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CANADIAN ARMY TRAINING MEMORANDUM

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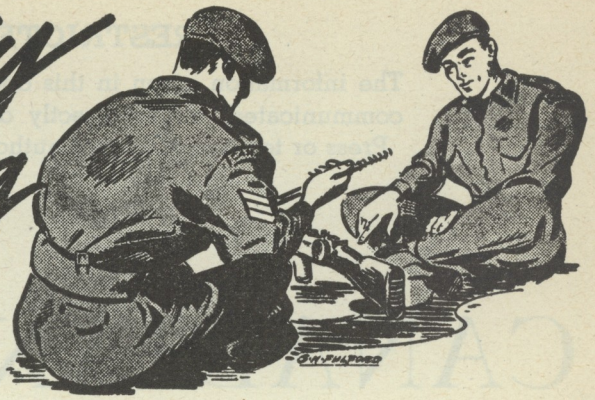

BATTALION INTELLIGENCE OFFICER

This is the first of a new series of articles prepared for CATM by the Directorate of Military Intelligence, Army Headquarters, Ottawa.
—Editor.

An old text book declared the duties of a Battalion Intelligence Section to be "The collection, collation and dissemination of information concerning the enemy and own troops." Such a statement, while true, was not very enlightening to an embryonic Intelligence Officer (IO) searching for his official duties and for methods of executing them. In the days before the Canadian Intelligence Corps, all military intelligence was associated with cloak and dagger methods, and, as few understood the purpose of intelligence and how it was obtained, the Battalion Intelligence Officer and his section were used for any odd job that came the way of Battalion Headquarters. Happily, that situation is now a thing of the past.

Specially Trained

The Intelligence Section in a modern Infantry Battalion is, or should be, a compact body of specially trained soldiers. Their ability to gain, sift and piece together information of value, and pass it quickly to everybody who needs it for fighting, is appreciated and understood by all ranks.

The establishment calls for one officer (a lieutenant), one sergeant, one corporal and five private soldiers, to which may be added (for he forms a part of the group) the indispensable driver-batman. Let us examine the qualifications required of a good Intelligence Officer and his section.

The Intelligence Officer: First, the officer should be chosen from among the senior platoon commanders, for it is essential that he have a thorough infantry background. He must know his battalion tactics in order to "read" the battle. He must be well acquainted with the officers of his battalion and Brigade HQ (for his estimate of the reliability of reports is based upon this knowledge of the officer concerned). He must be familiar with R/T procedure, be especially well trained in photo and map reading and be able to produce clear, accurate map enlargements and traces. He must be able to express himself clearly in concise military language and last but not least, having such a background, he must be eager for the job. His principle duties, which will be dealt with more fully in subsequent articles, will consist of:

1. Ensuring that all information obtained by the unit reaches him *without delay*. (In this regard the provision of an extra telephone and other facilities by the Battalion Signal Officer will do

much to ensure the rapid flow of information.)

2. Gathering reliable military information from all available sources, assembling it in a concise, readily digestible form, and maintaining its flow up, down and to the flanks. Organizing observation of the enemy within the battalion.

3. Keeping in close touch with flanking units and local inhabitants.

4. Studying terrain, both on the ground and from air photos and maps, and being prepared to make enlargements and sketches *quickly* and *accurately*.

5. Supervising the collection and disposal of PW, captured documents and material.

6. Assisting in the training of all ranks in enemy organization, tactics and weapons; in reporting information, in photo and map reading and numerous other subjects.

The Intelligence Sergeant: To assist the IO in these tasks a reliable NCO should be chosen. The sergeant should, besides having a good background of military training, be of cadet officer calibre and have qualifications similar to those required of the officer. He should be capable of working without supervision and be fully competent to act for the IO during his absence.

The Intelligence Corporal: The corporal should have had platoon and company training. He should be capable of properly running an Information Room, have a flair for mechanics (for he may be required to operate a motorcycle under trying conditions), be able to write a report and instruct others how to do so, and be able to read maps and air photographs well. He should be reliant and clear thinking as he may be required to perform liaison duties within the battalion.

Other Personnel: The remainder of the section should be chosen for their individual accomplishments. Common to all should be a good background of infantry training and the trait of reliability, as well as an ability to perform individual tasks without undue supervision. Having these qualifications they may be selected because of other attributes, such as ability to speak a second language, to use a compass, to draw or print clearly and legibly, or any other special ability which may be useful in the performance of their duties.

Must Have Co-operation

The contribution to success in battle, of a well balanced and efficient Intelligence Section, is considerable. It is, therefore, of the utmost importance that the Intelligence Officer receive the fullest co-operation of his Commanding Officer and the company commanders in the selection of other rank personnel, in order that a section may be formed that will not only perform efficiently, but also inspire confidence. Personnel, in excess of those required to form the section, should be interviewed by the Intelligence Officer and given a period of probationary training for the purpose of forming a pool of suitable personnel from which replacements can be drawn in the event of casualties or promotion.

Having assembled the section, ample time should be allowed for training. A syllabus should be prepared to include such subjects as:

1. All phases of map reading
2. Air photo reading

(Continued on next page)

TANK POWER PLANTS

In previous articles in this series the armament and armour problems of tank design have been discussed. The accompanying article is the first of a series dealing with the other major problem—the tank power plant. It was written by Maj. E. I. Appleyard, REME, B.Sc.(Eng.), Fighting Vehicle Wing, Military College of Science, England, for "The Tank" magazine, a British publication. It was submitted for publication in CATM by the Directorate of the Royal Canadian Armoured Corps, Army Headquarters, Ottawa.—Editor.

PART I

To the unthinking, the power of a tank might appear to present the least difficulty in design of all its major components because, after all, every mechanical means of transport, whether it be car, train, ship or even aeroplane, has a prime mover of some sort, and it would seem to be a simple matter to choose from amongst this vast array of engines one which would perform satisfactorily in a modern tank.

When we examine the problem, however, certain difficulties arise at once and these are mostly connected, not with the engine itself, but with its installation within the armoured hull of a tank. Not the least of these difficulties is that of providing adequate cooling which, in a tank such as a Cromwell, can only be achieved by passing approximately 20,000 cubic of air per minute through the engine compartment. The magnitude of this task can perhaps be realized by saying that it is equivalent to displacing the air contained within an army Nissen hut once every 12 seconds!

The Requirements

Let us therefore consider the requirements which an ideal tank power plant should fulfil and see how the designer is forced to compromise, due to the inability of any known engines of the present day to satisfy these requirements completely.

The main purpose of the engine is to give the tank mobility. Without that it is no better than an armoured pill-box. The first problem for a designer, therefore, is to decide on the degree of mobility which his tank shall have and this then fixes for him the power of the engine required. It has been found

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BATTALION INTELLIGENCE OFFICER

(Continued from previous page)

3. Foreign Army organization and methods
4. OP procedure
5. R/T procedure
6. Codes
7. Reporting information
8. Unit security, and other subjects too numerous to mention in this introductory article.

In addition, the Intelligence Officer should coordinate with the Second-in-Command in order that the section can be usefully employed on company and battalion training schemes. In peacetime, as during training for operations, a considerable amount of practical imagination is required to devise interesting methods of representing the "enemy." The "I" section can help to provide the interest and at the same time help to train themselves and the battalion.

(To be continued.)

that to have adequate performance in their respective roles, an infantry tank needs a power-weight ratio of about 10 brake horsepower (b.h.p.)* per ton and a cruiser tank about 20 b.h.p. per ton. Thus a cruiser of 30 tons and a heavy of 60 tons both require an engine developing about 600 b.h.p. If the future requirements is for heavy cruisers of about 45 tons, like a Panther, and superheavies of about 100 tons, such as the Germans were building at the end of the war, engines of around 900–1,000 b.h.p. will be needed.

Space Is Next

The required power output of the engine being thus decided, the space to be occupied by the power plant as a whole, i.e., engine, cooling system, fuel tanks and air filters, is the next consideration. From the viewpoint of having an excellent characteristic giving high torque at low revolutions and thus reducing gear changing, the steam engine would appear at first sight to have attractive possibilities for tanks. For powers in the region of 600 b.h.p. it is, however, impracticable, due to its large space requirement. The main reason for the large bulk of a steam power plant is that in a non-condensing steam engine, which is the most suitable type for a tank, not only has fuel to be carried to convert water into steam, but also room must be found for the water itself, which may have a volume of anything up to ten times that of the fuel, whereas in an internal combustion engine only about 1/16 of the working medium in the cylinder has to be carried as fuel, the rest being air.

The tank designer is therefore forced to use an internal combustion engine for his prime mover and immediately he is faced with two very difficult decisions. Is his engine to be air or liquid-cooled and is it to be spark or compression ignition (C.I.)—in other words, petrol or diesel? The petrol versus C.I. controversy has raged furiously ever since the high-speed diesel achieved popularity in the field of heavy transport vehicles and designers are still not unanimous in their choice of engine for the tank.

Petrol or C.I.?: Most tank soldiers quite naturally express a preference for the C.I. engine on the grounds of its reduced fire risk. This is undoubtedly true when considering those fires which originate when filling up with fuel or which are initiated through an electrical short circuit. However, the majority of tank fires are caused by enemy action and in most cases originate in the ammunition. Thus the type of fuel is only of importance when considering the rate of spread of the fire which, irrespective of the fuel, is usually too fast to be effectively countered by the crew who will almost certainly have become casualties due to the exploding ammunition. Thus, although the diesel engine definitely has the balance of advantage when considering fire risk, this in itself is not sufficient argument for the wholesale adoption of C.I. engines for use in tanks.

To the commander in the field, faced with the task of getting supplies forward to his armoured spearheads, the fact that a diesel-engined force would require less than 70 per cent of the fuel needed by its petrol-engined equivalent is the most telling argument for the C.I. power plant. Unfortunately, a heavy price must be paid for this great advantage. The high thermal efficiency and consequent low fuel consumption of the C.I. engine is only achieved by reason of the very high compression ratios, of the order of 16 to 1, that are characteristic of the diesel cycle. The high cylinder pressures thus produced require the use of heavier working parts in the engine, with the result that frictional losses are great and the maxi-

** Brake horsepower is the actual power given out by an engine or other motor, calculated from (1) the force exerted on a friction brake or absorption dynamometer acting on the flywheel or brakewheel rim, (2) the effective radius of this force, and (3) the speed of the flywheel or brake wheel.*

mum speed has to be limited to about 75 per cent of that of a petrol engine, due to the increased inertia effects. Furthermore, a C.I. engine is only able to burn about 80 per cent of the air induced into the cylinders, whereas a petrol engine can burn all of it and, consequently, for a given power output a diesel engine has to be about 40 per cent larger than its petrol counterpart to give the same reliability, whilst at the same time it will weigh 30 to 40 per cent more, due to its necessarily more robust construction.

Easier To Cool

These rather discouraging figures are offset by the fact that the C.I. engine is easier to cool, thus requiring smaller radiators, and also on fuel tanks only 70 per cent of the size needed in a petrol-engined tank can achieve the same radius of action.

The degree to which the smaller tanks and radiators cancel out the effect of the larger engine is entirely a matter of the length of time the vehicle is required to operate without refuelling. The German General Staff requirement was for a tank to operate at full load for five hours and in this case a petrol power plant, i.e., engine, cooling system, fuel tanks and air cleaners, will be found to be smaller than its C.I. counterpart. However, if the range is extended, and ten hours' full load operation considered essential, then the position is reversed and a diesel power plant becomes more economical in space. With the present British operating range requirements a C.I. power plant occupies about 20 per cent more space than does a petrol one, and this one fact is often enough to force the designer into using the less bulky type. The proportion of the total space within the armour of a tank which has to be given up to the automotive components is one of the chief headaches of its designer and any chance to cut down on this, and so make room for more ammunition, is eagerly sought.

The greater weight of a C.I. power plant also counts against it, but less importance is attached to this factor because, although the power plant of even the best designed tanks occupies at least 20 per cent of the volume enclosed by the armour, its weight is barely five per cent that of the complete vehicle and hence small increases in the weight of this component are negligible.

From the viewpoint of reliability and maintenance of tune there is very little to choose between the two types. With the petrol engine the usual cause of minor trouble is either the ignition system or the carburetor. In the diesel these two are replaced by the fuel injection equipment, which, although more delicate, will give reliable service if properly maintained with regular attention to the filters. It has the disadvantage though that if damaged it cannot be repaired in the field.

"Slogging": To the mind of the tank driver, after fire risk, probably the next most important consideration is the ability of an engine to give good torque at low revolutions, in other words, to have good "slogging" capabilities. There is no doubt that the C.I. engine scores here but it is questionable whether, taking the broad view, this ability to keep going under very adverse load conditions is a good thing either for the engine itself or the transmission. At very low revolutions the gas loads on the bearings are unrelieved by inertia forces, there is severe "snatch" in the transmission due to cyclic variation in rotational speed, and the tendency for a petrol engine to detonate and for a C.I. engine to run roughly (diesel knock) increases greatly as the revolutions fall away on full throttle.

The carburetor of a petrol engine protects it to some extent from these misuses. If run on full throttle below about 500 r.p.m. the air velocity through the choke becomes so low, and the suction on the jets so small, therefore, that too weak a

mixture is delivered and the engine misfires and stalls. On the other hand, the C.I. engine has no choice but to accept the fuel which is forcibly pumped into it by its mechanically operated injection system; and, consequently, much to the delight of the tank driver who is too tired to change gear and to the dismay of the designer who can almost hear the protests from the bearings and transmission, it keeps "slogging" to the very last revolution.

No Warming Up

Of lesser importance than the points already mentioned, but still useful attributes, are the ability of a diesel to run on full load immediately it starts without the need for warming up; its absence of ignition equipment to cause radio interference; and, finally, the harmlessness of its exhaust gas which, although smelling unpleasant at times, is not toxic. In contrast, the exhaust gas from a petrol engine can consist of up to eight per cent carbon monoxide. Under conditions of a following wind this may easily produce a dangerous concentration inside the vehicle and the same conditions may be produced by the exhaust of the tank in front when in convoy.

Of particular importance when considering this problem is the position of the exhaust pipes and the effect of the gas on supporting infantry who are moving up alongside tanks or even riding on them. Minor carbon monoxide poisoning is often experienced unknowingly, and one can imagine that a section of men, who have moved up sitting on the engine hatches of a Churchill with the exhaust from its petrol engine blowing up all round them, will arrive in battle less alert than a section who have ridden up on a diesel-engined Sherman, whose harmless exhaust gas emerges at the rear of the vehicle and is, in any case, very considerably diluted with cooling air from the radiator.

The exponents of C.I. engines for tanks usually try to claim one final point —that their favourite engine, having no float chamber or jets, is completely unaffected when operating at extreme angles of tilt such as are experienced when obstacle crossing. The petrol engine enthusiast, mindful of the latest developments in the aircraft and racing car fields, can, however, point out that one of his engines fitted with petrol injection equipment instead of a carburetor enjoys exactly the same immunity from the ill effects of tilt and so on this count the honours are even.

Conclusions: To sum up, therefore, assuming present-day range requirements and equal power outputs, the C.I. engine has the advantage of a lower fuel consumption, better torque characteristic, less fire risk, no radio interference, a harmless exhaust and can run on full load immediately after starting from cold; on the other hand, the petrol engine is always more compact and weighs less than it diesel equivalent. After considering these points, it is not surprising that designers find the choice of engine difficult. However, it is usually immaterial which type they would prefer to use for their tank, because there is one further factor which over-rides all others. This is that the designer is often forced to use an engine which does not satisfy all his requirements to the non-availability of the type which he would prefer to use.

If men of good will start out from the same premises of agreed fact, they do not necessarily find it impossible to reach the same conclusion.

—Winston Churchill

GERMAN TRAINING METHODS

ORGANIZATION OF GERMAN ARMY HIGH COMMAND IN REGARD TO TRAINING (1939 to 1945)

Here is the third and final instalment of an article condensed and reprinted from the publication "German Training Methods" produced by a combined British, Canadian and United States staff. The information was obtained from original German documents and prisoners of war. The first two instalments appeared in the December 1946 and January 1947 issues of CATM.—Editor.

With the outbreak of the war in 1939, the army was split up into a Field Army and a Replacement Army. Both were under the Commander in Chief of the Army, General von Brauchitsch, 1938–41, followed by Adolf Hitler.

Relative positions of the higher offices governing the training in both the Replacement Army and the Field Army are shown in the chart on page 9.

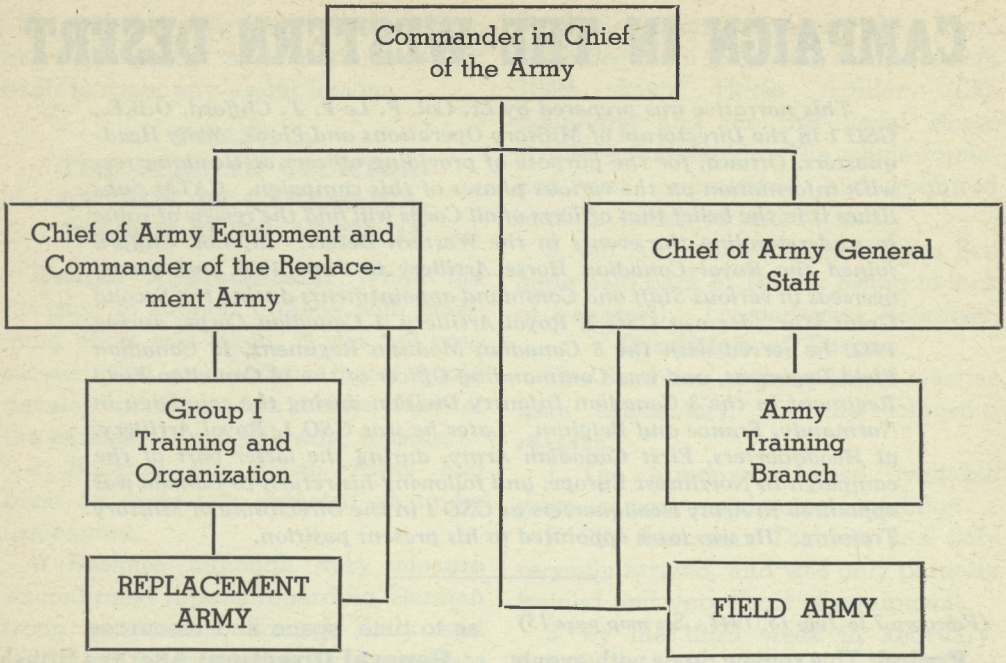
Field Army: The training in the Field Army was primarily an intensification of unit training emphasizing use of weapons and various methods of combat. In addition, emphasis was laid on short-term preliminary and advanced training of officers, NCOs and specialists, with consideration for the combat conditions existing in the particular theatres of operations concerned.

Replacement Army: In contrast to the training of the Field Army, the Replacement Army was primarily concerned with the basic training of all replacement troops for the Field Army. This included training of potential officers, NCOs and specialists, and the conducting of refresher courses for convalescent and redrafted personnel. The Replacement Army also co-operated in the training of organizations outside the army.

The time allowed for training was extremely short. In general, it was possible to deal with each of the various subjects only once. Experience revealed the necessity for a reference book for the recruit, which he could use to review what he had been taught. It was found, however, that all peacetime training manuals on the subject were out of date. Therefore, the Chief of Training compiled a new instruction manual which included up-to-date information. This manual, subdivided according to the various branches of the service, had been finished in outline by the time of the capitulation, but had not been printed.

Besides the normal replacement training, an additional duty of the Chief of Training was to train all newly-formed units which were under the command of the Commander-in-Chief of the Replacement Army. These newly-formed units (Volksgrenadier Divisions, Italian Divisions, Hungarian Divisions and depleted divisions) were trained in recruit or unit training formations in the Replacement Army. To complete this special training and not interrupt the regular replacement training system, special training staffs were established by the Chief of Training. These staffs, which consisted of two or three officers and three or four clerks, were either delegated to the service command or appointed from the existing personnel in the service command. They strictly supervised the training schedule and ascertained that all new training methods and new equipment were incorporated.

Foreign units were formed into their own divisions. They were trained by German personnel, along German lines



with German weapons. This German personnel was part of a cadre designed to carry out these tasks. All relevant training manuals, pamphlets, etc., were translated under the direction of the Chief of Training by a translation branch which was directly responsible to the Commander-in-Chief of the Replacement Army. In addition, the Chief of Training was required to co-operate in the pre-military training of German Labor Service (Reichsarbeitsdienst).

Only Regular Army officers were employed on the staff of the Chief of Training; these were officers who had proved themselves competent leaders in training and in action. With the exception of two General Staff officers, they were drawn from the various arms and services. Their activity, however, was not restricted to their respective arm or service, but took in the problems of all arms or services in the sphere of training with which they were charged. By having officers of all arms and services on one staff, it was possible for an officer to find competent advice on other service branches without going outside his staff or office.

As the war progressed, the German General Staff came to the conclusion that the replacement system in the Replacement Army was not living up to the standards required by the Field Army. With this in mind, the chiefs of arms and services who normally controlled training in the Field Army only were also delegated control and supervision over the training activities in the Replacement Army. Through this measure, it was intended to simplify the method of transmitting experiences gained at the fronts directly to the replacement troops and to guarantee a more uniform training system.

Staff Dissolved

As a result of this measure, the office of Chief of Training in the Replacement Army seemed to be no longer necessary. This staff was dissolved on 1 February 1945, and such functions as remained were again taken over by the staff of the Commander of the Replacement Army.

For all practical purposes, this innovation never came into effect, since, after March 1945, the activity of replacement

(Continued on next page)

CAMPAIGN IN THE WESTERN DESERT

This narrative was prepared by Lt. Col. F. Le P. T. Clifford, O.B.E., GSO 1 in the Directorate of Military Operations and Plans, Army Headquarters, Ottawa, for the purpose of providing officers at Headquarters with information on the various phases of this campaign. CATM publishes it in the belief that officers of all Corps will find the review of value in understanding the events in the Western Desert. Lt. Col. Clifford joined the Royal Canadian Horse Artillery in June 1935, and served overseas in various Staff and Command appointments during the Second Great War. He was GSO 2, Royal Artillery, 1 Canadian Corps, during 1942; he served with the 5 Canadian Medium Regiment, 15 Canadian Field Regiment, and was Commanding Officer of the 13 Canadian Field Regiment in the 3 Canadian Infantry Division during the campaign in Normandy, France and Belgium. Later he was GSO 1, Royal Artillery, at Headquarters, First Canadian Army, during the latter part of the campaign in Northwest Europe, and following his return to Canada was appointed to Army Headquarters as GSO 1 in the Directorate of Military Training. He was later appointed to his present position.

(February 7 to July 15, 1941. See map page 13)

Period: This review deals with events in the Western Desert during the five months between February and July, 1941.

Source: The source of the information upon which this study is based is the official report of Lord Wavell to the Secretary of State for War (Great Britain) dated Sept. 5, 1941.

Background: The student will find it advantageous to bear in mind throughout the study of this campaign the fact that no less than four other major campaigns had to be conducted in Greece, in Crete, in Iraq and in Italian East Africa, all of which had very far-reaching effects on the course of the campaign in the Western Desert, both as to time, space and resources.

General Direction: After the British capture of Benghazi February 7, Gen. Wavell was instructed that "no operation was to be undertaken beyond the frontiers of Cyrenaica, which was to be held with minimum force to secure the flanks of our Egyptian base and that the maximum possible force was to be made available for defence of Greece."

Course of the Campaign: The campaign in the Western Desert divides itself into three phases:

1. The German counter-attack in Cyrenaica, March 31 to April 11.

2. The interim or sparring and build-up period, April 11 to June 15.

3. The British attack offensive, June 15 to 17.

GERMAN TRAINING METHODS

(Continued from previous page)

and training units and of schools and courses in the Replacement Army was considerably hampered by a continuous withdrawal of the Field Army to the home theatre. These replacement and training units, schools and courses gradually came under the control of the Field Army, either as divisions or individual combat units. Because of the pressure of circumstances, the Field Army had to send them to the front without previous unit combat training, with insufficient training in individual combat and with inferior equipment.

It will deal with each phase in turn and will attempt at the conclusion of each to draw any useful lessons.

PHASE 1: THE GERMAN COUNTER-ATTACK IN CYRENAICA, MARCH 31 TO APRIL 11

British Appreciation: When the decision to support Greece with maximum effort was taken, it was not considered that any serious threat could develop in Cyrenaica before May at the earliest, for the following reasons:

1. Because the Italian Army had been so decisively defeated as to be discounted.

2. Because although very meagre unconfirmed reports regarding German troop movements through Italy and Sicily had been received, no adequate Intelligence organization existed in Italy or in North Africa to give any substance to them. Nor were there sufficient long-range aircraft available for more than a very occasional reconnaissance of shipping in the Italian harbours or in Tripoli. On the whole, the balance of the information was against any such troops having been sent or being on their way to Libya.

British Forces Available: In accordance with the general directive mentioned earlier, the maximum force was prepared for despatch to Greece, leaving the following forces available for defence of Cyrenaica: 2nd Armoured Division (less one Armoured Brigade and a portion of the Support Group, i.e., three armoured regiments, elements of the Support Group); 9th Australian Division.

Our covering forces towards the end of March on the frontier of Cyrenaica, just east of Ageila, 150 miles south of Benghazi, consisted therefore of:

1. 2nd Armoured Division, consisting of King's Dragoon Guards Armoured Car Regiment, 3rd Armoured Brigade, 3rd Hussars (Light Tanks), 5th Royal Tank Regiment (cruisers), 6th Royal Tank Regiment (captured enemy tanks), 104th Royal Horse Artillery (25-pounders) and the 3rd Royal Horse Artillery (anti-tank). The whole formation was unpracticed and required another month to find its feet.

2. 9th Australian Division: (One Brigade held back at Tobruk owing to lack of transport). Located near Benghazi.

Condition of Forces

The condition of these forces was far from satisfactory, for the following reasons:

1. The armoured forces available were in poor mechanical condition.

2. 9th Australian Division had only recently arrived, and was only partially trained and very short of equipment.

3. By the third week in February, the German air attacks on Benghazi were so heavy that all supplies had to come from Tobruk to the forward troops —a distance of more than 200 miles. This greatly affected the mobility of forward troops. In particular, 2nd Armoured Division had to be supplied by dumps instead of having its own transport.

Course of the Operations: During March, while concentration in Greece was proceeding, evidence accumulated of the presence of German Armoured troops in Libya. However, due to poor Intelligence we were very much in the dark and still it did not appear that an attack was likely before the middle of April.

Gen. Neame, commanding in Cyrenaica, was instructed that if attacked he was to fight a delaying action between his forward position east of Ageila and Benghazi. He was to give ground if necessary as far as and including Benghazi, but was to hold the high ground above Benghazi for as long as possible.

In actual fact, the landing of the 5th German Light Armoured Division at Tripoli had commenced early in Feb-

ruary, and by March 31 an enemy force consisting of one Italian Armoured Division and one Motorized Division (in addition to the 5th German Light Armoured Division) were concentrated against us.

The Attack: The enemy attack commenced March 31, fully two weeks to a month before it was expected and was supported by a considerable air force.

1. During the first three days, the 2nd Armoured Division withdrew slowly northwards and by April 2 was north of Agedabia, with the object of flanking any enemy advance by the main road to Benghazi and blocking any enemy attempt to turn our position by way of the desert road to Mechili. A proposed counter-attack north of Agedabia by the Commander of the 2nd Armoured Division was abandoned because no tank reinforcements were available.

2. On April 3 the force was to have continued its withdrawal to Sceleidima when a report was received that a large enemy armoured force was approaching Msus, at which was located the principal dump of petrol and supplies of the 2nd Armoured Division. The Support Group moved back to Regima and joined on the left flank of 9th Australian Division, while the 3rd Armoured Brigade (the only one) moved to Msus. On arrival it was found that the protective detachments, on hearing that the enemy was approaching, had destroyed all the petrol. The movements of the 3rd Armoured Brigade were now almost all dictated by lack of petrol, and the Brigade had now only 60 tanks.

3. On April 3–4 Gen. Neame decided to withdraw the whole force to line Derma-Mechili.

Air Attacks

4. The 9th Australian Division withdrew successfully to Derna, but had to retreat to Tobruk in view of events occurring to the 2nd Armoured Division to the south. From Msus back, the 2nd Armoured Division was attacked by air repeatedly. Headquarters, wireless sets and petrol lorries were special targets. As a result, Headquarters of the 2nd Armoured Division withdrew to Mechili and 3rd Armoured Brigade (or what was left of it) withdrew to Derna, where it was captured.

Headquarters of the 2nd Armoured Division and elements of the Support Group held off enemy attacks in Mechili, hoping that remains of the Armoured Brigade would join them, and on April 8 the greatest part of the force, including Headquarters of the Division, was captured.

5. At this point Lord Wavell ordered a Brigade of the 7th Australian Division to be embarked to strengthen defences at Tobruk, which contained a large reserve of supplies, and to deny the port to the enemy.

6. A mobile force of remnants of the Support Group of the 2nd Armoured Division was left outside the defences of Tobruk at El Adem, but it was driven back to the Egyptian frontier about Sollum by April 11. From this date Tobruk was invested, and the first phase of the operations was concluded.

The Lessons

Lessons of this phase may be summarized as follows:

1. The lack of Intelligence information regarding movement of enemy forces to Tripoli led to an unwarranted weakening of forces on a front which was strategically most important. This is the most important lesson.

2. Lack of transport from base to forward troops necessitated the build-up of a system of dumps in the forward areas, and as these became almost the only source of supply, the formation was tactically inflexible. The change of plan as a result of the report of the enemy being at Msus and the disaster of the 2nd Armoured Division illustrate this lesson.

3. No modern armoured formation can fight if its vehicles are in poor mechanical state (half of 2nd Armoured Division's tanks were in the workshop).

PHASE 2: THE INTERIM PERIOD, APRIL 11 TO JUNE 15

During this time the enemy had been checked on the Egyptian border; the forces of 9th Australian Division and one brigade of the 7th Australian Division holding Tobruk constituted a menace to the enemy's further advance. The enemy attacked Tobruk on May 1 but was severely repulsed. Another German Armoured Division was known to have landed in Libya.

The 6th Division had been moved from their training area to Mersa Matruh. The 7th Australian Division (less one brigade in Tobruk) was also available. A reserve of some 200 "I" tanks was on its way to re-equip the 7th Armoured Division, and these tanks, less 57, arrived May 12, but they were ill-suited to cope with the fast-moving German tanks in the open spaces of the Western Desert.

During this period our forces had been successfully withdrawn from Greece and preparations to strengthen Crete were undertaken. In the middle of May an attempt was made to launch a limited attack, which was at first successful in that Sollum and Fort Capuzzo were captured. But our small tank force was withdrawn the next day, the object of the attack being to inflict considerable losses on the enemy. This it did.

Not Fit

All tanks were unloaded by June 7, but the state of training of 7th Armoured Division was poor. They had been without tanks since February, personnel had changed and they were not fit for battle. During this period Lord

Wavell was being urged to attack with least possible delay, and he was himself anxious to forestall if possible the arrival of more German reinforcements. In spite of all difficulties, June 15 was selected as the attacking date. While planning was continuing the enemy, on May 27, secured Halfaya Pass which he occupied and began to prepare intensively for defence.

This period, April 11 to June 15, was a sparring period, both forces building up and each delivering one or more attacks of a minor character.

PHASE 3: THE BRITISH COUNTER-ATTACK, JUNE 15 TO JUNE 18

Object: The object of the British counter-attack was to engage and defeat the enemy's armour on the frontier and to continue the advance to the Tobruk-El Adem area, and to engage the enemy there in conjunction with a sortie in force by the Tobruk garrison.

Enemy Forces: There were estimated to be:

1. In the Bardia-Capuzzo-Sollum Area —About 5,700 Germans, with about 100 medium tanks, several armoured cars, 20 field guns, 70 anti-tank guns; and 7,500 Italians, with about 30 field guns and 20 anti-tank guns.

2. In the Tobruk-El Adem Area— About 11,000 Germans, 120 medium and 70 light tanks; Italian forces consisted of 16,000.

In all, if he brought up his tanks from Tobruk, the enemy could concentrate 300 against our 200.

British Forces: They consisted of the 7th Armoured Division which, you will recall, had just been re-fitted and which included an Armoured Car Regiment, 7th Armoured Brigade of two cruiser regiments and 4th Armoured Brigade of two "I" tank regiments; a Support Group of two field regiments, one anti-tank regiment and one motorized battalion. The 22nd Guards Brigade completed the array. The point of difficulty was that the 7th Armoured Brigade with its cruiser tanks and 4th Armoured Brigade with its "I" tanks had a completely different speed and radius of action—12 miles per hour and 90 miles for the cruisers against 5 miles per hour and 40 miles for the "I" tanks. In addition, the 11th Indian Infantry Brigade was available. Six fighter squadrons, four medium bomber and four squadrons of heavy night bombers were made available one week to 10 days before the attack. Very few photographic and trained tactical reconnaissance pilots were available.

The Plan: The force was to advance in three columns. The right column along the sea coast, consisting of the Indian Brigade and the Support Group, was to advance to Sollum, assisting the centre column to capture Halfaya. The centre column, consisting of the 4th Armoured Brigade ("I" tanks), 22nd Guards Brigade and two field regiments, was to advance south of the escarpment and crossing the frontier well to the south of Sollum, then turning north to capture Capuzzo. A detachment was to capture Halfaya. The left column consisted of the 7th Armoured Division, less the 4th Armoured Brigade, was to advance further south and engage enemy tanks wherever encountered. By protecting our left flank and threatening enemy lines of communication it was thought that a tank battle would be certain either east of the frontier during the attack on Halfaya or west of the frontier after our capture of Capuzzo.

Course of the Battle: By the evening of June 16 the right column had not captured Sollum; the centre column had failed to capture Halfaya, but had captured Capuzzo and Bir-Waer. The left column, as expected, drew an armoured reaction and, although inflicting heavy casualties, withdrew from Sidi Omar to the Sidi Suleiman area.

(Continued on next page)

ACCELERATED ATTACK

This article is a translation and digest by the Command and Staff College, U.S. War Department, of a Russian article by Maj. Gen. N. Ivanov in "Krasnaia Zvezda" (U.S.S.R.). CATM reprints it from the (U.S.) Military Review.

—Editor.

An accelerated attack is an attack launched against hurriedly occupied and weakly defended positions held by the remnants of routed units, newly-arrived reserves, or by previously detailed groups. These positions may be totally unprepared for defence from an engineering point of view. Some, however, may be well developed but occupied in a hurry.

Accelerated attack may be employed following meeting engagements with the enemy, terminating by his changing to defence, and in those cases when, after repelling hostile counter-attacks our troops immediately attack the enemy engaged in digging in along the line reached during the attack.

What are the characteristic features of the accelerated attack? First of all, it is characterized by the defence's absence or weakness of fortifications, shallower depth, imperfect co-operation among the participating units, gaps in combat formations and weakly covered sectors, especially on the flanks and near limiting points. Units changing to defence, as a general rule, have weak reserves, or none at all.

Thoughtful Approach

But the relative weakness of hurriedly organized defence does not all exclude the necessity for a thoughtful approach to the organization of the impending attack. It should be remembered that the accellerated attack, too, has its difficulties. Upon breaching the main zone of the enemy's position, the frontage of the attack usually lengthens considerably. Combat formations are characterized by small gaps between the units, while flanks and limiting points are often not covered at all.

Considerable forces are used for blockading strong-points still offering resistance, for encirclement and de-

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CAMPAIGN IN THE WESTERN DESERT

(Continued from previous page)

On June 17 enemy anti-tank and artillery columns approached the battlefield from Sidi Omar to Halfaya and from Bardia southward. Our tank losses were heavy, and on June 17, to avoid the loss of the 22nd Guards Brigade and the remnants of the 4th Armoured Brigade, the British force commenced its withdrawal. By this time, the 7th Armoured Brigade had 20 cruiser tanks in action and the 4th Armoured Brigade less than 20 "I" tanks, while the advancing columns were estimated at 200 tanks. However, the withdrawal was effected in good order.

Lesson: The causes of failure were:

1. Combining the action of cruiser and I'" tanks.

2. The lack of training of the 7th Armoured Division units, both in practice of their weapons and maintenance, leading to a very great loss of tanks.

3. Lack of timely reconnaissance and air action, leading to lack of Intelligence.

4. This lack of Intelligence allowed the enemy to have his whole tank force in the forward area without our becoming aware of it.

struction of separate hostile groups, and for mopping-up operations. All second echelons and reserves may be committed while the attack echelon is considerably weakened. The amount of support artillery decreases. Part of it is transferred elsewhere, while some artillery batteries and battalions lag behind for one reason or another. Control of the artillery by this time is decentralized and its centralization cannot be carried out in a short time.

All this must be taken into account by the commander organizing the attack. The difficulties become even more serious because of the fact that the troops have very little time for the preparation for this effort. And if the commander fails, under the circumstances, soberly to appreciate weak and strong points of the enemy, this will immediately register in the results of the attack.

Here is an example: One of our units fighting in rear areas of the enemy had approached a hamlet occupied by the Germans. Since the enemy had been considerably mauled up, the unit commander decided to seize the hamlet by using the method of accelerated attack.

The area where our troops were concentrated was flat. There were no heights, buildings or trees which could be used for observation posts. In addition to this, small groves and gardens around the houses and estates among which the German troops were disposed, made observation difficult. To observe the enemy's position, the commanders had to use the first trench held by our advance force, but to determine the disposition of the enemy forces even from here was difficult.

Bombed and Strafed

For certain reasons our troops had the impression that the hostile main line of resistance passed in the vicinity of a certain estate and grove. Therefore, our artillery and mortars fired strong concentrations upon these areas. These were also bombed and strafed by our aircraft. Artillery preparation lasted forty minutes, but when following this our infantry and tanks moved forward, they were met with a strong fire and were compelled to withdraw. The enemy had not been neutralized.

When darkness fell, the Germans left their position fearing new attacks. The following day, in considering the causes of the unsuccessful attack, our command found out that the forward trenches of the enemy were located not near the estate and the grove, but near a ditch passing about 300–400 meters in front of the estate. The ditch was overgrown by small shrubs which completely concealed the trenches. It is true that the Germans in the depth of the position had suffered from our fires. In the vicinity of the grove and the estate there were several German self-propelled guns, totally wrecked mortars, and a number of soldiers killed by our artillery. But the advance units had not suffered at all, and that was reflected in the results of the engagement.

Furthermore, the attack itself was not well organized. Some units did not know their missions and did not even participate in the action. Believing in the superiority of his forces, the commander of the attacking unit failed to prepare his troops, had not organized reconnaissance well enough, and as a result the attack was unsuccessful.

How does one organize an accelerated attack? First of all, a few words about reconnaissance. Its importance in the organization of accelerated attacks cannot be over-emphasized. The commander must know beforehand where and what intermediate positions the enemy is likely to defend, what these positions are, and how they are fortified. Some data of this type can be obtained from aerial reconnaissance, but scouts can obtain much more information.

As for observation, which is carried on before and during the attack in areas concealed by trees, groves and buildings, the troops should rely on balloons and mast periscopes several meters high.

After the enemy has been routed at the main defence zone the mission of the attacking units consists in not letting the enemy rest, and in preventing him from fortifying an intermediate position. Consequently, the preparation of the accelerated attack should take on an average of from eight to ten hours and not more than twenty-four hours. During this short period of time, one can solve all organizational problems, especially if these have been talked over before the break-through of the main line of defence.

Let us consider the experience of some of our units. In the majority of cases speed of action and success of accelerated attacks were achieved by a well-organized redistribution of all elements of the battle formation. Behind infantry units and tanks moved officers with signal, observation and engineer personnel. If the enemy tried to offer resistance on a new terrain line, they would immediately start the organization of observation, communication and control. Thus, when the command post displaced forward, everything was ready for combat work. After reconnaissance, summation of the results of the observation, and some artillery survey work, the troops received their missions and all the necessary measures in connection with the setting up of co-operative action were carried out. Everything was done as it is usually done, but much faster.

Experience has shown that the line of departure for the accelerated attack is seldom less than 400–600 meters from the advance elements of the enemy. In order to provide artillery support for overcoming this stretch, artillery preparation should last from thirty to forty minutes. As soon as the riflemen approach the enemy to within 25–300 meters, the fire of the artillery is transferred to the next terrain line. In some cases the situation calls for massed fires of direct-laying guns, for emplacing hurriedly displaced batteries next to batteries already firing to enable the former to fire by the firing data of the latter, and for firing without registration.

An Error

There was another error often made by our commanders in carrying out accelerated attacks. The advance toward the intermediate position of the enemy was effected on a broad front with a uniform distribution of forces and without a definite direction of main effort. This was due to the inability of some commanders to regroup their forces within the short time available, and because of a lack of data on the fire plan and fortifications of the enemy. It is expedient, therefore, even before approaching the hostil intermediate position, to decide upon the direction of main effort, and to establish a narrow frontage on the departure line for units making the main attack.

In order to insure a higher density and a greater depth of combat formations, some of the advancing infantry, tank, artillery and engineer units are rerouted toward the sector of the main effort. But one should not go into complicated manoeuvres requiring much time for their organization. The depth of echelonment in this case can be smaller than that in breaching defensive positions, but it should be deep enough to insure a continuous strengthening of the attack.

The main peculiarity of attacking positions which are built and occupied in a hurry is the employment of motorized and tank forces in the first echelon. The purpose of this is the breaching of hostile positions at the weak sectors and passing through the gaps between separate units.

(Continued on next page)

ECONOMY PROGRAMME - VEHICLES

The accompanying article, prepared for CATM by the Directorate of Mechanical Engineering, Army Headquarters, describes the measures being adopted by the Army to effect economies in the operation and maintenance of vehicles.

—Editor.

"Why don't army vehicles run as long as civilian vehicles before a major overhaul is required?"

That's a question often asked RCEME personnel and in spite of just as many answers affirming that "they do last as long under similar conditions," the idea still persists that army vehicles are run to a premature old age.

A recent survey of civilian practices conducted by RCEME showed that army maintenance methods and results were comparable with those on Civvy Street. At the same time it revealed that during peacetime considerable economy might be effected in the operation of military vehicles by the Canadian Army. How it is proposed to carry out these savings and what has already been accomplished is the purpose of this article.

Wartime Maintenance: Before hastily condemning, at least by inference, the preventive maintenance system evolved through the war years, let us consider for a moment the purpose of military transport in Canada.

A very large percentage of MT in this country was used for training purposes —the training of thousands of "butchers and bakers and candlestick makers" to be drivers, driver mechanics and vehicle mechanics. They were trained that in war it is essential that all transport be in first-class condition at all times, ready to fight a war.

In order that this training be as effective as possible, equipment and methods in Canada must resemble as nearly as possible those used in battle. Therefore if, to save time and reduce the element of chance to a minimum, it was good operational policy to substitute a rebuilt engine rather than make running repairs, good training procedure made the same thing advisable here.

Rebuilding Engines

In the interests of safety, along the lines strictly adhered to in the RCAF and civilian airlines, when tests showed certain limits of wear, an engine was removed from the vehicle and rebuilt. This meant boxing and shipping the engine to a rebuilding shop, or to a civilian contractor if the backlog was excessive, for cylinder reboring and the

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ACCELERATED ATTACK

(Continued from previous page)

To insure the element of surprise in the main attack, all preparations should be carried on in several sectors simultaneously. The enemy will know of the impending attack, but will never guess the direction of main effort. If more time is available, tanks and artillery may be assembled in the evening in plain view of the enemy somewhere in a secondary sector and then moved to the sector of the main attack.

The accelerated attack is characteristic of the modern war of manoeuvre, and our troops should be well versed in the fundamentals of this form of attack.

fitting of new or renewed parts to practically new-engine specifications. The average mileage at which engines were rebored was about 20,000 miles.

It is apparent that this policy of rebuilding, although expensive compared to civilian practices, kept the vehicles in as nearly as possible new condition and was the means of training tradesmen for similar service overseas.

Peacetime Considerations: The RCEME were not unaware of the fact that once public wartime enthusiasm subsided, there would be a great clamour for reduced defence costs. Any economy that could be effected would be right in line with general policy.

In peacetime when a breakdown is unlikely to mean the loss of a battle and a slightly noisy engine is still serviceable, it is considered that certain wartime repair specifications could safely be modified and many parts allowed to wear a little more before replacement. This change in standards is obviously limited by the risk of unreliability, and a balance between the saving from extra mileage and the added cost of higher fuel and oil consumption, but it is consistent with good civilian practice.

Revised Inspection and Maintenance System: In deciding on further revision to an already revised system, simplification and economy must be the objective. The inspection and maintenance procedures must be simplified without adversely affecting its thoroughness, because vehicles would be harder to get in the future.

The highlights of the new system will be: (a) reduction in paper work; (b) greater stress on driver maintenance; and (c) fewer trips to the workshop.

The first will be accomplished by a consolidation of inspection and maintenance forms, making one do the work of two. Forms will be smaller and standardized where possible. The number of RCEME inspections will be decreased from four to three each year.

Driver Maintenance

Greater stress will be placed on driver maintenance and it is considered that under peacetime conditions more time can be put on maintenance by the driver and the unit mechanic. Although there will be fewer men there will also be fewer vehicles and many wartime duties may be dispensed with. The regular maintenance tasks must assume their proper place in the life of the army driver, and become just as much a part of his job as his driving.

All possible repairs will be done "in situ," with emphasis on "top overhauls" to the engine in second line workshops, without removing the engine from the vehicle. It is estimated that 15,000 additional miles of useful life will be obtained by this method before the engine requires rebuilding.

Top Overhaul of Engines: Top overhaul is a term used to distinguish this procedure from complete overhaul or rebuilding, and will be limited, generally speaking, to the following operations. It may mean removal of the cylinder head; grinding valves and cleaning out the carbon from the combustion chamber; adjusting of valve clearances and tune-up. On the other hand it may include as well, the fitting of new standard or expander-type piston rings; adjustment of connecting rod and main bearings or replacement of liners; replacement of valve guides and exhaust valve seats.

As the number of top overhauls practicable before an engine must be rebored and rebuilt is limited by the amount of cylinder wear and general engine condition, it is apparent that good maintenance and approved driving practices are essential to the success of this system.

Vehicle Component Assemblies: The survey of civilian practices also revealed that limits of wear of almost every part in transmissions, transfer cases, differentials, etc., could be relaxed without materially affecting the safety factor. New tables for use when rebuilding component assemblies have been prepared allowing greater wear before replacement of parts, and giving wider tolerances for rebuilding.

Painting: Gloss enamel will replace the old familiar matte finish, and will make better looking vehicles at lower cost. It will encourage cleanliness and pride-in-appearance on the part of the driver, probably more important in peace than in wartime. The civilian car that looks smart usually "feels smart" mechanically.

This new gloss enamel will last longer and will give better protection than matte paint and doesn't rub off so easily. For vehicles in outside storage the new paint is of particular value because of its better protective and lasting qualities, and with thousands of vehicles to be stored "under the stars" that is quite a consideration. It means that much less time and material will be used in "touching up" and repainting than was the case during the war.

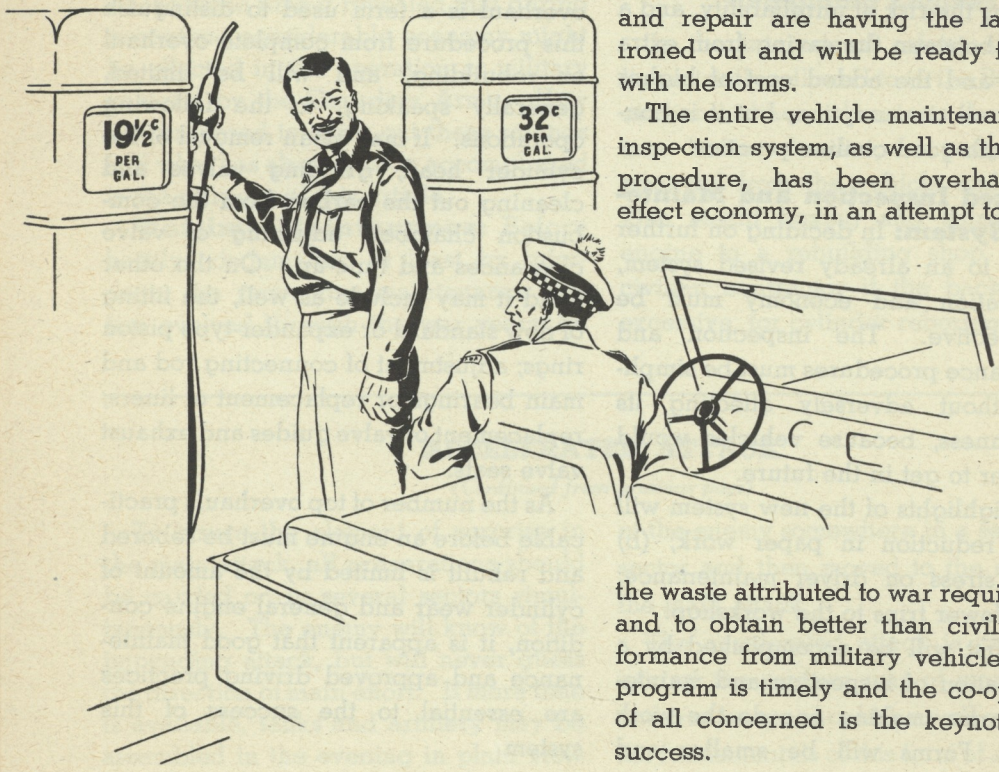
When camouflage is necessary, a removable top coat has been made available which can be painted right over the gloss. Although this dull finish can be washed satisfactorily and will not wash off in the rain, it can be easily removed with a solvent without damage to the permanent gloss finish.

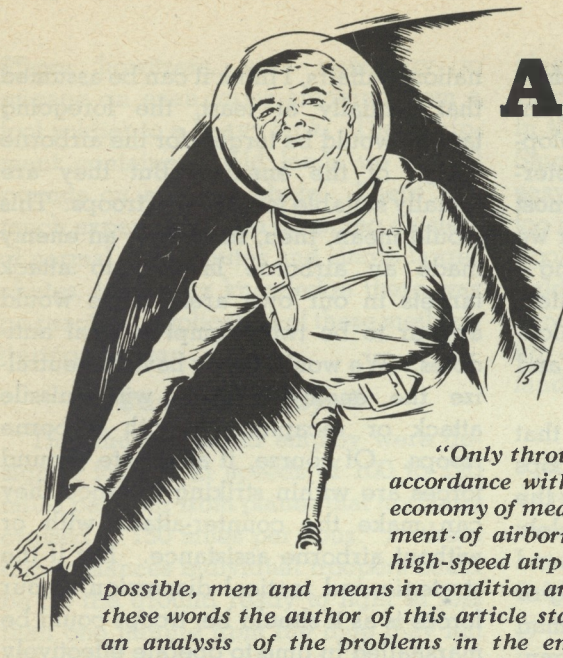
Inception of Program: Part of the program has already been started; for instance, gloss enamel was authorized on Aug. 1, 1946, and instructions on its application have been issued.

Revised RCEME inspection forms have been in use on a trial basis for several months, being tested in actual practice, and will soon be available to the field.

Canadian Army Local EME Instructions covering inspection, maintenance and repair are having the last kinks ironed out and will be ready for issue with the forms.

The entire vehicle maintenance and inspection system, as well as the repair procedure, has been overhauled to effect economy, in an attempt to correct the waste attributed to war requirements and to obtain better than civilian performance from military vehicles. This program is timely and the co-operation of all concerned is the keynote of its success.





AIRBORNE ARMIES OF THE FUTURE

"Only through flight can we wage a future war in accordance with the principles of surprise, mass and economy of means. . . The first problem in the employment of airborne units is that of transferring from a high-speed airplane to the ground, in the shortest time possible, men and means in condition and quantity to fight successfully." In these words the author of this article states his premise and then plunges into an analysis of the problems in the employment of airborne troops. He is Maj. Gen. James M. Gavin, Commanding Officer of the 82nd Airborne Division at Fort Bragg, North Carolina, who was with this Division in all its operations in Africa and Europeduring the Second Great War. As it is the Canadian Army's intention to familiarize soldiers of all Corps with the problems of air transported troops, this article should provide interesting and instructive reading. It is the first instalment of a series, and CATM reprints it from the (U.S.) Infantry Journal.—Editor.

PART I

All fighting men and everything they need to fight with in the future and live on as they fight must be capable of movement by air. Only through flight can we wage a future war in accordance with the principles of surprise, mass and economy of means. Only by exploiting to its utmost the great potential of flight can we combine complete dispersion in the defence with the facility of rapidly massing for counter-attack which today's and to-morrow's Army must possess. Even without the power and use of atomic energy they become axiomatic.

Never in the history of mankind, certainly, has anything affected man's thinking and his probable military behavior so drastically as the atomic bomb. It changes—must greatly change—our whole military thinking, organization and tactics. And I say this despite the positive and often expressed convictions of many highly skilled professional soldiers who as yet predict little change in ground fighting methods. To my mind, we professional soldiers are traditionally laggard in facing and adopting changes, especially radical changes that upset proven methods and the ways in which we have been doing things for years past. I hope that what follows here is a worthy contribution to the military thinking behind our national security. It may seem visionary now, it may even be theoretical now, but in time I am sure it will prove to be sound.

Three Things Important

The strategy and tactics of our armed forces in any given era consists of the full exploitation of the means of waging war available in that period of time. Most important among the means are the available arms, transportation and equipment. As these improve and change, of necessity the tactics and strategy change. It is important to remember, however, that the principles underlying the meth-

ods do not change. It is therefore possible by a thorough and fully open-minded study of the trend of development in the means of warfare to determine what the future methods are most likely to be. The latitude and power we shall be able to employ in conducting a possible future war can be accurately measured in terms of the future development of our arms, transportation and equipment.

To begin with, I am assuming that there will be a definite need for troops to fight upon the ground. Despite the opinions of advocates of victory solely through air power such as Douhet and Seversky, I believe that any bombing or guided missile attack will need a human follow-up force to exploit the disorganization and chaos that future bomb and missile attacks will cause.

The ground fighting that follows may or may not be severe or prolonged but that there will be need for such fighting in some form does appear to be inevitable. Not because there will be an effective active defence against the use of atomic power, for there is no such defence. Dispersion and other passive security measures will be taken. Many installations will be placed underground and troops will be kept underground for use in attack and counter-attack. The particularly lucrative targets for attacking airborne troops will be launching sites for guided missiles, sources of strategic materials used in making atomic bombs and warheads, military fabrication plants where bombs and warheads are made, politically sensitive areas either before or after bomb or missile attack, airfields and take-off areas for enemy airborne troops, and terrain of particular tactical value such as groups of airfields about which an airhead may be developed.

In view of the traditionally non-aggressive role of our country in international affairs, I think it can be assumed that, initially at least, the foregoing targets would be targets for the airborne troops of the enemy. But they are equally suitable for our own troops. This would mean, then, that when an enemy made an airborne landing to attack targets in our own areas there would appear to be two prompt tactical antidotes. We would either have to neutralize the enemy airhead with missile attack or recapture it with airborne troops. Of course, if adequate ground forces are within striking distance they can make the counter-attack with or without airborne assistance. But if the strategic and tactical dispersion of our forces is as it should be, troops could be marshalled in time to operate effectively in our own territory against a major enemy force only by the employment of airplanes.

The first problem in the employment of airborne units is that of transferring from a high-speed airplane to the ground, in the shortest time possible, men and means in condition and quantity to fight successfully. With the support they receive from the air, airborne troops must be able to destroy any hostile ground force they encounter. They must take along the means to do this by any or all of the three methods so far devised—parachute, glider and air-transport. The potentials for further development of these will indicate clearly the future capabilities of airborne troops.

The Parachute: At the end of World War II the parachute in use by airborne units was suitable for individual troopers with hand weapons, and food and ammunition for several days' fighting. The troopers usually landed carrying a rifle, tommy gun, or automatic weapon of the Browning type with from 150 to 250 rounds of ammunition. Dropped from the same plane in equipment containers were the supporting mortars, heavy machine guns, recoilless rifles, bazookas,

75mm howitzers, etc., necessary to engage on even terms anything from a foot soldier to a heavy tank. The equipment containers held loads up to 250 pounds on a single chute. There was much experiment with dropping clusters of normal sized chutes and single larger chutes, but to my knowledge there was no practical application of these methods during the war.

Chutes Employed

The chutes we did employ were designed for use at speeds of 100 to 120 miles per hour from planes that normally cruised at 150 miles per hour. In these circumstances individual troopers could be on the ground ready to fight in less than one minute from the time they left the plane, and a well trained airborne battalion could begin a co-ordinated fight in about 20 minutes after it landed. Notably lacking, however, in the equipment of such a force were ground transportation and anti-tank weapons of long range and high penetration. Long-range, lightweight radios were also lacking and there was need for additional medical service.

Since the war, intensive experiments have been conducted with the view to designing parachutes suitable for use at much higher speeds, chutes that can deliver much heavier loads, chutes that a man can shed faster and chutes with less tendency to mal-function. This work continues both in this country and abroad.

The high-speed problem has been approached from several angles. Experiments are being conducted with elastic and wrapped steel-spring suspension lines which reduce the shock to the jumper of the opening of the chute. In recent tests, men using regular type chutes equipped with elastic suspension lines jumped at 175 miles per hour with no ill effects. Another approach to this problem has been to reduce the area of silk exposed to the air blast in the opening shock. The Germans made considerable progress in this and developed a ribbon chute. Since the conditions that result in an easy opening chute also make it descend too rapidly, such a chute must be looked upon more as a braking chute than a landing chute. Under present jumping conditions the ribbon chute may be used for opening and the reserve chute for landing.

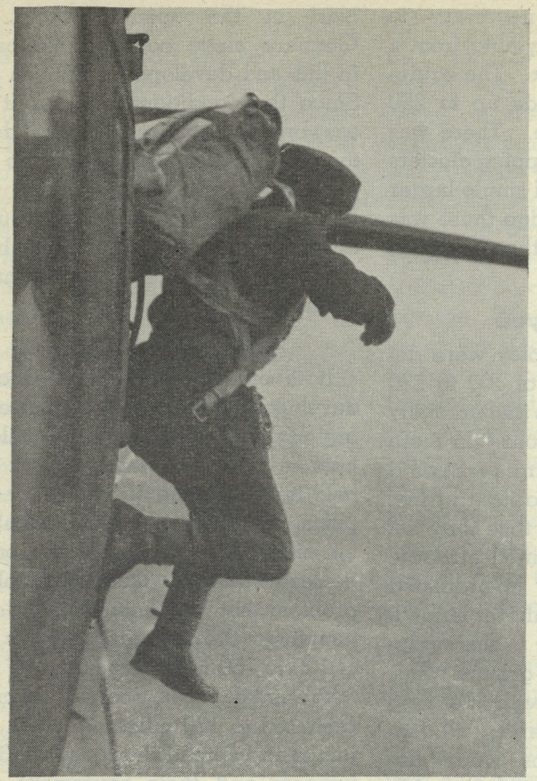
High-Speed Jumping

It is our hope that chutes can be developed which will permit safe jumping up to several hundred miles per hour. The most intensive work in this field is being done on chutes for fighter pilots. But high speed for combat jumping of airborne troops involves one particularly difficult tactical problem, a problem that may actually hold combat jumping to the comparatively low speeds of 100 to 150 miles per hour.

Present-day troop-carrier aircraft fly from 100 to 120 miles per hour during jumps and spread their loads of 36 to 44 jumpers and their equipment over a distance of 800 to 1,000 yards. The troopers leave their planes from two doors, one on each side of the fuselage. The unit dropped is usually a platoon. The distribution over such a distance creates a problem for the platoon leader which at once becomes a very serious one if the landing is immediately opposed in strength. To double or triple this distance makes his problem extremely difficult. It would require the use of much larger drop areas free of obstacles both to landing and reorganization. The solution may lie in designing aircraft with multiple exits. But this problem must be considered along with the development in gliders and air transport.

British Progress

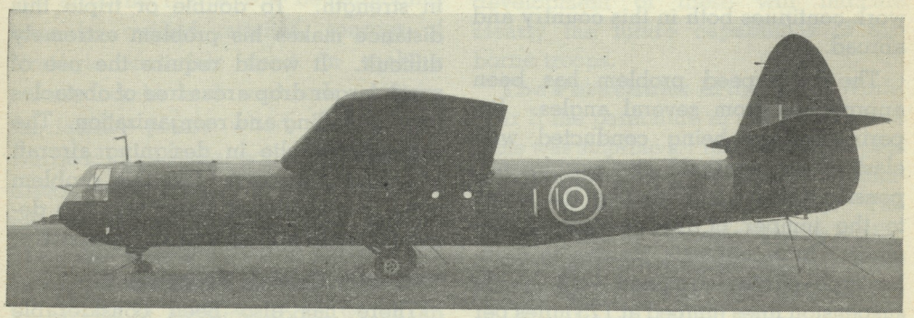
There has also been considerable study and test of dropping much larger weapons and equipment and cargo loads than ever before thought possible.



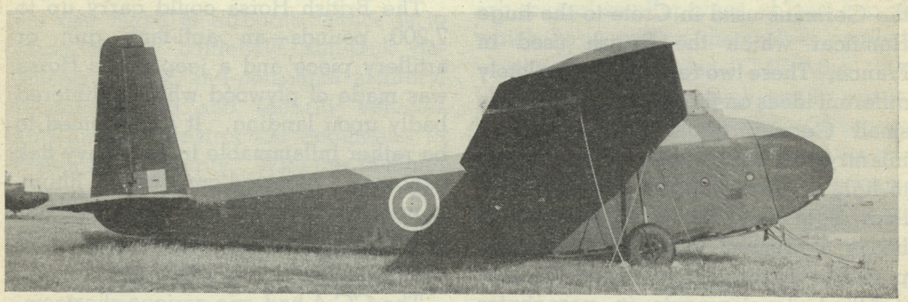
Photos by courtesy of the Deputy Directorate of Air, Army Headquarters, Ottawa

An intrepid paratrooper leaves the plane. This action "shot," a Canadian Army Photo, is one of the best of its kind.

Men and equipment are being dropped from a Dakota. The door loads have been pushed out, and as No. 1 jumper has left the door the para-pack loads have been released. In this case, men and a 75mm pack howitzer with stores and ammunition are being dropped.



Used successfully in the Second Great War, the British Horsa II is shown above. It could carry up to 7,200 pounds or 31 fighting troops and was flown by Army Glider Pilots.



This is the British Hamilcar glider referred to in the accompanying article. Flown by Army Glider Pilots and carrying more than eight tons, it was used in the Second Great War to bring in heavy equipment that could be transported to airhead by no other means. Typical loads were the Locust T9 Tank, 17-pounder anti-tank gun and the light armoured car.

Larger chutes and clusters of several chutes have both been used with marked success. The British have made exceptionally good progress in this work. Recently they have dropped loads up to 6,000 pounds at a rate of descent of 20 to 24 feet per second, using a cluster of three 42-foot chutes. This means the successful dropping of 25-pounders and 105 and 75mm artillery and prime movers for all of them.

There is also good progress in drop deceleration with two methods being tested. The first employs a U-shaped tube affixed to the drop load; the tube contains sand cartridges and a propellent that is fired toward the ground from the open ends of the U just before landing. A small charge is placed within the canopy near the apex of the chute. As the load descends an accurately measured length of line swinging below it strikes the ground first and detonates the charge in the canopy and this gives the chute a sudden upward thrust, stopping the rapid descent so that the load lands lightly.

So far it has been possible to land jeeps, artillery pieces, anti-tank guns and like loads by this means. However, flying and releasing such loads in flight will require modification of present type troop-carrier aircraft which should be considered in their development.

Gliders: There have been many types of gliders from the small assault glider the Germans used in Crete to the huge Hamilcar which the British used in France. These two represent completely different ideas on the use of gliders. The small German glider carried assault infantrymen with their weapons ready to fight. The Hamilcar, carrying more than eight tons, was used to bring in heavy equipment that could be transported to the airhead by no other means.

Allied developments in parachutes have made the German assault glider technique obsolete. Nowadays most airborne commanders look upon the parachute as the vehicle for the assault infantry and the glider as the vehicle for heavy guns, radios, and so on that can be brought only with their use.

Three critical characteristics of gliders determine suitability for military use—their weight-carrying capacity, their interior and door dimensions and their landing speed. There are many others of importance such as floor structural strength, location and number of doors, ease of handling and limitations of flying speed. But from the viewpoint of the using airborne combat commander the three questions are these: What can I carry in it? How much landing space will it take? And how fast will it come in?

Horsa and CG-4

The most successful gliders of World War II were the US CG-4 and the British Horsa. The CG-4 could carry up to 3,750 pounds which, measured in terms of effective equipment, meant two men and a 57mm anti-tank gun or a 75mm or 105mm artillery piece or a jeep. But a weapon and its prime mover could not be flown in the same glider—a serious deficiency. The glider, of cloth-covered tubular steel construction, was amazingly rugged in view of the handling it had. It landed at about 60 miles per hour. Thousands were used in all the airborne operations on the European continent.

The British Horsa could carry up to 7,200 pounds—an anti-tank gun or artillery piece and a jeep. The Horsa was made of plywood which splintered badly upon landing. It also seemed to be rather inflammable in the heavy flak exposure it received crossing the Rhine. It was not popular with American airborne troops despite its admirable weight-carrying characteristics.

The CG-4 had one serious shortcoming when it first appeared on the battlefield—a nose opening. It took but one operation to show that four out of five

gliders ended up against fences, stone walls or trees, thus making it almost impossible to remove the combat cargo. Future gliders must open in the tail. Both the CG-4 and the Horsa used the conventional tow rope, 300 feet of nylon from the tug to the glider. This made them take up about three times as much air space as they should have, and also made it impossible to fly them in cloudy weather.

Now In Production

The present glider development program is directed toward improving conventional type gliders with the lessons in mind that were learned from the war. All-metal gliders with tail openings suitable for carrying into an airhead the weapons and equipment necessary for engaging on favorable terms anything that may be encountered on the ground, are now in production.

Without going into airborne tactics too deeply at this point, I should point out that in the final analysis the measure of an airborne unit's effectiveness is its ability to hold what it takes. Its greatest mobility is in the air and after it lands it should have little need to move considerable distances except for reconnaissance and security.

Under present conditions of ground combat the backbone of the defence of an airhead is its anti-tank defence. Consequently, the greatest contribution gliders can make to airborne tactics is to bring to the battlefield anti-tank defensive means, anti-personnel artillery, reconnaissance and security vehicles and airfield construction engineers, in that order of priority. With this in mind, gliders are being developed which will carry four and eight tons. Their ultimate development will depend largely upon the progress made in air transports. It is clear that in airborne operations a point will be reached when it will be more profitable to land power airplanes with heavier loads than to continue the use of gliders. This would seem to put a ceiling of about 10 to 12 tons on the requirement of a tactical glider. Larger gliders will undoubtedly be developed for strategic uses, such as the mammoth Goliath, capable of carrying 16 tons, which was used by the Germans in the Mediterranean area.

Transport Planes: The United States has the greatest air transport production potential of any nation in the world. Leading the world with such ships as the Douglas Skymasters, Lockheed Constellations and the Constitution, Boeing Stratocruisers, Republic's Rainbow, the air industry of the United States is well out in front. With the know-how acquired in producing the types now flying, and the lessons to be learned from the flying wing and jet types, American air engineers should have the field to themselves for some time to come. These transports have the following characteristics:

Type	Cruising Speed (MPH)	Pay Load (Tons)	Range (Miles)
Skymaster (C-54) ...	210	4.5	2500
Globemaster (C-74)..	200	25	3400
Constellation (C-69).	225	10	4500
Constitution.....	300	35	6000
Stratocruiser (C-97) .	200	8.5	3400
Rainbow:.....	400	46 Passengers	—
X C-99.....	175	50	3000

Besides these large airplanes, there are several smaller types, at least two of which have proven themselves combat worthy—the Douglas C-47 and the Curtis-Wright C-46 which was in use in the opening days of the war. Of recent date the Fairchild Packet known as the C-82 has been used in training by airborne troops. The characteristics of all these airplanes are as follows:

Type	Cruising Speed (MPH)	Pay Load (Tons)	Range (Miles)
C-47.....	160	3	1200
C-46.....	175	5	750
C-82.....	200	5	1200

Air transports for military purposes fall into two classes: strategic airplanes of the Stratocruiser and the Constitution types, and tactical airplanes of the C-47 and C-46 types. The larger planes are now being produced and flown by civil aviation.

A Comparison

There is a distinct parallel between the military uses of aircraft and seacraft. Larger ocean-going vessels have lent themselves well to the strategic movement of troops. Tactical vessels, however, had to be manufactured for a particular combat use. For some years we tried to adapt ordinary seacraft to amphibious operations, work for which they were never designed. We seem to be doing the same thing in aircraft today. Commercial airplanes have fought our tactical battles so far despite their limitations. But the future of airborne operations requires the development of tactical aircraft embodying certain combat essentials, notably self-sealing tanks, pilot armour, interior arrangements to facilitate parachute operations, built-in recesses for paracontainers, arrangements for glider tow with built-in phone connections and other special items. It is imperative that we make steady progress in such planes if we are to maintain any effective airborne forces.

General H. H. Arnold stated in 1945 that guided missiles will replace the heavy bomber. In September 1946, L. D. Bell, president of the Bell Aircraft Corporation, said that the ultimate military weapon is "a long-range, high-speed guided missile carrying an atomic head that is capable of being directed by automatic navigation to its target."

The principal future of the airplane in war is clear. It is that of the highly developed troop-carrier transport and its accompanying escort, backed by a fleet of large strategic airplanes. The parallel between sea battles and air battles is again obvious. What we must develop now is the counterpart of the LSTs and LCTs with their accompanying destroyers and PT boats. Until we develop such craft we can make little real progress in airborne warfare.

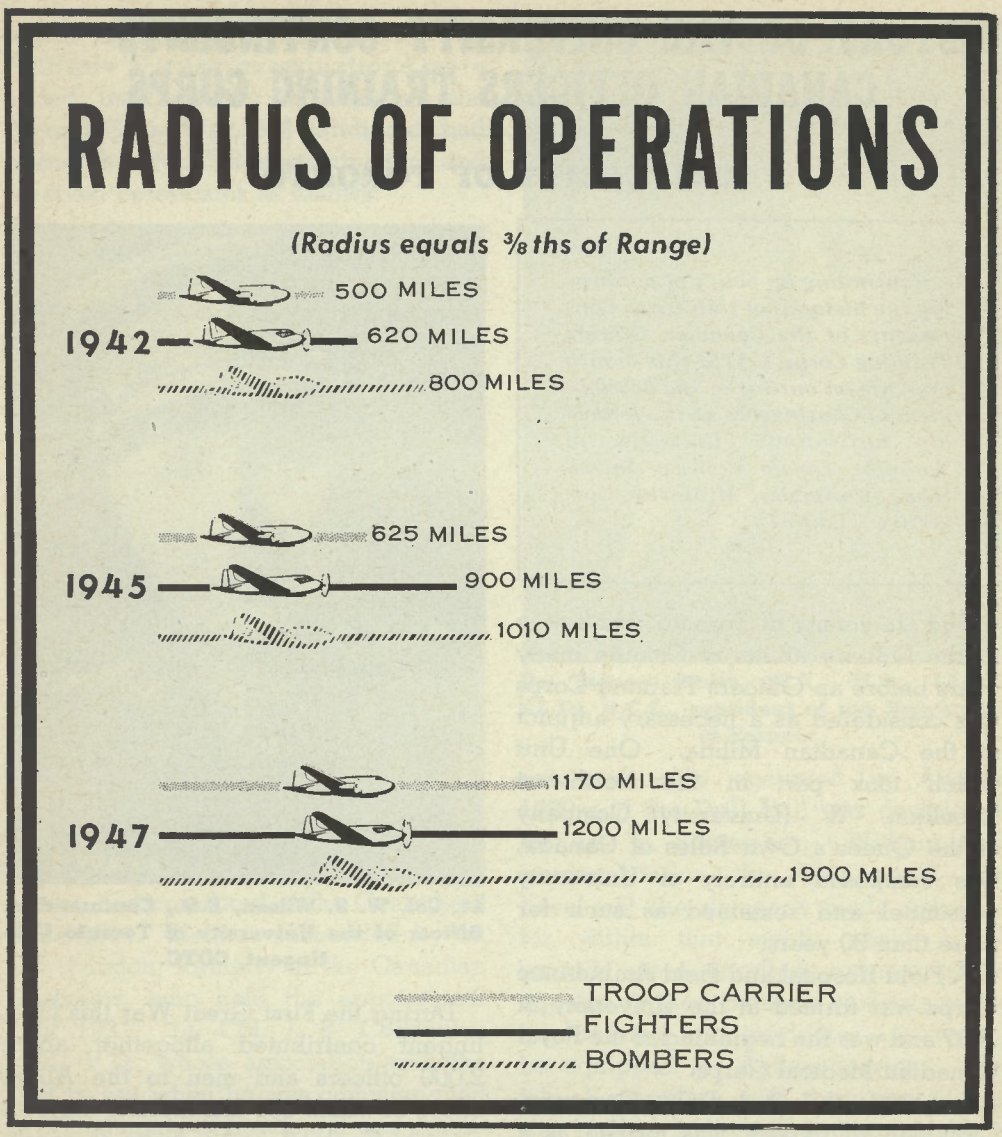
Ideal Type

So far the means discussed for solving the problem of getting from the airplane to the ground under specified conditions have been limited to the parachute, the glider and air transport. The ideal type of troop-carrier aircraft would be one that would permit the release of the entire fuselage as a land vehicle upon landing or at an altitude of a few feet upon arrival at the airhead. The pilot could then return with the power plant and pick up another cargo body to be flown into the combat area. If such a craft can be developed it would have all the advantages of the glider without the tow ropes, wings, and control surfaces. It could also be used as a land vehicle and thus regain for airborne troops some of their lost tactical mobility.

Here again, the development of the DUKW for amphibious purposes offers an interesting parallel. There were many who thought the DUKW could not be developed effectively.

This "kiwi" (we may as well call it that as anything else, for by itself it is a bird that can't fly) may, if properly developed, make parachutes and small gliders obsolete. Its development would be a great advance toward making all ground forces airborne, for the special training now needed for parachuting would no longer be required.

The helicopter also offers interesting possibilities, especially if the rotating members could be kept folded in the mother plane until the helicopter is dropped. Then the airborne cargo could be lowered to the ground with some selectivity in landing. Somewhere in these fields of development lie the future craft of airborne war.



I have so far summarized the developments in the means of transporting airborne troops to close proximity with the enemy. Before going on to discuss the application of these means of transport, I should point out the rapid strides toward improvement of the weapons now available to airborne troops for ground combat. Recoilless artillery, hollow charge weapons such as the bazooka and panzerfaust, lighter metal in weapons construction have all improved the chance of survival on the battlefield for airborne units of all sizes. In fact, they cannot only survive, they can carry the attack to the enemy deep in his own territory.

(*To be continued*)

HISTORY OF THE UNIVERSITY CONTINGENTS CANADIAN OFFICERS TRAINING CORPS

UNIVERSITY OF TORONTO

Continuing its policy of publishing the histories of University Contingents of the Canadian Officers Training Corps, CATM this month presents an outline of the development of Contingents at the following institutions: University of Toronto, Loyola College, Sacred Heart University, McMaster University.—Editor.

The University of Toronto was active in the Military affairs of Canada many years before an Officers Training Corps was considered as a necessary adjunct of the Canadian Militia. One Unit which took part in the Northwest Rebellion, "K" (University) Company of the Queen's Own Rifles of Canada, was composed entirely of University personnel and remained as such for more than 30 years.

A Field Hospital and Field Ambulance Corps was formed at the University in 1897 and was the beginning of the Royal Canadian Medical Corps.

In 1902, the 2nd Field Company, Canadian Engineers, was formed as a University Unit. This was the first NPAM Unit of that Corps, the 1st Field Company being PAM and stationed at Halifax.

OTC Formed In 1914

Previous to the First Great War the University of Toronto had urged the Minister of Militia to form an Officers Training Corps in Toronto, and on Oct. 15, 1914, the Contingent was formed with an establishment of nine companies and a Headquarters. It was later increased to 13 companies, with a total of 1,464 all ranks.

Lt. Col. W. S. Wilson, E.D., Commanding Officer of the University of Toronto Contingent, COTC.

During the First Great War this Contingent contributed altogether about 2,000 officers and men to the Allied effort, of whom 351 members of the Unit went to England in 12 drafts as candidates for commissions in the British Army.

In 1920 the Unit was reorganized for peacetime conditions, with Lt. Col. W. R. Lang as Commanding Officer, Maj. T. R. Loudon as Second-in-Command and Maj. H. H. Madill (who succeeded to the command prior to the Second Great War) as Adjutant.

In 1921 the first examinations for Officers Training Corps (War Office) certificates were held. Up to 1924, 126 members qualified for the Infantry Certificate; then, successively, Engi-

neers, Medical, Signals, Artillery and Artillery Survey examinations were added until, at the outbreak of the Second Great War, 904 candidates had passed the War Office examinations and received certificates as follows:

Arm	Certificate "A"	Certificate "B"	Total
Artillery	54	14	68
Artillery Survey	5	1	6
Engineers	47	8	55
Signals	12	4	16
Infantry (Rifle)	519	144	663
Infantry (MG)	10	—	10
Medical	70	16	86
	717	187	904

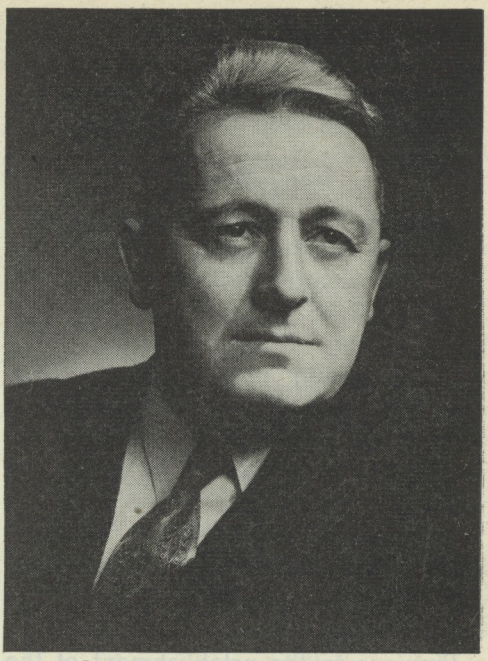
In addition to these, about 125 received Canadian officer qualifications, of whom several were commissioned in the Permanent Force.

A Brass Band had been formed in the Unit by 1921, and this assisted greatly in maintaining esprit-de-corps.

Commanding Officers

In November 1925, Lt. Col. Lang died, having had command of the Contingent since 1914. He was succeeded by Lt. Col. Loudon, formerly of the Canadian Engineers, who held the appointment until 1931. Lt. Col. J. R. Cockburn, M.C., V.D., whose association with the Unit began when he was commissioned as a Lieutenant at the time it was organized, took over the command in November 1931 and continued as Commanding Officer until 1935, when he was succeeded by Lt. Col. Madill. The acquisition and re-building of the commodious new accommodation on St. George Street, which includes a large Drill Hall, helped considerably in the training of members of the Unit for the various arms when war was declared.

It would seem that the University authorities and the Command of the COTC had a premonition of the outbreak of the war in that year, for the new



Dr. Sidney Smith, K.C., M.A., LL.B., LL.D., D.C.L., president of the University of Toronto.

premises were occupied in August 1939 and the Drill Hall was completed for use in September. Without this accommodation the Unit could not have met the demands made upon it, for within that month about 1,700 recruits were enrolled, approximately equally divided between students seeking training and graduates anxious to be equipped for Active Service. The job of grappling with these conditions was further facilitated by the excellent Lecture Room and office space in the new quarters, and especially by the number of enthusiastic retired officers who came forward to assist in the training. To them a large share of credit for the successful activities of the Unit during the war is due.

The task of the Contingent was greatly increased during the session 1940–41 owing to the fact that in addition to the courses leading to officer qualification in the various arms of the Service, the Board of Governors of the University required all physically fit

male undergraduates, 18 years of age and over, to take military training. Thus instruction was given to approximately 3,500 undergraduates and 425 graduates.

Second Unit

This additional burden was carried out by a second Unit known as the Training Centre Battalion, of which Lt. Col. W. S. Wilson was appointed Commanding Officer to train those students taking compulsory training. About this time a Pipe Band was formed, in addition to the Brass Band which had been in existence for about 20 years.

The Contingent attended the two-week camp at Niagara each year from 1940 to 1945, inclusive, the number varying between 300 and 2,500.

Previous to the establishment of the Officer Training Centres, this Contingent qualified 1,038 members as Second Lieutenants in the Canadian Forces, most of whom were invaluable in keeping up the officer strength of the various Reserve Units in this and other Districts, and who later proceeded overseas with Active Units or reinforcements.

During the 1944–45 training season the Contingent published a News Bulletin in two issues which was distributed to all members on Active Service who could be located. They numbered about 2,500 officers and over 400 Other Ranks distributed throughout all arms and services.

Honours, Decorations

Various honours and decorations were bestowed on members of the Unit for conspicuous gallantry and outstanding service during the war; they totalled 213.

In January 1945, Lt. Col. Madill retired as Commanding Officer after ten years of hard and able service which was distinguished by administrative ability and which steered the Unit through many difficulties and won for it an enviable record of service to Canada and the Empire. His successor is Lt. Col. W. S. Wilson, E.D., who is Assistant Dean and Secretary of the Faculty of Applied Science at the University.

LOYOLA COLLEGE CONTINGENT COTC

On March 17, 1919, a Service Flag dedicated to the memory of Loyola men who served in the First Great War was raised at Loyola College. And on the same day, as a living tribute to the record of these men, it was announced that authority had been granted for the establishment of a Loyola College Contingent of the Canadian Officers Training Corps.

The Corps was formed on May 15, 1919, with a complement of one company; since that time its strength has grown to four companies, with a Unit Establishment of 400.

In its infancy the Unit owed much to the experience and assistance of the returned officers of the Duchess of Connaught's Own Irish Canadian Rangers, 55th and 199th Bns., C.A.F., in the persons of its three Commanding Officers. And to further consolidate this link with Loyola, when the Rangers were eventually disbanded they presented their band instruments to the College, placed their Regimental Colours in the College Chapel and donated a Martyr's Window in memory of their fallen comrades-in-arms.

Six Commanding Officers have brought the Unit through 28 years of peace and war:

Maj. M. J. McCrory
Maj. E. Reynolds
Lt. Col. E. G. O'Brien
Lt. Col. J. W. Long, E.D.
Lt. Col. T. Guerin, O.B.E., E.D.
Lt. Col. V. O. Walsh, D.S.O.

Maj. McCrory commanded the Unit from 1919 to 1922, with Maj. Reynolds as his Second-in-Command. The first of many public ceremonies in which the Loyola Contingent took part was the unveiling of the N.D.G. War Memorial by His Royal Highness the Prince of Wales. On this occasion His Royal Highness presented the Unit with the King's Colours.

Maj. Reynolds took over command in 1922 with Capt. E. G. O'Brien as his Second-in-Command. At the annual inspection in May 1924, Maj. Reynolds presented the McCrory Shield, a trophy awarded to the Unit's best platoon. On April 20, 1929, the Contingent held a solemn Requiem Mass for the late Marshall Foch at the church of the Ascension, Westmount. The service was attended by the District Officer Commanding, by representatives of all regiments in the District and Consuls of several countries.

In May 1929, Maj. Reynolds resigned his command and was succeeded by Maj. O'Brien, with Capt. J. W. Long as Second-in-Command. On April 27, 1930, the Contingent took part in a parade commemorating the 2nd Battle of Ypres, and on May 30 it was inspected by Brig. Gen. King. In this same year four candidates successfully passed their Certificate "A" examinations and 14 their Certificate "B". In the whole of

Field Marshal Viscount Alexander of Tunis, Governor-General of Canada, inspects the Guard of Honour from the Loyola College Contingent, COTC, on the occasion of the College's Commencement Exercises in June 1946. The Guard was commanded by Maj. J. Brayley, M.C.

Canada, only one other University made a better showing that year.

Proficient Unit

The 1931 Syllabus called for a two-hour training period every Friday, and on May 12, at the annual inspection, Brig. Gen. King complimented the Contingent on its proficiency and compared Loyola with Eaton and Harrow.

In 1932, Capt. Long won the Canadian Sabre Championship, and the Loyola Rifle Teams twice defeated the McGill University Contingent in the Musketry Competition. Brig. W. Gibsone described the annual inspection on April 29 of that year as "the best display witnessed in nine years."

On Sept. 7, 1935, His Majesty approved the use of the Royal device on the Loyola Badges.

On Sept. 14, Maj. O'Brien was promoted to the rank of Lieutenant-Colonel, and on April 26 Brig. Gibsone, following his annual inspection, commended the Cadets on their discipline and smartness.

In 1936, the Unit paraded as a Battalion, both in the services for the late King George V and in the Armistice Parade. In the following year 2/Lieut. Joseph Hart (Capt. AF) represented the Unit at the Coronation ceremonies in London, and to mark the Coronation, the first annual Military Tournament was held at Loyola. This event was discontinued at the outbreak of war in 1939.

Maj. Long succeeded Lt. Col. O'Brien as Commanding Officer in May 1937. In that year 18 candidates passed the Certificate "A" examinations and 12 passed the Certificate "B".

First Armoury Guard

The Contingent paraded for the Royal Visit on May 18, 1939, and another event of importance in the Unit's history was the posting of an Armoury Guard for the first time on Aug. 26 in accordance with orders issued by the DOC. The Guard was placed on Active Service until Sept. 26, and records show that this Contingent was the first in Canada to post such a Guard in anticipation of the outbreak of hostilities. It was also the first to institute a Refresher Course for officers, upon completion of which men were qualified for commissions in the Active Force.

In 1940, a three-week summer camp was held at St. John, Que. The most important part of the summer's tactical work was an all-night scheme conducted near Lacolle, Que., from which the Contingent returned to be inspected by Brig. Gen. T. L. Tremblay. In 1941 the Unit, augmented by officer candidates from Reserve Units in the city, devoted considerable time to practical work, and a bayonet assault course was constructed for this purpose.

On May 3, Lt. Col. Long, Commanding Officer, received the Efficiency Decoration. Up to this time records showed that 60 officers, trained in the Contingent, had been accepted for Active Service and that 200 Loyola Alumni members were in the Armed Forces.

War Syllabus

Lt. Col. Guerin, a Loyola graduate of the Class of '07, succeeded Lt. Col. Long as Commanding Officer in 1943, Maj. D. L. Inwood being appointed Second-in-Command. During the succeeding years the war syllabus of training and instruction was carried out both at Local HQ and during the two-week summer camp at Farnham, Que. Unit strength grew steadily during the war years, and at the present time it numbers 407 all ranks, with an Administration and Training Staff of one Training Officer, one Clerk, one CQMS and one Assistant Instructor.

Lt. Col. Walsh was appointed Commanding Officer on March 1, 1946, being the second Loyola Alumnus and the first officer trained and commis-

sioned in the Unit to hold that appointment. Among the Loyola men who have returned to the strength of the Contingent are Maj. E. Hankey, M.B.E., as Second-in-Command, Maj. J. Brayley, M.C., Capt. E. O'Toole, M.C., Capt. J. Kastner and Capt. D. Ledoux. Two others have been appointed A & T Staff officers: Capt. O. K. H. Kierans, M.C., and Capt. E. H. Lanthier.

1,500 Served

It is estimated that between 1,200 and 1,500 men from Loyola College served in the Armed Forces. This number includes one Rear Admiral, one Major-General, one Air Vice-Marshal, one Brigadier, at least one Group Captain, 12 Colonels and Lieutenant-Colonels, several Wing Commanders, Naval Commanders, Majors and a long list of other officers. Included in the 31 decorations they received are one C.B., one D.S.O., seven M.C.'s, six D.F.C.'s, one D.F.M., one C.B.E., four O.B.E.'s, three M.B.E.'s, one George Medal, and five American decorations and one Polish decoration.

The last parade before the Contingent's reorganization was on the occasion of the Loyola College Commencement Exercises in June 1946 when His Excellency, Viscount Alexander of Tunis, Canada's Governor-General, inspected a Guard of Honour under command of Maj. J. Brayley, M.C.

SACRED HEART UNIVERSITY
COTC

Soon after the declaration of war by Canada in September 1939, steps were taken by the President of Sacred Heart University, Rev. Dr. S. Larouche, c.j.m., to obtain authority to establish compulsory military training at the University. This authority was granted by the Department of National Defence, and in October 1940 training was commenced for students 18 years of age and over. Instructors were J. E. Picot, vice-principal of the Bathurst High School, who was the Regimental Sergeant-Major for the Second Battalion, North Shore Regiment, and Prof. R. A. Pothier of Sacred Heart University, who was a Sergeant in the North Shore Regiment. (They were later commissioned when the Contingent was formed.)

The first parade was attended by Lt. Col. E. J. White, Officer Commanding the Second Battalion, North Shore Regiment, who expressed the hope that those on parade would form the nucleus when a Canadian Officers Training Corps Contingent was formed at the University. He promised his fullest co-operation.

Training continued apace during the year, and on several occasions the Unit paraded to the North Shore Regiment Armouries where instruction was given on the rifle, Bren and grenades by Sgt. Maj. C. Hornibrook, a veteran of the First Great War.

During the year instructors were RSM. Picot and Sgt. Pothier, assisted by Prof. J. G. Gautreau (also later commissioned), another member of the teaching staff at the University. Courses were taken with the Second Battalion of the North Shore Regiment, and all parades of that Unit were attended by students taking military training at the University.

Seven University students attended Summer Camp at Island Park Camp, Woodstock, N.B., being attached to the St. Joseph University Contingent, COTC.

In February 1941, Dr. Larouche applied to the Department of National Defence for authority to form a COTC Contingent at Sacred Heart, and this was approved July 3, 1941, by General Order No. 137, 1941.

Maj. E. C. Armstrong, District Records Officer, M.D. 7, St. John, N.B., visited Sacred Heart on Sept. 24, 1941, to advise on matters concerning the organization of the Contingent, and the Unit was formed on a company basis, with a Headquarters and three platoons. Slate of officers included Vice-Principal Picot of the Bathurst High School, who was Director of Physical Training at Sacred Heart, and R. A. Pothier, J. O. Foohey, J. G. Gautreau and L. A. Doucet, all members of the University staff.

There was a strength of five officers and 87 Other Ranks at the first training parade, Sept. 30, 1941.

The Contingent was issued with uniforms early in November, and on Nov. 11 the Cadets paraded for the observances at the Cenotaph.

The first inspection was held Nov. 18, 1941, on the University grounds, with Brig. G. G. Anglin, O.B.E., M.C., E.D., District Officer Commanding, as inspecting officer. On Dec. 11 that year the new officers received their ranks, as follows: Captains Picot and Pothier, Lieut. Fooey, 2/Lieuts. Gautreau and Doucet.

When named to the principalship of the Bathurst High School, Capt. Picot resigned as Commanding Officer and was succeeded by Capt. Pothier, who was promoted to Major. Lieut. Doucet was appointed Second-in-Command and promoted to Captain. Junior officers who served with the Contingent were G. Michaud, R. Voyer, L. Leblanc, H. Arseneau and G. Chiasson.

A & T Staff

Personnel of the Active Force who served on the A & T Staff were Capt. A. H. Mailhot, Sgt. Maj. F. Jean, Sgt. Maj. A. LeBlanc, Sgt. Maj. N. Furlotte and Sgt. M. Farah.

The Contingent attended four Summer Camps: Island Park Camp, Woodstock, N.B., 1942; Camp Utopia, N.B., 1943; Camp Sussex, N.B., 1944 and 1945.

Ten members of the Contingent proceeded to Officers Training Centres and many enlisted in the Active Services.

The Unit provided Firing Parties for military funerals and paraded on Remembrance Day each year. At the end of the war training was continued as intensively as before.

McMASTER UNIVERSITY CONTINGENT COTC

The origin of the McMaster University Contingent of the Canadian Officers Training Corps is perhaps to be sought in the platoon which this institution supplied to the University of Toronto Contingent, COTC, in the First Great War. It was not, however, until the Second Great War that an independent McMaster Contingent came into being.

Immediately on the outbreak of war in September 1939, authority was sought for the establishment of a Contingent at McMaster, and in October 1939 the Unit was formed, with Lt. Col. F. L. Henderson, V.D., in command. During the first year of the war enlistment was voluntary, uniforms were not available and equipment and training aids virtually non-existent. These disadvantages were more than offset, however, by the enthusiasm of the Cadets, who at the end of the University year in May 1940 were absorbed into the Canadian Army (Active) as officers. Many of them subsequently distinguished themselves in battle.

Majority for Army

Effective in September 1930 and continuing throughout the war until the opening of the academic year in September 1945, all physically fit male undergraduates were obliged to serve

Chancellor G. P. Gilmour, B.A., B.D., M.A., D.D., of McMaster University.

with the forces. At McMaster University the overwhelming majority favoured the Army and were enrolled in its COTC Contingent, which consequently became much larger. Until the cessation of hostilities it regularly had two companies of four platoons each; in the year 1942–43 there were almost 300 men, all ranks, on its strength. Military stores now became more plentiful, uniforms were provided, weapons were available and the University provided an excellent new Armouries.

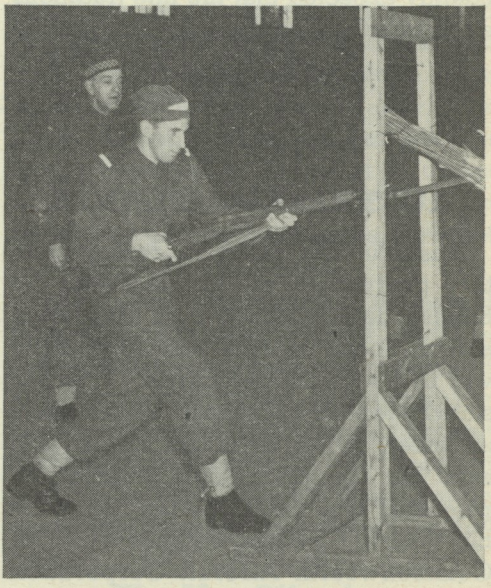
With the increase in numbers and equipment, the Contingent ceased to be a select body exclusively concerned with producing junior officers: it provided basic training for all ranks, practically all of whom were absorbed into the Active Army either at graduation or long before. It became, in fact, a Unit of the Reserve Army, smartly groomed and efficiently trained, which regularly spent part of every summer in Infantry training at Camp Niagara. Even though the Contingent thus ceased to be specially an Officers Training Corps, drafts were despatched to OTCs at Brockville and elsewhere. Of the men sent to the Active Army, a very high proportion (approximately 40%) obtained commissions; in all, 145 former members of the Contingent served as officers in the war.

Infantry did not get all the men from the Contingent: all branches of the Army, as well as the other arms, contained former members of the Unit. They saw service in all parts of the world—North Africa, Italy, Northwest Europe, South Pacific and the Burma-India sector. Practically every decoration, with the exception of the VC, is included in the honour roll of the Contingent.

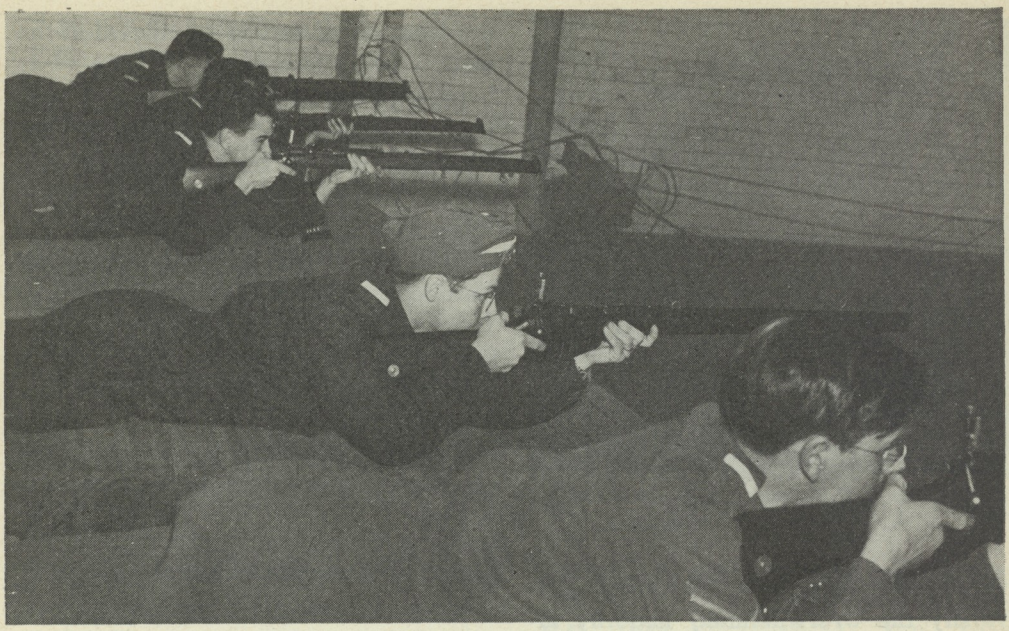
Twenty members of the Unit made the supreme sacrifice, and the wounded are not few.

Peacetime Training

At the cessation of hostilities, the Contingent returned to a purely voluntary system of enlistment in September 1945, and this fact, coupled with the general feeling of "let-down" after the grim struggle caused a drop in strength. The Unit, however, resumed its original function—the training of junior officers.



A member of the McMaster University Contingent, COTC, takes bayonet instruction under the critical eye of a Sergeant-Major. This photo of a Cadet in action was taken during the war years.



Musketry practice was an important part of COTC training during the war years. Members of the McMaster University Contingent are shown here on the indoor range.

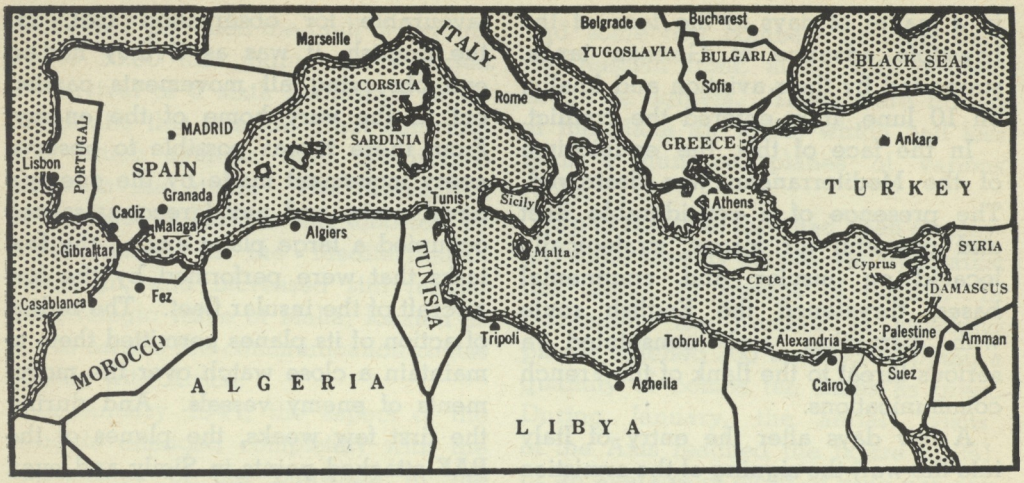
The announcement in September 1946 of a new system of officer training created among undergraduates a lively interest in the Contingent, and it is confidently expected that the fine traditions established during the war years will be more than maintained in the years of peace.

The present Commanding Officer is Maj. E. T. Salmon, with Maj. J. E. Reekie as Resident Staff Officer.

AUSTRALIA'S PLANES

Australia has taken its first step in the production of jet airplanes of English design. Soon both the design and manufacture of a new type plane will be begun in Melbourne. This was stated recently by an aeronautical engineer of the Royal Air Force. He said the Vampire single engine jet-propelled type would be the first to be built here. Twelve engineers of the Commonwealth Aircraft Corporation now are abroad studying latest developments in this class of aircraft manufacture.—*Australian News Summary*.

My hope is that generous instincts of unity will not depart from us in these times of tremendous exertions and grievous sacrifices, and that we shall not fall apart, abroad or at home, so as to become the prey of the little folk who exist in every country and who frolic alongside the Juggernaut car of war, to see what fun or notoriety they can extract from the proceedings.—*Winston Cnurchill.*



THE ROLE OF MALTA IN THE WAR

"Victory began to lead toward Malta the day on which, beaten and humiliated, the Italian fleet entered the devastated harbour of Valetta and gave itself up to the valiant garrison. On that day, Malta could well feel proud of her record." In these words the Spanish author of this article concludes a story of Malta's heroism as she stood athwart the Axis route of aggression in the Mediterranean during the dark days of 1940. The writer is L. Saenz de Pazos, and CATM reprints the article in digest form from the Military Review, a U.S. publication.—Editor.

When the English occupied Malta in 1800, they could not even remotely have imagined that what they were thereby adding to their extensive empire was a future airplane carrier. But this is what it was used as in the Twentieth Century.

At the beginning of the World War II there were only two powers at war in the Mediterranean, and both of them allied: England and France. Their interests crossed one another in time of peace, but they presented no obstacle in the way of their war activities. England made use of the Mediterranean as a route, or more accurately speaking, as a short-cut in the Imperial route to India. Her line of positions, Gibraltar, Malta, Suez (the English axis), was exposed to no threat on its flanks nor anywhere over its course and permitted of direct and effective communication with her overseas possessions. The communications of France with her North African possessions, her passage across the Strait of Gibraltar to others and by way of the Suez canal to the remainder of her possessions, was not interrupted or threatened.

The Mediterranean, during the period from the declaration of war till June 1940, occupied the attention of England and France only as an area requiring simple vigilance (with the consequent diversion of forces) in the face of possible intervention by Italy, which up to that moment was merely on the alert.

The May Offensive

In the month of May the great German offensive in the western theatre of operations began. France collapsed

in a matter of days in the face of the irrestible advance of German tanks, supported by their aviation and finally, on 10 June, Italy entered the conflict.

In the face of this, the equilibrium of the Mediterranean was destroyed. The presence of a considerable fleet and powerful air forces, strategically located on insular and continental bases, threatened the English route with disruption and constituted a serious threat to the flank of the French communications.

A few days after the entry of Italy into the war, the signing of the armistice resulted in the disappearance of one of the belligerents, France, who shut up her merchant and war vessels in her home or her African ports, with the exception of a few units which remained with the English. The English position was a delicate one in the face of the Italian threat, for she had a weak and extremely long communication line exposed to a serious threat over its whole distance. Italy had in her hands a wonderful opportunity to wipe out English power in the Mediterranean (at least in the central Mediterranean) since the English insular positions were represented by only 322 kilometers of territory divided among three major and two minor islands which were isolated and surrounded by formidable air-sea positions.

The Regia Aeronautica had approximately 200 bombers and 200 fighter aircraft stationed in the central Mediterranean. The Royal Air Force at that time had little more than a hundred planes of various types available. They did not have to wait long for an attack. The first day of the war Malta received the "official" visit of the Italian planes which, before the day was done, carried out seven more attacks.

The situation was bad. But in spite of this, the island rendered a very important service. Its position was so favourable for observation that, for the English, it was as if they had an eye observing all movements carried out in the very home of the enemy. From there it was possible to observe every movement made by the enemy's naval units, and naval reconnaissance occupied a large place among the few tasks that were performed by the few aircraft of the insular fleet. The radius of action of its planes permitted them to maintain a close watch over the movements of enemy vessels. And during the first few weeks, the planes of the RAF attacked points in Sicily and even bombed Italian ports, and Tripoli.

Supplies For Bombers

Another of its tasks was that of serving as a supply point for the bombers which, in their journey from England to Egypt, stopped at Malta for refueling. Otherwise, they would have been obliged to make a long detour, flying over dangerous regions of Central Africa where a forced landing would have been fatal. This applied also to mail planes and hydroplanes carrying wounded.

One of the best services rendered by the island occurred in the month of November. In the face of the threat constituted by the Italian fleet, the English decided to deal it a blow which would render it useless, or at least put it out of action for some time. The information obtained from Malta permitted of their following all the movements of the Italian ships and of their being perfectly acquainted with their whereabouts.

On the morning of the 11th, a plane was dispatched to Malta to obtain the photographs of the port of Tarento, which had been taken from the day before by observers of the RAF from planes taking off from the island. These photographs showed the Italian fleet anchored in the harbour, and among its units could be counted as many as five battleships. The planes

of the RAF patrolled the Gulf of Tarento up to 10.30 that night, and reported the arrival of a sixth battleship. Without doubt, this was the great contribution which aviation (and the island) made to the attack. The destruction of the fleet at Tarento was followed by repercussions in the Mediterranean campaign, and increased still further the strategic value of Malta, located as it was astride the communication routes of Italy with Africa.

In January 1941, the aspect of the struggle changed completely with the appearance of the Luftwaffe in the Mediterannean theatre. The first German attack cost the English the cruiser *Southampton,* and the destroyer *Gallant* and the carrier *Illustrious* were gravely damaged. German aviation also carried on a methodical destruction of the airdromes of the island.

During the following months, a few reinforcements arrived from Egypt or were dropped off by carriers coming from Gibraltar. The latter consisted of some 200 *Hawker Hurricanes*. The planes from the island continued attacking Axis shipping and bombing Tripoli. Naples was attacked, and finally all ports possible, especially those which were ports of embarkation for Libya.

War of Attrition

There is no doubt that during this period Malta made it possible to carry on a very successful war of attrition, since with relatively few planes it was able to interfere seriously with enemy communications and supplies. The danger from planes and submarines from Malta obliged Axis ships to make an immense detour.

Near the end of 1941, because of the total elimination of a convoy coincidental with the withdrawal of Rommel toward El Agheila, the Germans decided to execute an attack on Malta for the purpose of destroying it. Kesselring had some 600 bombers brought from the Russian front, along with a good escort of fighters. These were hurled at the Malta air force, which had less than a hundred planes of various types.

Up to that time they had been employing some seventy planes weekly against the island, in groups of twenty. In December, the number of attacking planes reached 200 weekly, dropping a quantity of bombs ten times as great. During January, the aerial "visits" of the Axis reached the figure of 261, or an average of eight or nine per day. In February, the bombs amounted to double those dropped during December, and a convoy intended for Malta was unable to reach the island.

In March, 6,000 tons of explosives were unloaded on the island, a total of 500 tons being dropped in a single day's time. Ten thousand buildings were destroyed, but in spite of this the English aviation was still alive, and executed an attack on the ships concentrated in Palermo. It was now reinforced by *Supermarine Spitfires*.

But it was in April that the island suffered most. On the 5th of the month the Luftwaffe unleashed its great offensive—called the Hundred-Day Offensive—and dropped 20,000 tons of explosives.

The paralysis of the island was almost complete, and from the air it presented the appearance of a besieged fortress. There were attacks which lasted 13½ hours. The lighting system was put out of order. The Fawara aqueduct was put out of commission. Not a house but what showed evidence of the devastating attack, and the anti-aircraft artillery was so short of ammunition that its quota was but fifteen rounds a day per piece. During this month Axis shipping supplied Libya without being molested in the least, since the garrison of the island was fighting solely for survival.

It is surprising that the total destruction at Malta was not attempted at the very outset. The opportunity that was presented at the time of the French surrender was not taken advantage of, and in April there was another opportunity for an attack on the island. Intentions existed, but they were never put into effect.

Ciano's Diary

Proof of this is contained in the diary of Count Ciano which says, under date of 12 May: "Rommel will attack in Libya at the end of the month with the object of crushing the British. (The attack began on 26 May). If he is able, he will take Tobruk and will go as far as the old boundary lines. Otherwise, he will limit himself to the avoidance of an enemy attack by striking the first blow himself. At this time, all his forces will concentrate for an attack on Malta. The Germans are sending a division of paratroops."

But in the month of May the island reacted, especially when fifty *Supermarine Spitfires* coming from the American carrier *Wasp* succeeded in landing at the battered airdromes of Malta. They had scarcely arrived when they brought down fifty-five attacking planes. But their sorties were limited because of the scarcity of fuel.

Under date of 20 June, Ciano says: "General Carboni has arrived at Rome to discuss the invasion of Malta. He is convinced we are going to suffer a terrible disaster. Preparations have been nothing short of infantile and our means are either ineffective or useless. Our landing forces will never succeed in landing, and if they do, they will be doomed to destruction. I am convinced we shall never succeed in this project."

Naturally, with such morale and spirit, no one could succeed. The chance was lost and never again was it presented in so favourable a manner.

Nevertheless, the need for getting supplies to the island was becoming urgent, and consequently an effort was made to get two heavily guarded convoys to the island—one from the east and the other from the west. The one coming from Alexandria met with a naval force composed of two battleships, several cruisers, and light units. This squadron was attacked by Beauforts and Liberators, but the convoy was forced to turn back to the point of departure in the face of the threat of enemy forces, supported by German planes based in Crete.

The one coming from Gibraltar succumbed to the attacks of the Axis, with the exception of two freight vessels which succeeded in reaching the port of Valetta. The Malta air force obtained some revenge by destroying two of the attacking cruisers. The assistance that had arrived was far from adequate and did not give the island sufficient strength for resuming the attacks in the strength in which it had executed them previously.

The island passed through an eight-week period without receiving any supplies, and it became necessary to attempt to get another convoy through.

Large Convoy

The convoy left Gibraltar and, for the purpose of achieving utmost security was composed of two battle cruisers, seven light cruisers, four carriers, and twenty-four destroyers, providing escort for fourteen merchant vessels. The importance of the convoy was such, and its volume so great, that it did not escape detection by the enemy reconnaissance planes. It was attacked before arriving within range of the fighter aircraft based on Malta. The attack was so violent that nine merchant vessels and four vessels of war were sunk—among them the carrier *Eagle* —but four merchant vessels and one tanker succeeded in reaching Malta. Then, for three months more, the island

received no additional supplies by way of the sea.

After Rommel retreated from El Alamein in October, Malta increased in importance. As the English advance arrived at the Cirenaica salient, the convoys that were sent to the island were able to make the journey with air protection over the entire distance.

Soon afterwards, there arrived in Malta a considerable part of the planes that had been based in Egypt, in addition to Beaufighters and Beauforts, accompanied by an abundance of carrier-based aircraft. Malta now went over to a state of uninterrupted offensive action which became a serious menace to the retreating troops. It began to attack the rear of the Axis troops, to disrupt their communications, to bomb their ports, and to pound their naval forces, more than ever before.

On the other hand the Axis aviation, now overpowered, was powerless to repel the action engaged in by Malta, and devoted its efforts to supplying and co-operating with its ground army which was very hard pressed by the advance of the Eighth Army, and with the presence of a new enemy who had landed in its rear and which threatened its retreat. The evacuation of the troops which were surrounded in Tunis was committed to the Axis air force, but the presence of Malta was not taken into consideration.

The prevention of the withdrawal of these forces by way of Sicily was perhaps one of the most important services that Malta rendered the Allies. The RAF maintained a watch day and night and German air transports were constantly attacked by English pursuit aviation. The position of the island forced the Axis to give up the attempt to evacuate the whole of its army which was surrounded in Tunis.

A short time after the conquest of North Africa, Allied aviation began to attack the Italian islands in the channel. At the end of twelve days of air attacks, the garrison at Pantelaria surrendered. Ninety minutes after the surrender of this island, the air offensive was turned against Lampedusa, which surrendered in twenty-four hours.

The bombers which attacked Gerbini and Catania were escorted by fighter aircraft based on Malta, and the planes of the RAF became more and more active over Sicily and southern Italy, attacking communications, airdromes, factories, etc.

Afterwards came the landing in Sicily and later still, the landing in Italy itself. With the capture of the Sicilian airdromes and the surrender of Italy, Malta ceased to be an advance base and now found itself in the rear. It was now able to rest. It had fulfilled its mission well.

This is, briefly, the story of Malta during the battle of the Mediterranean. We shall now attempt to draw a few conclusions from the part it played in that bitter struggle.

The first thing we note is the advantage it gave to the English to have at their disposal an observation post in the heart of the enemy area, a watch-tower from which they were able to observe all the movements the enemy made.

The second was the ability to intercept and render useless the enemy's communication routes. This became a constant nightmare to naval convoys which were forced into making a considerable detour, since their fear of its submarines—and still more of its planes—caused them to go as far as possible away from the island, with consequent loss of time in addition to necessitating the use of more fuel by the boats.

The third conclusion is that without Malta it would not have been possible to send special planes, supplies, and transports to Egypt by way of the Mediterranean. The island constituted an aerial supporting point. From being

a naval base it changed its role to that of an unsinkable airplane carrier, since the navy used it only for its submarines, and its surface units had prudently been withdrawn before the danger from the air had made itself felt.

The fourth, and very important conclusion, confirms the idea that fighter aviation continues to be the indispensable and basic element required for defence against hostile aviation. The island managed to survive only by virtue of its fighter aviation which fought ferociously, desperately at times, but which never permitted itself to be cowed by adverse experiences.

A fifth conclusion is that navies are not able to cross narrow water areas dominated by hostile aviation. Both the RAF of Malta and the aviation of the Axis achieved very notable victories over the other's shipping, including even the absolute annihiliation of enemy units, when merely local or temporary air supremacy was obtained.

The sixth conclusion is based on the importance of possessing a few square kilometers of ground in some location of great strategic value. More accurately stated, it does not consist in the possession itself of the terrain, but in recognizing the value of this island and the role it could play. Malta was fitted out as a naval base, and as such was very highly regarded, but it had sufficient flexibility, with the advent of aviation, to be able to adapt itself to its new role, and it played its part well.

An Axis Mistake

The seventh conclusion consists of showing us the great error the Germans and Italians committed in not completely eliminating the threat represented by Malta to their military plans. Malta and its airdromes were like a malignant growth introduced into the organism of their communication and supply systems.

The eighth and last conclusion we are able to draw is one of a purely moral nature. As long as the attackers "were convinced a landing would fail" (even before attempting it!) the island could rest assured it would be able to survive, for in the face of such a conviction failure is certain. The garrison, however, was not aware that this state of morale existed in the enemy camp, and they acted in accordance with their own, which dictated firm resistance and keeping their flag flying over the island.

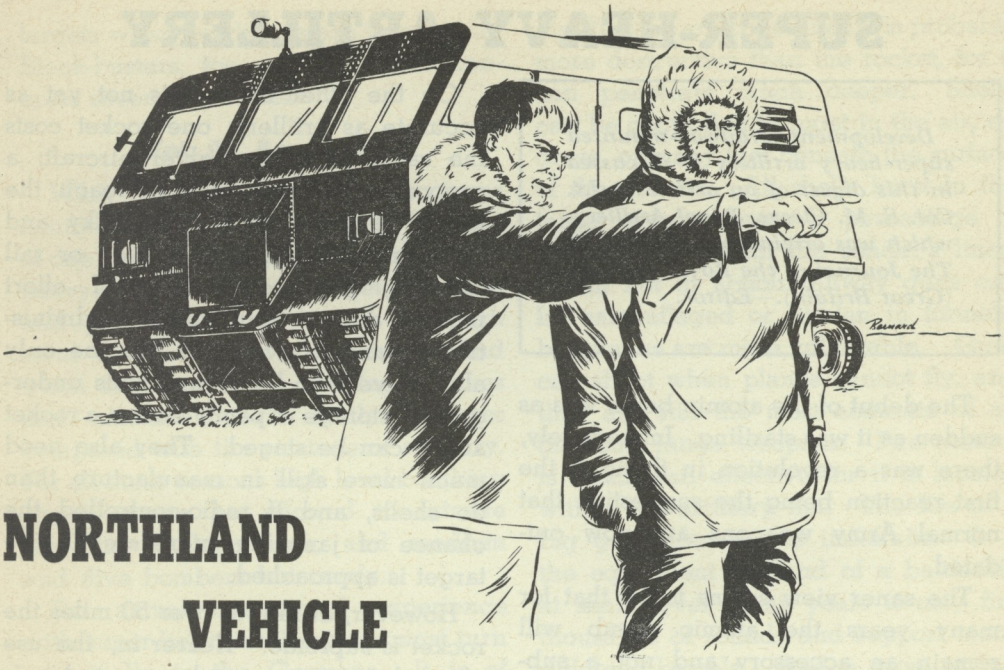
They resisted well and took maximum advantage of their precarious situation, in spite of the constant attacks of their adversaries.

Victory began to lead toward Malta the day on which, beaten and humiliated, the Italian fleet entered the devastated harbour of Valetta and gave itself up to the valiant garrison. On that day, Malta could well feel proud of her record.

The prime purpose of the armed forces is to win without excessive loss of life. In that purpose the Army won a success without precedent in our history, and this is proof enough of the character of the military leadership. It could not have succeeded if there had been anything radically wrong with our leadership, and I mean the leadership supplied by those in uniform.—(*U.S.*) *Secretary of War Robert P. Patterson.*

PROOF OF CAPACITY

It is necessary that every superior commander give proof of his capacity for judgment, of his foresightedness, and even of his spirit of decision. This is of much greater importance than is thought by those without experience, and it is necessary that, in the maneouvres of large units in time of peace this be exploited to the limit.—*A Defesa Nacional* (*Brazil*).



NORTHLAND VEHICLE

The accompanying illustration is a drawing by CATM's artist of a northland vehicle, the Penguin Mark II, which is being developed by the Directorate of Vehicle Development, Army Headquarters, Ottawa.

The Penguin is a modification of the Canadian Armoured Snowmobile. For Exercise Muskox, 15 vehicles known as the Penguin Mark I were produced by mounting special Duralumin and plywood bodies on the stripped Snowmobile chassis. Experience on this Exercise indicated that certain improvements should be made if this type of vehicle was to be used again in the north.

Improved Features

Thirty Snowmobiles are being converted to a design known as the Penguin Mark II, which will have the following improved features when compared with the Mark I:

1. Body of new double-skinned construction, roomier with improved seating and stowage arrangements. Sponson doors are installed in place of the rear entrance.

2. Crew compartment heating arrangements improved.

3. Redesigned engine and radiator installation to improve the engine cooling.

4. Altered final drive ratio and revised weight distribution to improve the performance and ride.

5. Better accessibility to components for ease of servicing.

These vehicles will be tried out in the north under both summer and winter conditions. The information gained will point the way to future vehicle designs suitable for traversing that area.

I repulse the idea that war is inevitable, still more that it is imminent. It is because I am so sure that our fortunes are in our own hands and that we hold the power to save the future that I feel the duty to speak out now.

—Winston Churchill

SUPER-HEAVY ARTILLERY

Development of railway-mounted super-heavy artillery is discussed in this digest of an article by Lt. Col. S. M. Cleeve, Royal Artillery, which was originally published in The Journal of the Royal Artillery (Great Britain).—Editor.

The debut of the atomic bomb was as sudden as it was startling. Immediately, there was a revolution in thought, the first reaction being the suggestion that normal Army weapons are now outdated.

The saner view seems to be that for many years the atomic bomb will remain an accessory and not a substitute. If it substitutes HE then its approach into the Army sphere will be from a distance, that is through V-2s, super-heavies, heavies, and so on down the scale. But until this happens let us make no mistake—we must carry on and even develop our normal weapons.

In doing so we have to consider the super-heavy artillery which appears to have been more nearly superseded by rockets and bombing than any other branch. Let us compare it then with those weapons.

In this sphere the super-heavies are not alone. The bazooka is challenging the anti-tank gun, the land-mattress the field artillery, the anti-aircraft rocket the anti-aircraft gun, and the long-range rocket the super-heavies.

Chief Advantage

The chief advantage of this rocket, of which the V-2 may be considered the type, is its range. In this respect it will always be superior to guns. Its effect in large built-up areas where accuracy is not required is great. Its firing site can be anywhere and easily hidden, and its projecting apparatus is light and cheap.

On the other hand it is not yet as accurate as artillery; one rocket costs the same as three fighter aircraft; a proportion of them fails to reach the target; they are light and bulky and therefore very wasteful of road or rail haulage; the maintenance of effort imposes an enormous strain on administration, and to overcome this the only alternative is to build enormous underground storage capacity before a rocket attack can be staged. They also need much more skill in manufacture than do shells, and if radio-controlled the chance of jamming increases as the target is approached.

However, at ranges over 50 miles the rocket is supreme. Nearer in, the use of rockets on super-heavy tasks is uneconomical.

Fresh in our memories is the bombing of Cassino, Caen and Brest, all within range of our guns. And there were close targets, too, which unfortunately incurred the loss of some allied troops. Perhaps we could not have massed enough super-heavy artillery to produce the same effect even had we developed this branch. These air bombardments may have been damagingly effective while they lasted, but they could never have achieved the same persistence or harassing effect as the artillery in all weathers.

We must remember, too, that when the enemy has air superiority we cannot make these attacks and may then be utterly dependent upon super-heavy artillery. Also, the more efficient and plentiful this branch is, the greater is the number of bombers that can be released for purely bombing tasks.

Nevertheless, bombing has its points: it can beat the super-heavy artillery in range, and often in effect for *short* periods; and Typhoons and Mosquitos can take on long-distance pin-point

targets when conditions are favourable. Block-busters, too, can penetrate concrete several feet thick.

Not As Accurate

What it cannot be, normally, is as accurate as the super-heavies; the cost of one bomber is the same as one super-heavy. Nor must we forget the time and petrol required to get the high level bomber to a safe height. And when flak is efficient, the loss of lives and machines is a costly business compared with the wastage of artillery. For all these reasons high level bombing should never be allowed to intrude into the artillery zone, and medium and dive bombers but rarely.

For actual operational experience with super-heavy artillery we must turn principally to the Germans. It is of course a fact that we employed 240mm super-heavy regiments operationally in the recent war and that their work has been very highly spoken of. But there has been no British military development of guns above this calibre since 1918.

Nor should we be dogmatic as to whether the guns are transported on road or rail mountings. The 240mm on the road mounting is reported to be efficient. But all the big nations have realized the advantages of mounting 11-inch guns and above on railway mountings for use over the massive railway systems of Europe. It is at present the only way of getting them in and out of action quickly, though it is conceivable that in future they could be given multi-track self-propelled mountings. To simplify the discussion which follows, however, we will bear in mind the big long-range gun on a railway mounting which many have been accustomed to look on as the standard super-heavy equipment.

Whereas the blast effect of the super-heavy shell is less—and we must always think first of the shell—where deep installations are concerned it is probably more destructive than the rocket, for it can penetrate much deeper. Shells can be controlled to burst in the air, on graze, or many feet beneath the surface of the ground. All shells burst in the target area whereas a percentage of rockets falls within the sender's lines. When not in action railway guns can be camouflaged or hidden in tunnels, but planes are more vulnerable. Guns can shoot when planes cannot fly, and they are still the most accurate of all the long range weapons. Fire control is quick and effective for it is located within the artillery net. The life of a big gun mounting is indefinite. It is the equivalent on land of a battleship at sea. Over many years it may fire thousands of rounds and support many different barrels. And a most important consideration is that casualties to air crews are probably much greater than they are to super-heavy gun crews. Lastly, from 80 to 100 big gun shells can travel in one railway car—and one car is required for one rocket.

Confined to Rails

The disadvantage of really big guns is that their movement is confined to railways and therefore the choice of positions is limited. Observation of fire is far from easy, and special apparatus is needed for the rather frequent changes of barrel.

Nevertheless the disadvantages are not insurmountable; they are the price that has to be paid for the delivery of the shells—but it is cheaper than that of any other arm. Every big gun shell can be relied upon to do some damage, and the super-heavy artillery can keep up a bombardment in all weathers, and bombers cannot. Super-heavy artillery is far from obsolete and, indeed, is worthy of further development.

In considering whether big guns are of more value in offence or defence the damage to railway lines in modern

war must be considered. Fresh in our minds is the damage done to the continental system by the RAF—the outcome of a deliberate policy. In spite of this damage, the German lines were seldom out of action for more than 12 hours at a time before November 1944 and till then, at least, they were well able to use their railway guns in defence. In the offence, there were many battles in the recent war, in the open and stabilized phases, in which we could have used railway guns. In the offence, too, it may be assumed that air supremacy will give more protection to the guns and lines over which they operate than in the defence in which it may be absent.

Big railway guns can be valuable mobile reserve to the static defences of ports. They can also be run quickly to portions of the coast not covered by the fixed defences. Indeed, as the position of the fixed defences is normally known, we must be prepared for combined attacks to be diverted to coast lines out of their range. The German railway turntable, which can be laid in three hours, now gives to these guns a quick rate of all-round traverse. With improved loading devices and portable fire control units, these guns might well play their part in a modern engagement of shipping, or in a defence battle against a combined operation. The Germans used them successfully in the recent war, and, in particular, we should note the very serious damage done to our combined operation at Anzio by their railway guns which were brought up quickly to counter it.

Economy Important

In the realm of big guns economy is of paramount importance and few powers have ever found it expedient to manufacture big guns purely for the field or coast artillery roles. The Germans used no less than 19 different kinds of big guns on railway mountings but of these only four were specifically developed by and for the Army, all others being naval designs adapted.

In a sense this is as it should be. Big guns and their cradles can well be designed for universal usage and only require minor adaptation for use on naval, field, or coast artillery mountings. The purpose should be borne in mind when they are designed.

So far as manpower is concerned there are only two points of difference between a super-heavy and any other regiment. One is that super-heavy guns have many power-operated devices which make the man-shell ratio much lower than in those batteries not so equipped. The other is that super-heavy batteries have longer periods out of action when their manpower is in a sense wasted. During these periods, however, they may be very valuably employed as railway repair squads, in which work they are well-trained, or on V-2s which, with their much longer ranges, can be used when super-heavies are prevented from following up an advance.

To fill the gap in range between our long range heavies and the commencement of the V-2 zone, and for use in combat defence, or in the anti-shipping role, we should plan for artillery which can deliver the heaviest possible projectile between a minimum range of 15,000 and a maximum of 90,000 yards. All-round traverse to be provided at a rate of 60 degrees to a minute, a rate of fire of one round a minute and a time in and out of action of not more than three hours which must include the laying of the turntable or base.