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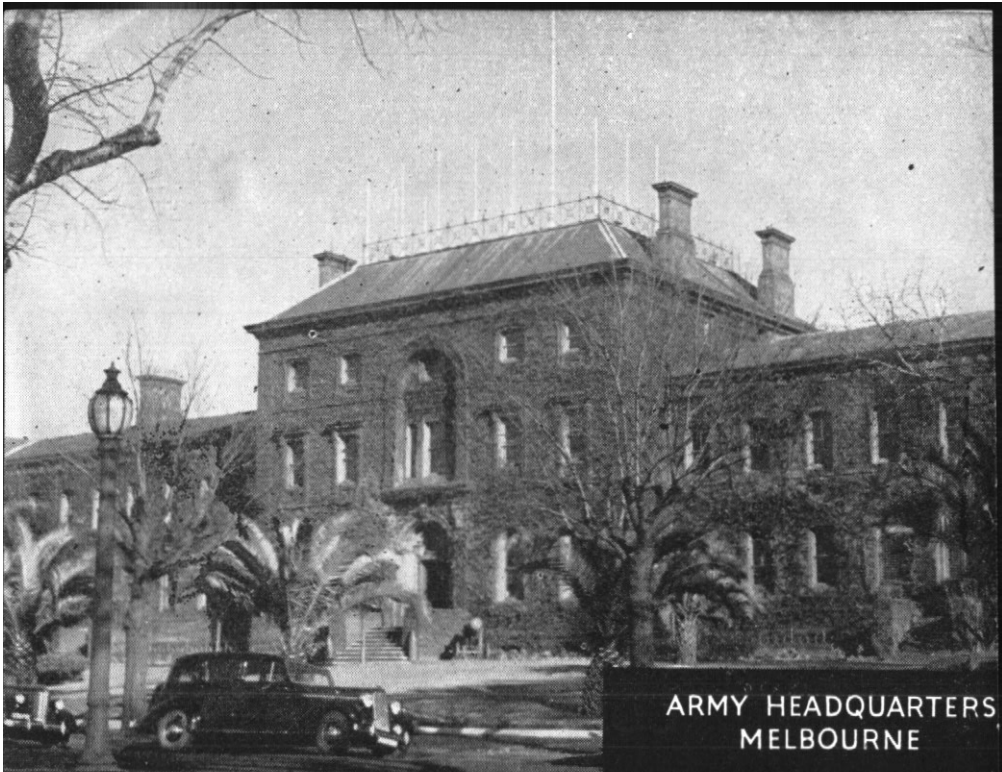
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ARMY HEADQUARTERS  
MELBOURNE

## AUSTRALIAN ARMY JOURNAL

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# TANKS in KOREA



Lieutenant Colonel George B. Pickett, Jr.,  
US Army.

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A detailed analysis of tank operations in Korea by the Chief of the Armoured Section, IX Corps.

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BEFORE the North Koreans jumped off and started the present fighting, the terrain estimates by most of our officers indicated that large-scale tank operations in the rugged Korean terrain were next to impossible. In spite of these estimates the North Koreans spearheaded their drives with tanks, specifically the T-34/85. Not only were they successful; but they drew the remark from one of our General Officers that "they don't go anywhere without their tanks." Subsequent events certainly proved the accuracy of his statement; for after the North Koreans ground the last of their tanks to bits trying to force the Naktong, their later attempts to secure Pusan by massed infantry attacks, similar to the old Jap. Banzai, failed miserably. Also it was only after the United Nations forces achieved armour superiority that the September break out from the perimeter was a possibility.

—From "Armour," USA.

One of the first lessons which can be learned from tank employment, both friendly and enemy, in Korea is the lack of appreciation on the part of the average American officer of the cross-country mobility of tanks. On numerous occasions, even after the North Koreans had over-run the bulk of Korea with tanks, US officers insisted that our tanks could not manoeuvre through the rice paddies, couldn't climb the hills, and were restricted to roads in a country where there are only a few roads, most of which are very poor. This is the same lack of appreciation of tank mobility that led to both German breakthroughs in the Ardennes.

When Task Force Dolvin made its magnificent break out from Chinju on September 26th, the route from Chinju to Hamyang to Namwon was a defile through high mountains almost the entire 65 miles. The road meandered along steep slopes and wound its way through the edge of the Chiri-San,

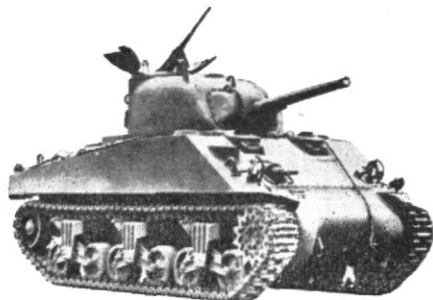
the highest mountain pass in South Korea. The twisting road and commanding ground gave the North Koreans every opportunity to mouse-trap the column; but by sheer determination and good leadership, Dolvin got through to Namwon and broke the back of the resistance in the 25th Division zone. The actual loss in tanks is still classified information, but it was amazingly small.

Task Force Dolvin consisted of the 89th Medium Tank Battalion (less two companies, which left two in the task force), two rifle companies, a heavy mortar platoon, and a platoon of engineers. The infantrymen rode on tanks except when actually fighting.

Armoured reconnaissance units also displayed their versatility in operating over adverse terrain. Task Force Torman, of the 25th Division, consisting of the 25th Reconnaissance Company and a depleted light tank company, broke out south-east of Masan on September 24th, and in 36 hours, drove 40 miles to seize the ford across the Nam River at Chinju. It was Torman's rapid drive which set the stage for Dolvin to take over and

complete the run from Chinju to Namwon in 48 hours. Later Task Force Dolvin advanced on up to the Kunsan-Iri area, but this phase was an anti-climax, for the rugged terrain of the Chiri-San ended at Namwon. Rugged terrain and a determined and well-equipped foe can make tank operations in the mountains extremely difficult, but not impractical. On the other hand terrain alone will not protect us from enemy armour.

The second lesson learned from the recent operation is the necessity for teamwork between infantry and tanks. Not all tank employment in Korea was as well planned and conducted as the operations of Dolvin and Torman. Unfortunately the tried and tested doctrine of infantry-tank teamwork so laboriously developed at Knox and Benning during the past five years, has not permeated the rank and file of our officer corps. Tankers are still being told that "All I've got on is a field jacket and you are hiding behind three inches of steel;" and they are still being sent out by "ones" to "Go shoot up that village." One commander was very vehement about the fact that one of his



M4A8—Sherman.



M46—Patton.

tanks "deliberately ran over a mine." Still another sent a tank down a road alone and couldn't understand why it never came back. The commander of the advance detachment of a British tank regiment en route to Korea was horrified to find that some of our commanders had put single tanks on road blocks at night without infantry support. So were we! Summed up, these incidents only tend to show that the team concept of infantry-tanks-artillery is not as fully appreciated as it must be.

A third lesson involves a common misconception that tanks are measured in numbers instead of units. On one occasion an order was issued attaching "five tanks to the — Infantry Regiment." What are five tanks? A platoon? A depleted company? A jackpot strike? Of course the tank battalion commander sent a full-strength platoon, but he would have been completely justified in sending any five tanks picked at random from his battalion. No one has issued an order (to my knowledge) attaching 203 riflemen to a tank battalion; but the same token as attaching "five tanks" to a regiment it appears a possibility. A little research shows that some of our World War I officers became accustomed to "accompanying guns" in France in 1918; there are

no "accompanying guns" in Korea in 1950, but tanks have been used as such.

A fourth lesson involves training. Most of the tank units arriving in Korea left their peace stations in a terrific rush. When overseas orders arrived the battalions were way below strength and were filled up with men without tank training just to fill up "spaces" to complete WE's. It showed in Korea. What actually happened proved the versatility of the American soldier; but it also cost unnecessary tank and personnel casualties. This condition might happen again. Put yourself in the place of a tank company commander whose gunners have never fired the tank gun, and you are on a ship headed for the Korean police action. You would certainly have had very little opportunity to train after you hit the Pusan perimeter.

A fifth lesson involves maintenance. Actually it fits in very closely with lesson four. Inexperienced crews equal poor maintenance. As a result of experience with tanks in Korea some ordnance officers are thinking in terms of "combat crews" and "ground crews" similar to the Air Force maintenance system. Sounds costly in manpower? Actually those officers main-



M24—Chaffee.



M26—Pershing.

tain that conditions in Korea indicate that such a system would be a saving in manpower and would keep more tanks in operation. Needless to say the terrific demands of continuous combat, with limited time for maintenance, imposed a real burden on tankers in Korea. For example one tank battalion on October 2nd had twenty-six M26's, of which only six were operational, the rest were deadlined for maintenance. There were many contributing factors, such as lack of time, lack of experienced personnel, and very rugged terrain, that taxed vehicles to the utmost. A "ground crew"- "combat crew" system would have kept 13 tanks in operation instead of six, more than twice as many. Compute the cost of tanks, add to it the man-hours lost from in-operative equipment, the cost of tanks lost purely due to inadequate maintenance, and the reduced combat efficiency of the unit, and you can visualize the necessity for improving the present system of maintenance. The writer believes that one ground crew for each combat crew is an impractical luxury.

Still another small group of tank and ordnance officers believes that the best way to render ordnance maintenance support in terrain such as Korea is to employ mobile ordnance maintenance teams along the axis of advance to repair the tanks in place. This system requires some heavy equipment, but has the advantage of not blocking roads with heavy retrievers. Battlefield recovery of tanks in south-west Korea was a tremendous problem. The necessary ordnance companies and retrievers were available, but couldn't be used for they would have blocked the Main Supply

Routes. This problem existed, of course, since almost every passable road became a division Main Supply Route. Another real problem in battlefield recovery was the inability to leave crews with disabled tanks. For example, in Task Force Dolvin the rate of advance was so rapid that the Task Force was miles away from each disabled tank in a matter of minutes or hours. The surrounding hills were still full of North Koreans, making it foolhardy to leave a group of five men with a broken-down vehicle. As a result the follow-up echelons of Americans stripped the disabled tanks. Our Army still is full of souvenir hunters. It's probably a national tradition; but it's rough on a battlefield recovery system.

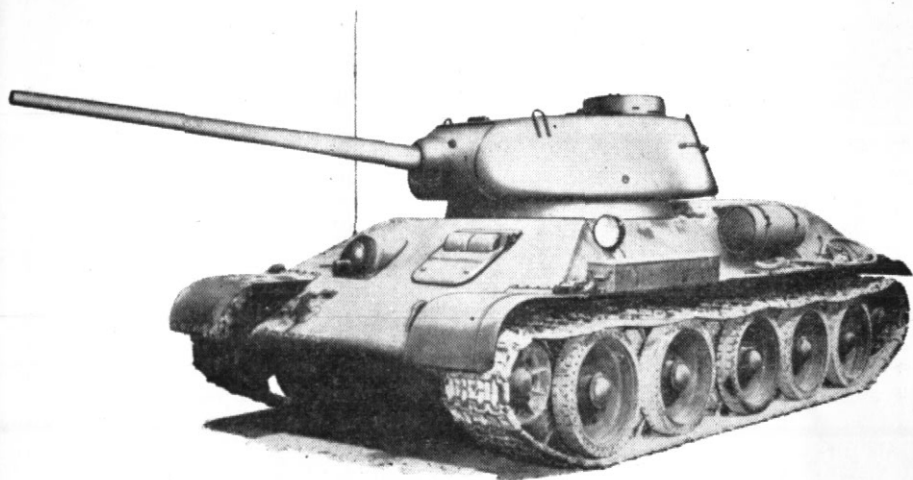
Great publicity has been given to the effect of the Air Force on the North Korean armour. Of the estimated 300 North Korean tanks at the outbreak of hostilities, over 80 of them were destroyed by the Air Force alone! The Air Force did prevent the North Koreans from moving tanks in rear areas during daylight. However, we can learn lesson number seven from the North Korean tanker. He became very adept at camouflaging his tanks by day in roadside hovels, in tunnels, in villages, and by using numerous other stratagems. He kept his losses from air attack down much lower than did the Germans in World War II. In one ten-day period for a given area our Air Force claimed thirteen enemy tanks definitely destroyed. The only two North Korean tanks found in that area when overrun during the recent United Nations offensive were two T34's knocked out by the 89th Tank Battalion, 25th Infantry Division. Maybe the North Koreans



bothered to drag off the 13 hulls and hide them. Air power can immobilize tanks in rear of the actual area of fighting; but to say that "The rocket firing aeroplane spells doom for the tank," as recently intimated by one of our leading scientists, has been proved wishful thinking by events in Korea.

Lesson number eight is the effectiveness of the 3.5-in rocket launcher on enemy armour. The shaped charge does present a real problem to the tank designer.

was recounting his recent combat experiences, and as usual the discussion settled on the weapons that the average doughboy fears most—tanks and mortars. The young soldier beamed: "Well, I know of two tanks that won't bother nobody any more; I got one and my buddy got the other." The surgeon asked him how he destroyed the tanks, and the quick reply was "With a super bazooka." However, continued questioning showed that the two North Korean tanks had been driven off the road into a gully by



Russian T34.

However, the "super bazooka" is super mostly for infantry morale. The ballyhoo surrounding the "super bazooka" did have the effect of giving our own infantry a greater sense of security when facing enemy armour. To illustrate this point, the IX Corps Surgeon was riding the hospital train from Miryang to Pusan after the attempted breakthrough by the 105th North Korean Armoured Brigade near Changnyang. One young soldier

tank fire from an American M26 and were unable to move because of the presence of US tanks. In addition the North Korean tanks were operating without infantry support, as they so often did, enabling our two doughboys to crawl up to the edge of the gully and let fly at point-blank range. Doesn't FM 17-33 say "Infantrymen armed with rocket launchers assist tanks in destroying enemy armour when terrain permits?" What the man was des-

cribing was a bit of good-but-accidental infantry-tank teamwork.

The super bazooka does have the wallop. However, it still has a low muzzle velocity, a high trajectory, like a short-range howitzer, and the resulting inherent inaccuracy. The North Korean infantry-tank teamwork left much to be desired; and many tanks knocked out by our bazookas would have been saved by the presence of supporting infantry. Our FM 17-33 states that "The infantrymen of the team protect the tanks from enemy personnel armed with rocket-launcher-type weapons." The enemy could have profited by this doctrine in Korea.

The difficulty of FM radio communication in high hills and mountains was brought home as lesson number nine in Korea. As a result of these communication difficulties, CW sets were placed in the tank company headquarters sections to provide AM communications. Radio communication in Korea is a function of the SCR 506 unless all of your tanks are in the same defile or valley.

There are several other miscellaneous facts about tank fighting in Korea. The T34/85 is the combat superior of the M24 and M4A3E8;

but the M26 and M46 both are superior to the T34/85. Even a good light tank such as the M24 cannot support infantry when outgunned and out-armoured by enemy tanks. This situation existed when light tank companies came from Japan to Korea early in July and were used as regimental tank companies. The net result was almost complete destruction of those light tank companies. However, when used to serve the purpose for which it was intended, the M24 was an excellent tank. For example Task Force Torman made its 40-mile dash with M24's on a security mission which developed into a flanking sweep.

As always there will be conflicting views and opinions coming out of Korea. The views in this article are a consensus of the majority of tankers contacted by the writer, along with personal observations from early September to the completion of the break out in early October. Each official report, wild tale, story, gripe, and complaint has been evaluated using the well-known G-2 system of evaluation and credibility of the source. Knocked-out tanks, both North Korean and United Nations, have been examined for causes and effects, and the tactical operation analyzed. In spite of most adverse conditions, tanks made the difference in Korea.

# CHINESE COMMUNIST ★ AIMS ★



毛澤東

(Mao Tse-Tung.)

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Directorate of Military Intelligence.

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NO country in the world has been more misconstrued by the West than has China during the last twenty years. The shock of disillusionment which occurred during the post-war years was commensurately severe. Nevertheless, until quite recently there were many people of long Chinese experience who believed that clever piece of communist propaganda which depicted the Chinese communists as simple and honest Agrarian Reformists, seeking only to make amends for Kuomintang misrule. Events in Tibet, Korea and Indo-China have finally exploded this belief, but not before it had the effect desired by the

communists of dividing the councils and undermining the policies of the West. But we have yet to learn that you cannot "compromise with communism" no matter what its guise, neither can you for long "buy off the barbarian," as history has so frequently shown.

The Chinese peasant may have the most endearing qualities, so had the dignified and apparently benign old scholar who seemed to float through life on a cloud of cultural felicity. But these were not the people who counted or decided China's destiny. Neither had those magnificent works of art displayed

at the Chinese Exhibition, nor those delightful Chinese plays, nor Old Peking, any real connection with modern China. Most of the books which foreigners read dwelt on these things, few wrote of the people who mattered—the fanatical communist revolutionaries or the men in the Kuomintang, who, by their supreme selfishness, prepared China for its ready acceptance of communism.

The Chinese communists departed from normal Marxist teaching by concentrating on the peasants rather than the urban proletariat. In this they showed wisdom as China's industry was negligible, whilst the peasants suffered from justifiable and long-standing grievances.

Although inspired by Moscow, the acknowledged fountain-head of communist doctrine, Chinese communism was cleverly modified to suit local conditions and the peculiarities of China's economy and social structure. The lessons and mistakes of the Russian revolution did not go unheeded. Apart from a few lapses when excesses were perpetrated by the People's Courts, an error in technique which was quickly rectified, the regime has shown remarkable moderation. This no doubt is a matter of expediency until such time as communist control becomes absolute.

The communists had a number of weapons and advantages which they used to good effect in the prosecution of their military and ideological campaign. These included: An unbeaten and highly disciplined army; the inspiration derived from communism and its success elsewhere; the innate xenophobia of the Chinese people; and Chinese im-

perialism. In addition, one of the most important factors in their success was the maladministration of the Kuomintang, which regime during its latter years was looked upon, not without justification, as a puppet of the West. Finally, the communist movement had in its leaders men, who for many years had proved themselves ardent revolutionaries and capable of enduring severe privations and personal sacrifice for the communist cause. Such men are rare in China, but they are accorded considerable respect.

The communist movement in China, in spite of every effort on the part of the Kuomintang to suppress it, continued to grow in influence after its secession from the Kuomintang in 1927. This was followed in 1931, by the "Long March" from the Kiangsi area, south of the Yangtse, through Western China to Yen-an in north-west Shensi, which became the communist main base. Throughout this period and until 1945 very little material support was received from the USSR, who continued to recognise the KMT until 1949. In 1945, however, the Japanese arms captured by the Russians in Manchuria were allowed to pass into the hands of the Chinese communists. From 1949, when Russia recognised the Chinese Communist Government, followed by the Sino-Soviet Treaty of February, 1950, Russian material assistance to the communists has been considerable and is increasing.

It would undoubtedly be a mistake to classify China as a Soviet satellite in the sense that the Balkan countries are satellites. Her geographical position, manpower and national characteristics would preclude such treatment. China and

the USSR are inter-dependent, and it would be difficult to determine which partner is the more valuable to the other. Without Chinese active support the communist movement in South-East Asia would be negligible, and China's full potentialities are still to be experienced. China, on the other hand, would be incapable, at least for a long period, of prosecuting her excursions into Tibet and Korea, and, more covertly, into Indo-China, unless assured of Soviet support.

Both Chinese and Russian communists represent the most ruthless, hard-headed and materialistic types which the human species has yet evolved. In their present alliance neither side will trust the other and each will be motivated solely by its own carefully-considered and probably long-term interests. Each will seek to use the other to a maximum possible degree, whilst at the same time ensuring that a minimum is given in return. This may appear to be a poor basis for a permanent partnership, but the partnership is by no means permanent. Neither does either side look upon it as such. Unfortunately, however, mutual interests are such as to make it probable that it will survive long enough to undertake a combined war against the West.

In spite of previous popular misconception as to Chinese characteristics, the Chinese, even under the Kuomintang, had coveted Tibet and South-East Asia. Of this there is ample evidence. Hence the previous reference to Chinese imperialism.

Events in China and Chinese intentions and reaction are notoriously unpredictable. Nevertheless it is

perhaps now possible to suggest, very tentatively, some of the aims of Chinese communism.

Firstly, as a natural reaction to Kuomintang mis-government they intend to unify China, including Formosa, under an efficient totalitarian government based on communism and recognised de jure by the rest of the world. This programme will include the final eradication of the Kuomintang, their only possible political rivals.

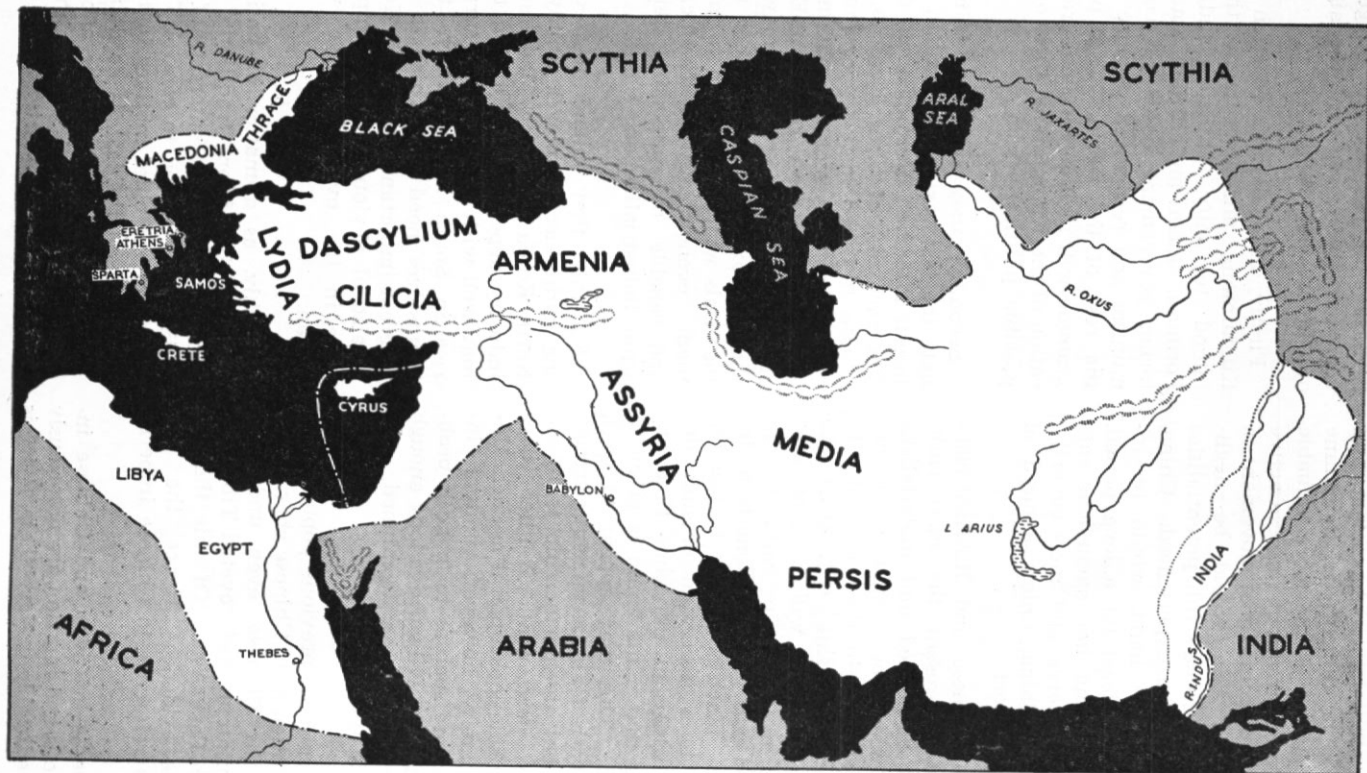
Secondly, they intend to eliminate the last vestiges of foreign interests after first bleeding them dry. The recovery of Hong Kong is, of course, included in this programme.

Thirdly, they seek to obtain a controlling interest in South-East Asia, which will provide them with the rice, oil, rubber and other raw materials which they need to make them economically self-sufficient and capable of supporting large-scale industrialization.

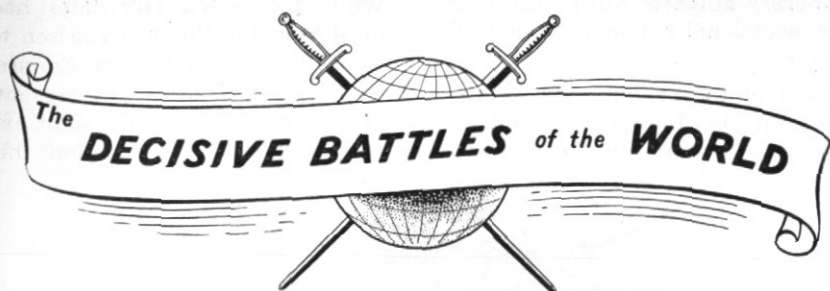
Fourthly, they intend to secure the hydro-electric power supply in North Korea on which Manchurian industry depends. In addition they may well wish to control the surplus rice in South Korea, which they themselves need and which is also of great importance to Japan. Korea is also of obvious strategic importance in the event of war with Japan.

Fifthly, as a matter of national prestige, based on tradition, and, secondarily, in the interests of the USSR, they intend to control Tibet.

One of the chief motives in these aims, except the last, is no doubt a genuine fear of the resurgence of Japan and even the Kuomintang, with Western support.



Map 1.



## MARATHON, BC-490

**T**WO thousand four hundred and forty years ago a council of Athenian officers assembled on the slopes of one of the hills that overlook the plain of Marathon on the eastern coast of Attica. The immediate object of their meeting was to consider whether they should give battle to an enemy that lay encamped on the shore beneath them, but on the results of their deliberations depended, not merely the fate of two armies, but the whole future progress of human civilization.

There were eleven members of that council of war. Ten were the generals who were then annually elected at Athens, one for each of the tribes into which the Athenians were divided. Each general led the men of his tribe, and each was invested with equal military authority. The eleventh member was the Polemarch, or War Ruler for the year, who had the privilege of leading the right wing of the army in battle, and who was the chairman of the council of war. The War Ruler for that year was Callimachus, an Athenian of noble birth,

who listened attentively to the earnest discussions of the generals.

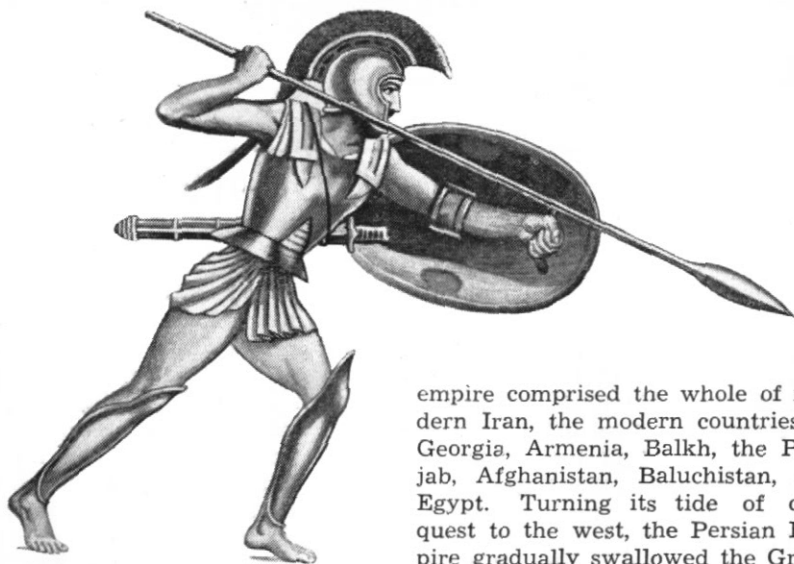
They had, indeed, deep cause for anxiety. They saw before them the great host of a mighty empire which had already enslaved nearly all the nations of the then known world. They knew that all the resources of their own country were comprised in the little army entrusted to their guidance. They knew that if they failed Greece would become a province of the Persian Empire. But they could have been but little aware how momentous for mankind were the votes they were about to cast, nor how future generations would reverence the courage and fortitude they displayed on that fateful day.

At that time Greece, as we know it today, was not a unified nation, and Hellenic Civilization—the forerunner of our Western Civilization—had not yet reached the full flower of its development. Political unity between the numerous city-states had not been achieved, nor even seriously attempted. These city-states went their independent ways, sometimes forming loose and

temporary alliances during the wars they occasionally fought with each other.

Some of the original Greek city-states on the European mainland, and the islands of the Aegean Sea,

While the Greek city-states had been developing there had arisen to the east the mighty Persian Empire. With a strong central government, backed by a powerful and experienced military organization, this



**Greek Hoplite.**

had, many years previously, established colonies around the shores of the Black Sea and in Asia Minor. In the course of time these colonies had themselves grown to city-states and achieved their independence. Similar colonies had been established in the opposite direction as far west as Sicily. The area in which Hellenic Civilization had thus taken root and was beginning to bloom is shown on Map 1. Socially, politically and militarily, this was the most advanced area occupied by Europeans. Rome had not yet risen to power, and the rest of the continent was inhabited by rude barbarians.

empire comprised the whole of modern Iran, the modern countries of Georgia, Armenia, Balkh, the Punjab, Afghanistan, Baluchistan, and Egypt. Turning its tide of conquest to the west, the Persian Empire gradually swallowed the Greek city-states in Asia Minor, crossed into Europe and occupied Thrace and Macedonia. The "Law of the Medes and Persians" ran from the Danube to the Indus, from the Nile to the Oxus.

Nine years before the Battle of Marathon some of the Greek cities in Asia Minor rebelled against the Persian tyrant and appealed to their mother cities in Europe for help. Athens and Eretria alone responded, and between them sent a small expeditionary force, which, after some initial successes, was defeated and obliged to withdraw.

The Persian king, Darius, counted the Athenian intrusion a deep personal insult and resolved to send, at the earliest opportunity, an ex-



pedition to bring all the Greek cities under his rule. Had this project succeeded the only barrier to the westward march of the Persians would have been destroyed, and the whole course of history would have been changed.

### The Antagonists.

Every free Greek was trained to military duty and, from the frequent border wars between the different city-states, few Greeks reached the age of manhood without having seen some service. But the muster-roll of Athenians fit for military duty never exceeded 30,000, and at this time probably did not amount to two-thirds of that number. Moreover, the poorer citizens were not well equipped, and were untrained in the operations of regular infantry. Some detachments of the best armed troops would be required to garrison the city and other important points, so that it is improbable that Athens could put into the field more than about 10,000 fully equipped men.

At this time the Greeks had practically no cavalry and they placed little reliance on lightly armed, mobile troops, except for skirmishing and pursuit. The main body of their armies consisted of infantry equipped with a long spear, a short sword, shield, helmet, breastplate and greaves. Thus equipped they usually advanced slowly and steadily into battle in a uniform phalanx of about eight spears deep.

The Persians, on the other hand, had developed the use of cavalry and missile weapons in the shape of bows and arrows. Their armies were built up on a large mass of lightly equipped, agile infantry, whose almost invariable method of



Persian Archer.

attack was to close rapidly with the enemy where their great skill at in fighting could be brought into full play.

Throughout the then known world the Persian armies were renowned for their prowess in battle. They had marched from one victorious field to another, no one had been able to offer them prolonged resistance. Their morale was very high indeed, the word defeat was not in their vocabulary. Usually the news that they were approaching was sufficient to bring submission.

### Opening Moves.

After crushing the revolt of the Asiatic Greeks, Darius began the concentration of his expeditionary force in Cilicia. Whilst a fleet for its movement across the Aegean was being assembled, he sent heralds to the European Greek cities de-

manding their submission. So great was the terror inspired by the name of Darius that all except Athens, Sparta and Eretria complied with the demand.

By the summer of BC 490 the army was ready and a fleet of some eight hundred galleys and transports had been assembled. A Median officer named Datis was given supreme command of the expedition. His orders were to complete the subjugation of the Greek cities, and to send the entire population of Athens as captives to the Persian king.

Datis coasted along the shores of Asia Minor until he was off Samos. He then turned westward through the Aegean, taking the islands on the way and compelling them to contribute contingents to his force. Landing on the island of Euboea, he overwhelmed the Eretrians after a stiff fight.

With half his mission accomplished, Datis re-embarked his troops and crossed the narrow channel that separates Euboea from the mainland. Landing on the Attic coast at Marathon, he drew up his ships on the shelving beach and disembarked his army. Behind him he had a secure and well-provisioned line of communications. Thus he had provided for strict adherence to the principles of security and administration. Concentration was assured by his immense superiority of numbers, and the morale of his troops was of the highest. Should the Athenians elect to attack him in the lodgement area, the level nature of the ground was favourable for the employment of his cavalry and would allow his infantry to use their characteristics to

the best advantage. He had between 70,000 and 100,000 men ashore and deployed well before the Athenians offered any interference.

On receiving news of the fall of Eretria the Athenians sent a courier to Sparta asking for help. This was promised, but it wanted a few days to the full moon and it was contrary to Spartan religious custom to begin an expedition at this period. Meanwhile the Athenians, appreciating that Datis would land at Marathon, had marched there to meet him with 10,000 men. To concentrate even this relatively small force they had reduced almost to vanishing point the garrisons of the city and other important posts.

#### The Battlefield.

The plain of Marathon lies on the east coast of Attica about 22 miles from Athens. It is about five miles long by two broad, lying between the mountains on the north and west and the sea. The coast is a long curve with shelving beaches suitable for amphibious operations. At one end of the plain is a great marsh close under the hills; at the other end is a smaller marsh. Through the middle of the plain runs the watercourse of the Charadra. There are two roads to Athens; one went to the north through the mountain passes, the other went southward along the coast.

The Athenians occupied a defensive position on the eastern slopes of Mount Kotroni. There they were strongly posted to resist a Persian advance by the northern road, and suitably placed on the enemy's flank should he elect to move by the southern road. This latter course seemed the more likely one

since it would enable his fleet to support and supply him en route. For the Athenians it had the disadvantage that it would force them to attack a vastly superior enemy.

Athenian morale was good in the sense that every man was resolved to die rather than yield. Most of them felt that they would die. Looking at the great host before them, a host renowned for its invincibility, they could have had little hope of victory.

And then an unexpected thing happened. Into the Athenian lines marched 1,000 men of Plataea, the smallest of the Greek states. Some years before, the Athenians had helped the Plataeans in one of their quarrels. Now, in one of the most touching episodes in history, Plataea gave practical expression to her gratitude by marching her entire able-bodied male population to Marathon.

The effect on Athenian morals was tremendous. Its hitherto negative quality turned instantly into a burning ardour for battle. If they had to die it was good to die in such splendid company. This spirit of exaltation brought with it a return of the Athenians' habitual self-confidence.

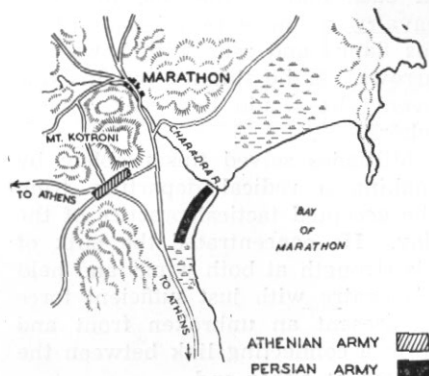
The generals were not so confident. Five were for immediate attack and five were for delay until the arrival of the Spartans, who could be relied upon to march at the full moon. Considering the disparity in numbers there was much to be said for this point of view. On the other hand, Miltiades, the most ardent advocate for immediate action, pointed out that it would take time for the Spartans to reach Marathon. Meanwhile the Persians

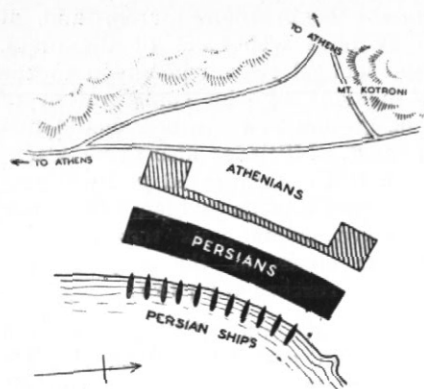
might begin their march, and, if they once won clear of the plain, the tactical advantage given to the Athenians by the configuration of the ground at Marathon would disappear. Miltiades also drew attention to the disaffected political faction in Athens which, like our modern communists today, would create chaos in the city if the enemy reached the gates.

In the end Callimachus, the chairman, gave his casting vote for immediate action. The council promptly appointed Miltiades to the supreme command for the impending battle.

### The Battle.

On landing at Marathon Patis took immediate steps to ascertain the strength and location of any enemy in the neighbourhood. Reconnaissance, supplemented by information supplied by fifth columnists, soon told him all he wanted to know. The small size of the Athenian army as compared with his own, coupled with its apparent inactivity, gave him a false sense of security. Apparently he came to the conclusion that he could safely ignore them. At any





rate he appears to have taken no precautions to mask their position or to protect his flank, while he arranged his army in column of route to march by the southern road.

While this movement was in progress Miltiades suddenly emerged from his entrenchments, and, taking advantage of every scrap of cover, moved down the mountain and deployed with great rapidity.

Miltiades' greatest problem arose from the disparity in numbers. If he deployed in the customary uniform phalanx of eight ranks deep the Persians would overlap both his flanks. Furthermore, there would be enough suitable ground at each end of the line for their cavalry to move round and attack his flanks and rear with bows and arrows. If he thinned out his line evenly he would be weak everywhere.

Miltiades solved this problem by making a radical departure from the accepted tactical practice of the day. He concentrated the bulk of his strength at both wings and held his centre with just sufficient force to present an unbroken front and form a connecting link between the masses at either end.

Instead of advancing at the customary slow and measured walk, Miltiades brought his army on at a steady run. In adopting this novel method of attack he had four considerations in mind. Firstly, he wished to wring every possible advantage from the Athenians' heightened morale by converting it, through the exhilaration of the rapid advance, into an irresistible *elan*. Secondly, he wanted to get to close quarters as quickly as possible to give the Persians' cavalry and skirmishers little time to deplete his ranks with showers of arrows. Thirdly, he wanted to give the maximum amount of shock action to the impact of his massive wings. Fourthly, he wanted to deny the Persians as much time as possible to deploy from line of march to line of battle.

Notwithstanding the speed of the Athenian advance, the Persians succeeded in forming a fairly firm line of battle. So confident were they that when they actually saw the small Athenian army running towards them across the plain a great shout of laughter and derision went up from their serried ranks.

When the collision occurred the massive impact of the Athenian wings swept all before them. In the centre, however, the Persians held firm and succeeded, by sheer weight of numbers, in breaking through the thin line of their opponents. The Athenian centre fell back towards the mountains in some disorder hotly pursued by the Persian centre. Meanwhile, the Athenian wings, having scattered their immediate opponents, retained their formations and wheeled inwards against the flanks of the Persian centre. When the

latter turned to meet this threat, the Athenians who had been driven from the field reorganized and renewed their attack.

Both the Persian wings were now destroyed. Their centre still held firmly together, but on three sides it faced a solid line of levelled spears. Time after time groups of Persians charged in vain attempts to break through the spears and develop their superiority at in fighting. Slowly, inexorably, with parade-ground precision, the Athenians forced them back until at last the hitherto unvanquished soldiers of Darius broke and fled.

Still retaining their formations, the Athenians pressed the pursuit to the water's edge. Despite their utmost efforts, however, they were unable to prevent embarkation and Datis got his fleet away with the loss of only a few ships.

Datis kept his head. Appreciating that the garrison of Athens must have been dangerously weakened to build up the field army, he planned to move rapidly by sea and take the city before the army could return from Marathon. Miltiades, however, foresaw this possibility. Rapidly reorganizing his army, he set out for Athens by a forced night march across country.

When the Persian fleet sailed into the harbour of Athens on the following morning, Datis saw arrayed on the heights above the city the troops before whom his men had fled on the previous evening. All hope of further conquest in Europe was temporarily abandoned, and the baffled armada returned to the Asiatic coast.

#### Comments on the Operations.

In the strategic field Datis made no mistakes, he followed faithfully the principles and precepts which today form the foundation of our military teaching. He used all available means to inform himself about his adversaries, and he did his best to undermine their resistance and divide their ranks by lavish promises to disaffected political elements. He provisioned his army on a superb scale, trained it, and moved only when he was fully prepared. Throughout his long approach march he proceeded from one firm base to another, tidying up his rear and establishing secure depots and lines of communication. At all times he kept his force concentrated and in good shape.

He made his first and only mistake when he departed from the *principle of security* by attempting to march across the Athenian front without taking the necessary measures for flank protection. He had ample forces available to provide a detachment to pin the Athenians firmly to their ground, but did not even take the precaution of patrolling vigorously to watch their movements.

It is always a mistake to underestimate one's adversary. When the adversary possesses the qualities of courage and energy, qualities which the Athenians were well known to possess, the mistake nearly always leads to disaster. In this case it cost Datis the battle, and it cost his king the mastery of the world.

When news of the Persian approach reached them, the Athenians acted with their usual energy, and adhered to the *principle of concentration* by packing every available

man into the field army. Compelled by the nature of the case to stand initially on the defensive, they occupied a position nicely calculated to give them an opportunity for a counter-stroke at the most favourable moment — the moment when Datis was disembarking his army. An understandable hesitancy, engendered by the tremendous odds, nearly lost the opportunity.

In considering Miltiade's arguments to the council of war and his subsequent actions, we are immediately struck by the importance he attached to gaining the utmost advantage from the sudden, and probably temporary, increase in Athenian morale. Next we are impressed by the manner in which he wrung every possible advantage from the special characteristics of his soldiers, and the peculiarities of the ground. The Greeks were superb athletes, they were well disciplined and drilled to perfection. Only troops with these characteristics could have maintained close formation throughout that long, swift charge and arrived at the point of impact with their fighting power unimpaired. Similarly, only disciplined and highly trained troops could have coped with the novelty of the unprecedented departure from customary tactical methods.

In establishing superiority at the decisive points and holding the remainder of his front with a force just sufficient, and no more than sufficient, to carry out its role, Miltiades gave the first recorded demonstration of the tactical application of the *principles of concentration and economy of force*. In addition, he demonstrated *surprise* attained by

*flexibility* of mind and movement, that is, through rapidity of thought and action, and novelty of tactics.

In every battle, in every action, there is a fleeting moment of opportunity. In recognizing that moment, and in exploiting every opportunity it offered, Miltiades gained one of the most important victories in history.

Marathon did not end the struggle with Persia. But never again was the issue so finely balanced, never again did the Great King have quite so good a chance of victory. By breaking so decisively the long, unblemished run of Persian successes, the Athenians acquired a self-confidence and a sense of superiority over the enemy that never deserted them. This heightened morale spread to the other Greek states, who promptly threw off their allegiance to Darius and, by showing a greater readiness to combine against the common foe, gave depth and power to the defence. Translated into energy, this impulse launched the Greeks upon a career of brilliant achievements in the intellectual and physical spheres.

#### What Might Have Been.

Whilst it is idle to speculate in detail what might have followed an Athenian defeat at Marathon, we can say for certain that all Greece would have fallen under the Persian yoke. Athens would have been occupied immediately, and her people sent into captivity. The other Greek states, as was customary in those days, would have furnished contingents to Datis. Against this augmented force it is highly improbable that the Spartans could have stood for long, though we may

be sure that they would have died to the last man and the last woman. The nascent Greek civilization would have succumbed to an Asiatic culture, which, in turn, would have changed the whole course of European development. Had the Persians continued their westward advance there might have been no Roman Empire, the map of the

western world might have presented an entirely different picture today.

Those were the issues decided at Marathon.

*This is the first of the series "Decisive Battles of the World." Next month we shall consider the "Defeat of the Athenians at Syracuse in BC 413."—Editor.*

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An immense, inordinate ambition, the kind of an ambition which can take root only in the soul of an oppressed people and be nourished only on the misery of an entire country, is now astir in the hearts of the Russians. This essentially aggressive nation lives in a state of submissiveness so degrading that it seems to be expiating in advance at home its expectation of tyranny abroad over other men. The glory and the booty to which it looks forward turn its thoughts away from the shame to which it is being subjected, and in the hope of washing himself clean of his impious sacrifice of public and personal liberty, this kneeling slave fills his dreams with visions of world domination.

—De Custine, 1839, quoted by Walter Bedell Smith in "Moscow Mission."

# THE CHEAP WAR

By Major Robert B. Rigg, US Army.

EACH new weapon that multiplies its killing power over its predecessor, brings with it the futile hope that a future war can be fought on cheaper human terms than the last conflict.

The concept of "a cheap war" is not new, and the power of weapons to come will inspire additional ideas for the substitution of machines over men. The unusual destructive power of the atomic bomb increases the tendency to place complete reliance on a single weapon, or weapons over men. Fortunately, the viewpoint that we must maintain a balanced military-naval-air force is, for the moment, still dominant.

Ancient man discovered that he did not have to choke an opponent to death with his own hands if he had a spear. Killing became less personal with a bow and arrow. Man was striving to make war "cheaper" in human effort by the use of weapons. War became no less bloody when he used muskets; man could kill at a greater distance and with a greater element of personal safety—to himself. Artillery meant that more men could be erased at ranges greater than the hand gun. The invention of armour

—From the *Armoured Cavalry Journal*, USA.

plate, and later tanks, was in line with man's consistent effort to make war cheaper. Aeroplanes with bombs increased the ranges at which one could kill, but alone they did not win battles or wars.

Mercenaries, fortifications, new tactics, improved weapons, gas, suicide planes and boats have all been created and employed in an effort by one side or the other to make war cheaper—either in respect to time limit of conflict, decisive results or human casualties for the user. There was no real cheap way to win. Victories were for the most part purchased in high human costs. Man still had to lock with man, and he will still have to as long as a bayonet or rifle bullet will penetrate human flesh.

The ancient Persian kings sought to spare their own troops by the hire of mercenaries. In this they eventually failed and were defeated. One need not specify other examples where mercenaries have failed. We may arm other nations, but in the event of war, can we purchase or ship them morale? Not unless we join with them in the dirtier tasks of combat with our own men alongside them.

The casualty cost of conflict has been lessened in the past by fortifications, but reliance on walls and



forts alone proved futile. The great Chinese Wall and the Roman fortifications remained effective only as long as the spirit of those respective armies remained aggressive.

The French placed great reliance in a single form of defence that was intended to make their next war cheaper. The Maginot Line is a monument to the folly of this thinking.

It may be argued that these were passive measures, that victory can only be achieved by aggressive instruments. Japanese kamikaze planes and Mussolini's suicide torpedo boats were designed and applied to achieve naval victories at a cheap cost.

Hitler believed his blitzkrieg to be the formula for an inexpensive war. It was, against the weak.

There was a period in history when a single battle could decidedly influence the outcome of a war, or even win it. May one believe that single or even multiple bombings can alone decide another conflict? History reveals that modern weapons have not shortened war. On the contrary, the improved instruments of death have simply made conflicts more costly by a multiplication of casualties and destruction. In earlier times the holocaust of war was generally removed from the civilian population. Today, a nation is liable to civilian casualties in excess of its military ones. But bombing, in addition to its destructive and demoralising effects can at the same time forge a hatred among survivors that can increase their will to resist. All the implements of a modern war ma-

chine may be strewn in wreckage along roads and railways, with its logistical support—the industries in smouldering ruins—but the people of a nation may elect to resist as guerillas or in a semi-guerilla form.

Regardless of the extent to which destructive weapons and machines may be developed or used, the soft flesh of man must be their final target.

Drone planes may lock in combat, guided missiles may be shot down by automatic anti-aircraft guns, driverless tanks may shoot at each other amid all the scientific refinements of crawling magnetic mines and similar machines, but no real victory can be achieved until the living men behind such machines can be eliminated or forced to surrender. As yet there is no substitute for man.

It is a popular misconception that money will buy almost anything, but we have never been able to purchase time. The public should not be lulled into a false sense of security by the presence of pilot models and blueprints of futuristic weapons. It now requires time to train men for the defence of their country. Even the most elementary positions of a modern defence machine cannot be filled overnight. Given even the best equipment and facilities it still takes months to produce a radio operator for a tank. Money cannot shorten this period of training. If this nation were attacked we would not enjoy the same period of unmolested mobilization we have had in the past. A declaration of war by an enemy will not be heralded by diplomatic exchanges, but by exploding bombs of the aggressor.

Diplomacy is still the cheapest substitute for conflict, but we should recognize that if we are involved in another armed struggle, a victory

cannot be purchased cheaply. Science has eliminated, not fathered, the chance of a cheap war.

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## How Many Bullets Find Their Mark ?

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OPINIONS differ as to how many rounds of rifle fire it takes to kill one enemy in modern warfare. All agree, however, that it is a very great many, but probably not so many realise that this has always been the case.

The following extract from "The Rifle and How to Use It," by Hans Bask, M.A., Lieutenant, Victoria Rifles, throws light on this point.

"Nothing indeed could have been worse than the weapons supplied to every branch of the service during the Peninsula War, unless it were the want of skill displayed in their use. The indisputable fact is that, on the average, a man's own weight in lead and ten times his weight in iron were consumed for each individual placed *hors de combat*.

"At Vittoria, on the morning of the 21st of June, 1813, each British Infantry soldier had in his cartouch box 60 ball cartridges, altogether 3,000,000 rounds; besides which 1,350,000 rounds more were issued by the field-train to the troops. We

will assume that only 3,675,000 were altogether consumed. Now, it is known that, on the side of the enemy 8,000 out of 90,000 men were killed and wounded—consequently only one musket shot in 459 took effect; and this calculation excludes entirely from account the injury inflicted by 90 pieces of artillery, each firing 73 shot or shell, or a total of 6570 rounds. Taking this into consideration, we may readily believe that there was not on that occasion above one musket ball in 800 which was not utterly thrown away. To show that our Infantry of the Line as lately as 1851 had not made much progress in the use of Brown Bess, I may add that a patrolling party at the Cape, in the month of August of that year, expended 80,000 ball cartridges in killing or disabling twenty-five naked savages, just 3,200 rounds to each Kaffir.

"General Gassendi estimates that 3,000 cartridges are expended to every man disabled, and this is stated as the proportion at the battle of Salamanca."

—From *Infantry Bulletin*, UK.

# THE ROYAL AUSTRALIAN SURVEY CORPS



Directorate of Survey, AHQ.

*This is an authoritative article written for the Australian Army Journal at the request of the Director of Military Training. It is designed to present a comprehensive picture of the work and organization of the Royal Australian Survey Corps which should be known to officers of arms of the service.—Editor.*

Every officer and every well-trained NCO is aware of the importance of maps to the soldier. Officers with experience in the recent war will recall, probably with some feeling, the numerous occasions on which they felt acutely the need for an accurate map of the area in which they were operating. The purpose of this paper is to describe the army organization which produces and provides maps for military use, and to explain briefly how these maps are made.

## **Kinds of Maps.**

The information shown on a map varies with the purpose for which the map was made. For example, the parish and county maps issued by Lands Departments are primarily concerned with the accurate delineation of property boundaries. Therefore they show little topographical information of interest to the soldier. Again, tourist maps are made with a view to giving the traveller all the necessary information relating to his journey; topographical detail which is not strictly relevant to this purpose is usually omitted.

On the other hand, to be of real value for military purposes, a map should depict all cultural features including dwellings, roads, railways, timber, water, bridges, telephones,

and such developments as actually exist and are within the limitations of map scale. In addition, the relief—hills and valleys—must be shown. Relief is usually shown on large and medium-scale maps by contours, and on the smaller scale by hachures or layers. Military maps are usually printed in several colours to facilitate easy interpretation of the mass of detail shown.

#### **Military Map Making in Australia.**

In 1908-9 six members of the British Ordnance Survey were obtained on loan to begin the military survey of Australia. Shortly after, the Australian Army Survey Corps was formed. Initially, the Corps concentrated on the production of training, tactical and strategic maps of the areas around the capital cities. Not only were the one inch to one mile maps produced of great value to the Army for training purposes, but they soon became popular with engineers and others associated with developmental projects.

From this small beginning the Survey Corps developed slowly until 1939, when the war impetus provided a strength of about a hundred, ultimately reaching a peak in 1944 of 1800 enlisted personnel. This resulted in a rapid extension of map coverage in all States, particularly in Queensland and the Northern Territory. In 1942, however, New Guinea became the focal point of concentrated effort, with subsequent decline on the mainland.

The operational mapping of the Survey Corps covered fields afar, including surveys of the border zones of Palestine, Syria, Transjordan and Turkey, then back to the

Pacific theatre, where extensive mapping was carried out in New Guinea, New Britain, Bougainville and the Philippines, culminating in the last offensive in Borneo. Most of this mapping was at tactical scales of one mile to one inch, or larger. An interesting development was the production of a four-mile-to-one-inch series covering about one-third of the mainland. This series was a recompilation of existing data into a standard and convenient form. It was not based on new survey or field investigation and is admittedly very much below standard.

#### **How Maps are Made.**

Consequent on general demobilization the Survey Corps strength diminished considerably, but nevertheless its present figure is much greater than any reached in prewar days. Plans for the post-war regular Army provide for the maintenance of a balanced survey force, and a long-range programme of mapping is already in hand.

Military maps are not just a collection of individual and unrelated sheets. Each sheet is "tied" to the other sheets by means of the overprinted grid, which makes it possible to determine one's position on a sheet in relation to any point on any other sheet.

Production of maps of this nature involves a triangulation survey, visual evidence of which appears as beacons on prominent hills throughout the countryside. Such beacons may consist of steel or bush-timber quardipods or cairns of stones supporting a central pole, on top of which are sheet-iron discs which from a distance appear to the observer as a black sphere on the sky-line. These trigonometrical

beacons are the surveyors' observation stations. Angles to and from them are taken with a theodolite, and provide the means of computing the bearing or azimuth and the distance to other such marks. The beacons, in addition, are permanently marked with a buried concrete block so that the exact point can be re-established should the beacon be destroyed.

The chain of triangulation is tied to what is known as a base line. This line is normally six to ten miles in length, and is measured to an accuracy within one part in a million, which is of the order of half-an-inch in eight miles. For this accuracy measuring bands of invar are necessary in order to reduce the effect of temperature errors. The Royal Australian Survey Corps has developed a technique of temperature measurement by using what is known as the electrical resistance method, which is far more accurate than any field thermometer.

Astronomical observations at the base line and elsewhere provide absolute values of latitude, longitude and azimuth on which the triangulation network is adjusted. An interesting development in this respect is the time signal broadcast from Belconnan and originated at the Commonwealth Observatory, Canberra. This was commenced during the war as a special aid to Army surveyors in their determination of longitude in previously un-surveyed areas of the mainland and New Guinea. The signal extends over a five-minute period at selected times of the evening, and is of the rhythmic type, beating 61 times to the minute and thus giving a vernier comparison with the field

chronometers to an accuracy of one- or two-hundredths of a second.

The triangulation survey is the framework for subsequent detail mapping. The old method involved the extensive use of the plane table, which is now becoming a lost art and is superseded by the practice of mapping from air photographs. The Survey Corps used air photos in 1930, being foremost in this field in Australia, and this method is now used for all military mapping. An examination of an air photo shows that a mass of detail is evident. The photo, however, is not a true map in itself as it has inherent distortions due to camera tilt and variations of ground relief which the surveyor and draughtsman have to eliminate.

The compilation of the detail map, therefore, involves the elimination of photo-scale errors, interpretation, annotation and the subsequent conversion to the conventional map. The field surveyor also establishes sufficient heights for contouring, which is then done with the aid of stereoscopic equipment. This equipment ranges from simple hand stereoscopes to the more elaborate and precise plotting machines, each of which has its special application. The Survey Corps favours what is known as Multiplex. This device consists of a battery of projectors which can be set in the same relationship of spacing, height and tilt as the original air cameras at instants of exposure. The images are projected in alternate red and blue colours, which, when viewed through spectacles of complementary colours, give a true three-dimensional model of the terrain. Plotting and measuring devices then convert this image

into the conventional map and eliminate a considerable portion of the field work otherwise required.

The next stage is the fair drawing, which is the finished article as far as the draughtsman is concerned. The last stage is the lithographic reproduction of the map in its final form. This involves photography of the fair drawing, the preparation of the lithographic zinc plate for each colour, and then the printing of the map for issue. The figure of twenty million maps printed by the Survey Corps gives some idea of the requirement in wartime at least.

#### **Air Photography.**

Closely associated with the work of the Royal Australian Survey Corps is that of the RAAF Photographic Squadron, with its Headquarters at Canberra. This unit, like its Army partner, has long since reached maturity and is also settling into its post-war stride. It is equipped with high-performance Mosquito aircraft, and with Lincolns for special occasions. Its potential is indicated by its output of 340,000 square miles of survey photography during the four and a half months' season of 1950, with the unit based at Alice Springs.

Air photography for survey is very exacting, involving flying at heights of 15,000 or 25,000 feet above sea level, close attention to navigation, horizontal flight, and accurate timing of the camera to obtain the specified overlaps of exposures. Specifications for photography are defined by the Survey Corps, which supplies liaison personnel with the RAAF squadron and detachments in the field. These liaison surveyors assist RAAF with the marking up of the proposed flight lines on existing maps or on key strips flown for the

purpose. It is then RAAF's responsibility to produce photography to specifications.

On completion of a sortie, the films are developed and one set of prints is obtained without delay. These prints are examined for overlaps, gaps and definition, so that any sub-standard work can be re-flown before the detachment leaves the area. On the satisfactory completion of a task, the negatives are forwarded to the Base Negative Library, where subsequent requirements for prints are processed.

It is easy to appreciate that this team of Army surveyors, draughtsmen, and printers, together with RAAF pilots, navigators and photographers, is building up a national asset of topographical and geographical information available not exclusively to the Armed Forces, but also to every organization concerned with planning and development, and within reason to the general public.

The Army Photo Library has filed air photos covering about a million square miles of the mainland and New Guinea, and this is just the start of a long-range programme which is intended to cover the whole of our territory, excluding perhaps the most desolate and waste areas, and concurrently with photography will precede the mapping at one or four miles to one inch. The military application is obvious, and so also is its application to the needs of the road and water supply engineer, the soil and forestry experts, the town-planners, and the farmer and pastoralist. What an asset to the last would be a photographic mosaic showing every detail of drainage, the river flats, the hill country, water holes, fences and timber.

### Use of Radar.

A technical development worthy of mention is the application of radar to surveying. Just as World War I gave an impetus to the use of air photos, so did World War II produce a method equally revolutionary in the field of surveying, and that is the development of radar. It is now common knowledge that radar was used extensively in air navigation and bombing, but the greater accuracy required before it could be applied to surveying necessitated some special investigation and equipment.

The impetus for this development came from the South-East Asia Command, as that theatre was so inadequately mapped for military operations that the only practical solution was some method of mapping enemy-occupied territory by remote control. The responsibility for producing the answer was given to the Directorate of Survey at the War Office in England, and in the comparatively short time that has since elapsed a practical and satisfactory technique has been developed,

Radar applied to surveying employs the measurement of distance which is related to the time interval of radio pulses and the rate of propagation of the radio waves. The stage has now been reached at which the course of an aircraft can be followed with an accuracy of within about twenty yards. In the case of a survey photographic aircraft this means that the location of the camera at the instant of exposure can be determined. In conjunction with photogrammetric equipment, the resultant photo can be analysed for tilt, and all points of detail visible on the photo can

then be plotted on the conventional map in true position; this can be done by remote control involving no survey party nearer than say 150 miles.

Another application of radar is the measurement of lines up to 500 miles long with an accuracy comparable to high-order survey triangulation. By this means it would be practicable to determine the position of a survey mark, say in Broken Hill, in correct relation to surveyed positions in Melbourne and Sydney. This application would largely overcome the existing deficiency in co-ordinated surveys which unfortunately is the sorry state in Australia today.

### Peace Organization in Australia. Regular Army.

The principal Regular Army unit maintained in peace is the Cartographic Company. Personnel of this unit include draughtsmen, lithographic photographers and printers. Its primary function is to reproduce from field data and compilations the maps and diagrams required by the Army. It also undertakes the compilation and reproduction of maps from air photos, using special photographic plotting equipment.

A Field Survey Section is normally allotted to a Command and, in addition to field surveys, its personnel compile maps for subsequent reproduction by the Cartographic Company. Personnel comprise surveyors and draughtsmen.

A detachment of a Field Survey Section is maintained to carry out liaison duties with the RAAF Photographic Squadron in the field. Its personnel assist in defining flight

lines and in the examination of air photos for proper overlap and general suitability for map production purposes.

A Field Survey Depot is a small unit responsible for the storage of bulk supplies of maps and their issue to the Army as required.

A School of Survey is maintained to instruct recruits in basic technical training, to prepare and qualify students for promotion, and to conduct refresher and specialist courses as required.

#### **Citizen Forces.**

CMF Topographical Survey Companies are to be raised in Sydney and Melbourne. These are mobile units which combine the functions of Cartographic Companies and Field Survey Sections. Their personnel includes surveyors, draughtsmen and lithographers. In addition

to carrying out field surveys they can compile and print maps.

#### **Organization in the Field.**

In war the survey units required in a theatre of operations include Cartographic Companies, Topographical Survey Companies and Field Survey Depots.

Normally the organization in a theatre of operations would provide for one or more Cartographic Companies and a Field Survey Depot at the Base. Topographical Survey Companies and detachments of Field Survey Depots are allotted to Army and Corps as required.

A Survey Section, or a detachment of a Topographical Survey Company, may be allotted to a division. Its function would be to establish the military grid and survey co-ordinates in the divisional area, and to revise the existing maps as required.

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**Appeasement from weakness and fear is alike futile and fatal. Appeasement from strength is magnanimous and noble, and might be the surest and perhaps the only path to world peace.**

*—Winston Churchill.*



# TACTICAL APPRECIATIONS

## for the **NCO**

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Directorate of Military Training.

**I**N all its teaching the Army stresses the importance of seeking the solution to every tactical problem by means of an appreciation of the situation. Whilst this teaching is unquestionably sound, it can, if judgment is not exercised in its application, lead to confusion of thought and slowness of action by junior commanders.

Manuals and pamphlets dealing with this subject usually list the following headings for working out an appreciation in logical sequence:—

### **Aim or Object.**

#### **Factors affecting the attainment of the aim, including:—**

- Relative strengths
- Ground
- Time and space
- Surprise and Deception.
- Weather, hours of daylight and darkness, etc.
- Security
- Air Situation
- Administration

**Courses open to each side.**

### **The Plan.**

Obviously all these headings must receive consideration in solving the tactical problems which usually confront a higher commander. However, a little thought will show that in the tactical problems which normally concern a platoon commander, and more particularly an infantry NCO, many of the factors listed above are irrelevant. It follows that the NCO who goes through the entire drill of a full appreciation merely wastes time on the consideration of things which have already been decided by circumstances or the orders he has been given. Furthermore, consideration of things which have no bearing on his task can, and very often does, divert his attention from things which are vital to its successful execution. It is no use teaching an NCO to be a battalion commander. Possibly he will come to that in time. But while he is an NCO it is better to

teach him the best and quickest method of solving the tactical problems of an NCO.

Bearing in mind that a factor is defined as "a circumstance, fact or evidence contributing to a result," let us examine the headings listed above to determine which of them can properly be said to lie within the sphere of NCO responsibility.

#### **Aim or Object.**

In every appreciation the aim must be clearly stated at the outset. Since the aim of the NCO is usually limited to the execution of the order he has received he should be in no doubt about it. But it is surprising how many, when they are asked to make an appreciation, become confused about their aim. It is of the utmost importance, therefore, that the platoon commander's orders should clearly define the task of each of his NCO's.

#### **Relative Strengths.**

It is not wise to encourage junior commanders at platoon and section level to worry overmuch about this factor. In an attack it might encourage too much caution and discourage dash. In defence it is the duty of a commander to hold his ground whatever the odds. In some problems a consideration of this factor, when linked with ground, might lead to a useful deduction about the possibility of defeating the enemy in detail. Since this is unlikely to arise at platoon level the factor of relative strengths will seldom enter into an NCO's appreciation.

#### **Surprise and Deception.**

Junior commanders must be taught to take every opportunity to surprise and deceive the enemy as part of their normal tactical train-

ing. Unless unusual facilities for deception have been placed at their disposal, opportunities for surprise will nearly always have to be sought through the use of ground and cover. At the platoon level, then, surprise and deception are more usefully considered under the heading of ground.

#### **Time and Space.**

Under this heading there is usually little to choose between the alternatives which confront a platoon or section commander. In an attack one method may be a few minutes quicker than another, but that consideration would be far outweighed by other more important factors such as the likelihood of increased casualties and the position from which the assault is made and the covering fire given. In an attack the question of which is the shortest and quickest approach should automatically be considered under the heading of ground.

#### **Weather, etc.**

Decisions as to whether a platoon will operate or not will usually be taken by more senior commanders. Consideration of these factors at the platoon level will lead to useful deductions only in exceptional circumstances.

#### **Air Situation.**

Nothing the junior commander can do will influence the air situation. He must accept it as it is. If it is adverse the only way in which he can help himself is, again, by the use of ground. Therefore a separate heading is not required.

#### **Administration.**

Except in a prolonged patrolling operation this factor is unlikely to

affect the plan on the platoon level and should not be included in an NCO's appreciation.

### Security.

So far as the section commander is concerned security boils down to guarding against surprise by posting sentries in defence and adopting a suitable formation on the move. These actions should be automatic and, since in both cases they are intimately related to ground, they are more suitably considered under that heading.

### Ground.

In any operation, and especially in platoon operations, ground is the all-important factor both in attack and defence. Through the consideration of ground the different courses will present themselves and enable the junior commander to arrive at the best plan.

In both attack and defence the junior commander will primarily be concerned with likely approaches and the selection of fire positions. Surprise and deception, time and space, are so intimately related to approaches and fire positions that they cannot, at the NCO level, be separated from them. The NCO should be taught to include them in his study of ground as a matter of mental drill.

It must be emphasized that ground is studied only with the object of arriving at a useful deduction. For example, the study of ground for an attack should lead to a clear deduction as to which is the best approach and which is the best position from which to give covering fire.

### Courses Open.

Various courses open to our own troops will come to light under the heading of ground. A separate heading to cover the various courses open to a commander is necessary only when more than one factor is considered and when the deductions made from these factors may conflict. In an attack on a platoon level consideration of the courses open to the enemy rarely leads to a useful deduction, since it is wise to assume that the enemy will hold his positions stubbornly.

It may be argued that in a defence appreciation the consideration of the courses open to the enemy is most important. That may be true at the higher levels, but at the platoon level this is far better considered with the ground factor under the heading of likely enemy approaches.

### Plan.

The outline plan, of course, is the essential part of any appreciation.

### Conclusion.

By a process of elimination we have now arrived at a simplified form of appreciation which should enable a well-trained NCO to formulate rapidly a sound plan without wasting time on the consideration of factors beyond his control or which have no bearing on his task. This simplified form of appreciation has only three headings, viz.,

**Aim**  
**Ground**  
**Plan**

Training an NCO to think out his tactical problems under these three headings tends to avoid con-

fusing him with a mass of irrelevant detail. With the full form of appreciation many NCO's will tend to spend more time on getting the headings in the right order than in working out a practical solution to the problem before them. The shorter form suggested tends to keep their minds right on the job.

Admittedly this short form has many limitations and there will be

many problems which require the more comprehensive form. However, on a platoon level such problems will be rare indeed. It is considered that any disadvantage the short form may have is acceptable in view of the greatly improved results likely to be achieved in considering most of the problems confronting junior commanders.

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#### DEVELOPMENTS IN EAST GERMANY.

All senior officers of the East German People's Army are to be trained in bacterial warfare at the Military Academies in the Soviet Union.

Five thousand pilots are required from the People's Army and the Russians have put at their disposal thirty training planes and a team of Russian instructors. This year (1950) the People's Army will have more than 750 Russian tanks and armoured cars, plus a large quantity of artillery and heavy weapons.

Those divisions of the Army which will have their Headquarters in Rostock will have under their command certain units of the Navy—destroyers, MT boats and coastal defence vessels so as to prevent the possibility of escape from the Russian zone.

It is planned to construct in Eastern Germany a Russian radar net manned by technicians from the German Communist People's Party. The net will be incorporated with the radar stations in the Soviet Union and will, of course, be under Russian control.

Russian rocket bases are being built at high speed along the Eastern European frontier, among other places in Peenemunde, Kalinengrad, and further south towards Warsaw, Bucharest, Lvov (Lemberg). The Russians have two kinds of rockets—the A/4, a copy of the German V-2 with a weight of twelve tons and a radius of 450 kilometres, and another unknown type with even greater radius and of heavier weight.

# A Whetstone For Your Sword



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Lieutenant-Colonel L. J. Loughran  
Australian Staff Corps.

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**"The personal qualities which demand a high standard of conduct at all times and which inspire courage and self-sacrifice in a crisis are by nature spiritual, not physical, and these are essential to our nation at all times."**

*—Extract from Military Board Instruction. No. 59/1950.*

## Part 2

**B**EFORE you can tackle a problem you have to see clearly what the problem is. In the question we are discussing perhaps the most difficult thing of all is to show that a problem actually exists. The modern world has produced an apathy which has made men indifferent to the spiritual side of their nature, and indifference is far more deadly than antagonism. The latter at least indicates some degree of interest — the former indicates a mood of hopelessness and, where hope is gone, vitality is gone. Nor do men have to be aware of their own lack of hope to be devitalized by it. Men have died of malnutrition who never heard of Vitamin B.

This indifference, this hopelessness, is a product of our materialistic age. Our ancestors, the men who built our world and our way of life, had a lively awareness of the spiri-

tual nature of man and its resultant effects on life and living. The modern man, however, tends to regard as a kind of religious crank anyone who expresses an interest in religious philosophy, much less in revealed religion. He brushes it aside as of interest to people who go for that sort of stuff, but not for him. It is as if you were driving in a car, saw it heading straight for a tree, and called out to the driver to swerve or he would hit it. If he answered: "It's no use talking to me about trees; I'm a motorist, not a botanist," you would surely feel that he was carrying respect for the specialist too far.

I don't doubt that many a potentially brilliant mathematician has lived and died without ever hearing about mathematics, and I am quite certain that there are many men who have never bothered with spiritual matters simply because

their interest has never been stimulated. They have been lulled and distracted by science in exactly the same way as one distracts a baby crying for its mother by offering it sugar sticks and making funny faces at it. The soul of man is crying for hope or purpose or meaning and the inventor says "Here is a jet-plane," or "Look, television"

Yes, we have a problem, and we won't solve it by refusing to see it.

Our task, then, is to stimulate men to "think on these things"—to learn, perhaps for the first time, that the moral law is not an accident of fate; that man has certain rights and certain duties which he must not ignore.

I do not suggest that the following course of lectures is by any means the ideal. My hope is that it will serve as a useful cock-shy; that it will be chopped about and possibly scrapped completely, but that something good will emerge in its place.

#### Lecture 1.—What is a Man?

The essential difference between man and other forms of life, such as plants and animals. — Should we treat other men as we treat animals and plants? — If not, why not? — What is conscience and whence does it come?

#### Lecture 2.—Our Way of Life.

In any community laws are necessary to regulate human relationships. — Our laws and customs are based on the Christian concept of God and the immortality of the human soul. — Our customs, the way we look at things, our ideas of personal conduct, everything expressed in the term "our way of life" is derived from the same basic

concept. — Christianity, the basis and inspiration of Western Civilization.

#### Lecture 3.—The Effects of Lack of Any Faith.

There is no absolute truth, no absolute good. — We are creatures of impulse and blind chance, governed by urges and passions. — There is no reason for behaviour. — There is no moral code. — All action becomes mere matter of expediency.

#### Lecture 4.—The Necessity of Some Belief.

Will a man fight to the death for something he doesn't believe in? — Belief in a cause is half the battle. — Have we any belief or are we purely negative?, i.e., will we fight for something or against something? — If so, can we sustain our effort against an enemy who is fighting for something?

#### Lecture 5.—The Effects of a Belief

in a Supreme Being.

What do we mean by a supreme being? — If we admit the existence of a supreme being is it logical to suppose that we have any duties towards Him or is He quite unconcerned with what we do? Has man any rights not conferred on him by other men? — Is man answerable for his exercise of his rights and the performance of his duties?

#### Lecture 6.—The Effects of a Belief in the Immortality of the Soul?

What do we mean by soul? — Would we be willing to risk our lives for others if we knew that we had no soul? — Is unselfish service foolishness? — Is there any real difference between good and evil?

**Lecture 7.—Who is My Neighbour?**

Man is a social being, cannot live alone. — He depends on others and therefore owes duties to others. — Loving one's neighbour doesn't mean loving him in the popular sense or even liking him. It means wishing him well, respecting his view-point, treating him with justice and kindness, helping him in any way we can.

**Lecture 8.—What is Patriotism?**

Love of family. — Love of larger circle of friends and acquaintances, of large groups of families (communities). — Love of State, love of country, not uncontrolled love, but love controlled and guided by prudence, justice, temperance and fortitude. — Our rights and duties in each of these spheres. — What is loyalty?

**Lecture 9.—Our Cause.**

What is our cause? — British way of life. — Personal liberty. — Our system of law. — The freedoms and values which our people have attained through centuries of struggle and effort.

**Lecture 10.—The Importance of****Example.**

What is example? — Has example any force? — Our tendency to imitate those whom we look up to because of their rank, their success or their natural qualities of leadership. — The effect of bad example at the top.

**Lecture 11.—Personal Influence.**

Are we influenced by others? — Do we influence others? — What does influence consist of and how can we exercise it? — The ability

of the individual to uplift or debase his circle of friends and acquaintances.

**Lecture 12.—Esprit de Corps.**

The necessity for unity of purpose and spirit in any number of people banded together for a common purpose. — The need for a code of honour in any profession, e.g., the medical profession. — Its essentiality in any army. — What does esprit de corps consist of? — How can we foster it? — Examples showing its value.

**Lecture 13.—The World of Today.**

Is the international situation serious? — Who are our likely enemies? — Do we want war? — If war is forced on us should we fight? — If so why will we fight? — Will we sustain our effort to the bitter end? — If we lose will our way of life be seriously altered? — What will happen to our individual rights, which are a remnant of the Christian ethic on which our civilization was built?

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There is, I suggest, nothing in the foregoing to which any reasonable man could take exception. The only questions now are: "Is it worth while?" and "Would it do any good?"

The only answers I can give are somewhat rhetorical: "Are we satisfied with things as they are?" If not, "Would it do any harm?"

We are still living on what remains of Christian principles. Many of them have gone without our realizing it. We are apt to dismiss as unimportant beliefs for

which our ancestors fought and died, for which men are still fighting and dying. Our values have become so materialistic that we cannot even conceive that a man would suffer and die for a principle; we must attribute some other motive—power, politics, money—something which is

more closely attuned to our corrupted view of man's nature.

Surely it is now time to take stock, to see what ails us, and why. Our armour is rusted, our sword needs a whetstone and—tomorrow may be too late.

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Science does not exclude faith.  
And faith alone can meet the threat  
that now hangs over us. Science  
does not teach a harsh materialism.  
It does not teach anything at all be-  
yond its boundaries, and those  
boundaries are severely limited by  
science itself.

—Vannevar Bush in  
*"Modern Arms and Free Men."*

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# MODERN AIR-GROUND DEFENCE

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Translated by the "Military Review" from an article by Lieutenant Colonel F. O. Miksche in "Forces Aériennes Francaises" (France), December, 1949.

While World War II furnishes many examples of the co-ordinated employment of air and ground forces in the offensive, such employment in defensive battles was rare. Air bombing alone, as devastating as it may be, will certainly not stop an invasion, just as ground forces alone, without adequate air support, will have great difficulty in holding terrain.

The problem we propose to study may be important in the light of the defence of Western Europe. How may small, well-equipped armies, supported by powerful air fleets, halt the invasion of an enemy that is numerically superior? To what extent may numerical inferiority be compensated for by technical superiority?

We are going to attempt to answer these questions without, however, pretending infallibility, or a complete study of the problem. Our sole purpose is to lead others to reflect on this important subject, calling attention, incidentally, to the fact that this article does not concern itself with the role of air forces in strategic bombing. This is an entirely different problem.

## The Evolution of Tactics.

The relation between fire power and movement—factors depending

principally on the technical evolution of weapons — has always exerted a decisive influence on tactics. In 1914, the surprise effect of small, automatic weapons, combined with powerful artillery fire, brought nearly all attacks to a halt. The need for protecting flanks constantly brought about a broadening of the fronts. The battle line in the west extended from the English Channel to the Swiss frontier and, in the east, from the Baltic to the Black Sea. The war of movement was soon transformed into trench warfare. An advance was less the result of a strategic manoeuvre in the classical sense than a crushing material superiority. At that time, railroads were the principal means of transportation. Since the concentration of forces in an assembly position often required weeks, it was often difficult to achieve surprise.

Consequently, the great offensives of World War I generally ended in a reinforcement of the front without any decisive influence on the outcome of the conflict. A rigid system of transportation made any rapid change in the direction of an offensive very difficult. The enemy always had time to bring up the reserves necessary for at least a partial re-establishment of his position. Thus, the offensive operations of

this period were characterized by a slow frontal push over a broad front, a push which could penetrate to a limited depth only. It is for this reason that the German General Ludendorf said that the war's strategy was stifled by tactics.

Compared with World War I, World War II was a war of movement. What were the reasons for this? This transformation is generally attributed to the use of armoured vehicles. However, the employment of armoured vehicles, although important in itself, was only one of the technical means for the rapid liquidation of machine-gun nests and artillery positions. Modern tactics have been influenced less by the invention of the tank than by the more important motorization of armies and their auxiliary services, by the synchronization of air and ground operations, and by advances in radio communication. Thus, the return to a war of movement is not due to any particular weapon, but rather to the combination of all the modern means of combat on the ground and in the air.

Motor vehicles have made possible the rapid concentration of superior forces on narrow fronts for sudden release against locally inferior forces. The result of this was the development of the breakthrough, followed by deep penetration by armoured columns into the enemy's rear areas. The defence was then forced to make difficult changes in the battle area in the midst of battle. The motorization of transport columns facilitated the supply of advanced units, and made possible rapid changes in axes of advance toward the points where conditions were most favour-

able. Such narrow, deep breakthroughs were possible, however, only in close co-ordination with aviation, whose role was partially that which formerly was given to artillery. Air forces opened the way for the tank columns.

More important was the mission of aviation in the protection of flanks, the "caging in" of the field of battle to prevent the arrival of enemy reserves. Initial concentration and supply of fighting forces was possible only when air superiority existed. In other words, the pocket created by the ground forces had to have air protection, the ground and air forces mutually complementing one another. Only through the perfection of radio communication could such close collaboration between the air and the ground be possible. Moreover, columns which advanced deeply into enemy territory and became completely isolated, at times were able to operate as part of a larger strategic group, through use of the radio.

Despite careful preparations, defensive positions were not able to hold out against these methods of attack. Entire armies were surrounded and destroyed by the "panzer" divisions. The German campaigns in Russia, up to the defence of Stalingrad, were mileposts in this evolution. Thus, we may describe in a few words the general characteristics of the offensive of World War I, in which tactics were once again subordinated to strategy.

#### Defence Organization.

The defence reacted normally by organizing "islands of resistance" or "hedge-hog defences," capable of

defending themselves from every direction with practically the same effectiveness. From the tactical point of view, these "islands" became the basis of every system of defence in which small and medium units are organized. The creation of such "islands of resistance" on a strategic scale, however, is replete with difficulties, and not free from considerable risks.

The idea of replacing a continuous front by the defence of certain important strategic zones, is effective only if the defender possesses air superiority which permits him to protect and fully support his ground forces. In addition, sufficient reserves must be available on the ground for liberating any divisions which may be encircled. Without these two safeguards — air superiority and adequate armoured reserves — such strategy is condemned to failure in advance. The domination of broad expanses, organized into "islands of resistance" of greater or lesser size in accordance with the nature of the country, requires large forces. The defence of an "island of resistance," 90 to 100 miles in diameter, would require the employment of from 25 to 30 divisions distributed over a perimeter of close to 300 miles, counting between 9 to 15 miles per division. The reserves necessary to provide mobility must be added to the interior of the "hedgehog" zone. Even then, the covering forces would be so extended as to be weak in certain sectors. Once completely surrounded, the position must count on the air force for its supply. This would be impossible without air superiority. Moreover, prolonged isolation demoralizes troops. Once the perimeter has been pierced, the "island of resis-

tance" contracts, and its final destruction results in heavy losses to the defender in men and material.

To attribute the defeat of the German armies to a fault in their doctrine of war would be a grave error. As regards its fundamental elements, it is just as correct today as ever, even more so, when we consider the latest advances in radio, aircraft, and mechanization. For this reason, when we speak of defence, we ought to take the latest forms of offensive action into account.

Germany lost the War because Hitler, drunk with his first victories, completely overestimated his capacities and, simultaneously, lost control of events in both time and space. He was not beaten in the sphere of tactics, but in that of strategy. This should serve as a warning to those who have contempt for the classic rules of strategy, and would attempt to decide future wars by the use of "special weapons" alone. They appear to forget that mechanization does not completely supercede hard work. Machines alone cannot clinch a tactical success, or a strategic victory. With the extension of a theatre of war, especially in offensive warfare, control over time and space becomes more and more difficult. The farther the German armoured columns penetrated into Russia, separating themselves from their bases, the longer became their communication lines, the heavier the logistical "tail" composed of numerous services and detachments behind them, and the more weakened they became. Thus, the initial encircler was himself encircled. The lack of reserve air forces and armies prevented the German General Staff

from warding off the Allied offensives by counter-attacks. Finally, after the battle of Stalingrad, the German Army was forced to use the same system of static defence as the Allied armies did during the first half of the War. Without air superiority, which is the necessary prerequisite for nipping an enemy offensive in the bud, the Germans lost all initiative and became strategically passive.

#### Choice of the Field of Battle.

Today, as in the past, one of the most important factors leading to a successful defence is the choice of the terrain, and its proper utilization. Nevertheless, it must be remembered that the shock power and high speed of modern armaments tend to deepen the zone of operations. The employment of aircraft against ground objectives deepens the field of battle still more. This battlefield, in its modern sense, comprises the combat zones of the two principal arms, the ground and air forces, which complement one another and which are inseparable.

Former systems of defence have lost nearly all their effectiveness. Today, one cannot anticipate halting a mechanized offensive at any certain line of the front. Constant fluctuations characterize modern warfare. Adversaries in contact will seek an advantage in all of the three dimensions — length, width, and altitude. Thus, defensive action will be less an attempt to bring about the halting of enemy attacks at a fixed line, than to organize a series of battles whose intensity will gradually reduce the energy of the assailant. The shock power of the offensive will be weakened more by the manoeuvres of the defence than by its fire.

These considerations lead us to two important conclusions:—

● From the point of view of the ground forces, the dimensions of the field of battle must be such as to permit the easy deployment of counter-offensives.

● The air forces will have bases sufficiently close to be able to dominate the air above the field of battle, and to give close support to the ground forces.

Taking into account the dynamic character of a tank attack, we may consider that the zone of manoeuvre of the ground forces must be from 60 to 90 miles in depth. In flat countries, the highly developed communications network increases the dimensions of this zone, while in mountainous regions, an offensive may be stopped at less depth.

In the interior of these zones, the defender must utilize every obstacle capable of slowing the advance of the armoured units, and of forcing the enemy to deploy in a direction chosen by the defensive. Among these obstacles must be considered rivers, large inhabited places, and mountains.

The experience of World War II proved that even large rivers, especially those that flow across plains, are no longer considered insurmountable obstacles. The Germans easily crossed the Vistula, the Sereth, the Pruth, the Dniester; the Don, and the Donetz from the west toward the east; and the Russians recrossed them from east to west.

An army which entrenches itself along a river over an extended front, runs the risk of an enemy opening bridgeheads in a narrow sector by means of an airborne attack, followed by divisions which

are sufficiently well-equipped to force the passage of the river. Therefore, it seems preferable to organize the defence farther back of the obstacle. Normally, rivers can be crossed only at certain points where routes converge. In order to cross these bridges, the assailant must direct his columns toward these junctions. These junctions, however, are choice objectives for air attacks. From this we may deduct that rivers cannot be considered as serious obstacles, except where they flow along a mountain which dominates the opposite side.

Inhabited places, especially the more extensive ones, are able to stop an assailant. Their importance lies in the fact that they consist of many junction points which are hard for motorized forces to avoid. Nevertheless, the defence of zones having a large population is a delicate matter. With the exception of very large cities, the effects of air attacks are more severe in populated areas than in open country. Small localities are quite easily encircled.

Of all obstacles, mountainous regions are, without doubt, the most effective. Here, the aggressor cannot deploy his armoured divisions effectively. Observation is difficult. Also, in the mountains, it is difficult to obtain the necessary co-operation between *ground forces and aviation*. This co-operation never achieves the same state of perfection as in a flat country. For this reason, the defender should seek control of irregular regions in order to lead the aggressor into exhausting actions against heights—as during the Italian campaign—where he will not be able to make full use of his modern weapons. Through intelligent use of the terrain, it is possible,

even with limited means in men and material, to prevent the passage of a superior enemy.

The problem is different when it is necessary to defend flat country or large valleys, where the enemy is easily able to deploy his tanks. Here, it will be difficult to stop the enemy attack on a previously determined defensive front. Would it not be wiser to permit the weight of the enemy attack to penetrate into the empty space between mountains or solidly defended positions? One of the principal characteristics of the defence in countries without mountains must be the counter-attack of the armoured reserves at a precise moment. As we shall see further on, the air forces will play the principal role in this mobile defence, as co-ordination between the two arms is easier in open country than in a mountainous region.

Thus, a relatively thin curtain of mobile units will maintain contact with the enemy on his main attack axes, to make the necessary demolitions. Behind this screen armoured reserves must be located in such a way as to be able to act at any moment and in any direction, especially on the flanks of the enemy attack.

Logically, ground and air operations, whether in defence of mountains, inhabited places, or plains must be completely co-ordinated. The assailant then will find himself in a dilemma. The capture of mountain positions is a laborious operation. Nevertheless, is it prudent to advance on the plain while the flanks of the offensive are threatened from the heights? Running such a risk is not feasible without air superiority. Let us suppose that this condition does not

exist. On the other hand, what is the value of the mountains occupied by the defender? Primarily, they will serve as places from which to launch raids against the enemy's flanks and rear. More important, the mountains will form a corridor in which the enemy's offensive will be channelized. While making their counter-attacks, the defenders' flanks will be protected by the mountains, and they can proceed without fear. The empty space between these mountain bases will be covered by the air forces, thus assuring the continuity of the front.

### The Defensive.

In order to play their role, the air forces must be part of the general organization of the ground battle. They must oppose all movements of the enemy on the ground and in the air, at the same time facilitating and supporting the movements of their own force. To accomplish this, air superiority is essential. Without air superiority, effective action against ground objectives is a gamble. Thus, to a large degree, the outcome of the battle fought on the ground depends on the outcome of the battle in the air.

It is true that the great speed and radius of action of aircraft render air superiority in all parts of the sky impossible. Aerial fighting is subject to constant shifting above the zone of battle. The master of the air is he whose planes succeed in penetrating most frequently and the farthest into the enemy's zone of action. Although the number of aircraft engaged is of prime importance, the quality of these planes as well as of the operating personnel may also be decisive factors.

The outcome of the aerial battle may be influenced by strategic as well as by tactical factors. As we stated before, the choice of the zone of battle may have considerable influence on the decisive intervention of the air units in a defensive battle. The closer the airfields are to the front, the more effective will be the employment of the aircraft. These airfields must be situated so that the aircraft will be able to reach the zones of action rapidly and easily. In addition, the choice of the field of battle must be made in such a way that the enemy will be deprived of the advantages of easily deploying his aviation, and will be forced to operate from airfields a great distance away.

The two roles of aviation in air-ground operations are as follows:—

- The battle for air superiority in which the two air forces are engaged. This struggle has a dual nature. The enemy aircraft are kept on the ground by bombing or machine-gunning. Further, the enemy planes are also prevented from entering the friendly air by intercepting them.
- Support of the ground forces by attacking ground objectives.

In order to understand the importance of the second mission, let us see how a mechanized offensive looks to an aerial observer. The jump-off position for the offensive may be from 95 to 125 miles back of the front. From this point, the columns converge on the breakthrough point. The average length of an armoured division in march formation is 75 miles. Mechanized offensives have exceptionally long lines of communication and depend on an uninterrupted flow of sup-

plies. It is very difficult, if not impossible, to camouflage the movement of such units toward the front, or in the advanced zones. Night marches are also very difficult. Thus, the assailant who always depends on roads and highways for movement is constantly exposed to air attacks.

The movement of a motorized army must be precisely organized in time and space in order to ensure rational employment of highway and railway systems. The movements of units are planned in such a way as to leave important road junctions clear at certain moments. But let us suppose that the intervention of air forces throws confusion into a carefully prepared plan of operations. As with railway timetables, a few slight delays create bottlenecks which upset the whole organization. Disorganization in the rear will soon have a disastrous effect on units already engaged at the front.

The full effect of aviation cannot be obtained except by launching concentrated attacks on the objectives desired at the times desired. This cannot be achieved except by systematic employment of the air forces. The air space above the field of battle will be divided into sectors and zones, in width and depth, in such a way that co-operation between air and ground forces can be effected under the best conditions. The air and ground sectors will be co-ordinated, in order to facilitate synchronization of the ground and air operations. The principal air effort must be made over the main axis of the hostile offensive.

The division of the air space in depth must correspond to the

characteristics of the mechanized offensive outlined previously. As a rule, this space will comprise two zones: the zone of actual combat—a region up to an approximate depth of 30 miles; and the rear area—up to a distance of some 90 miles.

In addition, the battle for control of the air above the theatre of operations must be fought by an air force designated especially for this purpose. This force must be subject to the direct orders of the high air command and be distinct from the air forces which work directly or indirectly with the ground forces. The distribution of the air forces in the defensive battle would be as follows:—

1. Air forces whose mission is to achieve and maintain air superiority above the theatre of operations, with a radius of action sufficient to operate against all enemy air bases supporting the offensive.

2. Air forces whose mission is the indirect support of the ground forces (up to a depth of 90 miles) by disorganizing the enemy's rear. This force attacks railway and highway traffic, important points such as highway and railroad junctions and intersections, bridges, and depots.

3. Direct support aviation which works in close co-ordination with the ground forces in the zone of battle up to a depth of from 20 to 30 miles. It directs its attacks against the same objectives as the troops on the ground, or against enemy troops which threaten the latter, at the same time attempts to disorganize the movements of the enemy.

4. A tactical air reserve, which provides direct or indirect support on request.

5. Strategic reserves which will reinforce the action of the air forces over the entire theatre of operations as required.

Such an employment of air forces requires an extensive ground organization and material adapted to the above-named conditions. Hence, they must be organized, as are the ground forces, into armies, corps, and divisions, equipped with different types of planes, such as fighters and bombers.

The problem of analyzing the air force organization, strength, structure, and types of planes best suited to assist in the ground battle should be left to qualified airmen.

#### Summary.

Today, as in the past, success in the defence depends on the different types of weapons that are used. Infantry divisions with motorized transport will defend mountainous areas and other places where tanks cannot deploy. Air units will conduct a continuous bombing of the

enemy's rear to disorganize it. Deprived of supplies, his advanced columns will begin to falter and come to a halt. The ground forces then will intervene in order to exploit the advantage obtained by the air forces. This is the moment for the defence to release its tanks in a counter-attack. To facilitate the counter-attacks, important strategic points are first occupied by air-landed forces. Immediately behind the armoured spearhead, the motorized infantry divisions consolidate the advance and occupy the terrain. That is the picture of today's defensive battle in which ground and air forces must complement each other.

But who will exercise the top command? In view of the current confusion on military subjects, this question is particularly touchy. It must be left to rational judgment. The ground forces must understand that victory is impossible without air support; the air forces must realize that the final objective is not in the air, but on the ground.