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AUSTRALIAN ARMY JOURNAL

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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. The

Citizen Military Forces

Lieutenant-General V. A. H. Sturdee, CB, CBE, DSO Chief of the General Staff

THE re-introduction of Citizen Military Force training constitutes another landmark in the history of the Australian Army.

In the present state of international affairs few can doubt the wisdom of investing in an insurance policy in the shape of an efficient defence force. An impartial survey of the trend of world affairs is not calculated to strengthen the hope that Australia may not be called upon again to defend herself against aggression.

Under the conditions of war as they exist to-day, and are likely to exist in the foreseeable future, ground forces will be required. The age of "push button" warfare has not yet arrived, and, according to the best scientific advice, it is not likely to arrive for a long time.

In time of peace, Australia cannot afford to maintain on a full time duty basis all the forces she will require immediately upon the outbreak of hostilities. So far as the Army is concerned, the most the national economy is able to sustain is a small regular nucleus, backed by an efficient Citizen Force.

There can be no question of unhealthy rivalry or jealousy between the Regular Army and the Citizen Forces. In Australia we have only one Army. The regular and non-regular elements are both essential parts of it, each is complementary to the other.

If they are to fulfil their function the Citizen Forces must strive for the maximum attainable efficiency. In 1939 the enemy gave us many months in which to raise and train a field army. We would be over optimistic to expect the same good fortune in the next conflict. Indeed, the march of events tends more and more to lessen the time available for mobilization. Citizen Force training, therefore, must be based on the assumption that they will be called upon to take the field at very short notice.

During the war there was a tendency amongst those who did not know the facts to speak lightly of the value of prewar Citizen soldiers. The fact is that despite all the difficulties under which they laboured the Citizen Forces fulfilled their function. At short notice they provided most of the regimental officers and non-commissioned officers required for the original formation of the AIF, and many of the staff officers as well. The AIF could not have taken the field nearly so quickly had these Militia soldiers not been available.

For many of the young men, officers and other ranks, now joining the Citizen Forces military service in time of peace will be a new experience. The degree of personal satisfaction they derive from this experience will depend entirely on the attitude of mind with which they approach the important national duty they are undertaking.

Citizen Force service brings few material rewards. On the contrary it demands of its personnel, and particularly officers, considerable sacrifice and much hard work. At times it might appear that little progress is being made and that the effort is not worth while. Many times these hard thoughts must have occurred to the personnel of the pre-war Militia, but they put them aside an' resolutely carried on. When war came the knowledge, the training and the background they had absorbed enabled many of them to rise to command and staff appointments of great responsibility.

Citizen Force service is a challenge to all that is best in Australia's manhood. If the material rewards are few there is the immense satisfaction of being an energetic member of an organization that has but one aim—service to the nation. And there is the abiding feeling of warm hearted friendship that comes from association with men working for a common object and bound together by the glorious tradition of the Australian Army. It has been truly said that democracies depend for their existence on the efforts of the many citizens who, in various fields of endeavour, give voluntary service to the community. Indeed it is this idea of community service that distinguishes the democratic way of life from all other forms of social organization and government. The voluntary acceptance of the obligation to prepare oneself to defend the nation in war is community service of a very high order.

In conclusion I should like to wish the members of the Citizen Forces every success and happiness in the national service they have voluntarily undertaken.

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Lieutenant-General Chief of the General Staff.

Editorial

Australian Army Journal

THE conversion of the Army Training Memorandum to the "Australian Army Journal" represents another step in the re-organization of Australia's post war Army.

The aims of the Australian Army lournal are:-

- (a) To provide a medium through which to convey to the officers of the Army and the Cadet Corps the latest trends in military thought and developments at home and abroad.
- (b) To provide information designed to assist officers with their personal studies and training problems.
- (c) To stimulate thought and encourage the study of military art.
- (d) To provide the basis of an Australian military literature which it is hoped, in the fullness of time will equal in diversity and dignity the military literature of other countries.

These aims will not be fulfilled if all the articles are written by the editorial staff. The Journal, therefore, invites contributions from all ranks on the Active List of the Army and the Cadet Corps, and from Reserve Officers.

Since the Journal is not a forum for the airing of grievances, contributions of this nature should not be submitted. Criticism is by no means unwelcome, provided it is constructive and does not touch on Government policy. Thought provoking articles, or articles recounting experiences from which useful lessons are deduced, will assist the Journal to fulfil its function to the Australian Army, and to take its place beside the military journals of other countries.

Short, crisp articles of about 1,000/ 1,500 words are particularly desired, but articles of 3,000 words, or more if the subject is important and the treatment meritorious, will be considered for publication.

Contributions, which need not be sent through command channels, should be addressed to, "The Director of Military Training, Army Headquarters, Victoria Barracks, St. Kilda Road, Melbourne." The covering letter, or the top page of the article, should be endorsed, "Contribution for Australian Army Journal." The name, rank, and unit of the author must be shown on each article.

The Australian Army Journal is wholly set up and printed by the Army Headquarters Printing Press. The unit is not equipped on a lavish scale, and some of its machinery was not intended for this class of work. At present it is overwhelmed with orders for new training manuals, pamphlets, etc. However, it is overcoming these, and a host of other difficulties, by ingenuity, improvization, and sheer hard work. If the Journal is appreciated by the Army, much of the credit for its production must go to the men behind the printing machines.

Development of Dress

for the

Post War Army

Lieutenant-Colonel C. W. T. Kyngdon Director of General Stores and Clothing, AHQ

Illustrated by WOII K. A. Capp

THE designs of dress for the Post War Army have been announced and, as is to be expected with something that is right next to a man's skin, a great deal of interest and discussion have been aroused.

The success of the new uniforms and the reaction of the soldier to them will depend not only on the garments themselves but also upon his understanding of the methods used in arriving at the final decisions. Those whose own views have been confirmed will, no doubt, be quietly satisfied, but those who had wanted something else will accept the results much more cheerfully if they know that all possible factors were considered.

The Purpose of Military Uniform

We must first be clear as to the purpose of military dress. Primarily, it is to facilitate the work of the soldier and at the same time, enable him to be clearly recognised as a member of an army in accordance with the requirements of International Law. Secondly, it is to promote morale and sustain the prestige of the service. For the first purpose, functional efficiency is the prime requirement, and, as with a weapon, considerations of tradition and sentiment must give way to the demands of efficiency for modern war. For the second purpose, however, good appearance and traditional features take pride of place, so much so, that in the British Army the final approval of walking out/ceremonial dress rests with His Majesty The King.

Failure of the Dual Purpose Uniform

In the past, and particularly in Australia, uniforms have been designed to combine both purposes in the one garment, but all recent experience, both here and in the British Army, RAF, and US Army, has demonstrated that this is impossible. For general duty, a uniform that gives the utmost freedom of action, with plenty of pockets and made of a tough material, is needed, whilst for social and formal occasions, the requirement is for something pleasing to the eye. Any attempts to meet both these requirements in the one garment have resulted in something that satisfies neither.

The Fighting Man's Point of View

To ensure that all requirements would be considered a "Committee on Post War Dress" was set up, embracing an officer of the General Staff to watch the fighting needs, an officer of the Adjutant-General's Staff to attend to matters of morale, health and ceremonial, and a member of the Development Division of the Branch of the Master-General of the Ordnance responsible for actual research and technical development.

Fact Finding

The first task of the Committee was to examine all available information, and to obtain an early forecast of the productive capacity of industry as well as of the date to which stocks of existing patterns would last. It transpired that stocks would last to mid-1949, and that, apart from some capacity for immediate manufacture from army cloths in stock, industry would not be able to undertake military orders until mid-1948. It was also ascertained that the materials in stock were mainly war-time substitutes and unsuited to the making of uniforms of the desired standards.

Examination of overseas developments showed that the British Army and the RAF had both completed their proposals for post-war dress. In each case a Committee had examined large numbers of witnesses of all ranks in all areas of service in order to get both preferences and the results of experience. Both had confirmed that Battle Dress was eminently suited to modern mechanised warfare, but had made a number of detailed improvements to it. The British Army had adopted a blue walking out/ceremonial uniform with coloured trimmings distinctive to corps and regiments and the Australian Committee obtained a sample of this uniform. The Canadian Army had confirmed battle dress for post war wear with alterations almost identical with those made by UK. Canada likewise was considering a distinctive walking out/ ceremonial dress. The US Army, which had adopted a modified British battle dress during the war, had confirmed it for all ranks for post-war wear, and had carried out a test of opinion amongst 30,000 soldiers, with the aid of the Survev Research Centre of the University of Michigan, on "Dress" uniform, and had decided upon a blue one. New Zealand intended to standardize with the UK in both battle and walking out/ceremonial dress. Of particular value were the methods used by these other countries in research and development, great use having been made of "opinion polls" to ascertain both the results of soldiers' experiences and their preferences and reactions.

Expert Opinion on Materials and Tailoring

The Committee next set up a subcommittee of experts to study materials, and another to study designs and patterns. The first examined all the suitable materials available in Australia, as well as those produced in UK for the British and US Armies, others produced during the war in Australia for the US Army, and certain of those used by Canada and New Zealand, whilst the other went into points of design that would aid comfort and serviceability, as well as facilitate quality mass production.

Battle Dress versus Service Dress

To settle the argument over the respective merits of Australian service dress and battle dress, comparative users' trials were carried out by armoured, infantry and signals personnel, who were required to report on an exhaustive list of points concerning each uniform under every kind of activity normally undertaken by the soldier in barracks and in the field. The results were conclusive: on every point battle dress was superior. Questions were asked even on "the effect on morale and feeling of well-being of the soldier on ordinary occasions when in public" and on "the appearance after being slept in as might be the case when travelling by train."

Questions of Regimental Tradition

The heads of all arms and services were called before the Committee to give evidence concerning the retention in the uniform of traditional features peculiar to their corps. In this respect, it must be remembered that certain corps, such as the Royal Australian Artillery, have a history that reaches right back to the time of State defence forces, and that the States of Australia sent contingents to the Sudan War of 1888 and to the South African War. Special thought was given to the very difficult problem of perpetuating traditional features of the not very satisfactory uniforms worn by the AIF in World Wars I and II.

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(a) Blue Walking Out and Ceremonial Dress. Scarlet Stripe on Trousers, Scarlet Band and Welt on Cap.

(b) Battle Dress for All Ranks.

Opinion Polls

To secure a cross section of the opinion of Australian soldiers of all ranks, a questionnaire of 41 questions with illustrations of various patterns of uniforms and headdress was sent to 1,000 serving members and 1,000 ex-members, of whom 25% were privates, 35% WOs and NCOs, 25% Lieuts and Capts and 15% Majors and above. This questionnaire was analysed on calculating machines by rank groups, areas of service, and by age groups of under and over 35 years. Members' and ex-members' answers were examined separately as well as in total. Certain questions of special regimental interest, such as that of headdress, were analysed by arms.

The evidence of all these witnesses became the starting point for designs, and indicated also where further inquiry was necessary. For instance, a majority blue of the Directors favoured a walking out/ceremonial uniform, whilst all except one considered that battle dress should be adopted for all ranks for every-day duty. The questionnaire showed that 78% of those who had worn battle dress preferred it to service dress. Only 15% of either serving or ex-members wanted to retain service dress on grounds of tradition if it were proved inferior to battle dress. For walking out, 48% wanted a forage cap, 28% a beret, 18% the hat, the remainder liking the airman's "field service cap", but for ceremonial in a khaki uniform the hat was first choice - the armoured corps would consider nothing other than the beret! Privates wanted a tie with summer dress, but officers wanted to get rid of it. The most decisive opinion was on the type of neck for the ceremonial/walking out uniform, the lowest percentage in favour of an open neck with shirt and tie being that of 76.2% among senior officers no longer serving, and the highest 92.1% among serving privates. A considerable proportion of the "free comments" suggested a colour other than khaki for walking out and ceremonial.

Prototype Walking Out/Ceremonial Uniforms

The next step was to make up uniforms in eight different colours-moss green, dark green, medium green, khaki, indigo blue, dark blue, grev blue, grev -and featuring different designs in cut, back, pockets, flaps, cuffs, as well as two special designs for tropical wear. These were then taken round all the capital cities except Hobart, and exhibited to a cross section of serving soldiers ranging from privates who had joined since the war up to the most senior officers. For BCOF, Tasmania, Darwin and the Washington and London Staffs samples of the different coloured cloths and a questionnaire on colour and points of design were sent to be answered by a similar cross section. For these tests of opinion, where the actual uniforms were shown, the witnesses were given an outline of the whole problem of army dress, and then shown in daylight both battle dress and the alternative patterns of walking out/ceremonial dress worn by selected models. This was followed by a quiz session in which headdress, belts and detachable shoulder straps were tried out with the various coloured uniforms and in which any other questions were answered. In the evening the witnesses were required to bring a lady to view the uniforms in artificial light and another quiz session was held in which the ladies needed no encouragement in voicing their views. At the end of the session, the witnesses were required to answer a written questionnaire on colour and points of design, whilst, by a show of hands, additional reactions of both witnesses and their ladies were obtained on questions of headdress, piping, etc. After answering the questionnaire, ten selected personnel, representing all ranks and conditions of service, were individually questioned by the interviewing officer on a number of points designed to ascertain the feeling towards the method of research and to give a cross check on the opinions sought in the questionnaire.

The results of the investigation into colour and design were conclusive. Blue was favoured in BCOF, Queensland, NSW, Victoria, Darwin, London and South Washington; grey blue in Australia and Western Australia; and The reasons most khaki in Tasmania. frequently advanced for choosing a colour other than khaki were that a complete change was desirable from the work-a-day colour, blue and red were traditional ceremonial colours for the Army, and a colour that would stand out on the parade ground and at the regimental ball was needed to "beat the Navy and the Air Force." Most considered the special uniform was needed mainly for regimental social functions and for ceremonial parades, and only a minority would wear it for walking out, the majority preferring battle dress or civilian clothes for this purpose.

Ninety per cent of those individually questioned said that they would "feel all right" in battle dress for social and ceremonial occasions, and the same percentage wanted battle dress first if any question of priority arose. Some vigorous discussions occurred on headdress, but the majority favoured a forage cap as being more in harmony with the blue uniform, less likely to be displaced by the rifle or by "eyes right", and more convenient on social occasions.

CMF Opinion

To get the CMF opinion, the results of all the researches made by the Committee, as well as the draft proposals, and the prototype uniforms, were made available to committees of future CMF Commanders in each state except Tasmania, and the comments of these Committees submitted in full to the Military Board.

Conclusion

As a result of these enquiries, the new uniforms for the Post War Army should be well suited to the various needs of the soldier, comparable in quality to those of other armies and services, and conform to the preferences of the majority of all ranks. They are in accord both with Australian military tradition from the earliest times in which forces were raised in this country, and meet the vital need for standardization of actual fighting kit within the British Commonwealth.

The Principles of War

Prepared for the Australian Army Journal by The Directorate of Military Training, Army Headquarters

Introduction

A cursory perusal of the Principles of War listed in Army Training Memorandum No. 53 (February — March, 1948), may lead to the supposition that the Chiefs of Staff in the United Kingdom have altered some of the old principles and introduced some new ones. Reflection, however, will show that all they have done is to re-state the well known and generally accepted principles in more precise terms, and to underline certain factors which, under the conditions of modern war, require emphasis.

It will be noted that the Chiefs of Staff have :---

- (a) Emphasized in the strongest possible terms the importance of the Principle of the Selection and Maintenance of the Aim.
- (b) Elevated to the status of principles two well known elements of war which were not included in the list of principles given in Field Service Regulations, Volume II, 1935. These two elements, now designated principles, are:—

Maintenance of Morale Administration.

It is felt that a brief review of the changes in the conditions of war which have necessitated the statement by the Chiefs of Staff may be of assistance in forming an appreciation of the differences between the new and the old list of principles. Since the only differences lie in the additional stress placed on "The Selection and Maintenance of the Aim", and the inclusion in the new list of "Maintenance of Morale" and "Administration," it is proposed to confine the review to these three principles.

The Selection and Maintenance of the Aim

At first sight it may appear that the selection of the aim to be pursued in any operation is a fairly simple matter. Experience has shown, however, that in practice the selection of an aim from several alternative courses is not always At the higher levels it is nearly easy. always subject to the influence of conflicting interests, opinions, and demands. Even when selected, the relentless pursuit of the aim is still subject to these same influences, and at all levels the general confusion of war and the ever changing situation, makes it extremely difficult to "keep one's eyes on the ball."

A good example of the selection and maintenance of the aim at the highest levels is to be found in the situation created by Japan's entry into the war in 1941. Instead of one major adversary the Allies now had two. Three courses were open to them. They could concentrate against Germany or against Japan, or they could attempt to defeat them both simultaneously.

All interested parties in both London and Washington ruled out the third course, because it violated the *Principle* of *Concentration*, and because it was obvious at the end of 1941 that we would not he strong enough for several years to launch a major offensive against both opponents simultaneously.

The selection of the enemy to be attacked first was not quite so simple. American public opinion had been aroused by the treacherous Japanese attack on Pearl Harbour and the course of events in the Far East. There was, naturally, a strong national desire to avenge these disasters. Similar influences, springing from a different cause, were felt by the British Government.

The Allied statesmen and military leaders saw clearly that Germany was the more dangerous enemy, and decided on the following course:---

- First: Concentrate the maximum available force in the European theatre with a view to crushing Germany. Simultaneously to allot to the South-East Asia and Pacific Areas the minimum forces required to protect the bases and resources which would eventually be required for an offensive against Japan.
- Second: Having crushed Germany, transfer from the European to the Asiatic-Pacific theatres the forces required to mount a decisive offensive against Japan.

The Allied leaders had now to decide how, when, and where the forces to be concentrated in the European zone would be launched against Germany. There were many places where a landing could be made in Europe, and many points for and against each of them.

Eventually it was decided to launch the main attack from the United Kingdom against the north-western coast of France, and to support it with a subsidiary operation in the south of France. Meanwhile diversionary operations, designed to knock Italy out of the war and bring about a dispersal of the German forces, were undertaken in Italy.

In adhering to these decisions despite considerable pressure to open a "second front" at a premature stage of their preparation, the Allied leaders had in mind one of the major lessons of World War I. In that conflict the Central Powers (Germany and Austria) induced us for political and other reasons to undertake a number of costly subsidiary operations in the Near and Middle East, and on the periphery of Europe. Whilst these operations absorbed a large number of our troops and much equipment and shipping, the Central Powers, working on interior lines, were able to hold our attacks with only a fraction of the forces and material expended by us.

Having selected their aim, and decided upon the method of attaining it, the Allied leaders resolutely pursued their purpose. Unlike their predecessors of the 1914-18 war, they steadfastly refused to disperse their forces by engaging in seemingly attractive side shows.

This is a strategic illustration, but in a very similar way the junior leader must select his aim, and then concentrate every possible effort on maintaining it.

Maintenance of Morale

Maintenance of Morale has always been considered vital to success in war. From time immemorial man has endeavoured to undermine his opponent's will to resist by methods that were sometimes subtle but very often crude and ineffective.

Until comparatively recent times the means of attacking an adversary's morale were strictly limited. In time of peace, only weak subversive influences could be brought to bear on the potentially hostile population. In time of war it was virtually impossible to reach them at all. However, improvements in means of communication, notably in the development of modern printing methods and wireless broadcasting, have opened up avenues through which the will to fight of the armed forces and the civil population can be reached at all stages of the struggle, before and after the "shooting war" begins.

Long before World War II started the Germans had brought their newly developed psychological warfare machine into operation. By every conceivable device, the radio, the printing press, smooth tongued agents, apparently innocent associations of honest citizens, they undermined the morale of their intended victims.

As a result of these subtle, indirect attacks. Austria and Czechoslavakia fell like ripe plums into the German basket without a shot being fired. In Norway, the activities of many influential people who had fallen victims to Hitler's propaganda machine, paved the way for the cheap and easy victory of the German In France similar methods met forces. with striking success. These things happened; they are not figments of the imagination. And they happened to people who were just as sure as we are that they were proof against any propaganda.

With the outbreak of hostilities we entered the propaganda field, and the Germans intensified their efforts. Although we are inclined to deride our opponent's appreciation of the psychology of other nations we should not forget our own futile leaflet barrage of Germany in the early months of the war. Nor should we forget that the Germans' efforts to influence the morale of fighting forces opposed to them did not in all cases go entirely unrewarded.

Throughout the world today intensive study is being given to psychological warfare. At least one great power is ceaselessly pouring out propaganda, and making other more subtle and indirect efforts to undermine the morale of its intended victims and those who might support them, in preparation for its own expansion with or without the use of force.

The first defence against this insidious form of attack is for every commander, in peace and war, to ensure, that his troops are thoroughly educated in the ideals and aspirations of their country, and unshaken in their belief in the ability of their own army to fight its way to victory.

Good leadership, good training, and good administration are the surest foundations on which to build and maintain morale. As a soldier gains confidence in his leaders, his weapons, and his equipment, so does his morale rise. These basic essentials, coupled with a firm belief in the justice of his cause, should sustain the morale of the soldier even under the most adverse conditions.

Administration

In the days before the Napoleonic Wars the relatively small and simply equipped armies lived off the country, and required no elaborate supply or transportation arrangements. Napoleon's attention to administrative detail placed him ahead of many of his contemporaries, and contributed in no small measure to some of his most striking successes. Nevertheless, administrative failure in his campaign in Russia in 1812 ruined his magnificent army, and led to his final overthrow.

As the dependence of armies on vast quantities of supplies and equipment has increased so has the importance of administration. Failure to realize this fact has led to many military disasters, of which the Crimean War of 1854 was an outstanding example. Lest it be felt that these events are too remote to be impressive it is worth recalling that administrative failures no less shocking British-Indian occurred during the Campaign in Mesopotamia in 1914-16. Even as late as 1941-42 the Germans' failure to provide their armies in Russia with winter clothing and equipment involved them in tremendous losses.

The administrative arrangements for the invasion of Normandy, which took many months to perfect, constitute a model of planning, forethought, and co-operation. They ranged from the secret construction of huge mobile ports and under water petrol pipe lines to the provision of paper bags for seasick The concentration, personnel. and embarkation in the right craft at the right time, of a large number of units and vast quantities of stores, vehicles, and equipment, called for detailed planning on an immense scale.

The plans worked. Despite bad weather that wrecked one of the mobile ports and impeded beach working, the success of the operation was never endangered by a breakdown in administrative arrangements.

For many years before the war the importance of administration was stressed in the training of the Australian Army. And yet the outbreak of hostilities brought to light certain weaknesses in ideas and methods, notably in the matter of the soldier's food. This administrative defect and the difficulties encountered in trying to rectify it, are described in detail by the Director of Army Catering (Colonel Sir Stanton Hicks) in his article "Army Catering" in Army Training Memorandum Number 54. And after five years of war startling examples of bad administration could be found in Australia, some of them in fixed establishments where there was no possible excuse for laxity.

Administration is not solely the concern of higher commanders and their staffs. Nor is it merely concerned with the mounting of operations on a vast scale. Every commander, and there are no exceptions whatever, is responsible for the administration of his command.

On the unit level administration only occasionally becomes involved in big operational plans. Within the unit it is a day to day affair of painstaking attention to detail. There can never be any let up in this matter in peace or in war because, in the final analysis, it is on sound unit administration that victory is built.

Patriotism depends as much on mutual suffering as on mutual success; and it is by that experience of all fortunes and all feelings that a great national character is created.

- Benjamin Disraeli, 1862.



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

PROMOTION examination for officers of the Regular Army will be introduced as from June, 1949.

To assist candidates for both promotion and Staff College entrance examinations, part time courses will be arranged by Commands and Military Districts. It must be appreciated, however, that the raising of the Citizen Military Forces, and the increase in training activity generally, will throw a heavy burden on formation staffs. Time simply will not permit them to run comprehensive and lengthy examination classes covering all the subjects in the syllabus. Officers must, undertake a considerable therefore, amount of self study, particularly in the subjects of Military History and Current Affairs.

To assist officers to attack the problem in a practical way the undermentioned sources of material for study are suggested.

District Base Libraries, which are established in all Military Districts except 7 MD. In Victoria the Base Library is combined with the Defence Library situated in Victoria Barracks. Every officer on the active list is entitled to borrow books and periodicals from the Base Library of the Military District in which he is serving.

District Base Libraries stock a wide range of books on service and related subjects. They are also supplied with copies of all the important service journals published in the British Commonwealth and the United States, and have on hand a wide range of periodicals devoted to international affairs and matters of general interest.

Army Education Service .- One of the

functions of the Army Education Service is to assist all ranks with the study of subjects not strictly classed as military training. One of its "pet" subjects is "Current Affairs." The Service maintains well stocked libraries in all Military Districts, and at the larger training establishments.

Students would be well advised to consult Army Education Officers on the selection of material for general background reading, and the study of international and current affairs.

United Service Institutions are semiofficial organizations established in all Military Districts, except 7 MD, for the purpose of encouraging the study of naval, military, and air art. Every officer should be a member.

The Institutions maintain well stocked lending libraries of service and related literature. In addition, they run regular series of lectures, many of which have a direct bearing on the subject matter of the promotion and Staff College entrance examinations.

Material for Study

In addition to the official manuals and pamphlets, the undermentioned material is recommended for study.

Military History.—Since the subject matter for the examinations will be drawn from the first three books in the list given below, candidates should make a close study of them. The remaining books are recommended for background reading and general "build-up."

Alamein to the River Sangro-Field Marshal Montgomery.

Normandy to the Baltic-Field Marshal Montgomery.

Tobruk-Chester Wilmot.

- Operation Victory-Maj-General Sir Francis de Guingand.
- Montgomery. A Biography Alan Moorehead.

British and American service journals, many of which contain articles bearing on the campaigns under study.

Current Affairs.—The undermentioned material is available in District Base Libraries and nearly all good lending libraries.

- "The World To-Day"—Monthly. Great Britain. (Journal of the Royal Institute of International Affairs).
- "The National Review" Monthly. Great Britain.
- "The Contemporary Review"—Monthly. Great Britain.
- "Foreign Affairs"-Quarterly. U.S.A.
- "Time"-Weekly, U.S.A.
- "Life" (International Edition)-Fortnightly. U.S.A.
- "The Australian Outlook"—Monthly. Australia (Journal of the Australian Institute of International Affairs).
- "Current Affairs Bulletin"—Australia. Issued regularly by the Commonwealth Office of Education, and obtainable from the Army Education Service. Every candidate should begin at once to build up a file of these bulletins.

All the more important metropolitan daily newspapers run regular features on international affairs. They make more profitable reading than the racing notes.

The commentators of the Australian Broadcasting Commission are all experts in the subjects on which they speak, while some of the subjects debated in the Commission's "Forum of the Air" are good value. A suitable "listening schedule" can be compiled from the programmes published in the radio weeklies.

Learn by Experience

It is a wise man who learns by experience—the experience of others. The libraries mentioned in the foregoing paragraphs are full of experience, ancient and modern. The works on their shelves cover the whole gamut of man's effort in the fields of statesmanship and war, from the sonorous passages of Gibbons "Decline and Fall of the Roman Empire" to the warm, human narrative of Private Bill Smith's thoughts and actions at the Battle of Alamein.

The habit of regular, selective reading is the best method of enriching our minds with the experiences of the tens of thousands of soldiers, from generals to privates, whose thoughts and actions have been recorded in print. A rich and varied literature about World War II is already being created. Besides the books mentioned in this paper there are numerous biographies and personal narratives which help to colour and enliven the official volumes. Many of them are very human documents containing useful lessons on morale, administration, and man-management. In particular the service journals are full of articles analysing the experiences of the recent war from the point of view of statesmanship, strategy, tactics, equipment, and administration, together with suggestions for the application of the lessons adduced to present and future requirements.

Remember that in reading for study one must read with an alert, critical mind. Since we cannot read everything we must be selective. Get to know your way about your library, and get to know your librarian. For serious work select and study—not merely read—the works which have a direct bearing on the subjects you have in mind. Then, for recreation, read those with a less direct bearing.

first glance these Promotion At Examinations look like a pretty tough programme. They aren't really. The syllabus was drawn up by experienced officers who have all been through the mill, many of them under much worse conditions than obtain to-day. The essential thing is to start working on them now, not next week or the week after that. Acquiring the habit of study is like starting off with a new motor There is a certain amount of car. "running in" to be done. After that the going is relatively easy.

16

BIOLOGICAL WARFARE =

. . . Its Place in History

Captain I. R. McKenzie, Directorate of Armament Army Headquarters

Illustrated by Lieutenant-Colonel K. A. Hall

IN September, 1947, the Association of Scientific American Workers, in a memorandum to the General Assembly of the United Nations, defined Biological Warfare as the use war of pathogenic, or diseasein producing, bacteria, fungi, protozoa, rickettsiae, viruses and other agents of infectious disease, of their toxic products, and of certain other organic chemical poisons (animal or plant toxins, plant "hormones") intended to kill or incapacitate human beings or economically useful animals, or to destroy or damage food crops or other useful plants.

In many respects, the concept of biological warfare may be likened to that of chemical warfare. In either case the agents may be considered as poisons designed to act detrimentally on animal or vegetable organisms. In application, the two fields are similar in that the agents may be disseminated over a relatively large area, thus threatening a large number of individuals simultaneously.

The modern idea of biological warfare depends for its application on the present standard of knowledge, and the ever increasing efficiency of techniques relating to the characteristics and functions of pathogenic organisms and chemicals. Bacteriology and its kindred sciences such as parasitology and microscopy are, however, only relatively recent developments in the field of scientific research.

Bacteria were seen and described by Anton von Leeuwenhoeck, a Dutch draper, in 1683, but it was not until the late nineteenth and early twentieth centuries, the era of such men as Louis Pasteur, Robert Koch and Joseph Lister, that the relation between bacteria and disease was put on a firm basis. The techniques of identification, segregation and classification, the methods of culture and storage in small and large quantities. and the precise relationships between micro-organisms and their pathological effects, have been studied and developed only in the past forty years.

It is understandable then that authoritative statements have been made to the effect that, apart from a few half-hearted



and amateurish instances during the 1914-18 war and after, the potentiality of biological warfare as a war-winning weapon has yet to be proved in practice.

From the point of view of present day knowledge and techniques in the field of bacteriology this statement is, of course, perfectly true. However, as a matter of interest, it might pay us to adopt a broader view of the definition already quoted and see whether history can verify the off-quoted statement that "there is nothing new."

The scientists of the far distant past were the high priests, tribal witch doctors and later those seekers of the Medieval Philosopher's Stone, the The production of poisons Alchemists. for warlike or other such sinister uses fell to these scientists of ancient days. Most of these poisons were obtained directly or indirectly from plants or animals, thus qualifying them for consideration as biological warfare agents. The use of poison as a weapon of war produces by means of its insidious nature, a considerable degree of surprise and an inevitable break-down of morale.

History tells us that a Carthaginian general, Maharbal, about 200 B.C. in a campaign against certain African tribes adopted the following tactics. He feigned retreat, leaving in his camp a large amount of wine mixed with an extract of Mandragora. The Africans drank the wine, fell into a narcotic sleep, and were attacked and slain during the night. The Mandragora is a plant of the nightshade family. The extract is still used in medicine as an hypnotic. A similar mass poisoning by means of plant extracts was employed by Duncan, King of Scotland, in a war against the Danish King Swen in the eleventh century.



For many centuries the poisoning of water supplies has always been considered an effective method of inflicting casualties and privations on an enemy. We are told that about 2,500 years ago, Solon, an Athenian statesman, besieged the Greek community at Kirrha. A small river ran through the town supplying drinking water to the inhabitants. Solon diverted the river from the town, forcing the besieged army to rely on small amounts of rainwater. Solon then ordered a quantity of Helleborus, a poisonous plant, to be thrown into the dammed When it was considered that river. sufficient poison had dissolved in the water the river was allowed to flow its normal course through the town. The unsuspecting town soldiers drank deeply To a man, they of the regained water. were stricken with violent attacks of diarrhoea. Solon captured the town without further ado.

Centuries later, in 1155, Barbarossa, Emperor of the Holy Roman Empire, besieged the Italian city of Tortona. Despite his powerful army, he could not capture the city. The citizens obtained their water supply from a spring, over which many battles were fought. Barbarossa had the spring poisoned by throwing rotting corpses of men and animals into it. The citizens had to drink this putrid water or die of thirst. Those who drank died and the remainder were compelled to surrender. The decaying corpses, of course, swarmed with death In these enlightened dealing bacteria. days, however, the bacteria may be cultivated, stored and disseminated under more favourable conditions, but, beyond the improvement in technique, the principle is the same. One of the most popular suggestions for the use of biological agents in any future war is that of the pollution of water supplies by selected cultures.

Incorporation of bacterial poisons in bullets and shell fillings has its parallel in the application of poisons to the tips of the arrows and spears of uncivilized tribes. The use by South American natives of the very powerful plant poison "curare" on blow pipe darts is well known. Not so well known perhaps is the custom of various tribes of bushmen in Africa. Livingstone reported that natives of the Kalahari district used the entrails of a small caterpillar for poisoning their spears and arrows. When drawn over a sore, this insect, which is known to the natives as "Nga," causes fierce pain, and those wounded by arrows meared with the poison die slowly in condition of violent delirium.

Other venomous creatures have been used to throw armies into confusion and panic, a condition most conducive to In the Third Century, the defeat. defenders of Atra, a town situated on the peak of a mountain, hurled earthenware with poisonous insects filled vessels against their attackers, throwing them On a somewhat larger into confusion. scale, Hannibal once gained a naval victory by throwing earthen vessels filled with venomous snakes on to the decks of Once again, it was an enemy vessel. the ensuing panic which led to final victory.

The biological agents so far considered, with the exception of those derived from decaying animal material, are lacking in one major characteristic, namely, they are not infective agents. Agents such as bacteria may cause infection in their hosts and in many cases the agents are characterized by a property not possessed by chemical or plant poisons; that of epidemicity or the capacity to spread from one infected man (or animal or to others, and thus continue plant) spreading over a more or less large area, so that a single effective attack, even though sharply localized at the source, may be potentially capable of spreading very widely.

This very important difference between modern bacterial agents and the plant and animal poisons of ancient times can well be illustrated by comparing the use by the Romans of vessels filled with poisonous insects with a comparatively recent attempt to spread bubonic plague in a Chinese city. Dr Lim of the Chinese Red Cross is said to have reported that in November, 1941, a lone Japanese plane flew at low altitude over Changteh, a city of fifty thousand people, dropping cachets of rice and wisps of cotton containing fleas infected with bubonic plague bacilli. Less than a week after the raid, six cases of plague were reported and more cases occurred as time went on. All victims died and autopsy confirmed that bubonic plague was the cause of death. It was a significant fact that there had been no plague reported in Changteh in ten generations and that the nearest epidemic centre was five hundred miles distant. At that time, Dr Lim believed that these small scale attempts were merely experimental and that Japan was planning full scale bacterial warfare for future campaigns.

Since the 1914-18 war, there have been many documents published setting out the problems involved in the use of biological agents in warfare. Many of these reports mention several attempts to infect animals during the 1914-18 war, and later experiments against human beings. Although there may be some doubt as to the authenticity of these allegations it will be of interest to mention them briefly as they may give an insight into possible future methods of use.

For example, in 1915, German agents in America, inoculated with disease producing bacteria, horses and cattle which were being shipped from the United States to the Allies on the Western Front.

Again, in 1916, a chest containing bacterial cultures, was sent from a military department in Berlin to the German military attache in Bucharest. The chest



also contained instructions for the dissemination of plague, glanders and footand-mouth disease among Rumanian horses and cattle. Fortunately, the attempt miscarried, the chest falling into the hands of the police.

Writing in the July, 1934, issue of "Nineteenth Century and After," Wickham Steed, former editor of the "Times," gave a description, based on German documents, of experiments by German agents in Paris in 1931. The agents quantities liberated of a harmless microbe near the inlets of the ventilating system of the Paris underground railway. Down below, on the platform, other agents were able to detect and register the organisms which found their way through the ventilating ducts. As the value of underground railways as airraid shelters is well known, the significance of these experiments will be apparent.

During the recent war, there was no large scale offensive use of biological However, the scientists were agents. fully aware of the possibilities of such a mode of warfare and took appropriate precautions. For instance, in the United States, at the height of its development, the Special Projects Division of the Chemical Warfare Service of the Army, which carried the main responsibility for the biological warfare programme, had a total strength of 3,900 personnel. This group worked throughout the war at high pressure and under the strictest secrecy. Their achievements in their particular field were remarkable. Needless to say, most of the results of their labours have not yet been published for public consumption.

As an example of the stage development has reached, a routine unpurified preparation of psittacosis virus, a representative member of a group of highly infective diseases characteristic of bacterial warfare, has been reported to contain, per millilitre, approximately 20,000,000 doses for man. No published data are available on the dispersion efficiency of bacterial warfare weapons, but even if the efficiency is as low as .01 per cent, the potency of this material would still be extraordinarily high.

Biological warfare can no longer be regarded as a laboratory experiment. The extent to which investigations have been carried out and the results achieved indicate that it must now be considered as a positive threat in any future conflict. It must be given adequate consideration in any major defence scheme and its use in an offensive role must be mastered as a "threat in being" of equal importance to our potentialities in chemical warfare.

In its memorandum to the United Nations, the American Association of Scientific Workers concluded that "Biological Warfare" is the pre-eminent terror weapon. Unlike the atomic bomb it would not destroy property. It must be used to produce casualties in large numbers or in such a way that only a few cases would be needed to demoralize a whole population. Biological Warfare epitomises the total war that is now or will very soon be ready for use.



THE RECRUIT .

Make Him Welcome

"Soldier"

ONE of the most distressing of human emotions is the feeling of isolation that takes hold of a young man when he joins a new organization, whether it be a school, a business establishment, or a military unit.

There may be a few hardy souls who are never troubled with this natural shyness. However, nearly all of us can recall the feeling of loneliness, even wretchedness, that troubled us during our first days at a new school. Everyone else knew each other, the masters, and the routine. To us everything was strange and rather frightening. Maybe the modern schoolmaster, with his improved knowledge of psychology, takes more trouble to put the newcomer at his ease from the moment of his arrival.

As we grow older this feeling of loneliness becomes less acute, but few men lose it entirely. Consequently an organization which goes to the trouble of eliminating its cause usually earns the affection and loyalty of newcomers to its ranks.

I can still recall my rather mixed feelings when, after an eight days' gruelling rail journey through India, my train approached Sialkut in the Punjab, where I was to be attached to a unit of the British Army. Being under the impression that all Englishmen were more than a little reserved I was wondering how I, a perfect stranger, was going to get on. Imagine the lift to my morale when I was met at the station by a bunch of very cheery individuals who gave me a sincere and comradely welcome. The way in which I was made to feel at home in the unit carried me over that first awkward hurdle, and helped to ensure that I enjoyed every minute of my stay in India.

I did not forget that experience and, during my service as a Militia adjutant, I did my best to ensure that all who joined the unit with which I was associated were made welcome from the beginning.

It is so easy to look upon a recruit as just another soldier, and to forget all about his personal feelings. Yet it is well worth while going to a little thought and trouble, if necessary a lot of thought and trouble, to assist the recruit through the first difficult stages.

Remember that the recruit is entering upon an experience entirely new to him. If he is allowed to feel alone, and perhaps a little foolish, in a cold, strange world he will react accordingly. He is apt to feel discouraged by the uncongenial atmosphere, and to regret that he ever thought of joining the Army.

If, on the other hand, the recruit is made to feel welcome and at ease it is more than likely that he will become an enthusiast at once. And every enthusiastic soldier is a magnet drawing other recruits to the unit.

Military Geography — 6

The Ex-Italian Colonies in Africa

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

This is No 6 in a series of articles on Military Geography carried forward from the Army Training Memorandum. Other articles in the series arc—Sinkiang, ATM 50; Manchuria, ATM 51; Greece, ATM 52; Persia, ATM 53; Turkey, ATM 54.

THE ex-Italian colonies are situated on the African sub-continent and consist of Libya, Eritrea and Italian Somaliland.

Libya, which is divided into Tripolitania and Cyrenaica, is an area of 679,358 square miles centrally situated in North Africa on the Mediterranean Sea -flanked in the west by Tunisia and Algeria, in the east by Egypt and the Sudan, and extending as far, south as French West Africa. There are three general zones-coastal, sub-desert and The coastal belt of 17,321 desert. square miles is considered to be the only area suitable for cultivation. The wet season extends from November until April, the remainder of the year being hot and dry.

The Eritrean coastline on the Red Sea is 670 miles long and the total land area of the colony is about 45,800 square miles —bordered by the surrounding States of the Anglo-Egyptian Sudan, Abyssinia and French Somaliland. For climatic and agricultural reasons the country may be divided into two zones; the plains, including the lowlands along the coast, where climate is tropical and rains fall in winter; and the uplands, where it is cool and sometimes cold, with rains during the summer. Italian Somaliland is situated on the east coast of Africa and its approximate area of 194,000 square miles is determined by the borders of British Somaliland and Abyssinia in the west, and Kenya in the south. The climate is tropical and the rains are confined to the winter months of the year.

Resources

Date palms, oranges, olives, mulberries, almonds, figs, grape vines and many other fruit trees and Mediterranean plants grow on the coastal belt and oases of Libya. The plains are used as pasture land and to produce wheat and barley on a small scale. Animals grazed include cattle, sheep, goats, camels, donkeys, mules and horses, whose skins are tanned or exported as hides. Salt is mined in some sections of the country and the product is of a very good quality.

In Eritrea irrigation works are being carried out in the lowlands in order to facilitate farming production. Pasture is abundant, and the pastural population is partly nomadic. Pearl fishing takes place at the Massawah and Dahlak Archipelagos. Salt pits are successfully mined and gold mines are worked in several localities.

In Italian Somaliland cattle rearing and agriculture are the principal occupations of the people. Products obtained from these sources are similar to those obtained in Libya but primitive selfsufficiency with enough surplus to buy imported cloth is the highest measure of unsubsidized prosperity this country can hope to enjoy.

THE EX-ITALIAN COLONIES IN AFRICA

History

Tripolitania and Cyrenaica, which had been under Turkish domination, were occupied by Italy in 1911, following a quarrel between Italy and Turkey. In 1934 the two areas were divided into four provinces and a military district, all of which in 1939 were incorporated into the national territory of Italy and became known as Libya. Allied forces completely conquered Libya by January 1943, and British Administration was established in the country.

The two provinces of Eritrea and Italian Somaliland were gained by Italy from the Arabs as a result of direct aggression. Eritrea is the oldest of the Italian colonies and was conquered in 1890, while Italian Somaliland became a colony in 1905. In 1936 these, together with Abyssinia, became known as the Colony of Italian East Africa and each



became a State or Government of this Colony. Eritrea and Somaliland were conquered by British troops in 1941 and came under British Military Administration, while Abyssinia reverted to an independent status from 1942.

The British administration in the three colonies is a caretaker administration only, as it is the task of the United Nations to decide their future. Deputies of the Big Four Foreign Ministers began discussions on the future of the ex-Italian Empire in October 1947. A Commission of Investigation was appointed to make an "on the spot" survey of the colonies and departed for Eritrea on 6 November 1947. The investigation is still proceeding and it appears unlikely that any decisions will be reached until the end of this year.

Political

Before World War II the three colonies came under the direct colonial administration of Italy in conjunction with the tribal rule of the Sheikhs.

The British administration has apparently permitted more freedom of political thought and expression than previously, as there has undoubtedly been an awakening of political consciousness by the native populations within the last few years.

In Libya the administration has two separate units, one in Tripolitania and one in Cyrenaica because the two combined are far too unwieldy to control effectively by a single administrative body. Within the past year there has been international interest and political activity in regard to the future of this semi-desert, three times the size of France and having a population of only one million. The Senussi, who form the major part of the population of Cyrenaicawith practically no minorities-are almost politically united, mainly because of the influence of their leader El Sayed Idres, who is pro-British and who has greatly aided the administration in rehabilitating the country.

In Tripolitania, the Arab and Berber, together with the Jewish and Italian minorities do not present such political unity as in Cyrenaica. The Military Government is advised by an Arab Committee drawn chiefly from members of important families of tribes.

In Eritrea there are two main groups of politicians, the Copts and the newly formed Muslim League, the former pressing for an immediate union with Ethiopia and the latter for an independent Eritrea with a preliminary trusteeship, preferably by Britain.

Italian Somaliland as a unit is difficult to discuss politically as it is only a part of the territory of the Somali nation—a territory embracing British and French Somaliland, the northern province of Kenya and Ethiopian Ogaden. The population are generally illiterate nomads with no conception of any unit greater than the tribe.

Whichever trustee assumes the task of educating the Somalis towards selfgovernment will find that a good start has been made by the British Administration, but even responsible native leaders realize that self-government by the Somalis is not a possibility in the forseeable future.

Strategic Significance

Libya is a part of the north African coastline, the possession of which would be necessary to adequately control the Mediterranean. It would also be a valuable base for air operations over Europe and the Middle East, and as a springboard for combined operations to the north and north-east.

Eritrea occupies a strategic position at the entrance to the Red Sea and is also essential to Ethiopia for ingress to the Red Sea.

Italian Somaliland has an extensive coastline on the Indian Ocean linking British Somaliland and Kenya. Ports on this coastline could be of great value as bases for operations in the Indian Ocean.

Ties to Other Nations

All three colonies have a predominantly Arab population whose main religion is that of Mohammed, and therefore strong religious ties exist between them and the people of other Arab and Muslim countries. Eritrea which was a part of Ethiopia until 1890 has religious, cultural and social ties with that country.

In both Italian Somaliland and Libya, the inhabitants have common tribal ties with other surrounding areas and the geographic boundaries of the map do not necessarily distinguish particular races.

Influences Being Brought to Bear

The major Powers are all interested in the future of the ex-Italian Empire and there have been numerous indications of the attitudes which the Powers intend to adopt, when the issue is finally discussed in the U.N.

The USSR after the end of World War II suggested U.N. trusteeship of Libya with preferably a Russian as the Adminitrator of Tripolitania, but now appears to favour the return of the area to Italy. The USSR is undoubtedly interested in obtaining a footing in North Africa and probably considers that either U.N. trusteeship or sole Italian administration, would be the most desirable solution toward achieving this objective.

The U.K. undoubtedly wishes to retain her present influence in the Mediterranean and would therefore probably oppose any solution which might alter the balance of Power in favour of any other major nation. In 1942 the U.K. promised the Senussi in Cyrenaica that they would not permit them to be returned to Italian rule.

The French appear to favour either the return of the colonies to Italy or a joint Franco-Italian trusteeship of at least Libya. The French no doubt consider that an independent Arab State so close to Tunisia would be a danger to French influence in her African Empire, already weakened by the growth of Arab nationalism—and that an international trusteeship may, from her point of view, adversely affect the present status quo in North Africa.

The U.S.A. favours a collective trusteeship of all the colonies.

Ethiopia wants an access to the sea, and is therefore agitating for trusteeship of Eritrea or Italian Somaliland in order to achieve this object.

The U.K. recently suggested a realistic solution for Somaliland, designed to merge the Somali territories into a United Somaliland. Apart from international repercussions and opposition, this scheme would probably also face some internal difficulties and the wide vision of a United Somaliland may be shut out by the narrower terms of reference.

These divergent opinions and views give some indication of the difficulties which must be overcome before a solution is found which is acceptable to all the Powers, and which would also enable the inhabitants of the countries concerned to progress toward eventual self-government.

Why Men Fight*

Colonel S. L. Marshall, United States Army

Condensed from Number 10 in a series of articles being published in the United States Infantry Journal. The articles are from Colonel Marshall's book, "Men Against Fire."

SO far, we have considered speech in combat mainly as a lubricant to all of the cogs in the complex mechanism of tactics. As Disraeli said, men govern by words. It is by virtue of the spoken word, rather than by sight or any other medium, that men in combat gather courage from the knowledge that they are being supported by others. Battle morale comes from unity more than from all else and it will rise or fall in the measure that unity is felt by the ranks.

However, the tactical effect of speech is not alone that it furthers cohesion, from which comes unity of action, but that it is the vital spark in all manoeuvre. Speech galvanizes the desire to work together. It is the beginning of the urge to get something done. Until there is speech, each soldier is apt to think of his situation in purely negative terms. With the coming of speech, he begins to face up to it. Let those who doubt it place themselves among several men who have just been pinned by sniper fire at close range. What happens? These men will hold to earth or get in close to fallen timber; but they will do nothing constructive about their situation until one of them makes a concrete suggestion; "It's too hot; let's get out," or "You cover me while I work up to that tree line."

 From The Infantry Journal, U.S.A., February, 1948.

movement during combat the In greater danger to the commander is not that he will err in wording his order, but that he will not follow through in making certain that the order is heard and understood all along the line. Words repeated out loud down to the last man will be obeyed. But an order only half heard becomes a convenient excuse for non-compliance. In the giving and in the relaying of orders the rule is to remove every element of doubt. If there is not time for this precaution, there is not time for the manoeuvre.

At any stage in battle, whether troops are attacking or defending, warmth in the giving of an order is more to be desired than studied self-containment. Too much has been said in praise of the calm demeanour as an asset in a fighting commander. That may have its place at the higher level. At the lower levels men do not fight calmly, and they are not reassured by commanders affecting the manner of an undertaker or the dead pan of a poker player.

Get the Hell out of Here

When a retrograde movement becomes necessary in combat, it is an invitation to disaster to move before men are told why they are moving. If the pressure has made that fact obvious, then they still must be told how far they are to go, and the line or point to which they are withdrawing must be made clear and unmistakable. Otherwise, they will keep moving and all control will be lost. The spoken word is the greatest of steadying forces in any time of crisis. An excited lieutenant shouting: "Get the hell out of here and follow me to that tree line on the far side of the creek," will succeed, though a perfectly calm captain, trying to bring off the same movement but keeping his voice down with the result that the men do not hear him, will fail. Formal language under these circumstances is almost unknown in the Army of the United States. In fact, "Get the hell out of here!" has virtually established itself in our jargon as the customary order.

There is a further point while on the subject of a fallback. Wherever troops engage, they should be told on what ground they are fighting, if this is possible. It need not be done with co-ordinates, which in any case are hard to remember. Some such phrase as "the hill north of St Mary's farm" or "east of the village of Grand Pre" is sufficient. This is a safety measure in the general interest, and to ignore it is to waste a type of insurance which costs very little extra effort. In the event of a general reverse, the worst form of operational confusion ensues when the survivors come drifting back, and are unable to give an account of where they have been. In large-scale operation, the effect is paralyzing. It means that command is denied the most vital intelligence of the movements of the enemy. It opens the door to him so that he can pile surprise upon surprise.

We saw this happen in the Ardeanes fighting in December, 1944. Not one in a thousand of the stragglers falling back through the American lines could say where they had last engaged the Ger-This was not primarily because mans. they were suffering from shock but because they had never been told by their Yet many of them had been leaders. routed from ground which the unit had been holding for days or hours. The commanders knew what they were defending but they did not think it was important to tell the men. Therein they were wrong. When all else was obscure, just a little knowledge in the ranks would have been priceless to the higher commands.

Man is a gregarious animal. He wants company. In his hour of greatest danger, his herd instinct drives him toward his fellows. It is a source of comfort to him to be close to another man; it makes danger more endurable, like hugging a two-inch sapling while sitting out an artillery barrage. Since this is his natural urge, what restrains him and enables him finally to retain his position in the formation which is needed for successful manoeuvre?

Habit against Instinct

Primarily, it is his training, his intelligence and his habit working against his instinct. Said General Dragomiroff: "A strong moral education is the best safeguard to the solidarity of troops under fire." Even so, the soldier will forget or discount much that training has taught him as the danger mounts and fear takes hold. It is then that the voice of the leader must cut through fear to remind him of what is required.

In battle, the voice of the leader is always needed to call men back from carelessness. It is their chronic attitude in and out of danger. Even in veteran troops, it is not the expected presence of the enemy which keeps them alert on a hostile field, but the force which they feel pressing them at the given moment. When fire comes against them, they sense danger from every direction; unless they are informed of the source of the danger, there is apt to occur a swift moral transition in which they become "mentally pinned" by the mere incidence of fire,

Once the fire lifts, the complete changeover from this attitude is not less marked. Should the same troops then advance rapidly into enemy ground from which they receive no fire, they will quickly abandon all security measures and become lax in all respects, unless they are constantly cautioned and cajoled by their leaders.

These are the normal reactions of fighting men. They tighten up when the immediate pressure rises; they relax as the immediate pressure lifts. Of themselves, they will not remain vigilant, even though they are battle wise. The degree of vigilance depends altogether on the measures taken by their leaders. Unfor- it other than double vigilance on the part tunately, the majority of junior leaders have this same tendency.

When the Leader Relaxes

Though the old military maxim that "the weakest point always follows success" applies with especial emphasis to the operations of minor tactical forces, it might more sensibly be re-written that the weakest point is when the leader relaxes. This being the natural reaction of troops, there is no safeguard against of those who command.

Despite the near presence of the enemy, troops will always let down at every opportunity, and it is the task of leadership to keep them picked up. They will always bunch unless they are insistently told by voice to stop bunching.

They will always run if they see others running and do not understand why. In these natural tendencies lie the chief dangers to battlefield control and the chief causes of battlefield panic.

CARRIER BORNE AIR LIAISON SECTIONS

Approval has been given for the raising of a Carrier Borne Air Liaison Section for duty with the first Royal Australian Navy carrier to be commissioned early in 1949.

The Air Liaison Sections attached to fleet carriers perform similar duties to the sections attached to the Air Force. In some respects, however, they are required to be more versatile, as they must be able to operate either ashore or afloat. When naval air squadrons operate from shore airfields the liaison sections are required to maintain shore touch with Air Force formations and airfields in addition to liaison with Army formations.

The officer selected to command the first Carrier Borne Air Liaison Section will proceed to the United Kingdom with the Naval personnel who are going to take delivery of the carrier. Whilst in England the CBALO will undertake training courses at the School of Land/Air Warfare and the School of Naval Air Warfare, During the return passage to Australia he will assist with the training of the Carrier Air Group in relevant Army doctrine and procedure.

Air Liaison Sections raised for duty with the RAN will be interchangeable with those allocated to RAAF formation, in order to give the personnel the widest possible experience of combined operations.

RADAR AND FIELD GUNNERY

Prepared for the Australian Army Journal by the Directorate of Royal Artillery, Army Headquarters

The articles in this series were prepared by Captain D. WILLETT who is now attending a Radar Course in the United Kingdom. Other articles in the series are:—The Principles of Radar, ATM 51; Radar Components, ATM 52; Radar and Anti-Aircraft Gunnery, ATM 53; Radar and Coast Gunnery, ATM 54.

Introduction

The use of radar equipments by coast and anti-aircraft artillery units was a recognized practice during the recent war, but it is not generally realized that a start had been made to apply radar to field gunnery. Several applications were found possible, and these have now been developed to become standard practices. The artillery officer, both regimental and staff, must now understand the principles of radar so that he can appreciate the capabilities and limitations of field radar equipments. Thus he can make best use of the equipments in their various roles.

Previous articles have outlined the principles of radar (ATM 51, 52)—the application of those principles to field gunnery will now be discussed.

Radar Observation

Although steps have been taken to improve the accuracy of predicted fire, the field gunner can provide the best possible fire support when he has excellent observation over the ground where fire is required. At night, or when blinded by smoke, fog or rain, observation is denied and therefore the effectiveness of artillery support is lessened. Radar can fill the gaps in round-theclock observation because it is unaffected by darkness, smoke, fog, or light rain. Other advantages over visual observation are:

- (a) Radar gives a direct and accurate measurement of range and bearing.
- (b) Radar can observe small, fast moving objects such as shells, mortar bombs, and rockets.

The detailed uses of radar to supplement visual observation can be divided into three groups. Firstly, those applications which have been developed-include location of these enemy mortars, correction of our own fire by observing ground bursts, and detection of movement of vehicles. Then those applications which are still under development - correction of our own fire by observing airbursts or by tracking our own projectiles, quick radar survey, and location of forward troops. The last group contains those applications under consideration - among these is the location of enemy guns.

Location of Mortars and Guns

The problem of detecting a target on the ground is quite a different one from detecting an aircraft in space. Moving targets may be detected, but the echoes from a mortar or gun merge with the echoes from trees, hedges, buildings, and irregularities in the ground, as all these objects reflect the radio waves transmitted by the radar equipment. These background echoes, which may fill the whole of the time base when the aerial



Fig. 1 .- Clutter



Fig. 2 .- Screening



Fig. 3.-Location of Mortars

system is at a low angle of sight, are termed "clutter" (Fig 1). Field radar equipments must be sited to remove as much clutter as possible from the timebase. This is done by "screening" the equipments—that is, the equipment is sited behind a low crest so that its lobe is just above those objects which would cause clutter (Fig 2).

The use of screening is particularly important when radar equipments arused for the location of mortars, as locations are obtained from information of their projectiles in flight. Measurements of range, bearing, and angle of sight to individual projectiles are taken at selected points, or continuously as with aircraft targets (Fig 3).

There are three stages in the process of location :--

- (a) Initial detection while searching.
- (b) Accurate observation.
- (c) Deduction of the co-ordinates of the weapon.

The radar equipment is allotted an arc in which to search for suspected mortar positions. A PPI display is used initially —the aerial system, instead of rotating through 360 degrees, is set to move backwards and forwards across the search arc. This system of searching is known as "sector scan" and must be done at a rapid rate to ensure that the small, fast moving projectile is detected at as small an angle of sight as possible.

When a projectile is observed, the aerial system is laid on the bearing indicated on the PPI, and the accurate range measuring device of the equipment is set at the indicated range. The echo of the next projectile from the weapon should appear on the A-display at the set range.

Completion of the second stage of location—accurate observation—depends on the type of equipment in use. As the most accurate weapon-locating radar employs automatic following and an automatic information plotter, this method will be described. When the second projectile is observed, the automatic following gear is switched on, and the projectile is followed throughout the visible portion of its trajectory. (That is, that portion of the trajectory above the screening angle Fig 3.)

Data is passed automatically and continuously to a plotter in the form of range, bearing, and height (the neasured range and angle of sight being converted to height). At the plotter, range, bearing and height are plotted independently against time, and a reference line corresponding to the height of the radar position is also traced. An example of the type of plot is shown in Fig 4.

From this plot, the last stage of location is done — the deducing of co-ordinates. The curves of height plotted against time for all types of mortars and angles of departure approximately very closely to the parabola $h = \frac{1}{2}$ gt², when h = height, t = time, and g = the acceleration due to gravity. Allheight/time curves can therefore besmoothed and extrapolated by means ofa single parabolic template cut to thisformula.

The place where the smoothed, extrapolated height curve cuts the radar height line will be the time at which the mortar fired (Fig 5).

If the range and bearing plots are smoothed and extrapolated back to this time, then the range and bearing to the mortar position can be read off on suitable scales. (Fig 6.)

A correction for any difference in height between radar equipment and mortar position must be made, and then the co-ordinates of the mortar position can be read from an artillery board.

The location of guns presents many unsolved problems. The method used for the location of mortars is applicable but with these differences :--

(a) Projectiles have greater velocity.













- (b) The shape of shells is such that they give weak radar echoes.
- (c) Height/time curves of shell trajectories do not closely approximate to any particular curve as do mortars.



Fig. 7.-B-Scope



Fig. 8 .- Target Display on B-Scope

Observation of Fire

When a projectile explodes on the ground there is a rapid scattering of fragments and also of the debris, earth, etc., thrown up by the explosion. Using a radar equipment operating on a short wavelength (less than 10 centimetres) it is possible to obtain an echo from ground bursts. The size of the echo depends on the quantity and quality of debris thrown up. A large projectile with a delay fuze, bursting in soft wet soil produces the best echo, while the echo from a small shell, with an instantaneous fuze bursting on hard, dry ground may be too small to be detected.

The type of display fitted to radar equipments used for observation of fir is called a B-scope. This is a compromise between the A-scope and the PPI described previously. The time base moves vertically up the face of the CRT, causing an increase echoes in the brilliance of the spot. In addition, the time base is moved from side to side across the CRT in synchronism with a scanning aerial system. (Fig 7.) Vertical bearing graticules are engraved on the face of the CRT, and electrical range markers are provided. A target at 5250 vards at Right 10 degrees with respect to the radar equipment would produce an echo as shown in Fig 8.

The methods of correcting fire are as follows :---

- (a) If the target to be engaged gives a target which is recognizable on the B-scope then the fall of shot is observed relative to the target and the necessary corrections ordered. While the general principles of ranging are unaltered, the process of bracketing is much reduced because radar will measure exactly how far each shot falls from the target.
- (b) If the target gives no recognizable signal, but its co-ordinates are known, then the bearing and range from the radar are calculated and the aerial system is laid so that the target would appear on the centre graticule of the CRT. Fire is then corrected to the centre of the CRT.

Two conditions essential for operation are, one, a clear line of sight between radar aerial and burst, and two, clutter in the observed area must not be so strong as to obscure the echo from the bursts.

If these ground effects can be eliminated, observation becomes more certain and the siting of the radar equipment becomes an easier problem. Observation of airbursts, and tracking our own projectiles are two steps in this direction. Airbursts are observed in a similar manner to ground bursts, except that special shells are used. These contain "brads"-metal wire cut to half the wavelength of the radar equipment in use. The brads are scattered by the explosion of the shell and produce a strong echo. Projectiles are tracked by the same equipment used for mortar location, and information is obtained of points as far down the trajectories as possible.

In both cases, the correction of the moment is obtained from observation of a group of rounds, and map data to targets can be corrected.

Detection of Movement

It has been stated that, while the echoes of guns or mortars would be lost in the clutter caused by surrounding objects, moving targets could be detected. This detection is possible, even in heavy clutter, because of what is known as the "doppler effect."

The frequency, or pitch, of the whistle from an approaching train differs from that of a stationary or receding one. This sound wave phenomenon is exactly the same in the case of radio waves, and is called the doppler effect. Radio waves reflected from a moving object are different in frequency from those reflected from a stationary object. When a moving object passes a stationary object, their echoes will merge together and the combined echo will rapidly vary in amplitude. This variation in amplitude is termed "beating," and will indicate the presence of a moving target in clutter.

On an A-display, the effect is shown in Fig 9-the effect on a B-scope is that the signals show up as broken echoes producing a striated effect. (Fig 10.)

This same effect can be used to operate a loud speaker. The radar equipment is sited to watch a selected point—when a movement is detected, an aural signal is produced. This method obviates the necessity for operators to strain their eyes watching the CRT for long periods.

> BEATING DUE TO MOVING TARGET









The detection of movement by radar methods has three main uses:---

(a) Intelligence—the equipment can indicate when movement is taking place at selected points.

- (b) Engagement of movement—using a B-scope, controlled harassing fire can be brought down on detected movement.
- (c) Control of watercraft—radar can be used to direct the movement of watercraft across lakes, or in coastal operations.

Radar Survey

Under certain conditions normal survey methods will be slow due to the absence of a clear line of sight. A method of using radar in "quick survey" has been devised to overcome this difficulty, and to put the guns of a division on a divisional grid quickly. The method uses airbursts as aerial reference objects.



Fig. 11 .- Radar Survey

The origin of the divisional grid is a radar equipment, which may be surveyed or given arbitrary co-ordinates. Rounds from a gun sited near the radar equipment, are fired to give airbursts at three points parallel to the FDLs and spaced apart about 3000 yards, and at about 8000 yards from the gun areas.

The radar station fixes the airbursts by movement of range by radar, and bearing and angle of sight by optical instruments. At , each gun position, directors are used to record the angle from a reference object and the angle of sight to each airburst. A set drill ensures that all stations relate recorded data to specific airbursts. The radar station records to each airburst the range, bearing, and angle of sight, and can compute the height of each burst and the co-ordinates of the point on the ground directly beneath each airburst. (Fig 11.)

This information is broadcast to all gun positions. Here the angles from the RO to the bursts A, B and C are drawn out on tracing paper. The co-ordinates, of A1, B1 and C1 having been plotted on the artillery board, a tracing paper resection is carried out and the position of the gun position fixed at G. By computation, the range and bearing from G to say B1 can be cal-Then the bearing to the RO culated. can be adjusted to conform with the orientation with the radar station.

The difference in height between G and the airburst B, and hence the height of the gun position, can be calculated from the known height of B and the angle of sight to it as measured at the gun position.

The nature of the accuracy to be expected is 25 yards for fix, 10 minutes for orientation, and 25 feet for height, and the time taken is about one hour, irrespective of the number of gun positions to be fixed.

For the location of forward troops, reasonable accuracy can be obtained by radar observation of one mortar bomb fired from the troops.

With wireless communication between radar equipment and mortar position, a special mortar bomb is fired at a prearranged QE to give an airburst at a pre-arranged height. The radar then observes range and bearing to the burst —knowing the height of burst, and the bearing and QE at which the mortar was fired, the co-ordinates of the mortar position can be deduced.

Conclusion

From the foregoing paragraphs, it can be seen that the use of radar by field artillery falls into three divisions:--

- (a) The detection and location of the enemy and his weapons, either by direct observations, or by deductions from observations of enemy projectiles.
 - (b) Control of fire, by observation of our own projectiles or bursts.
 - (c) Other uses such as quick survey, location of forward troops, and direction of watercraft.

In each of these divisions, some applications have been tested in battle, others have been developed in peacetime, and others are yet in the stages of development. As far as the Australian Army is concerned, each application has to be learned as a new procedure. Until every artillery officer is conversant with radar principles and their applications, artillery units cannot provide the best available fire support for infantry and armoured troops.

ARTIFICIAL MOONLIGHT *

Lighting of combat areas by searchlight beams was first used by the British Eighth Army in Italy in September 1944. It was picked up by the U.S. Army and tried in Europe and the Pacific, and the Germans employed it early in 1945.

Artificial moonlight aids movement of vehicles, the servicing of artillery weapons, and patrolling or attacking infantry. It marks front-line boundaries for aircraft, speeds engineer road and bridge maintenance, and provides a means of signalling.

However, the beams often silhouette our own troops, permit enemy observation from flanks, cause possible loss of surprise, provide lighting of the enemy's front area, and assist enemy airmen in strafing and bombing.

In employing searchlight in support of ground action, the terrain should be open and preferably sloping toward the enemy. Positions defiladed from the front and sides and hiding at least 100 yards of the beam are desirable.

A solid cloud base at 500 to 5,000 feet gives the maximum reflection. Tests are being made with 800 million-candle-power beams pointed at artificially-produced clouds and artillery smoke bursts. Ground haze, fog and rain cut the effectiveness, and wind prevents cloud stability. Ice or fallen snow increase visibility.

Best results were obtained between 3,000 and 7,000 yards. Visibility falls off sharply beyond 7,000 yards. — MILITARY REVIEW, U.S.A.

A more detailed article on Artificial Moonlight in ATM 44.

What Makes a Good Unit?

"Soldier"=

ONE of Napoleon's best known sayings is, "There are no poor regiments, there are only poor Colonels."

Now what is it that "good" Colonels do to produce their "good" regiments?

Good Colonels insist that, in addition to having the necessary military knowledge, their men must be trained so that they can take in their stride such things as danger, hardship, and unforeseen eventualities.

But to get his men up to this high state of morale a commander must produce a motive force to urge his men to give willingly of their best.

In war it is not hard to find a motive on which to build, as all ranks cannot fail to appreciate that a good unit results in the minimum of casualties, sickness, hardship, and discomfort, whilst at the same time it produces victories, decorations, and military glory.

In peace, however, it is obviously far more difficult to create this vital motive force, without which the volunteer will soon lose interest, withdraw from the Army if he can, and above all discourage others from enlisting.

With a view to helping in this formidable task I mention the following points in the hope that they may help in the creation and maintenance of this motive force which is so vital to the efficiency of our peacetime Army.

Make Instruction Interesting

Fight monotony in instruction like the plague. In wartime even the dullest instructor, employing archaic instructional methods can hold the interest of the soldier, as the latter is learning how to save his life.

In peacetime, however, in our Volunteer Army, it is only by very careful forethought, planning, and hard work that military instruction can be made really interesting.

Unfortunately, men join a unit with varying degrees of military knowledge and at all periods of the year, and it is therefore very difficult to instruct them profitably immediately they enlist. They must be classified according to their previous training, and receive only appropriate instruction if they are to retain the motive force which impelled them to enlist.

Natural instructors are a rarity, and those who are so fortunate will find it almost impossible to maintain the interest of the modern soldier in peace, unless they follow closely the latest methods now being taught to the AMF by the AHQ Method of Instruction Team (AUSTMIT).

Long-winded instruction on non-essentials with endless repetition and without the many aids now available, is not acceptable in the AMF, where not a minute should be wasted on dull or superfluous instruction.

Teach only essentials, but teach them thoroughly. There are two things to teach: KNOWLEDGE and SKILLS.

KNOWLEDGE can be acquired by the mental process of being taught, but SKILLS are a habit resulting from much practice.

AUSTMIT assists greatly in the acquiring of KNOWLEDGE. Many soldiers do not yet fully realize how quickly men, who are imbued with the required motive force, can assimilate military knowledge.

I well remember during the Cretan Campaign, when the British Army crews of two Matilda tanks had been disposed of, how new crews of Australian gunners and infantrymen were trained in under 6 hours to successfully command and operate those tanks in action. They had an abundance of motive power, because they were fighting for their lives.

Instructors must know every detail of the equipment and the name of every part, but the average soldier does not need this detailed knowledge, and quickly appreciating that his instructor is only filling in time, becomes bored.

Recognition of Progress

Every soldier cannot achieve the prize of non-commissioned rank, but some method should be devised of acknowledging and rewarding steady progress in a unit. Skill at Arms prizes are a case in point.

Competitions

Introduce the competitive spirit wherever you can. Cups, spoons, shields and other trophies should be provided for inter-Company, etc., competitions for sporting, physical, and also purely military prowess.

I well remember how sought after were the Silver Spoons awarded for the Weekly Rifle Shooting Matches in the pre-war militia.

Of course these competitions can be overdone, and in some pre-war militia units they became an obsession and absorbed a lot of precious time which could have been far more profitably spent on training for war.

Esprit de Corps

Make the maximum use of the proud records of your unit in World Wars I and II to build your men's pride in their unit in order to produce that vital motive force.

The Australian Army is young compared to the British Army, but by hard fighting and initiative has built up a reputation second to none amongst the Armies of the main fighting nations of the world.

Many unit war histories are now becoming available, and there are several good books on the two World Wars which cover the actions of your units.

Esprit de corps is a powerful weapon, and it is amazing how the very considerable repetition required to perfect a unit Guard of Honour or competitive drill squad is readily accepted when the reputation of the unit is at stake.

Social Order has Changed

The days when an officer said "Carry on Sergeant Major," and then proceeded to stand around with a cane under his arm, have gone for good except on the comedy stage.

The old social caste system is now mainly a relic of the past; today it is the degree of ability which decides who shall lead.

Officers can no longer afford to stand aloof from their men, but require to study them individually to find the best way to imbue each man with that vital motive force.

Development of Initiative

The Australian soldier is deservedly renowned for his initiative.

Possession of this trait enhances very considerably the value of a soldier.

Its development can be greatly assisted by first of all equipping the soldier with military knowledge and then giving him plenty of opportunity to exercise his initiative.

Patriotism

After the first World War men ignored history and dreamt of everlasting peace. Those dreams have been rudely shattered and men now realize that to be prepared for war is the only known way to avoid it.

All men are patriotic in greater or lesser degree.

Freely enlisted men must have been influenced by patriotic motives, as military training means sacrificing their leisure hours to learning to defend their country.

Fan the flame of patriotism all you can, as it is a powerful motive for military efficiency.

To this end decorate your Training Depots where appropriate with good prints and photographs of our war leaders and the campaigns in which your unit took part.

BRITISH ARMOURED BATTLES

The Landings in Normandy*

N. Campbell

WAR in the desert had been described as "The tactician's paradise—and the quartermaster's hell," a saying that most tank crews would have been quite prepared to endorse without bothering unduly how "The Q" felt about it—always excepting, of course, the vexed question of "The Bigger Gun."

War in Normandy was about equally exasperating for everybody. Before studying the problems of armour in the planning, and the initial battles, it is worth while to summarize the enemy's intentions, as far as they were known at the time, and also the country where we were going to fight him.

The Country

The Calvados countryside is almost equally divided between the "Bocage" and the "Campagne," the former being, in the terms of the textbooks, "Infantry country" and the latter "Tank country." The "Bocage" consists of what at first sight appears to be continuous forest. but on closer inspection gives way to innumerable tiny paddocks, each one separated from its neighbour by a high bank topped with a thick hedge. These paddocks are interspersed at frequent intervals with almost impenetrable woods and coppices. The lanes, along which all progress has to be made, are narrow and banked on both sides, and not infrequently the hedgerows almost meet

 From the Royal Armoured Corps Journal, January 1948. over the middle of the road. In this country a field of fire of fifty yards is considered good. The whole effect of the tiny chequered fields must be similar to the one that confronted Alice when she stepped through the looking-glass-much too picturesque for war.

This country extended to the west and south-west of Bayeux, and everyone who came into contact with it heartily detested it, for it bore a very close resemblance to continual street fighting.

At the other end of Second Army front was the rolling plain south and southeast of Caen. Here everything was the complete opposite. There were few trees, which were mainly confined to the roads, and the huge open fields were almost without exception under crops. These fields were seldom separated by hedges or ditches, and movement across country was as easy as across Salisbury plain.

Small, grey stone villages were clustered round their churches, and the entire plain was intersected by occasional narrow river valleys with thick woods on their steep slopes.

This, then, was to be the battlefield.

German Intentions

The German tactics were to defend the coastline with second-rate divisions not equipped with adequate transport to fight a war of movement, to back these up with field infantry divisions for immediate counter-attack, and to hold back the Panzer divisions in the rear for the blow that was to drive the invaders into the sea.

This plan the Germans referred to as "Crust-Cushion-Hammer."

On D Day the coastal crust on Second Army front was held by one second-rate division with two of infantry its regiments in the line. These regiments occupied concrete positions along the coast at intervals of approximately one mile, covering the continuous lines of mines and "Element C." Behind them to the south of Bayeux was stationed 352nd Infantry Division, while within the two Panzer easy reach were formations, 12 S.S. and 21 Panzer. at Falaise and Bernay respectively. Also to be expected on the scene by the evening of D-1 were two further Panzer divisions, 17 S.S. south of the Loire, and These divisions 2 Panzer at Amiens. were equipped largely with Panther and Tiger tanks, both of which heavily outweighed our own tanks in armour and gunpower. Their shortcomings in speed and reliability were not to become apparent until we had achieved the break-through.

The British Plan

The main assaulting forces were to make three landings. On the left-hand sector I Corps was to make two landings, using three British and three Canadian divisions, supported in each case by an armoured brigade, while on the righthand sector XXX Corps was to assault with 50th Division, also supported by an armoured brigade. This assault was to be followed up immediately by 7th Armoured Division, who were to pass through as soon as possible, directed on Villers Bocage.

The original feature of the plan was the enormous weight of armour in the assault.

The British Armour

The inclusion of nearly a thousand tanks in the immediate assault (ignoring for the moment the invaluable "Funnies" of General Hobart's 79th Armoured Division) was something new in the technique of amphibious landings, and it is worth while to pause for a moment to examine the equipment of these formations.

The new British cruiser tank, the Cromwell, was going into action for the first time and great things were hoped from it. The Cromwell was really fast and she presented a low silhouette, while she was certainly a reliable vehicle. Her armament, however, had recently been changed from the 6-pdr to the 75-mm gun, and her armour was not in the same class as the German Panthers and Tigers that she was to meet. Only one of the four brigades was equipped with Cromwells.



The other three brigades were all equipped with the battle-tested Sherman. The Sherman was a good tank and it had proved more than a match for the Pz. Kw. 4 in the battles in the Middle East. But once again the armour was insufficiently thick to give very much protection from the high-velocity 75-mm of the Panther or the 88-mm of the Tiger.

These tanks, however, soon found themselves in combat with both Tigers and Panthers, under conditions where they could neither make use of their superior mobility nor gain very much benefit from the alleged unreliability of their opponents.

The Assault

The assaults on the eastern beaches, and the airborne landings, had gone well and the troops were pushing inland, making satisfactory progress. As they neared Caen, however, resistance stiffened, with 21 Panzer Division in action north of Caen on D Day itself. The following day 12 S.S. Panzer Division was identified in action to the west of the town.

Clearly the enemy intended to prevent us from capturing the town, which was according to our appreciation that he would try to deny us all the ports. Caen, of course, was the sixth port of France.

Three British divisions pressed their attacks towards Caen, but without suc-They found themselves confronted cess. by the same open country as the Canadians on their right, but with the tiresome additions of prepared anti-tank ditches and concrete emplacements. Later, dug-in tanks appeared overnight which proved virtually unapproachable from the ground and seemingly invisible from the air. At all events, the initial thrust for the port of Caen was held.

The Thrust to Villers Bocage

On the morning of 12th June, the situation on XXX Corps front seemed to be crystallizing, with the enemy firm and in force in all the villages along the front, with co-ordinated anti-tank defence between them. Accordingly it was decided to regroup and launch 7th Armoured Division on a new thrust line to swing down on the flank of 50th Division and come in on Villers Bocage from the west.

The ground was difficult for armour, but the attack, if successful, would threaten the whole position of the enemy forces covering Caen to the north. To assist this thrust pressure was to be exerted in the Caen sector by 51st Division, which had just arrived.

At first light on 13th June the advance was resumed, and although the armoured cars and the Armoured Reconnaissance Regiment were in contact with enemy on both sides of the centre line, Villers Bocage was entered without incident.

There followed a mishap that put the case against British tank design far better than a dozen speeches in Parliament could do.

A squadron of one of the armoured regiments equipped with the new British Cromwells was ordered to occupy the high ground to the north of the town, and it was followed by the RHQ of the same unit, in all, about twenty-five cruiser tanks and half a dozen light tanks of the reconnaissance troop.

The cruiser squadron pushed on and reached the high ground as ordered, and were followed by the RHQ, consisting of four Cromwells, two artillery OP tanks of the same class, some half-tracks of the motor battalion, and some light tanks of the reconnaissance troop. This force was ambushed in the narrow lanes by a Tiger tank which "stopped the earth" at either end by destroying a half-track and a light tank. It then proceeded along the column, destroying the remainder of the vehicles at its leisure, for the guns of the Cromwells were useless against the heavy armour of the Tiger, and the high banks of the road effectively prevented all power of manoeuvre. Meanwhile the Squadron had gone on ahead and reached its objective, but had been completely surrounded by infantry and Tiger tanks. The last wireless message received from



BRITISH ARMOURED BATTLES

Weight – 66.9 tons Armour Turret front – 7 in. Hull front – 5.9 in. Speed – 18 m.p.h.

GERMAN "ROYAL TIGER"

Armament

88 mm and 7.92 MG Coaxially mounted 7.92 MG in hull Radius – 105 miles

Dimensions

 them reported the position untenable, and withdrawal, because of the blocked road, impossible. Nothing more was heard of this squadron.

What had happened to cause this sudden spate of German armour was plain enough. The anticipated counterattack by 2 Panzer, hitherto delayed by our air forces, was at last materializing and both sides had arrived at Villers Bocage simultaneously.

Fortunately the surprise was mutual.

This piece of deduction was confirmed by the action of a sergeant of the Armoured Car Regiment who was taken prisoner, but on realizing the identity of his captors, and appreciating the importance of the information, succeeded in killing one of his guards and taking the other one back to his unit for interrogation.

A force for the defence of the town was hastily organized, but the German tank attack having been beaten off, a more serious threat developed, that of infantry infiltration supported by heavy artillery fire. The garrison of the town was hopelessly inadequate, being about one infantry battalion and one squadron of tanks in strength, and to have reinforced it would have risked the entire force being cut off. It was therefore decided to withdraw about seven miles to the area of Amaye-sur-Seulles, where it was hoped that 50th Division would be able to make contact. The withdrawal was carried out without undue incident, and a tight "box" was formed some two thousand yards by fifteen hundred. It was the nearest thing to a British square seen in this wa'r and the enemy behaved as all enemies have always done when confronted with this situation. He flung everything he had at the "island" as it was called, and attack after attack was repulsed with heavy losses. The Artillery on one occasion broke up one attack with Bren guns and airburst at four hundred yards' range.

The position again became untenable, with no immediate prospect of an advance by 50th Division, and it was again thought necessary to withdraw. This twentieth-century "Quatre-Bras" came to an end on the night of 14th June when the weary columns pulled out of "the island" position. The noise of the tanks' engines was drowned by a heavy bomber attack on what was fondly imagined by all concerned to be Villers Bocage. The RAF, however, had got their maps upside down or something, and punished instead the little village of Aunay-sur-Odon, some four miles to the south.

The extent of the defensive victory gained at Villers Bocage did not become apparent till later. It was known that exceedingly heavy casualties were inflicted on the enemy in both men and vehicles-on the final day in the "island" forty tanks were claimed destroyed-but it was not realized at first that the German High Command had been trying to drive a wedge with 2 Panzer Division between the American and British Armies through Balleroy and the Foret de Cerisy. As it turned out, 2 Panzer Division had been severely crippled as an offensive fighting force at a crucial stage in the battle, and the fighting had given our infantry a feeling of moral superiority that stood them in good stead in the weeks to follow.

The Increase in Panzer Opposition

In the meantime, the attack by 51st Division against Caen had not been making very much progress. The arrival of VIII Corps had been delayed by the weather, and the enemy had deployed four Panzer divisions opposite the British front by the end of the 18th June.

The VIII Corps attack started well enough, bridgeheads being established over the Odon River and 11th Armoured Division reaching the high ground that dominated the crossing at Point 112. VIII Corps was particularly strong in armour for this attack, having under command 11th and Guards Armoured Divisions, and two additional armoured brigades. However, on 29th June, this advantage was offset to a certain extent

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by the identification of two new Panzer arrivals, 1 S.S. Panzer and 2 S.S. Panzer Divisions. Moreover, the vultures were gathering, for on the following day, 30th June, a further two arrivals were reported in action, the 9 S.S. Panzer and 10 S.S. Panzer Divisions. This made a total of eight Panzer divisions on the twenty miles of front of Second Army and, so as not to provide the vultures with a feast, it was decided to concenrate on holding the gains already won by the XIII Corps offensive without pressing for the Orne bridgeheads, and to withdraw the armour into reserve ready for another thrust.

The "Drawing Powers" of Second Army Attacks

As the time for the break-out drew nearer and the enemy showed signs of anxiety about the western end of the Allied front, Second Army were told to go ahead with the capture of Caen, in order to dispel any notions that the enemy might have about transferring some of his Panzer forces farther west. Care had to be taken not to be caught off guard by a large-scale counter-attack.

The attack on Caen went in on 7th July, and the operation lasted two days. The preparation included a very heavy "saturation" attack by Bomber Command, consisting of 460 heavies, each carrying five tons of bombs. The bomb line was 6,000 yards in front of the forward positions on the ground, and the interval was given a "working over" by massed artillery. The attacking forces were to consist of three infantry divisions supported by two armoured brigades.

At 2200 hrs on 7th July, the bomber attack went in, and at 0420 hrs the following morning the attacking troops crossed the start line.

The attack fell on the newly arrived 16 G.A.F. Division, and by 9th July, the whole of Caen was in our hands.

"The Curtain Raiser"

The American attack had originally been visualized as being launched in the middle of July. The Americans, no less than anyone else, had been delayed in their build-up by the weather and the target date for the assault had to be postponed for about ten days. The postponement correspondingly increased the difficulty experienced by Second Army in maintaining their threat to break out of the Caen hinge.

The Germans were already showing decided signs of anxiety about the ominous calm on the American sector, and it was agreed that the preliminary feint to the American attack by the Second Army must be on a grand scale to continue to hold the enemy's attentions.

A plan was made to launch three armoured divisions, supported by a colossal air programme, in a drive to the south-east of Caen, directed on Falaise. Meanwhile XXX Corps were to develop operations towards Thury Harcourt on the central sector of the British front.

The orders were to "cross the Orne to the north of Caen, and to turn southeast, where the armoured divisions were to be established in the areas Vimont, Hubert-Folie, Verrieres." They were "to dominate the area and fight the enemy armour which would come to oppose them. Armoured cars were to be pushed out towards Falaise in order to cause the maximum dislocation to the enemy."

It was an interesting conception. It had been proved time and again that armoured battles were not a paying proposition, and what sort of dislocation the armoured cars were expected to cause with their 2-pdr guns in an area known to contain a Panzer division equipped with Panther tanks was never satisfactorily explained.

It is now common knowledge that the attack gained about ten thousand yards and then stuck. At the end of the first day of fighting the tank casualties of the armoured divisions were well over 150 tanks destroyed, but it was established that, in spite of having brought 16 G.A.F. Division, 276th Infantry and 277th Infantry Divisions into the line, the only Panzer division not committed by 18th July was 12 S.S. Panzer. Certainly the German armour was drawn sharply back into the battle. Having accomplished this, our own armour was withdrawn into reserve ready for the next thrust, and the infantry took over the sector on 20th July.

Five days later the Americans launched their break-out.

It is interesting to glance briefly at the following table of the dispositions of the Panzer divisions at various stages, during the bridgehead fighting:--

Gaumont-Caen		Remainder of
	Sector	front
Mid-June	4	.0
Early July	7	1/2
Mid-July	6	2
July 20th	5	3

There is no doubt that these divisions were worn out by continual recommitment, first in one sector and then in another, and towards the end of July they were severely under strength in both men and tanks. The all-out attack at Mortain was the last major effort of which they were capable, but it was too late.

Epilogue

Perhaps the best comment on the whole battle of Normandy was made by the Colonel commanding a battalion of Canadian Infantry. Two tank columns of different armoured divisions, both in search of the enemy, met head-on on a fourth-rate track outside his headquarters near Cormelles.

"What beats me" he remarked to the leading troop officers, "is why we didn't bring over one Piccadilly Bobby as our secret weapon. He would have won us this war in half the time."

"A good commander is a man of high character. He must know his tools of trade; he must be impartial and calm under stress; he must reward promptly and punish justly; he must be accessible, human, humble, and patient. He should listen to advice, make his own decision, and carry it out with energy."

- General Joseph W. Stilwell, U.S. Army.

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THE GERMAN NEBELWERFER ROCKET

Major C. A. Johnston, Directorate of Armament Army Headquarters

THE Germans expected to use this weapon on a large scale as a carrier rocket for the dissemination of various chemical warfare agents in the event of chemical warfare being intro-, duced during World War II.

These rockets were muzzle loaded into, and electrically fired from a six barrelled projector resembling a small field gun of sturdy construction. A salvo of 324 rounds could be fired every 90 seconds by a regiment armed with the weapon.

The projectile carries a charging of approximately 4 pints of gas to a maximum range of 6,600 yards; that is, thirty per cent more chemical agent in proportion to its size than the German shell of similar calibre. 038 This increase is due to the use of a smaller burster, and the comparatively thin walled gas container, which, unlike a shell, does not have to withstand the stresses produced by firing from a conventional gun.

An interesting and unconventional feature of its design is the forward position of the propellant or rocket motor which, when it reaches the target, allows the gas container to burst above ground level. This increases the chemical efficiency of the weapon.

The rocket consists essentially of a cylindrical rocket motor containing either black powder or diglycol propellant charges, to which is attached the tail portion composed of the venturi jet system and the gas charging.

An igniter inserted in one of the venturi nozzles and fired electrically, ignites the propellant, the gases being ejected through the venturi nozzles, which are offset so as to impart spin during flight. The reaction from the gases carries the rotating projectile forward towards the target.

The shock imparted to the projectile on striking the target, causes the base fuze to detonate the burster. This ruptures the gas container and the remaining spin of the rocket assists in distributing the contents above ground, thus avoiding that waste of chemical agent due to burying, which is a common feature of the conventional gas shell.

By varying the size of burster used, the size of the area to be contaminated, and consequently the degree of contamination, can be controlled.

Although primarily designed for use with C.W. agents, the Nebelwerfer can be used as an area weapon to project both screening smokes and H.E. It also illustrates the fact that the range, accuracy, and destructive capacity of the comparatively primitive field rockets designed during World War II are capable of further development.



Customs of the Service – 4 – – – REGIMENTAL COLOURS

FROM the days of early man, some sort of insignia has been employed to distinguish families, tribes and nations. When, in prehistoric times, the head of a family wished to adopt a distinguishing mark he sought it in the animal and bird life around him. He compared the qualities he imagined he possessed, or hoped to acquire, with his surroundings, and adopted the device which seemed to fit these qualities.

In the very early days the family badge was carved in wood and fixed to a pole, so that all could note the position of their leader in combat. The tribal badge was the family device of the chieftain. Later, when man learnt to make cloth, it became customary to paint or embroider the device on a banner or flag.

The first military organization to adopt a unit device or standard, as distinct from the tribal or family badge, appears to have been the Roman Army, the units of which carried a bronze or silver eagle The basis on which mounted on a staff. eagles were allotted is not clear, but it seems that at one time each cohort (600 men) carried one. Since the cohort corresponds to the modern regiment or battalion - there were ten cohorts in a legion - it is reasonable to assume that the Roman eagles were regimental emblems.

With the disintegration of the Roman Empire armies ceased to be organized on a regimental basis. Throughout the Middle Ages armies were composed of the armed bands brought into the field by the nobles. The nobles reverted to the earlier practice of using their family badges, (armorial bearings) to indicate their position in battle or bivouac. The loose formation of armies gav place to a system of regimentation during the early part of the seventeenth century. A definite number of troops and companies, respectively, was allotted to cavalry and infantry regiments, with a Standard or Guidon to each troop and a Colour to each company. In the middles of the eighteenth century the number wass reduced to two per regiment, which corresponds to our present practice of having two per battalion—The King's Colour and the Regimental Colour.

The Colours became the most precious possession of the regiment, and elaborate ceremonies pertaining to their safe custody were evolved. Their loss in battle was regarded as a very serious matter. Writing of the Battle of Albuhera, in 1811, a French diarist records that when surrounded and summoned to surrender, the Ensign carrying the Colours of 3rd Buffs returned an answer that was "discourteous but to the point."

At the Battle of Alma, in the Crimean War, five men won the Victoria Cross for their defence of the Colours of the Welsh Fusiliers.

The last time Regimental Colours were carried in action was at Laing's Nek, on 26th January, 1881. About this time all commanding officers had been invited to express their views on the taking of Colours into battle. Because of the necessity for concealment imposed by the increased range of firearms, the majority favoured the abolition of the practice. An Order giving effect to these views was issued by the War Office in January, 1882.

REGIMENTAL COLOURS

An important event in the evolution of military flags was the decision to place battle honours on the Regimental Colour. The first of these distinctions was "Emsdorf," granted to the 15th Light Dragoons in 1768. Ten years later, the second distinction, "Gibraltar" was awarded to four regiments which served through the seige in 1783-84.

Although several Royal Warrants pertaining to the design of Colours were issued between 1790 and 1844, there was much laxity in their administration. In many instances regiments followed their own ideas in design; some placed their battle honours on the King's as well as the Regimental Colour. In 1844, however the rule that battle honours should be carried on the Regimental Colour only was enforced. The Foot Guards, being a law unto themselves, were granted an exemption.

Only a few units of the Australian Military Forces possessed Colours prior to the war of 1914-18. In 1928, however, His Majesty the King approved of Guidons being carried by Light Horse Regiments, and King's and Regimental Colours by Infantry Battalions. Australian Army Order No. 474 of 1928 details the designs for all three emblems.

The earliest battle honour possessed by an Australian unit is, "South Africa, 1899-1902." Only a very few units, however, are entitled to this distinction. In nearly all cases the earliest battle honour dates from World War I, 1914-18.

TACTICS OF THE EARLY BRITONS

Their mode of fighting with their chariots is this: firstly, they drive about in all directions and throw their weapons and generally break the ranks of the enemy with the very dread of their horses and the noise of their wheels; and when they have worked themselves in between the troops of horse, leap from their chariots and engage on foot. The charioteers in the meantime withdraw some little distance from the battle, and so place themselves with the chariots that, if their masters are overpowered by the number of the enemy, they may have a ready retreat to their own troops. Thus they display in battle the speed of horse, (together with) the firmness of infantry; and by daily practice and exercise attain to such expertness that they are accustomed, even on a declining and steep place, to check their horses at full speed, and manage and turn them in an instant and run along the pole, and stand on the yoke, and thence betake themselves with the greatest celerity to their chariots again .- Caesar's Commentaries.

Russian Artillery – 1941-1945*

= Lieutenant-Colonel H. G. de Watteville, CBE =

THE scarcity of information concerning organization and work of the Russian Artillery during the recent War is to be regretted since much that occurred during this conflict must prove of high interest to all soldiers. The following attempt to reconstruct certain artillery aspects of that war out of scanty scraps of published information is offered for what it may be worth.

For the previous two centuries the Artillery Service had been the pride of the Russian Army. Its complete failure in the war of 1914-17 had come as a shock to Russian soldiers. It could, however, be mainly attributed to the faulty system of supplying both material and ammunition to the troops not only during but long before that war; it could not discredit the human material.

After the Bolshevik Revolution of 1917 no effectual steps appear to have been taken to restore the Russian Artillery to its pristine pre-eminence until, in 1937, as a result of the political crisis that convulsed the Red Army, General Nikolai Voronov was appointed head of the Artillery Service. This forceful character, then 38 years of age, forthwith set about re-educating the Russian gunners in the traditions of which they had once been justly proud. His belief in the cannon as the main element of strength of the Red Army was profound; his energy was unbounded. By 1939 Marshal Voroshilov, then Commissar for Defence, could report to the Supreme Soviet that the firepower of the Russian Artillery had been trebled.

* Condensed from an article in the Journal of the Royal Artillery.

This statement was not far from the truth, though its further implications appear to have escaped all military critics This circumstance arose at the time. from the fact that the Germans in their frenzied haste to re-arm and to create a "New Model" army had neglected their artillery arm. The doctrine had been evolved that artillery had lost much of its significance, so German military, authorities devoted themselves wholeheartedly to the development of their "flying cannon," i.e., the dive-bombers, to work with large, fast-moving, tank formations, while they pinned their faith to the trench-mortar as the supporting weapon of infantry.

But Voronov, whilst increasing the actual number of cannon to be manned by his gunners had also made every effort to improve their mobility; and this fact was incorrectly appraised abroadat least by German critics. The probability that such was the misreading of facts gains greatly from the known course of the German offensives during 1939, 1940 and 1941, when no serious attempt seems ever to have been made by them to reduce any strong place of work of defence by means of artillery fire. Their theory of war depended so greatly on the superior rapidity of movement of their armies, that they assumed that there would be no time for siege operations.

This policy was certainly applicable to conditions prevalent in Western Europe —particularly in view of the limits of the Maginot Line—as well as to Poland in the dry season. But when applied to a projected invasion of Russia, any strategy based on such a theory must encounter at least two formidable obstacles—first, distances; secondly, paucity and poor quality of communications. In addition, climate demanded the attainment of success before the arrival of winter. Finally, the Germans were surprised by the staunchness of the Russian Consequently it may be asked troops. whether the Wehrmacht of 1941, however splendidly armed and equipped it might be for rapid shock movement, was intrinsically a perfect and complete instrument of war? The idea formerly expressed that tanks might suffer from the limitations experienced by the "heavy" cavalry of the 18th century, would seem to gain credence as the outcome of this war. Anyhow the Wehrmacht in 1941 was certainly lacking in artillery power.

It is not yet perfectly clear what actually took place during those early months of the war, but it is at least possible, and more than probable, that the Germans suddenly, and long before the close of the year, became aware that their army, designed and equipped for rapid offensive progress and relying upon massive attacks by tanks and divebombers, was deficient in artillery.

Hence the frantic search throughout occupied European arsenals during the winter of 1941-42 for every type of cannon and howitzer that could be despatched to the East where the excellent and numerous German trench-mortars were being held at arm's length by the superior Russian cannon. The Russians, on their side, lacked trench-mortars. Consequently Voronov created a special supply branch for the production of these weapons and their ammunition. Nevertheless as fast as the Germans began to bring up batteries equipped with Finnish, Belgian, Hungarian, Dutch, French. Czech and Rumanian weapons, so the Russians became more and more hardly pressed to produce reinforcing units of medium and heavy guns to counter this new artillery. The result was that there set in a species of competition or race between the two belligerents in the matter of producing artillery material.

The Russians in the end outstripped their rivals; but during the winter of 1941-42---in fact until the first Russian counter-offensive conducted around Stalingrad in the winter of 1942-43 superiority in artillery power hung in the balance. It was during this year that the provision of war material to Russia by the Allies might be regarded as having proved of the greatest assistance to the Red Army. Even "a little" might at that time have signified "very much."

Again, whatever the effect of Russian fire in the field may have been, it depended throughout the war very largely on a lavish supply of ammunition, which in turn depended on the vast numbers of the transport which the Russians managed to place in the hands of the artillery supply services. The arrival of lorries from the U.S.A. in 1942-43 may therefore have proved a distinct factor in the attainment of the later great Russian successes. The traversing of the vast spaces over which the war raged caused this question of ammunition supply to become the true crux of the whole Russian artillery problem. It was in this respect that Voronov's direction was so important. He never for one moment lost sight of the need for a lavish supply of ammunition, whilst never sacrificing the mobility either of guns or of artillery transport. Such were the twin foundations on which he evolved his fire tactics. Accordingly, ever stressing the value of massed fire, he planned and was able to produce with some speed and dexterity those great artillery concentrations which became perhaps a truly noteworthy feature of most Russian operations.

The first occasion on which Voronov could bring any concentration of fire against the Germans was before Moscow at the end of 1941. But his resources were still so limited that these attempts could not achieve anything very considerable; they could only be regarded as puny efforts compared with what was to come in 1943 onwards. Nevertheless, during 1942, by withdrawing one artillery regiment from every infantry division of the Red Army, Voronov managed to create a considerable mobile artillery reserve.

On November 19, 1942, the first great Soviet counter-offensive was launched to the north and south of Stalingrad; 5,000 pieces composing Voronov's reserve were sent into action almost at one stroke; on one single day they fired about 700,000 rounds.

The next ten weeks of fighting proved the value of Voronov's theory, tactics and organization in a planned offensive. It still remained to be seen how his conwould conform to defensive clusions action. When in July 1943 the Germans offensive effort launched their final against the huge Russian salient at Kursk, they attacked simultaneously from north and south with every tank and gun they could muster. The fighting and the casualties were, proportionately, perhaps the heaviest known in the war. In the end the Russian gunners defeated the German assaults-completely in the north of the salient, while they could admit of only a partial lack of success to the south, where they had to withdraw some thirty miles. Voronov's triumph was complete,

From that moment the Russian artillery swept all before it. Powerfully assisted by the new Russian Air Force, re-created by Stalin by the side of the squadrons existing in 1941, it went on from success to success. The new Russian aeroplanes came into action to assist the batteries just as fast as production began to falter It became clear that in Germany. German casualties in men and material could never recover from the terrific losses of 1941-43. So the tilting of the balance continued rapidly. The most powerful German defences were soon smashed at one blow: so during 1943-44 the greater German "hedgehogs," i.e., field-fortresses, fell one by one. Right down to the end the Russian guns continued to crush a German resistance that was weakening all the time.

Organization and Tactics

Very little indeed can be gleaned from published sources concerning Russian artillery organization. Interesting sidelights are, however, thrown thereon in Stalin's Orders of the Day which, for a short time towards the end of 1943, gave the official designation of the artillery units which had distinguished themselves in action. Some of the names and numbers disclosed are :--

Artillery Divisions-3rd, 11th, 13th, 16th, 17th.

Mortar Division-3rd.

- Anti-Aircraft Artillery Division-8th.
- Anti-Tank Artillery Brigades-8th, 9th, 24th.

Cannon Artillery Brigade-33rd.

Mortar Brigade-12th.

Artillery Regiments-69th, 1157th.

- Mortar Regiments-16th, 91st, 97th,
- 263rd, 292nd, 328th, 491st, 492nd, 493rd, 497th, 525th.
- Howitzer Artillery Regiments-11th, 678th, 805th, 827th, 839th.
- Anti-Tank Artillery Regiments-4th, 115th, 163rd, 166th, 222nd, 312th, 316th 317th, 493rd, 868th, 1000th, 1075th, 1642nd, 1644th, 1667th, 1669th.
- Self-Propelled Artillery Regiments-41st, 1543rd, 1694th, 1829th, 1831st, 1893rd.
- Independent Artillery Reconnaissance Battalion-84th.
- Independent Mortar Battalion-No number.

This fragmentary list may not seem of very great value; yet it substantiates several deductions to which various Orders of the Day and Press reports lend much colour. As a general rule it would appear that the ever-increasing Artillery Regiments were raised and armed as required according to tactical needs. As all such units and formations were numbered consecutively on a general list, large or small blocks of like units were being inserted in sequence on the lists without much reference to the nature of their neighbouring units. The list also tends to show that towards the latter part of the war the Russians concentrated on the constitution of new anti-tank and self-propelled units: this is all probably fact and more than guesswork.

Deductions to be drawn from such sources concerning organization, if not tactics, are the following:---

(1) There exists no doubt that the Russians organized and employed in the field whole artillery divisions and even corps. These were used as independent formations for tactical purposes and were handled in the field in a manner approximating infantry divisions. This assumption is strengthened by the continued mention of artillery commanders of the highest ranks in Stalin's Orders of the Day even when the practice of naming the actual formations and units was not customary.

(2) In all Press reports the repeated reference to Russian artillery firing over open sights as though this were a very usual proceeding seems to point to a regular practice of thrusting forward the guns to point blank range.

(3) The mention of artillery units and sub-units playing a leading role in street fighting during the capture of fortified towns would show a very bold handling of the guns, and their close connection with infantry.

In order to ensure surprise the handling of the Russian guns might be considered to be bold in the extreme. To quote one instance: in December 1943, during Vatutin's attempts made with the 1st Ukranian Group to regain the great Zhitomir main road to the west of Kiev, his batteries first began to conduct a normal creeping barrage. But time was urgent so the guns were suddenly pushed forward to point blank range when they rapidly smothered the enemy's positions. As might be expected it was owing to this audacity, so frequently possible on account of the Russian superiority in numbers and material, if not also owing to the decline in the German fire-power, that these forceful artillery tactics conduced to a great extension in the use of the self-propelled gun. The speed, the head-on armour and the readiness for action which were developed in this type of weapon was found effective, and this circumstance led to a rapid increase in the numbers of S.P. units — as may be deduced from their numerical appearances in Stalin's Orders of the Day. In fact the S.P. gun seems finally to have entered largely into the organization not only of the normal artillery division but also of the tank formation. The heavier types of S.P. weapons might be moved by rail to within 60 miles of their fighting destination which they might then reach in about three more hours. The guns fired, as a rule, over open sights and engaged visible targets.

When acting with tank formations the role of the S.P. artillery reserve was considered highly important since these weapons were intended to relieve the tanks of all tasks leading to a "direct" engagement. The object was to enable the tanks to recover their facility for manoeuvre or to carry out flank attacks. For such purposes the S.P. units would either go forward at speed to engage the enemy in front of the forward tanks, or they could hang back so as to prepare an ambush-all according to the nature of the terrain. For purposes of surprise to be obtained from ambush positions the Russian claim that this class of gun is unrivalled.

Again there is no reason for doubt that the Russian artillery, in common with the other arms, was organized into two distinct seasonal armies for summer winter work respectively. and The former was equipped as would be the case in any normal Western European army; but the latter was clothed in white; guns, tanks and transport were painted white; tracks on vehicles were made especially broad; ground clearance was increased: wheeled vehicles were supplied with skis in front-six wheelers would be fitted with some sort of tracks for the driving wheels and so forth. Most characteristic was the provision of air-screw propelled sleighs for crosscountry work over snow. In between the two seasons "intermediate" formations could be introduced to cope with the mud and floods of spring or of autumn. Such formations consisted largely of horsed Cossack divisions, still accompanied with horsed artillery.

Material

Super long-range and extreme high velocity weapons were not favoured by Soviet artillery designers. Neither did the Germans ever attempt to repeat their performance with the "Big Bertha" of 1918: its effects had come to be regarded as microscopic as to be useless. The largest German ordnance named in Press reports were the monster 24-inch (?) howitzers constructed for the bombardment of Leningrad city, and these constituted an outstanding exception. The Russians did not attempt to emulate this enormous piece. The maximum ranges at which the Russian artillery fired varied from 10 to 15 miles. Conversely the Russian designers did their utmost to obtain accuracy and fire-effect by adopting lower muzzle velocities and increasing the size and power of the bursting charge. The results of such a policy became clear when the Russians set about smashing the strongest German defences round Leningrad and Vitebsk. At the same time, owing to Voronov's influence, the mobility of all ordnance to be used in the field remained of paramount importance.

General Conclusions

In drawing any deductions, which may be applicable to artillery, from this German-Soviet war, it would be wise to bear in mind some of the general conditions which affected this stupendous struggle. Miscalculations as to the influence of such factors affected the German logistics of the war to such an extent that they may be said to be at the root of the German failure.

First, the scale of the area and the distance over which the operations ranged and the transports worked.

Second, the diversity of climate prevalent in Western Russia which profoundly affected strategy and equipment. The intense cold of winter followed by a period of flood and mud that in its turn gave way to the dust and glare of a flaming summer: the latter then again sinking across another stage of waterlogged terrain into the bitter cold of winter. Further, to the north, on the Baltic shores the winter was far more severe and prolonged than in the south; and even in the south considerable variations in snow and ice conditions prevailed from the Volga to the Danube.

Third, the enormous man-power reserve possessed by the Soviet Union. The Union's peoples-seven only out of twenty-seven Soviet Republics can be said to be of really Russian stockoffered some 180,000,000 inhabitants to draw upon for troops as against some 80,000,000 of Germanic race. But owing to the higher birth-rate prevalent in Russia the annual contingents between 18 and 36 years of age from which firstline troops could be drawn might have almost doubled the actual number of men to be levied, that is the Red Army might nearly reckon on almost a fourfold superiority in man-power reserves.

Fourth, the immense and distant dispersion of Russian sources of raw materials and war factories which placed a great proportion of Russia's war industries out of reach of aerial, let alone ground attack. This Russian superiority over the Germans began to increase rapidly from early 1943 onwards: and this result was achieved without any special effort being made on the part of the Russian Air Forces, at a time when air defence was constituting an increasingly serious drain on the German air-war potential.

With such advantages in hand, not to mention the steady influx of Allied way material, already mentioned, and the allimportant results achieved by the Allied Air Force, the Red Army could afford, from the time of the Stalingrad operations onwards at least, to indulge in far more venturesome tactics than the Germans, who soon began to feel the disadvantages of a withdrawal from their exposed positions deep in hostile territory.

Accordingly the Red Army's policy of employing artillery in large independent formations and of handling the guns almost as though they were wholly mobile tactical units and formations becomes comprehensible, even if allowances be made for any obligatory recourse to the simplest methods of fire and of communications. Moreover with two differently equipped types of units for summer and winter use — there always existed the possibility of finding a valuable reserve in case of accident. Again the large superiority of man-power enjoyed by the Red Army would permit of an advance in three distinct echelons from the latter part of 1943 until near the end.

Such a military policy might not work altogether as cleanly as outlined above, or as nicely as elaborated on paper; but it becomes exceedingly probable that it was applied as best might be, if the rate and extent of the various Soviet forward rushes made during the last eighteen months of the war be studied. Is it not possible that it was some failure in such a mode of advance that led to the dead stop before Warsaw, after the furious advance carried out through White Russia, in July 1944-if indeed it did not there meet with outright failure. At any rate the gain in confidence obtained from these advantages was of immense value, and so the Russian armies were able to rely on the heaviest and speediest artillery preparation to be followed by the advance of numerous mixed columns of tanks, infantry and artillery and aircraft.

Here we find, in fact, a tendency towards a tactical fusion amongst the various arms and assuming a more intimate nature than had been, normally and in practice, envisaged before 1939. The fact that such Russian mixed forces do not appear to have ever exceeded possibly—one division in strength, need occasion no surprise since the command and control of any such force might constitute a ticklish matter.

The reduction of the German fieldfortresses, "hedgehogs," was surely a demonstration that sheer artillery power, followed by the bold movements of the guns to keep in step with an infantry advance can be made highly lucrative. But such movement will be rendered possible only by the possession of great artillery superiority, this being of high mobility, and by a lavish expenditure of ammunition. So we return once more to the basic problems of the supply of ammunition and of fuel. In Russia it is said that the transport army employed behind the front numbered 250,000, and that it included women. These figures would imply one transport worker for every 10 to 25 front-line combatants: the total of the lorries absorbed in the back areas must have been very high, particularly if the use of sleighs for winter work be also taken into account. It might well be that the success of the Russian guns depended on the work achieved by their transport.

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Army Development

and

Proving Establishment

Lieutenant-Colonel J. F. Wrigglesworth Superintendent of Design, MGO Branch, AHQ

In the development of equipment the need for experimental testing and proving has long been realized by leading engineers. To support this contention one may quote the words of Frederick Henry Royce whose organization designed and produced the engines which powered the British fighting planes in the Battle of Britain.

He wrote :--

"Nothing is to proceed on the basis of theory or intuition alone, even one's own sure judgment and vast fund of knowledge are no substitute for recorded results from the Test Bench . . . Experiments produce the only safe result to follow."

It was inevitable then, that at the outbreak of hostilities, the Australian Army should feel the need of an establishment capable of checking by actual experiment the design and development of its many new and warlike stores.

In 1941, under the Chief Military Advisor, the Design Directorate was formed, and to this Directorate was allotted the, task of organizing an experimental section to be known as the Mechanization Experimental Establishment. This was later to become the Development and Proving Establishment. From a choice of rural facilities, "Mintaro House" at Monegeeta, some 35 miles from Melbourne, in the foothills of the Macedon ranges, was selected, and temporary quarters were established in the old mansion home.

Permanent installations were later erected on the Monegeeta site and by 1943 the new camp was occupied and a staff of 300 engaged in test and developmental work. The scope of this work had also been extended until, by this time, D & PE could deal with all Army experiment and testing with the exception of that of armament and armour, which was carried out at proof ranges under the Inspector-General of Munitions.

Concurrently with the erection of the new camp, the facilities for testing and development were increased and improved. Test tracks for vehicles were constructed covering a complete range from deliberately planned obstacles, through rough cross-country tracks and river crossings, to mountainous jungle trails. Vehicles, both A and B could be subjected to all or any of the conditions (except Arctic) that they would be likely to meet in service.

Comprehensively equipped workshops were built for the production of pilot models of new items of equipment under development, and for the building of special test-rigs and testing apparatus.

An Electronic Section was established and fully equipped with laboratory instruments and apparatus for testing telecommunication and allied equipment. An extreme-cold chamber was built to simulate Arctic conditions, as was a humidity chamber to reproduce the humid temperature of the tropics or the dry eat of the desert. A vibration machine was installed on which electronic and other equipment could be subjected to the rigours of rough usage. High tension apparatus enabled testing to be carried out at pressures up to 70,000 volts.

An electrical workshop was attached to the Electronic Section where pilot models of equipment under development could be manufactured.

D & PE built up a Mechanical Section which, besides the field testing of vehicles as mentioned before, carried out the testing of all general mechanical equipment other than electronic. In this section were housed dynamometers and allied apparatus to measure the horse-power, petrol consumption, water jacket temperatures, etc., of engines under test. A special vehicle called a Tyre Testing Trailer was constructed to measure the adhesion of various tyre patterns and sizes on different classes of road or ground surfaces. An apparatus was developed to give a precise record of the acceleration of a vehicle or the effectiveness of its brakes. Laboratory equipment was installed in a temperature controlled room for the measurement of wear and strength of mechanical components. This section was now

capable of giving a complete picture of the mechanical effectiveness of any mechanism.

From time to time the need has arisen for some item of specialized laboratory equipment or process, or the advice or assistance of specialists. Close liaison was, and still is, maintained with Government research authorities and with Universities, and much valuable assistance has been received from these quarters.

Since the end of the war, D & PE has suffered, in common with all other Army establishments, a run-down in man-power, but a nucleus of each section has been preserved. D & PE at the present day is still playing its part in the developing and proving of Army equipment.

Such then is a brief historical description of the Development and Proving Establishment at Monegeeta and the facilities it possesses. Now just what does it all mean? It means that when the Australian soldier goes into the field. he does so with the knowledge that the equipment he will use will have been scientifically and practically tested during its development to ensure as far as is possible that it will continue to function satisfactorily under the most arduous conditions. He will know that the need for maintenance has been cut to a minimum, and, indeed, in many cases, has been predetermined. He will know that not only has this been done, but done under the very conditions under which he may expect to operate.

Remember, "Experiments produce the only safe result to follow,"