AUSTRALIAN ARMY JOURNAL

AUSTRALIAN COMMONWEALTH MILITARY FORCES

No. 7 Jun–Jul 1949

Notified in AAOs for 31st July, 1949

MILITARY BOARD

Army Headquarters,
Melbourne,
1/7/49

Issued by command of the Military Board.

C.B. Loftus

Secretary to the Board.

Distribution :

One per Officer and Cadet Officer

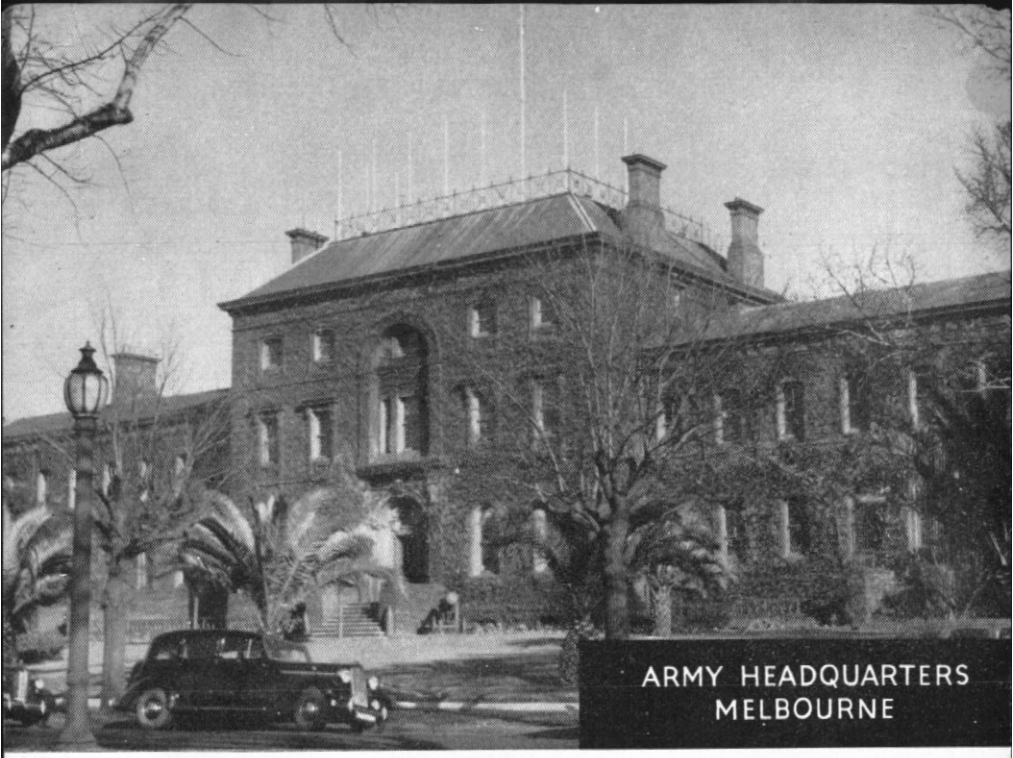
1535 S/C N. G. HANSEN

AUSTRALIAN ARMY JOURNAL

A Periodical Review of Military Literature

Number 7 —— Jun-Jul, 1949

CONTENTS



ARMY HEADQUARTERS
MELBOURNE

AUSTRALIAN ARMY JOURNAL

Editor:
LIEUTENANT-COLONEL E. G. KEOGH, ED (R of O)

Staff Artist:
MR. CYRIL ROSS

The AUSTRALIAN ARMY JOURNAL is printed and published for the Directorate of Military Training by the Army Headquarters Printing Press. The contents are derived from various acknowledged official and unofficial sources and do not necessarily represent General Staff Policy.

Contributions, which should be addressed to the Director of Military Training, Army Headquarters, Melbourne, are invited from all ranks of the Army, Cadet Corps, and Reserve of Officers.

Where Does the Army Stand Today ?

An address delivered by the Vice Chief of the General Staff, Lieutenant-General S. F. Rowell CB, CBE, to the United Service Institution of South Australia, on 11 April, 1949

I WANT, with your permission, to take up the time you have allotted to me today, to a defence of the Australian Army. It is a strange and disturbing fact that such action on the part of a serving soldier should be necessary. But I do this because I believe untold harm is being done to the country's defence organization in general, and my own service in particular, by a band of self-constituted critics who condemn the Government's defence policy as a whole; who say the Army is a poor show, and that, in general terms, our state of preparedness for war is far less than it was before World War II.

All this criticism is having two effects: First, it tends to a writing down of the services in the minds of the general public. This is bad, because no service, whether it be Navy, Army or Air Force, can have a high morale unless it has the good will of the community from which it derives. Secondly, the young man who has ideas of joining the Regular Army or the CMF is perplexed. On the one hand, he sees recruiting posters and hears recruiting propaganda which state that the Army is a good show. He then reads in the press that the Army is so much waste of time based as it is at present on a voluntary system. At his age he is not trained to assess the worth of the criticism given. As often as not he accepts it, and so you get the result that today some people who should be our best friends are, for reasons best known to themselves, our worst enemies. I feel that the time has arrived when someone, quite free from any political bias, should put the case for the Army.

You can take it that opposition to the existing order of things is primarily based on the categorical statement that "anything less than universal service is useless". Now there is a lot of loose thinking on many things, but on none more so than this question of universal service. I don't propose to venture into the realms of political controversy, as that is not my business; nor am I competent to discuss the effect that the introduction of universal service would have on our present economic organization. But I am competent to say this:

First, in general terms, the Army is the only Service which benefits in peace by universal service. The Navy and Air Force, with their very high proportion of skilled tradesmen, look to the long service personnel to fill their ranks.

Second, universal service would involve a very large increase in the annual Defence Budget.

You cannot consider Defence in several water-tight compartments — it must be dealt with as one joint service problem. It follows, therefore, that, if you propose to spend a lot of additional money on a system which benefits only one Service, you must then think again and decide whether, from the overall Defence aspect, these additional funds should not be devoted to all three Services. Lest it be forgotten, the Navy and the Air Force are just as important as the Army and, in the future, as in the past, they may well have to absorb the first shock of war. I am certain that my point of view is more nearly realistic in the

present world strategical situation than that of those who continue to urge universal service as the first of our *Defence requirements.*

The next allegation is that the Army is a poor show. I have always taken it as a matter of principle that every pound spent on Defence Services in time of peace must be justified on the basis of the value it produces in war preparation. Against this background, let us look at the existing situation in the Army.

We finished the war a little over three years ago with over 400,000 men in the Army. And the great clamour in which everyone joined, whatever his station in life, was to demobilize just as fast as possible and get back to normal. The problem then was to retain what we thought would be essential to the future, at a time when the post war Defence policy had not been, and in fact could not be, determined. Fortunately, BCOF was a great help here as it enabled us to retain many pieces of the organization which might otherwise have been swept away. It also gave us continuous experience of maintaining not only the Australian element of the Occupation Force but also those of other Empire countries concerned.

In July, 1947, we started off on the implementation of the Army's share of the Government's Post War Defence Policy, and there can be no two answers as to what was the major problem. It was to *"re-establish our basic organization"*, in other words to get back to a framework of formations and units on which we could build in an emergency. This has meant a heavy programme of training cadres of regular personnel for CMF units, and of re-conditioning equipment and training depots. And I say advisedly that, to the extent necessary to meet the needs of an emergency, we have re-established our framework.

In the course of this work, we have come acutely up against the two major national problems of the day, viz., accommodation and man-power. In so far as housing is concerned, we have to take our place in the priority lists, and it is true that some of our accommodation for regular personnel is at present below the standards we have fixed for the future. But every day progress is being made in this regard. And the position is the same for the CMF training depots where we have been limited to the essential renovations and repairs of existing drill halls. Coming to manpower, the Services are in open competition with civil industry, and civil industry can generally offer greater inducements. None-the-less we are getting a steady flow of recruits for the regular army, just as many as we expected to get, having in view the chronic all-round shortage existing today.

As far as the CMF is concerned, we are recruiting at the rate we expected. Although the target figure is 50,000, it was never anticipated that we would get this number in one wild rush. Those of us with experience of the pre-war militia know that the build up of CMF units is a gradual process and that the best recruiting agent is the satisfied soldier who advises his friends to join up. The material we are getting is splendid, far better, I believe, than we had before World War II, and some of the work I have seen in camps this year in Victoria and NSW is high class when one considers that we only started recruiting for the CMF in July of last year. Numbers are not everything, provided there is an adequate cadre to train young officers and NCOs, and it is to be remembered that, with extremely slender numbers in the period between the two wars, we produced the officers for four AIF Divisions and they lost nothing by comparison in war with the officers of the national armies of other democracies.

The third major element in the Army today is the Cadet Corps, which has a strength of about 25,000. This is one of our best branches and it is of great value not only because it gives the future leaders some insight into military principles while at school, but it also provides a recruiting ground for the CMF and for those who wish to make the Army a permanent career. It is refreshing to note that South Australia has recently

agreed to form Cadet detachments at State Secondary Schools, as up to the present this State has lagged sadly in proportion to its population.

I would not like you to think from what I have said that we are complacent about the position and that everything in the garden is lovely. This is not the case. We have a whole bunch of problems which can be solved in due course. But we do need the goodwill of the community, particularly in relation to helping rather than penalizing those young men who have the spirit to join the CMF.

The last allegation I want to answer is that our state of preparedness today is less than it was in 1939. One critic the other day said, "In 1939 we had seven Divisions. What have we got today?" What he did not say was that the total book strength of those seven Divisions was about 30,000, of which at the best 25,000 were effective, and that they had little or no modern equipment. I am not here to make suggestions as to where the responsibility lies for this state of affairs. All democracies in the period between the two wars took the line of disarmament and appeasement and we are all equally responsible for the troubles that came upon us in 1939.

But what is the position today in relation to 1939?

First :

We have a wealth of equipment which, in its main essentials, is as good as exists anywhere today. In some aspects we are dependent on overseas supply, and we have to take our place in the priority of production. Those of you who were actively involved in the Army in 1939 will remember there were no Bren guns; we had no artillery of a date later than 1912; we used broom sticks to represent anti-tank guns, and we had no MT vehicles which are as essential to the Army today as ships are to the Navy and aircraft to the Air Force. A visit to any CMF camp today will vividly illustrate the contrast.

Second :

We have a greatly improved organization with which to meet a future emergency. Our staffs in headquarters and regular cadres in CMF formations and units are stronger and better all round than they were, and they have had the experience of a long war in which to develop the capacity of mobilizing, training and maintaining any force which may be needed in the future.

Third :

We have a great reservoir of trained personnel who gained their experience in the hard way and whose value as a potential reserve will remain with us for some considerable time. It is from this reserve that we have officered the CMF today, and very fine officers they are.

I could elaborate on this point a good deal further but time will not permit.

I want, in conclusion, categorically to deny two charges which are made from time to time against regular army officers.

The first is that we are not interested in the voluntary system for the CMF. This is sheer nonsense. Our business is loyally to implement the Government's policy, and our livelihood, just as with any other business concern, depends on the success we make of our efforts.

The second charge made only recently, is that we don't want universal service and are interested only in large regular forces enlisted for long service. This assumes that, as a profession, we have no appreciation of the economic and man-power problems involved in raising large regular forces. We are only too well aware of the limited man-power pool available to us and of the high and ever increasing costs in running a regular force, and we know, perhaps a little better than the critics, just what force we would be likely to obtain and what funds could be provided for its maintenance.

I trust you will not feel that I have abused your hospitality by using this occasion to discuss a controversial subject. I thank you for the opportunity you have given me to express a considered Army view in reply to the present spate of ill-considered criticism.

The Place of Armour in the Modern Army

Major-General William G. Livesay, US Army

From an Address before the Royal Canadian Armoured Corps Association

I SHALL point out to you briefly my concept of the place of Armour in the modern-day army. In doing so, I think it well that we consider first the place of an army in a modern national defence organization.

I am sure that you will agree that warfare is conducted primarily from fixed land bases. These bases may be for the use of ground, air, or naval forces, or for the use of a combination of such forces. From these, forces sally forth to attack the enemy. Because these bases are so important to the scheme of modern war, they are naturally the primary targets or objectives of enemy forces — air, ground and sea. They must be defended in order that we may use them or in order that our enemies may not use them to launch an attack on us. The only force that is capable of defending such a base, if it is accessible to the enemy by land, is a land force or ground force supported by air. If it is not accessible by land, capabilities exist today to assault the base by airborne operations, perhaps by seaborne operations, or by a combination of such operations. Land forces are needed to help cope with such enemy ventures.

From the Armoured Cavalry Journal, USA, Nov-Dec, 48

Considering for the moment that it may be possible for air power alone to destroy the enemy's will to fight and to thus reach a decision, the protection of the bases which air power must have, and the occupation mission after the decision is reached, are jobs for land troops.

I am convinced that we shall see the need for land forces continuously so long as mankind commits the folly of engaging in warfare.

Less than ten years ago, when Germany overran France and the low countries, they had less than 2,800 operative tanks west of the Rhine River. Today we have set up nearly 3,500 tanks in our so-called Type Field Army. We have even placed in or made available a total of about 200 tanks for each infantry division.

Thus, we see that in a short span of ten years our Army has virtually become an armoured army. It is significant to note that throughout the world, the armies of great military powers have gone to Armour to the extent of their nation's economic capabilities.

To us who live in North America, the development of Armour for use in warfare has been a great military benefit. It has enabled us to take

advantage of our abilities in production and in mechanical aptitudes to effect decisive action on the battlefield against opponents who are capable of mobilizing far greater manpower. Mechanized warfare best fits our capabilities. We must and will continue to develop this great advantage.

This brings up the matter of tank development. The tank of ten years ago is as outmoded today as is the Model "T" Ford in the automobile field. In sight are tanks that will have revolutionary improvements in many fields — engine power, gun power, driver control, power transmission, fire control, etc. Development in the armoured fighting vehicle field must and will continue.

I am unable to consider the question of Armour in the modern-day army without considering the question of military teamwork. When we think of Armour, we think of teamwork. It wasn't many decades ago that we had what was known as land wars and naval wars. We had battles that were known as infantry battles and cavalry battles. That situation is practically non-existent now, and will exist to an even lesser extent in warfare of the future. Now in planning a military operation, it is necessary to consider teamwork between allies; and teamwork among air, ground and naval forces; and within the army itself. We must develop fully the teamwork among infantry, artillery, tanks, and engineers and service support elements. Warfare has become very complicated. Certainly we will not have tank battles alone of any great scale. Battles will involve all arms.

Before the last world war, we used to speak about the infantry-artillery team; now that team has given way to the infantry, tank, artillery, engineer, and tactical air team.

To launch a modern campaign requires careful and detailed planning. That planning extends not only throughout the combat zone, but into the communications zone, into the Zone of the Interior, and there into the mine, the factory, and the farm — all elements of the population are involved. In the future, the whole population will be on the nation's defence team.

Teamwork throughout is important. Those of us who are closely associated with Armour must not lose sight of this essential teamwork, for teamwork is especially vital to armoured operations.

Many of you recall that in the early days of armoured divisions, the percentage of tanks was very large as compared to the infantry component. We have found that to balance the team, nearly all components other than tanks needed to be increased in our armoured division. The infantry component has been increased from nine companies to sixteen. We have also increased the artillery, engineer, and service components of the armoured division.

We have also increased the tank component of the infantry division.

The question that may well follow is whether we ought to have a common or universal division, since we have increased the tanks in the infantry division and the infantry in the armoured division. To that question, our answer is no. While it is true that the roles of these two divisions overlap, primarily they do have separate roles and two types of divisions are essential to a modern army.

In Texas, they say that only fools and newcomers predict the weather. Probably in the field of military operations the same saying should apply when one attempts these days to predict the future of warfare. However, we must forecast the future the best we can, or else we would be unable to make future plans.

Therefore, I shall briefly summarize what I believe to be the future of Armour in so far as the next few years are concerned. In doing so I am not unmindful of the effect of the atomic bomb and guided missiles on military operations.

First, Armour will continue to be an increasingly important component of the army team.

Second, Tank development will continue, and we will see greatly improved armoured fighting vehicles of all kinds.

Third, The need for teamwork among allies in the national defence team, and within the army will increase in importance.

Fourth, Tank units will continue as components of the infantry divisions of the modern army, either as organic elements or as units capable of being attached to such divisions.

Fifth, Modern armies will continue to have armoured divisions to be teamed with infantry divisions in a corps or field army framework.

Increasing Russian Army Strength

In the Soviet Union, much industry is engaged in producing armament. On Soviet Air Force Day in July, 1948, the Minister of the Armed Forces declared that the aviation industry had developed multi-motored planes and jet aircraft. The manufacture of tanks is also being carried out on a large scale. At least 200,000 workers are employed in the tank-manufacturing industry, exclusive of the tank-motor industry. The Soviet Union is able to produce from 45 to 50 thousand tanks per year. By using all the reserve tank factories, it is claimed that yearly production could be raised to 60,000 tanks. The tendency is toward construction of lighter, hence faster, models possessing considerable fire power. The present standard models are the improved T-34 of about 30 tons and the reinforced Stalin type of 54 tons. Both types are provided with a long-tube gun which is not under 12.8-cm caliber. An effort is being made to improve tank radio equipment, which even in World War II was outmoded. All tanks are provided with a special non-magnetic outer-covering as a protection against magnetic charges. Since gasoline requirements for tank formations are enormous, the Russian oil industry is also being rapidly and extensively developed.

Reprinted in US Military Review from Allgemeine Schweizerische Militar Zeitschrift, Switzerland.

MODERN PROBLEMS OF DEFENCE

OF THE

BRITISH COMMONWEALTH

A Military Survey of the British Empire

Directorate of Military Intelligence, AHQ

A publication entitled "A Military Survey of the British Empire" is at present being prepared by the Directorate of Military Intelligence. The object of this book is to provide a modern survey of the main factors affecting the military potential of the British Empire, and it is designed to serve as a standard reference for Army officers, particularly for those officers studying for promotion and Staff College examinations.

Broad in scope, the book will cover such matters as the history and development of the Empire, the political structure of its components, and the innumerable problems associated in its defence.

Initially the book will be issued in roneoed form, and subsequently it is anticipated that it will be printed and distributed on a wide scale.

To give readers an indication of the contents of the book, one chapter — "Modern Problems of Defence of the British Commonwealth" — is reproduced below. — Editor.

Principles

Before discussing modern problems of the defence of the British Commonwealth, it is necessary to clarify one's mind as to basic principles. Such principles were defined as a result of resolutions arising from the Imperial Conference held in London in 1923, at which the United Kingdom, Canada, Australia, New Zealand, South Africa, the Irish Free State, Newfoundland and India were represented. The more important of these resolutions, together with other principles which were added at further conferences held in 1926 and 1937, were as follows :—

1. Responsibility for Local Defence.

The primary responsibility of each portion of the Empire represented at the Conference for its own local defence.

2. Maintenance of Adequate Sea Power.

Adequate provision for safeguarding the maritime communications of the several parts of the Empire and the routes and waterways along and through which their armed forces and trade pass.

3. Maintenance of an Adequate Standard of Strength.

The desirability of the maintenance of a minimum standard of naval strength, namely, equality with the naval strength of any foreign power, in accordance with the provisions of the Washington Treaty on Limitation of Armaments as approved by Great Britain, all the self-governing Dominions, and India.

4. Provision of Naval Bases and Facilities for Repair and Fuel.

The provision of naval bases and facilities for repair and fuel so as to ensure the mobility of the fleets.

5. Uniform Development of Air Forces.

The desirability of the development of the air forces in the several countries of the Empire upon such lines as will make it possible, by means of the adoption as far as practicable, of a common system of organization and training and the use of uniform manuals, patterns of arms, equipment and stores, for each part of the Empire as it may determine to co-operate with other parts with the least possible delay and the greatest efficiency.

6. Co-operation and Consultation on Matters of Mutual Defence.

The extension of the system of organizing military formations in the various parts of the Empire on similar lines; in the adoption of similar patterns of weapons; in the interchange of officers between different parts; and the promotion of further consultation between the General Staffs on all matters of mutual defence.

7. Creation and Maintenance of Air-Bases and Fuelling Stations and Air Forces Interchanges.

(a) The necessity for creating and maintaining an adequate chain of air bases and re-fuelling stations;

(b) The adoption of a system of mutual interchange of individual air force officers and, as far as possible, of complete units of the Royal Air Force and of the Dominion Air Forces.

8. Development of Empire Resources for the Manufacture of Munitions (including Aircraft) and Supply of Raw Materials.

The peace-time development in different parts of the Empire of resources for the manufacture of munitions, as well as for the supply of raw materials, with the following objects in view :—

(a) A reduction in the existing dependence of all parts of the Commonwealth on the munitions produced in the United Kingdom;

(b) The avoidance, as far as possible, of over-concentration of resources for manufacture and supply in any area especially liable to attack;

(c) The possibility of a development and extension of such resources in time of emergency.

9. Development of Manufacturing Self-Sufficiency and Arrangements for Combining Facilities.

With regard to manufacturing facilities, subject to any arrangements which may be made between them for combining facilities in peace, Governments should aim in the first instance at becoming self-supporting so far as possible in the matter of armaments and munitions of war (including aircraft).

10. Planning of Concerted Arrangements to Ensure Adequate Supplies of Raw Materials.

The vital importance of concerted arrangements for adequate supplies of raw materials is recognized.

11. Planning for Concerted Arrangements for the Supply of Foodstuffs.

The interchange of views which has taken place in the course of the Defence discussions at the Imperial Conference with respect to the supply of all-important foodstuffs, including feeding stuffs for animals, in the event of a major emergency, should be followed up by further communication as necessary between the Governments concerned.

Although the above principles were determined some years ago, it seems unlikely that they will need comprehensive amendment, as changes in weapons and technique of war do not necessarily alter main principles. However, many new factors have arisen during this period, which have made the implementation of these principles somewhat

difficult. The principal factors are as follows :—

(a) The lapse of the United Kingdom as the first world naval power;

(b) The loss and potential loss of components of the Empire, including vital bases;

(c) The development of new weapons such as long range missiles, the atomic bomb and the possibility of biological warfare;

(d) The upset of the traditional balance of power in Europe and the Far East — that is, the growth of a great Asiatic power — the USSR;

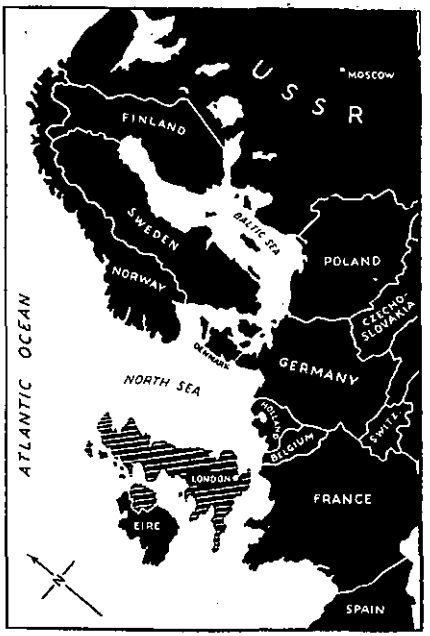
(e) The establishment of the United Nations Organization and the formulation of plans by its members for ensuring collective security throughout the world.

On the other hand, the development of the United States of America as the first world power and her gradual change of policy from one of isolation to one of participation in world affairs has tended to counter-balance the above difficulties.

The Position of the United Kingdom

The main result of the above factors is the threat to the security of the United Kingdom, as it seems probable that in the future her industries, ports, external and internal communications will prove excessively vulnerable to attack by modern weapons. This has been emphasized by the following statement made by Field Marshal the Viscount Alanbrooke in 1947 — "There is no doubt that modern weapons such as air bombardment, long range rockets, improved submarines and the atomic bomb have seriously weakened Commonwealth security by greatly increasing the vulnerability of its heart — the United Kingdom".

The centuries-old safety implied by the English Channel has today been largely nullified as a result of aerial warfare. Faced with an enemy air superiority, the power of the Royal Navy can no longer be brought to bear with any certainty against an invasion force in the



narrow waters of the Channel. The possession of air superiority by a future enemy would also make possible an airborne invasion of the United Kingdom.

Thus, in a future war, the United Kingdom would be vulnerable to —

(a) The destruction of its population and industries by bombardment and bacteriological warfare;

(b) Starvation through the inadequacy of its agricultural resources and due to the imposition of an effective blockade;

(c) Seaborne or airborne invasion.

Responsibilities of the Dominions

It is not beyond the realms of possibility that should the United Kingdom be engaged in a war against a combination of European and Asiatic powers she would initially become a defended fortress. Further, it would be most unlikely that, until her own physical security was assured, she would be able to spare from the United Kingdom any considerable forces to participate in

operations to reinforce her overseas bases or, in the event of their loss to the enemy, to recover them for future offensives.

It therefore would appear that the Dominions must plan for, and —

(a) Assume full responsibility for their own defence;

(b) Make a larger contribution to overall British Commonwealth defence.

In order that the Dominions may be capable of assuming these greater responsibilities and in order that the degree of concentration in the United Kingdom might be reduced it would appear that a redistribution of manpower and industry throughout the Empire is most desirable.

It is clear that the present location of the Empire's resources and manpower constitute a twofold vulnerability due, first, to the susceptibility to attack of the concentrated population, and, second, to the weakness of the dispersed, underpopulated areas.

If Europe is ever again to form a theatre of war, the British Commonwealth will be in the anomalous position of having its main reserve already in the front line. The United Kingdom is so near to Europe that warning of high-speed aircraft may be very short, and no part of that country may be, in the future, outside the accurate range of guided missile attack from European bases. The only present counter-measures are dispersal and a highly developed civil defence organization. It is possible that scientific and technical research may find some method of intercepting such attacks, but it is unlikely that it will be able to guarantee complete immunity. In short, there is a danger of the loss or effective neutralization of the main reserve in the early days of any future conflict.

The obvious and probably the most effective means of counteracting this present non-strategic distribution of power within the Empire would be the systematic dispersal of Great Britain's manpower, capital and industry to selected areas in the Empire with the object of developing a number of strategic centres (of which the United Kingdom would remain one), each capable of self-defence and each with a definite role in Commonwealth defence. It is at once evident that the completion of such a project would take a considerable number of years. Furthermore, the United Kingdom is at present short of manpower herself, and is committed to the task of re-establishing her own economy. Nevertheless, in the interests of Commonwealth defence, the need for such a project is imperative.

Areas Suitable for Development

In considering areas in the Empire which would be best suited for development into strategic centres the following factors are of importance :—

(a) They must be strategically sited and must be mutually supporting;

(b) They must be of sufficient area to enable a large scale population and industrial build-up to take place;

(c) They must already possess the foundations for —

i. Industrial development, particularly in regard to raw materials, sources of power and facilities for research and development;

ii. Increased production of foodstuffs so that they will be capable of feeding an expanded population;

iii. The provision of adequate bases, particularly for naval forces;

iv. Training facilities for sea, land and air forces.

It is clear that only the larger Dominions are worthy of consideration. Each will be briefly considered.

Canada

Canada possesses all the requirements of a strategic centre and has, because of

her favorable geographical position, been able in the past to make substantial contributions both of men and material to the remainder of the Empire in time of war. However, as new weapons are developed, she may well come within range of trans-polar attack and may find herself in the position of a buffer state to the United States of America with whom she has strong defensive and economic ties, which have come about owing to the contiguity of the two nations. There is no doubt that, should a future war extend to the North American continent, Canada's support to other Empire countries would be necessarily limited. On the other hand, however, the establishment of these ties between the two countries has the advantage of bringing about closer co-operation between a member of the British Commonwealth and the leading world power.

India and Pakistan

In relation to the Indian Ocean and the Middle East, India and Pakistan are geographically well situated to form a strategic centre. However, the present undefined attitude of these two governments towards the Empire is a serious obstacle to future planning for Commonwealth defence. Until this attitude is defined the formation of a strategic centre in this area cannot be considered. From the point of view of manpower and industrial potential, India possesses many advantages.

South Africa

The Union of South Africa possesses all the requirements of a strategic centre and in particular is, geographically, centrally situated in relation to the other Dominions. Furthermore, it possesses the qualities of "space deepness"; for, as long as the Imperial bases in the Middle East and East and West Africa are held, it is extremely well protected by them from attacks from the north. As the Union is connected by overland communications to North Africa it would be well suited, should the Mediterranean route be closed, as one of several main bases capable of rendering support to the advanced bases in the Middle East. Should, however, the advanced bases in the Middle East and East and West Africa become untenable and should India and Pakistan be neutral, South Africa would assume even greater importance as a main base from which allied operations to regain a foothold in the Middle East could be launched.

Australia and New Zealand

With the immediate threat of Japan removed, Australia and New Zealand are relatively secure for the present. However, with the spread of nationalism and communism in Asia it is not inconceivable that in a future war some of these countries may align themselves against the British Empire either actively or under the domination of an enemy nation. Thus Australia and New Zealand, which possess all the necessary qualities for a strategic centre, may, in any future war which extended to south-east Asia, once again form the main base for allied operations in that area. Further, with the position of India and Pakistan uncertain, the importance of Australia and New Zealand in the Indian and Pacific Oceans becomes increasingly vital in the pattern of Commonwealth defence.

Effects on the Empire

The final choice of these strategic centres must depend on many other factors of which the safeguarding of communications, treaty rights and obligations, and a correct appreciation of any future aggressor's strategy, are all important. However, there is no doubt that such a plan, if properly executed, would vastly improve the present system of Commonwealth defence and would result in the following :—

(a) The reduced population of the United Kingdom would be more self-supporting in foodstuffs and the smaller concentrations of people would present less vital areas for attack;

(b) The Dominions, reinforced financially, industrially and in essential manpower, would represent increased reserves of civil power and would provide for military and civil resistance in depth throughout the Commonwealth;

(c) The local defence capacity of each member would be more able to take the strain of initial aggression, and the loss of any one member would no longer prejudice the entire Commonwealth framework;

(d) All members would be in a better position to contribute to a Commonwealth military striking force held in readiness for rapid reinforcement of any threatened area;

(e) The white population of the Dominions and Colonies would retain their predominantly British character.

Such a re-distribution of manpower, capital and industry, planned according to the resources of raw materials and the manufacturing needs of the Dominions concerned, could result in the setting up of several strategic centres having a combined strength far in excess of that now possessed.

Whilst this suggested programme of dispersion would appear to offer the most satisfactory solution to the problem of the increased vulnerability of the United Kingdom, such a programme would in turn raise questions calling for definite answers. These are —

(a) If a proportion of the population, capital, and industry of the mother country were dispersed to the Dominion, would there be any clear-cut assurance that they would be available to assist the remainder of the British Commonwealth in the event of an emergency or a war?

(b) Would such a re-distribution of essential resources adversely affect the standard and production in quantity of essential items of war equipment, such as were produced during World War II in the United Kingdom?

(c) With the decline of the United Kingdom as a leading individual world power (as a result of the re-distribution of population), would the Dominions, augmented by such population, be capable of speaking authoritatively and as a whole to such an extent as can the United Kingdom in her present situation?

Until such time as the position of the Dominions in regard to their collaboration with the remainder of the Commonwealth in war is clearly defined, these questions must necessarily remain unanswered.

Difficulties Affecting Commonwealth Co-operation

As has already been mentioned, a most important problem in arranging for Commonwealth co-operation is the attitude which may be adopted by all Dominions as to their status in a future war.

Such a problem is basically political in that the Dominions have complete control over their own foreign policies. They can determine the nature and extent of their own actions at any time, and are in no way bound by any decision made by the Imperial Government. Although various principles governing Commonwealth collaboration (which have been discussed at the beginning of this chapter) have been agreed to by the Dominions, it should be realized that there is in existence no binding agreement within the Commonwealth covering the action to be taken by them in the event of war. The Dominions retain the right to declare war or to remain neutral. However, as a result of the great unity which existed between the members of the British Commonwealth in World War II and subsequent Commonwealth conferences, the possibilities of an all-embracing Commonwealth agreement covering a definite acceptance of commitments in regard to defence or

mutual aid in time of war are improving. Nevertheless, until such an agreement is reached any planning for Commonwealth co-operation must necessarily be limited.

Similarly, although the principle of standardization of war equipment within the Commonwealth has been accepted by the Dominions, in the case of Canada, with its problems of defence so closely linked with those of the United States, there will always be a trend on the part of that Dominion towards standardization of equipment on American lines.

The desire for autonomy expressed by many of the subject peoples in the world creates further problems in regard to Commonwealth defence. The effect of such movements has been seen with the granting of self-government to India and Pakistan, with the result that Britain can no longer rely on the vast resources of the Indian sub-continent being made available to her. It is likely that such autonomous movements may arise in other territories under British control, with ultimate possible loss to Britain.

The Defence of Communications

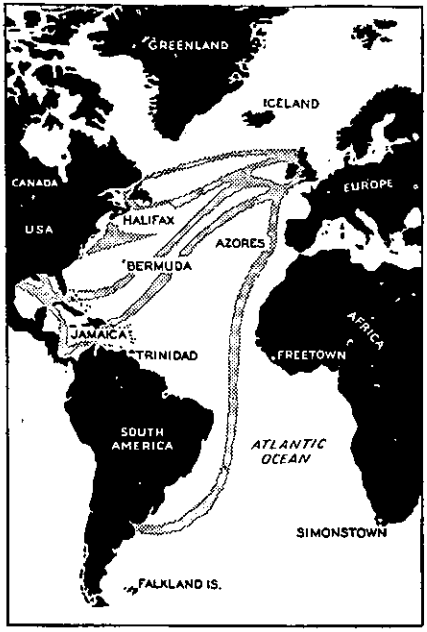
In war the transfer of raw materials, finished products and manpower is a basic requirement of the Empire. In peace the same transfer is equally basic to its well-being. Thus one requirement is vital and common to both peace and war — communications which can be secured against enemy attack or interference and can be maintained at all times.

The advent of air transport, while speeding up the transfer of small numbers of men and small loads of material and while giving great promise for the future, has not yet affected the essential need for good sea communications within the British Empire.

In order to defend these vital communications there must be adequate and secure bases, areas where strategic military reserves can be housed and trained, airfields where all the requirements of modern aircraft can be met, good harbours where supplies of men and materials can be off-loaded or embarked, and naval bases to cater for the repair and fuelling requirements of the navy. Such a requirement in an Empire spread throughout the world calls for careful attention to the strategic value of areas through which these lines of communication must pass. The most important of these in relation to Imperial defence are the Atlantic Ocean, the Mediterranean Sea, the Middle East and the Indian Ocean. The importance of each of these areas will be examined.

The Atlantic Ocean

As long as the United Kingdom retains its position as the leading nation of the Commonwealth, the security of sea communications to and from it, both in peace and war, is vital not only to the mother country but also to the Empire as a whole. Of all these routes, those which traverse the Atlantic Ocean are probably the most important because of the considerable quantities of foodstuffs and essential raw materials which are imported from North and South America. Furthermore, a large proportion of British products are exported to the



countries of North and South America. To ensure the security of sea communications across the Atlantic Ocean it is essential that, not only should Great Britain have sufficient naval and air forces in the Atlantic area, but also secure bases from which her forces may operate. The most important of these bases, in addition to those in the United Kingdom are Halifax (Canada) and Bermuda. Supplementing these major bases are operating bases in the Falkland Islands, Trinidad, Jamaica, and at Freetown, Sierra Leone. Just as the retention of these bases is of prime importance to Imperial defence, so too is the denial to any future enemy, of bases in Eire, the Azores, Iceland and Greenland.

The Mediterranean Sea

The importance of the Mediterranean to the Empire in war in the past has been threefold. First, it has formed a direct route for the passage of troops, material and merchandise between Britain and the Middle East and the countries bordering the Indian Ocean, thereby facilitating rapid concentration of effort and economy in shipping as compared with any transportation by the Cape route. Secondly, it has enabled the Empire to develop a strategy of exterior lines, or envelopment, in the European and Middle East theatres. Thirdly, it has acted as a barrier against attack on Africa from the north.

Imperial control of the Mediterranean has in the past been achieved through the continued retention of Gibraltar, Malta and bases in Egypt and Palestine, designed to protect the eastern entrance, that is, the Suez Canal. During the recent war this sea passage was so much imperilled by enemy action that mercantile traffic had to be re-directed to the three-fold longer route round the Cape of Good Hope. Recent political developments in Europe, as well as those in the air, have not only increased the vulnerability in war of ships using the Mediterranean, but have also increased the likelihood of Imperial bases in that area being completely neutralized by enemy attacks. The denial of the Mediterranean would lead to the re-introduction of the Cape route. This emphasizes the importance of the Union of South Africa in a future war, and particularly the need for the development of a strong base in the Union. Simonstown, which is capable of development into an excellent base, is almost equi-distant from Halifax, Southampton and Melbourne.

Although the security of the Mediterranean as an Imperial sea route in war-time has diminished, its importance as a means of developing a strategy of exterior lines and as a barrier against attacks on Africa in a future war has not changed. In addition, future Imperial control of it is vital for these reasons—

(a) For the fulfilment of treaty obligations to Turkey and Greece;

(b) As a means of denying an outlet to the Atlantic or Indian Oceans by any power whose navy is based in or near it;

(c) It is contiguous to North Africa where bases (particularly air bases) would be of great strategic importance in a future European war;

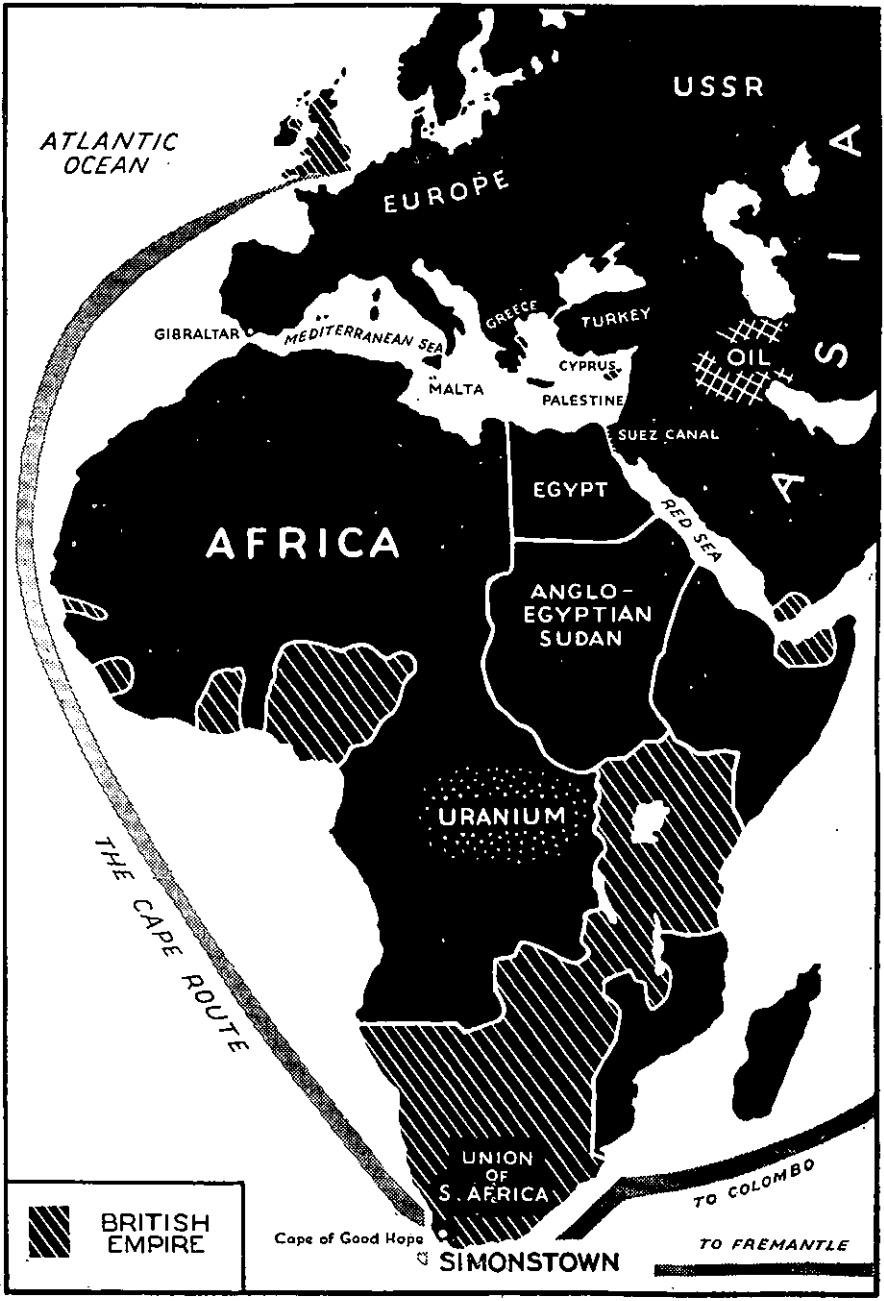
(d) The proximity of it to the Middle East and the vital sources of oil.

The Middle East

The Middle East is of paramount importance to the Empire as a source of oil fuel and as a centre of communications.

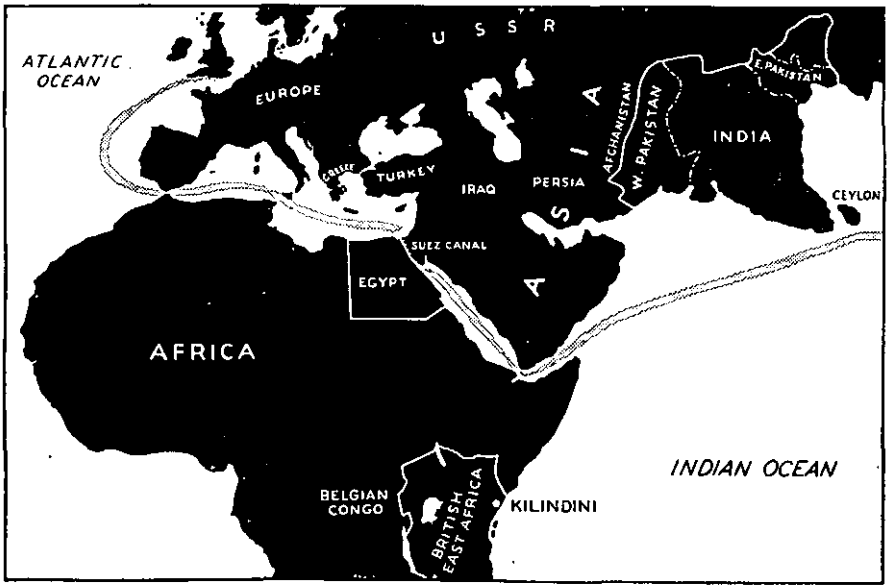
Being the principal source of oil supply to the Empire, the oil concessions of Iraq and Persia are vital to the British peace and war-time economy; hence it is imperative to ensure continued access to these supplies and security of the sea communications by which they are distributed.

As a communications centre, the Middle East forms the focal point for land, cable and air routes between Europe and the East and between Asia and Africa. The Suez Canal provides the shortest sea route from the North Atlantic and Mediterranean to the


ATLANTIC OCEAN
USSR
EUROPE
ASIA
GIBRALTAR
MEDITERRANEAN SEA
GREECE
TURKEY
CYPRUS
MALTA
PALESTINE
OIL
SUEZ CANAL
EGYPT
RED SEA
AFRICA
ANGLO-EGYPTIAN SUDAN
URANIUM
THE CAPE ROUTE
UNION OF S. AFRICA
TO COLOMBO
TO FREMANTLE
BRITISH EMPIRE
Cape of Good Hope
SIMONSTOWN

Indian Ocean. It also contains the land bridge between the continents of Asia and Africa. Further, through the Middle East and Afghanistan lies the historic route for the invasion of the Indian sub-continent.

Imperial interests in the Middle East have been safeguarded during the war in the past by early reinforcement of the peace-time garrisons in Egypt, Cyprus and Palestine, from the west by Great Britain via the Mediterranean and from the east by Australia, New Zealand, India and South Africa via the Red Sea.



As has already been mentioned, in a future war, it is likely that the Mediterranean may be too dangerous for use as a sea route in that Gibraltar and Malta may be neutralized. In addition there is the likelihood that the Suez Canal may be made unusable by enemy action. On the other hand, a future enemy may choose to leave the Canal system intact for his own use should his forces capture it. Other difficulties which further complicate Imperial defence problems in this area are —

(a) In the event of neutrality by India and Pakistan in a future conflict their troops will be unavailable for reinforcement of existing garrisons in the Middle East. In addition, the Empire would be deprived of bases in close proximity to and on the eastern flank of this area;

(b) British forces are no longer stationed in Palestine;

(c) With the exception of a small garrison in the Canal zone all British forces have been withdrawn from Egypt. The continued presence of British forces in the Canal zone is at the moment uncertain.

It is thus evident that the Imperial position in the Middle East has deteriorated since 1939, and that in a future conflict there is a danger that the remaining British garrisons in the Middle East might be defeated in detail before they could be reinforced by other Imperial forces. Should this eventuate the use of the Middle East as a source of oil and as a communications centre would be denied, until recaptured, to the Empire. Although the risk of neutralization of these bases is greater than it

has been in the past, it must be borne in mind that they have lost none of their former strategic importance. This particularly applies to Egypt, which, with a seaboard on both the Mediterranean and Red Seas, good internal communications, a reserve of labour and facilities for the garrisoning and training of large forces, is still a vital area as far as the Middle East is concerned.

In order to strengthen the British position in this area, the development of an alternate base in Africa would appear to be of advantage. If such a base was developed it would —

(a) Give depth to the existing garrisons in the Middle East. These garrisons would then assume the role of advanced bases.

(b) Serve as a firm base for the launching of large-scale operations which may be necessary to recapture the oilfields should they be lost.

The nearest British possession which fulfils the requirements of space and accessibility, and which provides facilities for the construction of ports, roads and rail communications, is British East Africa. Kilindini in Kenya is a fine harbour which could become a good naval repair base and a major port. British East Africa is also advantageous because it contains all the types of conditions necessary for the training of troops, as the terrain presents desert, mountain and jungle facilities. Its proximity to the Belgian Congo, the world's largest producer of uranium ore, is also of great strategical importance.

The Indian Ocean

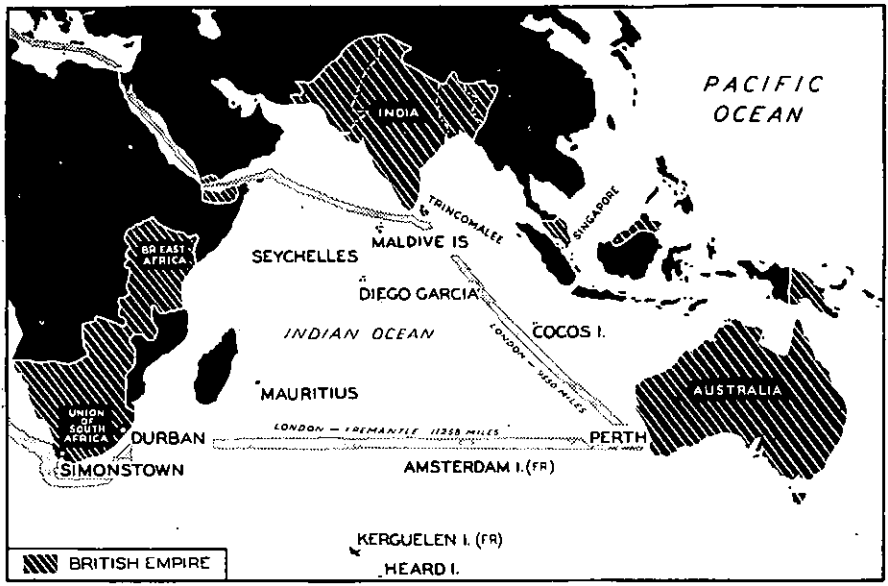
The importance of the Indian Ocean to the British Empire is emphasized by the fact that approximately two-thirds of its area and four-fifths of its population lie in the arch of British territory around it.

British control of the Indian Ocean has always been based on two main axioms, namely, that no great power should establish a defended port within the area, and that Great Britain should command the gateway from other seas. In the past the Indian Empire has formed the keystone in this area. The granting of Dominion status to India and Pakistan has further complicated the pattern of Imperial defence in that the position of the two new Dominions in a future war cannot at present be determined. In view of their strategic position in relation to the Indian Ocean, the Empire cannot accept their control by an unfriendly power. However, now, because of their self-governing status, little can be done to achieve co-ordination and improvement of their means of defence which at present would be incapable of withstanding the initial shock of modern war.

Reference has already been made to the historic route for the invasion of the Indian sub-continent via the north-west frontier. In the past, India's military thought revolved very largely around the problems of control of the tribal territory and the defeat of a major invasion by this route. However, the temporary loss of our naval superiority in the Indian Ocean during the recent war, due to the Japanese capture of our Far Eastern bases and the diversion of the bulk of our naval and air forces to other and more immediately vital theatres, led to the destruction of much merchant shipping and the threat of invasion of India by sea, and in addition drew attention to India's true strategic position as a maritime as well as a continental state.

As the part that India and Pakistan will play in a future war cannot be predicted with any certainty it is clear that, in the interest of Imperial security, other British territory in or bordering on the Indian Ocean must receive more consideration than has been the case in the past.

The importance to Imperial defence of secure bases in South Africa and East Africa has already been discussed in relation to the Mediterranean and the Middle East. Secure bases in these areas



are also of equal importance to the Indian Ocean. However, the range of aircraft and ships operating from these bases would be limited, and, for this reason and for that of the possible neutrality of the Indian Dominions in a future war, other bases will be necessary to secure British control in the Indian Ocean.

The most developed base at present is that at Trincomalee in the Dominion of Ceylon. To supplement it, the development of bases elsewhere in the Indian Ocean, particularly the Maldive Islands and Seychelles would appear to be worthy of consideration. In view of the growing strategic importance of East Africa, the post-war survey flights which have been carried out with a view to establishing an air route between Australia and South Africa are of great importance. Because of their location, Cocos Island and Mauritius, and also Diego Garcia and the Seychelles, may all assume importance in future flights between Australia and South and East Africa.

Further, it is not outside the realms of possibility that in a future war the development of an alternative trans-Indian Ocean air route, to the south of the route which is at present being surveyed, may be necessary. If such a route, designed to connect Perth with Durban, was developed, Heard Island, Kerguelen Island and Amsterdam Island would all assume importance as likely stopping places.

The collapse of Singapore during the recent war, which left the Indian Ocean as wide open in the east as would an uncontrolled Suez Canal in the west, only served to confirm its strategic importance. This importance is greatly increased by its proximity to the oilfields in the East Indies, the security of which would be vital to British strategy in the event of the loss of the oilfields in the Middle East.

Conclusion

From an examination of the foregoing, it will be evident that, of all the problems associated with British Commonwealth defence, the present undefined attitude of the Dominions as to their status in a future war is the most serious. This

applies particularly to India and Pakistan. In the past the question of the participation of India in war did not arise as her participation was simultaneous with that of the United Kingdom. With the granting of Dominion status to these countries, however, their actions in a future war will be a matter for decision only by their governments. Should these Dominions accordingly decide to remain completely neutral, the following problems, as far as the Empire is concerned, would immediately arise—

(a) The weakening of the British position in the Indian Ocean and the Middle East due to the denial to Britain of bases in the Indian sub-continent;

(b) The loss to the Empire of Indian manpower and industrial potential.

However, should overall agreement be reached between the Dominions in regard to defence or mutual aid in time of war, this problem would no longer exist.

Apart from this major problem concerning the status of the Dominions in a future war there are others which have recently arisen which are of paramount importance to Imperial defence. The most important of these problems and their possible solutions are —

(a) The increased vulnerability of the United Kingdom due to the development of new weapons. A project involving the dispersion of a proportion of the United Kingdom's population and industry appears to be the most logical solution to this problem;

(b) The weakening of the Imperial position in the Middle East due to the loss of Palestine and uncertainty of the continued presence of British forces in Egypt. Although strategically not as well situated as either of these countries, East Africa would appear to be the most suitable location for the development of an alternative base.

"We may establish it as a principle, that if we can conquer all our enemies by conquering one of them, the defeat of that one must be the aim of the war, because in that one we hit the common centre of gravity of the whole war. . . . ."

— *Clausewitz.*

ALLIED GRAND STRATEGY

in the

DEFEAT OF GERMANY

Colonel C. P. Stacey, OBE, Director
Historical Section, Canadian
Army Headquarters

The Opening Period of the War

Of the first year of the war we need say comparatively little here. The strategic initiative rested with the Axis, and the Anglo-French Alliance was limited to the defensive until it was destroyed by the Germans in the summer campaign of 1940. Thereafter, Britain and the Commonwealth, left alone to confront a Germany which now controlled Western Europe, continued to be limited to defensive action (and primarily to the defence of Britain). However, they were able to exercise a degree of strategic initiative against the Italians in Africa.

The most important strategic decision taken in this period was probably that to build up the forces in North Africa, at the expense of the security of Britain, as soon as the immediate invasion crisis passed in the early autumn of 1940, and even before. In August, 1940, three armoured regiments were dispatched from the United Kingdom to Egypt. The 2nd Armoured Division (one of two such divisions available in the United Kingdom) followed in the autumn, reaching Egypt at the New Year of 1941. The units sent out in August played important parts in General Wavell's successful offensive which was launched in December.

From the Canadian Army Journal, Aug-Sep, 1948.

The Beginning of Active Anglo-American Co-operation

The very severe shock administered to the United States by the collapse of France and the apparent imminence of a German attempt at the invasion of Britain produced certain American domestic decisions which deeply affected the ultimate outcome of the war. The United States Congress proceeded to introduce universal military service (16 September, 1940), thereby laying the foundation for the great American armies which made possible the defeat of the Axis power. About the same time came the famous "deal" by which 50 American destroyers were handed over to Britain in exchange for leases on certain Atlantic bases. A few months later the Lend-Lease legislation (approved 11 March, 1941) placed the tremendous economic strength of the United States behind the countries opposing the Axis.

The new circumstances also permitted the initiation of serious military "conversations" between the British and American military authorities. These conversations commenced as early as August, 1940, and more definite discus-

sions began in Washington late in January, 1941. A specific "staff agreement" known as ABC-1 was arrived at (27 March, 1941) and formed the basis for Anglo-American co-operation thereafter. The basic concept of this agreement was the determination to beat the Germans first. It was recognized that Germany was the predominant member of the Axis, and that even in a "global" war the decisive theatre would be Europe and the Atlantic. This concept had been agreed upon by the US political and service leaders among themselves in November, 1940, and was stated in the United States Joint Army and Navy Basic War Plan, drafted in May, 1941. It was perhaps fortunate that this decision was made, and to a large extent implemented, before Pearl Harbor. Had it been left until after the Japanese attack, an American historian suggests, "emotion and public opinion might then have dictated a concentration of American armed forces against Japan, as all fascist sympathizers in the United States vociferously advocated".

To this same period belongs the Canadian-American rapprochment. The Ogdensburg meeting of the Prime Minister of Canada and the President of the United States (17-18 August, 1940) produced the Permanent Joint Board on Defence, which has served since that time as an effective organ for consultation between the two countries upon policies for the defence of North America. Through the PJBD a Canadian-American Basic Defence plan (ABC-22), complementary to ABC-1, was elaborated during 1941.

On 9-12 August, 1941, came the "Atlantic Meeting" of Mr Roosevelt and Mr Churchill at Argentia, Newfoundland. During the discussions there the two leaders talked over the application of their countries' strength in the event of the United States actually becoming a belligerent. In general, the earlier agreements were confirmed, "and thereafter the principle was accepted that, assuming the United States became involved, the defeat of Germany was to be given priority until such time as the combined strength of the two countries was sufficient to deal with both the Atlantic and Pacific theatres on an equal basis".

The decision to defeat Germany first, and deal with Japan afterwards, was thus taken before either the United States or Japan became an actual belligerent. This was certainly one of the most vital and fundamental strategic decisions of the whole war, and events proved it to be absolutely sound.

After Pearl Harbor

The Combined Chiefs of Staff

On 7 December, 1941, came the Japanese attack on Pearl Harbor and on other American and British bases in the Pacific. Although the Germans had not been told in advance of Japan's intentions, they and their Italian allies now joined her in open war against the United States. Thus the American Republic, which had already been giving the Allies very active economic aid (and, in the form of protection to convoys, a measure of military aid), became an active participant in the war.

Shortly after the Japanese attack, Mr Churchill went to Washington, and the meetings known by the code name "ARCADIA" took place there between the British and American leaders (24 December, 1941—14 January, 1942). During these meetings, "greatly to the relief of Mr Churchill", who had feared that the new situation might alter the earlier conclusions, the decision to beat Germany first was again confirmed. In the course of these Washington discussions, it was apparently agreed between Churchill and Roosevelt that "a major military operation against Germany must be attempted in 1942".

During the military conversations early in 1941, it had been settled that, if and when the United States entered the war, an Anglo-American body to be known as the Supreme War Council would be formed to conduct top-level planning for the Allied nations. This body now duly

came into existence, but its name was changed from Supreme War Council to Combined Chiefs of Staff. It was composed of the Chiefs of Staff of the American armed forces and British permanent representatives of equal standing (in the first instance, Field-Marshal Sir John Dill and Admiral Sir Andrew Cunningham). The combined Chiefs of Staff met for the first time on 23 January, 1942, at Washington, and proceeded to consider the question of where, when and how to hit the Germans.

The Combined Chiefs had their permanent headquarters in Washington throughout the war. Their most important decisions were taken in a series of conferences, mostly held elsewhere, at which Mr Churchill and Mr Roosevelt were normally present and exercised decisive influence. Mr Churchill in particular was always ready to accept unlimited strategic responsibility. Theatre Commanders frequently attended these conferences also.

Although the US State Department had suggested a Supreme War Council representing the four great Allied powers, in the event neither China nor Russia was represented on the Combined Chiefs of Staff. The Russian leaders were never ready to agree to a really free interchange of information with their allies, and in consequence military co-operation with them was always on a limited, formal and somewhat difficult basis. We learn, for instance, that though the Russians were told in April, 1944, the approximate date of the Normandy D-Day, they were not told the exact point of attack.

The British Dominions likewise were not represented on the Combined Chiefs of Staff. It is true that Lord Halifax, British Ambassador to Washington, suggested to the US Secretary of State that they would probably have to be given a status in the proposed Supreme War Council "similar to that given Britain"; but it was explained to him that "if the Council should comprise a large number of representatives it would become unwieldy and ineffective". Harry Hopkins reported that "everybody and his grandmother want to be on the joint body". In the end, nobody got on it except the English (as distinct from the British Commonwealth) and the Americans.

The Strategic Discussions of 1942

During the year 1942, in a series of Allied conferences, decisions were taken which vitally affected the whole subsequent conduct of the war. In April, General George C. Marshall, Chief of Staff of the United States Army, made a special trip to London, accompanied by Hopkins, to press the desirability of an attack across the Channel as quickly as the essential lift and power could be mustered. In these London discussions, general agreement was reached that "the final blow must be delivered across the English Channel and eastward through the plains of western Europe". (It may be recalled that, the month before, General McNaughton, in the course of a visit to Washington, had had a conversation with the Acting Chief of the War Plans Division of the War Department, Brigadier-General Dwight D. Eisenhower, who told him that "he had racked his mind to discover how we could present Germany with a second front, and that the more he thought it out the more firmly had he been driven to the conclusion that it would be possible to do so only by attacking Europe from the British Isles".) The full-scale offensive against the Germans in France was tentatively set in the London conversations for the summer of 1943. It was known at this time as Operation "ROUNDUP", while the code name "BOLERO" was used for the American build-up in the United Kingdom in preparation for this operation.

At this time the Germans were developing heavy pressure against the Soviet armies, and the latter were falling back, It was agreed at the conference in London that it was of great importance to reduce pressure on the Russians in order to stave off the possibility of their collapsing. With this in view, emergency plans were made for a "diversionary assault" on the French coast

before 1943 "if such a desperate measure became necessary to lend a hand toward saving the situation on the Soviet front". The scheme was to use half-a-dozen divisions to establish a permanent limited bridgehead — a "Tobruk" — on the coast of France. At least two different plans were elaborated with such ideas in view: one for use in case of a crack in German morale, and another in case action became necessary even though German morale remained unaffected. The code name for the former plan ("SLEDGE-HAMMER") is frequently used for the whole emergency project.

Many Americans were, it is clear, anxious for some large operation in North-West Europe in 1942. Their anxiety was perhaps reflected in a sentence of the communique issued from the White House on 11 June, reporting on the President's conference with M. Molotov:

> "In the course of the conversations a full understanding was reached with regard to the urgent tasks of creating a second front in Europe in 1942."

The British, on the other hand, were pretty fully convinced that a second front in Europe that year was out of the question, and that the most that could be compassed was large-scale raids. They had refused to make a definite promise to Molotov when he visited London en route to Washington; and Hopkins had urged Roosevelt not to mention "1942" in the communique. The President, however, with a flash of the gay irresponsibility which he sometimes displayed, insisted on including the date. This considerably embarrassed Mr Churchill when he visited Moscow later in the summer to inform Stalin that there would be no second front in Europe that year.

In this same month of June, Vice-Admiral Lord Louis Mountbatten, Chief of Combined Operations, visited Washington and discussed the situation with General Marshall and other American officers and officials. (It was this visit that prevented Mountbatten from attending the first rehearsal of the Dieppe raid on 11-12 June). He found many Americans deeply wedded to the idea of an early invasion. A reference in the memoirs of Mr Stimson, the US Secretary of War, indicates that President Roosevelt spoke to Mountbatten of "the possibility of having to make a 'sacrifice' cross-Channel landing in 1942 to help the Russians". This greatly disturbed the British Prime Minister.

On or about 20 June, Mr Churchill himself arrived in Washington, accompanied by the Chief of the Imperial General Staff (General Sir Alan Brooke). The Allied leaders now proceeded to discuss both the long-term and short-term plans for invasion of North-West Europe as well as the possibility of operations in the Mediterranean. At this point, the British in North Africa suffered serious reverses, and the discussions were largely devoted to immediate measures for meeting the crisis there. When Churchill returned to England, it had been agreed that preparations for a cross-Channel operation should continue, with a final decision to be made later in the season. On 23 June, General Dwight D. Eisenhower flew to England with instructions to begin preparations for United States participation in the cross-Channel attack.

On 10 July what Stimson called "a new and rather staggering crisis" arose in Washington, in the form of a cable from London indicating that the British were "weakening" on the cross-Channel attack and proposing instead the invasion of North Africa. Stimson and Marshall were both "very stirred up" and actually recommended threatening the British government with a revocation of the basic decision to beat Germany before Japan. Stimson wrote in his diary, "As the British won't go through with what they agreed to, we will turn our back on them and take up the war with Japan." On later reflection, Stimson was "not altogether pleased" with his own part in this scheme; and his sober second thought seems more than justified. "Mr Roosevelt was not really persuaded, and the bluff was never tried." Not only was the President not

"persuaded"; he shortly went on record against the Japanese scheme in most decided terms.

The Decision to Invade North Africa

General Marshall, Admiral King and Mr Hopkins now took off for London to engage in what were in some respects the most momentous strategic discussions of the war. They are said to have carried "written instructions not to accept any substitute unless and until all means of obtaining the cross-Channel operation were exhausted". Hopkins' careful record of his conversations with Roosevelt indicates, however, that the President was quite prepared for a decision against such an operation in 1942. The one point upon which he absolutely insisted was that US ground and air forces must be in action against Germany somewhere in that year. He would not accept a great effort against Japan as a substitute. In his formal instructions to the delegation he wrote: "It is of the utmost importance that we appreciate that defeat of Japan does not defeat Germany and that American concentration against Japan this year or in 1943 increases the chance of complete German domination of Europe and Africa. . . . On the other hand . . . defeat of Germany means the defeat of Japan probably without firing a shot or losing a life." The substitute theatres to be considered, the President said, were North Africa and the Middle East. The discussion in London lasted for several days, and the Americans pressed strongly for the emergency proposal for a second front in France in 1942; their argument is said to have been to the effect that "the Russians' situation may become so desperate as to make even an unsuccessful attack worth while!" The British would have none of it. Finally, on 22 July apparently, the Prime Minister and the British service chiefs "made it clear . . . that they would not co-operate in any stabs on the Continent in that year."

As Roosevelt had foreseen the question now became that of a substitute operation to provide a major enterprise against Germany in 1942. From the beginning, the President had liked the idea of an American or Allied occupation of French North Africa. This scheme had been discussed earlier in the year, and rejected; and as we have just seen, the British had lately proposed it again, and the President had again referred to it as a possibility. Now it was accepted by the conferees as a substitute for the cross-Channel invasion. This was a most basic decision, for it entailed committing Allied resources to the Mediterranean to an extent that would probably require the postponement of the full-scale invasion of France from 1943 to 1944.

The important decision was made at London by the Combined Chiefs of Staff on 25 July, 1942: A combined Anglo-American occupation of French Morocco, Algeria, and possibly Tunisia, to take place within four months; the supreme commander to be a United States Army officer; detailed planning to begin immediately. That night Harry Hopkins cabled to President Roosevelt in code the one word: AFRICA.

"Thank God!" was the President's reply to the Prime Minister.

This very fundamental strategic difference of opinion was not purely Anglo-American. It was between the British and some Americans; Marshall and Stimson were prominent among the latter group, but President Roosevelt was not a member of it. It appears also that US Navy officers were somewhat less enthusiastic than the Army about an attack in France in 1942. Stimson had recorded on 21 June that the African operation was "the President's great secret baby"; and the known Roosevelt predilection for this project had assisted the British negotiators in substituting it for the emergency landing in France, which they regarded with good reason as a desperately foolhardy scheme.

It seems curious now that American officers who pressed strongly for the invasion of France at this time should have thought the North African project "fantastic". The scheme — Operation "TORCH" — was indeed a tremendous undertaking, involving as it did moving

a large expeditionary force directly from the United States to conduct an assault landing in Africa; such an operation would certainly have been considered impracticable a few years before. Yet the opposition to be apprehended in Africa was of an altogether different order from that which would certainly be met on the coast of France. In the light of later events, who can doubt that in the discussions of July, 1942, the advocates of a Mediterranean strategy were right and those who plumped for an immediate enterprise in France wrong?

To begin with, there was in 1942 an extreme shortage of amphibious equipment and particularly landing craft. "The vitally important 'lift' for a full-scale invasion simply did not then exist", and the shortage of craft was a major factor in the decision not to try even a more limited assault in Europe. Nor had we established anything like complete control of the air above the Channel in 1942. To attempt to maintain a permanent bridgehead on the French coast would have meant committing every existing element of Allied air strength to a continuous battle against the Luftwaffe in which all the odds would have been in favour of the latter. (It may be recalled that we now know that in the Dieppe air battle we lost more than twice as many aircraft as the enemy.) In the summer of 1942 the United States still had only very small ground and air forces deployed in the United Kingdom and available to take part. The scheme for an assault at that time might have produced disaster which would have set our preparations for the full-scale attack back almost to where they were after Dunkirk. At best it would have been a bottomless pit into which the resources needed for that operation would have been poured without result.

On this general question of the invasion of North-West Europe, it seems hard to question the judgment of Mr John J. McCloy, the United States Assistant Secretary of War: "The reasons both for the attack, and for its postponement until 1944, seem to be sound".

During the period between the decision to invade North Africa and the actual invasion, there took place the Dieppe raid (19 August, 1942). This project was not directly related to the schemes just mentioned for major invasions either in France or in Africa, except that the British Chiefs of Staff considered it an essential preliminary to full-scale operations, and so advised Mr Churchill. It was part of the tactical programme of Combined Operations Headquarters rather than of the strategic programme of the Combined Chiefs of Staff. But the plan for the raid certainly reflected the relative optimism concerning the problems of invasion which was current in high places in 1942, and its result certainly did much to prick that balloon. It seems probable that if the raid had taken place before the discussions in July, a good many Americans might have been less enthusiastic concerning the project for an immediate invasion of France.

As it was, the Anglo-American landings in French North Africa took place on 8 November, 1942. Along with the British victory at El Alamein a few days before, they represented the beginning of the end of Axis power in Africa, although there was to be a long struggle before the final victory in Tunisia in May, 1943.

One abortive project of 1942 remains to be noted. This was Operation "JUPITER", the scheme for a large-scale amphibious operation directed at the German airfields in Northern Norway from which the Luftwaffe was harrying our convoys carrying supplies to Russia. General McNaughton spent much time studying this project (to which Mr Churchill was greatly attached) at the request of the British authorities, and Lord Louis Mountbatten discussed it during his visit to Washington. It was shelved in the course of the summer, but long remained on file as a possibility for revival as a major Allied enterprise.

(*To be continued*)

SUPPLY BY AIR

Colonel R. G. Pollard, DSO, Australian Staff Corps

Until recently Colonel Pollard was Assistant Commandant and Chief Instructor Transport Support Wing, School of Land/Air Warfare

Introduction

The importance of "Supply by Air" and the need for all officers, regardless of their Service or Branch of the Service, to possess at least a working knowledge of the main principles and capacity of this form of supply cannot be over-stressed. No other form of transport has developed more in recent years.

Supply by air is now a normal method of supply. Nevertheless, it must at all times be correctly related with supply by other transport agencies, as the proper use of each agency will take advantage of its own inherent merits and ensure economy of effort.

At present supply by air is expensive in operation but, under certain conditions, it may well afford great economy in ground maintenance overheads and greater flexibility.

Definition

Air Supply may be defined as the direct delivery of supplies, stores and equipment to user formations, either by dropping or by the use of forward airfields.

Methods Employed

The various methods employed for supply by air are as follows :—

(a) *The Landing of Supplies by Powered Aircraft.* — This is the most efficient and economical method and should be used to the utmost when forward airfields are available.

(b) *Supply by Gliders.* — The advantages are much the same as for powered aircraft, with the addition that a prepared strip is not required. Normally, however, gliders and their pilots are all required for airborne operations.

(c) *Dropping by Parachute.*—This has been extensively practised and developed, but should only be used in conjunction with landing or where landing is impossible. It is, however, a flexible method of delivering supplies, as they can be dropped in practically any place.

(d) *Heavy Dropping.* — Almost any equipment, if under 12,000 lbs, which can be suspended from the bomb beam of an aircraft, can be dropped by parachute. Normally,

a cluster of cargo parachutes is used which is automatically released when the equipment strikes the ground. Crash pans are fitted to the equipment to take up the initial landing shock.

(e) *Free Dropping.*—This method has been used for many stores which can be dropped without parachutes. The limiting factor is the quantity of packing necessary. When the packing weighs more than one-third of the weight of the article this method is uneconomical.

Tasks

Having considered briefly the methods employed, a few words on the important role of supply by air are appropriate.

Transport Support Forces employed on supply by air will have to be prepared to undertake the following main tasks:—

Firstly, SUPPLEMENTATION OF EXISTING LAND OR SEA COMMUNICATIONS, e.g., for the Lae operation the sea L of C was supplemented by supplies by air from Moresby and Dobodura.

Again, in north-west Europe, the surface L of C had air supply super-imposed on it to the extent of 150 tons a day.

Secondly, MAINTENANCE OF THE FORCES WHEN NORMAL LINES OF COMMUNICATION ARE INTERRUPTED OR NON-EXISTENT, as was the case in the Papuan Campaign and the Ramu Valley operations.

The following extract from a report by the Chief of the General Staff, United States Army, is a further excellent example :—

"In 1944, from the first advance of the Chinese into Hukwang Valley, between 25,000 and 100,000 troops were at all times for the next ten to eleven months either largely or entirely dependent on food, ammunition and equipment supplied by air either by parachute, free drop or air-landed."

Thirdly, SUPPLY OF CLANDESTINE OR DEEP PENETRATION FORCES, as in France where the Resistance Movement, which it has been stated was equivalent to about ten divisions, was entirely supplied by air.

Lastly, EVACUATION OF CASUALTIES AND THE CARRIAGE OF REINFORCEMENTS AND WELFARE ITEMS.

With regard to casualties, the medical authorities in the United Kingdom are very much in favour of this means of evacuation, as it has been found that whereas "staging" of casualties has the effect of setting back recovery due to shock, air evacuation reduces this complication.

In north-west Europe, 116,000 casualties were evacuated by air between 13 Jun 44 and VE Day.

As regards carriage of reinforcements, the Papuan Campaign is probably as good an example as any, for here we saw 21st and 30th Australian Infantry Brigades air transported from Moresby to Popondetta to relieve 16th Australian Infantry Brigade and to reinforce 7th Australian Division.

Principles

Before proceeding further, I think the time is opportune to enumerate the following general principles for employment of supply by air, which were evolved from varied experiences in all theatres of the late war.

Firstly, that close and practical cooperation between the Services involved, at all levels, was especially important.

Secondly, that the accepted channels and organization for movement and demanding of stores and personnel should be followed.

And lastly, that all organizations involved in air supply must be simple, flexible and mobile, in order that the switch from surface to air L of C may be smooth and not create a single doubt in the minds of those to be so maintained.

SUPPLY BY AIR

OUTLINE OF PROPOSED ARMY AIR TRANSPORT ORGANIZATION

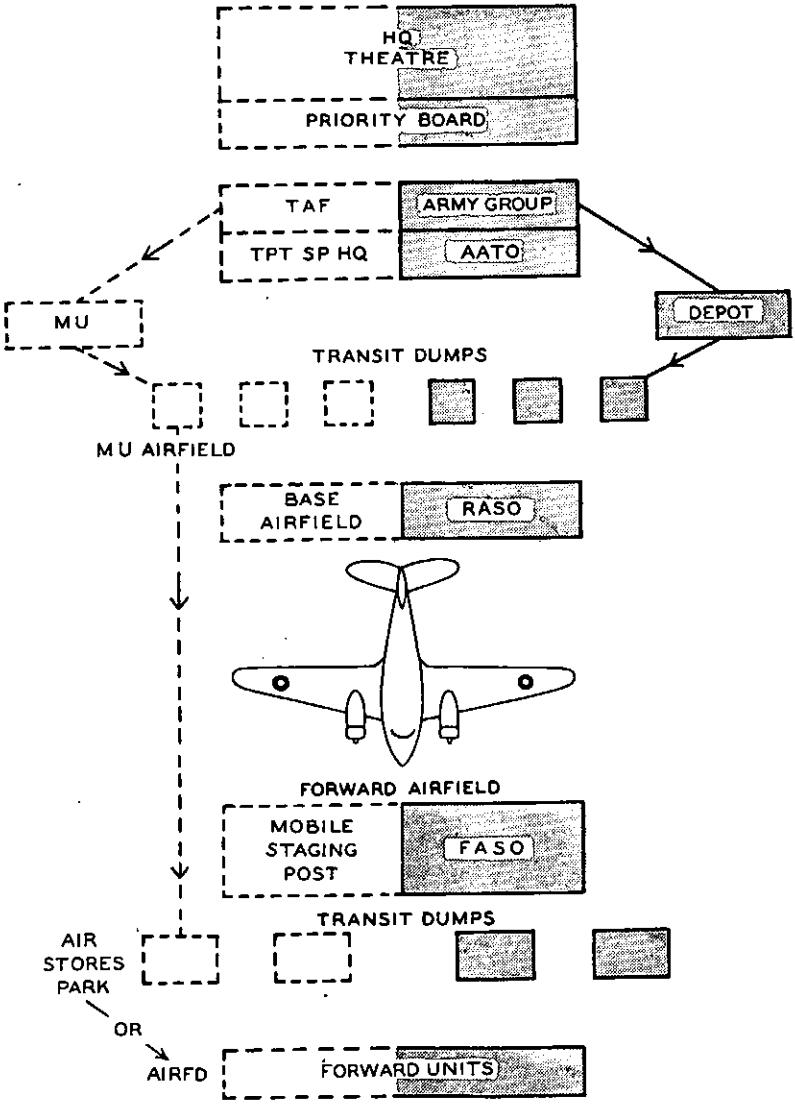


Fig 1

Organization

Let us now consider the organization required for supply by air.

Whatever may be the ultimate organization adopted, it will have to be above criticisms such as those levelled by General Omar Bradley about conditions prevailing in north-west Europe in the late war. He said :—

> "Airlifts were not used to their ultimate capabilities, owing to the involved channels through which bids had to pass, diversions of lifts to other purposes, and the lack of fully developed joint planning."

The proposed organization for supply by air, which was employed so successfully in the Berlin airlift, is one which will consist of Army and Air Force formations working together in parallel throughout the chain of command but still NOT a combined organization. It is based on the lessons learned in all theatres during the last war, and is designed to meet the requirements of any theatre in which the components of the British Empire may be called upon to operate.

The following explanation of the system will probably be clearer if read in conjunction with Figure 1.

The existing staff machinery at HQ Theatre, i.e., Supreme HQ/Air Command, and at Army Group/Tactical Air Force levels will deal only with broad planning and allotment of transport support forces within a theatre.

At HQ Theatre, there will be a Priority Board consisting of senior representatives of all three Services which will decide the allotment of all transport facilities. In other words, they will decide the split-up of transport aircraft between supply, re-supply, evacuation of wounded, air transported and airborne operations, intercommunication, etc. The existence of this Board will ensure that bids and priorities of the three Services are properly considered and determined.

Under the Army Gp/TAF HQ, there will be an army HQ to control the army organization for transport support, which will be known as the Army Air Transport Organization (AATO), and an Air Force Transport Support HQ (Tpt Sp HQ).

Depending on communications and relative location, AATO may be either an integral part of Army Gp HQ or a separate HQ; but, as the Commander Tpt Sp HQ controls all transport support forces in his area, it is imperative that AATO be set up right against Tpt Sp HQ and, if necessary, it must follow Tpt Sp HQ, as it cannot function efficiently otherwise.

The Commander of AATO will be the authority as regards army requirements and will do everything possible to take the burden off the shoulders of the forward Commanders.

Next, we have the Base Airfields at each of which there will be an army Rear Air Supply Organization (RASO) which will work in close touch with the air force transport wing or squadron operating from that airfield.

RASO will be responsible on its airfield for the administration of army personnel, for the loading of army stores and troops, and for the handling of stores in accordance with the programme received from the AATO.

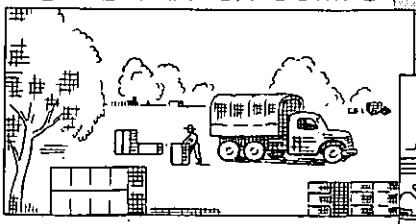
Supplies, stores, etc., will then be flown to the forward airfield where there will be an army Forward Air Supply Organization (FASO) and an air force Mobile Staging Post (MSP).

FASO will work in close liaison with the MSP and be responsible for the receipt, holding as necessary, and onmovement to the forward units of all personnel and stores delivered to it from the RASO, and for the backloading of aircraft in conjunction with the MSP.

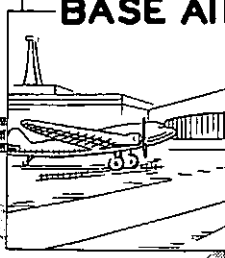
FASOs will be Army Group troops allotted on the basis of one per Corps, therefore, they will be under command of Corps and not under the RASO.

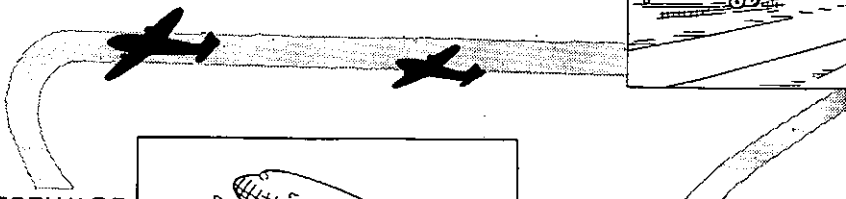
CHAIN OF SUPPLY BY AIR FR

BASE TRANSIT DUMPS

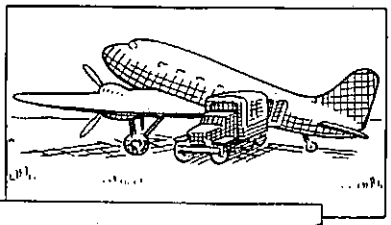


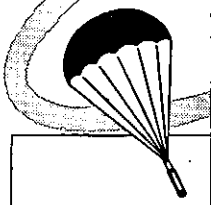
BASE AI

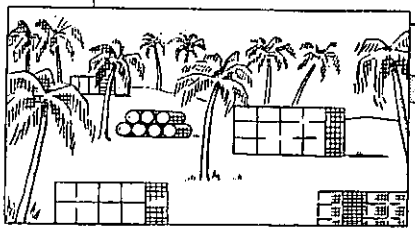




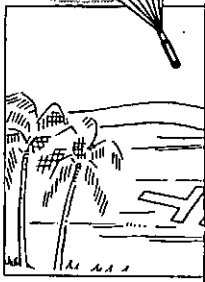
FORWARD AIRSTRIP

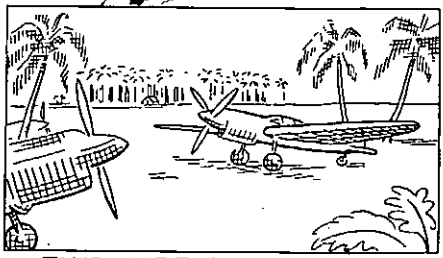




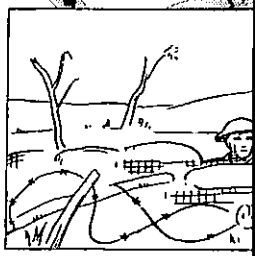


TRANSIT DUMPS



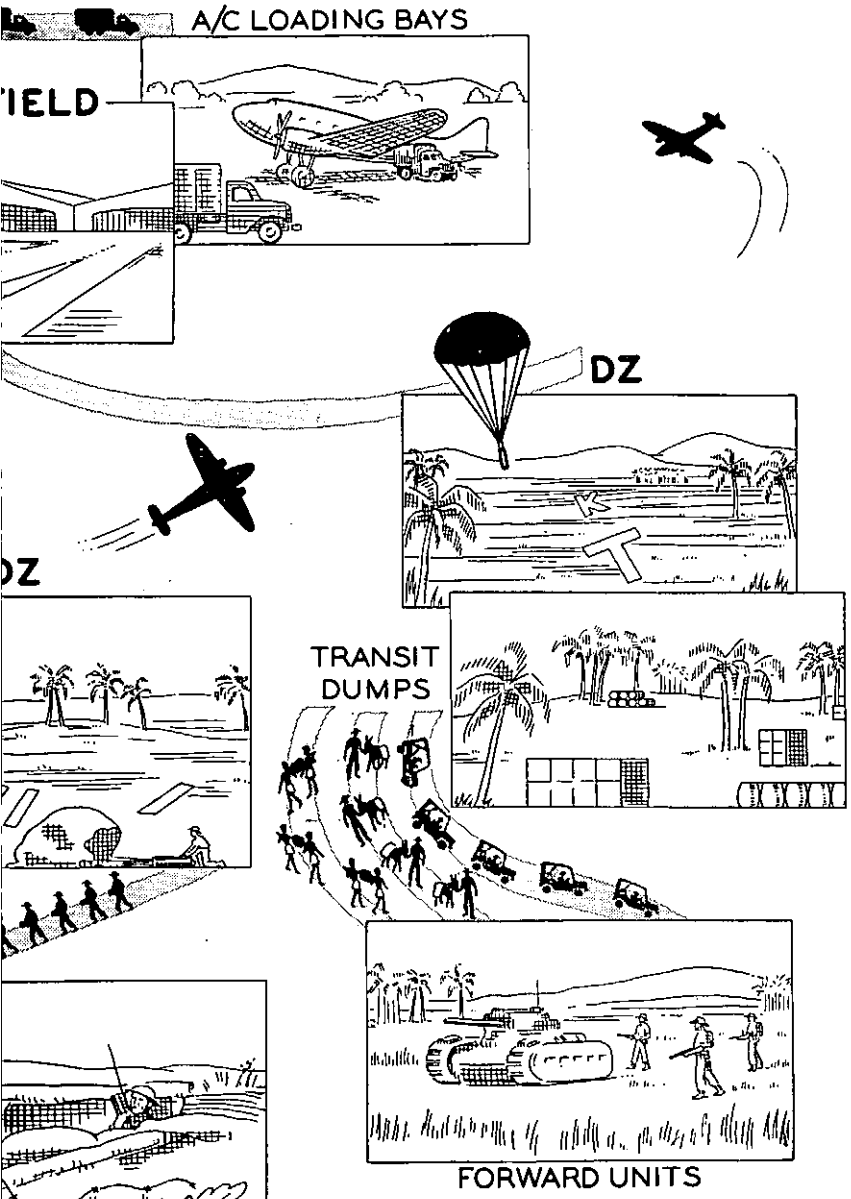


FWD AIRFIELD (FIGHTERS)



FORWA

M BASE TRANSIT DUMPS



Procedure

The requirements of the forward units will be supplied as shown in Figure 2, which is designed to illustrate pictorially the operation of this organization and the forward movement of stores, etc., from "RASO Transit Dumps" to "Forward Units", in cases where supplies are :—

(a) landed on a forward strip;
(b) dropped on an isolated unit;
(c) dropped on a brigade or higher formation which is capable of setting up the equivalent of a FASO.

AATO, which is responsible for ensuring that adequate and balanced stocks are held in RASO Transit Dumps in close proximity to the Base Airfield (when they are not immediately available in army Depots), will provide airlift forecasts and specify in sufficient time to enable RASO to work out the details, whether the supplies are to be landed or dropped.

Stores, etc., having been transported by rail or road from the Depots to the RASO Transit Dumps, will then be moved by lorry to the aircraft loading bays and loaded into aircraft.

In case (a), shown on the left of Figure 2, the transport aircraft is then flown to the Forward Airstrip where it is unloaded by FASO. The stores, etc., are then placed in the FASO Transit Dumps for checking and on-movement by road to the forward Army or Air Force (fighter) units.

In the event of an isolated or detached unit, which has no forward airstrip readily available, requiring supply by air, this would normally be done by dropping supplies by parachutes, as depicted in the centre illustration of Figure 2.

In this case, the unit would have to select and mark a Dropping Zone (DZ) on which the stores or supplies would be dropped, as well as provide personnel for the collection and distribution of supplies so received.

Where a brigade group or larger formation is dependent on supply by air, as experienced in New Guinea and Burma, the set up might easily be as depicted in the right hand illustration of Figure 2.

Here we see the supplies being moved from the RASO Transit Dumps to the transport aircraft, then flown forward and dropped by parachute on to the Brigade DZ. The equivalent of a FASO has been set up by Brigade HQ on the DZ, to collect, check and stack the supplies in the FASO Transit Dumps from whence they are being distributed to the forward units by carriers, pack animals and jeeps.

Dropping Zones

In the two latter cases brief reference was made to the preparation of DZs by units and formations.

The selection and marking of DZs is a study on its own which, therefore, cannot be dealt with fully in this article but, as ANY unit, including Armoured, may require to be supplied by air, it is imperative that ALL officers should understand it as an integral part of the procedure and working of air maintenance.

Figure 3, which is self-explanatory, shows the lay-out of a DZ and Dump Area for mass dropping in open country under European conditions.

This lay-out, of course, may be adapted to meet local requirements as necessary, however, in jungle country it may be preferable to revert to one of the wartime systems employed in SWPA for the marking of DZs.

Figure 4 shows an example of one such daylight system and the same system adapted for supply dropping by night.

It is to be remembered, however, that whatever system of marking is used, it must be agreed upon by both the Army and the Air Force and then adhered to rigidly. In supply dropping, pilots are fully occupied in flying their aircraft, so cannot be expected to decipher correctly

LAYOUT OF DZ AND DUMP AREA — MASS DROPPING IN OPEN TERRAIN

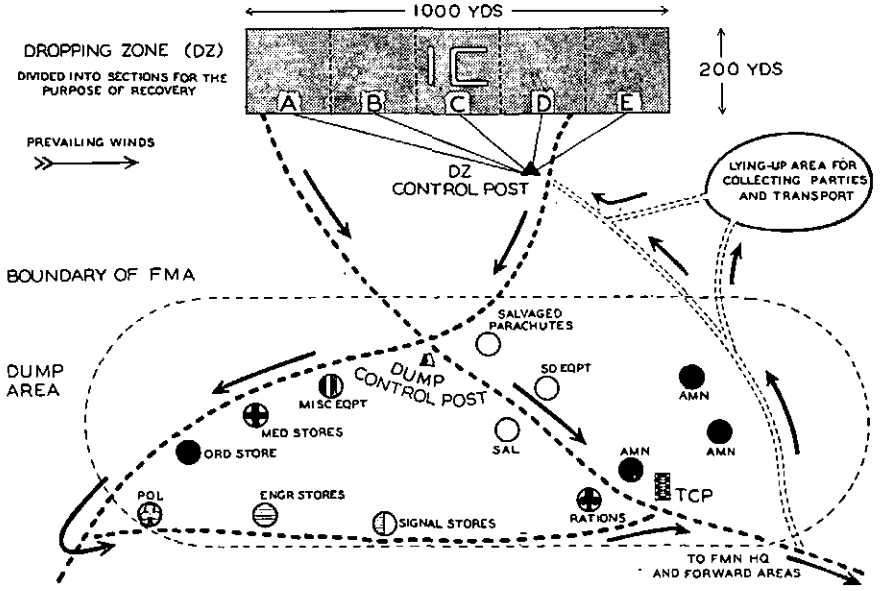


Fig 3

impromptu signals displayed on the ground, which, even if seen, may be interpreted as enemy action.

System of Demands

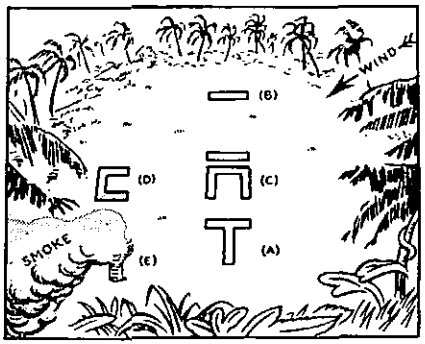
The last thing to be briefly considered is the system of demands as affecting the Army and the Air Force.

Normally, the procedure for the Army will be that demands will be forwarded through the normal channels to HQ AATO using, it is hoped, its own signals network.

In an emergency, consolidated demands may be sent by the formation requiring emergency items direct to the RASO supplying it, with a copy for information to HQ AATO. This privilege, however, will need to be strictly controlled, as widening of its scope would tend to reduce the efficiency and smooth functioning of the entire system.

Supplies and stores common to both the Army and the Air Force will be provided through the Army organization, whereas specialist Air Force demands for forward Air Force units will be handled through the normal Air Force service channels, as shown on the left-hand side of Figure 1, i.e., from Maintenance Unit (MU) — MU Airfield — Air Stores Park near forward transport airfield or direct to the airfield of the forward Air Force unit requiring the stores.

A SYSTEM OF MARKING A SUPPLY DROPPING ZONE IN JUNGLE TERRAIN



BY DAY

Notes:—

1. *If in open country the boundaries of the DZ must be marked with ground panels.*

2. *'T' (a) made from standard issue ground panels (15-ft long, 3-ft wide) indicates direction in which aircraft is to make its dropping runs and NOT wind direction.*

3. *Panel (b) is placed at far end of dropping run. All stores should land between (a) and (b). However, panel (b) must be positioned so that any overshoots land on clear ground and not in trees.*

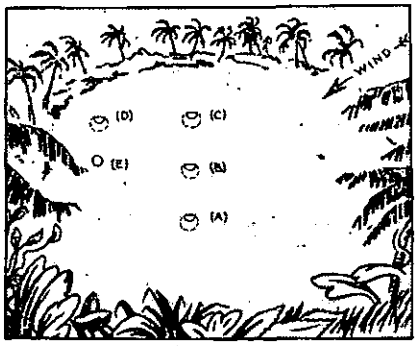
4. *"OK to drop" sign (c) is made with standard panels, and placed in position when ready to receive drop, shortly before aircraft arrive.*

5. *Panels at (d) represent code letter of DZ. In this case letter 'C'.*

6. *The smoke generating apparatus (e) is placed so that smoke does not obscure other markings, but is visible to the pilots.*

7. *The position of the R/T set, or alternative ground/air communications, is not shown as this cannot be definitely laid down.*

8. *If used, the Eureka (Radar) beacon will be placed close to the head of the 'T' (a).*



BY NIGHT

Notes:—

1. *Lights (a), (b), (c) and (d) are placed along the DZ as shown. The pilot flies from light (a) to light (c) keeping the lights on his left.*

2. *Light (d) should be placed as far to the left as possible so that it is not obscured (to the pilot) by the aircraft wing.*

3. *Additional lights may be used, but care must be taken to ensure that the flare-path maintains its 'T' shape.*

4. *All stores should land between lights (a) and (c), but these lights should be placed inside the DZ boundary to allow for under and overshoots.*

5. *An Aldis Lamp (e) may be used to flash the DZ code letter.*

6. *Lights may be screened so that they are visible only from the correct direction of approach.*

7. *The position of the R/T is, again, not shown.*

8. *If used, the Eureka beacon will be placed close to light (a).*

FIGURE 4

Conclusion

In conclusion, it must be emphasized that airlifts assume an importance far greater than the relatively small proportion of tonnage moved, owing to the fact that they deliver critical items at the critical time and place. Although relatively small, they can, nevertheless, be considerable, as evinced by the airlift in the Far East theatre during the last war, where a total of approximately 1¾ million tons of stores and equipment were moved by air, in addition to just on 1,100,000 personnel.

The more I see of war, the more I realize that it all depends on administration and transportation. It takes little skill or imagination to see where you would like your army to be and when. It takes much more knowledge and hard work to know where you can place your forces and whether you can maintain them there. A real knowledge of supply and movement factors must be the basis of every leader's plan. Only then can he know how and when to take risks with those factors, and battles and wars are won only by taking risks.

— Field Marshal Lord Wavell.

MINIATURIZATION IN THE *Development of Signal Equipment*

Lieutenant-Colonel E. G. Foster, Assistant Director of Weapons Development (Telecommunications), MGO Branch, AHQ

Introduction

The increased tempo of modern warfare has demanded a greatly improved system of communications. Fast-moving fighting units must be able to maintain contact with their own Headquarters and with other units, and commanders must be able to exercise control. Wireless communication is the obvious answer and highly efficient equipment has been developed, particularly types suitable for use by forward troops. By "miniaturization", little extra burden has been placed on the users.

Problems

In reducing the size and weight of an item of signal equipment, effort must be directed firstly to the miniaturization of the many components contained within each set. This was undertaken on a very large scale during the latter part of World War II, both in the United States and the United Kingdom, and many lightweight equipments were produced using miniature components.

With the accent on weight reduction, particularly of equipment for use by the infantry, the equipment designer is now required to provide more facilities than ever before in considerably less space. The ensuing circuit complexities generally demand more valves or stages, and hence the only solution to the size problem is a further reduction in the size and weight of the individual components.

Service equipment is now required to work in extreme ranges of temperature, under humid jungle conditions and in extremely cold climates with temperatures in the order of minus 30° Centigrade. In addition, the trend in design towards increased transmitter power and the reduction of overall sizes, coupled with hermetic sealing and tropic treatment, lead to many problems of heat dissipation.

Materials

The design of extremely small components demands the use of new materials, insulation tolerances are required to be much finer, and heat dissipation must be kept to a minimum. It is to the radio-chemist and the materials laboratories that we must turn if spectacular results are to be obtained. Fortunately the radio-chemists are fully alive to what is required of them and, considering the complexity of their problems, the progress being achieved is most satisfactory.

Components

Valves

One of the first important components to be reduced in size was the valve. This was the result of research by the

major valve manufacturing companies, and the first effort was released early in World War II. These tiny valves were designed to work off dry batteries, and were suitable for inclusion in small portable equipments. The size was considerably reduced by eliminating the moulded base, the contact pins being brought out through the glass envelopes. Improved methods of sealing glass to metal was the important factor in the production of this new valve.

Resistors

Most signal equipments contain a number of resistors for voltage reduction and valve loading which were normally one and a half inches long and a quarter of an inch in diameter. Miniature resistors have now been produced measuring only half an inch in length and one-eighth inch in diameter, and equally as efficient as the older types. Such "miniaturization" is most important because some equipments contain as many as 50 resistors.

Capacitors

Normally, large capacitors are made up of layers of tinfoil inter-leaved with special paper or mica as a dielectric; with this method, no matter how thin the foil employed may be, the average capacitor still requires too much space. By the use of thin papers, sprayed with extremely thin coatings of metal, efficient capacitors can now be produced in sizes only a fraction of that previously achieved.

Transformers

Practically every service radio set contains one or more transformers, either audio- or radio-frequency. The cores of audio transformers are normally made of a special iron. The development of a new improved core metal known as mu-metal, many times more efficient as a transformer core, enabled the size of transformers to be reduced usually by at least one-half. Radio frequency transformers were improved and greatly reduced in size by the use of cores and shields pressed from iron dust. Dust particles insulated from each other by a binder and pressed into suitable slugs are now used to tune radio-frequency transformers and coils.

The best example of "miniaturization" of Army telecommunications equipment is the British wireless set No 88, weighing only five pounds. This set contains 14 valves, is both a transmitter and receiver and is crystal controlled. A wireless set with similar range and performance manufactured ten years ago would have weighed at least 25 pounds.

"Sub-miniaturization"

One might reasonably expect that the reduction in size and weight already achieved is the answer to the Signals problem. However, it has been found possible to achieve still further reductions in both weight and size, "sub-miniaturization" is the term used to cover this newer technique. A range of these sub-miniature valves has been produced in America and the United Kingdom. The variable time fuze, which was described in the October-November issue of this Journal, uses this type of valve.

Future Development

With the appearance of the personal portable radio receiver and the general use of hearing aids by the public, radio equipment manufacturers have a considerable field open to them in the application of miniature techniques. New materials, including an extensive range of plastics, new methods of assembly, and tiny batteries will be required in increasing quantities. This commercial need, in stimulating effort by the manufacturer, will assist similar research and development by the Services.

Thus the development of miniature equipment is not just a problem of making small components and building them into a small equipment; but rather the evolution of new techniques, the investigation of the properties of suitable materials, and the development of highly skilled circuitry and methods of construction.

Operation "Cauldron"

A Classic Example of Infantry Tactics

Written for the Australian Army Journal by
The Directorate of Military Training, AHQ

IN the early hours of 19 August, 1942, the great British-Canadian raid was launched against the Dieppe area on the north-west coast of enemy-occupied France. The lessons learnt in this operation were intensively studied by the Allied staffs, and they had an important influence on the development of plans for the invasion of Normandy.

At Varengeville, three and a half miles west of Dieppe, the Germans had established a powerful 6-gun battery so situated that it could bring enfilade fire to bear on the beaches the main raiding force intended to use. It was essential that the battery should be silenced before the main raid went in.

The task of reducing the Varengeville battery was entrusted to No 4 Commando which comprised 252 personnel. The position was defended by an approximately equal number of Germans, with all the advantages of concrete, wire and mines, concealed machine guns, mortars, dual purpose anti-aircraft guns, and knowledge of the ground. They had had two years to perfect their defences, and they fought with the utmost gallantry and determination. Yet within 100 minutes of the landings the position was overrun. The battery and all its works were totally destroyed, and at least 150 Germans were killed. British casualties were 45, of whom 12 were back on duty within a few months.

Condensed from "Notes from Theatres of War," No 11

The Problem

The battery position near Varengeville was 1,100 yards from the sea front. The cliffs are steep except at Beach One and Beach Two (See Map). At Beach One two precipitous gulleys led up to wooded country running within 300 yards of the battery. Beach Two, near the mouth of the River Saane, appeared to be a good landing place.

The map shows all features of significance that could be detected from air photographs. The numbers on the map are reference points referred to in brackets in the text.

In the battery area, wire could be detected on all sides except the west. The gun positions (2) were close together. Two light AA guns were located at (3) and (4). Only one machine gun position (5) was definitely located, but it was expected that others would be similarly sited to cover the re-entrant angles of the wire and the road approaches.

An overhead cable (6) led from the battery to the lighthouse which was thought to be an OP. Last minute air reconnaissance reported two AA guns in the lighthouse area, but their exact location could not be determined.

Air photographs showed no indication of defence along the cliffs at Beach One.

At Beach Two traces of wire were seen on the beaches and at point (22). At the western extremity of the cliff line

were two pillboxes covering the beaches and the flat ground at the mouth of the River Saane.

Inland of Beach Two a complicated network of trenches, wire and MG posts was detected on the high ground to the right of the village of St. Marguerite covering the valley of the Saane.

It was known the battery and its protective troops, together with a company in St Marguerite and another in Quiberville, belonged to a first class fighting formation.

The Plan

The commander of "CAULDRON" Force decided to hold the enemy with covering fire from the seaward side of the battery whilst the assault was delivered from the inland side. Accordingly he divided his command into two groups. Group 1 was to provide the covering fire, and Group 2 was to carry out the assault.

Group 1, which comprised "C" Troop and a fighting patrol from "A" Troop, a total of 88 all ranks, was to land at first light on Beach One and —

(a) Form a bridgehead above the cliffs, both for the advance and to cover the withdrawal;

(b) Engage the battery frontally with small arms fire as soon as the alarm was raised or the battery opened fire on the Dieppe beaches. They were not to close with the battery until Group 2 had delivered the assault.

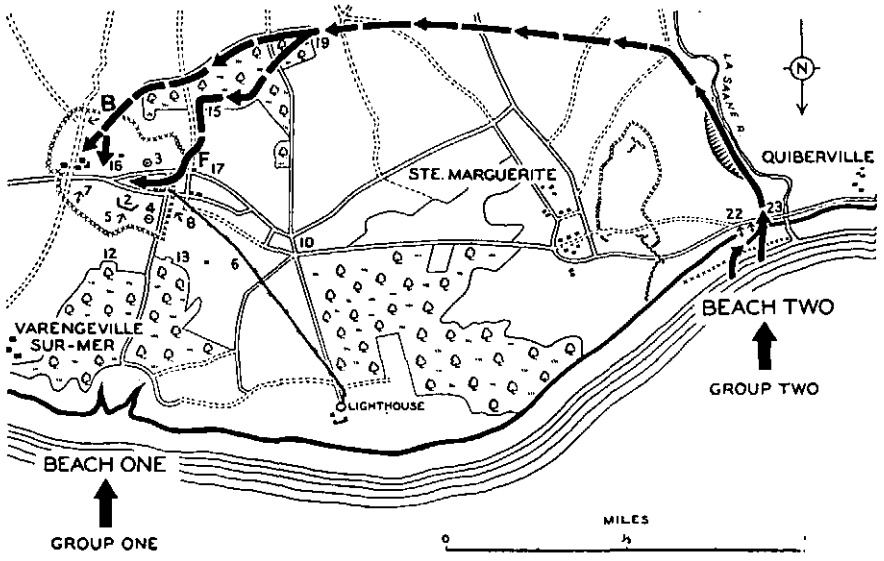
A reinforcement of ten men carrying additional 3-in mortar ammunition was to land after daylight. This party was to lay smoke grenades on the beach to cover the withdrawal.

Group 2 (164 all ranks), comprising—
Force Headquarters
"A" Troop (less the fighting patrol with Group 1)
"B" and "F" Troops —
was to land on Beach Two.

"A" Troop was to land to the left of the River Saane. Its tasks were :—

(a) To cover from the west the assault on the battery position;

(b) During the withdrawal to cover the right flank from attack from the west.



"B" and "F" Troops were to land to the right of "A" Troop, move rapidly up the valley of the Saane, swing eastward to the wood (19), and from there assault the battery.

Group 2 was to land in two waves. The first wave, consisting of a section of "A" Troop in one LCA, was to land, under cover of fire from an LCS, at the left end of the beach. Its immediate task was to overcome any opposition to the second wave, particularly from the two pillboxes. It was then to move by the shortest route to the crossroads area (10) to prevent the enemy in St Marguerite from interfering with the assault on the battery.

The remainder of Group 2, in four LCAs, were to land three minutes after the first wave. The LCS was to remain off the beach, and oppose by fire any enemy movement along the coast road from Quiberville.

The assault was to be delivered by "B" and "F" Troops from the wooded area (19) inland from the battery position. Covering fire was to be given by "C" Troop (Group 1) and "A" Troop. Ninety minutes were allowed for the assaulting troops to reach their forming-up position in the wood. At this stage — 90 minutes after the main landing — a squadron of four-cannon Hurricanes was to shoot up the battery area.

The Attack — Group 1

As Group 1 in two LCAs was approaching Beach One at 0430 hours the lighthouse, which had been flashing steadily all night, suddenly cut out and some white star shells went up from its vicinity. The LCAs increased speed and touched down within a few feet of the selected point. The troops stepped ashore on dry land, and within a minute of touch-down the whole force was across the beach and under the cliff.

Of the two possible exits from the beach, one was choked with natural debris and the other was so heavily wired that two Bangalore torpedoes had to be used to blast a way through. Fortunately the explosions were drowned in the noise of heavy firing farther down the coast.

As soon as it was clear of the beach each element of Group 1 pushed rapidly ahead with its pre-determined task. "A" Troop's fighting patrol, after cutting the telephone line from the lighthouse OP, worked round to the right of the battery and engaged the gun sites with accurate small arms fire at a range of 250 yards. This patrol also silenced the western AA gun, killing three successive gun crews.

After searching some houses on the way, No 1 Section of "C" Troop established itself in a good fire position in the front edge of the wood at point (12). No 2 Section, after searching the houses and ground in the immediate vicinity of the bridgehead on the top of the cliffs, moved into position between (12) and (13). One of its Bren guns got within 150 yards of the battery, whilst some of its riflemen got closer still. While the enemy MG posts at (7), (5) and (8) were being silenced, the 2-in mortar arrived and set alight to a cordite dump with its second round. The fire spread rapidly to other dumps, all attempts of the garrison to quench it being defeated by small arms fire. By 0607 hours, the battery, having fired only six erratic salvoes at the Dieppe beaches was out of action.

Throughout the action the enemy fire directed at Group 1 — mortar, MG, and horizontal AA — was heavy but inaccurate, being mostly too high. However, when the 2-in mortar fired smoke to cover the assault it was located by a German 80-mm mortar firing from the east of the battery position. This weapon got the range just as the withdrawal began, and inflicted the first casualties on Group 1.

The Attack — Group 2

At Beach Two the first wave got ashore without incident, and dealt with the pillboxes. The remainder of the Group, however, came under heavy MG

and mortar fire as it was crossing the beach wire. Fortunately an unexpected diversion in the shape of three low flying aircraft *en route* to Dieppe engaged the attention of the enemy machine gunners, and the hostile mortars turned their fire on the retreating landing craft.

Whilst "A" Troop moved to its allotted task, "B" Troop followed by Force Headquarters and then "F" Troop, rushed to point (23) and, crossing the Quiberville — St Marguerite road, proceeded at the double along the east bank of the River Saane. During this movement the Group was defiladed from St Marguerite by the steep bank on its left.

The ground between the river and the south-west corner of the wood (19) was open with only occasional patches of cover. The more exposed areas were crossed in bounds in open formation. By this time the assaulting troops could hear the heavy fire from Group 1, and they were greatly encouraged by the sound of the cordite explosions.

On reaching the wood, "B" Troop moved forward inside its southern edge until they were close to the perimeter wire where they came under fire from an MG position, the flak tower (3) and various buildings. Advancing by fire and movement and using covering smoke, they reached their allotted place just short of the main battery buildings and reported at H + 95 that they were ready for the assault.

"F" Troop moved through the wood to (15), from whence they advanced under cover of smoke to the corner of the perimeter. Fighting its way forward in the face of vigorous opposition from buildings and enclosures just inside the wire, the troop reached its covered start line in a ditch along the road immediately behind the gun emplacements.

Force Headquarters moved first to the north-west corner of the wood where situation reports were received from Group 1. Headquarters then moved to the track junction between "B" and "F" Troops at point (16), where they arrived just in time to see the Hurricane attack go in punctually at H + 90. This attack was only partially successful as the squadron came in mixed up in a dog fight with some Focke-Wulfes.

The assault signal was given at H + 100. "F" Troop went in across open ground under fire, overrunning several strong points and ending on the gun sites where the gun crews were quickly dealt with. The Troop then proceeded to blow up the guns, instruments, ammunition dumps and subterranean stores. Meanwhile "B" Troop had cleared all the buildings, mopped up the whole area, and mounted protective detachments to cover the demolition parties.

Although the Germans fought to the last they were obviously surprised by the speed and direction of the assault. Throughout the mopping up operations, odd snipers and small groups continued to harass the attackers. Since there was not time to root out these groups, smoke generators were used to mask their fire.

The Withdrawal

As soon as he was satisfied that the battery had been thoroughly destroyed the Force Commander gave the signal to withdraw in accordance with his prearranged plan. "F" Troop, Force Headquarters and "B" Troop, carrying their wounded and guided by elements of Group 1, retired successively to Beach One.

"A" Troop, after driving in enemy patrols from St Marguerite, also withdrew to Beach One.

During the evacuation an enemy mortar got the range of the LCAs. It was, however, quickly silenced by the 3-in mortar which had been mounted on the beach to deal with such an eventuality.

"C" Troop (Group 1) formed the rear guard, and withdrew in accordance with the rehearsed plan whereby the LCAs in pairs leapfrogged one another while the rear party put up a smoke screen. Haversacks containing No 18 Generators had been dumped for this purpose by the

troops on their way in. The final withdrawal across the beach was made through a lane of smoke 200 yards wide. This lane was extended for about 50 yards into the sea by smoke floats put out by the LCAs.

When the landing craft were a few hundred yards out and no longer under the shelter of the cliffs, they came under machine gun fire from the vicinity of the lighthouse. Further use was made of smoke floats until they were out of range.

Comments

Operation "CAULDRON" is an outstanding example of what can be achieved by troops armed only with infantry weapons, and by gallantry, sound planning, and thorough preparations.

It is a model of "fire and movement" tactics. Frontal fire pinned the enemy to the ground while the assaulting troops moved around the flank to their forming up positions.

The plan was simple, flexible, and understood by all ranks. Its thoroughness was based on a detailed study of all available information about the ground and the German dispositions.

The operation was prepared with great thoroughness. Nothing was left to chance. Each man knew exactly what he had to do at every stage, and he knew what everybody else would be doing at the same time. Extensive loading trials were undertaken to determine the best seating arrangements in the landing craft so that, on stepping ashore, all troops could move straight to their tasks without any pause for re-organization on the beaches. Special training was also given in blowing up gun barrels and breech mechanisms, cliff climbing, and the use of bangalore torpedoes in unusual conditions. The operation was rehearsed until perfection in all stages of execution had been attained.

The operation demonstrates that heavy casualties can be inflicted on the enemy at comparatively light cost by a sound application of infantry fire power and tactics, backed by team work, efficiency and discipline.

Military history is the record of divers experiences covering all conditions of country, of climate, and of armament. It is the storehouse of the accumulated knowledge of soldiers of all ages. It is the revelation of the practice and the principles of the great captains. It is the one and only means, in default of long service in the field, of forming a military instinct, and of gaining a clear insight into the innumerable problems associated with the organization and command of an armed force. . . . .

— Colonel G. F. R. Henderson.

The Things That Matter

Extracts from a letter written by a Rifle Platoon Commander In North-West Europe in 1945

SOUND weapon training is the first and foremost requirement. The platoon lives or dies by its ability to use the Bren, 2-in mortar, PIAT, and grenades. By no means can all the men handle their weapons correctly. I suppose that there is only one real way to learn how to keep the Bren firing, and that is to keep it firing. It is not dead accurate shooting that counts, so much as knowing what to do when the gun stops. Better still, the guns should be so well looked after that they never stop. Therefore, give your men plenty of shooting with live ammunition, having first made them fill their own magazines; and see that they get plenty of stoppages. Much the same sort of practice is needed with the 2-in mortar and PIAT.

It is a great help when troops can recognize shells that are coming and shells that are going. That is really what I call battle inoculation; to learn whether it is a Bren firing or a Spandau, a Sten or Schmeisser; to learn by the crack of a bullet whether it has missed you by inches or yards. I do not think that the type of battle inoculation in which you are shot at with the intention of being missed is of much consequence. No amount of such battle inoculation gives the same feeling as being shot at to be killed. I do think, however, that more could be done, in training, to teach men to recognize the various weapons by their sounds.

When men are fired at, it is often the very devil to prevent them from going straight to ground and staying there, with their heads well down. I believe that it should be rubbed well into them that, if they do go to ground, they must get their heads up straight away and fire back, whether they have spotted the enemy or not. I remember we used to argue this point at the battle school, and some people used to hold that firing back — the Fire of Down — Crawl — Observe — Fire, before the section commander had taken over and given a fire order — was a waste of ammunition. It may be, but to get the men's heads up straight away is a moral victory worth infinitely more than a few rounds of small arms ammunition.

It is not necessary to stress the importance of digging, but the need for head cover does not seem to be understood by most troops recently out from home. Head cover not only provides protection against air bursts and the weather, but is a positive requirement if weapon slits are dug anywhere near trees, because when mortar bombs and shells detonate in the branches, fragments will drop into any open trench. Probably the best arrangement is an L-shaped slit, one leg of which is an ordinary firing bay and the other a little dugout, with a good solid roof, flush with the ground, made of branches or timber.

Another point for consideration is whether the chin strap of the steel helmet should be worn in front or at the back. I have seen several men with their chin strap under the chin become half throttled when the blast of a nearby shell pushed their steel helmets back on to their heads. If the blast is as bad as that, they may be lucky if that is the worst that happens to them, but we now all wear the chin strap at the back, pulled tight so that it grips the head.

The one golden rule for night patrols is infinite patience. Once you are in the danger area, go dead slow; you are bound to make a noise if you try to go fast. Lie down for five minutes — yes, a full five minutes — and just listen.

At night you see with your ears; and so does the enemy. So don't let them hear you first, or your number will be up. They are certain to make a noise sooner or later, even if it is only a cough or a sigh, or heavy breathing. They may even start talking. It is during night patrols that you really use those battle school crawls; you have got to be able to crawl through a wood over ground covered with little sticks and leaves without making a noise. It can be done with real patience and care.

One other point about patrols; they may be more difficult to see if they keep to the cover afforded by hedgerows and tracks, but my advice is to keep away from these landmarks. They are apt to be death traps, with Spandaus sited on fixed lines along them, and booby traps and mines planted near them to catch the unwary. It is usually better to cross the middle of a field and risk being seen.

I want to give a word of warning about the "scruffy" man, the man whom you are always checking for this and that. With very rare exceptions, he is the man who lets you down in battle. I had three years in the ranks myself and, like most of the troops, I often thought less than nothing of all the baloney of "spit and polish" and blanco and brasses and tidy collars and salutes. But I have learnt my lesson. I have had some 60 to 70 men through my platoon, and I know that the "scruffs" are just as bad soldiers in battle as they are out of it. So keep on trying to cure them.

I am a little dubious of making this last statement. We have often had many arguments about its implications, but I think it may come as a help to some. I have found that most young officers and men, without battle experience, have not the faintest idea of what life in a rifle platoon in battle is actually like. They seem to think that it is all rather exciting and thrilling, almost like watching an exciting film. In reality it can, at times, be sheer hell, and there is not a man in the platoon who is not thoroughly frightened; and who would not be if he saw a man blown to pieces beside him? If only replacements knew the shattering strains of front-line fighting and the shock that they were going to get, I think that they would be better prepared to stand up to them, as indeed we all most certainly can if we are determined to control our fears. Besides this frightfulness, there is also the acute discomfort of life in a rifle platoon during most hours of the day, and during most days of the week.

"The habit of over-insurance which leads to the retention of undisclosed resources is a sure sign of bad administration."

— Field Marshal Montgomery.

Television

Major P. H. Read, Royal Corps of Electrical and Mechanical Engineers, attached MGO Branch, AHQ

Introduction

The purpose of this article is to give a brief description of how television works, as far as possible in non-technical language, going into sufficient detail only to enable its potentialities and limitations to be appreciated. The basic principles of television as used for civilian entertainment purposes are discussed and a forecast is made of the improvements to be expected within the foreseeable future, together with suggestions for uses of television other than for entertainment, particularly in the military sphere.

A distinction between television and electrical facsimile reproduction is necessary. In facsimile reproduction a still photograph or diagram is transmitted electrically, either over wire or radio circuits, and is reproduced at a distant receiver on photographic paper. Television on the other hand enables events to be seen from a distance as they occur. The methods employed have certain similarities, and the main difference is the speed at which the pictures are transmitted. Just as cine-photography may be considered as a speeded up version of still photography, so television may be considered as an extension of electrical facsimile reproduction.

Basic Principles

It is convenient, firstly, to consider "black and white" television which is the only form in which it has so far been used, although colour television is under development and will be mentioned later.

All methods which have been proposed for transmitting a picture electrically use what is basically the same system, although very great advances have been made in the techniques employed. The picture to be transmitted is not transmitted as a whole but is broken up into a large number of elementary areas. These elementary areas are explored in sequence in a systematic manner by some form of light sensitive device, to produce an electric current which varies with the intensity of light from the elementary area being explored at the instant. This operation is known as scanning and produces an electric current which varies with time as the scan moves over bright and dark areas of the picture to be transmitted. The camera used to transform pictures into electrical signals may be compared with the microphone which converts sound waves into electrical signals. Either line or radio circuits or a mixture of both can be employed to convey the picture to the distant viewers, in much the same way that sound is transmitted to a distant audience.

At the receiving end the electrical signals have to be converted back into light to form a picture. This is done by scanning a receiving screen in a systematic manner similar to that used at the transmitting end, at the same time varying the intensity of light on the elementary areas of the screen in

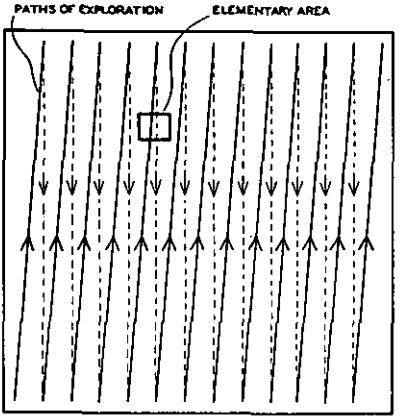


Fig 1

accordance with the electrical signals received. This action may be compared with that of an earphone or loudspeaker which converts electrical signals into sound waves.

The scanning process may be more clearly visualized by reference to Figure 1. The small square represents the size of the elementary area explored at any instant at the transmitter, or the size of the light spot on the receiving screen. The full lines show the paths of the exploration over the picture at the transmitter or the light spot at the receiver. Thus the scan starts at the bottom left-hand corner of the field of view, travels up the left-hand side, flies back to the bottom of the picture again, travels up the picture again on a path just to the right of the previous one, and so on until the whole field of view has been covered. This is a very convenient form of scan to use, because it is in effect a combination of two linear scans: first, a vertical scan with a quick fly back from top to bottom, and second, a horizontal scan at a much lower speed, with a quick fly back from right to left at the end of the picture to be ready for the start of the next cycle of operations.

The sequence of events to cover the picture over is often called a frame, by analogy with cine-photographic terminology.

The system as described so far is common to television and electrical facsimile reproduction; the difference is that in television the process is speeded up to such an extent that the effect of a moving picture is obtained. Early television systems used mechanical methods of scanning, but these have now been completely superseded by electrical methods, although the mechanical system is still used for electrical facsimile work. The advantages of the electrical system for television are the complete elimination of moving parts, so that much *higher scanning speeds may be obtained*, together with much greater camera sensitivity, so that quite good pictures may be obtained even in poor light conditions.

A description of the camera used to convert light images into electrical signals is beyond the scope of this article; briefly though, the scene to be televised is focussed by normal optical means on to a photo-sensitive surface, and this surface is scanned by an electron beam which picks up the electric charge produced by the incident light. The electrical signal obtained is then amplified and either transmitted over line circuits or used to modulate a carrier wave if a radio circuit is used.

At the receiving end, a cathode ray tube *(in American parlance a kinescope)* is used to display the picture. In simple language, a cathode ray tube consists of an evacuated glass bottle, at one end of which is an electron gun arranged to fire electrons towards the other end, where there is a screen coated with special material which emits light when bombarded by electrons. The beam of electrons from the gun may be deflected to hit any part of the screen, and the intensity of the light emitted may be varied by controlling the intensity of the electron beam. For television operation the beam of electrons is arranged to scan the screen in a manner similar to that used in the camera and in synchronism with it; at the same time the intensity of the beam, and in consequence the intensity of the light emitted, is varied by *the electrical signal received from* the transmitter. Thus the scene being

televised is synthesized on the screen and is viewed through the glass end of the bottle. Although there is really only a fast-moving spot of light on the screen, it appears to be a complete picture, due partly to fluorescence of the screen and partly to an effect known as persistence of vision in the human eye.

As well as the signals representing light intensity it is necessary to transmit signals to synchronise the receiver scan with the transmitter. Both line synchronising and frame synchronising signals are transmitted during the fly-back periods.

It will be appreciated that the amount of detail which can be transmitted depends upon the number of lines used, so that it would appear to be desirable to use a very large number of lines. This is shown in Figure 2 where the line structure is clearly visible with a low number of lines, but is masked by the dot structure of the print with a large number of lines. Unfortunately, however, the number of lines which can be used is limited, but to understand this it is necessary to consider the frequency characteristics of the electrical signal representing the picture. To get an idea of the speed at which it may be necessary to change from a black to a white signal, it is convenient to do a little simple arithmetic. This calculation will also show how very fast the scan moves over the picture.

Let us suppose that the repetition speed for the pictures is 50 frames per second, which is about the minimum required to produce a picture in which flicker is not apparent. This means that the whole picture is transmitted in 20,000 micro-seconds. (It will be seen presently that the micro-second equal to one millionth of a second is a convenient unit of time for this calculation.) Next, suppose that the picture is divided into 400 lines which again is a fair working

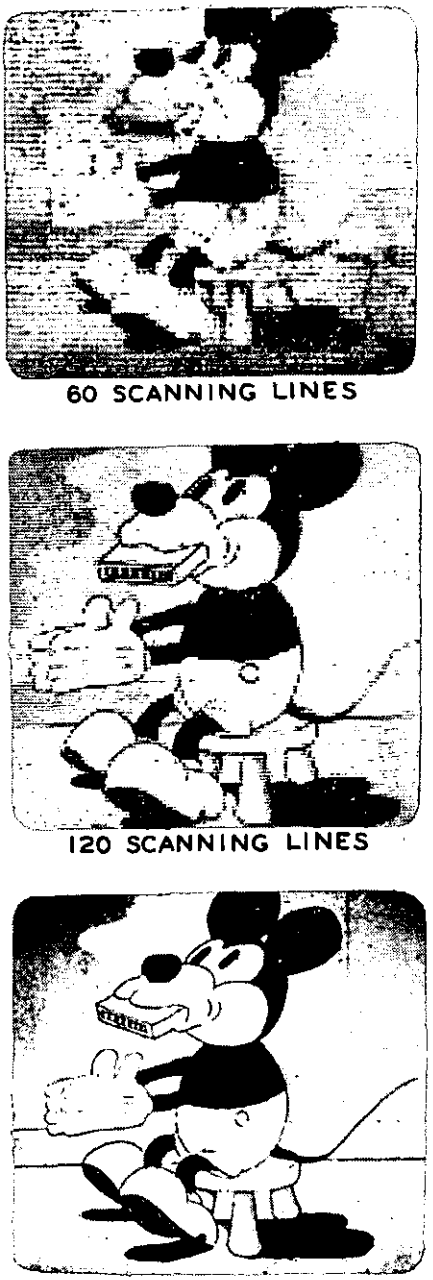


Fig 2

Figure 2 is reproduced by courtesy of the Radio Corporation of America and the Journal of the Society of Motion Picture Engineers.

figure, so that the time available for each line is 50 micro-seconds. Lastly, if the pattern to be transmitted consists of a chess board with 400 squares per side, so that the scan passes over alternate black and white squares 400 times on each line of the scan, the signal has to change from black to white and back to black again in $\frac{1}{4}$ micro-second. Put in another way this means that a signal frequency of 4,000,000 cycles per second will be obtained in the output of the television camera, or in technical parlance the bandwidth required is 4 megacycles per second. When this figure is compared with the 5,000 cycles per second commonly used for broadcast of music, it will be appreciated that television signals require a rather different technique to that used for transmission of audio signals.

The calculation above is not strictly accurate, it disregards entirely numerous factors, and is included to show the relatively large bandwidth required for television. The bandwidth as calculated is the minimum required to show that the chessboard has any pattern at all; if it were required to transmit a picture with clear discrimination between the black and white squares, a very much greater bandwidth would be needed; this would be a very high standard of definition, however, since with a picture 8 inches square the small squares of the chessboard would have sides of only 1/50th inch.

To reduce the bandwidth required a trick known as interlaced scanning is usually used. In this system the odd and even numbered lines are scanned on alternative traverses of the picture, so that if the picture is scanned 50 times a second, each line is scanned only 25 times a second. This gives a better picture than a 25 frames per second non-interlaced scan, due to the reduced flicker obtained, but uses the same bandwidth as a 25 frames per second system with straight forward scanning.

At this stage it is convenient to quote a few figures for a typical television service used for entertainment. The BBC London television service uses 405 lines with interlaced scanning at 50 frames per second, so that each frame consists of 202½ lines. The bandwidth used is 1.5 megacycles per second, so that comparison with the calculation above shows that it is inadequate to deal with the chessboard of 400 squares per side which would be transmitted as a uniform grey.

For line transmission of television a cable capable of carrying the wide band of frequencies is necessary; this would not have been easy to make 20 years ago, but today it presents no great difficulty provided the distance is not great; the cables used for normal telephone circuits or for power distribution are of course quite unsuitable. For entertainment and some other aplications it is required to use radio circuits for transmission; again the bandwidth required is the dominating factor and makes the normal medium and high frequency bands unsuitable for television. The whole of the normal medium band used for entertainment broadcasts would be inadequate to cover even one television service owing to the bandwidth required. Consequently it is necessary to use a much higher frequency carrier wave for television. The BBC service for instance uses 41 megacycles per second and it is probable that future systems will employ higher frequencies. The sound part of the programme for civilian entertainment is transmitted on an adjacent frequency channel to that used for vision.

Long distance reception of radio waves depends on reflection of the waves back to earth from ionized layers in the upper atmosphere. Now this action occurs only for frequencies below a limit dependent upon numerous factors which need not be discussed here. The frequencies used for television are well above the upper limit for reliable ionospheric reflection, so that the distance over which television can be transmitted by radio is limited by curvature of the earth. Thus reliable reception of television is limited to about 30 to 50 miles, dependent upon the power used and the heights of the transmitting and receiving aerials. Exceptionally favourable conditions may give good

reception at greater distances, but unfavourable conditions, such as a mountain between transmitter and receiver, may make reception impossible over quite short distances, and there appears to be no possibility of realizing television transmission over large distances without the use of intermediate relay stations.

Future Developments

Probably the first important development to be expected in civilian television is the provision of a larger viewing screen. The normal domestic receiver has a screen which will accommodate a picture approximately 8 inches by 6 inches, some have slightly bigger screens and the largest on sale in England has a screen 19 inches by 22 inches. These equipments all use direct vision of the screen of the cathode ray tube. The system proposed for increasing the size of the picture is projection of the picture formed on the screen by optical methods using lenses and mirrors. By this technique a picture large enough to fill the screen of a cinema can be obtained.

The larger size does nothing to improve the quality of the picture obtained; all it means is that the picture may be viewed by a larger audience situated further away from the screen, so that the picture still subtends the same angle at the eye of the viewer.

The next improvement which may be expected is an increase in definition. This will be obtained by using a larger number of lines and a correspondingly greater bandwidth, In the United States, 525 lines are already in use, and various higher figures up to about 1,000 lines have been proposed and are possible with present day technique although at greater cost.

Lastly, within the next five to ten years we may expect to see colour television realized on a commercial basis. This is not such a great extension of black and white television as might at first be thought, although there are many difficulties to be overcome to make it an economic proposition. All colours may be built up by combining in varying proportions the three primary colours — red, green and blue. With appropriate filters three television cameras can be used, one for each primary colour, and the resulting electrical signals transmitted over three different frequency bands. At the receiver the three pictures are recombined optically by filters, lenses and mirrors to give a single picture in colour. Alternatively the three colours may be transmitted in sequence on the same band, first, a "red" picture, then "green", then "blue", then "red" again, and so on, and are displayed at the receiver as red, green and blue pictures in sequence; in this case the recombination of the three primary colours to form a single colour picture occurs in the eye itself, and is due to persistence of vision, whereas in the previously described system the colours are combined on the viewing screen.

Other Applications of Television

So far the system used for entertainment has been discussed. It is proposed now to deal with other applications some of which have been used, others are merely possible future developments.

Firstly, consider the use of television for observation from some point where it would be dangerous or inconvenient to put a human observer. Examples of such applications are observations of the Bikini atomic bomb experiments and of the operation of high power rocket motors, for both of which television has been used. A word of warning is necessary here in case it should be thought that television is the universal tool of the future for watching anything dangerous. Suppose, for example, that it is required to observe what happens when a shell hits a tank. It could be done by television, but it could be done better by cine-photography and a permanent record of what happened would be obtained. In the rocket motor experiment mentioned above, however, television is better than photography because it enables the experimenter to

control the motor, if he sees that something is not functioning correctly. Two suggestions only will be made for applications of this type on the field of battle; no doubt readers will be able to think of others. In defence, a television camera might be located in some position untenable by a human observer to cover a patch of dead ground, transmitting the picture back to some convenient defended position. In attack, a television camera carried in an aeroplane and transmitting the picture to the ground might enable a Commander to have a bird's eye view of his area of battle.

Next consider the applications where a scene is required to be visible in several places at the same time. This is merely civilian type television applied to the military sphere. Possible uses such as the briefing of Commanders in the field, maybe with the aid of maps or diagrams, will no doubt suggest themselves to readers. The converse of this application also has possible military uses. In this case, by means of several television cameras, one observer can see what is going on in widely separated localities. It might for instance enable a Commander to view the country in front of him from various different angles. It may be of interest to note here that this type of application has been proposed for civilian use to enable a factory manager to observe what is going on in each of his departments, and for the power house supervisor to have displayed to him the readings of meters in widely separated parts of his station.

A rather different type of application is that of high speed communication. Readers may have seen in the press that in USA the whole of the book "Gone with the Wind" was transmitted over a distance of some three miles in about two minutes, which represents a speed of 1,000,000 words per minute. This was done by television technique, each page being exposed to the television camera and recorded at the receiving end on film. A microwave radio link was used in this application. Such a system appears to have obvious military uses for the transmission of quantities of information rapidly and with the security given by the narrow microwave beam, but maybe this should have been reserved for an article on electrical facsimile methods.

Every man has a right to hide his own opinions, but no man has a right to be wrong in his facts. . . . .

— The Honourable Bernard M. Baruch.

MAPPING A CONTINENT

Colonel L. Fitzgerald, OBE
Director of Survey, AHQ

THOSE who have travelled in Great Britain will be familiar with the mass of detail in the Ordnance Survey Maps so readily available in that country. These range from the large-scale plans at 25 inches to the mile used by the estate owner or agent as a basis of title, through the medium-scale maps at one to 25,000 scale and one mile to one inch showing all cultural features and contours so ideal for development of planning, to the smaller scales of two, four and sixteen miles to one inch, more useful to the tourist or road-user. They surely provide the answer to all enquirers regarding geographical location and topographical facts. Such maps are indeed a national asset quoted and envied by many European States, and an example to Survey organizations in Australia of what can be achieved.

It is of course futile and unreasonable to expect the same achievement to be reached in this country, because of the adverse factors of low manpower and vast areas which require a hundredfold comparative effort. On the other hand, however, because of our large extent of relatively waste lands, it is quite sound to assume that small-scale maps at say four miles to one inch will suffice for many generations to come over the greater part of the continent, with the larger scale mapping of one to 25,000 or one mile to one inch restricted to the developed zones or to those areas which are important on account of closer settlement, water conservation, mining, forestry, rail and road development.

Reprinted by courtesy of the Australian Geographical Magazine" "Walkabout", August, 1948

At this stage it is necessary to differentiate between the plan and the maps. The farmer or pastoralist at least will be familiar with the parish, hamlet, county, or pastoral plan as produced by the State Departments of Lands and Surveys. These indicate primarily property boundaries and roads according to title or lease. The main drainage features, and sometimes the mountain ranges, are indicated in broad terms, but cultural features and relief are not depicted. Such plans serve the purpose for which they are intended but are deficient in topographical data, and they are often misleading in that access roads and boundaries in title are not in fact physical features at all, nor are they apparent or existent on the ground. The map, on the other hand, depicts all cultural features, including dwellings, roads, railways, timber, water, bridges, telephones, and such developments as actually exist and are within the limitations of map scale. In addition, the large and medium scale maps show relief by contours and the smaller scale by hachures or layers. The plan is normally a one-colour production, while the map is multi-colour, permitting easy interpretation of the mass of detail shown. It is with the topographical map that this article is concerned.

Royal Australian Survey Corps

Just as the Army took the initiative in Great Britain with the production of topographical maps of the Highlands of Scotland following the rebellion of 1745, from which the great Ordnance Survey developed, so did the Australian Army

take the initiative in this country in 1908-9. Six members of the Ordnance Survey were obtained on loan to commence the Military Survey of Australia. Shortly after, the Australian Army Survey Corps was formed, and was supplemented by recruiting from Australian personnel. Its sphere of operations covered training, tactical and strategic areas mainly around the capital cities of the States, and before long the one mile to one inch maps became familiar and available to the general public and in great demand by the engineer, the planner, and those concerned with developmental projects.

From this small beginning the Survey Corps developed slowly until 1939, when the war impetus provided a strength of about a hundred, ultimately reaching a peak in 1944 of 1,800 enlisted personnel. This resulted in a rapid extension of map coverage in all States, particularly in Queensland and the Northern Territory. In 1942, however, New Guinea became the focal point of concentrated effort, with subsequent decline on the mainland.

The operational mapping of the Survey Corps covered fields afar, including surveys of the border zones of Palestine, Syria, Transjordan and Turkey, then back to the Pacific theatre, where extensive mapping was carried out in New Guinea, New Britain, Bougainville and the Philippines, culminating in the last offensive in Borneo. Most of this mapping was at Tactical scales of one mile to one inch, or larger. An interesting development was the production of a four-mile-to-one-inch series covering about one-third of the mainland. This series was a re-compilation of existing data into a standard and convenient form. It was not based on new survey or field investigation and is admittedly very much below standard.

How Maps are Made

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

The production of topographical maps of an extensive continent involves much planning and many stages. Those familiar with military maps will recall the over-printed grid, which is not solely a system of reference but also indicates a co-ordinate value based on a very accurate survey. One will realize that continuity of a grid and of detail is necessary over all sheets of a series. This involves a triangulation survey, visual evidence of which appears as beacons on prominent hills throughout the countryside. Such beacons may consist of steel or bush-timber quadripods or cairns of stones supporting a central pole, on tops of which are sheet-iron discs which from a distance appear to the observer as a black sphere on the sky-line. These trigonometrical beacons are the surveyors' observation stations. Angles to and from them are taken with a theodolite, and provide the means of computing the bearing or azimuth and the distance to other such marks. The beacons, in addition, are permanently marked with a buried concrete block so that the exact point can be re-established should the beacon be destroyed.

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

Astronomical observations at the base line and elsewhere provide absolute values of Latitude, Longitude and

Azimuth on which the triangulation network is adjusted. An interesting development in this respect is the time signal broadcast from Belconnan and originated at the Commonwealth Observatory, Canberra. This was commenced during the war as a special aid to Army surveyors in their determination of longitude in previously unsurveyed areas of the mainland and New Guinea. The signal extends over a five-minute period at selected times of the evening, and is of the rhythmic type, beating 61 times to the minute and thus giving a vernier comparison with the field chronometers to an accuracy of one- or two-hundredths of a second.

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

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

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

Air Photography

Closely associated with the work of the Royal Australian Survey Corps is that of the RAAF Photographic Squadron, with its Headquarters at Canberra. This unit, like its Army partner, has long since reached maturity and is also settling into its post-war stride. It is equipped with high-performance Mosquito aircraft, and with Lincolns for special occasions. Its capacity for survey photography can be visualized from its covering, in the first five months of 1948, of 100,000 square miles over many remote parts of the mainland.

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

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

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

It is not generally realized that the Army Photo Library has filed air photos covering about a million square miles of the mainland and New Guinea, and this is just the start of a long-range programme which is intended to cover the whole of our territory, excluding perhaps the most desolate and waste areas, and concurrently with photography will precede the mapping at one or four miles to one inch. The military application is obvious, and so also is its application to the needs of the road and water supply engineer, the soil and forestry experts, the town-planners, and the farmer and pastoralist. What an asset to the last would be a photographic mosaic showing every detail of drainage, the river flats, the hill country, water holes, fences and timber.

The long-range Army and RAAF mapping programme is adjusted to give some priority to urgent investigations for developmental projects. This has already resulted in RAAFs photography covering areas including the Blair Athol coalfields, the Burdekin River and Nagoa-Comet River areas, the South-West Channel country in Queensland, the Barkly Tablelands in the Northern Territory, part of the Kimberleys, the Fitzroy River and Hamersley Ranges in West Australia, extensive areas in South Australia, and the upper reaches of the Snowy River.

An interesting diversion of the Survey Corps involved the survey and mapping of the Kosciusko area in connection with investigations for the proposed diversion of the Snowy River for hydro-electric and irrigation schemes. Existing maps of this area were hopelessly inadequate and erroneous. Incidentally the publication of the Kosciusko map this year should be welcomed also by tourists and skiers.

Another example of diversion of activities was the preparation of the maps required for the 1947 census.

Use of Radar

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

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

Radar applied to surveying employs the measurement of distance which is related to the time interval of radio pulses and the rate of propagation of the radio waves. The stage has now been reached at which the course of an aircraft can be followed with an accuracy

of within about twenty yards. In the case of a survey photographic aircraft this means that the location of the camera at the instant of exposure can be determined. In conjunction with photogrammetric equipment, the resultant photo can be analysed for tilt, and all points of detail visible on the photo can then be plotted on the conventional map in true position; this can be done by remote control involving no survey party nearer than say 150 miles.

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

The Survey Corps and the RAAF Photographic Squadron are jointly interested in this development, and a team of two officers of each organization has recently returned from England after investigating developments and technique in that country. In addition the Radio Physics Branch of CSIR is active in research concerned with equipment and factors perhaps peculiar to our territory.

The field for radar surveying lies in our empty centre, the remote north-west and north, and the jungle-clad ranges of our mandated territories. It has not yet solved the problem of determining the third dimension, that is, elevation or contours, but with the help of Multiplex equipment the complete solution should not be far distant.

National Aspects

The national aspect of military mapping and air photography is fully appreciated, and advisory bodies have been set up to ensure a co-ordination of activities between service and civil agencies.

The Commonwealth Survey Committee consists of the Commonwealth Surveyor-General and representatives of the Departments of the Navy, Army and Air, Civil Aviation, Post-War Reconstruction, CSIR, and the Bureau of Mineral Resources.

A similar committee which includes State representation is the National Mapping Council, consisting of the Commonwealth Surveyor-General, the Army member of the Commonwealth Survey Committee, and each of the six State Surveyors-General.

The broad function of these bodies is to co-ordinate the activities of Government mapping agencies, to prepare standards for technical procedure, and to pursue an active policy for national mapping.

It is gratifying to realize that a very progressive attempt is now being made to map Australia and to create an asset that must contribute handsomely to the assessment of our national resources and the defence of our country.

The more mechanical the weapons with which we fight, the less mechanical must be the spirit that controls them.

THE MIDDLE EAST

Written for the Australian Army Journal by
The Directorate of Military Intelligence, AHQ

General

The Middle East countries, Turkey, Syria, Lebanon, Israel, Egypt, Transjordan, Saudi Arabia, Iraq and Iran occupy an area slightly smaller than Australia, and have a combined population of about 62,000,000. Taken as a whole, the area is rich in oil but poor in most other resources. Its great importance lies in its strategic position astride the main communication routes between Europe, the Far East and Africa.

Geography

Considered very broadly, the area consists of :—

(a) a great arc of mountains in the north extending across southern Turkey and into Iran, containing a number of high plateaux;

(b) the peninsular block of Arabia between the Persian Gulf and the Red Sea;

(c) the corridor dividing the mountains in the North from Arabia and connecting the Eastern Mediterranean with the Persian Gulf;

(d) Egypt, with its fertile Nile valley and surrounding deserts.

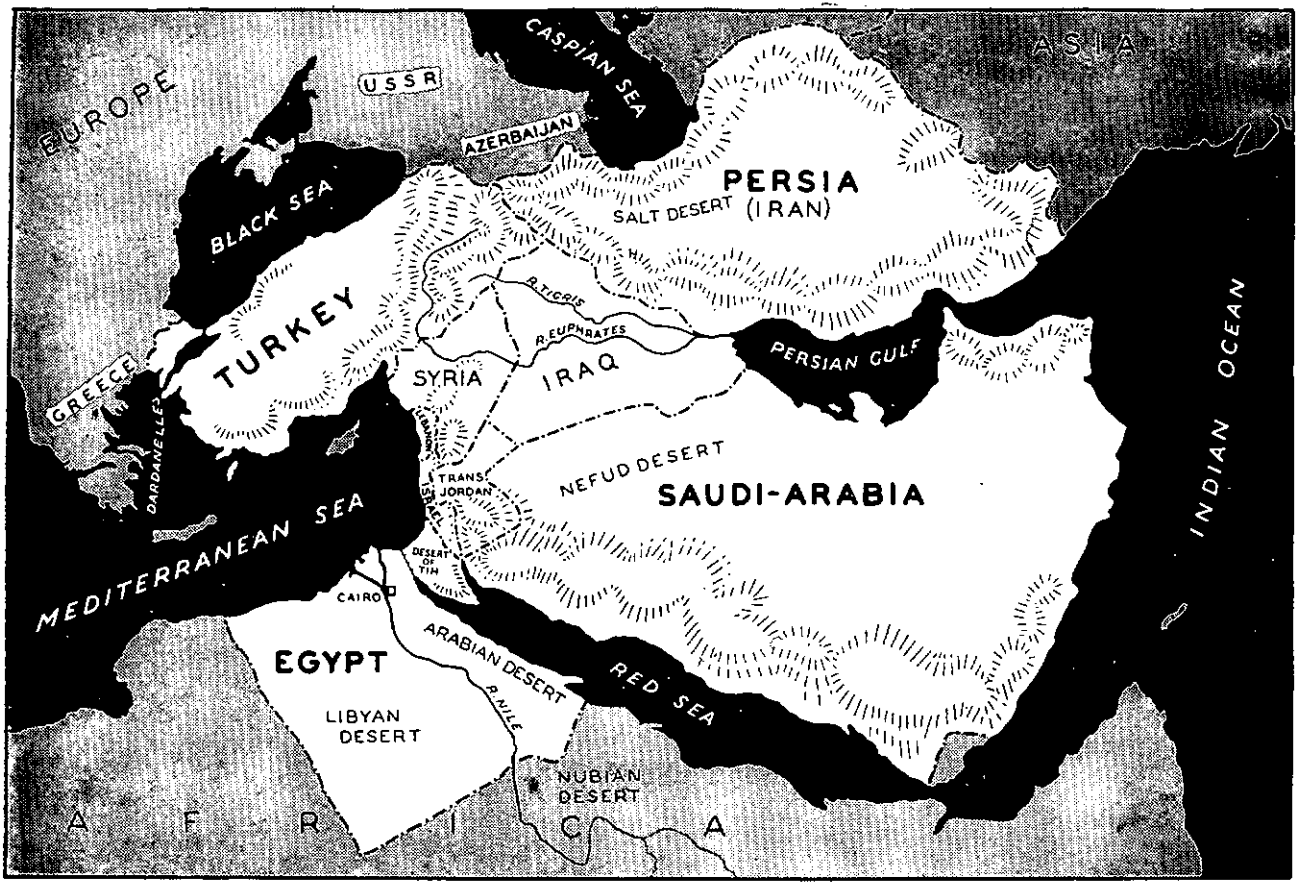
The most striking feature about the whole area is the general lack of water. The climate almost everywhere is one of prolonged or perennial drought. The summer months are especially dry. Only a few areas, principally northern Iran, northern Iraq, eastern Turkey and the Mediterranean littoral, have enough rain for normal agriculture.

The nature of the country can be classified into three major groups, true deserts, semi-deserts and cultivation areas.

True deserts are those where vegetation is absent owing to lack of water and the nature of the surface. These deserts have a surface of either hard gravel, deep gravel and sand or soft sand dunes. Some too have a hard volcanic surface. These areas are largely limited to Iran, the Arabian peninsula and Egypt.

The second type, the semi-deserts, are vast tracts of land with a hard, dusty surface (except after rain), having natural waterholes and coarse vegetations in the hollows. This type of land is the most widespread of all, and is especially characteristic of the northern plains between the Arabian peninsula and the northern mountains.

The third group, the cultivated areas, include quite a considerable portion under irrigation, and supports the bulk of the population in the Middle East.


EUROPE
ASIA
USSR
CASPIAN SEA
AZERBAIJAN
BLACK SEA
PERSIA
SALT DESERT (IRAN)
TURKEY
R. TIGRIS
R. EUPHRATES
PERSIAN GULF
INDIAN OCEAN
GREECE
SYRIA
IRAQ
DARDANELLES
TRANS-JORDAN
NEFUD DESERT
SAUDI-ARABIA
MEDITERRANEAN SEA
DESERT OF TIH
CAIRO
ARABIAN DESERT
RED SEA
EGYPT
R. NILE
LIBYAN DESERT
NUBIAN DESERT
AFRICA

Inhabitants

The sixty million inhabitants are predominantly Moslem and are mainly of either Arab or semi-oriental stock. Of the minorities the Armenians of Turkey and the Kurds of Iran, Iraq, Syria and Turkey are the largest, and most important. The Jews of Palestine, until recently a strong minority, have founded the Sovereign State of Israel and by their victories against the Arab States in the war in Palestine, they have assured for themselves a position of great importance in the Middle East.

Table "A" shows the approximate population and the size of the various countries in the Middle East :

TABLE "A"

Country	Area (sq miles)	Population
Turkey	336,000	18,000,000
Syria	54,000	2,800,000
Lebanon	3,600	1,100,000
Israel (a)		
Egypt	385,000	18,000,000
Saudi Arabia	350,000	3,700,000
Transjordan (a)		
Iraq	140,000	4,000,000
Iran	628,000	15,000,000

(a) To be included when Partition finalized.

Resources

Apart from oil, the mineral resources of the Middle East are poor. Turkey does have an adequate supply of coal, iron, copper and other minerals, but it is the only country in the area which has any mineral wealth other than oil.

Middle East Oil

The Middle East oilfields, for so long a vital source of British supplies, are now of great strategic importance. In fact, it is considered that Middle East oil is the greatest single strategic-economic factor in the world. Without it the whole economy of Western Europe could easily become chaotic. In 1948, two-fifths of Europe's oil came from the Persian Gulf area, and by 1951 it is estimated that it will amount to four-fifths. The reasons for this dependence on Middle East oil are chiefly because the United States has become an importer of oil, and that practically the whole of the Caribbean production will shortly be absorbed by the Americas.

Whereas the proved oil reserves of the United States total about 21,000 million barrels, those of the Middle East amount to 32,000 million barrels. Annual production in the United States is 2,000 million barrels against 425 million barrels in the Middle East in 1948.

The main oil-producing areas are bordering the Persian Gulf and north of the River Tigris in Iraq. Their geographic position in relation to Russia clearly indicates the strategic problem with which the Western Powers are faced as a result of their dependence on Middle East oil. Between them, Britain and America control over 90 per cent of both production and reserves and are continually consolidating their position in the area. On the other hand, the Soviet Union has not been able to gain any control or concessions in the area. Since the end of the war Russia has made three abortive attempts to gain a foothold in the northern Middle East oil area. In 1946, she was forced by the Security Council to withdraw her troops from Azerbaijan in Northern Iran, and later in the same year she failed in her attempts to set up a puppet Government in that province. In 1947 the Iranian Majlis refused to ratify proposals for Soviet oil concessions, for which provisional agreements had already been made though the latter have persisted with their demands, but so far without success.

Strategic Importance to the British Commonwealth

A glance at the map of the world will dispel any doubts as to the significance of the Middle East in relation to Commonwealth communications. Not only does the area control east-west sea, air

and cable communications but, in addition, it constitutes the only land bridge between Asia and Africa, a factor which is certain to weigh heavily in any future world conflagration.

The importance of Egypt and Palestine as bases and the value of Iranian communications as an approach to the USSR were amply confirmed by events in the recent war, and there is good reason to believe that they have since lost little or none of their significance in this aspect. The strategic importance of Middle East oil has already been dealt with in this article, and it is sufficient to stress here that its loss would, without doubt, place serious limitations upon the waging of an offensive war.

It is also difficult to conceive the successful prosecution of such a war from a Commonwealth point of view without the possession of land, sea and air bases within the Middle Eastern area. Finally, were this area to fall into unfriendly hands a serious threat would be created to the security of the Indian subcontinent at a point where its natural defences are the least formidable, and also to the security of the north-west Indian Ocean.

Influences Being Brought to Bear

It is logical that an area which is in itself a nerve centre of communications and constitutes the gateway to four continents and at the same time contains vast resources of oil, should be of paramount importance to the world powers who are either interested in maintaining or upsetting the *status quo*.

Long before oil attained its present strategic significance the Russian desire to possess a warm-water port to provide an outlet for her trade, led conflicting policies in the Middle East to the point of war. Now there is oil to be coveted and protected and in addition a host of considerations arising from the complexity of war on a global scale.

In view of the troubled nature of post-war events, and against such a background as has been described above, it is small wonder that the interests of the great Powers should clash in the Middle East. Whilst one side seeks to consolidate its position, the other, by fanning the flames of each and every situation that presents itself, strives to aggravate the delicately balanced equilibrium of the Middle East and turn it to its own advantage. In this involved scene two factors demand attention: First, Britain's strained economic position has prevented her from exercising the influences in Middle Eastern affairs which are traditionally hers. In this connection the United States of America have shown that they are fully aware of the implications involved and have undertaken military and financial commitments in Greece and Turkey that were hitherto accepted by the United Kingdom. Second, the rise of the sovereign independent State of Israel which has come into existence despite the efforts of its Moslem neighbours who have learnt to their cost that it is very much a force to be reckoned with.

The Soviet Union having failed to make as much capital out of the Palestine dispute as doubtless she would have wished, must now look elsewhere in the Middle East to pursue her disruptive policy. Whilst Soviet demands in respect of the Dardenelles are a constant threat hanging over the head of the Turkish State, it seems more likely that in the immediate future the Soviet Union will direct her attention to the renewal of pressure upon Iran.

Eyes in the Night

Condensed from an article in the Army Illustrated Magazine, November, 1945 Published by Middle East Command

Illustrated by Lieutenant-Colonel K. A. Hall

"WHEN you're driving at night, you may find you can see objects on the road more easily if you look at the hedge."

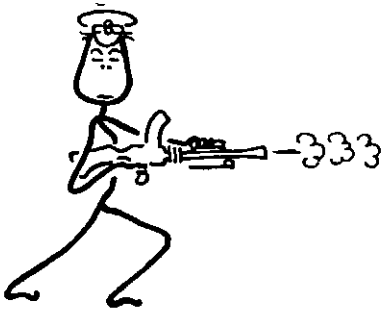
We came across this sentence in a little magazine called VIZ published monthly by GHQ Home Forces. First of all, we were surprised to find a 24-page Army magazine, well-printed in three colours, especially devoted to Visual Training. Second, we were tickled pink with the idea that you can see things better at night by looking away from them. Then we tried it. Then we understood. It works!

Further experiments surprised us still more, till our eyebrows almost reached the back of our neck. If you look at a small dim object in starlight, or a luminous watch four yards away in a dark room, they become invisible. Look away and they reappear. Practice noticing things out of the corner of your eye and see how far from them you can look and still see them.

The gunner in a tank may find that he can actually bring his crosswires on to the target although he is looking a few degrees away from the target at the time. With Bren or rifle, quite apart from the fact that the need to fire may be sudden and at close quarters, and the target uncertain, it will be easier to fire from the hip or by sense of direction rather than by careful aim.

There's a Reason

All this behaviour must seem rather peculiar but there is a reason — and a good scientific one as well. From a purely physical point of view, seeing by day and seeing by night are as completely different as seeing and hearing. Inside our eyes are two sets of nerve endings, both sensitive to light and the means by which we see. One set is called "cones", which we use by day, and the other is called "rods", which we use only at night. These rods take over seeing about an hour and a half after sunset (or at half moonlight). When it is brighter than this the rods are dazzled and cannot see, and the cones do the work. Owls and cats have only rods; hens have only cones; human beings have both, but living largely by day and using artificial light by night we tend only to be expert in using the cones. Rods behave differently and require different treatment.



In ordinary times our eyes have a chance to adjust themselves as dusk comes on, but if we go from full light to darkness, our eyes need 20 or 30 minutes to effect the change-over. Once adapted our eyes become extraordinarily sensitive —being able, for example, to see a match struck several miles away. But this power may be easily broken by a sudden light such as a gunflash or a torchlight.

Tricks at Night

To keep your powers of darkness-observation, you can do several things such as shielding your eyes or checking any light from moving around. If you must look at a map, read it as quickly as possible or let the light shine through a chink in your fingers. If you must look at an illuminated area, use the dodge of old sea-captains when they moved from bridge to charthouse, keep one eye shut and thus protect its dark adaption. If you read a map with one eye and keep the other instinctively shut whenever a bright light goes by, you will be well prepared. If you don't believe this, just try it the next time you go into a cinema from broad daylight. Have one eye closed for a while before you go in and then, in the darkness, open it and see the difference.

Just a little more about the cones and the rods. The cones are crowded in the centre of the eye and thus in daytime we look straight forward. But the rods have no room there and are more or less in an outer circle. Thus, at night the most sensitive part of the eye is a few degrees off of the direct line of sight and in the centre is a blind spot. So to see an object you must "aim off" by about 10 degrees or a fist's width at arm's length. It needs confidence and practice to resist the temptation to look directly at an object to "make sure that it is there".

Now having found an object you must be sure about it. If you stare at an object in the darkness, it will appear to fade after ten seconds and may disappear completely. This is because your rods tire rapidly. But shift your gaze and the object reappears. So time must be taken to assure that an object is really defined. By day you can scan an area in a methodical manner but as your eye takes in light slowly at night you adopt different tactics. You look at a few widely spaced points and then for a few seconds in each direction, paying attention to the areas at which you are not looking directly. If you think that you see something, do not look at it but look a little to the other side of it and give it a few seconds to reappear. But don't stare fixedly and rest your eyes for 10 seconds every two minutes.

Now watch out for some other tricks that your eyes might play you. Movement is easy to see. When a stationary object may be invisible, a moving object may be seen even out of the corner of the eye. But be on your guard against stationary lights because they too may appear to move. If you are in doubt, shift your eyes and pick up reference points for comparison. When it is very dark, faint points of light, shadows or glittering may be seen inside the eye itself. Unless you are wary you may mistake these for signals or gunflashes. So test by looking in another direction and if the lights move with you, then they are inside your eyes.

Silhouette

You cannot expect full results at night. For example you could never expect to recognize a tank by its bogies but must rely on your knowledge of its silhouette. And range estimation is most difficult because when detail is lost, large objects look larger but usually things appear further away than they are. Even familiarity with objects in daylight will not help at night because they will be so different. A tree which looks so solid by day might look very thin at night because all its twigs and smaller branches will not show up. Road blocks may be reported when there are only shadows; men may be reported where there are only cattle. But errors should

not be severely criticized because it is better to report something than not report anything until it is too late. It takes every effort to be alert all the time.

Binoculars as an Aid

Binoculars can help at night, especially the No. 5 Prismatics which are also known as night glasses. The eye takes in too large a field of view but the binoculars force one to a narrow channel and such glasses may have four to five times the range of the naked eye at night. But they must be supported steadily, and their focus and interocular distances properly set to get good results.

After having learnt all this training for the Army it is a pity that there will be no black-out in Blighty for you to practise in. But it may be useful after one of those late nights when you want to creep up the stairs to bed without disturbing anyone.

"I base my calculations on the expectation that luck will be against me . . . ."

— *Napoleon.*