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**ARMOUR**

**BULLETIN**

**DES BLINDES**



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# ARMOUR BULLETIN

## EDITOR'S COMMENTS

Our Corps professional publication, The Armour Bulletin, is produced by the Armour School at the Combat Training Centre.

The response to the requests for articles for the last two issues has been very good. This particular issue has articles from throughout the Corps as well as one from outside the Corps. It is hoped that this interest continues from both the regular force and the militia.

In conclusion, I would like to express my appreciation to Mrs. Frances Smith who did the typing for this issue and to all the authors who contributed articles to the bulletin.

E.D. Borylo  
Capt  
Editor



#### DIRECTOR OF ARMOUR'S FOREWORD

It was with a great deal of pride that I assumed the position of Director of Armour in July. My predecessor, Colonel Jack Dangerfield, who is now attending the US Army War College, has guided the Corps through three challenging and exciting years and we are all in his debt for his outstanding efforts. I know that I speak for all of us when I express our gratitude and extend to him our best wishes for continuing success.

As the Corps enters the 1980's I can readily see our past successes, our strengths and limitations, where we need to place emphasis, and the directions we need to take to be fully prepared to take our place and do our duty should the need arise. We have come a long way since the early 1970's but we still have some distance to go.

Our limitations, primarily in shortages of soldiers and equipment and in the unsuitability of some of our equipment, have had a serious effect on our ability to train as a part of the all-arms team. Many of these limitations have been overcome by equipment acquisition and planned manpower increases. These initial accomplishments, together with the inherent strength of our soldiers and Regiments, both Regular and Militia, now place

us in a position where we can "get on with it" and once again be a full fledged member of the all-arms team.

I have strong feelings about the direction which our Corps ought to take, and I intend to use this Bulletin in which to express them. I am also aware that many of you have good and viable ideas too, and I trust that you will take the same opportunity, for it is through such media as the Bulletin that we can air our views, put forth our ideas, and receive the essential feedback to ensure that the direction we take is indeed the right one.

There is no doubt that difficulties lie ahead, but we should treat them as challenges and I am confident that we will meet them in true Armoured Corps style.

It is my intention to get out and visit as many of you as I can in the next several months and I look forward to seeing you and to taking on the challenges together.

A handwritten signature in black ink, appearing to read 'C. Milner', with a long horizontal flourish extending to the right.

C. Milner  
Colonel  
Director of Armour

## Leadership Qualities

By: Major D.A. Henderson, CD

The black beret with two hat badges and the expression "Hit 'em for Six", are symbols of one of the great military leaders of the last war.

The characteristics of a leader, whether he was born hundreds of years ago or now, remain the same. Socrates' definition of a General goes to the root of the matter. He stated that the good General must:

1. Know how to supply his men with their rations and every other kind of stores needed for war.
2. Have imagination to originate plans and a practical sense and energy to carry them through.
3. Be observant, untiring, shrewd, kindly and cruel, simple and crafty, a watchman and a robber, lavish and miserly, generous and stingy, rash and conservative.
4. Have all these and many other qualities, natural and acquired.
5. Also know his tactics, for a disorderly mob is no more an Army than a heap of building materials, a house.



Leaders belong to a brotherhood. Each possess characteristics that make others take notice. The success of leadership depends on appeal to others, personality, knowledge, common sense and practical sense. Field Marshal Bernard Law Montgomery, who had commanded the American, British and Canadian Forces during the invasion of Europe in 1944, possessed these qualities.

The purpose of this article is to show how natural and learned abilities can work together to produce a leader of men.

Montgomery's home environment, during his early years, was a major factor in the development of his iron-clad character. The family lived on the Island of Tasmania, just off the coast, South of Melbourne, Australia, from the time Bernard was two, until he was fourteen.

His mother Maude was a striking woman described as being aristocratic and fiery in nature. She was authoritarian and ruled her children in a very strict manner. The children admired and respected her immensely. Bernard had inherited his mother's strong will power and it was this fact that ensured an inevitable clash. He was always in trouble.

As a child, Montgomery was restless --- almost nervous. He always had a new project and he was more than ordinarily impatient if frustrated. He showed a real eagerness to be the leader in games and was less capable than any of the children in obeying his mother's rules. He was continually mischievous and one row followed another. Every incident was a challenge and he could never seem to take life as easily as his brothers. He knew he was defying his mother's strong discipline but he could not help it, even if the result was punishment. Life was a continual struggle and one of setting one's self up against a superior force.

Bernard loved his father deeply. He was a Bishop in the Church of England and the image of kindness and justice. As an extremely passive man, he supplied the religion and love in Bernard's life. The boy worshipped him and secretly imitated him.

Montgomery had distinctive mental and physical characteristics. He loved to order others around, hated being ordered, did not like to study, enjoyed control of a situation and the company of other young men. He was capable of arrogance and aggressiveness and was extremely determined in anything he undertook. For example, although he did not like studying, he was determined to get into Sandhurst, and did, graduating as an excellent student standing 30th in a class of 150.

Physically, he was not too impressive. He had a small build, blonde hair and piercing blue eyes. His movements were bird-like, but he was, through tough self-discipline, extremely fit. This fitness saved his life



as he lay dying from chest and knee wounds, in a muddy and bloody field, during "The Retreat From Mons (W.W.I.). By the rules of the game, he should have been dead for hours. After a delayed rescue, a grave had been dug for him, but by chance, someone noticed a flicker of his hand and he was taken to a hospital for treatment. After a lengthy convalescence, he returned to France as a Brigade Major. The only telltale sign of his ordeal was a high-pitched, irritating voice, resulting from the wound in his chest. For the rest of his life he would have the use of only one lung.

By 1918, he rose to GSO 1 on the staff of the 47th (London) Division. Here he devised a system of liaison officers which he was to use effectively 25 years later. When the end of the war came, Monty was experimenting with new ideas which he considered necessary to overcome the blunders of the First World War. He was determined by 1918, to follow the Army as a life study.

His first move was to try to be accepted into Staff College. With difficulty, as Monty was still relatively obscure, he was asked to report to Camberley in 1920, at the age of 33. He laughed outright at the prescribed course. To him, and others, who were young veterans of France, the curriculum was absolute nonsense. Monty was regarded as quarrelsome and argumentative. He and his friends went through the one year course jeering and arguing -- and passed! Five years later he returned as a DS.

In 1930, Montgomery, as Secretary, succeeded in dominating the entire committee appointed to rewrite the Manual of Infantry Training. With a bit of persuasion, the War Office finally released the pamphlet, practically as Monty had written it.

After three years in the Middle East and one year in India as CO of an Infantry Division, Montgomery embarked on a new chapter in his life: that of teaching the art of war at the Quetta Staff College in India. He taught his young students the qualities of leadership as proposed in "his" manual. Of training he said:

"To do nothing is to do something definitely wrong. The Platoon Commander must place his own comfort and convenience after that of his men. Also, leadership depends on simple and straightforward human qualities. A leader, above all, must have the confidence of his men. He will gain their confidence by commanding their respect for his determination and ready acceptance of responsibility; for the clearness and simplicity of his orders and the firm way in which he insists that they shall be carried out: for his thorough knowledge of his profession, sense of justice, common

sense, keenness, energy and habit of forethought; for his sense of humour, for his indifference to personal danger and the readiness with which he shares his men's hardships; for his persistent good humour in the face of difficulties and for the obvious pride he takes in his command".

Tactics, of course, are supremely important to leadership. While Monty was teaching leadership qualities, he was advocating new tactical moves. When in command of the 9th Inf Bde in 1938, he had the chance to show that his theories worked. His brigade beat all competitors in the big annual manoeuvres on Salisbury Plains. There was no doubt that his methods were sound.

Montgomery was one of the few men who knew World War II was inevitable. He had prepared his strategy well. It was he who commanded 2nd Corps and helped supervise the movement back across the Channel at Dunkirk in 1940. It was here he saw a cardinal point of war confirmed. The success of the movement was attributed to accompanying factors plus the fact that the Germans did not dominate the air. As he put it later it is necessary to win the air battle before embarking on the land or sea battle.

It was in 1942, that Monty received his call of destiny. General Gott, flying to Africa to assume command of the 8th Army, had been shot down and killed. Montgomery had been ordered to report as the replacement and to take command August 15. It was here that the Montgomery legend took hold.

On August 13, Monty drove West from Cairo to the 8th Army H.Q. at Alamein. He was surprised and shocked. Later, he said that he had found the situation "unreal and dangerous". He decided to take action at once realizing that contact with G.H.Q. was useless. He took full responsibility for assumption of command two days early and cancelled all previous orders for withdrawal. Surprisingly, no one queried his actions. Everyone merely obeyed. This was an indication of Montgomery's personality plus the state of the 8th Army, at the time.

True to the Montgomery style, on the evening of August 13, the Staff Officers of the 8th Army were drawn up before him. Here he delivered one of the most astonishing speeches a Commander ever gave. After introducing himself and expressing confidence in his staff, he set about severely criticizing the atmosphere that he found at the H.Q. He said Rommel was rumoured to be ready to attack. He, Montgomery, would send him off. It could be the beginning of the end for the enemy in Africa.

Some men were astonished by this supreme confidence. They figured it was inexperience in desert warfare that allowed him to speak this way. Others were inspired by the extraordinary atmosphere this man created.

Immediately, an armoured reserve was built up. Orders in future, would be given through his new Chief of Staff, Brigadier deGuingand. The H.Q. was to be moved to a healthier site near the coast and closer to the desert Air Force H.Q. Men were "sparked", and agreed that this man and his plans might have something.

Montgomery's headquarters was split into three separate parts. The administrative work was directed from Rear H.Q., the Chief of Staff worked from Main H.Q. and the new innovation, was Montgomery's Tactical H.Q. where he, personally, directed the battle. His Tactical H.Q. was always as near to the fighting as practicable and very small for an Army H.Q., consisting only of a few caravans and a handful of officers.

The closest possible planning with the Air Force, the detached and almost clinical approach to the design and execution of an operation, and the objective account of what exactly was going on at any particular part of the battle-field, all symbolize Monty's approach to war. He placed great importance on his hand-picked staff of L.O.'s who delivered all this information to him, every evening.

Characteristically, as he had done in England, he had carried out a ruthless one man assessment of those holding key positions. Those who failed to measure up were removed and replaced by fresh ones, many of whom showed exceptional ability and stayed with Montgomery for the rest of the war.

Accent was on efficiency and youth. The vast majority of the Army were civilians. This fact was fully appreciated by Montgomery. He knew that to command such men demanded not only a guiding mind, but also a point of focus. In another way, they needed not only a master but a mascot. He became both. He deliberately set out to help the men recognize him as a person and an individual; the man who was putting them into battle. To obey an impersonal figure was not enough. He stated, "they must know who I am".

The Commander, as a personality, began to emerge. On first arriving in the desert, Monty wore an Australian slouch hat, for protection from the sun. On entering a tank, which he used to get closer to the fighting, a trooper offered him a more comfortable and practical beret. Montgomery added his General's badge to the Royal Tank Corps Badge already on the beret, thus becoming the only soldier to wear two such insignia.

Monty moved quickly and often among the units. He covered front and rear units, visiting with the men for literally, a cup of tea, very often accompanied by a handout of cigarettes. Sometimes, as many as 10,000 packages would be loaded in his vehicle in the morning to be given out at random along with papers from home. The so-called "handouts" had an alternate purpose.



The men loved it. They felt the implication being made and they were members of a fully appreciated team. His men also saw the practical reason for supporting Montgomery. With this man, they, at least, had a chance to stay alive. His staff were convinced that the symbolic black beret with the two hat badges was worth a division when produced at the right moment.

It was necessary to experience Monty's way of life in order to understand him. Everything was black or white, right or wrong, and he had supreme confidence in the fact that he was right. His whole life was to be geared to one objective - military victory over his foe. For this reason, he followed a strict daily routine that enabled him to give his most towards attaining his goal. He made sure that he was never overworked and never worried about anything. Worries never lingered for he immediately thought about the problem and turned those thoughts into actions, thereby getting rid of the matter.

Monty insisted absolutely on good discipline, above average work, and absolute loyalty. He expected the most from those around him. At the same time, he knew the importance and the personal enjoyment of good comradeship and comfortable living. He saw to it that his men were well fed, had adequate recreation, and were as well cared for as the situation allowed. True to character, Montgomery always considered a battle as a personal challenge. He had a ritual which was developed at Alamein and followed thereafter. He gave his outline plan in general terms. His planning staff then prepared several schemes and returned to argue their merits. Monty chose the one he wanted. Once it was selected, a series of intensive interviews followed. He heard from Intelligence, Armour, Artillery, Signals and Supply. Each man had to give clear, simple, rapid answers and be prepared to back them up. Commanders soon learned it was stupid to boast or underestimate. Monty was particularly severe on those he felt were not doing enough. Mistakes and miscalculations resulted in one thing: instant dismissal.

In the Montgomery tradition, speed was not important. He did not move until he was ready. He believed all ranks should be told as much as possible about the plan as well as the operations. He always delivered a message on the eve of a battle to his troops, giving the comforting re-assurance that the soldiers were not alone. They had the Air Force and good weapons behind them. Monty paralleled a battle to that of a cricket game where the term "Hit 'em For Six" has a similar meaning to a home run in baseball. He expected his troops to go into any battle with the momentum to "Hit 'em For Six".

In conclusion, Montgomery's teaching, as Chief Instructor at the Staff College at Quetta, sum up the leadership points that he felt were essential and that apply today as they did then. Remember this and all will go well.

Morale: Study the individual soldier, create an atmosphere of success. Atmosphere means everything.

Simplify the Problem. Sort out the essentials which must form the basis for all future action. Ensure they stand firm and are not swept away in a mass of detail. As a Commander, lay down the essential framework of what you want done - then allow great latitude to your subordinates. Explain the plan carefully and fully. Stand back yourself and avoid being encumbered by non-essentials.

Pick a Good Team. You must learn how to pick a good team of subordinates. Once you have them, stick to it and trust them. All men are different, so are brigades and divisions. If you study human nature, you will be able to fit them into the right places.

Know What You Want. Make yourself know what you want and have the courage and determination to get it. You must have the will to win. It is much more important to fight well when things are going badly than when things are going well. Battles seldom go completely as planned. Great patience is required and you have to keep on until the other fellow cracks. If you worry you merely go mad.

And remember, hit 'em for six.

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## Letter to the Editor

Dear Sir:

I refer to Captain Chris Corrigan's article in Volume 11 in which he writes of his experiences with C Squadron of my Regiment at the British Army Training Unit, Suffield (BATUS).

What Captain Corrigan did not say in his excellent piece was that, because of the sudden illness of his squadron leader shortly before C Squadron left Germany, Capt Corrigan led the squadron throughout the BATUS training period. He did so with much distinction.

Captain Corrigan's modesty should not go unremarked.

Lieutenant Colonel R.J. Rhoderick-Jones  
Commanding, Queen's Royal Irish Hussars

## Cease Fire Violation

by Captain M.R. McNorgan  
B Squadron 8CH

This is an article concerning one night in Cyprus from one Subalterns point of view. It was anything but a typical night. It was also, unfortunately, not an isolated incident. Events like this had happened before, and were to happen again.

On a cold February night, I sat in my jeep near an UN Observation Post (OP) watching colourful arcs of traces criss crossing the black sky. My task was to cross the two lines of its opposing armies, to make contact with the local commander on its other side and try to arrange a ceasefire. I'd given the question of where and how to cross a lot of consideration. During a similar outbreak a month before, I'd been unsuccessful in getting through at a regular crossing point. I had spent a frustrating period of time with a nervous sentry whose only reaction to my gestures and pleas was to take aim with his rifle everytime I advanced. Although I got within ten metres of his position, it was very evident I was not going any further. A well timed radio message for me back at the jeep gave me an excuse to back down with some shreds of dignity.

This night my plan was to cross in the middle of the lines, away from the checkpoints. At the chosen place, the respective front line positions were in houses on opposite sides of a suburban street. From my position, sitting in the jeep, I could see around a curve in the street into the back of a war damaged house. A crew of men were energetically loading belt after belt of ammunition into their tripod mounted machine gun, spraying the houses across the street from them. There was a lull in their outpour as one of them moved back to bring up more boxes of ammunition. I took that as my cue and, leaving my SMG behind with my driver, I grabbed a flashlight and quickly walked up to the house. Shining the light on my UN blue helmet, I tried to convey the idea that I was going to cross the lines. The man on the gun was friendly and obliging as he smiled and nodded and waved me on.



Too easy! Shining the light on my helmet I stepped out confidently, crossing on a right-diagonal, heading for a one storey bungalow where I had caught a glimpse of figures in a window. A voice behind screamed out, "Don't shoot!" My heart jumped into my mouth and I stopped, listening. There was no reaction so I continued on. Climbing its steps, the front door cracked open and a barrel peaked out. A moment later I was inside holding up both hands and smiling ingratiatingly.

An NCO came into the room. I spoke the name of the Second Lieutenant who commanded in this area. He gestered for me to follow and led me into the back of the house. As we stood in the wreckage of a typical well looted Cyprus kitchen, I could hear bullets whining off the front of the building. My friends across the street had evidently been replenished. The NCO preceeded me outside. Moving to the back corner of the house, he stopped until the machine gun paused in its firing. Then we doubled side by side across the driveway to the rear of the next house. The reaction from our friends was a hosing of rounds down the gap we had just crossed. Moving across the rear of the second house we got ready to repeat our performance. Again we were successful. Behind the third house, I met the officer I had asked for. He agreed to take me to his company commander and we headed back together toward their trench lines. In a way, we were going from the frying pan into the fire. Since most of the firing on the line appeared to be going high, there were more rounds coming down in the rear areas than in the front.

This trench line ran parrallel to the front and was in reality a four or five foot deep ditch, full of mud, braced with wood planks and topped off with a line of sandbags. Bent over to avoid showing my head above its sandbags, I followed along slipping and sliding in the slime. The scene in the trench seemed unreal to me. The arcs of trace, orange, green and yellow, the continuing rap-rap from the guns, made me wonder if it wasn't really 1915 instead of 1975.

My guide stopped at a right-angled turn. Here it was necessary to step up into a shallower communications trench which led back to company headquarters. My guide jumped a deep mud hole and stepped up to the communications trench. I prepared to follow when there was a sharp thwack in the sandbag by my head. My guide stood upright and yelled out in a forceful tone. I realized that one of the sentries at the headquarters had shot at us. My guide was doubly furious. Not only had we not been challenged but the sentry was one of his own men! There was a surprise for me at the headquarters. Instead of the Captain I had expected, I was greeted by an officer of General rank.

He was quick to agree to a cease-fire provided the other side also stop. He then indicated to me that the whole incident was a retaliation for the occasional midnight sniping that had been going on in one particular part of the line. I know this area well, since my soldiers occupied an OP there which was co-located with his. I also had been making protests about the sniping incidents in that location.

The return trip followed the same route as the trip up. Because of the orders for cease fire, there were now only occasional shots and I made much better time.

Back at the jeep I sent a sitrep to my Headquarters explaining what had taken place. (Later, we were all instructed to carry man-pack radios when on this type of duty). Headquarters told me that one of my OPs had been badly shot up and that there had been casualties there. I was then ordered to await the arrival of the Commanding Officer, who wished to speak with this General I had found.

The wait seemed endless. The only diversion was the arrival of a platoon of APC's touring the line to enforce the ceasefire. The platoon commander told me that one of our officers, who had been missing for some time, had reported in. He had gone out on the same mission I was on but had been caught in a cross-fire and had spent a lengthy period of time pinned down in a ditch.

The Commanding Officer arrived with the RSM and a small protection party. We started out for the headquarters, this time walking down the street. There were only the sounds of distant shots to be heard now.

Before we began, the RSM strode over to my two friends manning the machine gun. He stood in front of them pointing out their poor standard of dress and the dirt on their weapons. Although I am sure they didn't understand one word in ten, there was no mistaking the authority in his voice and bearing. The men sat back and started buttoning tunics and wiping off mud. There would be no more trouble from them.

Arriving at the headquarters, I had another surprise. The Commanding Officer spoke German! He and the General communicated quite happily in that language until both were satisfied with the arrangement for the cease fire.

After returning to our start point, the Commanding Officer left with his party to tour the line and I set out on a tour of inspection of my OPs.

Everyone had a story to tell, but aside from a few broken windows and bullet holes in already perforated buildings, everyone was OK.

The last stop was the scene of the start of the night troubles. The OP itself was a shambles of broken glass, mud and scattered papers. In the dugout, beside the position, was the bloody ground where a man had lain shot through the head. One of the two soldiers on duty was still in shock having seen a man killed. The other was calm and quietly reported to me how he had tried to save the wounded man by giving him first aid and carrying him on his shoulders back to the second line of trenches to an aid post. Having seen the volume of fire landing between the two trench lines, I was amazed he himself had not been hit. (He was later awarded the Medal of Bravery).

As he finished his story, the relief shift arrived. Their clean uniforms, black jackets and rifles stood out in sharp contrast to the muddy kit of the off-going shift. One of the new men picked up the OP log book from the wreckage strewn floor and entered his name. Another day on the island was underway.

---

#### ODE TO THE BLACK BERET

Oh! We're waiting for our berets,  
And we're waiting for our tanks;  
And we're waiting to return a very  
Cordial note of thanks.

To the Dieties who've saved us  
From that grease spot on the crown  
And that headache round the temples  
When you've got the chin strap down.

From the peak which saved our eyesight  
When the sun was shining hot,  
And passed us out at musketry  
A 'blinking' third-class shot.

Our beret has a flappy side  
Which drops upon one ear.  
There's more than meets the eye  
You bet my dearie dear.

The all-round traverse to the flap  
Is worth a mint of gold,  
You flap it round when it is hot  
And ditto when its cold.

You can drop you beret in the sump,  
Or leave it on the track  
And get it back as good as new  
Because it's issued black.

# The Anti-Tank Helicopter Threat

by Lt P.G. Ward

## Introduction

Much has been written on the anti-armour helicopter versus the MBT pointing out the advantages of each as the better anti-armour weapon. Of late, both weapons systems have been recognized as being separate and viable anti-armour weapons.

## Aim

The purpose of this article is to illustrate the effectiveness of the helicopter as an anti-armour weapon and to show that the helicopter needs to be used in conjunction with all the other anti-armour systems employed on the battlefield.

## The Anti-Armour Helicopter

The anti-tank helicopter developed from the use of helicopter gunships in the low intensity battlefield of Viet Nam. Bell UH-1B helicopters mounting TOW missiles accounted for acceptable kills against NVA armoured vehicles. The US Army recognized the potential of anti-armour helicopters and began converting AH-1G Huey Cobras to the TOW configuration. Its success has proven that the attack helicopter is a viable battlefield weapon. Planners at all levels now recognize that the attack helicopter is integral to combined arms teams:

The attack helicopter is a highly manoeuvrable, sophisticated, responsive, and extremely lethal member of the Combined Arms Team. Properly employed, the attack helicopter teams can defeat large formations of enemy armor and mechanized vehicles at ranges in excess of 3,000 meters, thereby providing major unit



method many helicopters operating today can be fitted with "strap-on" ATGM.

The Soviet armoured threat is far from static, with numbers increasing yearly in quantity and quality. It is against this that the role of the anti-armour helicopter is being played. The US Army is basing its tactics on the deployment of the AH-64 Advanced Attack Helicopter (AAH) in the mid-1980's. The AH-64 will have major improvements in performance, survivability and night capability. It is anticipated that 536 AAH's will be produced. Armament for the AAH will be 16 Hellfire (heliborne, laser, fire and forget) missiles that are being developed in a parallel program. In addition to the laser seeker, IR and RF-homing seekers are being developed. The missiles can be launched either lock-on after launch (LOAL) or lock-on before launch (LOBL). The LOAL missile is launched in a pop-up manoeuvre with the helicopter dropping behind cover after launch. A remote designator can make a mid-course correction. A maximum range of 8km has been indicated for the laser seeker. This is an improvement over the AH-1S as the AH-64 has a greater stand-off distance and its exposure time is less than the maximum of 30 seconds for the AH-1S. The AH-64 will possess a good night firing and limited visibility capability. Clouds or darkness engulf most of Europe 70% of the time, limiting the effectiveness of day-only attack helicopters. The AH-64 appears to be a sophisticated and excellent anti-armour helicopter. In conjunction with the USAF A-10 ground attack aircraft it will augment and enhance the anti-armour capability of the combined-arms team.

#### Soviet Developments

Helicopters have been in Soviet inventory for over 20 years with emphasis shifting to armed helicopters. US operations have demonstrated to the Soviets that helicopters make excellent weapons platforms. Their equivalent of the Cobra is the Mi-24 Hind. The Hind was introduced into Frontal Aviation in 1974 and was probably designed for the air assault role with the additional capability as a highly mobile anti-armour weapon. It was rapidly deployed into two units of regimental strength in East Germany with at least 72 in service in 1978 with a possibility of 144.<sup>3</sup> The Mi-24 Hind-D is the most recent development carrying 4 radio command-guided AT-2 Swatter missiles with an effective range of 3,500 meters and capable of penetrating 500mm of armour. Sagger can also be fired from the wingtip stations. On the inner stations of each wing are mounted 4 pods of 32-shot 57mm unguided rockets with a range of 1,200 meters, capable of penetrating 220 mm of armour. The Hind-D may possess a new fire-and-forget missile with a range of 8 km along the same principle as the Hellfire. The weapon sighting system has an all-weather capability of IR and LLT. An equivalent of the USAF A-10 has not been developed yet, so the Mi-24 bears the burden of the airborne anti-armour role. Soviet Professor of Military Tactics, Gen Reznichenko wrote of the Mi-24:

3. L.M. Hansen, "Soviet Combat Helicopter Operations," International Defence Review, (8/1978), p. 1246.

They are superior to other anti-tank weapons in terms of field of vision, manoeuvrability and firepower; they are capable of hitting armoured enemy targets while remaining out of reach of anti-aircraft weapons. The correlation between tank and helicopter losses is 12:1 or even 19:1 in the helicopter's favour, according to practical experiments.<sup>4</sup>

The Mi-24 appears to be a viable weapon in which the Soviets will likely rely on for anti-armour defence in conjunction with their massive armoured arsenal. Two other Soviet helicopters may be encountered in the anti-armour role. The Mi-2 Hoplite has been used in the armed reconnaissance mode with "strap-on" missiles. East Germany has configured the Mi-8 Hip-C with Swatter in the anti-armour role.

Soviet helicopter tactics are similar to those of the US, ensuring minimum exposure at maximum distance. Firing at a distance of 3,500 meters the maximum exposure is 30 seconds. Where tactics differ is that the Mi-24 is considered a weapon platform capable of carrying troops as compared to the AH-1S or AH-64, which are sophisticated weapons platforms only. It is envisaged that the Mi-24 will be used to attack a part of the covering forces and advance guards, cover the rear and flanks of friendly forces, disrupt the movement of enemy reserves, and destroy small reconnaissance units. Anti-armour helicopters were employed in three major Soviet/Warsaw Pact exercises in 1978, indicating that they have been accepted as an integral anti-armour weapon.

#### Conclusion

The anti-armour helicopter is an effective and highly mobile weapon that is just coming into its own, with many countries realizing its usefulness. By no means does it replace the MBT in its role as an anti-armour weapon. There is a requirement to use both the anti-armour helicopter and MBT in conjunction with all other anti-armour systems presently on inventory, as the strength of each system is required to offset the limitations of the others.

4. Ibid., p. 1244.



# AFV RECOGNITION TEST

answers on page 38

## IDENTIFICATION des VEHICULES BLINDES

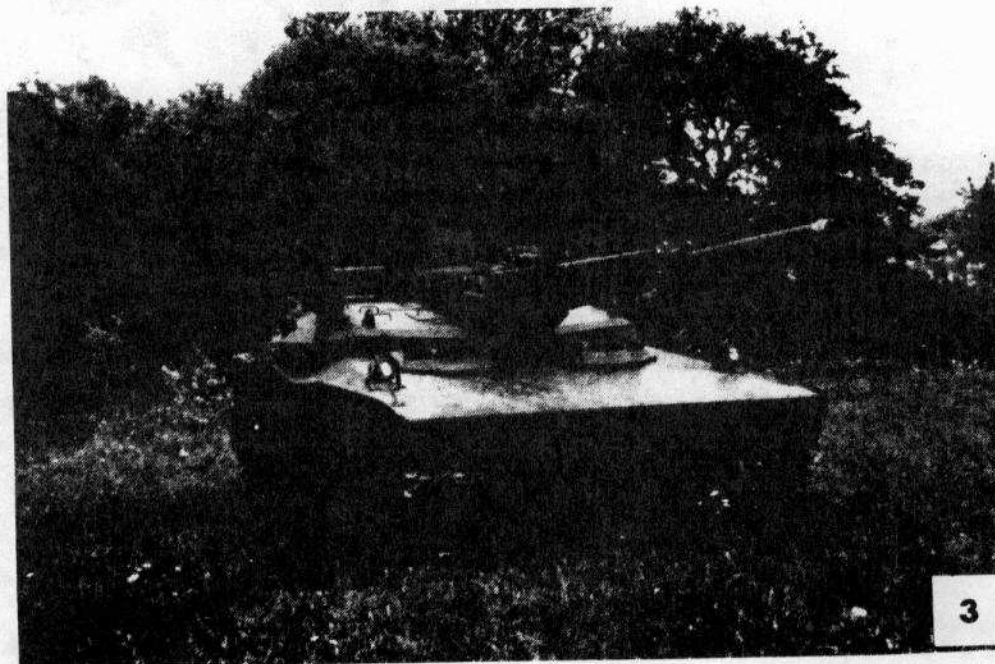
reponses à la page 38



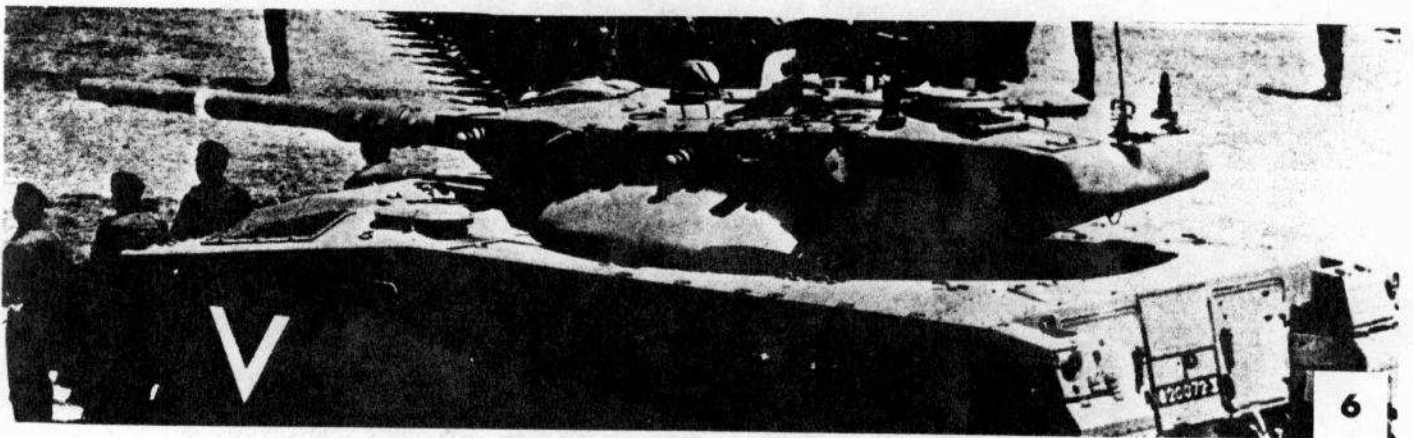
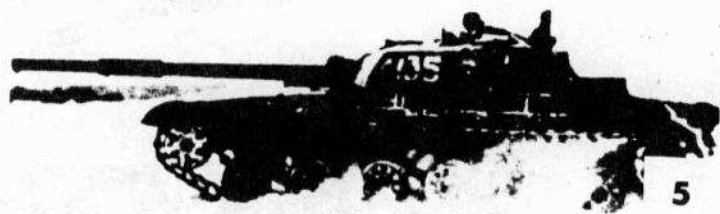
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# Tank Obstacles

By Lt Grant T.J.

B Squadron 8th Canadian Hussars

The training of tank troop leaders and crew commanders in the Corps is fairly extensive. All personnel have a working knowledge of the vehicle and the tactics that they will use. However, there is one essential element on the modern battlefield that is receiving less and less attention - obstacles.

Natural obstacles such as marshes, swamps, lakes, and heavily forested areas are known to us all. Personnel down to the newest tank crew commander realize how and why these land features either slow down or impose prolonged delay on armour units. Man-made obstacles are not as well known as natural ones. This is unfortunate as man-made obstacles can often cause more casualties and delay operations more than anything else.

Obstacles planning generally rests with the Corps Commander and his staff. Even though these decisions are made at very high levels, they can affect everyone on the battlefield. All personnel should be familiar with every type of obstacle they may be tasked to cover with fire on the defence or that they may face during offensive operations on the tactical battlefield.

There are several important reasons why a defending force will employ obstacles in its overall plan. Obstacles "check the attacker, canalise his advance, force him to concentrate and present good targets to the defender whilst his freedom of movement is restricted."<sup>1</sup> This explanation can be expanded upon to include the separation of tracked and wheeled vehicles, as well as infantry and armour. Obstacles prevent the bypassing or splitting of defended locations and allow defensive weapons to inflict casualties to a maximum.

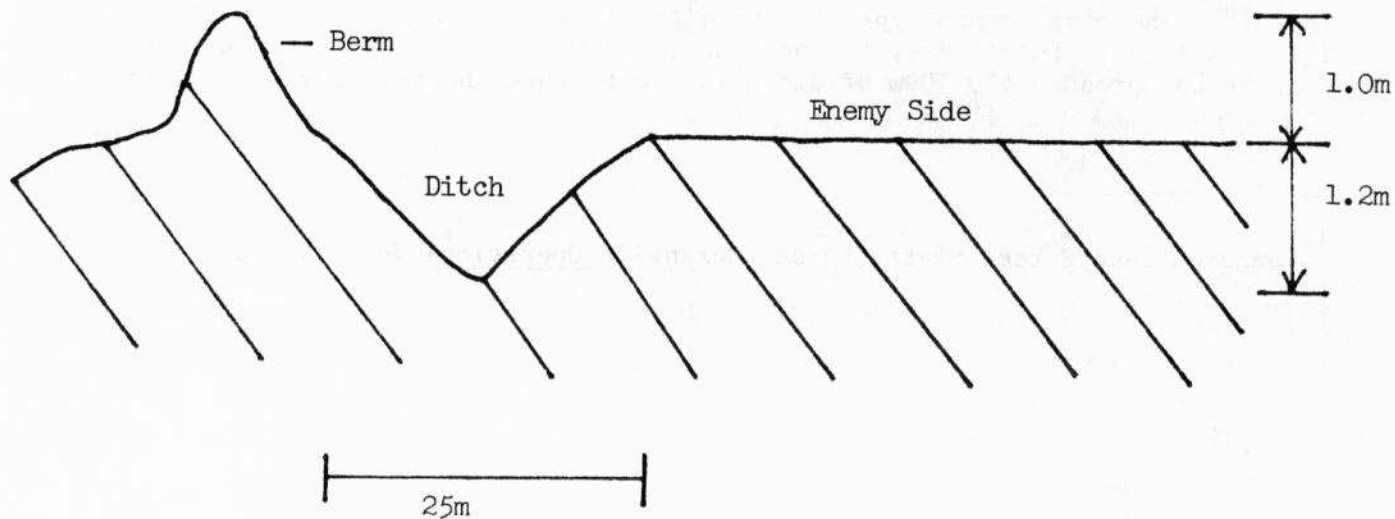
To determine how obstacles can achieve the aims set out for them, two obstacles will be looked at in depth, they are the tank ditch and "Dragon's Teeth." The most common type of tank ditch is the rectangular ditch (Fig 1). This obstacle is fairly easy to construct, two D-7 dozers and two front end loaders can produce 400-500m of ditch in two to three hours. The most important

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<sup>1</sup> Canadian Land Forces Staff Course, Defensive Operations Vol 1 (1978)



(Fig 1) The Leopard dozer quickly fills in and crosses a rectangular ditch.



(fig 2) TRIANGULAR TANK DITCH



aspect of this ditch is the width (3.3m). When the tank enters the ditch, it tips forward at a steep angle causing two things to happen. The top of the turret is exposed to enemy fire and the commander is forced to place his main armament over the back deck to keep it from embedding in the berm. This type of ditch can delay tanks without engineer support up to 15 minutes. The crossing time can be shortened to as little as five minutes if any of the following is available: Leopard dozer, ARV or AVLB, APC or D-7 dozer, or a Combat Engineer Vehicle. The rectangular tank ditch is as much an obstacle to the counter-attack force as it is to the enemy force.

The triangular ditch is similar to the rectangular ditch, but is not as effective (Fig 2). It takes 25% less time to construct and as a result, is easier to breach. This ditch does **not** give the defender as much time to employ his anti-tank weapons. This ditch can also afford good hull down positions to enemy tanks. Due to limitations and weak points, the triangular ditch is used primarily as a counter-attack route across a rectangular ditch.

The second type of obstacle are those made of concrete, more commonly called "Dragon's Teeth". Dragon's Teeth are concrete tetrahedrons measuring 1.5m on all sides, with an overall height of 1.2m and a weight of 1 metric ton. Dragon's Teeth set in a staggered pattern at least four deep will effectively stop an armoured advance (Fig 3). In most tactical situations this type of obstacle will have to be blown in situ, or avoided, as even dozer tanks are unable to move them unless traction is ideal.

While experimenting in Gagetown with both tank ditches and Dragon's Teeth, some valuable lessons were learned. The most important asset to have when working with obstacles is a field engineer troop. Their expertise and equipment make them an essential part of any operation.

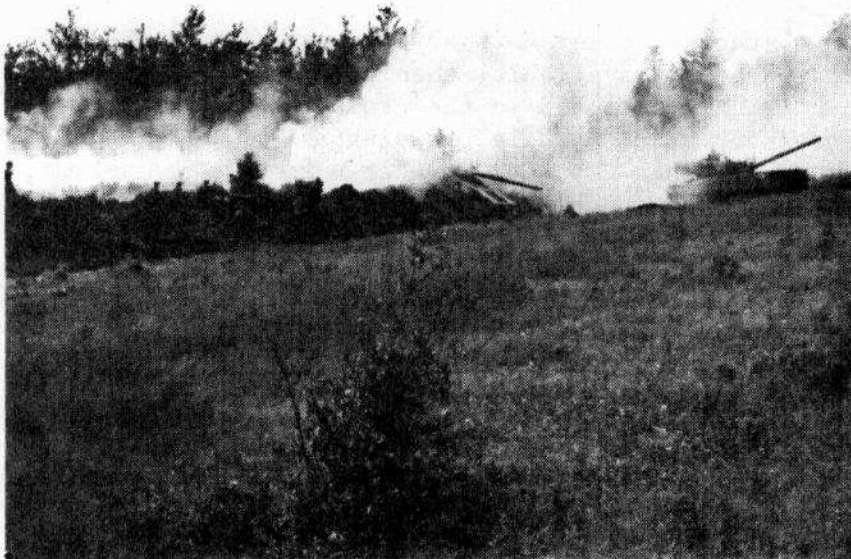
To actually breach obstacles, dozers of any type are essential. If sufficient dozers have not been made available, then there are several things the individual crew commander can **do** to aid in the crossing. He can employ his snow grousers for increased traction while crossing at an angle in an attempt to wear the walls down. When crossing, the crew commander must place the barrel of main armament over the back deck so as not to damage it during breaching.

It is only through field training in conjunction with Field Engineers, that individual tank commanders and their leaders can learn the effect obstacles have on the performance of tanks and the fulfilment of the mission.

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(Fig 3) A Leopard stopped by  
Dragon's Teeth.



(Fig 4) Leopard tanks of B Sqn  
8CH cross a tank ditch under  
simulated battle conditions.



# The Effects of Improvement in Armoured Vehicle

## Protection on Land Warfare

by: Major H.J. Marsh  
12<sup>e</sup> RBC

### Introduction

Since the introduction of the tank, weapons have been developed to defeat it. These weapons range from air delivered bombs to tank hunting parties which foraged a field with crowbars. The defeat of the tank is well recorded. Since its appearance at Cambrai, modern armies have tabulated and studied the failures of their designs. History records that mechanical and logistic failures account for the demise of 50 percent of the vehicles. A further 30 percent are defeated by direct fire weapons. The remaining 20 percent fall victim to mines, artillery and air attack,<sup>1</sup>

Tank designers dwell in two camps; those who attempt to design impenetrable armours, and those who seek the omnipotent gun. History attests that both camps have had successes. However, the gun camp has enjoyed success for a longer period of time. Since the end of WW II, the ATGM has experienced pre-eminence over the cast iron or rolled steel tank. However, both NATO and Soviet researchers have been working on new types of armour since the early 1960's,<sup>2</sup> and by the middle of that decade produced armours that were capable of defeating HEAT warheads without the huge weight penalty incurred by conventional armours. To realistically assess the implication of this advancement, it is necessary first to review the Soviet anti-tank direct fire threat and secondly to assess the state of the art of armour protection.

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1. According to Maj King REME, the greatest shortcoming of tanks is their mechanical unreliability. My paper does not dispute this but explores the consequences of direct fire weapons against tanks, D.E. King, The Survival of Tanks in Battle. Journal of the Royal United Services Institute for Defence Studies, v. 123 March 1978, p.26-31. A precise table of all allied tank casualties, listed by theatre, can be found in The Armour School RAC CENTRE Bovington, Dorset, England, Terminal Ballistics and Armoured Fighting Vehicle Protection, January 1972. p.10.6,

2. International Defence Review, v. 11, No. 9/1978, p.1373.

## THE SOVIET DIRECT FIRE THREAT

The Soviets have fielded and are still developing an entire family of anti-tank missiles. They range from their first generation systems like AT-1 SNAPPER (obsolete), AT-2 SWATTER and AT-3 SAGGER through to the second generation of anti-tank missiles AT-4 FAGGOT (2,000 meter range), AT-5 (3-4,000 meter range) and the latest AT-6 (7 kilometer range laser homing), launched from the Mi-24 HIND-D helicopter.<sup>3</sup> Although all of these missiles cover various ranges and have differing guidance systems, they all possess two similar characteristics. They are subsonic and rely on chemical energy to defeat armour. To this date, no western publication has recorded any evidence that the Soviets are developing "double-pulse" ATGMs or supersonic depleted uranium ATGMs.<sup>4</sup>

The older T-6 tank with the 115mm gun was designed to provide Russian Armoured Units with a gun whose performance matched that of NATO's 105mm gun which had been adopted by NATO in the early sixties. The T-62 tank is currently the mainstay of the Group of Soviet Forces<sup>5</sup> in Germany (GSFG) but is rapidly being replaced by the T-64 and T-72.

The most formidable direct fire weapon in the Soviet arsenal is the T-72 and T-64 tank mounting the 125 mm gun. This gun system fires an armoured-piercing-fin-stabilized-discarding-sabot (APFSDS) at approximately 1,700 meters per second. A projectile of this design has sufficient kinetic

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3. The 2nd Generation of Soviet Anti-tank Missiles. In International Defence Review, v.11, No. 1/1978, p. 15-17.

4. "Double-pulse" is an idiom used to describe an ATGM which initially would fire a shaped charge at a tank's armour to disrupt its outer layers. A microsecond later it could unleash a second shaped charge or fire a pyrophoric depleted uranium core that would pierce the armour.

5. International Defence Review, v.11, No.7/1978, p. 1014. T-64s and T-72s in GSFG are now (Sep 78) estimated to total more than 2,000. Ibid. v.11, No.5/1978, p.668. Total Soviet tank production continues at an annual rate of 3,000, some 2,000 of which are believed to be T-72s (and possibly a few T-64s) accounting for the remainder. T-62s are no longer in production.

energy to defeat the NATO HEAVY TARGET at 3,000 meters.<sup>6</sup> At ranges of 2,000 meters it is capable of piercing the CHIEFTAIN tank's frontal armour and quite capable of passing clean through a LEOPARD 1, from its glacis plate to engine compartment,

The Soviets will soon be fielding a new tank, the T-80. Like its predecessors, it too will boast the 125mm gun but even more alarming is the realization that the Soviets now have a tank that can match the latest NATO tanks in firepower and protection. The T-80 will be protected by a special armour that will defeat most calibres of ATGMs used by NATO.<sup>7</sup>

#### NATO ARMOUR PROTECTION

After the Korean war, the ATGM with the HEAT warhead appeared in the defence inventories of most nations. It was the ideal weapon, inexpensive, portable and it killed tanks. In order for the tank to be viable on the battlefield, its armour would have to defeat this form of chemical energy attack. The pressure jet from a shaped charged projectile readily penetrated 60 centimeters of steel, so the scientists had to look elsewhere. By 1967, Military Vehicle Engineering Establishment Chobham had developed a special armour that was able to disipate the energy of a shaped charged pressure jet and still achieve an areal density<sup>8</sup> comparable to aluminum. This meant that a tank protected with Chobham armour could defeat warheads up to a cone diameter of 155mm over its frontal arc and warheads up to a cone diameter of 90mm against its sides without exceeding military load class 60. In the intervening 13 years, the research establishment in Chobham, England and Ballistic Defence Research center in the United States have trialed and proven more successful armours. Knowledge of these armours is extremely limited, but an assessment of western military periodicals, which are now openly discussing the merits of Heavy ATGM against special armours, can only lead one to conclude that the Soviet's AT-1 to AT-6 missiles cannot defeat Chobham like armours which are optimized to defeat chemical energy attack. Their performance against kinetic energy rounds is superior to that of steel, but it is vulnerable to

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6. The kinetic energy of a projectile is dependant on the area of the bore, the gun's internal pressure and the shot travel. Theoretical calculations indicate that the 125mm gun can impart 80% more kinetic energy to a projectile than NATO 105mm gun. Thus it should be capable of these penetrations.

7. International Defence Review, v.11, No.9/1978, p.1373 quotes a source that this armour is probably already in mass-production and could be deployed on the T-64 and T-72. Should these fears be realized, virtually all the anti-tank HEAT warheads in NATO's inventory will have to be re-designed.

8. Areal density is a term used to evaluate levels of protection per pound of material over an area of one square foot.

long rod penetrators (APFSDS) of a particular dimension.

Technological advances in automatic fire suppression systems, compartmentalization of vulnerable components, laser and IR alerting sensors, and many other improvements including CBR over-pressure systems, have greatly enhanced the survivability of the tank and its crew. The improvement in armour protection is the single most important feature of these advances and the essay will concentrate on the effects of this development.

#### SCOPE

It is the purpose of this essay to examine first those armoured battles where protection exceeded firepower and secondly to assess the effects improved tank protection has on the conduct of land warfare,

#### BATTLES AFFECTED BY ARMOUR PROTECTION

Arras, France, May 21, 1940

The British MATILDA tank was immune over its frontal arc to attack from the PzKw II, III, IV and the German 37mm anti-tank gun.<sup>9</sup> When the 4th RTR, equipped with the MATILDA, defended against the 7th Panzer Division, the losses incurred by the Germans were the greatest they had experienced since the invasion had begun. As the MATILDA could be recommitted to battle (some had fourteen gouges in their armour) the Germans concluded they were faced by five British divisions. This assessment resulted in the Germans stopping their advance for two days, saving the British Expeditionary Force.<sup>10</sup> The significance of the Arras action was out of proportion to its size but it underscored the value of an immune tank. In this case, the Germans were surprised and deceived and the few MATILDA tanks greatly multiplied the combat force ratio in favour of the British. Despite the knowledge that the British commanding Officer was killed, the tank unit fought on, a testimony to their discipline and faith in their tank.

The advantage of the MATILDA was short lived. The Germans quickly brought up heavier artillery, STUKA dive bombers, and pressed the 88mm anti-aircraft gun into the anti-tank role. This was the last time in WW II that the western nations had a tank that was superior to the Germans.

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9. Terminal Ballistics and Armoured Fighting Vehicle Protection, p.1.1.

10. Robert J. Icks. Famous Tank Battles. 1972. p.120



Tunisia, Spring, 1943

"Overshadowing everything lay the stopping power of the latest high-velocity (anti-tank) guns...Only one type of tank refuted this trend—the TIGER, which could stand like a stone wall and take on a squadron or more of SHERMANS, GRANTS, CRUSADERS, or CHURCHILLS without self-embarrassment".<sup>11</sup>

Consequently, the German tank crews suffered few losses and were allowed to learn and make mistakes under fire. To defeat Rommel, the allies had to sever his supply lines and then overwhelm him with an army of 2,000 tanks. The most serious loss to the Germans in the African campaign was tank crews of impeccable and irreplaceable merit. These men would have been a priceless cadre for new divisions.<sup>12</sup>

Jessey, May 1944

"It was here that I first met the Stalin tanks. (the heavy Josef Stalin 1B with its 122mm gun). It was a shock to find that, although my TIGERS began to hit them at a range of 2,200 yards, our shells did not penetrate them until we had closed to half that distance. But I was able to counter their technical superiority by manoeuvre and mobility in making the best use of ground...In a tank battle, if you stand still you are lost."<sup>13</sup> In this case, a technical advantage was not exploited and the more resourceful commanders with tactical insight and well trained tank crews overcame the adversary,

Caen, August 1944

The tank crews of II Canadian Corps had the unpleasant task of advancing against the PANTHER and TIGER tanks. As the allies attacked, they experienced, at first hand, the consequences of losing a squadron of SHERMANS for every German PANTHER or TIGER tank they met. The morale of the tank crews became so low, obsessed as they were by fear of these tanks, that General Simonds' only option to maintain the offence was to attempt a night assault,<sup>14</sup>

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11. Kenneth Macksey. Tank Warfare. 1971. p.210.

12. Loc. cit.

13. General Von Manteuffel, Commander of Gross Deutschland Panzer Division

14. Macksey. op. cit. p.233.

## HISTORICAL LESSONS

The following lessons are learned from these historical incidents.

1. A tank with superior armour can be committed to battle many times.
2. Troops who have faith in their tanks can fight courageously against overwhelming odds.
3. A technological advantage is often short lived. An adversary will do everything within his power to address any imbalance.
4. Superior armour allows an opponent the opportunity to master his skills under fire.
5. An improvement in protection is of limited value unless the local commander exploits its advantages.
6. Types of offence are limited as a result of inferior armour.

## EFFECTS ON THE CONDUCT OF LAND WARFARE ON THE MODERN BATTLEFIELD

Improvements in AFV protection affect the attitudes of men as well as affecting the conduct of land warfare.

### Man

A tank crew in a well protected tank like the British MBT 80, and to some extent the LEOPARD 2 or XM 1, has considerable advantages. They know they will survive ATGM attack and that their armour will defeat most natures of tank ammunition fired from a T-62. Their main concern on the battlefield will be the T-72 and T-80 but with proper use of ground and mobility, they can circumvent these problems to some degree. For psychological reasons alone, it will be easier to initiate a quick tank attack with MBT 80 than with LEOPARD 1 because a well protected crew is more courageous.

Studies of air battles in Korea indicate that a novice who survives his first ten sorties is likely to go on and become an ace. Likewise in tank battles, a crew which lives through their first encounters learns invaluable lessons and develops into a formidable team. An improved armoured tank gives a tank crew that opportunity and increases the effectiveness of the force. Also, a crew in a well protected tank is able to fight within 30 seconds of an artillery barrage. The armour and over-pressure protect them from shock waves. Unlike the infantryman, who may be bleeding from the ears, the tank crew will begin to engage the enemy as



soon as targets appear. Therefore, the well protected crew can better withstand the rigors of battle and are not paralysed during the onslaught.

### Offence

A tank that can defeat Soviet ATGMs and is protected from the attack of the 115mm T-62 greatly affects the conduct of land warfare. When a combat team, equipped with this tank, assaults a Soviet defensive position, the infantry would not have to dismount at RPG 7 range and suppress man portable ATGM systems. Instead, they could remain mounted until the tanks are 50 meters from the objective. This would allow the indirect suppressive fire to continue to the absolute last second, and greatly enhance the survivability of the assaulting forces. Commanders and gunners would have to coordinate fire plans in seconds rather than minutes. Enemy defences that boast T-72s would require special attention.

The fear of man-portable ATGMs over the last thirty years has bred caution into every crew commander when he approaches woods. In fact, drills advocate that he bypass woods at the maximum range of the ATGM. The improved levels of protection would allow the tank to use the edge and interior of the woods as covered approaches. This would permit the commander to have greater mobility and would give him more options to assault objectives. Greater mobility and increased protection enhance the power of the offence.

### Defence

Tanks with improved protection multiply combat ratios. Allies in Africa and NWE experienced that a TIGER tank was equivalent to a squadron of SHERMANS when the TIGER was defending. The British considered their CHIEFTAIN in the defence could withstand seven T-62s, such is its stand-off advantage over that tank. Hence, a NATO force entirely equipped with specially armoured tanks would go a long way to reducing the Soviet conventional offence advantage. At the divisional level, the commander could commit more armoured resources to his mobile reserves without depriving the main defensive zone of the tank's direct fire value. However, if the GSFG attack with the T-80 then all of the division's armoured resources would have to augment the FEBA.

These developments seriously affect the value of the anti-tank attack helicopter. An attacking tank force protected with special armour could not be countered by the attack helicopter. Therefore, the helicopter's role as a highly mobile counter penetration force would be nullified if it retained the present generation of ATGMs.

Likewise, the value of ATGMs in anti-tank companies comes into question. To be of value, the HAWs would have to be sited in enfilated positions so that they could fire into the flanks of the aggressor. This would not allow them full use of the weapons maximum range unless the commander adopted an area

defence with killing zones. The option of maintaining a continuous line of defence, manned by infantry units with only ATGMs, would not be favoured by commanders.

Once the infantry soldier loses confidence in his weapon's ability to destroy enemy armour, he might well lose his willingness to stay and fight. Without a doubt, battalion commanders will be demanding that tank squadrons form the back bone of their anti-tank defence. This in turn will require that brigades and divisions maintain a better balance between tank and infantry units. Perhaps those who structure forces will rediscover the intrinsic strength of the now passé Square Brigade.<sup>15</sup>

The Soviet advantage of fielding a tank with an armour that defeats chemical energy attack will spur NATO to develop larger and more lethal ATGMs. These new weapon systems will require vehicles and crews to move them around the battlefield. Hence the tactical advantages of the small man portable LAWs and MAWs <sup>16</sup> currently used by NATO will be lost.

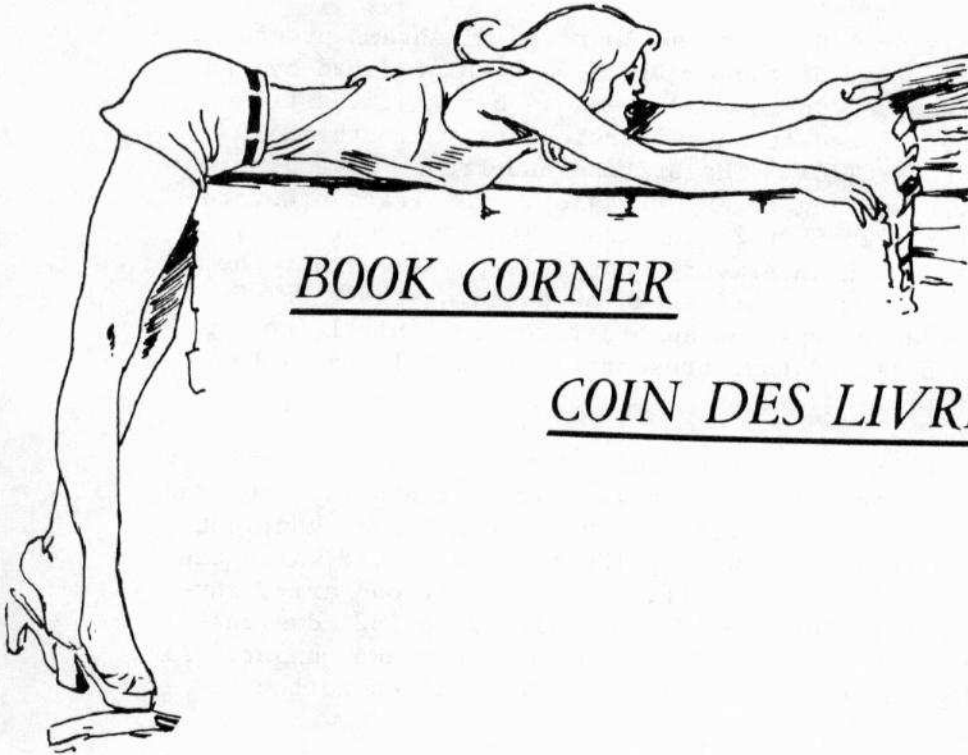
#### CONCLUSION

Soviet industrial capacity is capable of fielding 20,000 T-80s by 1990. By that time, the West should have 7,000 XM-1s, 3,000 LEOPARD 2s and 1,000 MBT 80s. If a new generation of ATGMs is not fielded by the middle of this decade then NATO's anti-tank defence will rely on the tank. When tank warfare dominates the battlefield, the conduct of land warfare becomes fluid. These operations will continue to demand the cooperation of all arms and they will be characterized by their speed, daring and manoeuvre.

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15. A Square Brigade comprises two armoured regiments, each with three tank squadrons and two infantry battalions each with four companies.

16. Those ATGM with a cone diameter of less than 90mm and a range less than 1,000 meters.



## BOOK CORNER

## COIN DES LIVRES

JANE'S ARMOUR AND ARTILLERY 1979-80 edited by Christopher Foss.

669 pp. Franklin Watts of Canada. \$117.50

reviewed by Captain Stephen Habington, RCR

Anyone familiar with the renowned selection of Jane's military reference books will welcome the appearance of this new volume. The subject matter has graduated from the middle pages of JANE'S WEAPON SYSTEMS and Mr. Foss has put together what is probably the most comprehensive work yet published on the world's current and future armour and artillery. It will be updated bi-annually; the next edition can be expected late in 1981.

More than half of the total content is devoted to tanks and other front-line AFVs and components. Items are grouped nationally by vehicle type. Each entry includes a brief development history, description, notes on variants and a table of technical specifications. Almost every entry is accompanied by a good selection of photographs. High quality line drawings are provided for entries on equipment in service. These will be very useful for recognition training. The section on tanks is the largest in the book at 104 pages. Recce vehicles, APCs and self-propelled tank destroyers are covered in a further two hundred-plus pages. More armour-related material is found in sections on ammunition, AFV turrets and cupolas and training equipment and simulators. The book is concluded with a tabular summary of armour and artillery in use throughout the world and an addenda offering the latest available entries before press-time (October 79).

In his foreword, Mr. Foss provides a thoughtful commentary on development trends. He reports that the US Army estimates that the Warsaw Pact

could have 30,000 T-72 MBTs by 1987. If the American M1 Abrams programme runs according to schedule, 7251 of these will have been produced by the same year. The T-72 is regarded in some quarters as being at least the equal of the M1 and Leopard 2 and it is in service now while the NATO MODELS ARE JUST ENTERING PRODUCTION. The British and French have kept their industries alive by resorting to export sales. The Iranian Government cancelled an order for 1225 Shir 2 (Chieftan with new power pack, integrated fire-control and Chobham armour) and it is possible that the British may adopt this tank themselves instead of pursuing their MBT-80 programme. Meanwhile, Jordan has placed an order for 200 Shir 1 (no Chobham armour) and it is believed that presentations on Shir tanks have been made to India and Egypt.

The French AMX-32 is another export-only item. It has a co-axially mounted 20 mm cannon, a feature only seen previously on the Swiss Pz61 and the earliest Centurion. The main armament is the French 105 mm gun, but provision has been made to replace it with a 120 mm smooth bore which can accept either French or West German ammunition. For their own army, further production has been ordered of the AMZ-30 modified to 'B2' designation, which includes low light level TV for crew commander and gunner. All of the more than 1000 AMX-30s in service will be retro-fitted to the B2 standard.

The Israeli Merkava MBT is unconventional in layout with the engine mounted at the front and turret and fighting compartment to the rear. The hull is all-cast armour with spacing used to carry diesel fuel. The Swiss also looked seriously at a front-mounted engine design for their new MBT programme. Latest reports indicate that they will opt for the Leopard 2. The US Army has some interesting developments in hand with the High Mobility Agility Test Vehicle (HIMAG) and the High Survivability Test Vehicle (Lightweight) or HSTV(L). Both vehicles' main armament is based on an automatic 75 mm cannon designed by ARES Corporation. It has automatic loading and fires APFSDS, HE, multi-purpose fragmentation and multi-flechette air defence ammunition. A three man crew is seated with commander and driver in the turret of HIMAC. For HSTV(L), the gunner sits beside the driver in the hull.

One would hope that the light armour developments arising from HIMAG and HSTV(L) might result in a better approach to recce by US Armor than that promised by the XM3 Cavalry Fighting Vehicle. This is based on the XM2 MICV and is intended to carry a five man crew and a motorcycle. It may be recalled that the XM2 programme was criticized in 1978 by the US General Accounting Office because of the vehicle's poor performance and greater height than the M1 tank that it was meant to support and a tendency to be noisy and smoky. Not much sneaking and peaking will be possible with the XM3.



There is a trend toward mounting 90 and even 105 mm guns on light tracked and wheeled chassis. With some, such as the Panhard AML, (with 90 mm gun) one wonders whether it would be particularly wise to try to fire the thing at a ninety-degree traverse. Another example from France, the AMX-10RC, is so ungainly looking that it probably wouldn't really need a 105 mm gun if it had more agility. Compared to a lot of the hybrids, it looks like we did not do so badly with the Cougar (which you will find in the APC section).

The above provides just a sampling of the information offered by JANE'S ARMOUR AND ARTILLERY. Although it has not been touched on, the Artillery content is of just as much value. The book should be used as a reference at all army headquarters, training establishments and major units. While the price puts it out of the range of most individuals, it can be ordered through the supply system for official use.

## Solutions To Recognition Test

1. MT-LB Multi-Purpose Tracked Armoured Vehicle (Russia)
2. T-72 MBT (Russia)
3. High Survivability Test Vehicle (Lightweight)  
AAI Corps - HSTV(L) (USA)
4. AMX - 10 RC (France)
5. M-1970 MBT (Russia)
6. Merkava MK1 MBT (Israel)

## BIOGRAPHICAL SKETCH

613 353 259 COLONEL CLIVE MILNER, CD

### CANADIAN FORCES

Colonel Clive Milner was born in Derby, England, is married and has three sons. After graduation from Broomfield Agricultural College in England, he immigrated to Canada and worked in various occupations prior to joining the military.

Colonel Milner was commissioned from the Officer Candidate Program in 1959 as a Second-Lieutenant in the Lord Strathcona's Horse (Royal Canadians) stationed in Calgary. After spending two years with the Regiment he was posted as a Recruiting Officer in Winnipeg, Manitoba. He returned to the Regiment in 1963 and served in various regimental appointments including a tour with the Reconnaissance Squadron in Cyprus. He finished his tour with the Strathcona's in Europe in July 1967 when he returned to Canada to attend Staff College.

On completion of the Canadian Land Forces Command and Staff College course in July 1968, he was posted to Headquarters, 3 Canadian Infantry Brigade Group, Gagetown, as Staff Officer 3, Operations/Training.

In July 1969 he was promoted to the rank of Major and took command of "B" Squadron, The Royal Canadian Dragoons. When the Dragoons moved to Europe in May 1970, he became Commanding Officer, "C" Squadron, 8 Canadian Hussars, which was formed in Gagetown at that time. In July 1971 he was posted to Fort Knox, Kentucky as the Canadian Forces Liaison Officer to the United States Armor Center.

He returned to Canada in 1974 to the Directorate of Land Operations, National Defence Headquarters, Ottawa.

Colonel Milner was promoted to Lieutenant Colonel in June 1975 prior to his assignment as Chief of Staff, Headquarters, United Nations Disengagement Observer Force, Middle East. He returned to the Directorate of Land Requirements, National Defence Headquarters, Ottawa, in March 1976.

In July 1976, he was appointed Commanding Officer of the Royal Canadian Dragoons, Lahr, West Germany. On completion of his tour there in July 1978 he was assigned as a member of the Directing Staff, Canadian Land Forces Command and Staff College, Kingston.

Colonel Milner was promoted to his present rank in August 1979, and attended Course XXXIII of the National Defence College.

In July 1980 he assumed the appointment of Director Land Plans/Director of Armour, National Defence Headquarters, Ottawa.