

# Futuristic Trends of Artillery in Mechanised Warfare

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"Infantry, as well as armoured troops, whether attacking or defending, need the protection of the artillery. Without it they may occasionally win successes, but are liable to severe losses and defeat in a great battle against a foe equipped with good artillery".

—LANZA

## INTRODUCTION

Victory if it emerges will depend on the ability to inflict losses—a function of fire power than it will on the capacity to absorb them—a function of mass. Command realisation that successful operations are dependent on effective and high concentration of fire power at the point of decision, is now a fact in most tactical conceptualization. In fact fire power can be defined as the combat multiplier.

The role of artillery has been to support combat arms by direct, indirect and long range fire against point targets and by area fire for effect against enemy concentrations, logistics and rear areas. Artillery establishes fire supremacy in the battle area by destroying or neutralizing the enemy's ground and air weapons, by causing casualties and ultimately breaking his will to fight. The modern battlefield environment is now characterised by the high mobility of armoured targets and improved protection enjoyed by all combat troops and supporting forces. Though there is little change in the role of artillery, but in the scenario of the mechanised warfare, artillery for maximum effect during mobile operations must also be able to react quickly and surprise the enemy with accurate first salvo capability and cost effective fire in as high a concentration as possible.

In this paper I shall discuss the future role of artillery in mechanised warfare with special reference to optimisation of effect of artillery fire. I shall present the paper in three parts as follows :—

- (a) Field branch.
- (b) Air defence branch.

## (c) Counter bombardment and target acquisition branch.

## FIELD BRANCH

FIELD branch of artillery should be designed to further tactical operations of the commander. This is made possible by providing timely, accurate and effective fire support in a concentration which is compatible with the relative force levels. Technical procedures must aim at reducing reaction time from demand to 'on target' fire support. The designing of equipment and organisation must ensure that maximum fire support is available at short notice to fight critical actions. Further the ammunition must have powerful terminal effect to cause damage and caution on the adversary. Field branch will be discussed under the following heads :—

(a) *First Salvo Capability.* In mechanised warfare, it is imperative to acquire a first salvo capability. First round accuracy, frequently eliminating the need for adjusting rounds, saves ammunition and achieves tactical surprise. Out dated, orthodox and time consuming procedures of adjustment of fire not/only train and condition the enemy but also give him adequate time to take evasive actions. Enough is being done to streamline the procedures and to eradicate weaknesses in technical procedures, with a view to attain higher capability of neutralization of the target rather than the ground. One of the latest innovations in this regard is the introduction of 'Master Gunner'; a class room trainer with a new approach to train artillery observers. This system relies on computer generated imagery to superimpose shell bursts and enemy activity symbology on to a conventionally projected view of the battlefield. The types moving targets simulated by Master Gunner are battle tanks and armoured personnel carriers. The instructor can manoeuvre each target independently or control them in groups. This aid is a definite improvement on the use of miniature ranges and enhances the realism which was significantly lacking. Technological advancement in equipment has made it possible to cut down response time. In other armies of the world, computerisation of data and inclusion of Fire Control Equipment have further reduced the probability factor of human error and have largely eliminated the variables of prediction of fire like the inaccuracies in survey of gun positions and targets, meteorology, calibration of gun, variations in charge temperature and charge weight. Some of the artillery compiling systems which have been produced include FADAC (USA), Odin (Norway), Falke (FRG) and FACE (Field Artillery Computer Equipment) (UK). These systems basically concentrated on solving the technical problems at battery level. However, future development will include a new generation of fire control computers to do all that FACE does but with the necessary input/output facilities for integration into the overall command and control system. This integrated system will

dramatically improve the effectiveness of weapons by solving technical gunnery problems quickly and accurately. Further the probable high intensity of a general war has given rise to the requirement to provide automatic data processing at different levels of artillery command. Artillery staff will need to have the means of receiving and collecting target, tactical and logistic data which must be rapidly processed so that commanders can take decisions without delay. TACTICAL FIRE of which BLC (Battery level computer) will be an integral part is being adopted by USA and equivalent system in the UK will be BATES (Battlefield Artillery Target Engagement System) which could possibly capitalise on the experience gained to take the concept stage further. In our own artillery, we have improved our capability by introducing sophisticated equipment and with forethought and innovation we should be able to acquire matching capability of responsiveness with the other manoeuvring elements.

(b) *Build-up of Artillery at the Point of Decision.* Equally important is to ensure adequate quantum of artillery support for engagements at points of contact. Since the enhanced mobility of targets reduces the engagement time, conventional battle drills to ensure build-up of artillery to support the actions of mechanised forces will not meet the requirement. Despite a deliberate appraisal of the enemy pattern of operations by the commander, it may not be possible to evaluate exact points of anticipated engagements because the enemy may react differently. Hence there is a requirement of long range guns which could cover wider zones of battle engagements. Long range guns will also reduce the frequency of deployments and hence would be comparatively less vulnerable to enemy air. Therefore, there is a case to have guns of the calibre of 155-mm as Field Guns and of 185-mm calibre and above for medium guns.

(c) *Terminal Effect.* Modern battlefield is characterised by targets which enjoy improved protection. The ammunition currently in service for field guns falls short of the required destruction of target. Hence, the terminal effect of the ammunition should be enhanced to either ensure destruction of the target or to damage it adequately to disable the same. The contention that the terminal safety of the ammunition must be so small that it ensures intimate fire support when the troops close in—at the cost of reducing the effect on target, is misconceived. Infact the first priority must go to the achievement of required degree of kill probability of the target and thus the necessity of a heavier shell. Consequently, a heavier shell will need to have larger safety distances. During the conflict with Pakistan in 1971 and the Yom Kippur War, experience shows that there were very few examples of hand-to-hand fighting. In any case the safety distances laid down could be reduced in war depending upon the mutual confidence achieved between the gunners and the supported arm. Further, it may be better to have a few minor casualties by fire of own guns than to get the

troops butchered by the fire of the enemy—a matter of command decision though.

(d) *Decision Making.* To capitalise on the dramatic improvement in response time of the weapons, a similar improvement is desirable in the decision making process. It is generally acknowledged that the number of artillery targets to be engaged in a general war situation will be far greater than the number of fire units available. Therefore, priorities have to be established and targets engaged in rapid succession using all artillery within range to create the required effect. In order to do this efficiently the old artillery boards, proformas, and china graph pencils must be replaced by data processing facilities linking artillery batteries, FOOs, target locating devices and artillery staff at various formation levels.

#### AIR DEFENCE BRANCH

Despite the ever increasing use of surface-to-surface missiles in land battles and the continuous improvement of land based weapons (such as increased fire power of guns), aircraft will continue to play a significant role in land warfare by virtue of its operational flexibility and its ability to carry a variety of armament to be used for a wide range of missions. It is therefore, obvious that air threat will continue to be a problem for ground forces.

Air Defence Artillery requires a highly efficient system to be able to carry out its task of providing air defence to combat forces in the field. The air defence weapon systems must possess a degree of mobility which is atleast equal to mobility of the supported force and must be flexible to provide adequate air cover in any situation.

Existing air defence systems for providing the necessary cover for a division against low level threats, is limited. Surface-to-air missiles by themselves have only a limited capability against this type of threat, while rapid firing small calibre air defence guns are handicapped by the short effective range (1500—2000 m).

A single type of weapon cannot effectively provide air defence against all types of air attacks. This necessitates development of complementary weapons. The Egyptian air defence network was composed of a mix of guns and missiles system. The new Soviet SA-6 missile proved to be very effective, being able to engage targets either by radar or optically, and was able to operate in an electronic counter-measures environment. The Soviet ZSU-23 system also performed very well. However, the Egyptian air defence did not move alongwith the manoeuvre units and as the ground forces stripped the air defence cover, they were subjected to heavy air attack and

further progress stopped. In keeping with its role and latest tactical doctrines, most modern armies are using both missiles and radar controlled (small calibre with high rate of fire) guns for defence against low level air attacks. Some of the correct missiles and guns in Service with the modern armies are as follows :—

(a) *Missiles*

- (i) *Red Eye* (US Army). An all arm air defence guided weapon. Man portable, shoulder fired, supersonic, low altitude air defence missile ; can engage fixed wing aircraft and helicopters upto 3000 feet height. American Division has—15 Red Eye air defence missile sections having a total of 65 teams allotted to infantry/armour/artillery units.
- (ii) *Blow Pipe* (UK). Shoulder fired, short range missile. Monocular optical sight, radio command guidance with IR proximity fuze ; can engage targets upto a height of 1500 metres. IFF system fully integrated.
- (iii) *SA-7* (USSR). Shoulder fired, short range missile akin to the Red Eye. Maximum slant range 4 kms and effective between altitudes of 15 m to 2000 m.
- (iv) *SA-6* (USSR). Mobile, low level surface-to-air guided weapon system. Range between 3.5 kms and 24 knis and effective between altitudes of 30 m to 7000 m.

(b) *AD Guns*

- (i) *Vulcan*. (US army.) System based on 20-mm six barrel guns to engage low flying aircraft. Rate of fire 3000 rpm. Mounted on self propelled vehicle and employed in combat zone for the protection of Vulnerable Areas and Points. American Air Defence Battalion organic to Division is equipped with 24 Vulcan guns.
- (ii) *Schilka* (USSR). System based on 23-mm four barrelled automatic gun, fire control radar and a computer to engage low level aircraft. Rate of fire 3400 rpm. Mounted on self propelled chassis of PT 76 tank.

Despite a variety of effective AD gun and missile systems in service in many countries, the threat posed by hostile aircraft to leading mobile combat groups in the modern battlefield has not been fully catered for. The answer lies in shoulder fired missiles of Red Eye, Blow Pipe or SAM-7 family. These missiles are fairly accurate and can easily be carried along by the troops in combat zone. These are particularly suitable for providing air defence to combat group or team which may be assigned a special mission task or other tasks for which they have to operate outside the AD coverage provided by

other weapons. In sum, air defence of the leading combat troops in a division should comprise of the following :—

- (a) Very low altitude all weather missile system.
- (b) Low altitude all weather gun system for defence of vulnerable points.
- (c) A new portable system, like the Red Eye family, for defence of leading combat teams.

USA, Germany and France have gone in for Roland Air Defence System. Roland is a compact and highly mobile weapon system for the defence of both fixed installations and troops, against low level air attacks. Roland principal role is the defence of mobile units, even when on the move in the combat zone.

#### COUNTER BOMBARDMENT AND TARGET ACQUISITION BRANCH

It should be an endeavour of every commander to gain ascendancy in force levels over his adversary before the commencement of hostilities. However, there is a limit to which it can be achieved. An alternative method then is to negate the fire power of the enemy first by detecting, identifying and locating the hostile targets and then to destroy the same by bringing down highly concentrated fire. By and large commanders have not been much interested, except in extreme stress or on quite a low key retrospect, in the institutionalization of counter bombardment and target acquisition (CB and TA). This is probably because of lack of appreciation by commanders of the effectiveness of locating devices and partly because of meagre resources normally allocated for CB. Perhaps the example that best illustrates this lack of appreciation for CB is a casual allotment of two to three fire units (out of a total of 30 odd fire units) at priority call to DCBO during fire planning in support of a brigade attack and hope that all hostile guns and mortars will be neutralized.

There is a requirement to adopt a fresh approach with a view to utilize the CB and TA resources effectively. The tendency to employ CB resources in orthodox and machine like process must be avoided and its utilization made less mechanical and more flexible. It is desirable to carry out a realistic appraisal of the enemy pattern of operations and assess as to where he is most vulnerable and then to hit him with a high concentration of fire power like a boxer aiming at the chin or solar plexus to knock out his opponent. The troops in contact are adequately protected; however the targets in depth areas are generally complacent about their security, are less protected, and

hence are more vulnerable. Such targets normally include concentration areas, enemy's headquarters communication centres, administrative echelons, move of resources and hostile and potentially hostile guns and mortars. It is these targets on which we need to concentrate our attention and reduce enemy's operational capability. In the context of mobile warfare, such targets though lucrative, will be of fleeting nature. Current surveillance equipment falls short of the requirement of location of hostile guns and for battle-field surveillance in precision and reaction time. Modern advancement in technology should be geared to improve upon acquisition of targets and link these with the guns at priority call to CB to make the whole system more responsive to take on fleeting targets. One such example is the enemy artillery locating radar AN/TPQ-37 introduced in service in USA. This employs a principle of three dimensional vigil by electronically scanning the horizon with a pencil shaped beam moving so fast that it forms a sensitive barrier. It can pin-point enemy artillery gun position with great speed, sometimes even before the first incoming shell hits the ground. It can handle a number of targets simultaneously, is mobile and can be deployed quickly.

There is a requirement to improve range and quality of battle-field surveillance with the help of electronic and optical devices. Use of drones—a radio controlled pilotless aircraft designed for identification and location of targets is one step towards the enhancement of this capability. It would have a radius of action of approximately 50 kms and carry a photographic sensor system whereby targets would be capable of being located to an accuracy of 25 mills. Other surveillance equipment includes a surveillance Radar Section (Radar AN/TPS 25A with a range of 18000 m) at Division level and Ground Surveillance Section (Radar AN/PPS-5 with a range of 10,000 m. Besides, Aerial Surveillance, with the help of helicopters with increased optical range at brigade and division level, will pick up moving targets like movement of reserve and administrative echelon from one battle zone to another and within a zone.

There is a general consensus on the opinion that TA and CB will be ineffective in the mechanised warfare due to the fluid nature of battle. I have a differing view. In fact it may be easy to pick up moving targets and hostile guns and mortars due to large movement of forces. Besides the extent of fluidity of operations has to be viewed in the context of the likely nature of terrain on which the mechanised forces are to operate. Therefore, the chances are that the enemy will expose more lucrative targets than expected. Of course, targets till expose themselves for a very short time. However, once the targets

have been located and the fire brought on them in the shortest possible time, the effect achieved will be out of proportion to the effort and this will lead to reduction of operational capability of the enemy.

### CONCLUSION

Artillery, to maximise the effect of mechanised operation, must be geared to make it a useful partner to other manoeuvre elements, armour and infantry. It must be equipped with tracked long range guns to be able to cover wider areas of operations to ensure high concentration of fire with latest computerised fire control system to improve its responsiveness with first salvo capability. To counter a variety of air attacks—air defence is based on a mix of gun and missile with shoulder fired missiles to give much needed air defence at combat group and team level. A realistic appraisal of CB and TA with a view to enhancing its capability to engage fleeting targets with impunity should be made and a new family of battle field surveillance agencies and gun and mortar locating radars introduced in service. There is a need to re-assess the weightage given to CB and TA to inflict casualties on enemy with results out of proportion. Further, tendency of taking shelter behind conventional doctrines and rigid mathematical golden rules must be avoided and employment of artillery made more flexible.