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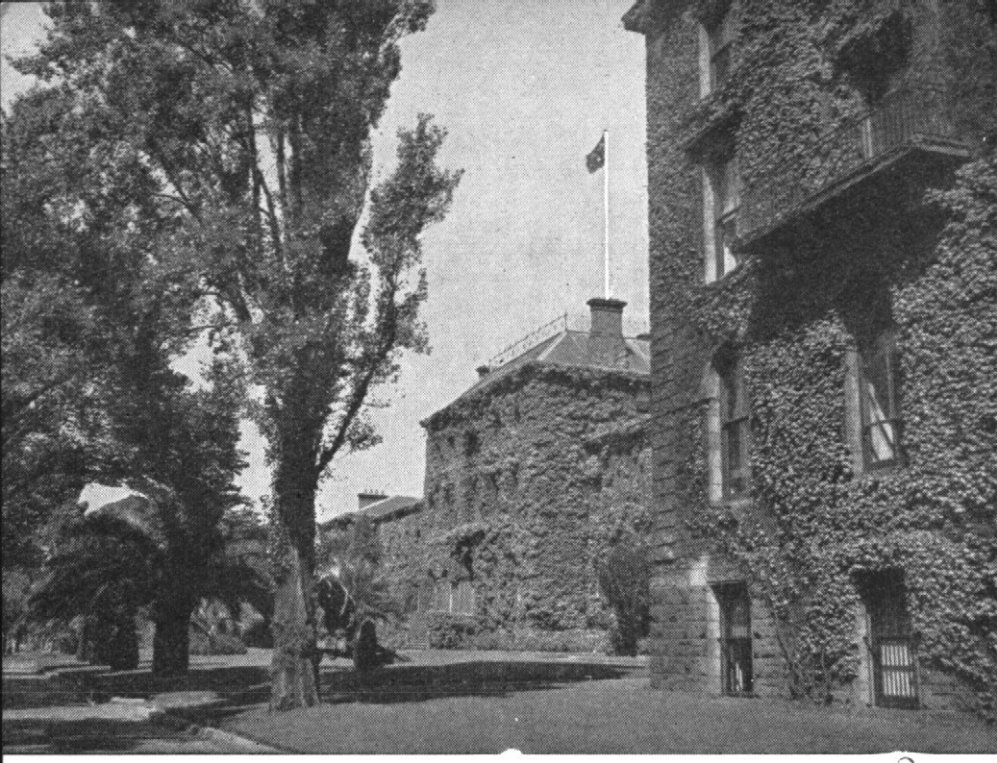

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Editor:
COLONEL E. G. KEOGH, ED (RL)

Assistant Editor:
MAJOR W. C. NEWMAN

Staff Artist:
MISS JOAN GRAHAM

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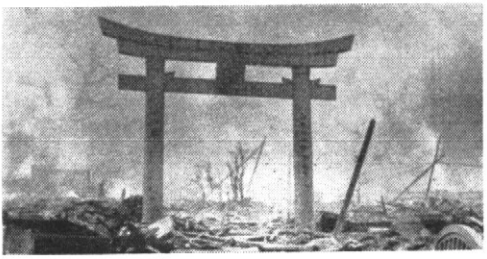
THE PURPLE TESTAMENT



Major-General A. G. Wilson, CBE, DSO
Australian Staff Corps

Object of War

"THERE is no dispute as to the ultimate object of war."[1] It is for one nation to impose its will upon another nation.

"The ultimate aim in war is to force the enemy to abandon the purpose for which he resorted to arms and to conclude peace on satisfactory terms."[2] It is NOT the object of war but the ways of attaining the object that are contentious.

Attainment of Object

A nation "endeavours to achieve its aim by employing part or all of the means of persuasion at its command. These means include diplomacy, economic influence applied in the form of financial or commercial restrictions on its opponents or of assistance to its allies, and in the last resort the use of armed forces at sea, by land, and in the air."[3] Or to put it another way:—

> "War is essentially a relationship between two powers in which one endeavours to force the other to submit to its will by the application of some form of pressure. This pressure may take on economic form, or it may take the form of possible starvation, or the more direct form of bayonets and bullets, but where vital issues are at stake it must be severe enough to throttle the national life."[4]

Some Means of Persuasion

Economic Persuasion

The application of economic persuasion dates back to antiquity. The Roman legions ravaged the land to make it untenable for their enemies. A scorched earth policy was pursued by Wellington when he retreated to the lines of Torres Vedras and by the Russians on a much larger scale in 1812 when the inhospitality of a western Russia, scorched then

1. "British Strategy" (Major-General Sir F. Maurice, KCMG, CB).
2. FSR Vol III 1935 Chap 1 para 2.
3. FSR Vol III 1935 Chap 1 para 1.
4. "A Study of War" by Admiral Reginald Custance (refers to an essay written in 1913).

frozen, forced the French to retreat disastrously to their homeland. And nation to nation — the blockade of Germany in World War I when the main instrument was the Navy. In World War II Great Britain herself was almost forced to her knees by the German sea and air attacks on her shipping. In one month alone—November 1942—more than 600,000 tons of Allied shipping were sunk by submarine attack.[5] In similar manner the economic blockade and bombardment of Germany and her satellites during 1939-45 contributed materially to their defeat.

Persuasion by Propaganda

Propaganda as a means of persuasion came into its own with the introduction of radio. By such means it was practicable to disseminate quickly to a large listening-in public only the information it was considered advisable for them to receive. The "thing to do" in England during World War II was to listen-in to the wireless news—especially the "9 o'clock"—so much so that it became one of the revue jokes of the day. Who could ever forget those stirring war-time broadcasts by Winston Churchill!

On the other hand there were infamous enemy propagandists like Lord Haw-Haw and Tokio Rose, whose broadcasts, whilst at times most humorous, were not particularly effective.

As an example of how much notice was taken of broadcasts even as early as 1940, and of how insidious rumours can be, in September of that year a rumour was passed around the Australian Force on Salisbury Plain that Lord Haw-Haw had broadcast that 18 Aust Inf Bde was due to leave England for the Middle East shortly and that it would never reach its destination. The CO of the unit in which the rumour originated mentioned it to the GOC. The then CIGS attended one of our exercises near Tidworth. The GOC in the course of conversation with the CIGS told him of the rumour. The first I, as GSO1 of the Force, knew of it was when an IO from the War Office reported to me that he had been given the special mission of finding the source of the rumour. It was traced to a unit cook who, however, stated that his offsider had heard the broadcast. The "offsider," of course, knew nothing of it.

Persuasion by Fear

I have coined the phrase. It is an age-old method—persuasion by massacre—the Romans, the Mongols, the Huns, the Turks—most nations at some time or other practised it. Seneca in his day wrote:—

> "We check manslaughter and isolated murders; but what of war and the much-vaunted crime of slaughtering whole peoples."[6]

There came a time when the massacre of civilian populations became relatively unpopular until eventually there was international agreement regarding the waging of war. To quote from the Manual of Military Law Chap XIV — "The Laws and Usages of War on Land":—

> "In antiquity and in the earlier part af the Middle Ages no such rules of warfare existed; the practice of warfare was unsparingly cruel and the discretion of the Commanders was legally in

5. "The Struggle for Europe" (Page 124) —Chester Wilmot.

6. "Epistulae ad Lucilium" (Stevenson's Book of Quotations).

> no way limited. During the latter part of the Middle Ages, however, the influences of Christianity as well as chivalry made themselves felt, and gradually the practice of war became less savage."

Most of the "laws of war" were formulated and agreed to in the early part of this century. It is interesting to view some of them in the light of subsequent events:—

The Hague Convention 1907—
"Relative to the Opening of Hostilities."

Remember Pearl Harbour December 1941?

The Hague Declaration 1907—
"Prohibiting the Discharge of Projectiles and Explosions from Balloons."

Remember the bombing of Rotterdam and of London in 1940?

The Geneva Convention 1929 "Relative to the Treatment of Prisoners of War."

Remember the Thailand Railway and the Sandakan Death March?

Recently I came across the following sentence in a book "The Memoirs of Hadrian," by Marguerite Yourcenar:—

> "The stupid, cruel and obscene game would go on, and the human species in growing old would doubtless add new refinements of horror."

The words referred to war and were ascribed to a man who lived AD 76-138.

The latest "refinement of horror" was introduced on 6 August 1945 with the dropping of a "nominal atomic bomb" on Hiroshima which caused the death of 70,000 and which injured a similar number. It is said that the explosions at Hiroshima and at Nagasaki hastened the armistice with Japan. Whatever the general political effect of the dropping of the bombs was, it was "persuasion by fear." The destruction of either town had not, as far as I am aware, any military significance. I do not intend going into the rights and wrongs of the matter. Suffice it to say that the bombs *were* dropped and that their release was *not* related to an immediate *military* aim such as the invasion of Japan.

It would appear quite clear that in a future "hot" war atomic missiles will be used by the military forces in the field. As Field-Marshal Montgomery has said:—

> "In fact, we have reached the point of no return as regards the use of atomic and thermo-nuclear weapons in a hot war."[7]

But will such weapons be used against "undefended towns, villages, dwelling or buildings"? In my opinion there is "no return" here also. Even in our own writings on atomic warfare, included in likely targets for atomic attack are support areas and "civilian populations with the aim of disorganising the system of civil administration upon which fighting forces rely for most essential services."[8] This sentence refers to targets the destruction of which would have a direct effect on military operations. But what is there to prevent the extension of the use of atomic bombs to the wider field of the political objective of enforcing the will of one nation upon another?

What happened in World War II?

7. "A Look Through a Window at World War III" by F. M. Montgomery: Australian Army Journal April 1953.

8. "Notes on Atomic Warfare 1954" Sect VI para 2.

Were targets for bombardment, especially from the air, restricted to those which had a direct effect on military operations? I recall being in England when the first 1,000 'plane raid on Germany took place. Aircraft were gathered from far and wide. I understood that any "kite" that could fly the distance and drop a bomb was used. The propaganda value was great, not only in raising the morale of our own people, but also in lowering that of the enemy.

Was it not claimed at one time that the persuasion of the fear of bombing would make the enemy sue for peace? The exponents of this theory were, of course, wrong, as they always will be. No thoughtful person will contend that wars can be won by one Service alone.

Persuasion by Disorganisation

It was bad enough during World War II when London was being bombed in the winter of 1940-41. Much time was lost due to disrupted communications, to being in air raid shelters, to leaving early in the afternoon to get home before the night air raids began. How much worse it must have been in many German cities! How much more confusion there would have been if atomic bombs had been used. Imagine the effect of a "king hit" thermo-nuclear bomb dropped without warning on the centre of London at 1 p.m. on a week-day!

Effects of Atomic Bombs

I do not intend going into the details of the effects of atomic bombs, both fission and fusion, which have been covered adequately already in articles in the Australian Army Journal. Let me, however, remind readers of the casualties caused at Hiroshima and Nagasaki by nominal atomic bombs (20 KT), one of which was dropped on each city:—

	Killed and Missing	Injured
Hiroshima	70,000	70,000
Nagasaki	36,000	40,000[9]

Let me remind readers also that the destructive power of a nominal bomb is only 20 kilotons. It has been estimated that the American thermo-nuclear bomb exploded at Eniwetok on 1 March 1954, reached the incredible force of 15 megatons, 750 times as great as that of the bomb dropped at Hiroshima. The economical maximum for an explosion is said to be approximately 50 megatons, above which there is no increase in the area destoyed because all additional power is dissipated into the upper atmosphere. So there we are—from 20 KT to 15 MT to 50 MT, the ultimate!

We in our exercises without troops (and, of course, without bombs) talk glibly of dropping a 20 KT or a 50 KT bomb. A template is placed on a cloth model to show the area affected by the explosion. We refer to our books and our charts. Taking a nominal bomb being burst at medium height to produce the maximum number of casualties, anyone in a trench with complete flush earth cover (18 ins thick) within 1000 yards of GZ might become a casualty.[10] Or put it another way, under similar conditions, if the concentration of troops on the ground is 4 per

9. "Effects of Atomic Weapons" page 336 US Government Printing Office.
10. "Physical Effects of Atomic Weapons" by W. R. Blunden, AAJ No. 78, Nov 1955.

5000 sq yds, the number of fatal casualties would be about 220.[10] Let's be *generous to the bomb and say* it could possibly eliminate one major unit—one infantry battalion, 700 men.

And every time the dropping of a 20 KT bomb is mentioned I visualise Hiroshima as I saw it early in 1946—a flattened city. The only buildings standing within a reasonable distance of GZ were of steel and concrete, but they were gutted and awry as though "pushed about" by some naughty child. I recall the utter devastation. I remember that 70,000 people were killed by the explosion. I compare this result with that hypothecated against troops in the field. *Surely the persuasion by* fear and by disorganisation by dropping atomic bombs on cities is going to further the aim of a nation at war more than by using such weapons against armies in the field! A horrible thought which, however, history shows cannot be discarded. World War II demonstrated clearly that "open cities" no longer exist and that when a nation now goes to war every man, woman and child in it is involved in some way or other.

Churchill in his famous speech in March 1955 stated that:—

"The hydrogen bomb has placed mankind in a situation both measure'ess and laden with doom.

"There is no defence—no absolute defence — against the hydrogen bomb."

It has been reported that Lord Russell said that five hydrogen bombs could knock Britain out of a war.

But whence is all this argument leading? To the following conclusions:—

(a) That the effect of an atomic or thermo-nuclear bomb on a city is immensely greater than on troops in the field; and
(b) that, accordingly, the aim of war can usually be furthered more by employing such missiles against cities than troops; and
(c) that a great advantage could be gained by "king" hitting the enemy to reduce his power of retaliation.

Total War

Perhaps you agree with me; perhaps you don't. It doesn't matter much.

In a speech in May 1917, Woodrow Wilson said:—

"It is not an army that we must train for war; it is a nation."

Such a dictum must apply more these days than then. But yet we still concentrate only on the training of armed forces for war.

The term "Total War" was, I think, coined in World War I. World War II confirmed the expression and World War III will, without a doubt, endorse this confirmation.

It is June 1960—a bright, warm early summer's day in London. The Miracle of Spring has just been completed and the earth is gay with its newly acquired coat of many colours. In spite of the joy in the air, the gentlemen wearing the bowler hats and carrying the tightly rolled umbrellas look worried. Those travelling by bus or underground are scanning their morning papers. International tension has risen to fever point. Parliament is meeting this day to consider what emergency measures are to be taken. Whoosh!! There are five of them out

of the blue without even the sound of an aeroplane engine—one on each of London, Liverpool, Hull, Glasgow and Birmingham.

Shortly afterwards there is a swarm of light bombers with the obvious objective of destroying our retaliation force, including our fighters. Although the enemy do terrific damage, sufficient of our bombers remain to carry our missiles to Communist cities. The "Battle of Britain" is being fought again, although this time a decision is reached within a matter of days. Our fighter aircraft match evenly the enemy, who are at a disadvantage owing to the distance from their bases.

The surprising thing is that there is no Communist blitz against our forces along the Elbe. From Intelligence sources it is ascertained that had the Communists succeeded in blasting our fighter force from the sky, an airborne invasion of England would have taken place within a week of the "king hit" thermo-nuclear attack on our cities.

And what is the position on D + 3 day? In England there is chaos. There is no question of the Lion licking his wounds. He has lost his head, and with his head, of course, his tongue! Hence, no licking! With the destruction of Parliament and the means of government (plans prepared in 1956 included the dispersion of departments into the country, but the attack came before this was done) the country had become completely disorganised. Fortunately GHQ Home Forces was tucked away in a remote spot in the country and survived the attack. The C-in-C, a peaceful character, declared Martial Law and tried to reinstate some sort of order. For the Armed Forces he laid down that priorities of tasks were:—

(a) The destruction of any enemy forces which might invade Britain.
(b) The restoration of law and order.
(c) The succour of the survivors of the enemy's attack.

In the meantime, what was happening to our troops on the Elbe? The only enemy attack was by propaganda—and insidious it was, too! Information on what had happened in Britain was passed to the troops by every available means—broadcasts, news sheets, leaflets, and, most important of all, fifth column rumours. There was no need to exaggerate the frightfulness of what had happened. There were bewilderment, great anger, horror and above all, anxiety for families and friends. The alternatives seemed to be either:—

> To go "berserk" and kill as many enemy as practicable before being killed oneself

or

> to return home to help succour the remaining few.

To stay still was almost unbearable.

That might be the picture. But there are hundreds of variations of it. However, whatever its shape might be, we can rest assured that the next war will be TOTAL and that every man, woman and child will be involved.

Preparations for World War III

I shudder when I hear officers refer to the forecasts of the devastating effects of the introduction of the cross-bow and of gunpowder, and compare such forecasts with those in respect of thermo-nuclear weapons. There is NO comparison! Why try to belittle the effects of

this evil thing of mass destruction. It is better to know the worst and to prepare for it as best we can. The United States hydrogen bomb exploded in 1954 contaminated 7,000 sq miles — and that was only a test explosion!

Someone said to me the other day:—

> "If an enemy dropped an atomic bomb on Sydney what do you think the people of Melbourne and Brisbane would do?"

I leave it to you to answer the question.

In a pamphlet published in November 1954, the Hon. W. C. Wentworth, MP, stated amongst other things:—

> "A Pearl Harbour upon a world scale is by no means inconceivable. In such cases, the defence preparations made after the onset of hostilities would be virtually negligible; it would be what is done before the attacks which would count."

I could not agree more!

The training and preparation of a nation for defence in war involves a completely new concept. In England, according to that admirable article in the Australian Army Journal, April 1956, entitled "The Army and Civil Defence," the present plan is to raise a Mobile Defence Corps of thirty-six rescue and twelve fire battalions. Other assistance, especially from the technical arms and services of the Armed Forces, would be required. The article ends by stating:—

> "If, however, the dangers were as apparent as in the United Kingdom a Mobile Defence Column would be a readily available solution to this problem as a surprise attack would prevent a civil force being trained in time, and it had been proved that such a force of the numbers, training and mobility required, cannot be raised in peace-time."

What an admission to have to make!

Field-Marshal Montgomery in his article on World War III, to which reference has been made before, stated:—

> "Indeed, there is no sound Civil Defence organization in the national territory of any NATO nation as far as I know."

It stands to reason that if there were to be a third World War, Civil Defence would be as important as Military Defence. Its importance would be such that after the "king hit" was delivered, any of the armed forces which could be spared from engaging actively the enemy's navy, army and air force would be used on Civil Defence tasks. This means that all troops will have to be trained in rescue work and similar duties. The body which controls the defence preparations of a country will need to contain representatives, not only of the three Services and Supply, but of all other instrumentalities involved directly in the control of the country in time of war. It is only by thinking afresh and by planning more or less ab initio that we can hope to be prepared for the next war.

Conclusions

(a) In a life and death struggle between nations, atomic and thermo-nuclear weapons will most probably be used.

(b) Atomic and thermo-nuclear weapons are so much more

effective against concentrations of people and materials than against troops in the field, that priority for their use would probably be given to targets such as centres of population, of industry, of trade, of communications.

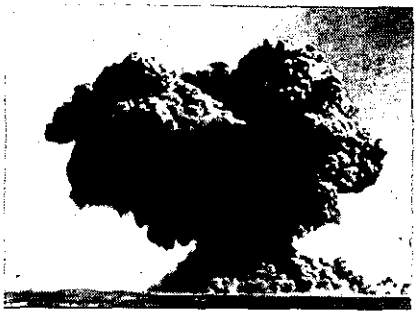
(c) The next war will be TOTAL in all its aspects and will involve every man, woman and child.

(d) Preparations and training for the next war, which we hope will never come, must be national and must be undertaken accordingly.

(e) The armed forces must be fitted into the over-all pattern of defence and not be considered separately.

Epilogue

For modern civilization, or perhaps for mankind itself, to survive, there is only one real solution to the problem—the abolition of the "last resort" means of persuasion, the use of armed forces at sea, by land and in the air.



The Base for Airborne Penetration

Commander R. A. H. Millar

Royal Australian Navy

I REFER to an article entitled "The Small Airborne Unit in a Long Range Penetration Role," which appeared in the January 1956 edition of the Australian Army Journal.

The author has apparently made quite a study of the academic problems attached to this subject, and of some of their solutions; but although he states "For our purpose South-East Asia includes Malaya, Thailand, Indo-China and possibly Burma," I suggest he took only a cursory glance at the map before writing his paper, and closed his atlas without appreciating the most important single factor of the area—its vulnerability to sea attack.

There can be no doubt that the success of a long range penetration by land forces depends on transportation. Their infiltration, probably by air, is mandatory to success. But what of the exfiltration? Has that no bearing on their morale? And what sort of air should be employed? He never even considered Naval air.

Under the heading "Methods of Transportation" were listed (a) land; (b) sea; (c) air. The first two were quickly dismissed and the paper then discussed air transport only. That may be the academic solution, but is certainly not realistic. Let me show why.

Geographical Factor

Much of South-East Asia is within 200 miles of the coast. He who controls the sea (and here a degree of air control is also required) can, by sea, produce his raiders within 200 miles of their target, and could evacuate them when their task has been completed.

Throughout South-East Asia, in time of war (and that is the assumed state) the lack of airfields will be very keenly felt. It is currently accepted in staff circles that one of the first targets to be neutralised is enemy airfields.

A field capable of operating heavy troop-carrying aircraft is expensive to build and difficult to defend.

In the event of a "limited" war it could be that such major airfields as Changi or Don Muang would be tenable, but airfields in South-East

Asia are at a premium; they would be taxed to breaking point in endeavouring to achieve and maintain air superiority. It would be unwise to plan on their being available for penetration projects.

Recently, at Bangkok, a demonstration was put on where 35 helicopters, operating from USS "Princeton," transported a Marine battalion ashore, and subsequently showed how the elements of surprise, mobility, and economy of force could be exploited. It was a lesson which any thinking man could apply to practically any military operation, but the type to which it is particularly suited is the "Chindit" type operation.

Additional Methods of Transport

To the methods of by "Sea, Land and Air" should be added:

(a) By sea and land, and

(b) By sea and naval air.

By Sea and Land

Much of the land communications of Indo-China, of peninsular Thailand, of Malaya and peninsular Burma follow the coast. In many instances there is no alternative. Is this not an ideal circumstance for landing the raiding party by sea? They can be deposited where they wish, and when their task is completed they can be evacuated and moved to a new area for further operations. They thus retain the initiative, achieve surprise, maintain their mobility, employ the greatest economy of forces, and their morale is sustained.

Aircraft Carriers

The aircraft carrier is a floating airfield complete with its own fighter defence, fire fighting appliances, fuel supplies, ammunition supplies, aircraft control systems, air warning devices, etc., but which is able to move from theatre to theatre, to strike and withdraw, to seek out weak spots and to disperse an enemy's defences.

The small carrier group, comprising, say, three carriers, is ideal for land force support operations. One carrier provides day defence of the group, the second night defence, and the third the main military support aircraft. Should one be damaged the others provide the "spare deck," i.e., the alternative landing facilities.

In raider type operations the helicopter, operating from its floating base, can ferry personnel and stores ashore. The required landing area is small, certainly not as large as that required for parachuting troops. Helicopters are, however, vulnerable. It is not beyond imagination to visualize an aircraft designed to parachute men and stores, and yet be capable of landing on and being catapulted off, a carrier.

The carrier can provide protection; it is capable of giving fire support to the forces on the ground should they require it; it can attack and neutralize any enemy airfields and installations within a dangerous radius; it can withdraw from the hornet's nest at will and by its mobility can confuse and disperse the enemy's defence.

Sea and Naval Air

The combination of sea transport to the general area, and the use of naval air to the specific area of operations, can, perhaps, provide the most efficient method of infiltration, of re-supply, and eventual evacuation. The force can be given close support in the field, and can employ those basic principles of war without which no operation deserves success.

HONOURS and AWARDS

Lieutenant-Colonel A. R. Etheredge, OBE (RL)

Office of the Military Secretary, AHQ

MANY articles have been written on the subject of Honours and Awards, yet there remains a certain amount of mystery about the pieces of ribbon worn on the breasts of members of Her Majesty's Services. Most people today correctly associate these pieces of ribbon with the various Orders, Decorations and Medals granted by the Sovereign, but comparatively few are able to summarize at a glance the record of a serviceman's career from his ribbons.

Ribbons of Orders, Decorations and Medals awarded for operational or non-operational service are worn in a certain sequence on the left breast, whereas medals awarded by various Societies for saving life are on the right breast. The sequence in which the various awards are worn is published from time to time in the London Gazette, and may also be found as a frontispiece to the Australian Army Lists.

Generally, anything which is not an Order or a Medal is usually held to be a "Decoration." The Victoria Cross, George Cross, Distinguished Service Cross, Military Cross and Volunteer Officers or Efficiency Decoration are cases in point.

Medals fall into four distinct groups, viz.:—

(a) Medals for gallantry in action or for bravery and saving life in peace.
(b) Medals awarded for war service.
(c) Commemoration Medals.
(d) Long Service and Good Conduct Medals.

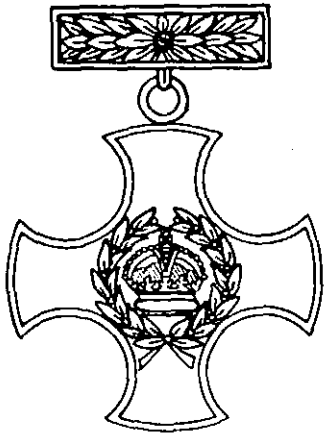
Gallantry Medals

Among the Medals awarded for gallantry in action are the Distinguished Conduct Medal (DCM), the Military Medal (MM), the Conspicuous Gallantry Medal (CGM), Distinguished Service Medal (DSM), and the Distinguished Flying Medal (DFM). These are all awarded for war service. The Albert Medal, the George Medal (GM), the Air Force Medal (AFM), the British Empire Medal (BEM) and the Edward Medal are awarded for outstanding service in peace or war.

Commemoration Medals are awarded to commemorate Coronations, Jubilees of the Sovereign and other important national events.

War Medals

Medals for war service were not issued generally to all officers and other ranks engaged in operations until well into the nineteenth century, the only exception in Great Britain being the Medal for the



DISTINGUISHED SERVICE ORDER

Battle of Dunbar in 1650. The award of this Medal was voted by the House of Commons to all ranks of the Parliamentary forces who had participated in the battle.

Throughout the Peninsula War (1808-14) Medals were conferred only on senior officers. It was not until 1848 that the Military General Service Medal, with bars for Peninsula actions, was issued. By this time many of the veterans had died natural deaths, and only a few surviving junior officers and men received the Medal. It seems strange that participants in battles like "Maida" (4 July 1806) or "Albuera" (11 May 1811) went unrecognized for 42 and 37 years respectively.

However, there was one exception to the general rule. In 1816 a Medal was issued to all ranks who participated in the Battle of Waterloo the year before.

The Royal Navy suffered in much the same way. Admirals and captains engaged in the victory over the French Navy off Ushant on 1 June 1794 were rewarded with Gold Medals, a precedent which was followed in all subsequent naval engagements except "Copenhagen." Junior officers and ratings received no awards until 1848 when a Naval General Service Medal, with bars for various actions, was issued. One of the bars, incidentally, was for "June 1st, 1794."

After the Battle of the Nile (1 August 1798) Lord Nelson's Prize Agent, a Mr. Davison, issued a Medal at his own expense to every officer and rating engaged in the action. It was in gold for admirals and captains, silver for lieutenants and warrant officers, bronze gilt for petty officers, and bronze for seamen and marines.

Similarly, for the Battle of Trafalgar, a Mr. Boulton, of Birmingham, received authority to strike and present a Medal to every British officer and other rank engaged in the battle on 21 October 1805. On the same occasion a special medal was given by Mr. Davison to the ship's company of Nelson's flagship HMS Victory.

Today it is surprising to think that it was left to the generosity of private individuals to reward the servicemen who had won such important victories as the Nile and Trafalgar.

In the period 1840-1850 it became customary to grant a Medal to officers and other ranks who had taken part in a campaign. Early issues had the name of the recipient engraved on the face of the Medal, but subsequently the name was engraved on the rim.

An unusual award was made for the Sutlej campaign of 1845-46. The Medals bore the name of a battle on

he reverse, and an officer or soldier who fought in any one battle received the appropriate Medal. For each subsequent battle he received a clasp or bar inscribed with the name of the battle for attachment to the ribbon. For some years a similar system was followed, a single Medal being awarded for the campaign, with clasps engraved for each battle in which the recipient was engaged.

What are known as "General Service Medals" were instituted to obviate the multiplicity of Medals. The same Medal was awarded for all small wars or expeditions in a certain country or continent, while bars attached to the ribbon denoted the particular services for which the Medal was awarded.

In World War I one General Service Medal was awarded for service anywhere, while another, known as the "Victory Medal," was awarded for service in a theatre of operations. Neither of these Medals bear any clasps.

Beginning with World War II it has become the practice to issue a General Service Medal for service anywhere, with additional Medals or Stars for each theatre of operations in which the recipient was engaged.

There is a widespread belief that Medals won by a father may be worn by his son, but there is nothing to support this idea. It is true that awards to deceased service men, including the Victoria Cross, are usually presented to their next-of-kin, but this does not imply that they may be worn in uniform.

It is a punishable offence for service men to sell or otherwise dispose of their Decorations and Medals. They may, however, have them replaced if they are lost or destroyed through no fault of their own.

British subjects are not permitted to accept or wear foreign Orders, Decorations or Medals without the permission of the Sovereign. The procedure is for the foreign Government wishing to confer the award to approach the Commonwealth Government concerned through diplomatic channels. If the award is approved a recommendation for acceptance is forwarded to the Sovereign and the final decision conveyed to the foreign Government.

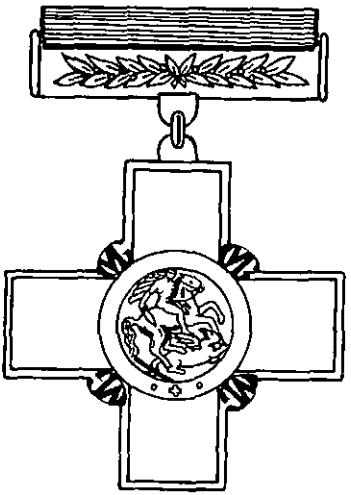
Miniature Medals

Miniature medals are small reproductions of the originals provided at the wearer's own expense. They are worn by officers in Mess Dress, and on certain occasions may be worn with civilian attire.

It is not known when the use of miniatures was first authorized, but photographs of officers taken soon after the Crimean War show them being worn. However, the earliest miniatures date from about 1817, when officers who had received the Waterloo Medal had small replicas made for their wives to wear.

The George Cross

A full description of the Victoria Cross, the highest award a British Commonwealth service man or woman can receive, was given in AAJ No. 85. The next highest award a British subject, service or civilian, can receive is the George Cross (GC), which was instituted on 24 September 1940. The Cross is intended primarily for civilians of both sexes, and awards to members of the fighting services are confined to actions for which purely military honours are not normally granted. Under the



GEORGE CROSS

terms of the Royal Warrant instituting the Decoration, the Cross may be awarded to "a Territory being administered by Us." Only one award has been made under this provision —to the Island of Malta for the outstanding services of its people during World War II.

The George Medal (GM) is awarded in similar circumstances to the Cross, where the services are not so outstanding as to merit the award of the Cross.

The Distinguished Service Order

The Distinguished Service Order (DSO) was instituted in 1886 for rewarding individual instances of meritorious and distinguished service in war. No person who is not a commissioned officer of the Navy, Army or Air Force is eligible for this Decoration, nor can any officer be nominated for its award unless his services have been marked by the mention of his name in despatches for meritorious or distinguished service under fire in the field or before the enemy.

Orders of Knighthood

All Orders of Knighthood are governed by Statutes created by a British Sovereign by Letters Patent under the Great Seal.

The premier British Order, the Most Noble Order of the Garter (KG), was instituted by King Edward III in 1349. The number of members is strictly limited.

The Most Illustrious Order of St. Patrick (KP) was instituted by King George III in 1783. The Most Honourable Order of the Bath was instituted in 1399, allowed to lapse and revived by King George I in 1725. This Order has military and civil divisions with three classes in each—the Knight Grand Cross (GCB), Knight Commander (KCB), and Companion (CB).

The Most Distinguished Order of St. Michael and St. George was founded by King George III in 1818 and has three classes—Knight Grand Cross (GCMG), Knight Commander (KCMG) and Companion (CMG).

The Royal Victorian Order was instituted by Queen Victoria in 1896 and is awarded for extraordinary, important, or personal services to the Sovereign. It may be granted to foreigners as well as to British subjects.

The Most Excellent Order of the British Empire was established by King George V in June 1917. It has military and civil divisions and is in five classes—Knight Grand Cross (GBE), Knight Commander (KBE), Officer (OBE) and Member (MBE). In awards made to women the first and second classes of the Order are known as Dame Grand Cross (GBE) and Dame Commander (DBE).

Some of the more important Orders usually awarded for distinguished civil service are the Order of Merit (OM), the Order of the Com-

panions of Honour (CH) and the Royal Victorian Order.

Recommendations for Awards

Awards to members of the fighting services are based on a recommendation usually submitted by the member's commanding officer. The recommendation is accompanied by a citation which records the acts or service considered to merit reward. Since these important documents will be handled by high ranking authorities on their passage to the Sovereign, care should be exercised in their preparation. Particular attention should be given to the following points:—

(a) The citation will be initiated by a commissioned officer, usually the member's commanding officer.

(b) The original will be signed by the initiating officer and all other recommending officers. "Replica" signatures will suffice on copies.

(c) Wherever possible the citation should be typewritten.

(d) The information given on the form must be accurate, particularly in regard to the personal particulars of the member. Abbreviations and code words must not be used. The citation must be as concise as possible consistent with clarity. Since awards are granted for outstanding acts or service, the citation must describe those acts or service in detail.

The following table shows awards in the Orders of the Bath and the British Empire which, in the British Army, are appropriate to each rank, This table is usually followed when recommending awards of these Orders to members of the Australian Services.

Officers

(Substantive and Temporary)

Major-General Brigadier Colonel	Companion of the Order of the Bath (CB) and Commander of the Order of the the British Empire (CBE)
Colonel Lieutenant-Colonel Major (exceptional cases only)	Officer of the Order of the British Empire (OBE)
Major Captain Lieutenant 2nd Lieutenant	Member of the Order of the British Empire (MBE)

Warrant Officers

Substantive Warrant Officers Class I and II	Member of the Order of the British Empire (MBE)

All Other Ranks

All other ranks below substantive Warrant Officer Class II	British Empire Medal

SOME THOUGHTS on the FUTURE of ANTI-AIRCRAFT ARTILLERY

Major J. R. Salmon

Royal Australian Artillery

This article will be treated as RESTRICTED, and will not be published in whole or in part without the authority of Army Headquarters.—Editor.

FROM the time the first atomic bomb exploded we have heard a great deal about a "push-button" type of warfare in which the infantryman and conventional weapons would play little part. Now that surface to air guided missiles (SAGW) are in existence, the pundits have prophesied the end of the anti-aircraft gun and that branch of artillery directly connected with air defence.

The aim of this article, therefore, is to show that just as the infantryman is assuming a greater importance in the atomic era, the anti-aircraft artilleryman will have a more important and increasingly difficult task to perform in the guided missile and atomic age.

A False Impression

It appears that the disbandment of Anti-Aircraft Command in the United Kingdom has caused many to assume that the day of the anti-aircraft gun has gone. The breaking up of this static organization would be better interpreted as a need for increased mobility in anti-aircraft defences. With the height and speed of attack of aircraft and missiles changing almost daily, it is no longer economical to spend vast sums on static emplacements and equipments which cannot be moved to deal with changing enemy tactics. Thus it is preferable to keep one's weapons in mobile AGRAS (AA).

It is worth noting that neither the United States of America nor any other country has dispensed

with anti-aircraft guns, although the USA is now equipped with the Nike missile. In fact, General Alfred Gruenther, Supreme Commander Allied Forces in Europe, only as recently as the latter half of 1955, took the unusual step of making a press statement to the effect that he hoped that NATO countries would not interpret the demise of Anti-Aircraft Command in Britain as the signal for the scrapping of their anti-aircraft defences. In fact he strongly urged them to retain their guns as they have a definite role to play.

The Role

"Conduct of War" states:—"The aims of air defence are to ensure that enemy aircraft:—

(a) Cause the minimum of disturbances to civil and military activities.
(b) Are hindered from carrying out reconnaissance.
(c) Suffer such casualties as will deter them from attacking strongly defended areas.

The gaining of air supremacy is the best form of air defence."

The two principal elements of air defence at present are fighter aircraft and anti-aircraft artillery. Shortly, guided missiles will be available to assist the fighters and guns.

With two services involved, the planning of air defence is a joint Army/Air Force problem, while operational control of the various elements is vested in the air force.

In considering the role of anti-aircraft defences, let us direct our attention to the protection of the forces in the field—in particular those in the combat zone. It is, of course, very important that the field force commander should be protected from air attack. Without air supremacy he has no chance of taking the initiative or winning the land battle, and air supremacy starts with effective air defence.

Can the air forces alone achieve these aims? Let us look at some of the air force problems more closely.

The Air Force's Limitations

At the outset of a war the air forces will be very busy trying to establish air superiority. There will be few, if any, aircraft available to protect the combat zone and air defence will be non-existent unless there are guns and guided missiles suitably sited in the forward areas.

When, or if, air superiority is achieved, modern jets will be unable to intercept the enemy over the combat zone as the limited range of light air force early warning radars in the field will not give advice of his aircraft until they near our FDLs. In suport of this argument, I want to quote two authorities, but suggest the reader should make his own calculations based on the time required to get early warning to airfields, to get fighters airborne, and to direct them to the enemy after they have climbed.

The Army and RAAF Staff College precis on "Air Defence in the Field" issued to 1955 courses, states:—

> "A fighter interception is not easily arranged against raiders moving at 10 miles a minute even under the optimum conditions of a static air defence system. In the combat zone where operations on the ground may restrict the deployment of radars, and frequent moves hamper signal communications, the prospect of interceptions over corps and divisional areas is receding sharply; against

low flying raiders this is especially true. The trend in the future is that the army will have to defend itself within the combat zone."

General Gruenther, speaking to the press in Paris on 29 Mar 56, while talking of the highly organized defence system in North-West Europe, remarked:—"An attacking aircraft could be 80 miles inside the frontier before it was intercepted by a fighter plane."

The army in the field has most to fear from reconnaissance aircraft, who may provide information of suitable targets for the enemy's atomic weapons, and the sneak raider who, approaching over the FDLs from outside the coverage of the RAAF early warning system, is able to deliver his weapon before fighter aircraft can reach the area. With the best will in the world, the air forces equipped with jet fighters of limited duration will obviously be unable to give continuous cover over the tactical battlefield and their capacity to intercept sneak and reconnaissance aircraft is certainly questionable.

This is particularly true when the raider approaches at low level. Siting problems and radar characteristics are certain to prevent adequate early warning of aircraft below 5,000 feet. As the attacker's height increase he will be detected at greater ranges, and with the improved climbing capabilities of fighters more interceptions will be possible. However, it should be apparent at this stage that the combat zone cannot be adequately protected by fighter aircraft, and the army requires weapons with which to protect itself.

Guided Missile Limitations

After reading "Development of the Guided Missile," by Kenneth W. Gatland, F.R.A.S. (published by Iliffe & Sons Ltd.), it appears that the new guided weapons he mentions are going to have some serious disadvantages from the point of view of the army in the field. One can see from this book that, besides the problems of cost and weight of the equipment, the SAGW is not going to provide an effective answer to the "hedgehopper." In fact, as long as these missiles rely on radar for early warning and more especially control, their performance is limited by the radar characteristics.

Consider a 600 miles an hour aircraft at 500 feet approaching a hypothetical missile site equipped with a current S-band tracking radar of over-all beam width of 8 degrees 10 minutes. This means accurate tracking is not possible at angles of less than 4 degrees 5 minutes—in fact, not before the target is about 2350 yards away. This allows only 8 seconds for firing the missile, assuming adequate early warning has previously been obtained for alerting crews, pointing the launcher in the required direction, etc. Even if this could be done, the rates of change of bearing and angle of sight would be so great by the time the missile had been launched and achieved stability that it is quite improbable that the missile's control system would be able to deal with these violent changes.

Based on such a small effective range the number of missile sites required would be impossibly large and for the present we can discard SAGW replacing the gun in the light anti-aircraft role.

The above figures assume perfect radar siting, which will never exist. This factor, coupled with the im-

probability of a missile being able to cope with high rates of change of bearing and angle of sight in the immediate future, would suggest that SAGW will not be able to deal with fast moving targets flying at heights below, say, 10,000 feet.

At the same time, to quote Gatland, "One might be impressed by an American estimate that, using the Boeing GAPA rocket, the cost of defending a city the size of Washington would be 40 million dollars to destroy 250 bombers, or 100 million dollars to counter a 1000 bomber raid," and again — "Whilst the amount of guidance equipment carried in the 20 ft Nike is comparatively small—being esentially a receiver and appropridate servo mechanisms for working the controls—the ground equipment is exceedingly complex and contains no fewer than 1,500,000 individual parts."

When one considers the production problem, and that Australia's economic capacity to pay for some much needed and less expensive equipments is strictly limited, one must expect that the ration of SAGW available in the combat zone will be rather small after the needs of Australia's air defence and the communications zone are met. Thus if we can effectively use guns to deal with a target we should do so for economic reasons.

Another problem and one which will face the air defence commander, is how he is to maintain a supply of missiles on to his launchers under heavy or mass raid conditions so that he always has a weapon ready to launch against a target—especially that target following in a wave of bombers. One suggestion is to use an improved mobile heavy anti-aircraft gun site of increased lethality to deal with all possible targets, reserving guided missiles for those escaping or outside the capacity of the guns.

When bombing from a height, using a bombsight or the latest electronic means, a bomber still requires a period of run-up during which a constant course must be maintained. As long as this remains in the 30 second or higher time bracket, the aircraft becomes an admirable target for an improved gun employing improved prediction and radar techniques.

As Gatland points out, the anti-aircraft shell is not effective above 35,000 feet. As we approach 20,000 feet and below its efficiency increases, so above a height somewhere between these two heights, air defence becomes the exclusive province of the guided missile in conjunction with fighter aircraft, should interceptions be possible.

Height Coverage

From these arguments, it would seem that for the present, air defence in the combat zone should be provided under the command of one service somewhat as follows:—

(a) Ground to 5000 feet ..	An improved form of light anti-aircraft gun
(b) 3,000 feet to, say 10,000 feet	A new mobile heavy anti-aircraft gun site
(c) Say 10,000 feet to 35,000 feet	Shared between the heavy anti-aircraft gun *SAGW, with the latter increasingly* responsible as height increases
(d) Above 35,000 feet ..	The exclusive field of SAGW

This plan envisages three weapons. If we could reduce it to two we might effect a considerable saving of effort. While a gun might be designed capable of doing (a) and (b) above, it is probable that its effectiveness in (c) would be limited to the lower heights by weight considerations.

One big advantage is that a universal gun with on-mounting control facilities might be able to deal with a target which is at present relatively immune from the rather conventional coverage plan just mentioned. That is a target approaching low, climbing rapidly to 12,000 feet when the LAA defences are reached, dive bombing from that height to 6,000 feet, then escaping at low altitude.

Although it would appear economical to have one gun capable of engaging all types of targets at all heights up to the minimum effective height of SAGW, this would be offset by the increased requirement for SAGW.

The Low Attack Threat

We have seen that our greatest threat at present is the low flying aircraft. Before we consider what current information is available on how to deal with this problem, it is as well to see what the pilot is likely to do and how we can interfere with him.

Assuming the aircraft will approach as low as map reading will permit, he must find and identify his target. In an aircraft travelling at 400 to 600 mph, this is a problem in itself, particularly if the target is well camouflaged and concealed, and the pilot may have to climb to several thousand feet to identify it. Then he must get his fast aircraft into position for the attack, probably a shallow dive, during which accuracy prevents him from exceeding a speed of about 450 mph. During this time our guns are engaging him and upsetting his aim. Having released his weapon, the pilot has to escape from the guns, climb to get back his sense of direction, and get home.

Thus the pilot's task is a difficult one, which is carried out at great speed. If we can get our fire sufficiently accurate to disturb him and distract his attention, his aim will be upset. The truth of this was proved in Korea when Chinese 37 mm gunners time and again caused inaccurate bombing and straffing with conventional weapons. Furthermore, they destroyed a considerable number of aircraft.

The mere presence of guns will prevent attacks being made as the pilot pleases, and the capacity to hit back will do much to boost the morale of the soldier on the ground. Destruction of aircraft, preferably before they have released their weapons, must always be the anti-aircraft gunner's aim and with new weapons he *will* destroy more despite the improvement of aircraft performance.

Possible Equipments

The Swedish firm of Bofors have manufactured new 57 mm and 40 mm LAA guns. The latter is eminently suitable for the LAA task and the firm's brochures mention the following characteristics:—

(a) Weight	About 4½ tons
(b) Muzzle Velocity	Over 3,000 feet per second
(c) Rate of Fire	240 rounds per minute

(d) Shell weight	Just over 2 lb probably
(e) Effective range	2,500 to 3,000 yards
(f) Rate of Traverse—	
(i) Bearing	85 degrees per second
(ii) Elevation	45 degrees per second
(g) Effective Height	Up to 6,000 feet

The gun is very mobile and can be controlled by one of three ways:—

(a) Manually	Using two layers and two Nife reflector sights
(b) Local Power Control	One layer with joystick power control and one Nife reflector sight
(c) Remote Power Control	Control by an automatic radar fire control equipment

It should be noted that:—

(a) The Nife reflector sight employs techniques very similar to those used in "eyeshooting" with cartwheel sights.

(b) That such a radar fire control equipment passes a welcome death sentence on the need for LAA searchlights for illumination of targets at night.

Careful reading of the October 1955 issue of "The Gunner" reveals a commercial advertisement inserted by N. V. Hollandse Signaalapparaten, Hengelo, Holland, who wish to sell an automatic fire control equipment. The firm advertises the following characteristics for this automatic mobile predictor and radar—"specially designed to combat low flying aircraft" and operate the Swedish guns:—

(a) Size	Mounted on 40 mm chassis
(b) Range—	
(i) Radar	25,000 metres
(ii) Tracker	10,000 metres
(c) Rates of Tracking—	
(i) Bearing	60 degrees per second
(ii) Elevation	45 degrees per second
(d) Time from detection to first round	6 seconds
(e) Accuracy	Appears to be good from trial results published
(f) Displacements	To a maximum of 1,000 metres can be set in

Such remote power control systems can employ X-band radars with a narrower beam than S-band radars and this will enable adequate early detection of low aircraft if given a reasonable site from the radar point of view.

In conjunction these two equipments present a lethal combination to low flying aircraft. As these facts

can be gleaned by writing to firms or reading magazines so it can safely be assumed that the equivalent or better equipments are available in the British service.

Conclusion

As development takes place in light anti-aircraft, so it obviously does in bigger equipments. The new heavy anti-aircraft site will have to be mobile and dispense with all manual operations to achieve the required accuracy. Full remote power control and automaticity in heavy guns is obviously essential and not far off for field equipments.

Gatland's book is convincing in its argument and details on SAGW in static air defence, but he rather overlooks the special problems of the field force and in particular those of the combat zone. Here air defence will require a combination of LAA, HAA guns and guided missiles for some years to come, and the desirability of one service commanding both is apparent.

Just as the end of piloted fighter aircraft in the air forces is in sight, so is possibly the end of the gun. However, both will take some time to die. There is no doubt that both have a very useful role to play for the next 10 to 20 years.

At the same time, radar techniques and the principles of target selection, target surveillance, acquisition, etc., as employed in heavy anti-aircraft today are with us to stay, as these will form the basis of guided missile engagements. It is up to all anti-aircraft gunners to master these, and at the same time we must prepare our thoughts for the problems that will come with new weapons, which are surely not far off.

COMPETITION FOR AUTHORS

The Board of Review has awarded first place and the prize of £5 for the best original article published in the May issue to "Married Soldier—Bedouin or Troglodyte" by Lieutenant-Colonel A. Green, Royal Australian Army Service Corps.

Lieutenant-Colonel Green, a former regular officer of the Indian Army and graduate of the Staff College, Camberley, joined the Australian Regular Army in 1950 after service in the United Kingdom, India, Iceland, Iraq and Palestine, including three years in 52 (Mountain) Division. A specialist in army air transport and Oriental languages, he has since served successively as a Land/Air Warfare instructor, GSO 1 and ADST in Army Headquarters, and is at present Chief Instructor of the Royal Australian Army Service Corps School.

SUBMARINE SAPPERS

Captain J. D. B. Young
Royal Australian Engineers

DURING the last war a group of highly trained specialists were making a name for themselves that was to capture the imagination of all ranks and ages. Known as "Frogmen" by the British and "UDT" (Underwater Demolition Teams) by the Americans, they were normally used in tactical roles.

The tradition and history of "Frogmen," started by the Italians, and added to by such groups as mentioned above is to be perpetuated in Australia by the RAN. But it would be a mistake to assume that underwater activities are thus no concern of the Army. On the contrary, a vast new field has been opened to Army exploration.

Candidate Requirements

Underwater breathing apparatus is often so easy to use that the beginner may not realize the importance of being a proficient swimmer. Such a delusion can be extremely dangerous, as at any time a diver may have to jettison his breathing gear and revert to normal swimming in order to survive. Obviously then, candidates must be reasonable swimmers.

Since swimming involves a considerable physical exertion, diving candidates should be in a state of general good health. Past history of chronic respiratory disorder would immediately bar a man from diving, as would middle ear disease or unusual sensitivity to cold.

Equipment

Due to increasing popularity and corresponding publicity, most people are familiar with the external appearance of breathing apparatus of the "Aqua-Lung" variety. It is intended therefore, merely to give a brief outline of diving gear in use today.

Open Circuit (Compressed Air)

The most common of this variety is the "Aqua-Lung," which incorporates original patents by Captain J. Costeau, Commanding the Underwater Research Group of the French Navy. This set consists of a light steel alloy cylinder with a working pressure of 1800 PSI (120 atmospheres), the capacity of which is 40 cu. ft. of free air.

Since it would be fatal to deliver air to a person's lungs at 1800 PSI, a reducer valve is incorporated. In this particular type of gear the reducer valve assembly also houses the demand valve.

Thus we have high pressure air being reduced to a safe breathing

pressure and, at the same time, the flow of air into the mouthpiece is controlled by the demand of the diver's lungs. Add to these features a carrying harness with a pressure gauge and you have the "Aqua-Lung."

Identical in principal of operation, but with several important structural differences is the Australian built "Porpoise."

This unit has separated the reducer and demand valves, placing the demand valve immediately in front of the mouthpiece. As the water pressure governs the requirement of the lungs, at the same time regulating the flow of air through the demand valve, it would appear logical to have both the demand valve and the lungs at the same depth and so under a common pressure.

In addition to this feature, each "Porpoise" is fitted with a quick release mechanism and granulated cork buoyancy pack. If in difficulties the diver can jettison the main unit, float to the surface and be supported by the buoyancy pack.

Closed Circuit (Oxygen)

One of the main requirements of an underwater reconnaissance is secrecy. This would be almost impossible using open circuit diving gear, for as its name implies, the exhalation is passed straight into the water, thus leaving a tell-tale trail of bubbles as the diver progresses. To overcome this the Closed Circuit outfit was produced. Using this apparatus, the diver breathes pure

oxygen into his lungs and his exhalations are directed through CO_2 absorbent, purified and passed back for re-breathing, in much the same manner as the gas respirator of the last war. Although having the obvious advantage of secrecy, and an increase in duration over the open circuit, the closed circuit oxygen set has a severe limitation in that it is only safe in up to 33 ft. of water; beyond this depth the diver runs a strong risk of oxygen poisoning.

Characteristics of Free Diving

Buoyancy

One of the most pleasant characteristics of free diving is the weightlessness in water and the ability to move in any direction with so little effort. To obtain this neutral buoyancy it is necessary for the individual diver to experiment with lead weights in order to find the correct quantity of ballast. This, of course, will vary from person to person and would be most noticeable if the diver were to change from salt water to fresh.

Swimming Form

The best swimming form when using diving gear consists of keeping the arms by the sides and moving the legs in slow sweeps, with the knees slightly bent. The use of the hands as in conventional swimming will prove a hindrance rather than a help.

Descent

The ability to clear the ears is the main factor governing the rate of descent and, with conditioning of the eustachian tubes, an experienced diver may descend the first 100 ft. in about two minutes. The first sign of equalisation difficulties will be a "wedging" sensation in the ears. This can usually be cleared by blowing through the nose against the nose clip or swallowing. Should this fail, then the diver must cease his descent until he has completely equalised.

Breathing Control

As the main purpose of using the gear is to remain underwater for long periods, limited usually by the shortage of air, considerable research has been made into the most practical method by which a diver may conserve his air supply. A diver must breathe with a slow even rhythm; nervousness and quick breathing will drastically reduce the diving time, and yet the desire to breathe must not be restrained in an endeavour to conserve air.

Since the demand regulator fills the lungs with air to the pressure corresponding to the depth of operations, the diving time from a tank of compressed air becomes less with greater depths. During submersion the lungs fill to the same extent as at the surface, but the actual consumption of free air increases nearly in proportion to the number of atmospheric pressures found at the swimming depth.

Thus, at a depth of 33 ft. (two atmospheres) the diving time is reduced to 50 per cent. of that available at the surface, at 99 ft. (four atmospheres) the consumption rate in theory is four times that at the surface.

It is apparent that if long distances have to be travelled underwater a considerable conservation of air will result if the diver ascends as near the surface as the situation permits.

Proposed Tasks

The possible uses for shallow water diving in the Army are unlimited,

the simplicity of operation and short period required to train divers in its use, plus the ease of transport, make this gear a valuable addition to Army units, particularly any RAE unit. Listed here are a few possible tasks.

(a) Recovery of stores from wet bridging operations.

(b) Inspection of wharves and piers.

(c) Inspection of bridging piles.

(d) Salvaging of sunken pontoons, etc.

(e) Reconnaissance of river beds.

(f) Demolition of bridges or wharves.

(g) Inspection of small ship keels.

The important point about these tasks is that they can be carried out, not by highly skilled specialists in bulky equipment, which takes long periods to get working, but by normal soldiers, working in an office or driving a tractor, ready to dive within minutes of a request.

Demolitions

Whilst not exactly a new field, underwater demolitions are still at

the embryonic stage in the Army today.

Assuming the task to be the removal of submerged rock, one of the first problems is the drilling of holes to receive the charges. In cases where the rock is naturally "fissured" it is not necessary to drill holes, as the crevices or fissures form very good receptacles for the explosive charges. Using existing fissures, it will normally be difficult to apply tamping in such a manner as to obtain full efficiency from the explosive. In such a case a waterproof bag containing the explosive is the best form of charge to use as it will shape itself to the irregularities of the crevice. If, however, drilling is necessary, pneumatic drills similar to those used in every-day quarrying will be required.

Explosives for underwater work should have a high bulk strength, good water resistance and be capable of retaining their sensitivity when subjected to hydrostatic pressure. The severity of hydrostatic conditions under which an explosive can be used is dependent on two main factors, namely, the type of explosive and diameter of the cartridge.

Due to the seepage of water into the explosive on submersion, at a rate of penetration dependent on water pressure, it is important that the diameter of cartridges used be as large as possible, thus keeping for the longest period a maximum explosive dry core.

Salvage

During a recent field day at SME, two divers using the type of equipment discussed previously gave a demonstration of raising a sunken pontoon. The method used was as follows:—

Having located the wrecked pontoon, open all hatches, remove drain plug from each end section, and attach air hoses from surface compressor by screwing hose adaptor into drain plug hole, then feed air into wreck. The pressure of air will force the water out through open hatches and thus form an air lock within the hull of the pontoon. As sufficient air passes through the hoses the pontoon will rise to the surface where it can easily be beached for repairs.

Summary

It is apparent from the foregoing information that suitable equipment is readily available to the Army, and that fit men, capable of swimming, could be trained in the use of this equipment without any difficulty.

Several possible uses have been discussed, but there are still countless so-called impossibilities requiring the services of free divers.

THE USES OF STATISTICS

Condensed from the Monthly Letter of the Royal Bank of Canada

ALL of us must work with figures and numbers every day. The simplest assertion in conversation, as well as the most profound business analysis, deals with quantities. Statistics is one way of bringing big numbers down to a size where they can be grasped with ease.

Men are fond of collecting figures, pushing them around into different combinations, drawing conclusions from them and quoting them. Many a man has built himself a reputation as a shrewd executive merely by demanding: "Give me the figures!"

What we do with figures once we have them is another story. There is an art in handling the information that figures give. This essay is concerned with the preliminaries: how to get the right figures for the purpose we have in mind, how to throw them into readily understandable form, and how to protect ourselves against certain dangers.

There can be little argument against the need for knowledge of our number language. Lord Kelvin put it in a straightforward way: "When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

However, we need to go about collecting the figures in the right way. Unassorted data, no matter in what great masses we gather them, are of little service until we arrange them, classify them, and relate them to one another and to other data. To achieve this, we turn to methods of abbreviating and summarizing the facts we have gathered. The size of a factory may be described by its average monthly output and the importance of a bank may be characterized by its average deposits. To compare the income value of two or more stocks we do not need to memorize long tables of rates of interest, but only to be able to say that the average rate of this stock is $6\frac{1}{2}$ per cent. and of that stock $6\frac{3}{4}$ per cent.

What Statistics Show

Statistics is not a new science. The earliest English book on the subject was published in 1661, while the first complete work was *The Statistical Account of Scotland,* edited by Sir John Sinclair in 1791. The term "statistics" is thought to have ori-

ginated in the Latin word "status," meaning a state, and from that came "statistica," meaning one versed in matters of state. The word "statist" crept into the English language, and was used by Shakespeare in *Hamlet:* "I once did hold it as our statists do, A baseness to write fair."

As defined by Galton, the English anthropologist of the 19th Century, the object of statistical science is to discover methods of condensing information concerning large groups of allied facts into brief and compendious expressions suitable for discussion.

Upon such data there is a host of private and public decisions made every day. Business men make plans in the light of known facts in their field of interest, and check the progress of their business by reference to statistical material collected within their organizations. Government policy is built upon detailed knowledge about the nation's employment, production, and purchasing power. Legislation on conservation, crime suppression, public health, education, housing, industrial relations and economic stabilization must stem from accurate up-to-date information.

We do not value statistics for their own sake, but only as they pay for their keep by enabling us to make better plans, to check performance, to close budget gaps. Through statistics we enlarge our individual experience, obtain facts in definite form, simplify and classify numerical facts so as to make them readily comparable, and qualify ourselves to interpret conditions and foresee trends and tendencies. Without planning we cannot control either business or domestic finance, and planning can only be done effectively when we have a knowledge of conditions such as we gain from perusal of statistical information.

Discretion Needed

There is a cause and effect relationship between all phases and areas of business activity. The business man, however well versed he may be in the techniques of his own business, needs to know also the trends in major supplying, purchasing and competitive businesses. He needs to be able to forecast reasonably well from the record of the past what is ahead.

At the same time he must be careful to avoid over-indulgence in statistical control. Too much information may be gathered, adding to the expense of office work. Statistical indigestion may result when we fail to ask the purpose for which data are to be used, and to appraise the value of the information against the cost of obtaining it. *Executive control is not gained by piling up reports, but by the use that is made of them.*

Gathering of statistics should be tested by practicality: what purpose will be furthered by these statistical data? One could keep a staff busy for a long time averaging the numbers in a telephone directory, but it is hard to know what one would do with the resulting statistic. As Dr. J. A. Gengerelli puts it in lighter mood in an article in "The Scientific Monthly": "Consider, for example, the blades of grass on a lawn; what a capital fact-finding project they would make! We could use the very best in stratified sampling devices to calculate an unbiased estimate of the number of blades of grass con-

tained in the defined area." And then what would you have?

It will pay office managers and executives to look at the statistical efforts being made by their staffs with a view to finding those that are counting blades of grass. Collection of figures, started for a good purpose, which was served in a short time, has a habit of going on and on, and even spreading into new areas.

Principles of Statistics

Most people will agree that if we can measure what we are dealing with, even roughly, it is far better to make some measurement than no measurement at all. In almost all events connected with business we are able to do better than that: we can come very close to accuracy.

The basis of statistics is the law of large numbers, sometimes called the law of average. We may formulate it in this way: "A reasonably large number of items, chosen at random from a large group, have the characteristics of the group."

When we are dealing with statistics of people, goods, finances, and so forth, we may be able to predict the probable course of the whole galaxy without being able to tell what course will be taken by any particular person, parcel or dollar.

All statistical information resolves itself into simple judgments of magnitude, comparisons between this and that or between similar things at different times.

The principal comparisons based upon statistics are: the same thing at different times; something in relation to a larger thing of which it may be a part; and one thing in its relation to something else which is supposed to influence it.

Averages

An average is simply a way of combining a number of numbers so as to obtain a single number that for our purpose can be used to represent the entire set, or to summarize certain of its properties. It gives a quick understanding of the general size of the individuals in a group.

When properly arrived at, a series of simple averages or percentages may prove effective for business planning and control, and yet be easy to understand. It is, however, necessary that three persons know precisely what is being measured and with what purpose: these are the collector of the raw data, the person who computes the average, and the person using the resulting figure. As Dr. Paul H. Nystrom says in *Marketing Handbook:* "Without this knowledge and familiarity with the conditions that give rise to the data the statistician holding sharp analytical tools is not unlike a small boy holding a sharp knife. Each can do very serious damage."

We have a choice of several averages, and we pick out the one which is most appropriate to our data and most meaningful for our purpose. They are mentioned here just as a reminder that there is more than one sort. The arithmetic mean, the most common, is obtained by adding a series of numbers and dividing the sum by the number of items added. The median divides a series equally with the same number of items above as below. The mode is the value in a series that occurs

most often. The geometric mean sounds more difficult than it is: the nth root of the product of n items. If there are three items, you multiply them together and extract the cube root of the product. The harmonic mean, used principally in certain cases of averaging time rates, or when dealing with rates and prices, is a special kind of arithmetic mean, working through reciprocals.

The difference between two averages may be illustrated in an example. The arithmetic average of 2, 4, and 8, obtained by adding them together and dividing the sum by 3, is 4.6; the geometric mean of the same figures, obtained by multiplying them and taking the cube root, is 4.

No one type of average can be considered the best, but only the best for a purpose. Each of them has characteristics that are favourable or unfavourable under the circumstances and for the purpose, is representative.

Whatever average is used, it is necessary that the crude data be of the same sort. If we scramble together several distinct classes of individuals and take an average of whatever sort we shall get a meaningless figure. For example, if we put into one table the heights and weights of men and women, the average height and weight would represent neither men nor women.

Intelligence Needed

It is not enough to have honest statistics placed in front of us; we need to be intelligent in our interpretation and use of them. Statistical methods cannot be relied upon to take the risk element out of enterprise, nor to create certainty of judgment, nor to predict future events. They are a base upon which to formulate sound business judgment: that is all.

Among the best criteria by which to judge a statistical statement is the simple test of reasonableness. Is the conclusion consistent with other known data?

Care is needed in determining the existence and extent of relationship between facts reported statistically. Cause and effect are not always to be deduced because two factors move together. For example: we see in a report that 90 out of every 100 bus drivers have gastritis some time between the ages of thirty and forty. We are not justified in concluding that there is any special connection between driving a bus and having gastritis, if this is all the information we have.

In concluding we quote from Mr. Moroney's Facts from Figures: "If you are young, then I say: Learn something about statistics as soon as you can. Don't dismiss it through ignorance or because it calls for thought . . . If you are older and already crowned with the laurels of success, see to it that those under your wing who look to you for advice are encouraged to look into this subject. In this way you will show that your arteries are not yet hardened, and you will be able to reap the benefits without doing overmuch work yourself. Whoever you are, if your work calls for the interpretation of data, you may be able to do without statistics, but you won't do so well."

PAKISTAN–AFGHAN FRICTION

Lieutenant D. R. Little

Royal Australian Army Service Corps

ONE of the most inhospitable areas in the world, some three hundred miles long by about one hundred and fifty miles at its broadest point, is the cause of the present tension between Afghanistan and Pakistan.

The British called it tribal territory. The Afghans aspire to call it Pathanistan or Pashtoonistan. Pakistan, the possessor, refers to it simply as part of her newly-formed Western Province, and regards it as her rightful legacy from the British.

The area itself is valueless. It contains no large cities or towns. It has no factories, no industrial potential. It is not a high yielding agricultural area. It contains no mines; has no mineral resources.

Its worth is indirect and purely economic, for through it runs the famed Khyber Pass, one of the only two trade routes linking Afghanistan and Pakistan and through which flows the entire export trade of Afghanistan. Before the advent of what is loosely termed modern warfare is boasted of a military value —both tactical and strategic: tactical, since the Khyber Pass in the hands of either country deprived the other of access, and strategic from the British viewpoint since control of the area forced Afghanistan to ally herself economically and militarily to her neighbour, which in turn blocked any Russian aspirations for control of the country.

Tribal territory was borne at the stroke of an administrator's pen. Up to 1893 the frontier of British India lay to its east, among the lower foothills of the Hindu Khush Mountains. Over the frontier to the west lay the Khyber Pass which, in the grasp of an aggressor, might prove disastrous

to any form of defence. The Pass was controlled by hostile tribes who made constant raids into British India, plundering the nearer, richer towns and villages, and withdrawing quickly in the face of any action against them. Beyond tribal territory lay Afghanistan, whose northern borders marked the hitherto limit of the Russian sphere of economic influence which was gradually encroaching on the countries to the south and causing concern in the House of Commons. For Russia to take control of Afghanistan by peaceful means as she did Sinkiang would prove to be a major disaster to the eventual security of the Indian sub-continent.

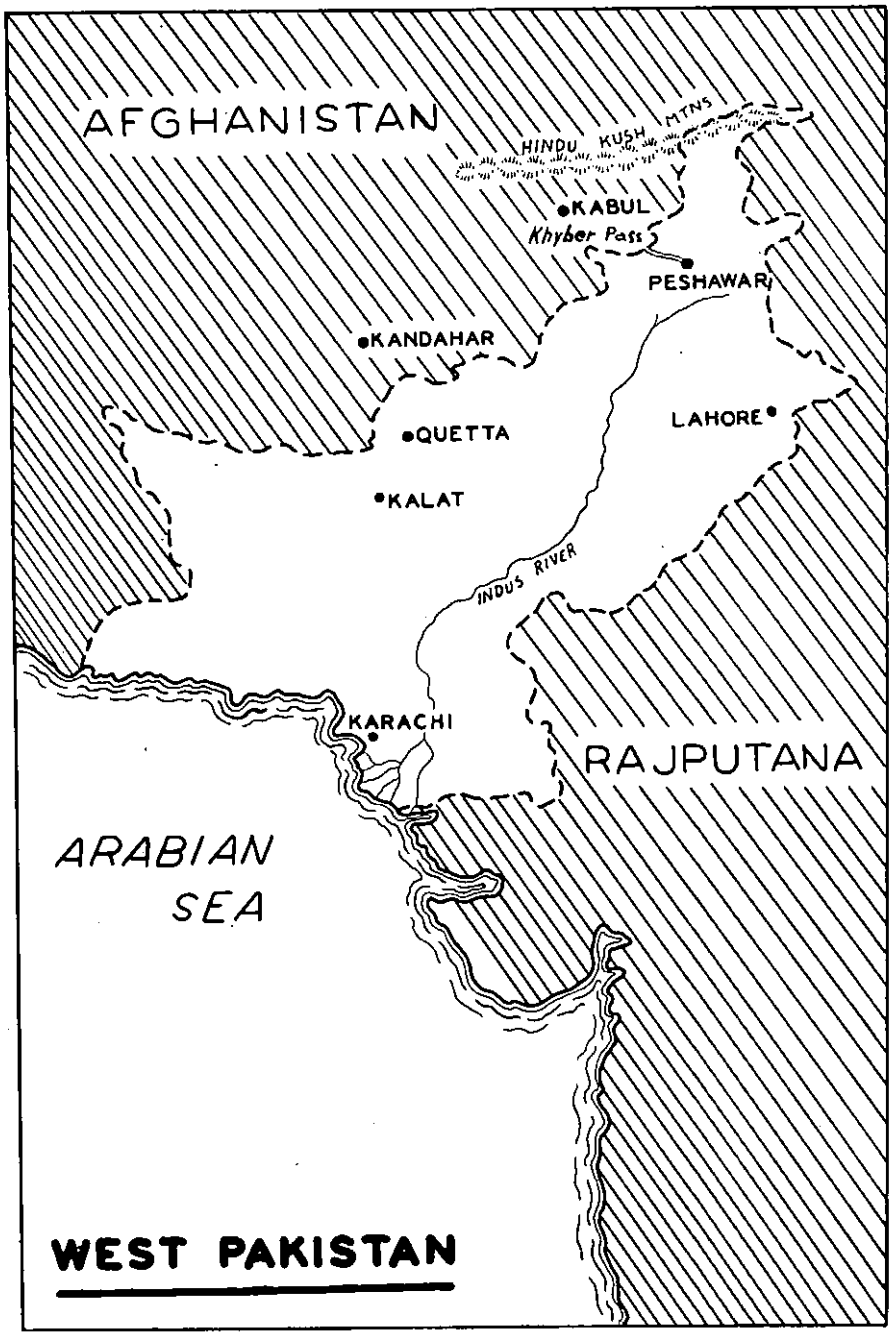
Mindful of these facts, Sir Henry Mortimer Durand formulated his "Forward Policy" and drew—outside the limit of India — a line later to become famous as the Durand Line encompassing tribal territory and seemingly encroaching upon Afghan soil. The ruling Emir of Afghanistan, happy at the thought of a friendly neighbour controlling the tribes and making safe the trade routes, acquiesced to the arrangement. So did three successive Emirs who reigned after him. It was in their interests to do so, since so long as the area was in the hands of a friendly power, the traffic of the passes was safe and the tribes under quasi-control at no expense or inconvenience to themselves.

Durand's move achieved a threefold objective. The Khyber Pass came into British hands; the local tribes could now be pursued into their own country to curb their lust for plunder; and an influence was exerted over Afghanistan which successfully countered any Russian moves for over half a century.

The working agreement which Britain adopted with the tribes is an interesting one, though by no means peculiar to tribal territory alone. The land on which they lived become British territory, which allowed the British free access. The people themselves did not become British subjects, but were allowed to retain their own autonomous rule. They were not governed, administered or restricted in any way so long as they confined their war-like pursuits to within their own country and desisted from plundering the passes. However, since the tribes claimed that to refrain from attacking the traffic of the passes deprived them of their chief source of income and their time-accustomed means of livelihood, Britain compromised by paying them subsidies to police the passes, raised regiments—later to become famous in actions against their own people — and recruited them into the Indian Army.

In theory it worked. In practice it cost Britain millions of pounds in an endeavour to keep peace on the frontier. Forts and garrisons had to be built, roads constructed to isolated outposts, and a large force of troops constantly deployed and maintained in punitive actions against the inhabitants, who were not by nature peace-loving, who regarded unrest and turmoil as their normal state of existence and who for countless generations had enjoyed a state of war-like leisure and banditry.

There are roughly two and a half million of them in tribal territory, all belonging to the Pathan race, which is composed of several lesser


AFGHANISTAN
HINDU KUSH MTNS
KABUL
Khyber Pass
PESHAWAR
KANDAHAR
QUETTA
LAHORE
KALAT
INDUS RIVER
KARACHI
RAJPUTANA
ARABIAN SEA
WEST PAKISTAN

tribes, speaking the same language, sharing the same religion, enjoying customs peculiar to themselves. They are sturdy, of high intelligence —though riddled with superstition —courageous in battle and utterly treacherous. Each man is a soldier, trained by years of struggle for survival. They seldom leave their dwellings, which are loop-holed and buttressed for defence, unless they are armed — generally with foreign rifles of ancient manufacture. When not fighting a common enemy they war amongst themselves—clan fights clan, village fights village and, added to the relentless combat of individuals, are blood-feuds handed down through the generations, waged with a ruthlessness to surpass even the vendettas of Corsica. Interminable years of unceasing turmoil have today produced a race in whose mind murder is the commonplace, and who embark on war with the careless levity of savages. Life to them is cheap—but short.

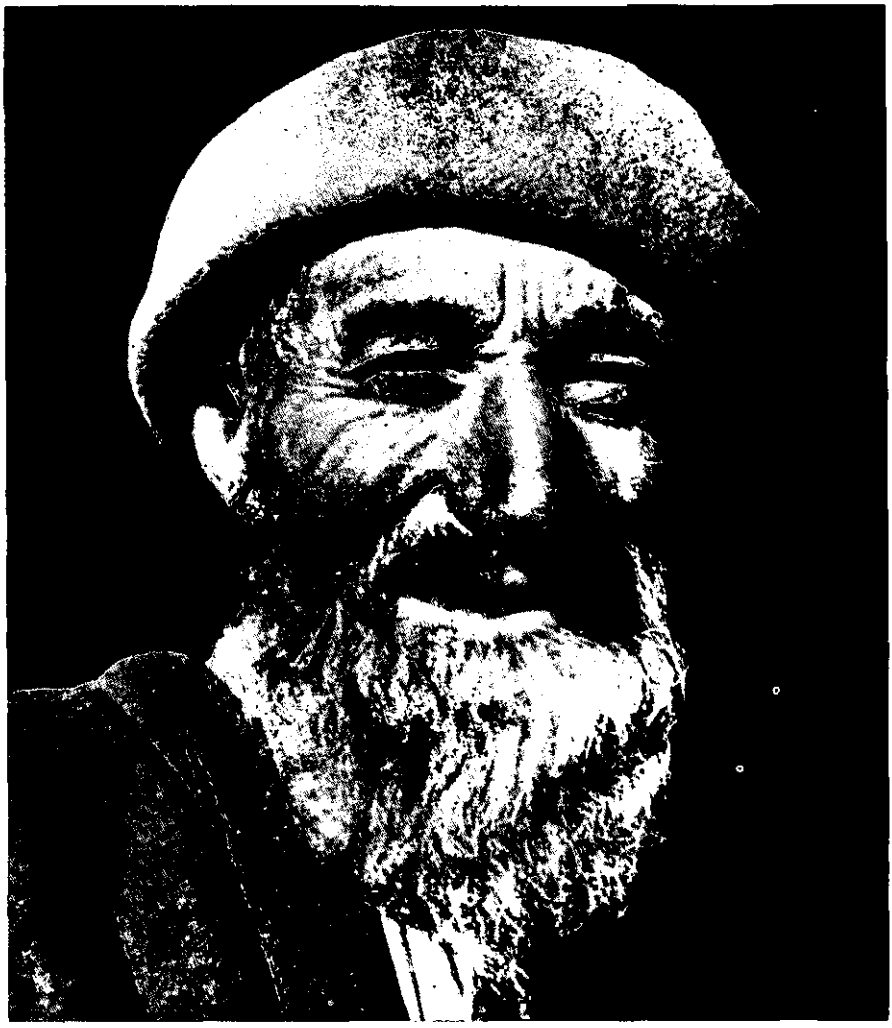
The country in which they live is entirely mountainous. It lies roughly north and south along the spurs of the Hindu Khush ranges. It is barren; and desolate in its harsh monotony of jagged peaks and rocky outcrops from whose slopes drenching rains have washed the soil, leaving exposed everyhere black primeval rock. Nothing grows, for the simple reason that nothing can grow. In the valleys, however, the picture is different. They are broad and flat and fertile with silt washed down from the surrounding hills; well watered with streams and an abundant rainfall; amply able to support the population which grows maize and millet as its main crop.

Prior to the partition of Pakistan and India in 1947 a referendum was taken among the tribes. As a result their country was ceded to Pakistan. And it is interesting to note that they asked for the same arrangement with the new government as had previously existed between them and the British.

Afghanistan immediately protested, She claimed that the referendum was unfair since the people were given only two alternatives: to join either India or Pakistan, and since they were Muslims they naturally chose the latter. They had not been given the option of returning to Afghanistan. She pointed out that while there were two and a half million Pathans in tribal territory, there were another four million immediately across the border; that they were, in fact, Afghans and were related ethnologically to the remainder of the Afghan people. The least that Pakistan could do, she maintained, was to give the Pathans their complete independence by allowing them to set up their own autonomous state of Pathanistan.

Pakistan objected. Her attitude was that though the formation of an independent state might be considered a just solution, no minority group had the right to secede simply because it was a minority group; that Pakistan was filled with minorities. She made it clear that she considered the country hers by right of legacy from the British, and vaguely hinted that if the tribes were given their independence it would not be difficult for Afghanistan in the course of time to stretch out an embracing arm and gather her ethnological Afghans into her fold.

As a result, diplomatic relations between the two countries became strained. Clashes between Pakistan



Tribesman

and Afghan troops broke out and later became frequent, both countries claiming violation of their respective frontiers. Casualties were in the main light, but for the next seven years the danger of outright hostilities breaking out was always present and the diplomatic channels were sporadically jammed with notes of protest, refutation and counter-protest.

The tribes, on the other hand, appear to have taken no part in the struggle for their territory, though once it was reported that the Waziris —the largest and most influential of

the Pathan tribes—had pledged their loyalty to Pakistan, though it is doubtful on which side they would have actually fought if war had broken out.

Matters came to a head in the autumn of 1954. Pakistan declared that early in the new year the country would be divided into two new provinces — East and West Pakistan, and that tribal territory would form part of the Western Province. In this action the Afghans saw their hopes for the state of Pathanistan finally doomed. Riots broke out in the capitals of both countries; the Pakistan Embassy in Kabul was attacked by Afghan demonstrators; both nations mobilised their forces and rushed troops to their frontiers. Afghanistan brought in conscription. Pakistan withdrew her Embassy. War between the two countries seemed imminent, and possibly avoided only because of the expense involved.

Slowly, however, the heat of near-battle finally cooled, leaving frayed tempers and bitterness on both sides. Afghanistan, claiming that an economic blockade has been imposed on her trade outlets through the passes, has ceased exporting to and through Pakistan and all her trade now flows northwards through Russia. Pakistan, in addition to losing the Afghan trade, has lost the comfort of a friendly neighbour and is forced to maintain armed control of her frontier, an additional strain on her budget already drained by military expenditure.

And the winners of the situation? Clearly the Russians, whose aspirations, for fifty years frustrated by the Durand Line, India's Forward Policy, the Afghan's pro-British sentiments, have finally been achieved. She has at last drawn Afghanistan within her sphere of economic control, is establishing trade and diplomatic facilities, offering technical and educational assistance, surveying the country's mineral sources, and has plans of building Afghanistan's only railway to link her own communication system —confident that the investment will be worthwhile since the country will provide a deep salient into the heart of the line of Western defence, and only a few hundred miles from the warm water ports of the Arabian Sea.

BOOK REVIEW

COMMUNIST GUERILLA WARFARE. By Brigadier C. Aubrey Dixon, OBE, and Otto Heilbrunn. (George Allen and Unwin Ltd., Ruskin House, Museum Street, London.)

MUCH has been written about the effects of atomic warfare and new tactical methods necessitated by the use of nuclear weapons. Most of these writings concentrate on the primary effects of atomic weapons, that is to say, on the direct influence they will have on tactics and administrative organization. Nearly all are agreed that the chief new characteristic of both fighting and servicing may be summed up in the word "dispersion." Few, however, give any attention to a very important secondary effect of dispersion—to the great opportunities it will present for the operation of guerilla bands.

Similarly, few accounts of the Korean War give sufficient attention to the operations of the Chinese and North Korean guerillas, and those that do touch on this aspect of the campaign usually confine themselves to a recitation of the counter-measures adopted. And no complete account has yet appeared of the war in Indo-China, in which the Communist guerillas decisively defeated a powerful French army. Here again, in the sketchy accounts which have appeared the emphasis is on counter-measures.

Quite apart from atomic weapons it is important that the possibilities, problems and techniques of guerilla warfare should be systematically studied because our enemies have demonstrated in Russia, in Korea, in Indo-China and in Malaya that guerilla warfare is an integral and effective part of their method of waging war.

The authors of COMMUNIST GUERILLA WARFARE have written a valuable treatise on this form of conflict as it was practised on the Eastern Front, or rather behind the Eastern Front, in World War II. Although they deal almost exclusively with the activities of the Russion partisans, they show that the principles of guerilla fighting are well understood by Communists everywhere, that they are, in fact, an integral part of Communist doctrine. They find it surprising that the Nazi leaders, who had closely studied Communist teaching, overlooked this important point. And they show, too, the terrible price the Germans paid for this omission. The figures quoted tell only half the story, but they are significant. In the Leningrad region up to March 1944 the partisans inflicted 104,242 casualties, and put out of commission 1,050 locomotives and 18,643 railway wagons. In the Ukraine up to the

end of the German occupation they inflicted some 310,000 casualties, wrecked 4,080 locomotives, 39,700 railway wagons, 6,693 lorries, 810 tanks and armoured cars, 324 guns and 108 aircraft. In one instance over a thousand raids on railways, roads and installations occurred in the space of seven hours.

These figures show that properly organized guerilla warfare is not just something that can be dealt with by a few security detachments on the L of C, as the Germans found to their cost. Since they had given the matter insufficient attention before the war they had to improvize an answer on the spot. When improvization failed they had to organize a special section of the staff to devise counter-measures and supervise their execution. This staff produced a manual devoted entirely to the subject. Despite all this, despite the very large numbers of fighting troops withdrawn from the front for the protection of rear areas, despite a powerful organization of specially trained and equipped troops, and despite the most ruthless methods of repression, the Russian guerillas continued to inflict heavy losses on the Germans and to disrupt their operational plans.

It is significant for us that the man who enunciated the principles followed by the Russian guerillas, and later by the victorious Communists in Indo-China is the Chinese leader Mao Tse Tung.

The authors of this book rightly point out that guerilla warfare should be studied not only with a view to devising suitable defensive measures, but, more importantly, with a view to discovering how best to organize guerillas and to use them offensively.

In the past there may have been some excuse for leaving guerilla, or partisan, warfare to a few "cloak and dagger" specialists. Today it is the concern of every commander, it has become as "normal" as any other form of warfare. At any stage short of a major conflagration it is by far the most important form we are likely to encounter. If a major conflict does occur the dispersion of all echelons caused by the mere threat of atomic weapons will give the guerillas a wonderful opportunity. If atomic weapons are used the resulting devastation might well make it impossible for conventional armies to operate at all, in which case the guerilla will probably be the deciding factor. And the decision will almost certainly go to the side which is most thoroughly trained in the use of guerilla methods.

In COMMUNIST GUERILLA WARFARE both sides of the partisan struggle behind the Eastern Front in World War II are reviewed in detail. From this review the authors deduce a set of "rules" to guide us in organizing, materially and intellectually, for waging both offensive and defensive guerilla warfare. It is the most penetrating study of the subject which has come to our notice, and should be carefully read by everyone who is endeavouring to prepare himself for the demands of modern war. Since the book has reached the second impression it is evidently being widely read overseas. It deserves a great deal more attention in this country.

(Note: COMMUNIST GUERILLA WARFARE was reviewed in AAJ No. 69, February 1955. This review of the second impression has been undertaken because of the importance of the subject.) E.G.K.

THREAT TO STRATEGIC AIR COMMAND BASES

EACH year of the Cold War brings its own special crisis in the military, political and economic fields. In the military field these revolve mainly around comparative effectiveness in air power, for, undeniably, strength in the air is now looked upon as the most likely deciding factor in any future global war.

During 1955 the United States was forced, after a great deal of panic, to accept the existence of a really effective air force at the disposal of the Soviet Union. (During previous years the world had come to accept the existence of superior Soviet land forces.) The Soviet Air Force would appear to have bombers of such long range as would enable it to transport the most powerful bombs over the territory of the United States. In order to live with this idea of Soviet air power the Americans accentuated the production of new supersonic interceptors, began to develop techniques leading to the use of atom bombs against aircraft in flight, and to set up a new command for protection of its territory.

All these measures were defensive.

—*From Irish Defence Journal.*

When considering its own capacity to attack or counter-attack, the United States had no particular worries. Strategic Air Command, equipped to deploy to, and operating from, some 17 foreign bases, was still capable of that massive retaliation which is the keystone of current American military policy. While SAC's overseas bases remained intact then its aircraft were still capable of their various missions within the Soviet Union. As long as it retained this capability the Command could be regarded as the greatest single deterrent to the global ambitions of militant communism.

The crisis of 1955 was thus not so much solved as countered. Within the United States better defensive organization provided an answer, while the free world, generally, took comfort from the awareness that SAC, yearly gaining in offensive power, still had the initiative.

The crisis of 1956 goes straight to the root of SAC's power and threatens to render it ineffective. The threat now is to the overseas bases, which are absolutely essential to SAC. Denied these bases it would be impossible for its aircraft to engage in sustained, intensive bombardment of Soviet territory. SAC

would have to resort to operations on a scale so greatly reduced that its present title would hardly be merited.

The New Missile

The Soviet counter to United States long-range air power is, as reported, a long range missile, an atom-age development of the German V2. If such a weapon exists then the United States has lost the initiative in the Cold War, and the West has temporarily lost an important measure of protection.

Nobody outside the USSR can say that such a missile either exists now or will exist in the immediate future. It is not unlikely that this optimum weapon, combining as it would the power of the H-bomb with a carrier incapable of interception, exists only in the fears of United States planners and in the aspirations of Soviet scientists.

It is generally accepted, however, that there is—or will be shortly—at Soviet disposal a missile which has all the characteristics of the optimum weapon except its great range. This missile is reported to have a maximum range of 1,500 miles.

So great has been the agitation created in the minds of Americans at highest levels that there is no doubting their convictions. Fears have been given expression by the institution of a rush programme for the development of a similar (or better) American weapon, by the resignation of the Assistant Secretary of the Air Force (who was charged with wanting to get ahead with just such a development) and through an unusual spate of worried public pronouncements.

Two Versions

In American terminology the Soviet weapon has been labelled **Intermediate Range Ballistic Missile** or IRBM. The title suggests that one of longer range must be possible, and this, too, has, in anticipation, been named. It is the **Intercontinental Ballistic Missile.** The words "intermediate" and "intercontinental" as used in this context refer to the range of the carrier; the former can travel 1,500, the latter 5,000 miles. It is assumed that the warhead will be a H-bomb.

As to the carrier itself—the delivery system—it must be an engine which can operate outside the earth's atmosphere, in other words a rocket which carries its own oxydiser as well as propellant fuel. Fired ballistically like a shell on a given course it must be capable of a speed many times that of sound. Its speed, in fact, must be such as to propel it well into space, on course, before its motors stop. In falling it curves towards the earth at a speed so fantastic as to make interception impossible. The warhead will have exploded long before the whine of the missile is heard by the survivors.

Guidance is not possible after firing; all data must be pre-set as it is for artillery shelling. Just as artillery pieces have to be "surveyed in" so, too, must the IRBM, for it is essentially a "map shoot," its accuracy depending entirely on the accuracy of the maps from which its firing data are calculated. Since many problems affecting flight exist in the upper air, and in airless space, these, too, must be contended with.

From these considerations it follows that the target must be a fixed

installation of appreciable size and great importance.

The world's only precedent for such a weapon was the German V2. Once launched on its 200-mile course none was ever stopped.

The Firing Sites

Wherever trucks can haul materials, launching sites can be built, for they are little more than reinforced concrete platforms on which the missile can be erected preparatory to firing; once targets have been decided upon, sites can be built and concealed. It is acknowledged that the Russians are past masters at concealment of new weapons until they are all in place in the battle-line. Sites, too, are expendable; they can be located in depth within any given area with decoys exposed to invite destruction.

In attempting to find out just how far the Soviets may have got towards perfecting the IRBM one can only let the indications speak for themselves. Their leaders have ever been realists, untrammelled by moral or economic scruples. What was required they got by all means, including abduction, espionage and the diversion of great scientific effort.

The close of World War II showed the potential might of strategic bombing as carried out by the Allied air forces. It also indicated that the V2 was a better approach to strategic bombardment. The USSR was first to grab at German V2 experts and research plant. In all probability it was American encirclement, beginning in 1950, which caused the Russians to set about devising means to break it. Their intensive programme of missile development may date from ten years back. The Americans are this year beginning theirs.

SAC Bases

Strategic Air Command can deploy some 1,500 B47 aircraft. These have a range of 3,000 miles and must continue to constitute the great offensive punch until replaced by the B52, whose range will be some two thousand miles greater. It will be noted that the operational radius of the B47 is no greater than that claimed for the Russian IRBM and the latter has all the advantages.

To extend the range of the B47 the technique of inflight refuelling has been perfected. But the object of this technique has been to assist speedy deployment from home stations to forward bases overseas and not to enable the B47 to engage targets located deeper in Russia.

If this technique is given a combat role then many difficulties arise. The present tanker fleet of KC97's is piston-driven. The tanker is slow and not capable of the operational altitude of the B47, which is 40,000 feet. The net effect of these characteristics is to slow down the bomber at times and in places where it needs to exploit its own great speed and maximum operational altitude. Further, to operate from home bases two refuellings would be required by each bomber and the present tanker fleet would appear to be inadequate to permit of two refuellings for more than, say, 300 bombers.

Jet-tankers under development will permit of complete integration and, indeed, will change the face of air operations by permitting entire self-contained fleets to operate; but these are not yet available to SAC.

At present, and for some years to come, SAC could, if its overseas bases were compromised either by the threat of, or actual devastation, mount sorties from American territory on a scale of only one-fifth of its total effectiveness: *and the entire U.S. policy of massive retaliation has been geared to a full exploitation of all its power.*

As to the bases there is as little secret concerning their location as there is concerning their purpose. They consist of multiple concrete runways, 11,000 feet or more in length. Depots, workshops, fuel tanks, hangars, arsenals and living quarters all surround the basic installation, for these have not been put on the ground to serve the need of the passing tactical moment, but as instruments of strategic support for American foreign policy in wartime. They are large and fairly precisely located targets.

Where Located

Set into islands and continents as the stepping stones to air assault, they encircle the Communist land mass, with not a gap, even on the Arctic flank. Only in the region of the Indian Ocean, between the South China Sea and the Sea of Arabia, are there no bases, for here the dominant local power is not pro-American. In the area most vital to the West — Western Europe — there is an abundance of bases. Britain has many of them; Spain and Morocco have theirs, as have Saudi Arabia and Turkey. All represent threats to European Russia. The key air-distance here may be taken as that between London and Leningrad —a bare 1,500 miles.

Vulnerability

Are the bases vulnerable? The answer depends on geography, but it would appear that the main consideration which decided their locations has made them so. A missile with 1,500 miles range could reach any forward base, including those on Japan, Okinawa, the Philippines, Arabia, Tripoli and French Morocco. A considerably shorter range missile would be needed to reach Alaska (from Siberia), Korea (from Manchuria), Italy, Greece and Turkey (from the Balkans). From East Germany the range to British bases is a mere 800 miles.

The only bases secure from the threat of such a missile would be those on Hawaii, Johnson Island, Guam and Greenland. The former three, however, are not forward bases, but staging areas — stepping stones on the route across the broad Pacific. Only the Thule base on Greenland, then, would remain as a possible source from which strategic bombing could be carried out and from there bombers would require to be refuelled at least once.

Alternatives

In the face of this possible crisis what alternatives are open to the U.S.? Assuming the American object to be a restoration of the military balance through a comparable weapons system, then many solutions can be offered. They include, as the ideal, the development of an American missile with range twice that of the Russian weapon. This is already under way but its successful outcome is a thing of the next decade.

In the meantime what can be done with the weapons system at hand?

A glance at the map offers a partial solution which has the merit that it needs but a few years for its implementation. It depends on the existence in quantity of the B52, with its 5,000 mile range, and demands the presence of the jet-tanker for operational refuelling.

This solution — the only immediate one to be seen—is still based on air power, and air power still needs bases, and bases need security. New bases situated well outside the 1,500 mile range of the Soviet missile, and accommodating B52 fleets, offer no less protection that that at present obtained by SAC.

New Bases?

Where to site the bases presents a problem, for there are but two general areas on the globe which would be suitable. These are North America and the continent of Africa. The hazards encountered by air crews in negotiating the frozen wastes of the Arctic for thousands of miles are so real as not to recommend this course if an alternative exists.

Bases deep in Africa, between the Atlantic and Indian Oceans offer, on the other hand, good flying conditions to the USSR's most vital localities; and they could continue to protect that ground which is most vital to the free world—West Europe.

M. H.