E.,
Royal Electrical and Mechanical Engineers

"Before the fighting proper the battle is fought and
decided by the Quartermaster."

Rommel.

THE onward march of civilisation has introduced in its train many complexities into the everyday life of the ordinary human being. Equally is this so in other more specialised spheres and nowhere is the effect more profound than in the military world. As Lord Allenby said twenty years ago—

"Progress in science has now given to the machine the mastery over man, its maker."

So it is that the arts of war can no longer be practised without the use of large and expensive masses of very intricate machinery. The knowledge and skill needed to operate, maintain, and repair these engines of war require a level of intelligence not hitherto demanded of the common soldier. Where this level cannot be met, as all too frequently it is not, the mental frustration induced by this lack of ability may well be the cause of a mild, or even of a severe neurosis.

When to this is added the mental reaction to the evident havoc wrought upon our forces by similar machines in the possession of the enemy, the degree and extent of potential neuroses may be very considerable.

As a mental prophylaxis for these incipient dangers civilisation demands "amenities" for its armies which will provide mental stimulation, or relaxation, to counteract the stresses and strains of modern war. A high degree of personnel administration is also necessary to cater for the bodily needs of the soldier, and, equally important, to make it patent that they are being adequately looked after.

There are therefore two major requirements which tend to enlarge the tail of an army at the expense of its head. One is the necessity to supply, maintain, and repair this mass of matériel, and the other to provide additional mental and bodily

comforts for the highly stressed individual. The current complaint that the administrative tail grows daily longer and longer is therefore understandable.

Historically a comparative analysis might reveal that this complaint is not fully justified. There have been contractions as well as expansions. The original "trayne of artilerie" of the 16th century "carried all the comforts of life, including hired women" and this practice was emulated by the Royal Wagon Corps when it was founded at the end of the 18th century. The latter was, according to Sir Arthur Bryant, "recruited from the thieves' kitchens of Blackfriars and Seven Dials" from which was also recruited a motley collection of girl friends. Such camp followers are no longer included in war establishments.

The Administrative Services

However that may be, the size of the administrative services in relation to the fighting arms is a matter of some moment and one which requires very careful study.

In broad outline these services may be considered under two headings—

The essential services.

The morale-building services.

Included among the essential services are those which supply the sinews of war such as food, clothing, ammunition, petrol and war matériel in general, and the organisations which maintain and repair them. Also included are those medical services which are directly concerned with the repair and return to battle of the human material, the soldier.

The morale-building services comprise on the other hand postal, educational, and religious organisations, the less essential medical services, bathing and laundry units, and welfare organisations which include such para-military bodies as canteens and film and entertainment units and also public relations services.

The distinction between the two groups will be more apparent if one considers the Russian or Chinese forces vis-à-vis the American Army, as exemplifying the extreme left and right respectively.

In the former in time of war the individual soldier has no identity, he is in fact not even a cypher. The staff of an Asiatic force is concerned solely with mass numbers which must be fed, supplied with ammunition and transported, more frequently on foot than otherwise, from place to place, as dictated by the course of the battle. Morale-building services, other than political indoctrination which possibly supplants religion, are fragmentary or non-existent.

The American Army on the other hand appears to require the full panoply of civilisation before engaging in a campaign. Refrigerated "coke," 3,000-seat theatres, the latest films and live artist shows, a PX selling anything from buttons to Buicks, and a public relations and newspaper staff nearly equalling that of the force itself, appear to be accepted as the minimum essentials for life in the field. Added to this the "essential services" supply food, clothing and warlike stores in a variety and quantity which would be regarded as the height of luxury by their opponents.

The forces of the British Commonwealth steer a course in these matters which is slightly to the right of centre, in that it is more akin to the American than to the Asiatic pattern.

The Morale Building Services

Let us then consider these services first before dealing with the larger and more complex problem of the essential services. The Asiatic model is obviously unacceptable to any community which places a value upon the individual soldier as such. The American counterpart, though possibly desirable in some aspects, and this is highly debatable, is generally, for reasons of finance alone, outside the orbit of British forces.

If the morale of the individual soldier, and in this context officers are included within this generic term, is to be kept high there are certain services which need to be provided. Of these an efficient postal service is probably of prime importance. News, other than bad news, from home is of the greatest value in building up morale and in maintaining the individual's interest in matters outside his profession. Postal services cannot therefore be dispensed with without seriously affecting the well-being of the force. Fortunately they are not expensive in manpower or materials and the basic organisation already exists internationally in peace time.

Next, many would say first in importance, come the ministers of religion. Even the dullest mind when faced with the appalling destructiveness of war seeks to find some answer to the question "Why?", and, when confronted with the imminence of death, is concerned to know

what lies beyond the grave. These are problems to which only religion can attempt to provide a satisfactory answer. Furthermore it is well known that besides the organisation of formal religious services and the administration of religious comfort to the sick and dying, the good padre can contribute immeasurably to the general welfare of a unit or formation in a hundred different ways and can be a most valuable instrument in the maintenance of high morale. Once again the overheads are negligible and the source of supply is one which could not in any case be tapped to provide more warlike services.

Though education is accepted as a prime responsibility in any civilized community, formal classroom education for fighting troops, other than for those in base training units, is an impossibility in war and, with the increase in literacy, is not as essential as it once was. The impact of current events upon the world at large does, however, require explanation and the soldier will fight better if he knows why he is fighting, why a particular land area is of importance to his country, and if he is kept informed of the day-to-day events in his homeland. Current affairs sessions are therefore useful in building up morale and once more do not involve an elaborate staff, this being in general provided from the existing resources of units and formations. Educational demands do not, therefore, present a very grave problem and are in general capable of fairly easy fulfilment.

We come now to those organisations which appeal to the lighter mental processes or which cater for the physical needs of the body, and it is here that the extent and variety

of the services provided need more critical examination. It is undeniable that the provision of good bath and laundry facilities and of good unit canteens are of much assistance in maintaining the well-being of the troops, but they are NOT essential to the conduct of war. Soldiers are capable of washing both themselves and their clothes by hand, and, as their rations are already delivered to them, do not of necessity require canteens to provide semi-luxuries to augment those rations. In particular coke and popcorn factories and PXs on the American model cannot be justified in a conflict which is a struggle for national existence, as modern wars are increasingly becoming. Strict moderation is therefore needed in the provision of these facilities which, though not unduly expensive in manpower, absorb considerable freight and transport capacity.

Similarly, as has already been mentioned, entertainments whether by live artists or by use of films, are a valuable mental antidote to the strains of battle. To achieve measurable results, however, super theatres and elaborate scenery are not required and an immense amount of good can be achieved with the moderate resources often available within units themselves. Furthermore, the production of a unit show entails an expenditure of energy and a level of mental and physical activity which is definitely beneficial to the individuals involved, in that it removes them even more completely, though maybe only temporarily, from the realities of war. Where professional artists can be made available with relatively little disruption of transport and other services they are obviously a valu-

able addition to the mental menu. They should not, however, be regarded as a necessity and the rule should be "the best or none at all." Professional mediocrity is NOT appreciated by the troops.

Of public relations and accredited newspaper correspondents little need be said. There is undoubtedly a need for the general public to be informed on the conditions of service under which their relatives and friends are labouring, but a lot of the fulsome rubbish that has been published in recent conflicts would have been better left unsaid, producing as it frequently did, entirely false pictures of actual conditions. This is a modern phenomenon of comparatively recent, but very lusty, growth which needs continuous pruning if it is to remain healthy.

With regard to the Press, within the limits of essential censorship it is right that the country should be informed of what is toward in theatres of war, and the more responsible daily papers fulfil this duty in an admirably conscientious manner. There is, however, little excuse for the hordes of correspondents who nowadays descend upon military formations, and even less for the ridiculous importance which they arrogate unto themselves in the performance of their duties. These are an evil and not even a necessary one. They clutter up communications, misappropriate transport, and are a continuing liability due to the folly with which they expose themselves without regard to the dispositions or aggressive intentions of the enemy. In their search for sensation they magnify trivialities and distort detail in published material which frequently has an

alarming and wholly adverse effect on the morale of a nation as a whole. The mass of contradictory and misleading information published during the recent war in Korea is a prime example of such affairs.

The problem is difficult of solution, lying as it does largely without the purely military sphere, but the provision of accommodation, rations, transport and communications for these representatives, all of which if not provided will in any case be "scrounged," entails a big administrative effort. On the other hand a friendly, reliable and conscientious Press is a valuable asset to any force and, with the increasing entry of politics into the higher strategical decisions relating to a campaign, may well be a useful and proper means of swaying popular opinion, and thus political favour, in the direction desired by the general staff. A more profitable use of the facilities which then existed by the austere and rather unapproachable Haig in World War I might have led to a more successful outcome to his struggle with Lloyd-George.

The Essential Services

An army must be clothed, fed, transported from one place to another, supplied with weapons and ammunition, and must have its human or material wounds dressed when required. Certain supply and repair services are therefore essential to the conduct of war but in what manner can these be kept to a minimum?

Dealing first with the human element the supply of manpower available to the Western World is not inexhaustible, in fact with the increasing demands of civil adminis-

tration and of industry it is barely adequate for the task. On purely economic, as opposed to humanitarian, grounds it is therefore essential to care for the bodily welfare of the individual, to save his life and dress his wounds, mental or physical, and to return him fit for battle, or at least fit for employment in a productive capacity within the national economy. On humanitarian grounds this is a duty imposed by all civilised communities upon their armed forces. Furthermore the knowledge possessed by the soldier that, in the event of his becoming a casualty, he will receive the best medical care available is a valuable aid to the maintenance of individual and collective morale.

A highly efficient medical service is therefore of paramount importance, and any short-sighted economies attempted in this sphere will undoubtedly have the most serious repercussions.

As has been stated above, the Asiatic view is that the individual is of no importance and, with a well-nigh inexhaustible supply from which to draw, may be regarded as expendable. Such forces are not therefore burdened with a very elaborate medical service as was amply demonstrated by the Japanese in South-East Asia, and later in the Korean War.

The provision and the supply of food and clothing are now fairly clearly defined processes. A Western Army of any magnitude is no longer able to live off the country it occupies, were this even to be desirable from a political aspect. Much has been done to streamline the supply of rations by issue in bulk to formations and subsequent breaking-

down to unit loads, by the production of special ration packs for various purposes and durations, and more will undoubtedly be achieved in the future. However, a force of a certain size requires a certain minimum dead weight of food a day to maintain a reasonable degree of mental and physical effort, and manpower economies in the handling and distribution of these rations are likely to be small, even though progressive, over the years. Increased mechanisation will materially assist in reducing labour overheads, but may bring in its train problems which are discussed below.

Similar remarks apply to the supply of clothing, except that variations due to prevailing climatic conditions are more extensive than in the case of rations. It is easier to eat the same food on the equator or at the North Pole than it is to wear the same clothing. Economies can and will, however, be made in this area of supply. A high standard of unit care of equipment can make clothing last appreciably longer than average, and the introduction of new materials and improved methods of manufacture will give garments a longer life. The resulting economies in manpower will, however, as in the case of rations, be small.

With regard to transport a modern army requires the potential to move its forces rapidly in any desired direction. It is not, however, always necessary to utilise this potential to the full and greater use of the feet would undoubtedly be advantageous. It was patent to competent observers that the American forces in Korea were almost completely road bound, and rarely if ever marched on foot any distance from a formed

road. The British forces had, however, many remarkable tactical achievements to their credit resulting from the use of pure infantry tactics, and for the Chinese and North Koreans to use roads was the exception rather than the rule. As an added bonus the necessary physical exertion produced for them a very tough and resilient soldier, and one who was mentally attuned to warfare in all types of country. This is, of course, merely a restatement of the lessons learnt from the Japanese invasion of South-East Asia, lessons later learnt and mastered, but at great cost in sweat and blood, by the British and American forces.

Already a review is being made of the transport needs of the various units and formations in a British force, and undoubtedly considerable economies are possible which will yield a substantial manpower saving with consequent reduction in the length of the administrative tail. These results will be both direct and indirect in that as fewer vehicles are required, so there will be fewer drivers, less petrol and oil will be necessary requiring fewer persons to supply them, and the repair load will be reduced with fewer tradesmen needed for this purpose. This reduction in unit strengths will lead to reduced demands for rations and clothing and so on, or, alternatively, will free more soldiers for an active fighting role.

Economy in the provision of transport and further economy in its subsequent use in units will therefore pay both direct and indirect dividends, and is a matter for the most careful consideration by staffs at all levels.

Engines of War

Finally we come to the provision, supply and repair of war matériel in general. It is in this sphere that there is the greatest field for economy, but, as will be shown later, not necessarily to the advantage of the fighting arms.

In the days of the bow and arrow the problem of weapon supply was elementary, the individual provided both the weapon and the ammunition himself. Even in the Boer War the problem was not complex. Rifles and their ammunition were simple and artillery was, by modern standards, primitive. Quantity rather than complexity was then the problem, since mass production methods were almost non-existent and the supply of ammunition rarely kept pace with the demand. Today both quantity and complexity are very real, and very big problems.

The phenomenal increase in the mechanisation and electrification of armies which has taken place in the last twenty years has necessitated the creation of enormous stores holding organisations and supply pipelines, and the setting-up of vast repair workshops which together now comprise from a third to half of all the administrative services in a theatre of war. It is therefore apparent that this field is likely to be a fruitful source of economies in manpower.

Arbitrary limits can, and frequently must, be placed upon quantity by imposing restrictions on rates of fire, weights of bombardment, use of special equipments, and so on. Complexity can be, but is very rarely, controlled. It is here that the field for economy is widest.

The present policy in the production of weapons is for the general staff to state a requirement, and for this to be examined by research and development staffs prior to the sealing of a design. Now it is probable that no staff requirement is physically impossible to produce, but it is apparent that in fulfilling these requirements designs are frequently sealed which it is NOT possible either to produce in quantity by efficient mass-production methods, or to maintain in service with any reasonable economy in time and manpower.

This is because research and development staffs are frequently without up-to-date experience in modern production techniques and are rarely troubled by, or even cognisant of the problems which will arise in the maintenance and repair of the equipments they envisage. They must, of necessity, include in their numbers many abstract scientists, and to the scientist in his laboratory nothing is impossible. The products of the laboratory rarely, however, stand up to the rigours of use in the field.

Evidence of this is available every day throughout the army. Complex new equipments cannot be delivered rapidly in quantity due to manufacturing difficulties which preclude the efficient use of mass-production methods, when received they require endless modification to rectify basic errors in design, or those later revealed in normal service operation, and due to their complexity and the use of non-standard engineering techniques or materials they require frequent, expensive and lengthy overhauls. This in its turn requires a large and extravagant spare parts

supply system, and, as spares can be produced only at the expense of complete equipments, inevitably reduces the number of equipments in the hands of the troops. It requires costly and unwieldy machinery for the repair organisation, which imposes a further load on the country's heavy industry and on the supply and transport services throughout the supply pipeline.

A few examples will suffice to illustrate this problem. In the days before the invasion of Sicily the ability of the repair services to waterproof a mass of equipment for deep wading was viewed with great scepticism by the general staff, and even before the Normandy invasion Montgomery himself doubted the ability of the service to cope with the task. The results, however, were sufficiently spectacular to "sell" waterproofing in a big way. To sell it to such an extent that some post-war specifications call for built-in waterproofing of vehicles. The folly of this decision is apparent when the production line difficulties in manufacturing this equipment, which must be made to fine limits, the additional range of spares required to be manufactured and stored, and the greatly increased maintenance and repair load involving a much reduced availability to the user unit, are balanced against the possible number of occasions when such waterproofing will be necessary to the success of an operation. Design a vehicle capable of being easily waterproofed — yes — but build a permanently waterproofed vehicle — NO.

The radar set AA No. 3 Mk. 7 was designed to fulfil a requirement for use in jungle warfare and in close

country generally. It had therefore to be small and compact, yet nevertheless was required to give a cover equal to that of a set twice its physical size. The scientist agreed that this was possible in the laboratory, and would no doubt have built in a television set as well if asked to do so, and produced an equipment which by and large met the requirement — in the laboratory. In the field it was only after many years of modification, involving in some cases complete redesign of major items, that a set was produced which would operate efficiently for extended periods, but which is even today an expensive and heavy repair liability.

The gun control equipment of a Centurion tank is without doubt supreme in its class, but even so can be temperamental, and, due to the large number of variables, is more prone to failure at a critical period than a more simple control system would be. It does inevitably present a considerable spares provision, and maintenance and repair load. It is for the statistician to evaluate whether a more simple equipment produced in greater numbers with a much reduced liability of failure and a greatly increased availability factor to the user, but with a relatively inferior accuracy, would give a higher killing rate than this very efficient but sensitive equipment.

Enough has been said to illustrate the enormous overheads in stores holding and maintenance personnel which are generated by the fulfilment of an over-ambitious staff requirement. The General Staff, who complain most bitterly about the size of the administrative tail, have

Frankenstein-like produced their own monster.

To cut down these overheads the design of a new equipment, or the choice on purchase of one model as against another, requires a very careful balance sheet to be drawn up. The ideal requirement must first be stated by the staff; to this is added the ability of the research and development staff to produce what has been called for. Set against this is the estimated capital cost, the ability to make full use of modern production methods, the degree of skill required to operate the final product, the ease of maintenance and repair, which will indicate the expected normal availability of the equipment to the user, and the requirement for maintenance and repair stores. Too little attention has in the past been given to these basic considerations, too many non-essential refinements have been incorporated, leading in the end to an equipment which is more often in the hands of the workshops than of the user. Greater weight must be given to the recommendations of the production and of the maintenance engineer when designs are formulated.

Very careful consideration of these highly relevant factors can produce quite startling economies in the manpower required to service a particular equipment and will ensure that its availability to the user, which is after all a basic prerequisite, is much greater than would otherwise be the case.

It can further be seen that increased mechanisation of supply or other services referred to above may bring in its train additional repair

maintenance and stores problems which might offset the gain in labour overheads unless the equipment to be used is designed, or selected from an existing range, with these principles well in mind.

The ideal is then the simplest and most robust equipment which can be produced to give, or approximate to, the stated requirement. Technically it will always be possible to improve upon this at the expense of simplicity, but as Sir Robert Watson-Watt, the inventor of radar, has said—

“The best is never achieved, the second best comes too late. The third best is the practical answer.”

There is one alternative, however, and that is to produce a machine of such complexity that it will carry out the will of the user almost of its own volition — push-button warfare made perfect. This possibility would lead to a single operator pushing the button, surrounded by a horde of technicians keeping the robot up to specification. As was hinted earlier this might not be viewed with favour by the fighting arms — all tail and no head. Historically, for what it is worth, in the process of evolution the snake is one of the lower, not the higher forms of life.

Finally, it must be remembered that future wars, with the threat of atomic and nuclear weapons, will place increasing emphasis on small highly mobile task forces requiring equipment of great reliability, and will inevitably interdict the establishment of large stores holding or repair organisations in the field.

Conclusion

It has been shown that civilisation has inevitably added to the burden of military administration in a number of ways. Certain parts of this load cannot be jettisoned without risking the failure of the whole machine. Others of parasitic growth

clinging leech-like to the body of the army must be removed or curtailed in activity.

It is, however, in the strategic design of the forces to be employed and in the equipment which they will use that the greatest economies are possible. Man must once more regain his mastery over the machine.

COMPETITION FOR AUTHORS

Beginning with the July 1955 issue of the Australian Army Journal, monetary awards will be made on a competitive basis to authors of original articles published in the Journal.

Monthly Award — All original articles published in each issue will be reviewed by a Board appointed by the Director of Military Training. The Board will select the best article published each month. The author of the selected article will receive £5.

Annual Award — When twelve monthly awards have been made, the twelve first place articles will be reviewed by the Board, and the author of the one judged to be the best will receive £40.

The award of both monthly and annual prizes will be based on the substance, originality, completeness, and the over-all merit and quality of the article.

THE THOUGHTS of a LIEUTENANT-COLONEL ABOUT to go on LEAVE



Lieutenant-Colonel C. J. Miles,
Royal Australian Armoured Corps.

I HAVE a theory! Although, perhaps, like most of my theories, it is about as useful as that of the lunatic who trained a cockroach to obey his words of command. When an onlooker expressed his amazement the lunatic said: "But wait, I haven't explained my theory." With these words he pulled off all the cockroach's legs, and proceeded to give forth more words of command. The cockroach naturally enough didn't make a move. "There, you see," he said, "when you pull his legs off he goes deaf!"

My theory relates to the rank of lieutenant-colonel, which I believe to be superfluous. Not only can we do without him regimentally, but we can spare him from the staff as well. Not that he doesn't serve the staff well; but my point, which I hope to make later, is that we have too many levels of staff, and if someone has to go it may as well be he.

Once upon a time colonels commanded regiments. Not only did they command them, but as far as I can see they practically owned their regiments. The day came, however, when actually commanding

regiments in the field became a somewhat tedious chore, so that finally a lieutenant-colonel was hired for this tiresome purpose. These gentlemen, who then, as now, probably couldn't afford to buy a regiment of their own, used to keep their masters informed about the state of the regiment, and from time to time made their modest requests for money, supplies, uniforms and other necessities of war.

As time wore on, the management began to find it rather difficult to find gentlemen of means who were prepared to raise regiments, and so the management had to supply their own regiments, which both in theory and in fact were commanded by lieutenant-colonels. The colonel would then have found himself out of a job had not the staff system come to his rescue. This, of course, would have been quite unnecessary had the colonels gone back to their proper task of commanding regiments, and allowed the lieutenant-colonels to slide back to the limbo whence they came.

You may say now, of course, that we should find it difficult to fill our

Grade I staff appointments if the supply of lieutenant-colonels were to dry up completely. Naturally if you don't agree with the second part of my case then I am compelled to admit that filling these Grade I appointments would be a rather puzzling problem.

I feel that generally we have too many staff levels. Any captains amongst my readers will assert that they do most of the work on the staff of a headquarters. As I am not a captain, I must say in all fairness that all the bright ideas do not stem from captains, and neither are they responsible for the whole task of collocation and presentation. And so we must admit that a staff composed entirely of captains would scarcely be a success.

Let's then look a little more deeply into what really does happen. A problem of some sort arises, and it usually finds its way, through all the very best channels, of course, to one or more captains. Some sort of a decision will usually filter down to the captain as well. He fossicks about, and produces the answer, and the major vets it. Sometimes the major may produce the answer based on the facts produced by the captain. Then the lieutenant-colonel vets the answer (sometimes he even writes the paper if he thinks the major is a clot), and finally the colonel signs the paper, perhaps after consultation with his superiors. Clearly this is a case of too many chiefs and too few indians (captains).

Now naturally there must be someone to have bright ideas, set the indians to work, and then bring together the fruits of their labours. These chiefs could, I suggest, be colonels OR majors. If we used big

chiefs we call them colonels, but if a minor chieftain will fill the bill then we employ a major.

A man can readily control up to about seven subordinates if he really tries. However, our staff system gives rise to such absurd pyramids as, for example, a colonel, two lieutenant-colonels, four (sometimes two) majors, and three or four captains. This, of course, is very wasteful and unproductive. I suggest that a colonel and, say, five captains would have produced a better result in a shorter time with a saving to the management of approximately £6000 per annum.

Please don't get the idea that I am suggesting that we need be rigid about this business to the extent that a branch or section must consist of a colonel or a major and anything up to seven captains. I am merely suggesting that all we need is a boss and a number of workers directly responsible to that boss. If the nature of the work warrants it, all the workers may be majors, or alternatively some could be majors and some could be captains, depending on the degree of experience and training required for a specific job.

Such a system would demand that the boss has the ability to grasp readily the essentials of a problem to a sufficiently detailed extent to set his workers to work on the problem. The workers would have to get used to working directly with one another and with other workers elsewhere without fighting their way through an impenetrable jungle of middlemen. Now that is an apt word that I should have thought of before, because we have far too many of them. So let our slogan be "Down with the Middleman."

Tactics

and

Atomic Weapons



Colonel K. Mackay, MBE
Royal Australian Infantry

THE aim of this paper is to assist regimental officers to marshal their thoughts and provoke discussion and further study of the practical effects of atomic weapons on tactics.

Introduction

Atomic weapons include bombs, guided missiles and artillery shells. The practical effect is a much more effective bomb or shell burst than was used by the opposing armies in the last war. There is nothing unusual about this, in fact it is a normal development. They do not replace any existing weapons, they supplement them.

Now read the title and aim again. There is no reference to "conventional warfare." Such a reference would tend to brand atomic weapons as unconventional. They are not, and to the practical soldier, there is really no such thing as conventional warfare. We study principles, procedures, drills, characteristics

and so on in order to get the maximum efficiency from the forces at our disposal. We have a "normal way" of doing most things under different circumstances, but this is largely a guide. As we develop new or improved weapons and techniques let us master them, regard them in their turn as normal and progress from there. We must think well and wide, be flexible and place a premium on brains and initiative. Then by all means let us be unconventional in our methods if they will surprise the enemy and lead to success in battle.

Very few officers have seen an atomic weapon or know very much about them. That does not matter. Consider two practical examples. For years we have been studying the characteristics and best employment of heavy gun tanks. In due course we will get them and quickly be able to use them efficiently. Modern tanks have a stabiliser. How or why it works is no concern of the

crew, yet many private soldiers can use the stabiliser very well. So it will be with atomic weapons.

General Considerations

Cost. It has been stated that atomic weapons are extremely expensive to produce. Right now they are, but it is possible that cheaper ways will be found of producing a similar effect. Yet one or two planes with atomic bombs may be more effective than hundreds of planes carrying ordinary bombs, or a gun firing atomic shells may be more effective than many regiments firing HE. However, total war can only be assessed in terms of total national wealth and effort. In a total war we must win the initial defensive battle for survival or our national wealth counts for little. Our manpower is limited, difficult to replace and cannot be given a monetary value. So if atomic weapons will save manpower, particularly the lives of trained soldiers, and these weapons will assist us in defeating the first onslaught of an aggressor, then they must be used regardless of cost. To the soldier, the user, the cost in national effort is a factor for consideration, but it cannot and must never be an over-riding factor.

Use. It has also been stated that a decision to use atomic weapons will be made only on the very highest level. Let us be practical. The decision to use them may be made already, but by whom, when and how the decision is made, is only a matter of academic interest and newspaper headlines to the regimental officer. Atomic weapons will be used in another war, in fact they might well be used to check an aggressor in the first day of war.

Supply. It has been suggested that atomic weapons might be in short supply. This is an idle or defeatist thought. We must look ahead a little and we must assume that lessons of the last two wars have at last been learned and these weapons will be available when and where they are likely to be required and in quantities to be fully effective. Our task is to employ them effectively.

Control. Next consider the question of control. Here it would be appropriate to refer vaguely to joint army/air machinery for command and control. This, of course, exists at the Army Group/Tactical Air Force level. If smaller forces are operating in a particular area this control would be exercised at Corps or possibly Division. Now let us come right down to earth. Effective control is not possible without accurate and timely information which will be obtained principally from air and ground observation. In defence, attack, advance and pursuit the employment of atomic weapons can be pre-planned to a certain degree, but recommendations must come from the forward units in contact. Regimental officers must have the tactical knowledge and ability to appraise the situation quickly and take advantage immediately of any opportunity offered. Skill on the part of junior officers in the art of war and leadership will be vital, whereas at the moment the question of control of atomic weapons is relatively unimportant.

Effects of an Atomic Explosion

Nominal Bomb. Before proceeding further it is necessary to have a rough but practical knowledge of the likely effects of an atomic explosion.

Most figures produced to date are theoretical and tend to be alarming. These figures are calculated on the explosion of an air burst "nominal" bomb. This is a bomb calculated to be equal in explosive energy to 20,000 tons of TNT burst at an optimum height of 2,000 feet under ideal conditions. This 20,000 tons of TNT sounds frightening, but most of it is wasted because it is over concentrated at the centre of burst and much of it is thrown upwards. Figures of likely casualties in the open envisage a flat surface with no protection at all and for practical purposes this is unreal. Similarly figures for troops in trenches are likely to be misleading as they cannot take into account the configuration of the ground, depth of trench and degree of overhead cover. An indication of casualties is contained in Table "A."

Size. Explosions have been produced both larger and smaller than the nominal bomb. Larger bombs are less predictable and are more susceptible to weather, particularly wind. The explosive force carried up large quantities of particles of pulverized earth which become contaminated and eventually "fall out," or return to the ground, perhaps many miles from the burst. For practical purposes it would appear that the nominal bomb is the largest which might be used by either side in a tactical role. This bomb then represents the best or worst case. Smaller bombs or missiles might be perhaps one quarter the size of the nominal bomb or less. Size and casualty effect are not in a direct ratio because of the waste at the centre of burst. Let us assume for practical purposes that the smallest missile

will have a casualty-producing effect of about one-third of the nominal bomb. Now check back on Table "A" and see that it is not devastating or formidable at all.

Types of Burst. Consider the nominal bomb again and radio activity. A high air burst, that is one at 2,000 feet, will produce no residual radioactivity. A low air burst, about 500 feet, will produce residual radioactivity and a fall-out area of contaminated particles close to ground zero (immediately under the centre of the burst) extending down wind. Such ground could be traversed safely in a vehicle one hour after the burst, or on foot, after six hours. A ground burst will produce a large crater about 100 feet deep and 200 yards in diameter, depending on the type of ground. This area will be heavily contaminated for days, possibly months. Each type of burst has a tactical application.

Casualties. As a working guide for the regimental officer, the largest explosion in a tactical role under favourable conditions will produce few casualties on troops in the open beyond one mile radius from the burst. There will be few casualties past 1,200 yards radius if troops are in slit trenches and few past 600 yards if troops are well dug in. Low air or ground bursts will produce less casualties and the smallest explosion will have about one-third of the effect of the nominal bomb. Apart from troops moving into an assault, who will remain highly vulnerable, these weapons cannot and will not produce devastating results if they are used singly.

Now examine this more closely and take the case of an infantry

Probable Casualties from a Nominal Bomb Burst at 2000 Feet

RANGE (From ground zero)	LIGHT (Instantaneous)	BLAST (Speed of sound)	RADIATION (Lasts only 10 seconds)	HEAT (Lasts only 3 seconds)	INDIVIDUAL ACTION TO BE TAKEN
Up to 1000 yards	Temporary blindness if soldier is looking towards the explosion	OPEN. Perhaps 50% casualties TRENCH. Few casualties, except in immediate area of ground zero	OPEN. Death TRENCH. 100% casualties. Death up to 500 or 600 yards	OPEN. Death. TRENCH. Severe burns with any exposure	Fall flat face downwards — eyes closed — hands under body. No time to run for cover; stay down for 15 seconds
From 1000 yards to 2000 yards	Duration of temporary blindness half an hour to half a minute, but no permanent damage	OPEN. Some casualties from flying debris TRENCH. SAFE	OPEN. Death up to 1200 yards with severe radiation sickness up to 2000 yards TRENCH. SAFE	OPEN. Death up to 1200 yards with severe burns up to 2000 yards TRENCH. SAFE If not exposed	As above
From 2000 yards to 3000 yards		OPEN. SAFE TRENCH. SAFE	OPEN. SAFE TRENCH. SAFE	OPEN. Some casualties from burns TRENCH. SAFE	As above

1. The above figures are a rough guide only and, for the **OPEN**, do NOT take into account that some troops will be behind cover or in folds on the ground. The effects of the bomb are reduced by broken ground, rain, mist or fog.
2. As a rough guide there will be few casualties past 1 mile in the open, $\frac{3}{4}$ mile in slit trenches and $\frac{1}{2}$ mile in trenches with good overhead cover.
3. Remember that most of the casualties are caused in the first few seconds.
4. This table will emphasise the vital importance of troops digging in.
5. Weapons are less likely to be affected than soldiers.

Table "A"

Atomic Weapons

The tactical employment of atomic weapons offers wide scope. For a start it is not easy to say where strategical employment ceases and tactical employment begins. As a rough guide, targets in the enemy communication zone which, if attacked, will have a direct effect on his build-up or his front line troops, may be regarded as tactical targets. In Europe this might be 50 miles or so and in undeveloped areas it might extend for 200 miles or more. The principal means of delivering an atomic weapon are aircraft and heavy guns. Guided missiles are also being produced with a much greater range than the gun and one day they may replace it. The weapon delivered by air has no range limitation in a tactical role, but it may be affected by enemy air action and weather. The gun has a range limitation (15 miles or more), but it is less likely to be affected by enemy air action and weather should prevent no problem. However, both types are essential.

For close targets the gun will have advantages over an aircraft. It is likely to be more accurate both in space and time, and delivery from time of request will be faster. Mathematically it can place a more accurate pattern of rounds on the ground. The gun might be used to fire HE and could fire atomic shells as required. To obtain surprise its firing position could be surveyed in and the gun could be moved by night to fire at first light. It might register targets with HE or HE of a type designed to conceal its calibre, then be moved and concealed until it was required to come into its prepared position to fire atomic shells.

battalion in defence, dug in, with overhead cover, against a strong enemy. It would be reasonable for the battalion to hold an area, preferably hilly, of up to 2,000 yards by 2,000 yards in depth. Arrange the companies in any reasonable way in this area and superimpose the worst case of a high air burst nominal bomb over it. It might look like Figure 1. Those in the area of the circle would be killed or become severe casualties. There will be some casualties outside the circle but the majority would be safe. Those not casualties would be under a tremendous psychological strain, but they could still fight. A proportion of troops will be out of this area at A or B echelon, so the overall effect on the battalion might be 50% or 60% casualties. If the area occupied by the battalion was about 1,200 yards by 1,200 yards casualties might be as high as 90%. This means that units in well-prepared defences will not necessarily be wiped out by one explosion and it suggests that several missiles may be required to produce worthwhile results.

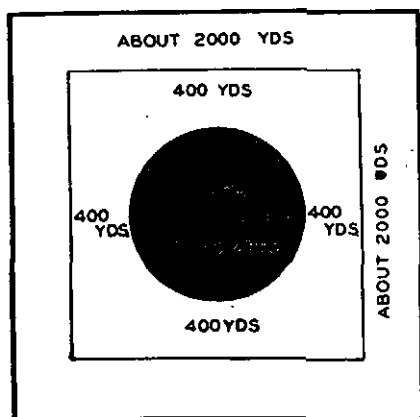


Fig. 1

The Enemy

We know that at the beginning of a war an aggressor has many advantages and primarily we must conduct a successful defence to beat his attack. Our enemy, initially at least, will have a superiority in numbers of troops. In attack his planning calls for as much superiority in men and weapons as he can muster at the point of attack. He prefers to attack on a wide front or at several points at once and aims at deep penetration. He is not so much interested in the capture of ground as developing an attack into a pursuit which will give him greater gains. He emphasizes both quality of troops and weapons and we must assume he will have atomic weapons. He regards power as more important than reason and requires blind obedience so he does not emphasize initiative. Higher headquarters exercise very tight control over subordinate formations and units which leads to rigid planning. The unexpected or surprise will be a potent weapon against him. We require highly-trained troops and the best weapons from the outset, but equally important, we require a high degree of knowledge, leadership and initiative to get the best value from what we have. Naturally he will be forced to reconsider his methods in the light of modern developments, but in any study of tactics we must keep our enemy well in mind.

The Principles of War

At this stage it might be wise to check over the principles of war. Look at them again: The Selection and Maintenance of the Aim, Offensive Action, Maintenance of Morale,

Surprise, Administration, Flexibility, Economy of Effort, Concentration of Forces, Security and Cooperation. They are a fruitful source of study in themselves and each warrants a separate detailed examination. However, that might not be appropriate here, as this study is intended as a quick check to note some of the more important aspects as a lead up to a consideration of the phases of war.

Offensive Action. All agree that offensive action is essential for success in war. Yet, in the past, our forces in the first year or so have suffered disadvantages in such things as numbers, weapons, vehicles, even training, and opportunities for offensive action have been limited. Then when the opportunity offered, the offensive action was often limited. Perhaps we tend to place too much value on ground for its own sake and are inclined to be methodical or over-cautious. Now we have powerful weapons which could prevent heavy concentrations of enemy troops and so place a greater premium on individual skill and leadership. There will be more opportunities in future for bold thinking and bold action. Offensive defence will take on a new meaning.

Morale. High morale will assume added emphasis in future. The psychological aspects of morale might be more important than those we know better — high standard of proficiency, fitness, discipline, understanding, and a state of well-being. Moral fibre will be more than a term, it will be vital. Education, knowledge and careful mental preparation will be required but, more than ever, morale in all its aspects must be watched and nurtured, or

fear might predominate in a show-down.

Surprise. Here the added emphasis is obvious, but it is double-edged. At times we tend to pay lip service to some aids to surprise such as camouflage, concealment and deception, particularly on unit level. They will assume much greater importance.

Administration. The tremendous medical problems arising with many serious casualties occurring simultaneously will present a big challenge at any time. It involves not only capacity to cope with treatment, but the speedy collection and evacuation of hundreds of casualties over many miles to where treatment will be available.

The whole supply system is now more vulnerable and the most efficient control of all handling agencies forward will be essential. Many installations, including ports, will have to be kept small and be duplicated. This will probably involve more dispersion and reduced holdings in base areas, but not necessarily further forward. We may have reached a stage where further dispersion is hardly practicable, but it would be wise to consider the duplication and spread of both installations and commodities in an area of about the same size as that required in the past.

Administrative planning must also take into account that bottlenecks such as defiles through which main rail and road arteries run could be put out of action for months, and detours, due to terrain, might not be practicable. This means having alternative and spare capacity to get maintenance through to forward

units. We should look more to the air but not necessarily to planes dependent on well-prepared airfields and ancillary services which could be rendered unusable. Assault aircraft and cargo helicopters would give much needed flexibility and could also be used to back-load casualties quickly.

In more inhabited areas the use of atomic weapons may terrorise the civilian population and road capacity could become clogged with refugees. These few examples indicate that administration in all its aspects will assume increased importance.

Flexibility. Flexibility has always been a great asset and its importance will increase. It includes mobility, command and communications, and flexibility of mind. Speed is implied, particularly the ability to recover quickly from shock or surprise and redispense forces to overcome a threat or take advantage of an opportunity. We have this advantage of flexibility over our enemy now and the aim should be to exploit it.

Security. The enemy will seek worth-while targets for atomic attack. He will require good information. This must be denied to him more than ever before. Our ideas on firm bases may require some adjustment. In the past a heavily defended feature often formed a bastion in defence or a firm base around which, or from which, offensive action was initiated. Such a feature can now be neutralized or destroyed by one, but more likely by several atomic explosions. In future a firm base might consist of an area in which, or into which, a mobile force could be deployed

quickly to hold. Perhaps a feature could be dug and prepared with the bulk of the force to hold it dispersed and concealed to the rear, but ready to man it should a threat develop. Alternatives and mobility and deception will be required.

The Phases of War

The phases of war might be considered in any order, but for this study it is probably more convenient to begin with defence, both deliberate and hasty, then lead on to the attack, advance and withdrawal. Let us consider them in some detail in that order.

The Defence-Deliberate

Here the ground will be of our own choosing with the enemy some distance away, and some time should be available to prepare the position and rehearse the main likely actions in the conduct of the defensive battle. *The minimum requirement is that the defence should be strong enough to defeat normal enemy methods without atomic weapons.* The last imposes additional problems. We require as much time as we can force from the enemy to dig deep and develop overhead cover. We must know where the enemy is and begin hurting and delaying him as early as possible.

Covering Troops. Very little change is indicated except to increase their delaying power. This could be improved by increasing their supporting artillery and air support. The 25-pounder has not got the range or weight of shell, so medium artillery should be made available from an AGRA. Possibly

several regiments deployed forward of the main defensive position might be the ideal.

Screens. The main requirement of denying the enemy close observation of our position is increased. As with covering troops, screens may require more strength and might be sited a little further out. Strength could be provided by additional artillery support and the use of more armour, but not necessarily infantry. Again they should offer as much resistance as their strength will allow and more co-ordination, at least on brigade level, will probably be required.

FDLs. A strong line of FDLs will be required as a good front door to the position. Gaps in the FDLs may be unavoidable due to numbers, but they will be more than ever undesirable. Enemy patrols seeking information should be stopped in the last instance at the FDLs and penetration by patrols must not be permitted. It would appear that we require the FDLs to be held with not less strength than we have used in the past. Further dispersion due to an atomic threat might not be acceptable with the forward battalions. In fact, there appears to be no change. Forward platoons and companies must be mutually supporting, dug in with overhead cover level with the ground and camouflaged. Protective wire will be required forward and over the positions and mines will be laid if it is desirable or policy to use them.

Depth. Depth in defence is always essential. Now we should think in terms of much greater depth since focal points of the defence, usually dominating high ground, can be neutralized or made untenable to either

side by ground burst explosions. Most ground is defensible, so it might be better to regard as depth the total distance from where we chose to fight initially back to a general line the enemy must not be allowed to penetrate. Here it may be necessary to deny some or most of the approaches by contamination from ground bursts, or more likely from radioactive material sprayed or dropped on the ground. Depth on a large front might be anything from 30 miles to 300 miles.

In the forward division it might not be possible to obtain much greater depth than in the past, although more dispersion within that area might be achieved. One limiting factor is our artillery. The divisional artillery plays a very important part in the conduct of the defence and the gun area should be secure. This area will tend to increase to provide for dispersion, deception and adequate alternative positions. The present range of the 25-pounder does restrict to some degree the area in which the forward brigades can manoeuvre. If the 25-pounder had a range comparable to that of the enemy light medium gun (120 mm) of over 20,000 yards, the whole of the division would obtain considerably more freedom of action.

Penetration. Let us try to consider counter-penetration and counter-attack separately, as far as possible, in the case of a forward division. It might be deployed with two brigades forward and one brigade held in depth. The forward brigades might each have two battalions committed to holding a strong line of FDLs. These will form the first crust of the defence and will be in some depth themselves. These battalions will

fight from the positions they have dug and prepared. They should not consider counter-attack and can do little about penetration. This leaves one battalion in the brigade, or at least a part of it, preferably supported by armour, for counter-penetration and most likely it will have more than one task. Its job will be to stop enemy penetration and hold the attack. This should take place not far behind the forward units through which the penetration came or the forward units may be defeated in detail. Once the enemy is stopped he can be attacked with fire or by a counter-attack force. All of this might be regarded as normal tactics and in such close fighting the use of atomic weapons by either side would not be practicable.

If a forward brigade failed to stop penetration it would fight from the positions it then held and force the enemy attack to lose momentum through lack of support. At this stage part of the brigade in depth might be used to ensure that penetration was stopped or, when it was stopped, counter attack.

It would appear that the threat of atomic attack against the defence might not affect greatly the tactics of forward brigades. A reserve held in the brigade will be primarily for counter-penetration, but it should also have a position, at least partly prepared, from which it could fight if atomic weapons were used to neutralize the forward battalions. This latter task could still be called counter-penetration. The reserve might be in a little more depth than in the past and it could remain more dispersed until it was required to move to carry out its role.

In the case under consideration, the division used a brigade in depth with part of it held as a reserve, and it would appear that its role and dispositions will be very similar to the reserve of the forward brigades. The whole of this brigade in depth may be required to stop penetration if the forward sectors are over-run quickly. The ground used for this role will present problems as it may be in or near the divisional gun area. Also at this stage a proportion of the guns will be moving, and their fire will not be available.

Counter-Attack. The reserve held by division must prepare for two roles and we can but hope that its task will be counter-attack. It would seem, however, that the main counter-attack strength on a sector of the front might be controlled by Corps. At this level something really solid will be necessary and a force of up to a division in composition might be required.

Offensive Defence. Another very interesting aspect arises. If the conduct of our defence is sound up to the stage where the enemy comes against our FDLs in strength, we should have a good deal of information about his build-up and intentions and he should know far less of ours. We might not be in a position to assume the offensive, or desire to, but a limited offensive action could destroy the enemy's capacity to attack.

The force required might be up to a division supported by armour which should be available from well back in the depth of the defensive position. This force could be moved to forward concentration areas with

the role of attacking to a depth of five or ten miles behind the enemy front following the explosion of several atomic missiles. These could destroy or completely neutralize the enemy troop build-up over some 5,000 to 6,000 yards to a depth of about 4,000 yards. The limited offensive could have the role of destroying his supporting arms and administrative build-up and taking prisoners. The whole operation might last twenty-four hours or a little longer and be completed before it encountered strong enemy counter-action.

Our possession of atomic weapons will hinder the enemy's ability to develop an undue superiority of men and guns against any part of the defence. The use of these weapons might deny him this ability and at the same time create opportunities to develop limited offensive operations aimed at destroying his capacity to attack in strength. In the final analysis offensive defence on such lines might well be the best policy to adopt.

Security in Defence. More than ever before it will be necessary to deny the enemy information of our position and our intentions. To attack he will want to know in particular the location and strength of our forward units and reserves, including armour. Good camouflage and deception will be required and our patrolling must dominate his. Alternative plans for the conduct of the defence will be required to cater for such eventualities as atomic weapons being used on our forward units, gun areas and reserves. Good communications will be essential and more than ever the emphasis will be on the efficient use of wireless.

The Defence-Hasty

Here the ground may not be of our own choosing. Examples are the reorganization and holding of objectives in the attack or the final line held as a result of enemy penetration into a position. Usually close contact is involved and from our point of view it is a temporary measure until our forces are in a position to continue or develop the attack, counter-attack or exploit to seize further ground we require. It will be essential to dig in fast, not so much because of an atomic threat, but to reduce casualties and develop better fire from the position. Greater dispersion than was used in the past will probably not be practical, but that will be largely dictated by the strength of the enemy at the time. The employment of atomic weapons by either side in the immediate area of the conflict will be unlikely until the position is more stable.

The Attack

It would appear that atomic weapons will affect considerably the method of conducting the attack. There will be a choice between attacking where the enemy is known to be weak or deliberately attacking his strength to obtain greater destruction. However, let the attacker beware, because troops in the open, such as in the attack, are much more vulnerable than at any other time.

In planning the use of atomic weapons in attack we should be bold and should not pull any punches. The aim should be a breakthrough in depth with the main gains coming from pursuit or preferably from a rout. Atomic weapons may be required in two or three phases and they would be re-

quired in considerable numbers to be really effective.

The first phase might be to neutralize with high air burst, a sector of the front, which will include immediate reserves, to enable a quick break in. The forces in this phase will require good mobility to move from dispersed assembly areas and attack positions to secure the flanks and penetrate as far as they can go. They will, in fact, seize a large bridgehead giving enough room to allow the next phase a clear run on as wide a front as possible.

The second phase might be composed of mobile troops with good hitting power and cross-country performance. They would require tactical air support and their task would be to break through the second or third zone of the defence taking advantage of speed and surprise. They would require atomic weapons to neutralize strong points to keep up momentum.

The third phase would be the normal break-out using armoured formations. They would require atomic weapons on call but with the speed envisaged their use may not be required. Possible tasks might include the disruption of main communication centres ahead of the pursuit to delay the enemy or on the flanks to slow and disorganize any enemy counter moves. This phase might work in conjunction with airborne forces, but let us consider them separately later.

Mobility and speed, particularly across country, have been emphasized. These will be required not only in the attack itself, but in the preliminary moves behind our own position prior to the attack. This

will require careful co-ordination or surprise might be lost and worthwhile targets might be presented to the enemy. In any case flexibility will be required in planning as atomic weapons may be used against the attacking forces. Administration is likely to be a limiting factor on speed though air supply might help. Enemy casualties will be beyond the capacity of attacking formations and special arrangements will be required. The problems of natural and artificial obstacles such as deep defensive minefields are not solved with atomic weapons.

The day of the infantry moving in an attack formation with their normal support will still be the rule rather than the exception. Mopping up and exploitation on foot will always be required. More use might be made of good cross-country type vehicles to increase mobility, but greater dispersion will hardly be practicable if ground has to be mopped up quickly and held.

The Advance

Basically the advance should be considered from two points of view. One has already been covered to a degree; that is the follow-up to a successful attack. The other is advance to contact when touch with the enemy has not been made or has been lost.

In a follow-up, an advance continues to be called such while the enemy retains the ability to withdraw intact and fight delaying actions on ground he chooses. It becomes a pursuit when the enemy loses this ability, and a rout when he loses cohesion. The use of atomic weapons does offer far greater scope to turn a follow-up into a pursuit

or rout. However, the use of atomic weapons and mines by the enemy, particularly in broken country with few developed roads, will slow the advance and may prevent bold action. In these circumstances there may be little change from the tactics used in the past, that of keeping up strong pressure with forces ready to go should the opportunity offer.

The advance to contact is really a question of sweeping forward with balanced forces on all available approaches until the main enemy strength is located. Light hard-hitting forces with a strong reconnaissance element forward clear the terrain as they go, drive in weak opposition, and then search to find the flanks and strength of the enemy when they are halted. It is unlikely that atomic weapons would be used in such action.

The Withdrawal

In the past, due to dire necessity, the ability to conduct a successful withdrawal was most important, particularly in the early stages of a war. As a phase of war, the withdrawal tends to be over-rated, and it might be opportune, in the light of atomic weapons, to reorientate some thinking on this subject.

The essential elements of a withdrawal are meticulous planning and resolute leadership coupled with good discipline. These are not likely to change at all. Atomic weapons used on the enemy administrative elements and troop concentrations could slow a follow-up and allow a withdrawal to be conducted as planned. Ground burst explosions or radioactive material in road defiles or even in restricted

approaches will make that ground unusable and impose further delay on the enemy. In these circumstances it might be wiser to regard any withdrawal action simply as a manoeuvre in the over-all conduct of the defence.

Airborne Forces

Reference has already been made to the possibility of much greater use of assault aircraft and cargo helicopters to provide more flexibility on the administrative side. At first glance it would appear that greater use might be made of airborne forces in the future. An airborne force ready for action is a potent threat in itself to the enemy and surprise is an element it can exploit well. Surprise can also be exploited by the use of atomic weapons and it would seem that the combination of the two might achieve great gains.

Airborne forces are particularly vulnerable in the air and immediately on landing. Perhaps they could be adequately protected in flight and dispersion might defeat undue casualties from ground to air missiles. However, as soon as the force begins to land they will be vulnerable to sneak raid attack or ground to ground atomic missiles. Again, dispersion over several dropping zones might be effective in reducing the number of worth-while targets. It would seem that operations on the scale of an airborne division would involve considerable risk. Yet in a fluid situation, if airborne forces were dropped and made contact immediately, the use of atomic weapons might not be practicable. The same might apply to the capture of important communi-

cation centres involving large numbers of the enemy civilian population.

If the enemy should use radioactive contamination to hamper a ground advance, airborne forces will be essential. In attack, the use of even a small airborne force in conjunction with the use of atomic weapons to achieve sudden and deep penetration is likely to pay great dividends. They might also be used in limited offensive operations referred to in consideration of the defence. There is certainly a future for airborne forces and it is a subject which requires a great deal of thought. One avenue worth special consideration might be to simplify our technique and increase the number of regular field units, who with very little training, might be used in an airborne role. In other words we might look to the air to obtain much greater mobility, not just for specialised forces, but for the majority of regular field units.

Jungle Warfare

The jungle presents special problems arising mainly from the lack of suitable developed communications and resources, restricted visibility and usually the lack of information. As a rule, large forces are not likely to be opposed in action at one time and contact, though bitter, will probably be restricted to a relatively small area. The effect of an atomic explosion in heavy jungle is likely to be considerably reduced. In these circumstances, when contact is made, the use of atomic weapons in forward areas seems rather unlikely. However, any attempt to hold a small area with a garrison or develop a tight perimeter defence

might present a worth-while target and invite disaster.

In jungle terrain the capacity of the communication zone will probably dictate the size of force which can be maintained in the field. This capacity will be a governing and perhaps critical factor. Any serious disruption of the communication zone is likely to have immediate repercussions on the forward troops. This zone is likely to provide the more worth-while targets for attack by either side.

The sea, and it is usually not far away, offers wide scope as a means of getting maintenance forward, but the development of many small, even temporary ports, and beach dumping might be the only practicable way of getting sufficient dispersion. A railway system, should it exist, is likely to have a limited capacity and like roads, it will probably cross defiles which could be attacked by ground burst contamination. Existing airfields are likely to be few in number and small and will require considerable time for development. Sites for new fields might be limited and will require a great

deal of effort and time to prepare. Yet this must be done as alternatives will be required in the event of attack. One thing seems to emerge clearly and that is the means to provide a considerable supplementary air lift and air drop will be essential.

Summary

The aim stated that this was an introductory precis to assist regimental officers to marshal their thoughts and it has been prepared from that point of view. Most of the points raised have been presented deliberately in brief outline and detail has been avoided. Many are contentious and provocative to lead to further discussion and study.

Conclusion

It would be both premature and unwise to arrive at any firm conclusions from this brief study. The only certain conclusion is that the junior officers of today will be the commanders of tomorrow and the sooner they begin a serious study of the atomic weapons they will be dealing with in another war the better.

HOW IT BEGAN



C. C. Soden

IT is safe to wager that pretty well every feature of Army procedure, even the most trivial, has an origin of great interest and often of great antiquity. Take, for instance, the ceremony of Changing the Guard. Those who had the good fortune to witness this ceremony outside Buckingham Palace or St. James may have noticed that, while the sentries are being posted and the main bodies of the "New" and the "Old" Guards are standing facing each other, their respective officers pair off and march to and fro in the space between until the change of sentries has been completed, when they part company and take post again with their Guards.

Of the innumerable officers who have thus paced up and down, how many have known that they were not doing something inserted in the ceremony merely to pass the time pleasantly while the sentries were being changed? How many know that this movement originated away back in 1709 when Queen Anne, for some inexplicable reason, suggested that in order to invest the ceremony

with a little added interest and animation, the officers of the "Old" and "New" Guards occupy the interval during the reposting of the sentries by dancing the stately paces of the minuet.

The Royal request was carried into effect, and henceforth the no doubt astonished onlookers were regaled with the sight of the officers in their handsome, full-skirted jackets, silk breeches and hose and white wigs, advance towards each other and, after a ceremonious bow, hand their canes to a waiting orderly, and then proceed to dance a minuet to the music of violin, flageolet and 'cello.

It would seem, however, that this innovation found no favour with that great warrior, the Duke of Marlborough. Soon after his return from the Flanders campaign, the Duke attended the guard changing at St. James. Striding into the centre of the courtyard, he harshly suggested that, as it was not customary for one man to dance with another, one of each pair of officers might enhance the spectacle by don-



QUEEN ANNE



DUKE OF MARLBOROUGH

ning a skirt for the occasion or, better still, pay greater attention to the conduct of their men, several of whom had left the ranks and were gathered under the balcony drinking mugs of ale.

The Duke, having expressed his views even more forcibly at the War Office, the terpsichorean portion of the ceremony was immediately changed to a simple walk.

The ceremony of "Feu de Joie," a feature of military ceremonial seldom seen these days, originated in a demonstration of a new weapon before another queen — Queen Elizabeth I. The new matchlock had just been adopted as a more reliable and handy weapon than the cumbersome wheel-lock, and Her Majesty was invited to a demonstration of the effectiveness of the new firearm at Tilbury.

The valiant musketeers, having completed the capers of loading and getting the forked rests in position,

an operation which took nearly ten minutes, tensely awaited the order to fire a volley. The order came all right, but the volley didn't. The primitive matchlock mechanism produced only a ragged series of bangs one after the other up and down the line. The Queen took a very dim view of the performance, and gave voice to her opinion in language which caused all present to wish they were somewhere else.

However, it is a woman's privilege to change her mind, and presently the Queen had an idea — why not use the one after the other firing business as a planned feature of military ceremonial.

The only trouble was the inability to ensure an unbroken ripple of fire right along the line. This problem was solved by forming the men in three ranks, the second file letting go if his front rank man failed to "make fire." If both failed the third rank file came into action. This pro-

cedure prevailed until the introduction of the flintlock, a weapon which was sufficiently accurate to ensure an unbroken chain of bangs right along the line.

The new ceremonial was endowed with the name "Joy Sounde." However, the French Army also adopted this novel form of musketry

for festive occasions and gave it the name of "Feu de Joie." Under this latter name the ceremony has passed down through the centuries as one of Britain's favourite military displays. Incidentally, the Navy's system of gunfire saluting was copied from the Army's "Feu de Joie" in 1730.

At the same time, we must never lose sight of the elemental fact that, in the last analysis, victory in war depends on human beings. In this field, at least, there is a point beyond which the machine cannot be substituted for the soldier. It can increase his capabilities, it can magnify his effectiveness, but it cannot take his place. We must not fall into the error—potentially a fatal one—of thinking that in war we could replace manpower with machine power to the degree that we have done so in other fields of endeavour. There is no easy road to success in combat. The only way to win victory is to fight for it.

General Charles L. Bolte.

Artillery Command and Control

Another View

Major I. A. Geddes
Royal Australian Armoured Corps

AFTER reading Lieutenant-Colonel A. D. Watt's article "Command and Control of Artillery in a Nutshell" (AAJ No. 68, January 1955) it is agreed that certain aspects of the subject are certainly enclosed in a nutshell. However, the difficulty is to crack the shell in order to get at the kernel — I don't mean the author.

Shot One

Lieutenant-Colonel Watt stated: "... each regiment of the divisional artillery is in direct support of the division and is always available to the CRA." Yet in the same paragraph he told us "in all cases when the direct support artillery is temporarily unavailable, the Commander may be certain that it is being used in a higher priority task."

These statements conflict surely—if the artillery is always available, how can it ever be temporarily unavailable?

Shot Two

Again, each regiment of the divi-

sional artillery is stated, in the article, to be in direct support of the division — does this mean that X Field Regiment is in direct support of its "associated" (affiliated) brigade and also its parent division?

It must be either one or the other, if the artillery text book requirements for artillery in direct support are to be fulfilled.

As the divisional artillery is part of the basic organization of the Infantry Division, could not the various artillery units be said to be under command of the division — they are certainly administered by the division and has not the GOC authority (through his subordinate commander—the CRA) to order "the move of guns into and out of action"? I certainly hope so!

Shot Three

Let us take the case of an infantry battalion or armoured regimental commander. What does he want to know about his supporting artillery? Many things, no doubt — number

of rounds available, type of guns, number of guns, times, etc. — but ABOVE ALL he wants to know what artillery fire he can count upon with complete certainty. The fact that his direct support battery is being used on a higher priority task is of little consolation, if his forward troops are in a precarious state and his fire plan can NOT come into full effect.

I quote in this regard Artillery Training Volume I, Pamphlet No. 1, Section 37, Paragraphs 229 and 230, which state, inter alia, "Any call for fire in these — Close DF — tasks is a matter of great urgency. The field regiment in direct support of each brigade is available to provide the *immediate* response.

If this direct support regiment is likely to be temporarily unavailable, upon what HE fire can the forward battalion commander rely explicitly? His own 3-inch mortars only?

This uncertainty is a problem which worries and confuses many "busy officers of all arms" in their tactical studies. The Americans have words (or a lyric) for it — "is you is, or is you ain't—"

It may be argued that the situation when a direct support regiment is NOT available is unlikely to arise— if this be so, it should be explained to the student.

The perennial question, however, still seems to be unanswered by Lieutenant-Colonel Watt's article, a question that the forward troops will always ask of the supporting arms. That question is — what fire support can be relied upon at all times and under all conditions? If the answer is none, let it be clearly stated.

Finally, is the science — or is it an art — of command and control of artillery so abstract that it is not possible to be explicit?

Changing Nature of • • • War • • •

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IN the current rapid flight of history — with significant happenings telescoping one onto another — it is interesting to note that our newborn atomic age is the underlying factor controlling most of the significant actions of our time. The impact of atomic energy on the art of war appears, at first glance, to be overwhelming. However, precisely in what directions and to what extent does it change the nature of war? It becomes compelling that officers of the Armed Forces give greater thought to conditions created by the introduction of the new weapons into the military arsenal. Do these weapons change the concept of war itself? In what way do they change strategic thinking? What impact do they make on tactical situations?

From the beginning of time there has been conflict of interests among the peoples of the world. Frequently this conflict was resolved by negotiation; sometimes it was resolved by armed conflict. The point where negotiation or diplomacy failed as an

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instrument of national policy and resort was made to war is indeed difficult to define. Moreover, there may not be a definable point at this juncture for, as Clausewitz stated: "War is nothing but a continuation of political intercourse with an admixture of other means." He held that conflict among nations almost always conformed to a single pattern; first negotiation, and then war when negotiation failed. Thus, it appears that negotiation or diplomacy and war are the means by which conflicting interests among peoples of the world have been resolved. Whether nations resort to one or the other — or both — for a solution to their differences is a matter of choice of the nations themselves, or the choice of one nation that can and desires to force such an alternative upon the other.

The Record

The resort to the violence of war for the settlement of international disputes may seem, at first glance, an unusual court of last resort — a last ditch approach to the problem.

Actually, war has been at least as frequent as peace throughout the 5,000 years of recorded history. Moreover, succeeding wars increase in destructiveness while at the same time they appear to occur more frequently. Since the turn of the century, there have been a total of 27 major wars, including the most destructive wars of all time—World Wars I and II. During this period of 53 years, one or more major wars have been in progress continuously except for a period of only six years.

Why do nations resort to the violence of armed conflict to settle their differences? They do this to get a clear-cut decision — something that is not always possible at the conference table in a battle of words. Particularly when one nation is weak militarily, a strong military power can impose a condition of war by attacking it and thus forcing a solution favourable to its cause. Similarly, a group of nations—individually weak — may ally themselves to form a strong military bloc to gain greater weight for their arguments in negotiation, or to ensure victory in war if negotiation fails. The violence of war has been used effectively to throw off the yoke of political tyranny when all other means failed. War was used as the instrument to gain political freedom and independence for the United States. Sometimes a nation will go to war because it is the lesser of two evils—war may be an acceptable alternative to submission. Nations devotedly seeking peaceful solutions to international disputes may be forced to war rather than accept the maintenance of peace on the aggressor's terms.

Then, too, there have been reli-

gious wars. The Crusades to the Holy Land, and the spread of Mohammedanism by force of arms are only two of many examples. Wars have been fought for ideologies, for economic or political gain, for expansion of boundaries, and out of fear for security.

Alexander the Great, Julius Caesar, and Genghis Khan, to mention only a few, fought for glory and personal power.

The Cold War

In recent years the term "cold war" has become popular. It refers to a condition of international tension somewhere between negotiation and war itself. It is actually that point where political intercourse between nations has become strained, and the next step in a worsening situation could lead to armed conflict. In the cold war the participant nations are, in fact, in political and economic conflict, but by the exercise of mutual restraint full-scale warfare has not developed. The entire Continent of Europe has been under attack since the end of World War II in 1945. The prize is the coal and steel of the Ruhr and the Saar, a highly industrialized continent, and a population of 300,000,000 people, which includes one of the most skilled labour forces of the world. Whichever of the two power blocs controls this vast asset has, in fact, the balance of power in the world today.

There have been no bullets or marching armies, but the ever-present shadow of military force has been used as a wedge to gain political ends. The technique of terror and psychological warfare — with unlimited use of vituperation in

Press and radio propaganda — has run a full course. Subversion, sabotage, espionage, political trickery, and chicanery have been employed on a large scale. There has been the economic squeeze to keep food from people — such as the Berlin blockade. However, the cold war approached a warmer degree in Greece, where an outside power incited and armed Greek groups to revolt against the lawful government. International politics have been fraught with divisive tactics against the nations of the opposing bloc — while practising cohesion tactics for the friendly bloc. The war on the economic front is extensive and bitter because the fight for world markets employs methods which only a few years ago were considered underhanded and unethical by most of the world powers.

To date, this complexity of conflicts in the world has been contained at the level of international politics and negotiation. But how close are such volatile actions to a shooting war? Remember, it was only a short generation ago that many of the disturbing actions of today, such as blockade, shooting down aeroplanes of another country, open subversion and sabotage, summary recall of ambassadors, breaking off diplomatic relations, and the arming of guerrillas were sufficient cause for declaration of war against the offending nation. A critical danger of the cold war is the fact that it deteriorates international relations to such an extent that the situation can be likened to a tinderbox. A small spark can set off the volatile mass, compelling the nations to resort to armed conflict, as occurred in Korea. Thus we see

that the thread between the cold war and a hot war is thin indeed.

The Hot War

Once the policymakers have decided to employ armed forces to settle an international dispute, the purpose of the military is to win on the battlefield and thus restore the peace. It is not generally appreciated — in this country — that the purpose of our military services is, and always has been, to restore peace after the peace is broken in the channels of diplomacy. The military services of our country have nothing to do with war except to win it when the policy makers decide — or are compelled by outside forces — to resort to war as an instrument of national policy.

The military man has no control over whether diplomacy or war is employed to resolve international differences — the Chief Executive and the Legislative Branch of the Government make this decision. It is compelling, however, that the military man be cognizant, at all times, of the factors which may lead to war. Frequently, international disputes slip from the conference table to the battlefield with the suddenness of lightning. In times of peace, the military man must study the art of war and the manner in which modern technology can be applied to achieve victory on the battlefield. He must be prepared to perform his role with maximum efficiency and skill at precisely the moment when his country has decided to employ war as an instrument of policy. It has been possible in the past to develop the sinews of a military machine after war was declared. The tools of war were

manufactured, the required leadership, skills, and manpower were trained *after* hostilities had started. This is no longer possible. Small holding forces do not have the capability to hold off a modern aggressive enemy while a country arms. Topographical obstacles and the oceans of the world no longer provide barriers which permit organization for defence. The world has become so small that all the peoples of the world are next-door neighbours.

Inter-Continental War

Up to the present time, shooting wars have been confined to the boundaries of a single continent. Nations outside the affected continent could bring their power to bear only through the long haul across the oceans. This was time-consuming and costly, as the vast pipeline had to be filled with materials and human resources before it could have effective impact at the scene of conflict. It was evident in World Wars I and II that this linkage required a tremendous transportation effort and an enormous covering force. Even with the impressive speeds and flexibility inherent in the employment of aircraft in World War II, it was a long haul of several years before decisive military strength could be applied on the enemy's homeland across the Pacific.

Today, we find the world has shrunk — when measured in terms of time rather than distance. War no longer tends to continental conflict. Military power can be applied inter-continentially with the ease with which once it was applied continentally. Oceans no longer provide barriers to an attacking force and,

conversely, oceans provide no security for a defending force.

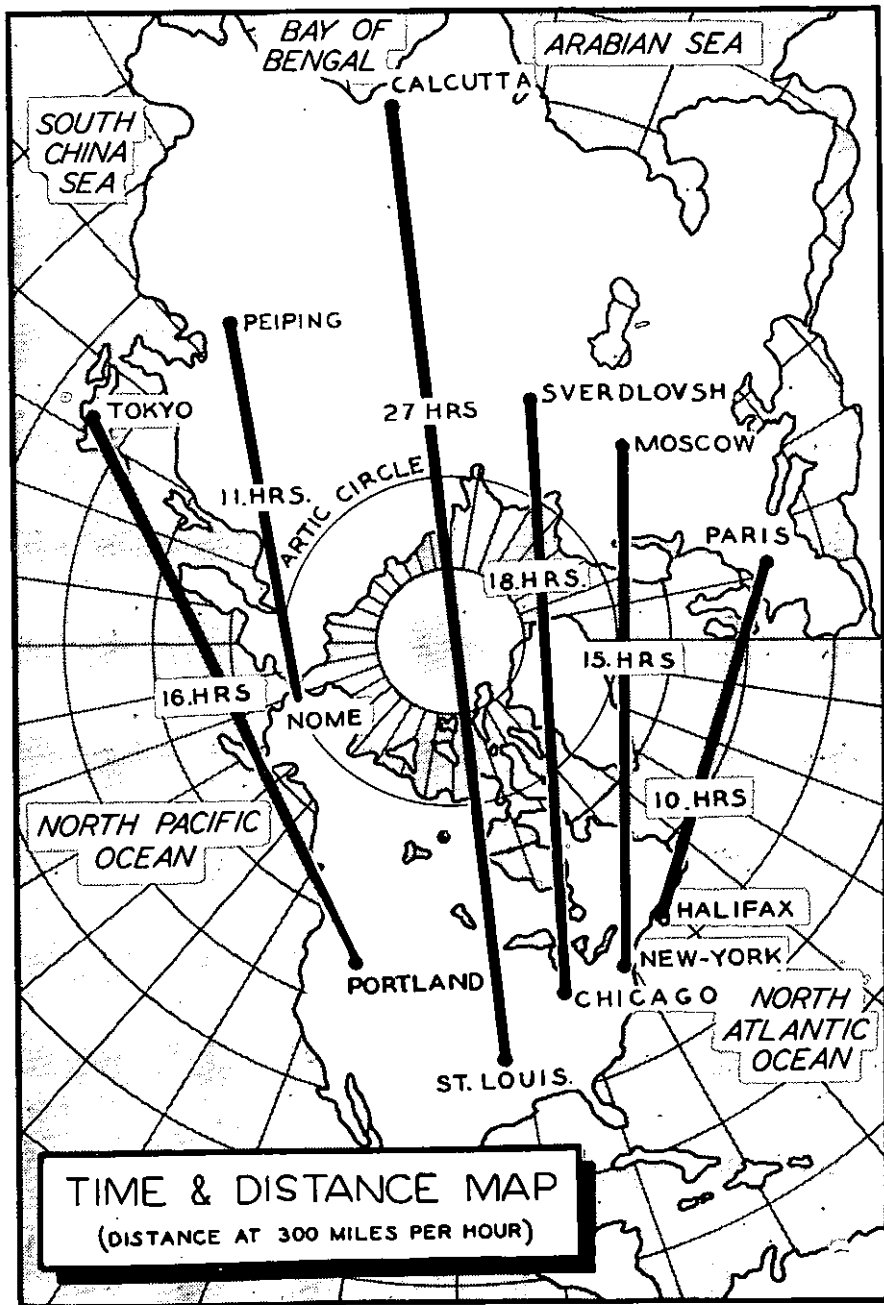
The time and distance chart shows how really small our world has become. It grows smaller each day as aircraft speeds are improved, and as inter-continental guided missiles become a reality.

Military Strategy

Once a nation extends its international argument into the field of armed conflict, the military element gains ascendancy and all resources of manpower and the economy are placed at the disposal of the military machine to ensure victory. What is victory? In the past this has meant the destruction of the enemy to the extent that he could no longer wage war; thus, he was forced to surrender outright or to seek an armistice to the fighting until surrender arrangements could be effected. The key in this concept of victory is destruction.

Prior to 1914, wars were fought with small armies and navies, and loss of life and destruction of material was limited to the scene of battle. When one military force was bested in battle by the other, the vanquished was thus destroyed for all practical purposes. The overall cost of waging war was represented by a small part of a nation's resources in men and materials.

World Wars I and II changed this pattern radically with the advent of the concept that all material goods and manufacturing resources must be placed at the disposal of the armed forces. The introduction of the aeroplane for attack on urban communities and manufacturing centres placed the civilian population in the midst of battle. The en-



tire world became the battlefield. The increase in fire power, the multiplicity of weapons and weapons systems, and attack from the air conspired with a breakdown in international legal limitations upon the methods of waging warfare. Thus, the phrase "total war" came into being, and with it a state of chaos and ruin in all countries within range of the enemy's aircraft.

In World War II, the destruction of the enemy's forces in the field did not in itself spell victory.

The sinews of power in the enemy's homeland also had to be destroyed before victory was achieved. In spite of the employment of tens of thousands of tons of high explosives against the heartlands of Germany and Japan, their destruction in the military sense could not be effected until these countries were physically occupied by troops. Then, the manufacturing sites were dismantled and the hostile armed forces were disbanded.

Destruction or Annihilation?

It is in this area of military strategy that weapons of mass destruction make their greatest impact. Harry S. Truman — former President of the United States—in his last State of the Union message on January 7, 1953, spoke of these new weapons in an ominous tone:

The war of the future would be one in which man could extinguish millions of lives at one blow, demolish the great cities of the world, wipe out the cultural achievements of the past — and destroy the very structure of a civilization that has been slowly and painfully built up through hundreds of generations.

Is there a need to occupy a defeated country which has been so effectively destroyed that populated areas have been levelled? Such areas become "no-man" lands on a vast scale within the enemy's borders. Human casualties are numbered in the millions, and the survivors are without shelter, food, or medical facilities as the urban centres and food distribution facilities are wiped out. Nor is it likely that the great cities can be spared in an all-out attack because the critical targets of war, the industrial concentrations, railroad marshalling yards, and major airports are all in or near large cities. The super weapons cannot attack these targets without wiping out entire communities.

Thus, the new weapons give us a new connotation to the word "destruction." Unlike the traditional military meaning of the term, we now have in fact "annihilation." The annihilation of a people, their cities, mode of living, and the very pattern of their existence, which reduces the surviving population to primitive existence, introduces new concepts to the objective of "victory."

What can one nation gain by such a victory over another? Certainly the traditional pattern of reparations and cession of territory is no longer applicable when everything of intrinsic value is destroyed. It seems that such a war would be a war of hate—not a war designed to destroy a nation's government and to seek material or political advantage. How paradoxical, how untraditional such a war would be. The armed forces of the nation being attacked would receive only incidental blows, while

the homeland would be the main target for the quick knockout punch that would reduce the attacked country to ruin and defeat.

This could be the pattern of strategic war if an irrational government had exclusive use of weapons of mass destruction. However, it is clear that several great powers of the world possess — or will have in the near future — this capability to destroy the other. As President Eisenhower said before the United Nations General Assembly on 8 December, 1953: "But the dread secret, and the fearful engines of atomic might, are not ours alone." It seems reasonable that one nation having these weapons will not unleash such strategic blows against another unless it is assured that it will be free from effective retaliation. Nations possessing these weapons will, as a matter of primary consideration for their own survival, maintain secret and dispersed launching sites in a state of readiness for an effective retaliatory capability. Thus, the employment of these weapons by one nation against the homeland of another will bring upon its own head certain destruction. It would appear unappealing for a rational government to seek such a solution to its international disputes. Dr. Bernard Brodie summarized this point very well in his article in the January, 1954, issue of *Foreign Affairs* magazine when he wrote:

Strategic bombing, which used to be deprecated on grounds of its presumed ineffectiveness, may in the future have to be restrained because it has become all too efficient. The ability to destroy the enemy's economy and some 30 or 40 millions of

his people overnight might be inharmonious with our political objectives in war even if it could be done with impunity; but if we have to suffer such a blow, the fact that we can also deliver one may be of small advantage and smaller solace.

Is it possible that a nation will find a method to neutralize or stop an enemy's attack while it delivers such a blow with impunity? Such a possibility remains quite remote for the present. In his United Nations address, President Eisenhower touched on this point when he said:

But let no one think that the expenditure of vast sums for weapons and systems of defence can guarantee absolute safety for the cities and citizens of any nation. The awful arithmetic of the atomic bomb does not permit of any such easy solution. Even against the most powerful defence, an aggressor in possession of the effective minimum number of atomic bombs for a surprise attack could probably place a sufficient number of his bombs on the chosen targets to cause hideous damage.

Limited War

This is not to say that a stalemate in the strategic use of nuclear and thermo-nuclear weapons will outlaw war as a means to settle conflicting differences among the nations of the world. Although such a solution would be a happy one indeed, we must be realistic. There is always the spectre of "limited" or "peripheral" war confronting the world. The Korean action brought into focus the fact that the strategic employment of weapons of mass destruction was not resorted to,

although the opposing blocs possessed this capability throughout the three years of conflict. Clearly, the opposing blocs desired to limit the fight to the battlefield—the land mass of Korea. The Korean conflict provides the military thinker with a vast breadth of material for analysis, for here was a conflict in the atomic age that was fought in the classical concept of conventional war.

Here was a fight with all the modern trappings — except for the use of weapons of mass destruction. Here was a fight that was waged on a well-defined battlefield — Korea — while no attacks were directed against the homelands or the main logistical bases of the opposing blocs. Here was a fight that was carried out with balanced military forces in the traditional sense. Such a reversion to conventional war surely must have a great appeal to large segments of the peoples of the world.

Let us consider the possible developments of warfare on the battlefield in the age of atomic plenty. Tactical atomic weapons could be introduced in limited wars without resorting to their use strategically. The factor that precludes the use of weapons of mass destruction against the homelands of nations — the threat of annihilation for both sides regardless of who initiates such attack — need not preclude the use of atomic tactical weapons against targets in the battle area.

Any attempt on our part to match the Soviet and Chinese military manpower masses would be catastrophic in the long pull because it

would spell our economic ruin. Nor should the need to secure decisions on the battlefield necessarily imply the need for large masses of men. Implicit in the current reappraisal of our own Army forces is the thought that enemy hordes may have to be fought—either in Europe or in Asia — and they must be defeated with smaller but more effective forces. We are thus impelled to search for new methods that will keep us ahead of the enemy in the tactical art. Additional reliance is indicated on our scientific and operational research, but more important, we need improved and expanded tactical atomic weapons systems. A modern army, highly mobile, fast-striking, hard-hitting, and equipped with a complete line of atomic ordnance will meet the requirement.

Much has already been accomplished in the development of weapons for use on the battlefield. Tactical aircraft, guided missiles, free rockets, and artillery are all capable of delivering nuclear destructive power in support of tactical forces. However, we need to go much further than we have to date. We must develop atomic arms for all echelons of our forces which fight on the battlefield. It would be well to outline the pattern of ground warfare under this concept. Taking Europe as an example, we find there great numbers of enemy ground forces in being. We must balance out these manpower masses with our atomic weapons. This can be done only if we induce the enemy to concentrate and thus provide atomic targets. Let us take, for example, one segment of our tactical ground forces to examine what can be accomplished in this respect.

Battlefield Mobility

The battle for dominance of armoured forces has been, heretofore, a race for bigger and bigger tanks with heavier and heavier armour plate. However, these land cruisers can be self-defeating if they become so big, so unwieldy, and so heavy that they cannot successfully and speedily traverse the ordinary roads and bridges, or negotiate the more difficult terrain. On the other hand, lighter and faster hard-hitting armoured forces can elude the enemy's atomic weapons by dispersion and evasive tactics, and yet, they can concentrate swiftly to strike at the vital enemy targets. The enemy can react to such thrusts only by concentrating his forces for counter-action — such concentrations as provide choice atomic targets for our tactical air and ground-to-ground guided missiles. But this should be only part of the pattern. The tank itself should have the capability of firing atomic projectiles so that it may more readily destroy the critical targets and the enemy it has induced to concentrate. This is not to say that the tank should fire nuclear ammunition producing the great yields of today's atomic weapons. Tank cannon projectiles would necessarily be of a much lower order of magnitude — yet retaining the destructive features of atomic detonations. The tank should be atomic-designed in other respects. Shielding from radioactivity is required so that personnel will be protected when the tank traverses contaminated areas — particularly when the force rapidly exploits its own or the enemy's atomic bursts. Such tanks must be designed to accommodate rapid decontamination equipment which could well be

simple water-hose connections to provide water spray under pressure to all exterior parts of the tank. Armoured forces withdrawn from combat would be staged through decontamination centres for this treatment.

In the area of tactics, battlefield mobility must replace the slow and deliberate approach to battle. The sharp, cutting blow coupled with rapid infiltration of the enemy's area is desired rather than the mass attack along a lineal front. More boldness is indicated in driving to the heart of the objective with no regard to securing the flanks; manoeuvre and superior fire power should be employed for safety of the force. The armoured force must be married to Army aviation, and, in fact, the command post may well be airborne where the commander can get a better feel of the situation, control dispersion and concentration as required, direct the employment of his atomic guided missiles and tactical air, and direct the drone tanks. These remotely controlled scouts will seek out avenues of approach; test suspected mine-fields, enemy strong points, and radioactive areas; provide mass groupments for saturating the enemy's defensive fires; and—armed with static atom bombs—can be directed to critical targets and detonated by remote control.

This brief discussion of tanks and the armoured force serves only as an example of the thought required to make our ground force a real atomic threat. The artillery arm has already made important strides in this respect. The same approach can be profitably extended to the ordnance of our infantry, airborne,

and amphibious forces. Atomic ordnance must be employed to do the job at every level of our tactical units. Additionally, military thought of tactical atomic implications must extend into the areas of organization, formations, and tactics.

We must be alert to the specious arguments of the "big bang" adherents who will say that air and missile-delivered atomic ammunition gives us greater economy in the use of atomic energy; that expenditure of nuclear power is not profitable in smaller weapons. This argument can be placed in proper perspective only when we appreciate the objective of an atomic-powered ground force — alleviating our manpower shortage. We should not be satisfied with half measures in the atomic-arming of such a force; true economy is attained only by ensuring victory on the battlefield. Manifestly, if we accept the possibility of the return of war to the battlefield, we must look to the organization of military forces tailored to this requirement.

This is not to say that we can ignore our other arms. Strategic forces and the means with which to effectively deliver the weapons of mass destruction to the enemy's homeland must always remain in being. This is the requirement for national survival. If we let down our strategic guard, we become easy prey to the enemy's atomic attack. But tactical military forces are required when nations resort to limited or peripheral war as an instrument of national policy. Because such wars tend to ground combat for decision, we must look to the weapons system of our ground forces. Thus, it becomes apparent

that economy in the atomic age must be based on the effectiveness of the weapon on the target system we expect to encounter, not on the cost of manufacturing the ammunition.

It is inevitable that we should ask the question, "What happens when a full line of tactical atomic weapons becomes available to the ground forces of both power blocs?" In the first place, we should put off this day to the distant future by moving into this field quickly and with vigour; thereby maintaining a dominant position in this area as long as possible. However, if the day should come that the enemy matches us in this respect, we in the West still will retain the advantage because the problem of tactical war will have been placed on more of a technological basis, rather than on the employment of sheer human masses. Technologically, we can outstrip any country in the world, and with allied manpower assistance we can stay well ahead of the enemy.

On the other hand, if the enemy should acquire tactical atomic superiority before we do, that factor, coupled with a stalemate in the use of strategic atomic weapons, could well spell doom for our way of life.

Population and Manpower

The requirement for more and more military power in the conduct of modern international relations makes it mandatory for the two opposing blocs to seek more and more allies and bases. This aim to pool human, technological, and natural resources is really the essence of the cold war which has split the world into two armed camps. The bloc that is most successful in organizing the decisive political and

economic strength of the world will win. Let us discuss the most important element in this respect—people.

Human resources have been and will continue to be a paramount factor in war. No matter how much mechanization is involved in the military art, it will require people to build, maintain, and operate these machines. There can be no substitute for human skills and leadership, for manpower is the very essence of military power.

Because of the fact that Western civilization was the first to industrialize, the peoples of the West sprang forward in world affairs. Their ability to apply industrialized, military power through the vehicle of modern methods of transportation gave them the capability to dominate the peoples of Asia. The awakening of Asia to the prospects of nationalism and industrialization has already made an impact in world affairs. There is nothing in the make-up of the Asiatic that precludes his effective industrialization. Japan, in her history of the past century, presents a good example of what can be accomplished in this respect under the most adverse conditions of lack of indigenous raw materials in a short time. The presence of rich raw materials in other areas of Asia creates conditions even more favourable to industrialization than those found in Japan.

Coincident with her awakening, we find Asia is forging ahead in population increases at a tremendous rate. One-half of the two and a half billion people in the world live in Asia. In 50 years, the population of Asia will be greater than the present total population of the world.

During this same period the populations of North America and Europe will advance only fractionally. Asiatic birth rates continue as Western birth rates drop. The introduction of sanitation and medicines to Asia will lower the death rate. The introduction of modern local transportation systems will preclude famines as food will be more easily transported from area to area. None of these factors are at work for North America and Europe, as these areas have progressed beyond the point where they assist in increasing the population.

However, it is not necessary to await the industrialization of this area to foresee its importance in world affairs. Already its population masses are making a profound impression in the form of huge and effective ground armies. Chinese successes in limiting the United Nations forces in Korea, and the Vietminh ability to stand up to the French for seven years in Indo-China are the most important political and military factors in Asia today.

Manpower Requirements

Much has been written about the manpower requirements in the atomic age. Do we need more men in the military services, or can the job be done with fewer? The evidence appears clear and abundant that the strategic capability must be in addition to the tactical forces. To rely upon only one of these two forces to the numerical detriment of the other would be folly indeed. A nation is protected militarily only when it is strong in all departments. There is no evidence that an enemy will be so considerate as to select

a method of warfare in which the opposing power is strong. On the contrary, the enemy traditionally selects those methods of warfare through which he can exert the greatest strength to overcome the opponent's weaknesses.

However, to pursue the problem further, is there a manpower savings in the tactical forces where nuclear weapons can replace conventional types? A superficial approach might tend to an answer in the affirmative, for it can be argued that a nuclear bomb does the damage of many conventional bombs; a battery of atomic cannon is the equivalent of many batteries of artillery; that guided missiles require fewer personnel than manned aircraft; that "near misses" of atom bombs do the job as well as the pinpoint accuracy of conventional bombs — thus less effort and fewer fire missions are required.

The fact of the matter is that the introduction of nuclear weapons to the battlefield will require more, rather than less, manpower. Simply stated, nuclear weapons do more damage against personnel and material in a shorter period of time. With both sides using these weapons, each will suffer more casualties and each side will require more labour force to decontaminate and repair the devastating destruction that will ensue. If we take a situation where one force employs tactical atomic weapons systems while the enemy does not, then the question is academic. The force with the atomic weapons will win, hands down. But such military advantage would be only temporary. Consider the fact that the long bow, the cannon, the repeating rifle, and other revolution-

ary tactical weapons did not long remain the exclusive property of a single country.

Summary

In summary, then, the destruction of one nation by another through the use of fire power was neither the objective nor a possibility for the powers engaged in World War II. This is no longer true. The existence of atomic weapons to include thermo-nuclear types, coupled with effective means of delivery, make possible the complete destruction of nations. Since this destructive capability is available to both great power blocs — regardless of who initiates the attack — it is reasonable to assume that a stalemate in their use will exist as long as both blocs maintain rationality, or until some time in the distant future when a complete defence against these weapons has been developed by either side.

The possibility of limited war, the return of warfare to the battlefield on the scale of the Korean conflict, calls for a re-evaluation of the organization of modern military forces. It necessitates study in the tactical employment of atomic weapons so that military victory can be achieved promptly on the battlefield. The attrition of long sieges is archaic and serves only to prolong the friction which, in itself, is the greatest danger to extension of the conflict beyond the battlefield.

The most important element in war is man. It would be folly to depend on technological progress alone as a defence. The stock-piling of manpower through the device of combined allied efforts is as impor-

tant as any other preparation for survival in modern war. In this respect, Asia provides the greatest challenge to the two opposing blocs.

Finally, the atomic weapons are not a panacea for victory since both sides possess the key to this riddle.

Success will come to the side that can most intelligently grasp the significance of the changing nature of war, and plan searchingly for attainment of the maximum benefits in the diplomatic, strategic, and tactical arts.
