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Editor:

COLONEL E. G. KEOGH, MBE, ED, (RL).

Assistant Editor:

MAJOR W. C. NEWMAN, ED

Staff Artist:

MR. G. M. CAPPER.

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Photo: Australian War Memorial, Canberra.

WESTERN DESERT

In the early stages of World War II, and later in New Guinea and Borneo, Matilda tanks were used chiefly in a close infantry support role. Matildas were slow, heavily armoured tanks mounting a 2-pounder gun as their main armament.

Owing to their slow speed, Matildas operated under a great disadvantage on the wide open spaces of the Western Desert. Nevertheless they did some very effective work, particularly in the first Desert campaign, which culminated in the capture of Benghazi and the destruction of the Italian army in Cyrenaica. In this campaign units of Matilda tanks co-operated closely with 6 Australian Division in the capture of Bardia and Tobruk.

COMMAND AND CONTROL OF LOGISTICS IN THE DIVISION

Major N. M. Turner
Royal Australian Army Service Corps

CURRENT DOCTRINE portrays the rather alarming prospects of enemy guerilla action in the rear of our combat troops as normal activity. Add to this the further probability of being forced to site divisional logistic units in an area in which the local population is an unknown quantity at the best and actively hostile in the worst case. Superimpose the setting of close country with limited roads and vehicle movement dictated by the season of the year. This, then, is the backdrop or situation against which rear area security must be considered.

It is a situation in whcih every movement by road must be carefully co-ordinated and heavily protected. It requires intensive patrolling about static defences. It will call for an extraordinary effort from those men who will provide the logistic support for the fighting units and who must, at the same time, provide for their own defence. It envisages a battleground without boundaries in which every soldier, combatant or logistician, is involved to very much the same degree.

To fully appreciate the problem confronting the logistic units, it must be appreciated that their establishments are based on the number of tradesmen required to carry out their particular logistic function. They are not bolstered in any way to provide an in-built capacity for full time, intensive defensive activities. It becomes increasingly important, therefore, to evolve a system which can co-ordinate the limited capacities of all units in the administrative area — a system of command and control invested with the responsibility of co-ordinating the defence and operational functions of these units. This system must further provide for the operational control of combat units allocated for rear area security.

The Present System

The current organisation for a divisional headquarters includes separate staffs for "A" and "Q" functions, each headed by a Grade 1 staff officer. As it is normal to split the headquarters into Main and Rear Divisional Headquarters, it becomes necessary to retain one of the two Grade 1 officers at Main HQ for liaison whilst his staff and the other Grade 1 officer with his staff, less a representative, are situated with Rear HQ. This, in itself, is unsatisfactory.

The Grade 1 officer at Rear HQ controls that element of the divisional headquarters and is responsible for the establishment and co-ordination of defence of the divisional administrative area. On occasions, the responsibility for defence co-ordination has been delegated to CRASC.

"A" services and "Q" services are controlled by two separate staff officers with co-ordination achieved through the Chief of Staff. However, the Chief of Staff has further responsibilities in regard to "G" Branch functions and cannot be regarded as a complete answer to the problem of co-ordination of logistic functions which is in itself full time employment. Whilst most of the "A" and "Q" staff is grouped at Rear HQ, the Chief of Staff will normally be with the Divisional Commander at Main HQ.

The control of combatant units allocated for rear area security is the responsibility of "G" Branch, that part of Division HQ which should be involved only in the main battle and which should be divorced from side issues as much as possible.

The present system then has certain weaknesses:—

(a) Separate staff control of "A" and "Q" services.

(b) No provision for command and control in the rear divisional area other than by a staff officer.

(c) The requirement to provide at least two logistic staff officers at Main HQ to ensure adequate liaison for the "A" and "Q" services.

(d) Inadequate provision for co-ordination of defence and operational function of units in the divisional administrative area.

(e) Control by Main HQ of combatant units involved in rear area security.

Proposed New System

The weaknesses expressed about the present organisation can be summed up as —

(a) Lack of co-ordination in staff control.

(b) No command structure for co-ordination of defence and operational functions of divisional logistic units.

At divisional headquarters there seems little to justify the separate "A" and "Q" appointments at Grade 1 level and possibly the lack of co-ordination could be overcome by deleting the two Grade 1 officers (AAG and AQMG) and instead including an AA & QMG and a DAA & QMG. The AA & QMG would control divisional staff at rear HQ and co-ordinate the staff control of both "A" and "Q" service. He would then be represented at Main HQ by the DAA & QMG.

The command structure could follow the American pattern, a divisional train commander, call him what you will. He must be senior in rank to the principal service commanders and he would require a small headquarters to assist in the co-ordination of defence. He would be responsible for the implementation of the administrative plan in support of operations, and the command and control of combatant units employed in rear area security. The duties of this commander would also embrace the following:—

(a) Co-ordination and protection of road movement.
(b) Co-ordination and protection of isolated logistic points such as DPs, BLPs, CCP.
(c) Selection of routes within the divisional area.
(d) Selection, preparation and defence of divisional air strips and LZs.
(e) Co-ordination of engineer logistic effort.
(f) Policy for patrolling the rear divisional area and co-ordination of defence in the divisional administrative area. Command of a mobile reserve to back up perimeter defence.
(g) Co-ordination of unit "B" Echelons. When unit transport is pooled for a particular task, executive control would be vested in CRASC.

Conclusion

The combined staff control of "A" and "Q" possible through the appointment of an AA & QMG and the introduction of a commander to co-ordinate the defence and operational functions of the divisional logistic units would provide better balance of command and control in the division. It would divorce the responsibility for rear area security from "G" Staff at Main H.Q. and free them to concentrate on the main battle.

The development of our new tactical doctrine (or the realisation of half-forgotten past experience) must be met by the development of imroved command and control, decentralised responsibility and a system of co-ordination without which the logistic units could not cope with their operational duties and their own defence. The alternative is the deployment of an unacceptably large proportion of combat troops for rear area security.

BATTLE PRELIMINARIES

Major General M. P. Bogert, CBE, DSO, CD,
Canadian Army (Retired)

Reprinted from the Canadian Army Journal

In peacetime training, particularly on tactical exercises without troops, much time is wasted in trying to decide on the best plan for a given operation. What is really required is not necessarily the best plan, but a good plan quickly arrived at. Most well-trained officers are quite able to produce a good plan for any operation that they may reasonably be expected to conduct, but unfortunately not all of them have confidence in their ability to do so. Much of this lack of confidence has been created by the evil cult of the directing-staff solution. In fact, most tactical problems admit of several sound solutions and, if one of these is selected as the DS solution, those who produce other sound solutions may feel that they have somehow failed, with resulting damage to their self-confidence.

Planning is, of course, only one step in the carrying out of an operation. The ability to produce a sound tactical plan is clearly essential to a successful field commander, but the making of a plan is one thing and its execution quite another. In reality, the course of a battle very seldom closely resembles the original plan; for obviously — although this is somehow seldom reflected in training — the enemy always tries, often successfully, to disrupt or completely to frustrate our plans. The fact is that the conduct of the battle is often a more serious test of a commander's ability than is the planning.

The elementary lessons of command can be well taught in tactical exercises without troops, but it is only in telephone battles, signal exercises, and particularly in tactical exercises with troops that the problems of the conduct of the battle can be presented with any realism. The two-sided exercise is very difficult to control and umpire, and, although it provides an entertaining spectacle, it is often of no great instructional value, except perhaps for commanders and staffs at a very high level. Up to the divisional level the one-sided exercise with a controlled skeleton enemy is probably the best means short of battle itself of training commanders and staffs in the conduct of the battle. This type of exercise permits those controlling it to represent the action of the enemy in a realistic manner of great instructional value and, in particular, to create a realistic intelligence picture. Unfortunately, even when intelligence is realistically represented in an exercise, it is often not well handled. Too often officers assume that exercise intelligence is necessarily entirely accurate and entirely complete, whereas intelligence in war seldom pretends to be either; exercise controllers must be careful not to be sportsmanlike when the fortunes of real war would not be.

The need for sound training in planning for, and in the conduct of, the battle is recognised and in general well provided for. There are, however, a number of preliminaries to battle other than the making of the plan, which may seriously affect its outcome. These preliminaries are certainly carried out in tactical exercise with troops, but seldom do they receive as much attention as they deserve. This may be partially owing to a reluctance on the part of exercise directors to criticise these preliminaries because such criticisms are apparently aimed directly at commanders and headquarters. In any case there is always room for improvement in this sphere if the battle is to begin in the most favourable circumstances possible. Much can be done by preliminary arrangements and study. The composition of reconnaissance-groups, orders-groups and the rest can be dealt with in standing orders, but the actions necessary between the recognition of a situation requiring a new plan and the execution of the orders to put that new plan into effect provide abundant food for thought. For this period of preliminaries to the battle an orderly procedure is required; but not a standing procedure, for the factors affecting it are too numerous and varied to permit any sort of standardisation. Let us examine this period.

During this period the following must be done: the reconnaissance, the making of the plan, the issue of orders, and the deployment of the forces for battle. These actions must be carried out at all levels from the highest commander concerned to the lowest, and, if time is short as it usually is, they must as far as possible be carried out simultaneously. This is fairly obvious and is generally well understood. What should be equally obvious, but which, for some reason, seems to be less clearly recognised is the importance, if time is short, of setting in motion first of all those processes that are going to take longest; these are generally the deployment of the forces for battle and the preparation and distribution of the fire-plan. Only too often a commander goes on with his reconnaissance, planning and issue of orders without beginning his deployment, with the result that unnecessary confusion and fatigue are produced among those who must actually fight the battle; or he does not at the earliest possible moment give to those responsible for working out the details of his fire plan the information necessary to do this task, with the result that the detailed fire-plan cannot be distributed in sufficient time for it to reach, and be digested by, all those who are dependent on it.

The fact is that the ability properly to appreciate time and space is one of the most important qualities that a successful commander at any level must possess. The importance of this quality will very frequently appear during the conduct of the actual battle, but we are concerned here with its effect on the preliminaries.

Two or three ways have been mentioned in which a commander may help to make the best use of the time available between the recognition of a new situation and the carrying out of the necessary action to meet it. But even if these steps are taken, there will frequently be insufficient time to do all the things at all levels that seem to require to be done. It is here that the character and ability of a commander are really put to the test. He must decide what share of the limited time available he is entitled to take for his own use.

If, when time is short, senior commanders do all the things that they consider it desirable that they *should* do, it may well be that their subordinate commanders have not time to complete the essential things that they *must* do. A senior commander may, for example, consider it most desirable that he carry out a reconnaissance on the ground for an operation he is about to order. If, however, his ground reconnaissance would take so much time that there would be insufficient left for subordinate commanders to carry out ground reconnaissance which for them is essential, the senior command must be satisfied with a map reconnaissance. An able commander will not only estimate correctly his share of the time available but also ensure that he does not exceed it; his skill will enable him to make the best use of the time available and his experience will tell him things that less experienced commanders would have to seek out.

One of the things that each commander must do in the time available to him is issue his orders. This is not only a very important action, but also one that may easily result in his exceeding his share of the time. The commander must select carefully the place where he intends to issue his orders, bearing in mind the time that he and his subordinates must take to travel to and from that place and not forgetting that movement in the forward area takes much longer than movement further to the rear. Usually, but not always, it is better to go forward to issue orders.

The place where orders are to be given must be selected early so that the warning order may be issued without delay. The warning order may contain little more than the time and place at which orders will be issued; it may, however, indicate the nature of the operation, its general area and direction, probable grouping including the composition of the reserve, the time before which there will be no move other than of reconnaissance parties, the general position of assembly areas, and the composition of, and rendezvous for, reconnaissance parties both operational and administrative. The more information that is in the warning order, the more subordinate commanders can do early so that time will be saved later. The rule is that, if time is short, a long warning order is worth while; if time is abundant, there is no necessity to issue much information before the orders-group assembles and a short warning order, perhaps limited to the time and place of orders and the time before which there will be no move, is appropriate.

To return to the operation order itself. If time is short, confirmatory orders in writing often do not reach the addressees in time to be of value; in fact, if, as often happens, the written orders contain some amendments to the verbal orders, confusion may result. Below a very high level, well-trained formations and units can, and in general should, except in deliberate and complicated operations such as opposed landings and major river crossings, dispense with written operation orders. This can only be done, however, if the commander is able to issue orders clearly and consisely. It is fatal if, knowing that confirmatory orders are not going to be issued, he rambles on, repeating himself in his efforts to ensure that no detail is omitted.

Particularly if the giver and receivers of orders are tired, misunderstandings can readily happen, and they are best avoided by following fairly closely the laid-down sequence of orders; but this certainly does not mean that the issue of orders should be a monotonous recitation. The commander must address his orders-group personally and convey to them his determination that his plan will be accomplished. Nevertheless, he must not, in an endeavour to avoid sounding stilted, allow his orders to become merely a directive or operation instruction. An operation instruction is highly appropriate when a commander wishes to give latitude to deal with unforseen circumstances to a particular subordinate commander — for example, to the commander of a covering force or of a mobile force carrying out an independent mission — but, when several subordinates who are expected to work in close cooperation are all given latitude, confusion is very likely to ensue.

Sometimes a commander may consider it advantageous to issue preliminary orders some time before he gives his operation order proper. This is appropriate, for example, when he considers that it is important to carry out a reconnaissance on the ground but that, if he does reconnoitre, there may be insufficient time left for his subordinate commanders to do so too. In this case he may issue preliminary orders from the map in sufficient detail to permit his subordinate commanders to carry out their reconnaissances at the same time that he is carrying out his. The operation orders are then issued after the reconnaissances have been completed.

This method used in the appropriate circumstances has obvious advantages, but it has disadvantages that are perhaps less obvious, and these should be carefully weighed against the advantages. The first of these is that the orders-group must assemble twice instead of once, and this may seriously encroach on the limited time of the subordinate commanders. Secondly, if the superior commander's reconnaissance is really worth while, it may result in changes of plan, and this means, of course, that the subordinate commanders, having made their reconnaissances before they knew about these changes, may have to carry out further reconnaissance later. Finally, the superior commander having completed his reconnaissance may, in order to save time, be tempted merely to amend his preliminary orders rather than to give a complete operation order; if he does this, there will be grave danger of omissions, misunderstandings and resulting confusion. Important as reconnaissance is, if there is not really the time for a commander to carry out a reconnaissance, it is better for him to accept the fact and to issue orders after a careful study of the map; the additional time made available to subordinates by doing so will probably more than compensate for the disadvantage of their superior not having seen the ground himself.

If time permits between his issue of orders and their execution, a commander usually visits his subordinate commanders to discuss their plans, and at these meetings some changes to the original plan are sometimes agreed to. If changes are made, they must, of course, be notified to all concerned, and this can often be done most effectively by holding a co-ordinating conference. A commander should remember, however, that the co-ordinating conference, although a convenient device from his point of view, can be most inconvenient to his subordinate commanders, who are probably summoned to it at a time when they have many other important and urgent things to do. It is often better to disseminate changes in the operation order by message or liaison officer rather than by holding a co-ordinating conference, except in circumstances when there is ample time, as, for example, in the deliberate occupation of a defensive position well in the rear of the existing front. In very deliberate operations, of course, there may be no objection to holding two or even more co-ordinating conferences after the operation order has been issued, and when the operation is a very complicated one it may be essential to do so; but even in these circumstances a commander should only hold a co-ordinating conference when one is really required.

Occasionally a commander will issue preliminary orders some time before giving his formal orders and also hold a co-ordinating conference later. When this is done, it is safe to say that either the issue of preliminary orders or the holding of a co-ordinating conference is redundant, for the circumstances in which these two events are appropriate are different. The issue of preliminary orders is a device to save time when it is short; whereas the co-ordinating conference is appropriate only when there is no great urgency.

Sometimes, regrettably, a commander has been known to issue preliminary orders and later to hold a co-ordinating conference, without any formal issue of orders at all. This is a most unsatisfactory and untidy arrangement, because the very name preliminary orders implies that formal orders follow, whereas a co-ordinating conference implies that formal orders have already been issued and may require co-ordination. Such a practice invites omissions and misunderstandings and is, therefore, dangerous and should be considered quite unacceptable in war.

A good commander does not readily complain or make excuses; but, if searchingly questioned after an operation or exercise, subordinate commanders will very frequently admit that they were not given sufficient time in which to carry out their orders. Unfortunately, this is only too frequently true. What is probably as frequently true but much less frequently admitted or even recognised is that these commanders probably did not make the best use of what little time they were given. It is a very lucky commander in war who receives all the time he needs to plan and execute an operation, but many a commander who believes that his part in an operation failed because he was given insufficient time would be very surprised to know that, with the same allotment of time, a more skilful commander would have achieved success.

There are many ingredients that make for success in battle; the first is men, and, even on the nuclear battlefield, nothing can be achieved without them. But the best men — and somehow Canadians who are not in the Services seem to find this difficult to grasp — can achieve little without discipline and training, and the better their discipline and training, the more a given number of men can achieve. With good discipline and training even men of less than the highest quality can achieve much. Then there is equipment, always important and now more so than ever, but still not, as some people seem to think, the only ingredient that counts. Leadership is certainly of the first importance, but, like other ingredients of success in battle only significant in conjunction with the rest. It is a quality that cannot be acquired by training, but which if possessed, can by training be greatly increased in value. Another ingredient is the plan. A good leader and good men can, it is true, succeed in spite of a mediocre, or even a bad plan, but seldom can they do so at such a disadvantage without paying a heavy price. The making of the plan is the most important preliminary to battle, but the other preliminaries that we have been discussing are necessary to translate the plan into action and they form still another important ingredient making for success in battle.

In the conduct of the battle, the commander and his staff each have a distinct role to play. The staff must constantly keep themselves informed of the progress of the battle and pass this information to all concerned; above all they must present to the commander a clear picture neither distorted by unreliable reports nor clouded by unimportant detail. The commander for his part, must decide when and how to influence the battle, and this does not mean merely approving action suggested by the staff. The major decisions of the battle are the commander's and his alone; he must decide what to do and how to do it. In the same way, in the beginning the commander must himself make the plan and this, too, does not mean approving a design prepared by the staff, although the staff may be required to examine the feasibility of various courses of action in the light of weather conditions, from the administrative standpoint and so on.

In the preliminaries to battle other than the making of the plan, again the commander and the staff each has a distinct role to play. The commander himself must decide the general way in which his plan will be turned into action, and this is just as much his own task as is the making of the plan itself; but within the framework of this design are innumerable details which must be provided for and controlled, and this is the task of the staff.

This period of battle preliminaries lies, as we have said, between the recognition of a situation requiring a new plan for battle and the control of the battle itself. These preliminaries must not be dismissed merely as a drill or standardised procedure; they are a series of interrelated processes demanding from the commander and his staff qualities no less than those demanded by battle itself; intelligence, natural aptitude, experience, imagination, self-confidence and, perhaps most important of all, training.

That which is wishfully conceived or grotesquely mismanaged has no claim on Heaven's help or on redemption due to enemy stupidity.

— *Brigadier General S. L. A. Marshall, U.S. Army.*

DELEGATION

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GREEN LIGHT TO COMMAND CONTROL

Colonel Richard K. Hutson
United States Army

Reprinted from the November 1963 issue of MILITARY REVIEW, Command and General Staff College, Fort Leavenworth, Kansas, U.S.A.

RAILROADS of the world employ two basic systems for controlling trains. One might be termed the "green light" system and the other the "red light" system.

In the case of the former, all control jacks are green and the conductor has a license to keep going until someone in control authority turns the red light. This is the system in use by United States railroads.

European railroads use the opposite approach in which all lights are turned red and a conductor may not proceed until someone in control authority turns the light green.

Both systems apparently work quite well for running a railroad, but when applied to the operation of a military organisation, one has definite advantages over the other. In one instance, the conductor can go all the time until the man in control flashes the red light. In the other, he cannot go at all until someone tells him "now is the time".

Colonel Richard K. Hutson, Deputy Chief of Transportation, served with the 7th Infantry Division in the Asiatic Pacific theatre during World War II. A graduate of the United States Army War College, his assignments include duty with the Office of the Army Deputy Chief of Staff for Logistics; Chief of the Procurement Division, Office of the Army Chief of Transportation; Deputy Commander and Chief of Staff, 2nd Logistical Command; and Port Commander, Bremerhaven Port of Embarkation, Germany.

The advantages of one system over the other for military operations are quite obvious. The green light system provides for the delegation of authority which is essential to the success of military organisations. The red light system, on the other hand, completely centralises control and is the antithesis of sound military operations.

Delegation of authority, coupled with a widespread willingness by individual soldiers to assume responsibility, results in the development of leadership qualities at both the highest and the lowest levels of organisation.

Basic Doctrine

The Army's doctrine of command is found in *Field Manual 101-5, Staff Officers' Field Manual, Staff Organisation and Procedure*. It is stated quite succinctly. "Command," says the manual, "is the authority which a commander in the military service lawfully exercises over subordinates by virtue of rank or assignment."

Thus if one is to command, someone must first give him the authority to do so, and it must be lawful and given from top to botttom. Authority cannot be assumed; it must be delegated by a superior. Until this is done, there is no licence to operate.

The field manual states further that "The commander alone is responsible for all that his unit does or fails to do. He cannot delegate this responsibility." An excellent example of correct usage of the term "responsibility" was this statement by President Kennedy in a State of the Union message: "One year ago," the President said, "I assumed the responsibilities of President."

The President, in effect, was acknowledging the receipt of authority delegated to him by the people of the United States. At the same time, he was stating his willingness to assume the responsibilities entailed in exercising this authority. Actually, the people had delegated to the members of the Administration and to Congress the authority to make their decisions for them, but they had not delegated their inherent responsibility for the decisions made. Mr. Kennedy assumed these responsibilities of his own volition.

Key to Success

The Army doctrine of command, then, involves lawfully exercised authority delegated from top to bottom and an understanding that a commander can delegate authority, but cannot delegate his responsibility. The green light system of operation is really nothing more than the proper exercise of this doctrine. The key to its success is a willingness to delegate authority freely to the lowest possible levels at which sound decisions can be made. And the authority delegated at each command level must be sufficient in each case to permit acceptance of responsibility for the decisions which will be required.

Delegation of authority is sometimes difficult to get started when people are not accustomed to it. It can be done with little change in basic organisation, but it calls for a major change in concept of operations and organisation.

A good commander will utilise his staff to the fullest. The more he gives them to do, the more work the unit is able to perform, and the more the men can grow to the benefit of themselves and the organisation. What better training is there in peacetime than permitting subordinates to exercise authority and make independent decisions?

Independent decisions may not be easy to make. If an error is made, it may cause the commander some embarrassment. Some good does come from it, however. If a man makes a mistake, and is corrected, and the man is honest and is trying, he will never make the same mistake again. Also, the man who is permitted to take on decision-making duties during peacetime is going to be ready to make the comparable or more difficult decisions required in time of war.

A senior who will not delegate authority either doesn't have confidence in the people below him or he thinks he is the only person capable of doing the job. But one thing is certain — unless a person has a distinct understanding with his superior as to what he is to be permitted to do, and unless that superior has delegated him the authority to do it, he has no licence to do anything. He cannot do a thing because authority cannot be assumed. Authority has to be given by a superior.

The dilemma faced by leaders at all levels is to know how much authority it is safe to delegate, and how much should be centrally retained. A commander also wishes to know how he can be sure that a junior will do a good job in exercising the authority he delegates to him. There is no simple answer to either problem. There are, however, a number of ways in which a commander can protect his interests:

- Delegations of authority should first be accompanied in writing from the commander down so that each control level will understand clearly the limitations of its "green light" to operate independently.
- Authority is not sufficient in itself. The subordinate must also have access to the guidance which he will require for making decisions. This guidance must be sufficiently broad to permit the subordinate some latitude for the exercise of initiative. Therefore, the commander must publish his policies.
- Policies might be defined as the amalgamated expressions of the commander's personal traits, his experience, and his intellect on matters of management and procedure.
- The commander is the only person who can make policy. His policies must fall within the framework of those of his next higher commander, and must be restricted to matters affecting solely his own particular element of the organisation.
- The bigger an organisation, and the more it is spread out, the more essential it becomes

for the commander to establish and publish definitive policies.

Policy Deviations

Policies serve as guides in standardising operations normal to the times and circumstances. Since it is impossible for anyone to write a policy which has meaning and is good for all circumstances and conditions, it may be necessary in certain times and circumstances for a subordinate to deviate from policy. The person who is really worth his weight is the one who says, "I know the regulations, I know the policy, but I should deviate from them now — at this time and under these circumstances."

Perhaps he will make a mistake; maybe he will trip up the commander. All right, that's the chance a commander must take. But this person is assuming the responsibilities of his job and should not be criticised if he has made an honest effort. Everyone is going to make a mistake at some time or another, and the person who accomplishes the most is likely the one who will make the most mistakes. As one commander advised his subordinates, "Don't be afraid to go out on a limb; that's where the fruit is."

No one has a licence to disregard the regulations and the policies indiscriminately. All must follow them unless time and circumstances determine they should not. Not much will happen to anyone, of course, who follows them always.

Standards

Closely allied to the issuance of policies is the necessity for establishing standards against which day-to-day performance can be weighed.

The word standards is just another term for yardsticks. A commander who will accept anything less than superior has a warped sense of values. Every objective at every echelon should be to do the best and nothing less within the capability of its men, money, materials, and facilities. If objectives are not high, standards will not be high.

Many people fail to recognise and evaluate standards. Standards are really relative matters. High standards for one might be considered mediocre in another. They are going to change with the individuals involved. A man making an inspection helps set standards. Basically, this is the reason for inspections. They are a means for checking prevailing standards against those desired by the commander.

Central Control

In recent years the design of military organisations has been directed at centralised control and decentralised operations. The advent of automatic data processing systems which permit the rapid collection and assimilation of information, the effect of fiscal and budgetary controls, and the vertical nature of the management control exercised over major Army systems have the inherent tendency to centralise more and more of the decision making at progressively higher levels in the organisation.

As in the red light system for running a railroad, this centralisation denies commanders at lower levels the freedom of action to act independently and is incompatible with the requirements for the conduct of successful military operations. Too much centralised control can cause serious inroads upon command authority. It seriously restricts flexibility and slows reaction time to changing situations.

Giving a man all the authority which he is capable of exercising and for which he will assume responsibility is good business. Done properly, authority is delegated and redelegated in writing to the lowest levels at which sound decisions can be made. Delegation is followed by the publication of policies and establishment of standards which leave no doubt as to the commander's desires. When delegation has been properly accomplished, individuals are less confused about their duties, take renewed pride in their own and the command's accomplishments, and acquire valuable training in making the progressively higher and higher level decisions which are the substance of true military leadership.

Commanders who have the courage to initiate the green light system will find that it is not only an excellent way to run a railroad, it is also a good method for running a military organisation.

COMPETITION FOR AUTHORS

The Board of Review has awarded first place and the prize of £5 for the best original articles published in the April and May issues as follows:—

April — "The Leader and the Led" by Major W. F. Burnard, Royal Australian Signals.

May — "The Battle of Gettysburg" by Lieutenant Colonel John Nocita, Artillery, United States Army.

INDUSTRIALISATION IN MAINLAND CHINA SINCE 1949

Major W. A. Piper
Royal Australian Infantry

CHINA, that vast country behind the Bamboo Curtain, is this year again included in the topics for current affairs examinations. Its reappearance emphasises once more China's importance to us as Australian citizens, and this article with a geographical bias, is intended for those readers seeking a wider background knowledge of this country.

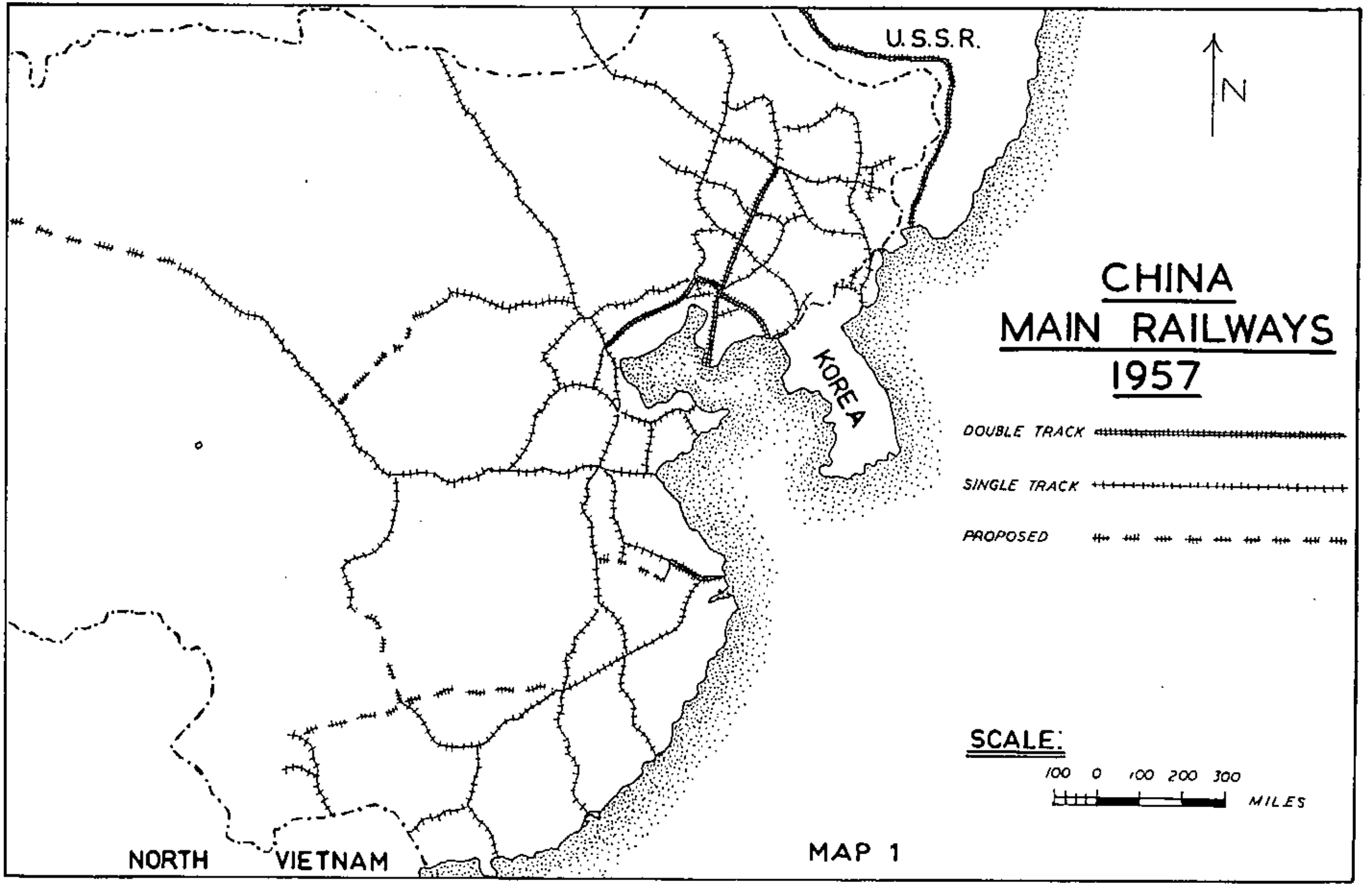
The Background

In 1963 the US State Department estimated the population of China to be 720 million, but estimated that of this number only 90 million or 12½% were engaged in non-agricultural employment. China is basically an agricultural country and is in its infancy so far as industrialisation is concerned.

An explanation for this laggard industrial development can be traced back into China's history, but briefly the reasons are threefold. Firstly, social traditions encouraged the development of philosophy and literature at the expense of scientific reasearch, and even when Western nations introduced modern scientific methods these same social traditions discouraged their pursuit by the Chinese intelligentsia. Secondly, tightly knit families restricted the mobility of capital, and thirdly cheap labour promoted economic inefficiency.

The advent of the Communist regime in 1949, however, has seen a complete change in this, as in many other aspects of Chinese life, and the Government has striven to change China from a predominantly agricultural to an industrial nation. It has taken considerably more than a change in government policy, however, to achieve this aim and while after 14½ years production has doubled and quadrupled in successive years, the absolute increases have not been large.

There are many problems confronting the government in its drive for heavy industries and the most important of these are the large demand of the people for consumer goods, and the shortage of capital which can be derived only from the agricultural base of the country. Other problems are inadequate transport facilities, difficulty of importing capital and technology, and the low level of income. The ravages of war with Japan and the civil war have also contributed to making post-war industrialisation a mammoth task.


CHINA
MAIN RAILWAYS
1957
U.S.S.R.
N
KOREA
DOUBLE TRACK
SINGLE TRACK
PROPOSED
SCALE:
100 0 100 200 300
MILES
NORTH VIETNAM
MAP 1

On the credit side it can be said that there is a more than adequate labour supply, and it is estimated that 200 million workers could be freed from agriculture for industry. While the government has complete control of both the labour and the capital, development should be rapid.

Transport and Communications

The inadequacy of its land communications has seriously retarded the development of modern China. The railway network is small and while the mileage has increased by 30% to 20,000 miles since 1949, this represents only a very small mileage per person and an almost insignificant distance when viewed in the light of China's area of 3,860,000 square miles.

The situation in relation to motor highways is only slightly better, and in 1954 they were estimated to be about 100,000 miles. Most of this was not macadamised. Owing to the limited number of motor vehicles and the shortage of petroleum, however, road transport is of little significance in modern China.

Water transport has been important along the coast and along the major rivers, but very little of China is transversed by navigable rivers and the total tonnage moved by this means is also small.

Until 1949 "coolie" carriers and draft animals were the major means of transportation and even today are still significant. These means, however, are very inefficient, especially in moving the bulky raw materials required in industry. For this reason China is extending its railroads.

Before 1949 the main railways were along the eastern seaboard and predominantly in Manchuria where they were a legacy of the Japanese occupation. There were in addition other lines. One connecting the coast at Lien-Yuen with Paochi, and which the Communists have extended to Lanchow, and more lately with Yumen in the north-west. It is proposed eventually to join this with the USSR system. Another connection with USSR, completed in 1955, is that from Peking through Ulan Bator in the north. The other major railway work of the Communists, completed in 1952, was the extension of the Northern Railway system south into Chungking. It is proposed to extend this line further south to connect with the South Eastern system. (See Map 1.)

It should be noted that the railways from Amoy have strategic rather than economic importance.

Power and Mineral Resources

In 1947 the coal resources of China were estimated to be 444 thousand million tons, but in 1957 Peking announced reserves of 1,200 thousand million tons. Almost 80% of this is high grade bituminous coal. China's problem, however, has not been a paucity of such raw materials but rather the capital required to develop them. Despite these capital shortages coal production figures have increased enormously and are shown in Table 1.

Year	1944	1956	1957	1959	1960
Total coal produced (in millions of tons)	62.5	95	130	348	420

Table 1

Although coal is scattered widely in China, and 14 provinces have resources of over one thousand million tons, there is still a marked localisation of deposits. Four-fifths of the total are found in the two northern provinces of Shensi and Shansi and further large deposits are found close by in Ssuchuan.

Paradoxically China's coal production, particularly in the earlier years, has been from areas with small reserves such as Southern Manchuria and Hopei, and located at Fushun in this field is one of the world's largest open cut coal mines.

Oil production in China, while showing some increase since 1949, has still only reached about five million tons. Reserves of oil are still largely unknown owing to limited exploration, but in 1956 there were proven reserves of 100 million tons. Large sections of north-west China, however, are of sedimentary racks of a petroliferous character and the appearance of oil seepages shows promise for future exploration.

In 1956 half of China's oil production of one million tons came from Yumen in the north-west, and a large refinery for this field has been built at Lanchow.

China has large reserves of hydro-electric power and in 1957 these were estimated at 300 million kilowatts. Unfortunately most of this capacity is in remote areas, and even where not remote is subject to violent seasonal fluctuations. Other factors mitigating against the establishment of hydro-electric power stations are the silting of many rivers and freezing in the north. The development of the capacity, therefore, has not been rapid, and it was not until 1954 that the pre-war capacity (mostly Japanese installations) was restored. In 1957 work was commenced on a large new station called Hsinan in Chuntang province.

China has only moderate supplies of iron ore, and in 1952 a United Nations report estimated them at 4-5 thousand million tons. Peking claims double that quantity and future exploration may prove further deposits, particularly in the remoter provinces. Most of the known deposits, however, are of low grade ore and unsuitable for industry at the present level of technology.

Three-quarters of China's known iron ore in 1956 was found in Southern Manchuria, but other high grade deposits are known in Hainan, and around Paotow in Inner Mongolia there are high grade deposits estimated at 92 million tons. Other important ore deposits are known to exist in Eastern Hsikang and there are important mines at Tayeh in Eastern Hupei.

An increase in iron and steel production has been one of the primary aims of the Communists

Year	1940	1952	1955	1957	1959	1960
Steel Production (millions of tons)	.8	1.3	2.8	5.35	13.35	18.45 (target figure)

Table 2

and remarkable results have been achieved. Some idea of the increase can be seen in Table 2.

The 1960 output places China sixth in world steel production. Most of this expansion has taken place in Southern Manchuria and Shanghai, and the two industrial areas of Anshan and Shanghai between them produced about two-thirds of China's steel in 1958.

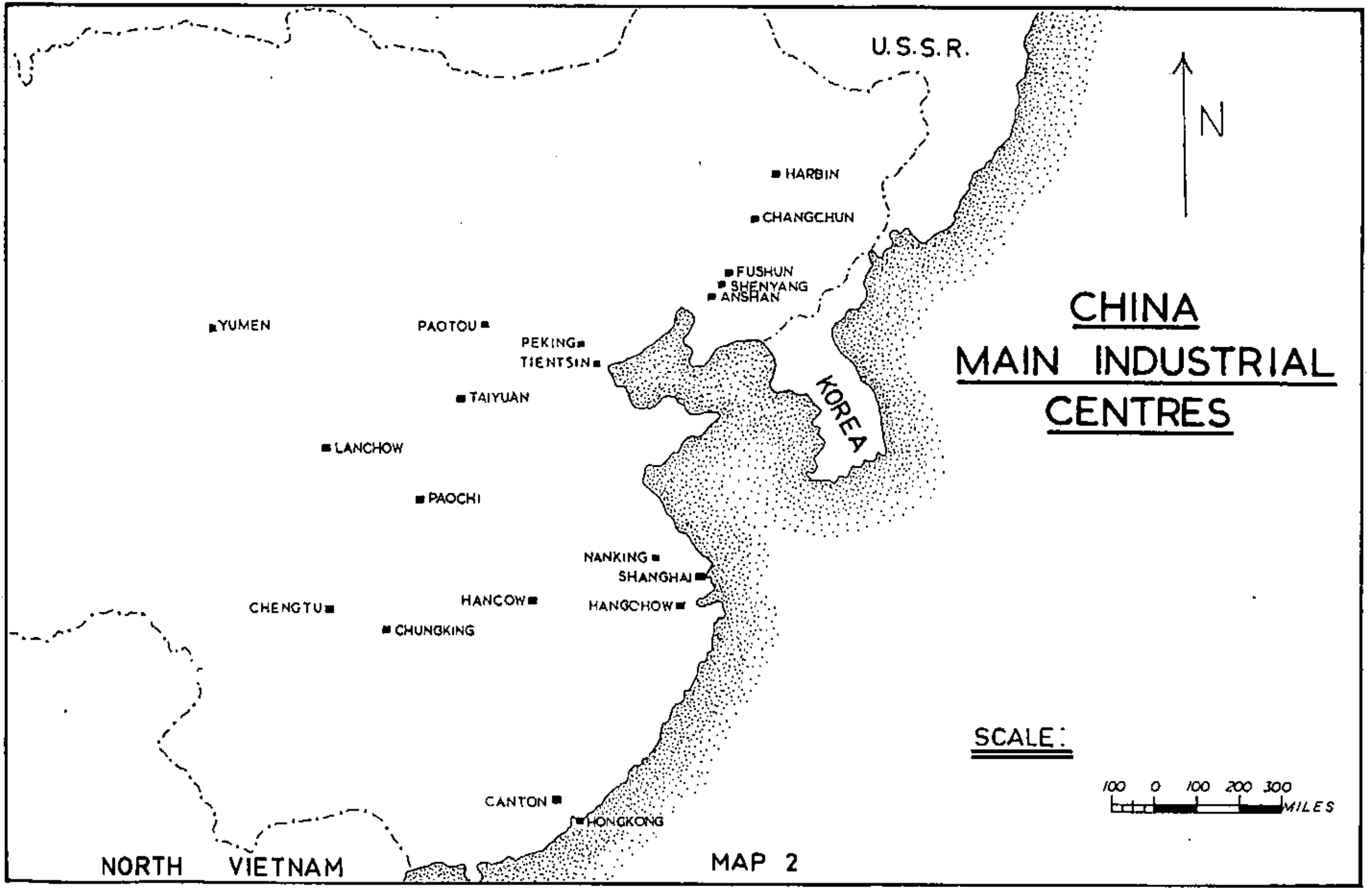
The production of pig iron is not so concentrated, and the increased demand for pig iron by the hungry steel mills has been met by expansion of blast furnaces throughout Southern Manchuria, at Tientsin and Taiyuan, at Shanghai and Chungking, and through the construction of new installations at Tayeh near Hankow and at Paotow. The latter has an annual capacity of 900,000 tons. Small furnaces throughout the villages to wide variation in quality this have also contributed, but owing practice is being discontinued.

Industrial Regions and Production

The main industrial regions of China in 1949 were easily separated into two groups, those close to foregn trade, that is, along the eastern seaboard, and those which had sprung up in the north-east and south-west during the war with Japan. Since the war there has been a third group established on sites close to the major raw materials of coal and iron.

The foremost industrial area in China is undoubtedly South Manchuria. This pre-eminence is largely due to the iron and coal deposits to be found, but more because of the impetus received from an early start under the auspices of the Japanese. It was the Japanese who constructed the first industrial plants in this area, laid the railway lines, and trained the workers. Since 1949 the Communists have built on this foundation. Today this area boasts some of the largest and most up-to-date plants in the world, and the electric furnace at Anshan is typical of the trend. While this area can boast of an automobile plant, ship yards, an oil refinery, cement works, chemical plants and modern machinery capable of producing items such as seamless pipes, the whole is seen against

Major W. A. Piper graduated from the Royal Military College in 1954 and served as a platoon commander with 2 RAR in Malaya in 1955-57. After a period of service with 17 NS Training Battalion he was posted to HQ Western Command, then returned to regimental duty with 3 RAR. From December 1961 to March 1964 he was Adjutant and Quartermaster of the Queensland University Regiment, and is at present a company commander in 2 RAR.


CHINA
MAIN INDUSTRIAL
CENTRES
U.S.S.R.
N
HARBIN
CHANGCHUN
FUSHUN
SHENYANG
ANSHAN
YUMEN
PAOTOU
PEKING
TIENTSIN
TAIYUAN
LANCHOW
PAOCHI
KOREA
NANKING
SHANGHAI
HANGCHOW
HANCOW
CHENGTU
CHUNGKING
CANTON
HONGKONG
NORTH VIETNAM
MAP 2
SCALE:
100 0 100 200 300
MILES

a very primitive background, particularly in short haul transportation, which, as for centuries past, remains the lot of human or animal labour.

The next important area is the lower Yangtse plain centred on Shanghai. This area, while also developing heavy industry such as steel, is better known for its light industries, particularly those based on agricultural products such as textiles and food processing. This sector of the economy has not been pushed ahead by the present government to the same extent as the heavy industry, and any increase has largely been at the expense of home handicrafts. Most of Shanghai's power is derived from thermal plants using coal from the north.

North-eastern Hopei province is probably the next most important industrial area. In this Peking-Tientsin area are coal mines, a cement works, textile mills, flour mills and China's largest glass factory.

The area Hankow-Changsha is another distinct industrial area based on the iron deposits near Hankow. This area is second only to Manchuria in iron ore extraction and has a large modern iron and steel plant at Honyang. In the towns of this district are found large textile and flour mills and factories preparing tea and vegetable oil and refineries for antimony. This area is being expanded as rapidly as possible.

Another light industrial area which has not declined in importance since 1949 is the Canton-Kowloon-Hongkong area in the south. (While Hongkong remains British, it belongs industrially to this area.)

The Chunking, Chengtu areas developed as a result of the westward movement from the Japanese and have been further developed since 1949. Chungking now has several small steel and cement plants while Chengtu produces textiles, pottery, paper and matches. Power for this region comes from hydro-electric, as well as thermal plants.

Since 1953 a completely new industrial area has been established around Taiyuan in Shansi. Taiyuan had long been a centre of light industries, but after 1953 heavy industrial development was pressed forward with the construction of a large thermo-electric plant and a major steel and machinery complex. A new iron and steel industry has also been established around Paotow just north of Shansi in Mongolia. These two areas are in some respects complementary — Shansi having the good quality coal and Inner Mongolia the iron ore deposits.

No paper on China's Industrialisation would be complete without reference to the Five Year Plans introduced by Mao Tse-tung and his colleagues.

These plans aimed at mobilising the nation's resources in the quickest and most efficient way possible. Initially, capital for industrialisation was to be obtained from increased agricultural production. This increase was to be achieved by improved efficiency gained through socialisation.

Product	1952	1957
Steel	1.3M	5.35M
Coal	63.5M	124M
Electricity (K'watts)	7,260M	16,080M
Vegetable Oil	.98M	1.1M
Cotton bales	3.6M	4.6M
Cotton bolts	111.6M	156.2M

Table 3

The first Five Year Plan (1953-57) called for the elimination of small individual land holdings and the establishment of collectivised farm units. The initial results of this plan were more successful even than the planners had thought possible, and throughout the period of the plan increased targets were set for industrialisation based on capital obtained through increased agricultural production.

Some idea of the success of this first Five Year Plan can be obtained from the fact that from 1953-56 capital investment in China increased by 316.7% and the capital investment in heavy industry in the same period increased by 425%. Individual production increases for some products are shown in Table 3.

It is estimated that worker productivity increased 70% during this period.

Flushed with success after the first plan, the leaders set the nation off on the second Five Year Plan (1958-62). This was heralded as "The Leap Forward" at the end of which China was to emerge as an industrialised nation. As in the previous plan the increased capital expenditure was to be obtained through increased agricultural production and this was to be achieved through the communes.

Whether it was due to the communes, or in spite of the communes, but agricultural production in 1958 was a record when 250 million tons of grain were produced. Industrial development in 1958 and 1959 therefore went on at a great pace even though the 1959 crop was below 1958's record.

Production figures showing the increases in 1959 over those in 1957 are shown in Table 4 which

Product	1957	1959	1960 (target)	1960 (actual)
	(M tons)	(M tons)	(M tons)	(M tons)
Steel	5.35	13.35	18.45	18.45
Coal	130	348	450	420
Electricity (M K'watts)	1934	4150	5170	Not Published
Petroleum	1.46	3.7	5.2	,,
Machine Tools (in 1000)	28	70	96	,,
Cement	6.86	12.27	16	,,
Cotton bales	4.65	8.25	9	,,
Cloth (metres)	5.05	7.5	7.6	,,
Vegetable Oil	1.1	1.40	1.7	,,

Table 4

also sets out the target figures for 1960.

Three years in succession after 1958, however, saw three bad seasons and the floods of 1961 were the worst in 100 years, and this despite the dams which the Communists have constructed. In 1961 the grain production in China was about 195 million tons, about equal to the 1957 figure although in this period the population had expanded by 40 million. Far from being able to export food to pay for its industrialisation, China has in recent years had to import food and its industrial expansion programme has ceased, at least temporarily. In January 1961 the nation's leaders in Peking announced that there would be a pause in the expansion programme and that for the next two years there would be a period of consolidation. This period would be used to improve the quality and increase the variety of goods produced rather than increasing the quantity. This statement is probably as close as the Peking Government could go to admitting that further expansion was impossible at least for the time being. Since enormous increased production figures are not available, the government has refrained from issuing any statistics at all. Chinese import/export figures since 1959, however, can give some indication to the buoyancy or otherwise of the economy. From a peak of £2.2 thousand millions worth of exports in 1959 there was a reduction of 6% in 1960 and a further reduction of 15% in 1961.

1962, however, saw a small increase in exports, although nowhere near the 1959 figure. We can fairly accurately assume then that following capital investment in 1959, showing increased production in 1960 and partly also in 1961, there has been very little industrial expansion in China in recent years. Increased agricultural production at a rate greater than population growth seems to be China's only hope as an aspiring industrial power, and a larger portion of the capital investment in future years will have to be made in this sector of the economy.

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RECRUIT TRAINING AT 1 RTB

Captain G. P. Marshall-Cormack
Royal Australian Artillery

IF YOU HAVE never been to Kapooka, or have not been there for some time, this article is a MUST KNOW. If you have visited the area recently or passed through it in training some short while ago, it's a SHOULD KNOW. If you have instructed the recruit here, it's a COULD KNOW. Whatever your category, please read on. You get our soldiers. This will tell you how we train them.

Introduction

1st Recruit Training Battalion is the first stage in a programme designed to produce a disciplined, fit, well dressed and smart soldier who is able to handle his weapons proficiently.

The specific aim in this first stage, which covers eleven weeks, is to produce a basically trained soldier who is fit in every way to undergo more advanced training with his Corps. So when you get him, don't try to teach him all over again or say, "Forget that, son, do it this way".

The Battalion is located at Kapooka, some six miles out of Wagga Wagga on the Albury Road, and the total training area covers almost 4,000 acres of lightly timbered, undulating pasture land.

Orientation

During the pre-training week the recruit is issued with his basic equipment, a part of his clothing entitlement, and his toilet requisites. He receives the rest of his clothing about five weeks later and our tailors make final adjustments at the ninth week. We find that physiques change so dramatically that what was a good fit at week one looks either like a dressing gown or a swim suit by the time he leaves us unless we watch him carefully. He is then examined medically to ensure that he is fit to undergo training, and he receives his first inoculations. He is interviewed by a phsychologist who assesses his leadership potential and tests him to determine his aptitude so that this may be considered later when he is allocated to a Corps.

The recruit is also interviewed by a Chaplain of his own denomination, who is available to advise on any personai problems. Finally he is taken on a tour of the surroundings to familiarise him with the local training area, the camp and other facilities.

Training Programme

Broadly the training programme is designed so that the recruit will become proficient in five main elements:—

(a) Drill.
(b) Weapons.
(c) Fieldcraft.
(d) Map Reading.
(e) Physical Training.

In addition the syllabus includes character guidance and education. The training hours consist of nine periods a day, of forty minutes each, with a number of night periods. There is a summer and winter timetable to combat the sometimes harsh weather experienced at both ends of the scale. Let's look now, in more detail at the elements mentioned above.

Drill

In his training the recruit learns step-by-step all drill movements so that he can carry out commands instinctively. This gives the soldier confidence in his own ability and adds to his morale. He is tested twice whilst at Kapooka, once in the fifth week and again in the ninth. This ensures that he has reached the required standard. If he is below it, he is allowed to try again — it might be nerves. If he then hasn't reached the standard he is "back squadded".

Weapons

This is perhaps the most interesting section of the course at our Battalion. He learns to handle weapons with confidence and skill, and test his new knowledge on the range. Much research has been done towards the best way to pass over this knowledge from the staff to the soldier. Elaborate but simply understood aids are permanently constructed near the ranges. We use a rifle team, attached to the training branch, who specialise, and do all rifle shooting instructions. This team has achieved notable improvements in the general standard of results at the range. This is shown by the fact that 22 per cent. of recruits qualify as 1st Class shots or marksmen on their initial open range practice. They all ultimately qualify.

Weapon training combined with drill gives the recruit a good knowledge of the self-loading rifle (L1A1) by week four, the automatic rifle (L2A1) by the fifth, and machine carbine by the eighth. Tests of Elementary Training, which must be passed by all, are carried out at the conclusion of training on each weapon. If he doesn't pass the test he is "back squadded".

Fieldcraft

In these lessons the recruit is initiated into the principles of camouflage in perfect surroundings. Lessons covering movement by day and night, estimating ranges, methods of indicating targets, are liberally supported by training aids set up in the field. He is carefully watched and assessed by his platoon staff and more often than not, the critical eye of the Company Commander. Again he has to pass a test — we invented a Test of Elementary Training for fieldcraft.

Map Reading

The recruit is given lessons in basic map reading. He learns how to read a map, how to use the service protractor and compass. He is examined individually towards the end of his training. A night march is done by the recruits in which the soldier takes turn in guiding his group over several miles using compass and map. It starts at 2230 hours and should end at first light. It's amazing how often platoons arrive home early.

How many times have you experienced in your unit the new soldier who has said, "I didn't do it; I was on duty," or, "I was in hospital"? If he didn't do it, he didn't pass the test, and he was "back squadded" until he passed or was abandoned as hopeless — we do get some of them.

Physical Training

The efficient soldier must be fit. With this in mind the Battalion has an intensive PT programme for all recruits and the difference between week one and week eleven is astounding. On conclusion of this course they do the following tests:—

(a) Foot assisted vault over 5 ft. wall.
(b) Broad jump of 12 feet.
(c) Climb a 20 ft. rope twice.
(d) Six chest heaves to the bar.
(e) Four instep heaves to the bar.
(f) Walk five miles in one hour.
(g) Run a mile in 6 minutes 15 seconds.

If the man doesn't pass the tests he is either put on full time PT or held back until he is fit. Three weeks is the longest we can hold him. If he fails then, a discharge follows.

Sport, both team and individual games, is considered of great importance and the recruit is able to play games summer and winter and frequently represents the unit in local sporting competitions. Every Wednesday afternoon all recruits and staff participate in organised sport on one of the many fine playing fields close to the company areas, including a 9-hole grass-green golf course. While enjoying himself the soldier also learns team spirit.

Character Guidance

During his stay at 1 Recruit Training Battalion the recruit will form habits, attitudes and impressions which will dictate the course of his entire Army career. Discussion groups led by Chaplains for each denomination gives the recruit the opportunity to keep in touch with his religious duty, or perhaps rediscover it. Twenty-six periods spread over four days, are devoted to the Character Guidance Course. No "back squadding" here!

Education

The main educational activity is directed towards the Army Class Three Certificate of Education. This course is of 46 periods, and is covered during the seventh, eighth and ninth weeks.

The course must be attended by all recruits. However, those who hold a certificate of Intermediate, or its equivalent or higher, with passes in English, a branch of Mathematics and at least two other subjects, are exempt and are often used as monitors to assist the Education Officer and his staff.

About 18 months ago the Commanding Officer decided that the Class III Certificate was obligatory and threatened that all who failed would stay back a further three weeks after their mates marched out. Curiously enough the education standard has risen dramatically from an average pass rate of 25 per cent. to about 85 per cent. Some still fail. They need nearer to three month's full time tuition and we cannot afford to hold them that long.

Back Squadding

This takes two forms. The recruit is either held for a time to be coached for an examination or test, or is literally back squadded to another platoon in an earlier week of training. This allows the soldier to undergo lessons he may have missed by hospitalisation or absence for other reasons.

There is a limit to this back squadding and a small number of men don't make the grade even after back squadding. These cases are individually considered at CO level and a Review Board decides whether the man is to be discharged or otherwise.

The Standard of Recruit

A careful survey of the intake is maintained. This shows that the average age on intake over the last eighteen months has been under 19 years and that 50 per cent. are in the SG1 or 2 category. This, we are told, indicates a capacity for higher training and augurs well for the future of the ARA.

Many applications for the Officers' Cadet School are handled here. This year approximately 15 per cent. were found to be correct for age and education. Almost 30 will ultimately face the Selection Board, of whom one third are 01R 10 (the highest). Those discovered by us who pass through at a time when applications are not required, have their C28A suitably inscribed in red ink. If you look at these forms when your soldiers arrive you can make a note of which ones to follow up when the call comes.

Recreational Programme

As mentioned previously, recruits are encouraged to participate in all sports — both inter-company competitions and as representatives of our unit.

1st Recruit Training Battalion has an excellent sporting record and fields teams in most summer and winter sports in the Wagga Wagga district. We were grand finalists in every sport in 1963. We have similar hopes for 1964. To date we have been successful in cricket. Keen sportsmen find facilities good, and coaching from the P & RT Branch is naturally of a high standard.

The cinema shows current films on four nights of each week. The Edmondson VC Club is first rate, ASCO providing wet and dry services similar to those of regular units, and indoor games amenities.

Although training is the prime concern, recruits find ample activities to occupy their recreational time.

Leave

During the first weeks most activity is concerned with training but later local leave commences. At the end of the seventh week recruits are given four days leave and may journey home if this is practicable.

Soldiers are well accepted by the local residents and public relations are on a healthy footing always. In 1962 the City of Wagga conferred the honour of the Freedom of the City upon the Kapooka Military Area. Every month we beat the Retreat in the main street of Wagga and occasionally we favour other nearby cities with this, and other similar spectacles.

Much emphasis is placed on good behaviour on leave. Woe betide the man who misbehaves. He automatically graces the CO's carpet. We hope the pride we instill in him lasts for his service career.

Emergency leave may be granted to recruits, and naturally with a fluid average of 850 men at Kapooka we receive our share of applications. Each is dealt with in the normal manner, bearing in mind that this fellow is not yet adjusted in his new job. A better insight into a reinforcement's general well-being in the service can be gained by regimental officers if they take a quick glance to see if their man has had emergency leave whilst in training. This will lead to a better understanding of your man and better man management.

Allocation

During the tenth week of training each platoon is interviewed by the Allocation Board chaired by an allocation officer from Central Army Records Office. This decides the Corps for which the recruit is most suited.

Allocation is made initially on the basis of preference, aptitude and performance, the Board being most careful to ensure that "square pegs are not placed in round holes". Those in the top ten are given preference and know this from day one onward.

Graduation

The end of recruit training comes with the formal march out parade, where the graduating platoon marches past in slow and quick time, advances in review order and is inspected by the Commanding Officer or some visiting senior officer. The entire Battalion is on parade to witness the performance. Even at this stage, perfection is insisted upon, and there have been days when platoons have been ordered to repeat their performance, either immediately or later in the day or week.

After presentation of trophies, the platoon marches off and after a wonderful party that night departs for the Corps Centres the next day.

Relatives and friends are welcome to witness the graduation parade and it is not uncommon to find, amongst those present, families who have travelled over 1,000 miles to see it.

Rebuilding

The article would not be complete without a mention of the huge rebuilding programme which began in February this year. When completed, the finest barracks in Australia, costing over £2½ million, will stand over the tired and unsatisfactory accommodation which has been Kapooka for so many years. The "Q" complex buildings are already under way, staff barracks foundations as well as a 1,000 man kitchen are being blasted daily in the heavy shale rock. The valley reeks of battle simulation noises — machines, dust, explosions, automatic fire on the nearby ranges and the tramp of many men in training. This same valley is to be fitted up with the trainfire target system which will change what can become a tedious practice into a lesson enjoyed by teacher and pupil alike.

Atmosphere

"Yes, we know what it's like; we were in National Service," is an often used phrase which doesn't quite fit into Kapooka. These men are volunteers, keen, seeking adventure, and/or security. (Verified by asking the soldier). All are eager to learn and between 48 and 72 men in each platoon are competing with one another to gain that "Top Ten". As I watched a bus load depart last night, I could see it in every man's face — keenness. Is this edge lost on some men, between us and the combat unit which he finally joins? It's not my place to say, but I have experienced the odd dull blade at the receiving end — which is food for thought in our methods of progressive (Corps) training?

Conclusion

Note the things that the Recruit Training Battalion teaches to its men and bear in mind that they passed these tests (14 in all) by qualifying in front of impartial judges outside the soldier's company — no pencil passes here!

The syllabus is available to all, except the enemy, and we welcome enquiries and visitors, but we don't want to become a mail order centre.

If you care to join our team of Instructors, Platoon Commanders or whatever you may be, come gladly and in the spirit of giving one's best. You will find that the return is justly rewarding.

THE INSTRUMENTATION OF GUIDED MISSILES

SERVICE RANGE REQUIREMENTS

Major N. G. Johnson
Royal Australian Artillery

The Service Aspect

IN THIS AGE of guided weapons, many Service officers may be interested in those aspects associated with Service practice firings. In this paper, which is original only in the expression of occasional opinions, an attempt has been made to discuss the subject without recourse to technicalities or technical language. The aim, then, is to enable any Service officer to understand the broad requirements for a practice range for any type of guided missile. To achieve this aim the reader is introduced first to the concept of the missile as part of a system, then taken through the early stages of development Sections are devoted to types of ranges and typical instrumentation, and the importance of safety is emphasised. The requirements for a comprehensive and precise timing system are argued and a current concept, called mathematical modelling, is introduced. Some of the Service requirements for proof or practice fir-

The author of this article is currently employed at Weapons Research Establishment, Department of Supply, Salisbury, S.A. His previous appointment was in the Ministry of Aviation, U.K., where he was directly involved with the instrumentation of missiles for all Services, including development, evaluation and service type missiles. This article is published by permission of the Chief Scientist, Department of Supply.

ings are outlined, and, finally, the reader is given a series of typical questions to pose. If the paper succeeds in conveying some understanding of the reasons for asking such questions, and it is accepted that the answers go a long way towards defining the range requirements, then the aim of the paper will have been achieved.

Missile as Part of a Missile System

There is a tendency to think of a guided missile as a complete entity and to forget that it is part of a missile system, which demands transport, testing, launching and guidance equipment. In other words we tend to think of the missile in flight. It is better to think of it as a projectile, similar to a shell or bullet, but to remember, that when launched, control over its flight is exercised in some way. If this is accepted, a true picture can be formed on air portability, cross country portability and deployment, because all the pieces of equipment which go to make up the missile system will then be taken into account.

Developing a Missile System

Any piece of military equipment is developed to meet a requirement. The legal and financial procedures vary from country to country and are omitted here. The initiative may lie with a government agency or with a private firm, but government finance is usually needed for the larger guided missiles. A very approximate definition for "larger" might be "other than anti-tank". When feasibility and design studies have been completed and a decision has been taken to proceed with development, one missile contractor is usually awarded a development contract. The complexity of most guided weapons usually demands that specialist sub-contractors will be employed, but the co-ordination is normally done by the prime contractor. Naturally, the Service and Government agencies have representatives who study development activities. They act as "watch dogs", but also advise the contractor on service philosophies and requirements. It is axiomatic that a close watch is kept on progress and expenditure, comparing them with the planned estimates. Experience has always shown that estimates of time and cost are optimistic. The study of means by which progress can be more accurately assessed and controlled is a completely separate subject worthy of investigation.

At some point in time, some rudimentary hardware will be ready to fly. It will be rudimentary in the sense that it will not bear a close resemblance to the missile which will one day come off the production line as an operational weapon. If, then, a significant technical advance is going to be achieved in the missile, and the ancillary elements of the system, it will be necessary to gather all the information possible from successive trials and firings. This is done with instrumentation. In its broadest sense instrumentation involves taking measurements, whether the quantity measured be a distance, angle, pressure, voltage or any other parameter.

The complication in measuring things concerned with the behaviour of missiles is that there is great interest in events during flight. This means, of course, that there is a necessity to produce devices to take measurements automatically, and either preserve the records in the missile for subsequent recovery, or to transmit information back to a receiving station on the ground. In addition, observing stations on the ground can occupy strategic positions to use a wide range of radar, electronic and optical devices. These observing instruments provide a variety of records, which may subsequently be used in conjunction with the information from the missile. Later it will be seen that the establishment of a common timing "clock" is of vital importance.

Whereas one may spend years making an equipment, and, on the delay of its completion, obtain a steel rule or tape measure to determine its dimensions, this system is not permissible with missile manufacture. Engineering standards are precise and dimensional tolerances are small. In addition, the types of measuring devices and their stowage in the missile must be planned or developed at the same time as work begins on the missile proper. It is true that as missile research and development trials proceed there may be modifications to the instrumentation requirements. It is also true to say that failure to pre-plan and pre-provision instrumentation would cause unacceptable delays in missile development.

During research and development stages the missile contractor has considerable latitude to design and test what is likely to be the best missile to meet the particular requirement. However, there are limits on the amount of time and money which can be spent, and these control the number of trial firings which comprise the R. & D. programme. As this programme advances, certain designs of components are shown to be satisfactory, others appear faulty, and are modified or replaced. If the R. & D. programme indicates that a useful missile system can be derived from the R. & D. type equipment, it is usual for an advance decision to be taken to produce a number of missiles for missile evaluation trials. These put the accent on testing the missile, rather than the whole system, but launchers, etc. are necessary. Obviously the missiles to be evaluated have to be as representative of service missiles as practicable, otherwise they would give the Services little confidence in that particular missile. Since the evaluation is a process based on scientific experiment, in addition to demonstration, the need for instrumentation will continue into evaluation. It is worth noting that an increase in scientific planning and a decrease in demonstration can materially reduce the number of evaluation missiles, without any loss of confidence in the results of the evaluation. This, of course, appeals to the financiers who seize on any opportunity to reduce the cost of missile programmes.

Assuming that the evaluation trials confirm the suitability of the weapon system for operational use, production will follow and the usual process of unit formation and equipping will proceed. When the missile was being evaluated, all other aspects of the system were being studied, for example, could the items be tested and maintained in the field; were they reliable and capable of operation by service personnel; could they be used over a wide range of climatic conditions; was the documentation and provision of text books suitable and adequate? Even if the answers to all such questions appeared to be satisfactory, the service user might be pardoned for feeling a trifle apprehensive. No one had yet told him how well the missiles would stand up to storage and his opportunities to do practice firings would be somewhat limited.

Types of Missile Range

If there were opportunity to exercise a choice of range for practice firings the user might try to decide between a land range, or land to sea, or, in the case of the Navy, ship to sea. Although some factor might preclude a particular area, it is probable that the final choice would depend on instrumentation requirements. This rather provocative statement is introduced here so that the reader may consider it against the arguments which follow. In the past, getting an area large enough to deploy and fire with safety might have been the prime considerations. Any ancillaries, such as instrumentation, would probably have been self contained, and been carried to the selected site. This is unlikely to be the case with missile practice firings, unless they are limited to simple launching exercises.

Some Types of Instrumentation

In the early days of guided missiles extensive use was made of cameras. These were set up to record the behaviour of the missile during and after launch. This is still done, but, as one would expect, a whole range of cameras has been developed which are suited for particular missile applications. Some of these are based on the ground at accurately surveyed positions, and others are carried in the missile.

Those in the missile have been modified for special purposes connected with recording of roll, or interception of aircraft targets, etc. Because space is always at a premium they have tended to become extremely small items and bear little resemblance to the hobbyist's camera. They can be fitted with lenses of 180 degrees field of view. On the ground, cameras no longer rely exclusively on (a) hawk-eyed operator(s) to pick up and track some distant speck in the sky. They may be "slaved" to some other system which points them in the right direction and at the correct elevation, at the right time to pick up the target. The target, which may be the missile, aircraft, etc. is then photographed, usually by manual tracking, together with other relevant data, to make a useful part of the trial record.

Radar performance has been improved since the last war and most missile ranges have a variety of radars, some fixed, others mobile, some of the surveillance types, and high resolution tracking beams, effective to very long range. Of course, the usual limitation of echoing area of the target applies, but ways have been found to enhance this, thereby increasing the range at which a radar may be used against selected targets. Radar information of present target position can be fed to a computer which will calculate, very rapidly, the location of a target with respect to any other instrument or point on the range. If an automatic data link is provided from the radar to such points the target will have moved very little during the short time interval, and may be readily "acquired". Much has been learned of the optimum location of radars, with respect to the launching sites, to obtain radar cover of the early parts of the trajectory. Topography also plays an important part, particularly when the radar beam is at a low angle of elevation.

If a fixed observer transmits at a fixed frequency and this rebounds from a moving object, the observer notes a change from the frequency he transmitted. The amount of change is a measure of the velocity. If a number of such stations transmit and receive, it is possible to determine the trajectory of the missile, its velocity and hence its accelerations. Furthermore, this raw data can be produced in a form which lends itself to sorting out quickly on a computer to give the trajectory etc. The system is improved by putting a doppler transponder in the missile which receives the signal from the ground, multiplies it by some simple number and retransmits it to the observer. There will still be a frequency shift due to the velocity of the missile. The main advantage of this multiplied signal is that a reflected signal is quite weak compared with the signal transmitted from the transponder. The multiplication separates transmitted from reflected signals. An increase in signal strength results in an increased range. The main drawback with doppler trajectory is that it is not immediately available, it must be calculated. However, if a reduced accuracy is accepted, a tracking system can be produced which will give trajectory continuously throughout the flight. A number of stations track a beacon in the missile and their (comparatively) rough observations are constantly computed to give a missile path in so called "real time". Whereas a radar may be located near the rangehead, tracking stations can be advanced down the range, if firing is over land. This means that there is less likelihood of losing the missile at longer ranges. Furthermore, if reduced accuracy is accepted, a wider aerial beam can be used with tracking stations than with radar, and there is less chance of the missile getting out of the beam.

So much for the usual items found distributed over the range. Within the missile itself all sorts of parameters require to be measured. These might include pressures, temperatures, fuel flow, accelerations in any plane, vibrations, shaft rotations, angles, voltages, currents, strains, roll, pitch, yaw, etc., etc. In fact, any physical phenomenon or its effect may require to be measured. It is apparent that not many of these parameters are in common units of measurements and some of them are such that they are not in a convenient form to record or transmit. A device called a transducer is used to convert (say) a pressure reading to a voltage. As the pressure changes so will the voltage, in a fixed and known way. If, then, a whole series of transducers is used a corresponding number of voltages can be obtained. These voltages or their effects could be recorded individually on a tape recorder in the missile, or they could be transmitted to the ground and recorded there. Some means of sorting them out is obviously required and if they could come from a single transmitter and still make sense there would be obvious advantages.

In fact, a number of samples are taken each second from each output (i.e. voltage). The sampling is done by a rotating switch, much like a commutator in an electric motor, and the number of samples per second is limited only by the switch speed. Furthermore it is possible to subcummutate some of the high speed sampling channels to give an increased number of low speed samples. As all the samples appear with regularity in the record taken at the ground receiver it is possible to sort them out, join all the little pieces of information together and have a continuous record of any one parameter. What is more, this process, which might appear laborious, is done automatically. So that the records of voltages may be more reliable it is possible to put calibration marks on the records so that there is some sort of datum or reference point readily available. This system is quite good unless there are some events or measurements of extremely short duration which may be lost in the short time interval between successive samples. If this is considered possible it may be necessary to have a separate continuous transmitter for this one measurement.

You will have noticed that the word telemetry was not introduced above, but the description given is of a very general and oversimplified telemetry system. Telemetry has been defined as "the taking of measurements at a distance". Naturally there are many types of telemetry, but it is not intended to discuss them here. What must be remembered, and there is no margin for guesswork here — the telemetry system in the missile must be compatible with the telemetry equipment at the ground receiving stations.

On the ground a receiving aerial(s) must be provided which is matched to the type of telemetry transmission from the missile. There may be one or more ways of recording the transmissions. Two popular ones are on photographic film or on to magnetic tape. Add to this the "unscrambling" machinery and the data is starting to approach a usable and useful form. The necessity for high speed computers becomes obvious when a simple calculation is done, namely seconds of time of flight × samples per second. This can be a very large number, particularly if multiple telemetry senders are used.

Safety and Break Up Systems

In the case of a gun, the projectile will go where the barrel is pointing. There are minor hazards, due to blast and possible ricochet, but the safety problem is, at the worst, controllable. It is very much worse in the case of a missile. There is a famous law, attributed to one called Sod, which ordains that if there are two possibilities, favourable and unfavourable — the latter will occur at the most inconvenient moment. This knowledge is ingrained into all missile safety officers. What then are some of the safety problems with inflight missiles?

The first requirement is to know where the missile is, at any moment. In the case of missiles flying a ballistic trajectory, it is also necessary to know where they would land in the event of fuel cut-off at that same moment. Should the missile commence to misbehave immediately after launch the safety officer has some bad moments. Usually the safety devices, to command destruction of the missile, do not become operative until some short time after launch. In any case, the launcher crew and range staff would not appreciate a missile blowing up, by command or otherwise, at a short distance from the launcher. The safety officer may have to "sweat it out" for a time, until the command destruct devices are armed, and then choose the appropriate time to press the button. If everything works correctly the missile will then break up. It is the job of people who design break up charges, to ensure that all the pieces of the missile become aerodynamically unstable. This is to guard against the possibility of a large section continuing to fly a ballistic course, in which case it might achieve a very long range. Once the break up charge has operated, there is no further control which can be exercised over any of the missile remnants.

The final responsibility of the safety officer is to ensure that what reaches the ground is rendered safe to approach, destroy in situ or recover. The recovery of missile debris has become quite an art on certain ranges. Examination of remains may often supplement trial records, in diagnosing the cause of a missile failure. If a tape recorder or cameras have been included in a missile there is an obvious requirement for their recovery.

Central Timing System

Perhaps the best way to illustrate the importance of timing would be to quote an actual example. A missile was launched from the ground against an aircraft target and scored a direct hit. The telemetry record showed that a main structure in the missile failed. The timing record showed that this failure occurred before the target was hit. Two deductions would be possible. Firstly, it does not matter if there is a structural failure as the missile will still hit the target. Alternatively, had the missile not been very close to the target it would have fallen to pieces before interception. The latter was correct. By studying all the forces acting on elements of the missile at precisely the same point in time, it was possible to analyse the failure and subsequently to correct it.

Earlier it was pointed out that trial records came from a number of dispersed places. The distance is of no significance, if it is possible to place each alongside a common time scale. In addition, if it is known that some event occurred at a particular time, the records a little before and a little after that time can be examined in great detail. In principle this is the same as putting something under a microscope. If the reader will accept the arguments in favour of a central timing system he might be persuaded that some sort of code marking, indicating the common time, should be printed *automatically* and *continuously* on each trial record. Something of this nature is usually done.

Mathematical Modelling

There are many ways of describing the characteristics of an object. The artist sketches it, the draughtsman prepares a drawing, the journalist describes it in words, and the scientist writes an equation. It is possible to describe the performance of a missile, in varying circumstances, with a series of equations. When all of these have been worked out and verified by trial firings it is possible to group them together for use as a mathematical model. The model bears no physical resemblance to a missile, it is a model of the missile's behaviour. You may recall the statement earlier in this paper, concerning evaluation trials, and the balance between scientific planning and demonstration. Obviously, planning of firing trials must aim at securing the necessary data for, or confirmation of, the material to be used in the mathematical model. Having obtained a satisfactory model, and verified it with successive firings, the scope of the missile and missile system can be fully explored. This is done by using computers and literally thousands of simulated trial firings can be carried out without firing a single missile. If there are further live firings, with adequate instrumentation, the validity of the model can be further checked.

The purists and the sceptics can look suspiciously at the model approach and claim it is too theoretical. Certainly the approach was *theoretical*, but the final results have been produced as a result of many actual firings, and can be modified or brought up to date if missile behaviour should change. The practical aspects of modelling should answer all criticisms. It has been possible to make remarkable improvements in certain missiles, based on information disclosed during modelling. It has also been possible to indicate to designers where improvement should be made in successive generations of missiles. The advantage of a mathematical model, to the Services, is to enable a missile environment to be simulated, which cannot be achieved in practice. For example, 1,000 bombers attacking in a variety of formations, height, etc. The model will not solve the problems of the serviceman, but it will indicate the probabilities of success under stipulated conditions. Such conditions may include factors which did not exist when the missile was evaluated, for example, a new type of electronic counter measure.

Service Requirements For Missile Proof or Practice Firings

The life of a missile system in service is rather indeterminate. It may be conditioned by the missile becoming of limited use for its intended role, or deterioration of performance with age, or be prolonged because of the large capital cost of a replacement. Let us assume that the missile system will have a service life of ten years. A shell can be scraped and painted every so often, and its explosive content can be readily checked. The storage of a missile is more like the testing and laying up of a television set. Some electronic components do not store well and there will be a requirement for periodic inspections. What form should these take? Should the circuits be tested with meters, and the assemblies and sub-assemblies be workshop tested, or should selected missiles be fired, to prove the whole system? I think most servicemen would favour the latter. If one operational missile is fired and it does not function properly, what then? Fire another? Suppose the result is the same. All operational missiles of that type are now suspect and there may be no clue to the cause of failure. However, if suitable instrumentation is available the next firing trial should pinpoint the trouble area and allow repairs to be made. If suitable instrumentation was not readily available, and the missile had not been preplanned to receive it, the picture would be quite gloomy. At the missile contractor's production plant there might be a few people left with an expert knowledge of the service missile. Naturally, drawings etc. would be available, but the process of modifying missiles, and designing/producing the instrumentation package would be difficult and time consuming. Furthermore, the instrumentation produced in this way would be unproven, and to some extent suspect in that missile environment. Some 18 months to two years after the first failure the fault might be diagnosed. This time might be shortened but great effort would be required to do so. Contrast the situation with another country using the same missile system purchased at the same time. Their service missiles had been designed to receive instrumentation, the transducers, looming and instrumentation packages had been produced and stored. Within 48 hours of their first failure their own service personnel had modified and fired an operational missile and were able to diagnose the cause of the trouble. There was certainly additional expense to the second country but what a wise insurance policy. In addition, the capacity to fire an instrumented round also meant that the results could be checked against the mathematical model, and any real or suspected fall off in performance could be checked. In any case, this was done on at least one round, each practice firing. It was quite immaterial that the automatic data processing and analysis was done outside the service. The important fact was that adequate facilities existed. Such facilities take a long time to evolve and install.

Analysis of the Requirements for a Service Missile Range

In what appears above I have expressed my opinion, as forcibly as I can, that instrumentation and capacity to analyse data is the prime requirement of a missile range. Let us assume that the reader agrees with me and proceed to examine our requirements for our service range.

1. *Safety:* We must have capacity to fire with minimum risk to service and civilian personnel, and to property. What area is necessary, and what command break up devices?
2. *Observation:* What radars do we need? What optical stations? Do we need additional tracking stations? Do we need data links between radars and other instruments? Do we need doppler to give velocity, accelerations or trajectory? Can we dispose these required ground stations on the available area, in a satisfactory way?
3. *Missile installations:* What parameters may we need to measure? If fuse or guidance failures occur can our telemetry give us the information we need? How many telemetry senders do we need to ensure that we can diagnose failures and get the data to use with a mathematical model? (Assuming one is in existence).
4. *Location:* Is the selected area accessible to transport, particularly items which may have limited cross country performance, and be too bulky to air lift?
5. *Cost:* Is the capital cost of establishing a range to meet the requirements justified?
6. *Time:* Can we wait until all the required facilities have been installed and proven?
7. *Staffing:* Will we make some service personnel range specialists, or will we use civilians or both?
8. *Techniques:* What steps will we take to ensure that we keep up to date with techniques for using our instrumentation to the best advantage?
9. *Analysis of results:* Will we install our own data processing and analysis equipment or will we send it so some agency which is continually engaged in this activity?
10. *Test equipment:* Will we use commercial type test equipment for missiles and instrumentation or will we have

items produced to meet service specifications?

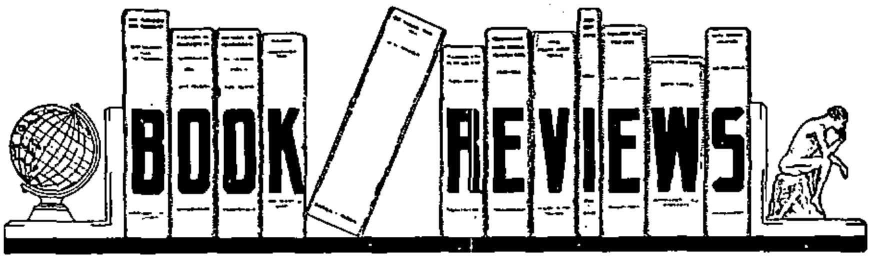
When answers to the above questions have been supplied the following opinion might be reached. It would meet the convenience of any Service to have its own self contained missile range. The capital cost would probably not be justified in Australia. The Army could not easily spare the specialist staff needed at such a range. Time should therefore be purchased at an R. & D. type range and the full facilities should be hired, including specialist advice to plan and analyse trials.

Author's Recommendation

As a result of my experiences in the G.W. field I offer the following advice. When we obtain missiles of any type for operational use in the Australian Services we should provision adequate instrumentation, compatible with the ground facilities at the selected practice range. If we take this precaution we can be confident of our ability to diagnose faults and to have them corrected in a reasonable time. Without some such insurance we must consider our position, with regard to that particular missile system, as dangerously vulnerable.

Range is more to strategy than force. The invention of bully beef did more to modify land warfare than the invention of gunpowder.

— *T. E. Lawrence.*



THEY FOUGHT ALONE, by John Keats. (Martin Secker and Warburg Ltd., and William Heinemann Ltd., 317 Collins Street, Melbourne.)

When the American-Filipino Army in the Philippines broke up in May 1942 under the massive blows delivered by the Japanese in the early stages of their first great offensive not all of the officers and men surrendered. Some avoided capture by drifting off into the jungle, some escaped from the POW compounds before Japanese security clamped down. Not all of these men were imbued with the idea of continuing resistance. Most of them simply wanted to stay away or get away from the enemy in the expectation that a relieving force would soon come to their rescue.

Among those who chose the jungle in preference to the prison camp was Lieutenant Colonel Wendell Fertig, an American mining engineer working in the Philippines who had been commissioned on the outbreak of war. If Fertig had little military experience, he knew the Philippines, and he was particularly well acquainted with the people of the island of Mindanao. With this knowledge as his only asset, he set himself the task of organising guerilla resistance throughout the island.

It was a formidable undertaking. The small band of Americans and Filipinos he was able to get together in the first place had no equipment, a mixed bag of light weapons and precious little ammunition. That they were able to live at all was entirely due to the generosity of the people, from farmers of substance to the primitive mountain people.

Fertig was not the only guerilla in the field. There were numerous bands on the island, most of them led by Filipino officers who had promoted themselves to colonels and generals. Some were genuine patriots determined to fight on until relief arrived; some were bent on personal aggrandizement and the profit they could make in a situation where civil government no longer existed. Generally, in the beginning the people were content to mind their own business and see how things developed — until the Japanese aroused their hostility by rape, loot and murder. On the outskirts the hill tribes hovered, raiding everyone for arms and any other pickings they could get.

Backed by a few staunch supporters, faced by suspicion and open hostility, cut off entirely from the outside world, Fertig set out to weld the numerous bands into a cohesive guerilla army and to organise the countryside into a supporting base. He began this task in September 1942. Eleven months later he had bands numbering 8,000 men under his command, he had established control over a substantial part of Mindanao, and he had set up a civil government to enforce the rule of law throughout his territory.

The Japanese controlled the coasts, the ports and the larger towns, and they could always move strong columns along the major roads. But that is about all they could do in a land where almost every man was a farmer, an artisan or a clerk by day and a guerilla by night. They could not put a stop to the activities of the "Free Philippines Government", a clandestine government which suppressed the black market, pegged prices, dispensed justice, manufactured home-made ammunition, and even ran a postal service.

Eventually submarines from Australia began to bring in radio equipment and a trickle of ammunition and medical supplies. With the radios Fertig established a coast-watching service which faithfully reported the movements of Japanese shipping to the Central and South West Pacific Commands. The trickle of supplies from outside strengthened the people's faith in an Allied victory, and when the relieving armies eventually arrived they found Fertig in command of a guerilla force of some 35,000 men.

Wendell Fertig ranks with T. E. Lawrence and other great leaders who have organised guerilla warfare behind the enemy's lines. In this book John Keats has given us the story of his exploits in a way which holds the reader's interest from the first page to the last. It is exciting, absorbing — and wonderfully instructive. Mr. Keats not only tells a good story, but he tells it in a way which makes it an excellent text book of guerilla methods, a text book which, because of the manner of its telling, makes a stronger appeal to imagination and a deeper impression on memory than reams of official writing. In compiling it he had the assistance of Fertig and many of the participants, and he went over most of the ground himself. In addition to his exposition of guerilla methods and tactics, he gives us a first rate picture of the people of Mindanao.

This book is confidently recommended both for its entertainment and instructional values. It is important reading for Australian soldiers.

— E.G.K.

THE AMERICAN REVOLUTION, by Hugh Rankin. (Martin Secker and Warburg Ltd., and William Heinemann Ltd., 317 Collins Street, Melbourne.)

This book is another in the series "History in the Making". It claims to be "History written by those who were there. The American War of Independence as seen by British and Americans, soldiers and civilians, and recorded in their own words."

The author certainly makes good this claim for the book with a collection of extracts from diaries, despatches, orders and reminiscences all neatly arranged in sequence and linked together with brief explanatory passages. This treatment does permit us to see various aspects and episodes of the struggle as they were experienced by the participants, but it does not present a clear picture of the war as a whole. It pre-supposes that the reader has a sound knowledge of the political and military course of the war. To the reader with this knowledge the book could be fascinating. To the reader without it, it could be irritating.

The book certainly presents in a very striking way the doubts and fears, and in many cases the reluctance, of the American colonists who initiated and maintained the rebellion. Few of them seem to have wished to make a complete break with Britain, but simply to demonstrate their determination to free themselves of the tyranny of remote control, to insist that the interests of the colonies be placed on an equal footing with the interests of British trade and the British Treasury. Across the Atlantic, strong voices in the House of Commons supported the colonists, but their appeals to reason, to common sense, were brushed aside by the Government and the Crown.

On the service side, the book presents the spectacle of a militarily untutored rabble being converted into a formidable army in the crucible of conflict. But it gives little information about strategy or tactics except in a very general way. On the other hand we do see the struggle as it was experienced by the ordinary folk who constituted the bulk of the population, and we may acquire a fair idea of the characters and motives of the leaders on both sides.

Perusal of this book will not give you much information about the course of the American Revolution, but it will give you much information about the people who participated in the event.

— E.G.K.