AD NUMBER

ADB006698

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

Distribution authorized to U.S. Gov't. agencies only; Proprietary Information; 06 JUN 1975. Other requests shall be referred to U.S. Army Command and General Staff College, Fort Leavenworth, KS 66027.

AUTHORITY

ODDR&E ltr, 20 Jan 1976

Antiarmor Operations of Combined Arms (Volume I & Volume II)

U.S. Army Command and General Staff College
Fort Leavenworth, Kansas 66027

6 June 1975

Final Report - 6 June 1975

Prepared in partial fulfillment of graduation requirements for:

U.S. Army Command and General Staff College, Fort Leavenworth, Kansas 66027

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): Antiarmor Operations of Combined Arms (Volume I & Volume II)	5. TYPE OF REPORT & PERIOD COVERED: Final Report 6 June 1975
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Student(s) at the U.S. Army Command and General Staff College during Academic Year 1974-75.	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Command and General Staff College, ATTN: ATSW-DD, Fort Leavenworth, Kansas 66027	12. REPORT DATE: 6 June 1975
	13. NUMBER OF PAGES: 130 pages
14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Distribution limited to U.S. Government agencies only; Proprietary Information; 6 June 1975. Other requests for this document must be referred to U.S. Army Command and General Staff College, Fort Leavenworth, Kansas 66027.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

This study was prepared by a student(s) in partial fulfillment of graduation requirements for the U.S. Army Command and General Staff College.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

See Reverse Side

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

2

This report provides a composite collection of techniques and ideas on antiarmor warfare. The various sections of the report were compiled by members of the review group from student papers prepared in term II 1974-75 USACGSC. In some cases, the entire paper is included in the report and in others only those portions considered innovative are quoted.

To cite reference papers in each case was not possible given the variety of subjects covered and the duplication of effort found in many of the papers. In some circumstances the thoughts of members of the review group are incorporated.

The review group attempted to avoid restating thoughts and concepts found in current antiarmor publications.

Where duplication does exist between current publications and the report, it was felt that the particular technique or concept was worthy of emphasis.

ANTIARMOR OPERATIONS

OF

COMBINED ARMS

VOLUME I

PREPARED BY:
LTC Malcolm Blankenship
LTC Akira Odawara (Japan)
MAJ George Ferguson
MAJ Roger John
MAJ Fletcher Lankin
MAJ Malcolm Otis
MAJ Barry Roller
CPT Robert Higgins
CPT Charles Olson
CPT Glenn Walker
CPT Paul Hollowell
CPT Robert Logan

INDEX

INTRODUCTION

The purpose of this report is to provide a composite collection of techniques and ideas on antiarmor warfare. The various sections of the report were compiled by members of the review group from student papers prepared in term II 1974-75 USACGSC. In some cases, the entire paper is included in the report and in others only those portions considered innovative are quoted.

To cite reference papers in each case was not possible given the variety of subjects covered and the duplication of effort found in many of the papers. In some circumstances the thoughts of members of the review group are incorporated.

The review group attempted to avoid restating thoughts and concepts found in current antiarmor publications.

Where duplication does exist between current publications and the report, it was felt that the particular technique or concept was worthy of emphasis.

SECTION I

GENERAL ANTIARMOR TECHNIQUES

PART I

PROPOSED ANTI-ARMOR TECHNIQUES

HELICOPTERS

1. An attack helicopter company incorporated into the division base. This unit may be used as an example, as a reserve to disrupt enemy penetrations or to destroy by passing enemy armor heading for the rear.

2. Assigning helicopters to lower echelons for the movement of anti-armor teams from one position to another in the Main Battle Area (MBA) and initial Battle Area (IBA).

3. Use of attack helicopters under illumination in conjunction with other elements at night to deny the enemy full use of the hours of darkness.

4. Long range engagement of armor in the dessert by attack helicopters.

5. Use of helicopters to insert anti-armor teams behind enemy lines to attack the second echelon or tanks in assembly areas. The purpose to disrupt enemy units before they are ready to attack.

6. Dispersal by helicopters of anti-tank mines behind enemy lines in or near assembly areas or on routes of march.

7. Attack and scout helicopters can serve as security elements on the edge of cities to delay and disrupt forces attacking city. This employment extends security area.

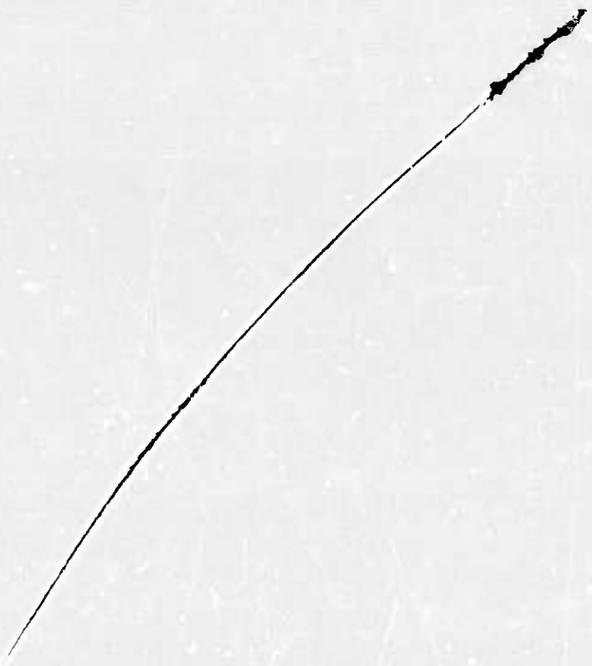
8. Use of helicopters to move elements around from strongpoint to strong points in cities.

9. Integration of attack helicopter platoons directly into anti-armor strongpoint defenses by placing them OPCON to company team elements, to thicken the forward defenses.

8

10. Use of air cavalry and attack helicopters to cover less dangerous areas or avenues of approach in order to concentrate ground anti-tank forces on the most dangerous avenues of approach.

11. Maximum number of attack helicopters OPCON to forces in the intial battle area (IBA) to attrit the enemy well forward. These attack helicopters will then revert to the forces in the main battle area after the fight in the IBA.



7

PART II

ENGINEERS

A. GENERAL: (Engineers as infantry)

1. In future conflicts, it is probable that divisional combat engineer units will be committed as infantry. The engineers will have to engage in infantry operations incident to their combat support role, however, they are deficient in anti-tank missile weaponry (TOW and DRAGON), have no Redeye air defense capability, and no organic indirect fire weapons such as the 91mm and 4.2 inch mortars. These deficiencies severely limit the employment of engineer units as infantry, especially against armor.

2. The conversion of construction engineer battalions into combat engineer battalions (heavy) presents the tactical commander with a new source of infantry troops, if necessary. The same constraints must be considered when assigning infantry tasks as was the case of in the conversion of divisional combat engineers. In addition to the augmentation of organic weapons, training would have to be done at both the staff and trooper levels to insure effective operation. Finally, if the unit is committed as infantry, provisions have to be made for the large amount of engineer equipment to be stored and secured until after the conclusion of the infantry operation.

B. New Developments Cratering.

1. Rapid emplacement of obstacles offers a commander an advantage in establishing an effective defense. Currently, it takes approximately 20 man-hours to create a crater. The obstacle is made using standard 40 pound ammonium nitrate charges, a method unchanged since World War II. A new method is undergoing evaluation at the Armor and Engineer board. The heart of the

10

new system is the Cratering Demolition Kit, XM 180. The XM 180 consists of a shaped charge and a rocket propelled charge. Two men can easily assemble and fire the kit in ten minutes. In average soil, the resulting crater was 23 feet in diameter and had an apparent depth of five feet. A series of XM 180 kits have produced effective anti-tank trenches. Although still in the testing phase, the kit represents a great step forward for use in the near future.

a. The US is currently deploying a helicopter-delivered scatterable mine system to Europe. Deployment of the M-56 system will be complete by mid- FY 76. The M-56 system consists of two mine dispenser pods which are attached to the airframe of the UH-1H helicopter. Each dispenser pod contains 80 mines which are paired in 40 canisters. The canisters are fired downward during flight over the area to be mined. Interval of firing is determined by the length of the minefield and the density. A typical flight would yield a minefield 50 meters wide by 150 meters long, having a density of approximately 0.5 mines per meter of front. Each mine (the M-34) is approximately 10 1/2 x 4 1/2 x 2 1/2 and weighs about 6 pounds. The mine contains about 3 1/4 pounds of composition H-6 explosive, which is able to stop vehicles. A variety of fusing is available and different types are found in each pod. Approximately 20% of the mines have anti-handling devices to prevent easy clearing. All of the M-34 mines are, however, anti-vehicular. With a factory pre-set timer, the mine will neutralize itself by self-destructing.

b. Disadvantages of the system.

(1) Aircraft limitations (availability, night, and weather)

//

(2) Aircraft vulnerability

(3) High cost and limited numbers (#290 per mine)

(4) Minefield marking and reporting

(5) Single type (AT only)

c. Advantages of the system.

(1) Responsiveness

(2) Speed of installation

(3) Self-neutralization

(4) More difficult to defeat

(5) Fusing varied and factory set

d. Applications of the system.

(1) Offensive Operations:

(a) Flank protection (economy of force)

(b) Disruption of enemy movements (reserves and rainforcements)

(c) Airborne and Airmobile operations

(d) Instant kill zones for ACCB and TOW-COBRA

(e) Seal routes into built-up and fortified areas

(f) Deep interdiction (logistics and command center)

(g) Anvil operations

(2) Defensive Operations.

(a) Reinforcement of conventional minefields and obstacles

(b) Closing lanes, gaps and breaches in minefields

(c) Blunting and sealing penetrations

(d) Disruption of enemy second echelon and reserve forces

(e) Defeating river crossings

(f) Containing and countering exploitations

(g) Channelization

e. Other Scatterable Mine Systems

(1) Artillery delivered mines are still in the evaluation phase. When fielded (in the 1980's) they will offer the commander a greater degree of flexibility than with the M-56 system. Cost is, however, expected to limit the number of rounds which will be available.

(2) The ground vehicle dispensed mine system (GVDMS) will be assigned on a basis of one per combat engineer company. The GVDMS is towed behind a vehicle and dispenses mines at a rate of 1-4 mines per second. A band of mines 30 meters on either side of the GVDMS is established. Although the GVDMS forward speed is terrain dependent, it has a range of 10 kmph (rough terrain) to 40 kmph (on roads). The mines are similar to the M-56 system and self-neutralize; however, costs should be considerably lower.

(3) Several Allied systems are available in the field. The British have a mine planter (bar mine) and an AP scatterable system (Ranger-launched from a vehicle). England, France and Germany have programs developing air and artillery delivered scatterable mine systems.

3. Obstacle Effectiveness.

a. A current study by OEC has observed that properly positioned obstacles can provide a significant enhancement to the anti-tank weapons of a defending force. Exchange ratios indicate the following degree of enhancement:

WEAPON	% ENHANCEMENT
106 mm RR	50-65

WEAPON	% ENHANCEMENT
M-60A1	160
DRAGON	50
TOW	300

b. A summary of observations is provided on the attached Table 1.

TABLE 1

SUMMARY OF OBSERVATIONS

As These Variables Increase	For These Defender Weapons	Effectiveness, Measured by the Exchange Ratio: (Attacker Kills/ Defender Kills)	The Relative Percent Enhancement of Exchange Ratio
1. Range from Defender to Obstacle	106-mm RR	Decreases	Decreases
	DRAGON, TOW, M60A1	Increases	Increases
2. Attacker Breaching Time At Obstacle	106-mm RR, DRAGON	Remains Constant	Remains Constant
	TOW, M60A1	Increases	Increases
3. Defender PF (Range .35-.70)	106-mm RR, DRAGON, M60A1	Increases	Increases
	TOW	Increases	Increases
4. Attacker Speed	106-mm RR, DRAGON M60A1	Remains Constant	Remains Constant
	TOW	Decreases	Decreases
5. Terrain Irregularities	The model is only partially sensitive to terrain.		

For interpretation, as the range to the obstacle increases for a defender armed with a TOW, the exchange ratio increases and the relative percent enhancement of the exchange ratio in increased by the use of the obstacle. Thus, for the defender armed with TOW, the obstacle becomes more effective as it delays the attacker at longer ranges.

Figure 13

PART III

THE EMPLOYMENT OF ARMOR IN THE

ANTI-ARMOR ROLE

A. GENERAL:

1. "It was found that tanks and TOW should engage, in priority, agressor BMP's and tanks at or near the maximum effective range of the weapons system. This is particularly true of tank vs tank engagements, where friendly tanks outrange agressor capabilities, and it is thus advantageous to seek and develop tank vs tank engagements."

2. "In most cases, it appears best to position tanks well forward in covered and concealed positions so that the tanks inherent range capabilities can be maximized."

B. DOCTRINE REEMPHASIZED:

1. "Aggressor's ability to successfully use high ground terrain has a direct relationship to the effectiveness of friendly AT (and tank) fires, particularly in conjunction with his use of smoke."

2. "Agressor Forces are able to effectively use smoke. Principal tactic is to mask (opponents) observation of lead vehicles passing through high visibility areas and also to block flank fires from known AT weapon positions."

3. "Range cards must be prepared for each individual (tank and) AT Weapon; maximum and minimum engagement lines/zones must be delineated so that Plt Ldr/Co Cdr can integrate entire unit defense."

4. "Selection of Initial Firing Positions for AT Wpns:"

a. "Mutual Support--AT wpns within Plt, to include tanks, should be mutually supporting."

11

b. "Routes of Withdrawal--should be carefully selected to insure speedy and secure withdrawal once wpn/tank has fired and revealed initial location."

c. "Alternate Positions--necessary to insure continuous engagement once Aggressor Forces have penetrated FDA."

NOTE: In the following, Armor applies exclusively to tanks and tank units. Other tank killing systems are referred to as "anti-tank" (AT).

C. SUMMARY:

1. Tanks remain the primary anti-armor wespon on the modern battlefield. Where there is a need to modify current armor doctrine it is not in response to enemy tank capabilities, it is rather a response to the introduction of a myriad of highly lethal AT systems now accompanying tanks. The vast majority of new concepts for the deployment of armor are oriented on reducing the vulnerability of the "friendly" tank. However, basic concepts for the employment of tanks in the anti-armor role have not changed.

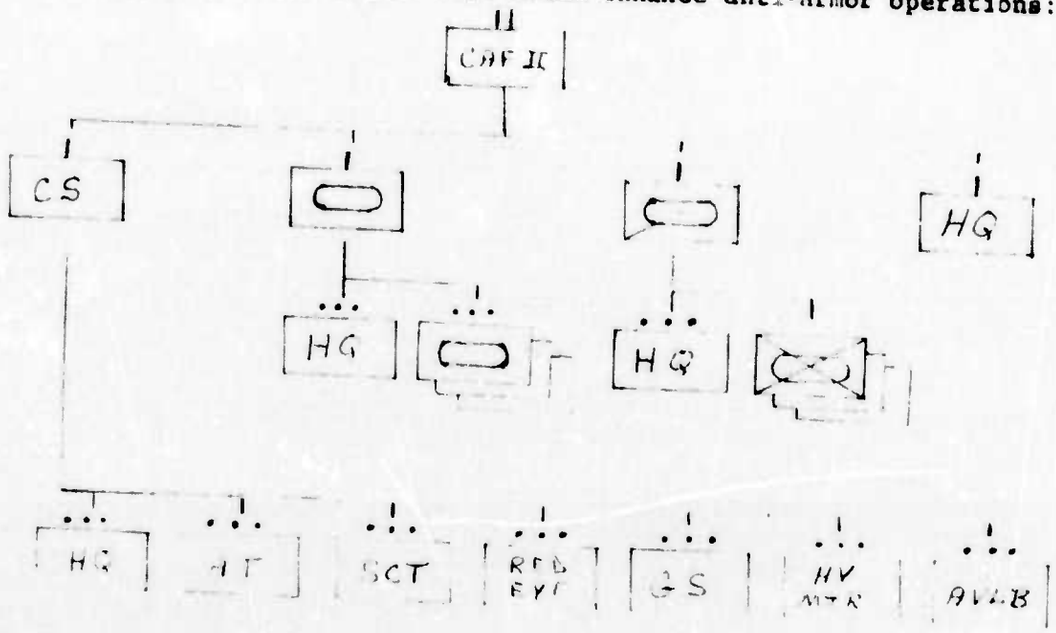
2. Armored units must give first priority to the detection, suppression and destruction of enemy AT weapons if they are to retain their mobility, firepower, and shock-action. These classic characteristics may be enhanced by the substitution of our own AT weapons in static roles formerly held by tanks. Though not a completely new idea there may (should be a marked trend toward this tactic as economic restraints reduce the number of tanks on the battlefield and concurrently modern AT systems are deployed with rapidfire capability, shielding from suppression fires and greater mobility.

PART IV

A TYPE ANTI-ARMOR ORGANIZATION

A. A Type Force Structure.

1. Organizations for combat that would enhance anti-armor operations:



The above organization supports the concept of a combined arms force by reorganizing maneuver units into a permanent parent organization. All combat support remains in the division organization and is assigned as required.

2. Combined Arms Force II (CAFII) because of its inherent leanness, presents the least demand against the commander's span of control. The permanency of the mix resolves many of the organizational problems coupled to mission change. It is not hampered by a large logistical tail. However, its capability and flexibility are restricted without the addition of further combat support and combat service support assets.

B. General Thoughts and Considerations on the CAFII.

1. In the CAF II battalion there is a mix of tanks and TOWs integrated at all levels. A pure mechanized battalion has a reduced night anti-armor capability. Neither the TOWs nor the DRAGON currently have a night capability because the mix of tanks and TOWs in CAF II provides a continuously night anti-tank capability. CAF II units are preferable for this mission.

2. The organization as suggested in CAF II is preferred. At battalion level in a mobile defense because of the stability of the organization.

3. Current Field Artillery doctrine and organization can support the CAF II organization.

4. Although CAF II reorganization is supportable logistically, it will require additional PLL, and maintenance personnel, etc.

5. The CAF II organization should definitely enhance combined arms training.

C. Conclusions:

1. Command and control favors CAF II due to the smaller span of control and the close working relationships which would result from this organization.

2. Night operations favor CAF II.

3. Enemy artillery suppresses soft targets so the organization under CAF II is preferable to a mechanized, armored or TASK organized battalion.

4. The current organization gives the mechanized battalion more TOWs which are critical to the suppression of the BRDMs. Therefore, in this aspect, as well as the normal weapons mix, the current organization is superior.

5. By adding additional organic TOWs to CAF II, this unit should be superior in every way to current doctrine.

17

PART V

ARTILLERY

A. Introduction:

1. Tanks in WWI were susceptible to artillery fire, and many were destroyed by conventional artillery munitions. However, as tanks became impervious to conventional artillery, specialized anti-tank weapons were developed as artillery reverted to the role of disrupting armor rather than destroying it.

2. Artillery loses its effectiveness as artillery when it must lower its tubes to engage tanks in a direct fire role. Furthermore, because of its low-velocity projectiles and its crude direct fire sighting (when compared with a tank) artillery is generally a poor second when battling a tank in direct fire. However, in its indirect fire role, artillery can still be an important component of the combined arms team in defeating armor and, with future developments, may even become a very important tank killer on tomorrow's battlefield.

B. Weapons and Munitions. The three basic artillery delivery systems in today's U.S. Army are the M102 105mm Howitzer (towed), the M109A1 155mm Howitzer (SP), and the M110 8in Howitzer (SP).

1. The M102 has a maximum range of 11,500 meters and can shoot high explosive, white phosperous, smoke, and illumination rounds. It can defeat armor in a direct fire role using HEAT or HEPT; however, conventional ammunition will cause little damage to tanks even with a direct hit.

2. The M109A1 has a maximum range of 18,000 meters and can shoot high explosive (HE), white phosperous (WP) illumination, and improved conventional

munitions (ICM). The HE can defeat armor with a direct hit, although the probability of defeating armor with a battalion volley is less than one per cent because it is very difficult to hit a moving target with an indirect fire weapon. The ICM round has 88 sub-missiles each of which employs a shaped charge. These missiles can defeat vehicles.

3. The M110 has a maximum range of 16,800 meters and employes HE and ICM. The HE can defeat tanks; however, like the 155mm, the probability of scoring a hit in indirect fire is extremely low. The ICM rounds have 195 sub-missiles and are capable of defeating vehicles.

C. New Developments. Two new developments which will dramatically improve the artillery's tank-killing capabilities are soon to enter the army inventory: scatterable mines and cannon-launched guided projectiles (CLGP).

1. Scatterable mines of both antitank and antipersonnel capabilities can be employed by using specially-designed artillery projectiles. This gives the commander an instant minefield capability in the area of his choosing.

2. The CLGP is a weapons system designed to defeat either stationary or moving point targets. The CLGP system consists of a 155mm terminally-guided projectile and a ground laser locator. The range of the projectile is 16,000 meters when fired from the M109A1, and the ground laser locator used by the FO can designate moving targets at 3,000 meters and stationary targets at 5,000 meters. Although the laser light cannot penetrate dense smoke, fog, or low clouds, the general rule is that if the FO can see the target, he can hit it. The CLGP provides a formidable addition to the Army's tank-killing capabilities.

D. Employment of Artillery Against Tanks. With the weapons systems described above, the ground commander possesses valuable assets to deal with an armor threat. He should use his artillery as a part of his combined arms team, rather than as an entity in itself. The available munitions should be used as follows.

1. HE. Used with VT or time fuze, HE can cause tanks to button up. This is particularly effective against Soviet tanks, which normally fight with open hatches. The ability of the Soviet tanks to maneuver, engage targets, and communicate would be severely restricted when they are under attack from our artillery. This would make the US antitank weapons all the more effective while reducing the vulnerability of our weapons.

2. Smoke and WP. Both munitions types restrict visibility and are effective in covering the maneuver of both sides in a battle.

3. Scatterable mines. These can be employed to force the enemy into tank killing zones or to slow the enemy advance when under fire. They can quickly slow an attack and make the enemy tanks very vulnerable to anti-tank fires.

a. Scatterable minefields should be observed by fire whenever possible. The aspect of direct observation does not necessarily apply.

(1) Unattended ground sensors (UGS) and/or radar may be used in many instances. The sensors may be emplaced by hand, air or artillery.

(2) The field may then be covered by artillery to prevent breaching.

b. Tactical air sorties and ground forces could also be used to react to enemy breaching attempts, especially when defending on an extended front.

4. CLGP. This weapons system will be extremely effective against any point target, but its first priority should be against tanks. Forward observers must be properly positioned so that they can control the fires of this very important weapon system and employ it at maximum range. Furthermore, the FO should be tasked for planning all indirect fires at the company level, employing CLGP on hard point and moving targets.

E. Conclusion. With the advent of CLGP, artillery will once again become an important tank-killing weapons system. When all available munitions are carefully integrated into a fire plan, tanks can be slowed, cannalized and trapped so that they can be engaged by antitank weapons and CLGP. Artillery can be an important factor in our success against tanks when it is properly used as a part of the overall combined arms team.

PART VI

STRONG POINT DEFENSE

A. Strong Point Defense Thoughts:

1. There certainly is merit to fragmenting the defense into platoon strongpoints. However, in any battle, a decisive point will occur in which the commander must maximize the application of combat power at an appropriate location." An extended frontage requires that the large majority of available forces be committed to the security and forward defensive areas. Thus the ability to provide defense in depth by positioning forces in the reserve area is seriously limited.

B. Considerations: For Planning & Conducting the Strongpoint Defense.

1. Command and Control.

a. The ability of the company commander to effect control during decisive points in the battle will be limited. Since he cannot be at each strongpoint at all times, and considering the enemy's EW capability the commander will probably be unable to be certain about actions at each platoon location. The potential absence of certain facts (i.e., casualties, ammo status, defense status, location, etc.) will hinder the commander's ability to make sound decisions at critical times - true.

b. Another consideration is the propensity for these strongpoints to think of themselves as independent operators, albeit mutually supporting. With this in mind, one could say that there are thirteen decisionmakers in a battalion (a platoon leader, 3 company commanders, 1 battalion commander). Although it is not intended to inhibit initiative, decisions should

be made in concert with the overall problem and the situation cited above does not enhance this. Critical to a successful defense is the need not only for a fluid movement on the battlefield but also a command situation which will facilitate central control in order to mass forces at the appropriate time.

2. Firepower.

a. The greatest shortfall of the concept is its application of fire support. Half of the combat power available to the battlefield commander comes from the fire support means. Therefore this asset must be planned, integrated, and designed to complement the maneuver force. The concept should refer to appropriate Fire Support doctrine and also extract appropriate principles and apply them to the strongpoint defense.

b. Fireplanning must insure that aggressor infantry accompanying tanks is broken-up and personnel in tanks button-up thereby reducing their visibility and increasing their vulnerability to anti-tank weapons. Fireplanning must be accomplished in a timely and precise manner, utilizing appropriate target locations which will accomplish the desired results.

c. Under the platoon strongpoint concept, fires can be called for by the platoon leader. However, he cannot send it directly to the supporting artillery battalion. He must send his request to the company commander who in turn has the artillery FO forward the request. This will incur unnecessary delays which could be crucial to the situation.

d. Under the fluid battlefield situation, air space control will be limited, if not impossible. There must be an agency that centrally controls and orchestrates the artillery, tac air, and TOW Cobra gunships.

e. The concept advocates the use of tactical air to help eliminate the enemy forces once he has penetrated our forward defensive area. It also calls for tactical air to support an attack on the remnants of an enemy force surrounded by friendly strongpoints. This technique requires extensive coordination and pin-point accuracy by the air elements in order to avoid friendly casualties. (It is the opinion of this writer that this concept is too risky to be endorsed as a standard technique.)

3. Intelligence. With the fluid battlefield situation, the passage of critical information (i.e., spot reports) will be limited. Problems encountered in this area are related to those of communications. The concept must address alternate means of communications which will facilitate the passage of pertinent intelligence data.

4. Mobility. The density of tracks and vehicles normally found in either a mech or armor unit can support the strongpoint system. However, battlefield repair and recovery in these [illegible] resistance could be difficult. Furthermore, the requirement for POL resupply could become critical if resupply cannot be effected.

5. Combat Service Support.

a. Prestocking of supplies is not the solution to the problem of strongpoints, because generally, time will probably not be available. A quick displacement may require unnecessary destruction of these pre-stocks or leaving them for the aggressor.

b. Combat Service Support elements must be positioned to provide responsive support.

6. Movement. Inherent in this concept is the restriction of daylight tactical displacements and logistical activities. As such, training must emphasize conducting logistical/administrative/tactical activities during the hours of darkness while greatly restricting daylight movement.

PART VII

THOUGHTS ON ATGM AUGMENTATION

A. General: Limitem ATGM augmentation can be implemented as a short-term measure toward enhancing the credibility of the western conventional anti-armor defense. Such augmentation should further consider the following thoughts regarding limitations and assignment.

B. Thoughts Applicable to both the TOW and DRAGON Systems.

1. That the current issue to the rifle company remain unchanged since additional ATGMs would be detrimental to the infantry capabilities of the platoons and squads.

2. That all commanders controlling ATGM assets analyze the terrain (visibility, cover and concealment, avenues of approach, etc.) and the situation to weigh the critical areas through re-distribution of these assets.

3. That augmentations be assigned to units affording centralized control of the additional ATGMs where possible. It is unfeasible to proliferate the entire battlefield, and the merit lies in effecting economy of force through massing controlled anti-tank firepower at the points of decision.

4. That a priority for ATGM training be immediately recognized. Development in simulators for tracking, identification, and firing are clearly in order, as well as instruction at all levels in employment and fire control. The rate of augmentation should be dependent on training progress.

5. That the required logistical support for current and augmented ATGM density be closely examined with regard to unit capabilities. Revisions to ammunition resupply may be in order, with missile ASPs located further forward in smaller unit trains areas. Increasing the density of supply vehicles is not compatible with the combat environment envisioned.

C. The TOW System.

1. That the AT platoon of the mechanized battalion conduct extensive training for GS, DS, and attachment roles from platoon to section level. Platoon chain of command should be developed to affod the capability for any combination of sections to support units within a task force.

2. That the TOWs remain mounted when feasible, and under centralized control to facilitate fire control and displacement.

3. The AT platoons in reserve provide additional defense in depth by supporting the forward battle area with long-range fires initially, followed by displacement to rear positions before vulnerable to direct fires.

4. That TOW augmentation be limited to the scout platoons of the maneuver battalions, mechanized and tank, and that each platoon be assigned four TOWs (one per section). Furthermore, that the reconnaissance mission of the platoon be retained, and the M114s be replaced by M113s if necessary, until a new vehicle is procured. (Several prototypes are now being tested.)

5. That TOW augmentation of the armored cavalry squadron be accomplished by attachment of battalion AT sections. The long-range capabilities of the M551 should be sufficient in almost all circumstances, and the scout section should remain fully orientated toward reconnaissance.

11

D. The Dragon System:

1. That a priority research and development program be undertaken to reduce the vulnerability of Dragon gunners to artillery and direct fire.

2. That augmentation be considered as follows:

Unit - (Nr of Dragons) - Possible designated gunners

Armored Cavalry Troop - (2) - Rifle Squad

Military Police Company - (6) - MP and Security Squads

Comd Op Co, Sig Bn - (4) - Cable Installation Section

Fwd Comm Co, Sig Bn - (3) - Installation Sections

Cbt Engr Co, Engr Bn - (6) - Engineer Squads

Svc Btry, Div Arty - (6) - Ammunition Sections

Fwd Spt Co, Maint Bn - (5) - Maintenance Sections

Sup and Svc Co, S&T Bn - (6) - Fwd Supply Sections

(NOTE: See Interim Conclusions 6.f. of para III.D. for Dragon centralized control comments.

E. Summary. Emphasis to a great extend is on mobility with the need for highly responsive counterattacks conducted by forces with mobile firepower. An increased density in TOW and Dragon systems is not compatible with this mission and the discerning approach to augmentation again seems advisable. The ultimate of any defense is to regain the initiative: and proliferation (of ATGMs), designed totally for the defense, could tend to reduce the required battlefield flexibility for offensive operations.

SECTION II

ANTIARMOR OPERATIONS IN BUILT-UP AREAS

ANTIARMOR OPERATIONS IN BUILT-UP AREAS

A. Tactical Considerations Specific to Built-up Areas.

1. In the European Theater during World War II, over 40% of the significant land battles were fought in built-up areas. Accordingly, the growth of urbanization and the geographical spread of built-up areas during the past two decades will require the military commander to plan for and to execute extensive offensive and defensive operations in these areas in any future mid- or high-intensity conflict.

2. Due to the physical configuration of built-up areas, the use of massed armored formations will be restricted; except for wide boulevards, the width of an attacking armored force will be no more than two vehicles abreast. Conversely, the availability of multiple avenues of approach will cause the defender to disperse his antitank defenses.

3. Most (90%) of the opportunities for use of large caliber weapons in city combat occur at very short ranges (less than 50 meters). Additionally, targets will be 'fleeting' due to the natural cover available and lateral routes.

4. In built-up areas the angle of attack on armored vehicles will include more side and top/turret engagements than in rural, open terrain where frontal engagements are the norm. As armor thickness is generally less on the sides and tops, a hit will have a higher probability of defeating the tank or other armored vehicle. Accordingly, the commander should consider positioning his light antitank weapons (LAW, 90mm Recoilless rifle, and rifle grenades) in the upper floors or roofs of structures.

5. Elevation restrictions on tank main guns limit their employment against positions in the upper floors of structures at close ranges. Also, historical research indicates that closed tanks have suffered high casualty rates in built-up areas. Therefore, it is essential that antitank positions be augmented with machineguns to separate any accompanying infantry and to force the tank crews to remain closed-up.

6. Effective communications in extensive built-up areas will be difficult due to the severe reduction in range of FM and AM radios. If time permits, wire should be laid to all primary and alternate antitank firing positions. Decentralized operations will be necessary to control the movement and use of antitank weapons in built-up areas.

B. Antitank Tactics in Defensive Operations.

1. Regardless of the type of defensive system employed within the built-up area (strong-point, linear, mobile, etc.), the commander should consider employing a heavy, antitank force in his security zone on the periphery of the area. As the environs of built-up areas are normally composed of detached and semi-detached business and residential structures, there exists excellent opportunities for creating multiple, covered and concealed weapons positions that maximize the employment of ATGM's, recoilless rifles, and tanks. In addition, artillery fire support is more effective in this terrain as the attacker's forces are partially channelized and the trajectory of the rounds can clear the structures. The use of attack helicopters against armored formations can extend the range and effectivness of the defender's security zone.

2. The use of ATGM's (DRAGON and TOW) in built-up areas will be severely restricted due to extensive backblast which precludes their use in any but the largest structures (warehouses or factories). Additionally, the depression limitation (20°) on the TWO (DRAGON data unknown) will prevent their emplacement on any roof higher than two or three stories unless the mount is anchored.

a. As the TOW warhead is not armed until 65 meters and the rocket not 'captured' until about 150 meters, the commander must carefully select firing positions. Due to the signature effects of these weapons, covered and concealed routes out of the initial position must be planned to the rear and to alternate and supplemental positions. As the ATGM system is weighty and bulky, foot displacement through structures will be slow and arduous; therefore, whenever possible leave TOW's mounted on their prime movers.

b. The problem of backblast can be partially alleviated for their use within structures by two methods. The first is to remove interior walls and partitions to vent sufficient backblast to preclude static overpressures. This method obviously requires extensive engineer assistance and time to prepare numerous firing positions. A second method, of limited utility, would be to position the launcher so that it vents out an opening in the rear of the structure; the missile's trajectory would be through the building and out a door or window to the target.

c. Commanders conducting defensive operations should consider selecting 'kill zones', such as at intersections, which maximize the range capabilities of ATGM's. Antitank weapons of all types should be oriented

to portions of this zone with rules of engagement clearly understood. Ideally all targets within a 'kill zone' should be engaged simultaneously; the first and last armored vehicles in the zone should each be engaged with at least two different weapons.

3. The use of antitank mine fields as obstacles will be partially negated by the composition of route surfaces found within most built-up areas. One alternative would be to emplace and conceal a few mines along critical avenues of approach into the defensive positions: a second alternative would be to scatter mines along similar-looking devices, such as dinner plates, etc., as was done in Budapest in 1956 to force the tank crews to dismount. Barricades are also effective obstacles in reducing the movement of armored vehicles if sufficient time and demolitions are available. All obstacles must be covered by small arm, machine gun, and antitank weapon fire.

4. Due to the limitations of ATGM's and recoilless rifles in built-up areas, the commander will have to use tanks as an integral part of his antitank defensive system.

a. Primary firing positions should be selected that provide partial defilade for the tank, such as at the corners of masonry buildings; the tanks should be in covered and concealed locations near these positions. As attacking armored forces come within range, the tank crew is signaled, moves into firing position and engages the lead enemy vehicles; the tank should then be moved by a concealed route to an alternate position.

b. Although the use of large counterattack forces will be restricted in built-up areas, the commander should consider using tank-heavy teams in this role. Once the attacker's armored force has beenstopped in planned

'kill zones' by obstacles and antitank weapons, the counterattack force can attack along multiple lateral routes to destroy the enemy's immobilized vehicles.

5. Attack helicopters (TOW equipped) can be an effective supplement to the antitank defense within an urban area.

a. Once the attacker's main armored forces have been located, and preferably slowed, attack helicopters can be employed. Helicopter assets should be staged outside the built-up area due to restricted landing areas within the city. In addition, as air defense capabilities are enhanced in built-up areas, the defending force must use all available weapons to suppress these positions when helicopter forces are committed.

b. Helicopters can also be effectively utilized in shifting reserve forces within a built-up area; this is particularly important due to the dispersion of the defender's antitank forces to block multiple avenues of approach. Small, organized teams can be moved to counter armored penetrations or to reinforce positions.

C. Antitank Tactics in Offensive Operations. Antitank operations during the attack of an extensive built-up area will normally be oriented to three armored threats: enemy armored attacks through the environs of the area into the enemy's main defensive positions; and armor counterattacks within the urban area.

1. Offensive operations against a built-up area requires the attacker initially to establish a major base of operations for command, fire support, and logistical activities in the environs of the area. 'Threat' doctrine emphasizes the use of massed armored forces to destroy this base of operations

and to prevent the attacker from initiating his attack. The commander of the attacking forces should consider positioning his ATGM assets in depth around his base of operations while retaining his tanks for operations within the built-up area.

2. The attacking force should expect the enemy to employ numbers of armored vehicles as part of his linear defense system and within strongpoints. As the attacking force will be relagated to movement and selection of firing positions in the streets, there exists the need to employ tanks that provide a relatively mobile and protected system with a large caliber antitank weapon. Tank sections or platoons should therefore accompany mounted and dismounted infantry in the lead attacking elements. ATGM's, mounted on their prime movers, and other tanks would be used in an overwatch role; artillery and mortar fires should be planned on expected enemy positions with smoke rounds included in all fire missions.

3. The attacking force within anyxtensive built-up area should expect enemy counterattacks to its flanks, rear, and front. An effective method of neutralizing these counterattacks would be to destroy these armor vehicles in their assembly areas; accurate intelligence, coupled with the use of attack helicopters (TOW), tactical air, and artillery, could reduce this armor threat. The commander should also consider retaining an armor-heavy reserve to repulse enemy counterattacks. Due to the limited utility of ATGM's during the attack, the commander should consider placing these in firing positions in the areas that have already been cleared; positions in dominant structures with coverage of two or more enemy avenues of approach could serve to defeat these counterattacks.

SECTION III

MIDDLE EAST SCENARIO

ASPECTS OF ANTIARMOR OPERATIONS IN THE MIDDLE EAST

A. Tactical Considerations Peculiar to the Middle East.

1. The terrain in the Middle East is far more varied than many casual observers believe. The region contains sandy deserts and dune fields, lava fields with rocky surfaces, steep mountains and small hills (jebels), and large areas of hard surfaces cut by steep sided wadis. Many areas are not suitable for vehicular military operations, particularly the extensive areas of sand dunes. In those areas that appear wide open and suitable for operations, movement is frequently restricted by interruptive terrain features (wadis, lava beds, etc.) Aside from the few fertile river valleys, much of the Middle East is characterized by a lack of natural concealment.

2. Navigation is extremely difficult in the desert areas of the Middle East due to the vastness of the terrain and the lack of recognizable features. Observation and range estimation are likewise difficult owing to the mirage effect of desert heat.

3. Another problem created by the vastness of the terrain is insuring coverage of likely avenues of approach.

B. Defense Considerations.

1. To effectively counteract the advantages armor gains in the barren desert environment, the use of terrain becomes critically important in the selection of antiarmor defensive positions. If AT weapons positions are carefully selected, enemy armor can be engaged at maximum range. TOW weapons employed at 3,000 meters, and complimented by field artillery VT and surface bursts to confuse the enemy, will make it very difficult for the enemy to

close to a range where his tanks have the advantage. Range cards are essential, however, as gunners may be tempted to engage at a range exceeding the capabilities of their weapons systems. The mirage effect created by desert heat coupled with featureless terrain make range estimation extremely difficult.

2. When enemy tanks are able to get closer before they may be engaged, the temptation to engage rapidly closing armor first should be avoided by the defensive force. Enemy ATGMs are likely to be in overwatch positions because of their greater accuracy at longer ranges. BMPs with Sagger missiles that can be seen should either be smoked or suppressed with friendly ATGMs and artillery before the attacking tanks are engaged.

3. A number of war game trials performed at CGSC have demonstrated that the concept of permitting the attacker to penetrate the defensive area while attriting him to the maximum appears to be less valid in the desert than on European terrain. Due to the fact that the terrain is generally open offering the enemy numerous avenues of approach, the attacker is less likely to be canalized. It appears important to either defeat him in front of the defensive position or to pull back and refuse major penetrations, attriting him in the process of delay. However, the war games demonstrated that principle of maximum use of flank shots that interlock seems extremely valid.

4. The same trials demonstrated that, where time permits, mine fields and barriers should be employed. While they generally will not stop the enemy, they will force him to turn or assist in canalizing him in order

that flanking fires may be directed into him. It should be noted, however, that during the Yom Kippur War Israeli minefields along the Bar Lev Line and the tank ditch in the Golan Heights were quickly breeched without significant delay.

5. Within defensive positions, supplemental and alternate firing positions for AT weapons are essential. The barren desert terrain affords little or no concealment and direct fire weapons will have significant signatures due to the clouds of dust and sant they will create. Rapid displacement to another firing position is therefore critical. Routes to secondary positions must be carefully planned and reconnoitered. While jebels and wadis may afford good firing positions, rapid egress from these features is usually difficult for tracked vehicles. AT weapons should be mutually supporting in depth as well as lateral emplacement so as to provide overwatch as forward weapons displace. The use of smoke to conceal displacements should also be considered.

6. A conclusion drawn from one CGSC war gaming trial asserts that, in a desert defensive situation, tanks should be employed forward at task force and lower levels. They should be emplaced in such a way that they can deliver flanking fires and, with their mobility, cover the displacement of forward ATGMs and displace rapidly to new firing positions themselves. If kept in reserve, at this level, they would spend most of their time moving to engage and in the process would forfeit prepared firing positions and be more vulnerable.

7. In the desert, as in any other environment, field artillery is an essential defensive tool. It causes enemy armor to button up and separates

enemy tanks from dismounted infantry, hence making it more vulnerable to flanking AT fires. Smoke is an important tool for concealing the displacement of weapons from one position to another and for obscuring enemy overwatch positions where BMP/Saggers are likely to be.

C. Offensive Considerations. One of the most sobering lessons of the Yom Kippur War was the Egyptians extensive use of highly successful antitank ambushes which foiled numerous Israeli offensive armored formations. After the canal crossing, 8,000 Egyptian infantrymen armed with RPG-7s and saggers fanned out across the desert to ambush Israeli tanks as they raced toward the Bar Lev Line. One successful technique was to establish ambush positions well forward and allow several Egyptian tanks to be seen in the rear. This would lure the Israeli tanks forward to engage the Egyptian tanks only to be met by a hail of Sagger and RPG-7 fire. From this experience the Israeli's, who favored large pure tank formations, relearned the necessity of combined arms teams. After suffering significant tank losses intially, the Israelis formed combined arms teams to deal with ATGMs and RPGs. Offensive formations employed field artillery to prep likely firing positions and infatnry to dissrupt possible ambush sites.

SECTION IV

EUROPEAN SCENARIO

THE MECH HEAVY TASK FORCE IN THE DEFENSE IN EUROPE

A. Concepts from Wargaming a Battalion Defense in Europe.

1. The conduct of the defense, as outlined, will be successful against a motorized rifle regiment.

2. The employment of the COP as a delay force is a doctrinal change. It is justified in view of the anticipated light friendly losses and the probability of high enemy losses. It is probable that excessive enemy losses well forward of the FEBA would force him to initiate major force changes in his attacking echelon and probably delay his attack.

3. Closed terrain (hilly, wooded areas) severely degrades the effectiveness of antitank weapons organic to US infatnry units and causes increased reliance on the tank as the primary anti-tank weapon. Reliance on wire-guided missiles with minimum range limitations places the US infantryman at a significant disadvantage when compared with his Soviet counterpart who employs a combination of missile and direct-fire AT weapons.

4. US infantry weapons do not have air effective night-firing sight, thus placing increased reliance on the tank as an AT weapon.

5. US APC armament must be up-gunned to increase its capability to kill enemy APC's and BMP-type systems.

6. Widely dispersed defenses will hinder the ability to concentrate a counterattack force, especially at night when counterattacks are most likely to occur.

7. After withdrawal from the FEBA, the battalion task force does not have adequate troop strength (especially infantry) to retain key

44

terrain against an enemy force larger than a motorized rifle regiment.

8. Although EW must be considered, it is not anticipated that enemy jamming of radio channels below battalion level will be significant. However, in the initial defensive position along the FEBA, primary means of communication will be wire with FM voice and pyrotechnic backup.

B. Conclusions. In the European Scenario restrictive terrain compounds the selection of kill zones. Target acquisition and observation is limited by the nature of the terrain (trees and undulating terrain). As such, at the extreme ranges the TOW's effectiveness is significantly reduced. The depth of the kill zone is limited. The enemy must be made to halt and/or pile-up. In the European Scenario it would appear that the most effective weapon is the Dragon supported by the TOW in exceptional circumstances.

SECTION V

IMPROVEMENTS IN ANTIARMOR ORGANIZATION

IMPROVEMENTS IN ANTIARMOR ORGANIZATION

The introduction of new, or vastly improved, older weapons into a combat environment invariably causes a change in tactics by those who do not have the new advantage. It is of little advantage if both sides have the new weaponry. The result is almost hygienic; that is, if you have it you gain no advantage, but if you don't have it you are at a disadvantage. Armored warfare, as we have known it over the past twenty years, is now faced with this dilemma. The introduction of accurate, long range, highly lethal, antitank guided missiles into the offense and defense by the armies of NATO and Warsaw Pact countries has not in itself given an advantage to either side. (It has, however, caused a retooling of our tactical manipulation of the battlefield.) The real impact of all weapons systems on maneuver lies in accuracy and lethality. If there is armor on the battlefield, there will be antiarmor weapons, and both can kill if they can see the target. One-shot-kill capability with almost 100% probability predicts a very cautious maneuver in the future.

The tactical advantage must thus be gained, as it inevitably is, by application of systems in a manner which will maximize their performance, and protect their weaknesses. Success will depend on the organization of men into units capable of making better use of their equipment than the enemy does of his. This study analyzes a small phase of the application of organizational structure toward achieving an advantage. Using the personnel and equipment authorizations found in a type mechanized infantry division, we have addressed three areas in an effort to increase the

antiarmor capability of such a division when employed in the central Europe scenario currently defended by NATO forces. Our study has assumed any reorganization would require the division to retain the capability to perform all current mission assignments to the present degree of efficiency and in the same environment.

The areas of investigation are:

1. Creation of combined arms units of tanks, infantry and antiarmor forces in a formally organized structure.

2. Creation of special mission forces, i.e. antiarmor companies armed with ATGM and employed in direct or general support of maneuver forces.

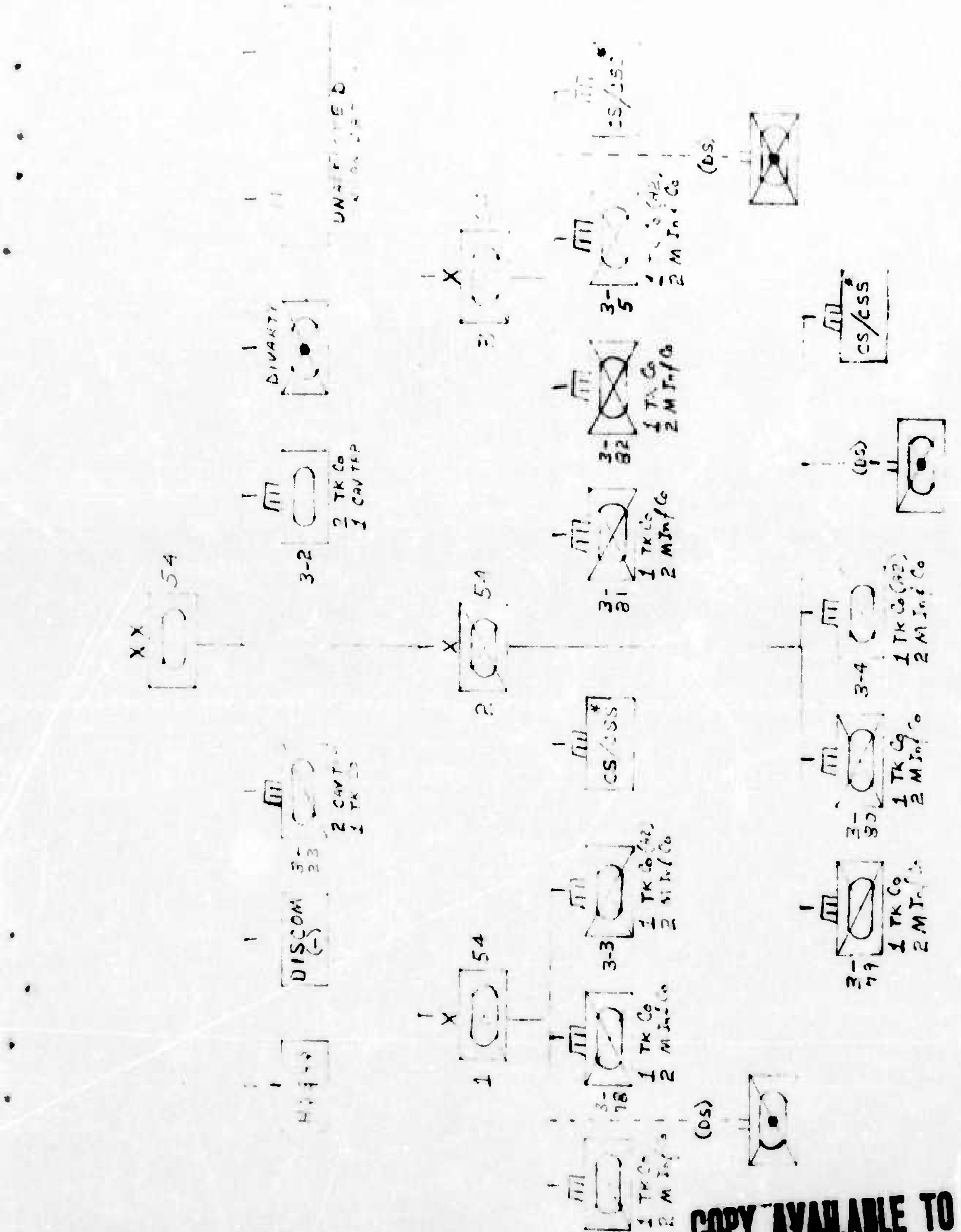
3. Employment of maneuver forces in a "pure" configuration without regard to combined arms efforts.

Each of the three areas will be addressed as to its impact on tactical employment, control of fires, command and control, training, security, camouflage, field fortifications, and night operations.

COMBINED ARMS UNITS ORGANIZED IN FORMAL STRUCTURE
(54th Infantry Division (MECH))

1. Organization. The three brigades of the division will be permanently organized as combined arms units, each with three task-force size combined arms units. Each brigade would have a DS artillery battalion, an AOA battery (C/V), an engineer company, and the brigade slice of CSS assets.

Each battalion task force would have two mechanized infantry companies and one tank company. One of the task forces would contain an M60A2 company, while the other two task forces would have M60A1 tanks.



* For the sake of simplicity smallest units

The remaining tank battalion and the armored cavalry squadron would be task organized into two task forces:[1] One having two GC troops and one tank company, and the other having one AC troop and two tank companies.

Thus the 54th Mechanized Division would be organized as shown in figure 1. The combat support units such as the field artillery battalions and engineer and ADA units with each Brigade are on an "association basis" and their parent units still command them, although their normal mission is DS. This arrangement facilitates a coordinated effort in each area concerned.

One further comment on organization concerns the divisions TOW assets. Each mechanized infantry company would retain its two TOW's and those in the infantry battalions combat support companies will be adjusted so that each battalion task force of the brigades would have eight TOWs in the combat support company.

2. Tactics. We view each brigade being assigned a zone of action as shown on the attached overlay. Each brigade zone will be subdivided into three battalion sectors as shown on the overlay. Based on the extended front assigned, we see no brigade reserve except for a "string" on one or two of the task force reserves. Based on the tank threat, the width of a task force sector would be adjusted on the tank trafficability of terrain in zone.

The task forces (TF's) of the brigades could be employed as follows: Each mech company could be divided into three platoon sized ambush elements.

---

[1]We discussed mixing the cav and the tanks to come up with three equivalent TF (-)'s, but the extra command element was a problem.

Each mech company could be divided into three platoon sized ambush elements. The six ambush elements in a battalion could each have two TOW's and three DRAGONS. Each member of the ambush element would have 2-4 LAW's in addition to the TOE weapon. These platoon sized anti-tank ambush elements would be employed according to General Starry's concept. First, they would use the terrain to prevent their own discovery and to reduce the direct fire capability of the enemy by deploying on the flanks of hills and in defilade wherever possible. Second, care would be taken to maximize their own long range fire capability either from their ambush site or from supplementary positions. Lastly, the ambushes would be mutually supporting as far as possible.

The platoon ambushes would not necessarily be on line, but would take advantage of the terrain in the TF sector, so some of them would be layered in depth behind others.

The platoon ambushes would not be employed in one mass normally, but would be a cluster of anti-tank squads organized to fit the terrain. A platoon ambush cluster might look like figure 2.

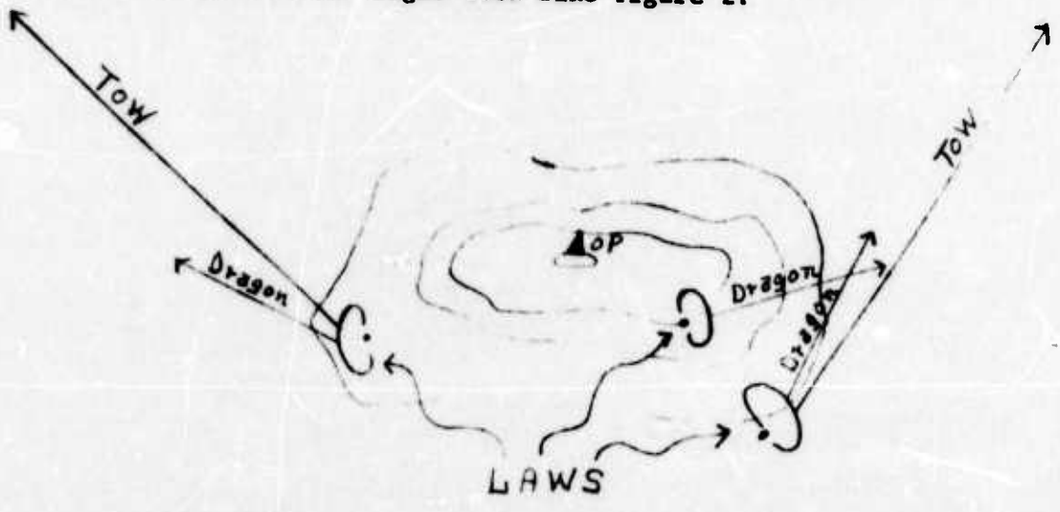


Figure 2

The ambush elements would be mobile and take advantage of preselected routes to alternate and supplementary positions to add depth to a sector. Some of the ambush elements may be tasked to hold key terrain, however. (When such a mission is given, the terrain must be key and difficult to assault.) Each platoon leader would continue to control his element and platoon integrity would be maintained.

A great deal of effort would be made to fortify the battle area with barriers and minefields in order to canalize the enemy into kill zones and break up his attack. Unattended ground sensors and automatic ambushes would also be employed to provide early warning and to confuse and delay the enemy.

With such heavy emphasis on the anti-tank capability of a platoon there is a concomitant degradation of the anti-infantry capability of a platoon. As a result, great care must be taken to integrate antipersonnel mines, claymores and artillery into platoon defenses. Another technique might be to employ Vulcan barrages for night defense along with the platoon's .50 caliber machine guns to defend against infantry assaults. A great amount of artillery would be adjusted by infantrymen in this concept.

Within the TF sector, the mission of the ambush sites would be to attrit the enemy. The tank company of the battalion would be located in another attrition zone to the rear of the platoon ambush clusters and the tanks could be employed in five ways normally.

1. As a counterattack force against the attritted enemy.
2. As another attrition force.
3. To reinforce selected ambush sites.
4. To cover the withdrawal or displacement of ambush elements.

51

5. As the spearhead of a spoiling attack.

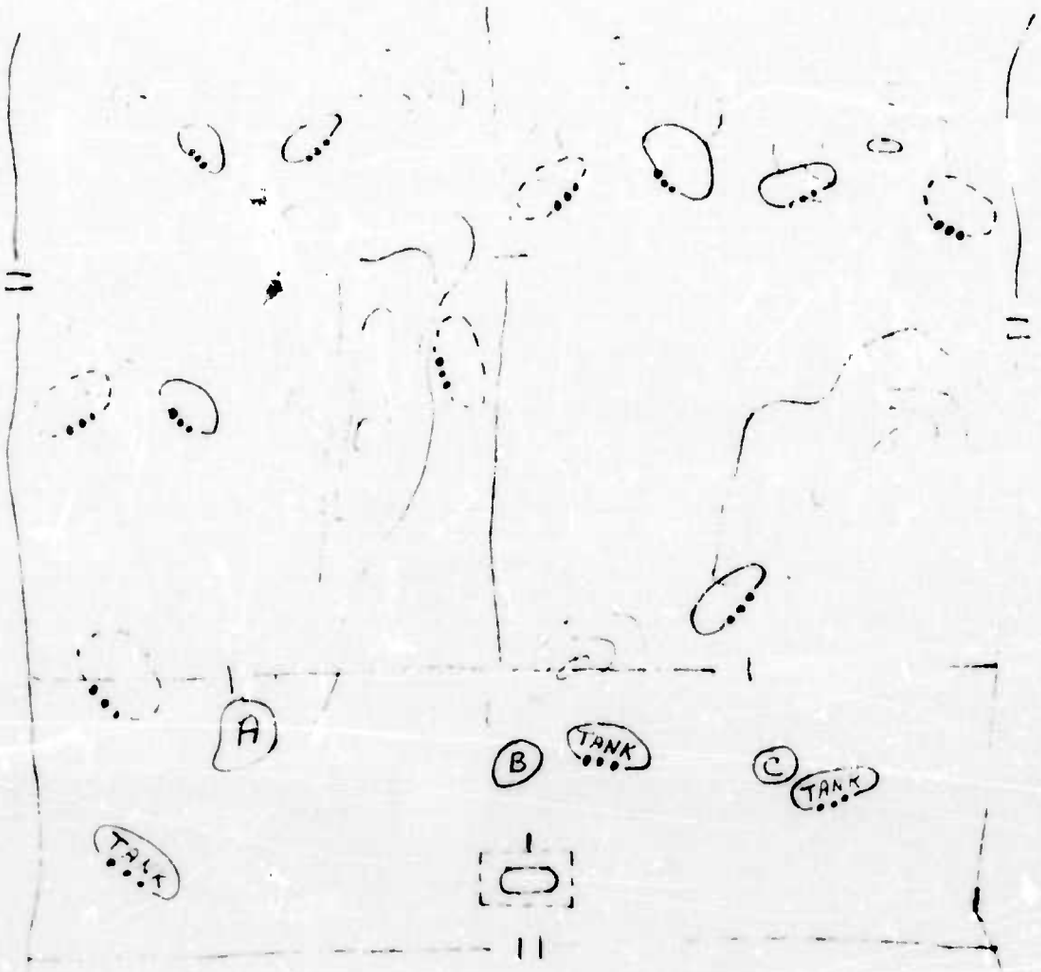
One apparent problem is the TF with the M60A2 tank company. As a counterattack element the M60A2 tank company is at a decided disadvantage. It is probably desirable to make temporary mixes within the brigades to have two M60A1 platoons and one M60A2 platoon in each TF, but the special maintenance problems associated with the M60A2 necessitates a temporary mix.

Forward observer parties would work with selected platoon ambushes and every effort would be made to bring maximum fire on the aggressor at the greatest range possible.

A typical TF defensive zone is shown in Figure 3. The TF zone would be large and there would be many more supplementary and alternate positions in a given zone.

As stated, the brigade would have no reserve with the exception of a string on one or two tank companies. We envision that in another defensive belt, along with the brigade trains and field artillery units, the Division Commander would position his two reserve TF's. These reserve TFs would not be positioned in assembly areas, but in additional ambushes and thus add additional depth to the battle area. The ambush sites would not be the primary mission of these units, however. These TF's represent a mobile anti-tank force which can be employed to destroy enemy units which penetrate the FDA.

One last point should be made when discussing defense in depth; that is the role of the brigade support areas in adding depth to the FDA. There is in combat support and combat service support units a latent and potentially



Platoon would be deployed as three squads in an "ambush cluster." A, B, and C are targeting points for massing the tank company.

Figure 3

powerful anti-tank force. These forces would also be organized so that they add additional depth and serve to slow any quick aggressor thrust.

Figure 3 is a schematic showing a typical TF deployed in the FDA and the attached overlay shows a division organization of the FDA. Note that the brigades have most of the Division zone and that the reserve TF's are located in the brigade rear area.

3. Fire Control. Platoon ambushes would control their own fire within restrictions laid down by Bn. TF commanders. The company command group would locate itself with one of his platoon ambushes that gave him maximum possible control of their action and allowed him to control his forward observer party (artillery) to bring fire to bear on the enemy. TF, Bde, and Div. would maintain normal control.

4. Command and Control. The conduct of the defense would be a severe test of command and control. Observation in the battle area would be vital. A battalion commander would attempt to situate himself so that he could orchestrate the defense of his area. This may mean having several positions or even fragmenting his senior staff. The same would be true for the brigade commander and the division commander. (There would be no substitute for a commander's presence at the point of decision at the critical time.)

Alternate means of communication must be established and rehearsed. Vital to the success of the defense might be the assembly of the reserve and its committment at a critical place. Alternate visual or sound signals should be designed to accomplish this.

5. Training. In an anti-tank ambush there will be no substitute for anti tank weapon proficiency. All personnel should be trained on the DRAGON and TOW as well as the LAW. Proper selection, fortification and camouflage of ambush sites will require extensive training as will coordination of ambush cluster attacks. Practice of route selection, land navigation, withdrawal procedures and massing at preselected points will also demand training time. Individual initiative is another item requiring emphasis in the ambush environment.

6. Security. At the division level there would be no GOP. That portion of the corps covering force in zone would come under the division commander's control when it was within 20-30 km of the FDA. Upon rearward passage through the FDA, the covering force would revert to corps control.

Maximum use of unattended ground sensors, camouflage, cover, night observation devices, aerial observers, obstacles, minefields, automatic ambushes and smoke will give early warning or provide passive security. Illumination should be preplanned and rehearsed. Routes of withdrawal should be covered and concealed and withdrawals rehearsed so that squads of the ambush cluster cover each other during each position change.

7. Camouflage. The art of camouflage must be revived. The camouflage of a position should include dummy positions. We recommend that small blocks of TNT or some other device be used to give a dummy TOW or DRAGON signature. These positions could be controlled by wire from the true position in order to confuse the enemy as to actual weapon locations. Stove pipe could be used to serve as the launcher simulator.

8. Field Fortification. Positions should be prepared with overhead cover. Pre-fabricated pieces (similar to culverts used in Vietnam but lighter) should be available to support sand bags for roofs over positions. If in one position long enough communication trenches or tunnels should be dug between positions and back to routes of withdrawal.

9. Night Operations. We see the denial of access to the battlefield during darkness as one of the keys to success in the defense. Extensive patrolling and night ambushes will make agressor recovery attempts difficult. Artillery should be adjusted on disabled tanks beyond patrol range during the day and used to keep recovery units from approaching the tanks at night.

Tank killer patrols on foot should use the cover of darkness to take the offensive whenever possible. The noise of refueling, rearming and repairing of enemy tank units makes a target and gives cover for advancing foot patrols.

SPECIAL MISSION FORCES

This section develops a division defense based on semi-independent task forces organized with organic TOW companies. Organization and tactics will be discussed; then the concepts for the employment and training of the TOW company will be presented.

The best defense is one that keeps the enemy from penetrating the FEBA. But to prevent a penetration, the defender must have combat power all along the FEBA comparable to the attacker. If the attacker has enough combat power to force multiple penetrations, the defender must have tremendous

flexibility to continue the fight. At the same time, the defender must minimize his combat power deficiency by maximizing the use of his available combat forces.

The flexibility required to fight a fluid battle is obtained by assigning each task force an area of operations (AO) extending from the rear of the corps covering force to the brigade rear boundary and by allowing each task force commander to maneuver, deploy, and fight his forces within the assigned AO as he sees fit.

To minimize the difference in combat power, the task forces have most of the combat power which means there are small reserves. The idea is to have the maximum number of people fighting the maximum amount of time. Each brigade has two task forces; a direct support artillery battalion, and an engineer company. One task force of each brigade consists of a mechanized infantry battalion, two tank companies, and a TOW company. The other task force in each brigade has a cavalry troop substituted for one of the tank companies, thus allowing each brigade to have one tank company for a reserve.

Initially, the aggressor will meet the corps covering force. The division cavalry squadron is part of the covering force and when it is forced back to the task force AO's, the ground troops are attached to their respective task forces. The air cavalry troop remains under division control.

The aggressor is aware of the lethality of our anti-armor weapons; so he will probably try to maximize his use of cover and concealment. Since the 54th Mech Div area east of Frankfurt has many villages and

wooded areas that provide good cover and concealment, each task force must make the enemy pay heavily for access to these areas. If aggressor's armor formations are forced into the open areas; then our TOW's, DRAGONs, Sheridans, tanks, and artillery can kill the maximum number of armor vehicles.

When the aggressor enters an AO, all of the task force occupies defensive positions at the edges of woods and towns nearest the entry point of the aggressor. From these positions, the open areas are covered by the interlocking fires of the anti-armor weapons and tanks. From these positions, the remainder of our personnel will be prepared to engage any aggressor infantry that dismount from their vehicles. These positions will be manned as long as there is no threat of being overtaken by aggressor tanks.

Each anti-armor weapons crew moves to a preselected firing position in the next woods or village when they are forced out of their present position so that they can continue to cover the open areas. When forced back from the edges, the other personnel from squad size anti-armor killer teams and move to preselected ambush positions throughout the woods or village they presently occupy. The woods and villages will break up the armor formations if aggressor chooses to enter these areas and make it possible to ambush individual armor vehicles using LAW's. Each LAW team ambushes one or two vehicles and when forced moves to another preselected ambush position. The aggressor will find it very costly to attack through the woods or villages without dismounting his infantry which would considerably slow his attack.

Those aggressor vehicles that manage to get completely behind a task force are counter-attacked by the reserve tank company. If the aggressor is still successful in getting significant forces into our rear areas and the division is fighting throughout its sector, then the corps commander has to employ his reserve.

The TOW company is under the direct control of the task force commander. The company commander leads the company on the battlefield when it is employed as a whole in support of the task force. But, during decentralized operations, the company commander is primarily a planner and resource manager and controls the TOW teams from a company tactical operations center.

The company is formed by taking the two TOW teams from each line company and the twelve TOW teams from the battalion anti-tank section. Each tank killer team consists of six or seven men, an armored personnel carrier and a TOW weapons system, the team has a gunner, loader, driver, team leader, two security personnel, and may be augmented with an artillery forward observer.

The TOW company will be used to augment the anti-armor capabilities of the task force in the vicinity of the active battle area. Some of the TOW teams may also be employed in the enemy rear to impede reinforcements and disrupt enemy formations.

The teams are employed singly or in pairs and are given zones of responsibility. The success of a team depends on tactical surprise which is achieved by the mobility and evasiveness of a single track or pair of tracks. Success of the company as a whole is dependent upon an unstructured

tactical employment designed to strike the enemy at any or all points and enable rapid disengagement and movement to new firing positions.

Maximum use of artillery is mandatory to add confusion to the battlefield, disguise signature effects of the TOW, and aid in disengaging.

The firing positions used by the TOW teams will greatly influence the success or failure of the teams. Therefore, the teams must be trained to select firing positions that provide:

1. Extended and unrestricted fields of fire that cover the armor avenues of approach.

2. Mutual support between TOW weapons when possible.

3. Hull defilade, concealment, and cover.

4. Positions above likely avenues of approach to improve visibility and long range engagement of targets.

5. Back blast clearance that will still afford concealment of back glast signature.

6. Covered and concealed routes out of the firing position to alternate positions.

7. Avoidance of terrain features which are likely registration points for enemy artillery.

When employed independently, consideration must be given to selecting positions that allow the TOW team to establish local security. Individual team members will leave the launcher position and occupy observation or listening posts. Not only do these positions provide local security, but they will also be advantageous for locating targets for the TOW gunner and indirect fire weapons.

In the defense, prior reconnaissance of all possible firing positions is essential. The TOW teams should be trained in recording all security and camouflage measures peculiar to each position. Accurate range cards must be prepared for each position. Fire/no fire lines should be established when the tactical situation or terrain dictate.

When possible, the TOW should be fired from the APC. The APC gives the crew some protection and allows rapid displacement. In some terrain, it may be necessary to fire the TOW dismounted. Rapid firing and moving is essential if the TOW team is to survive. Consequently, the teams must be highly trained in dismounting, firing, and mounting the weapons system.

The TOW teams need training in the use of demolitions and mines to create obstacles. These obstacles could be invaluable in gaining time for the teams to move from position to position.

In addition; aggressor armor doctrine, armored vehicle identification, and the call for the adjustment of indirect fires are major training subjects for the TOW teams.

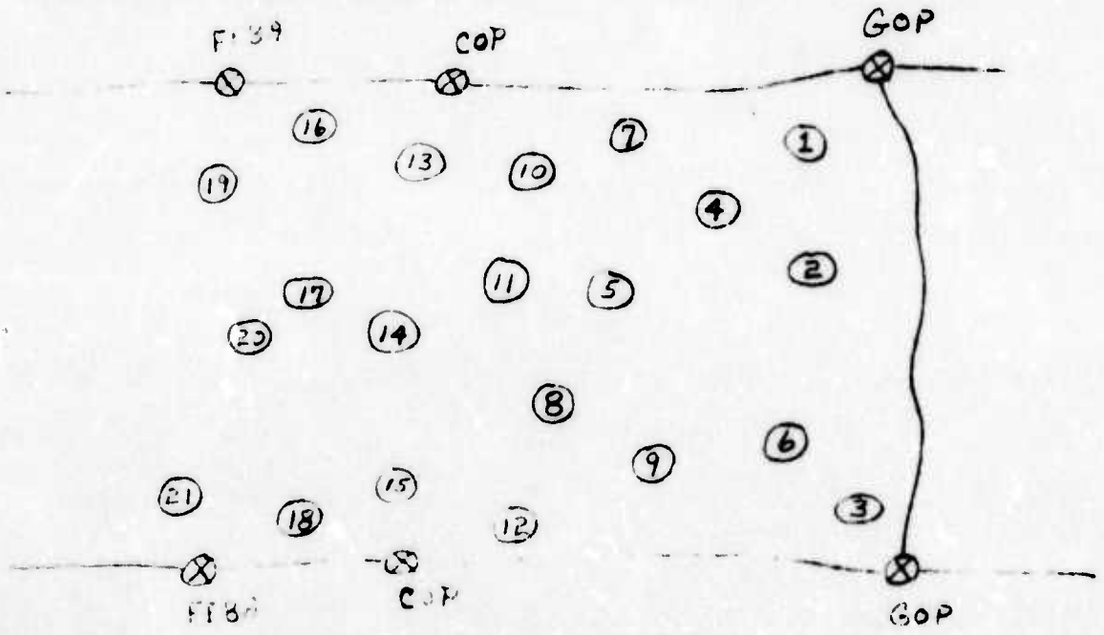
There are several weaknesses in this defensive concept, such as: the small reserve and the coordination between adjacent AO's. The lack of reserves can be partially compensated for by employing two or more task forces in one AO. For instance, if the aggressor is not exerting pressure all along the FEBA, covering forces can be left in one AO and the majority of the task force assigned to that AO is utilized in the area that is being hit hard by the aggressor.

If the aggressor has overwhelming combat power and is attacking all along the FEBA, then this defense will maximize the defender's combat power by having the majority of the force fighting the maximum amount of time.

MANEUVER FORCES IN A "PURE" CONFIGURATION

Can the employment of maneuver forces in a "Pure" configuration without regard to combined arms efforts improve antiarmor capabilities of the 54th Inf Div (Mech)? This question is addressed within the restriction of present personnel and equipment authorization for the 54th Infantry Division (Mech) as used in course R3161. Any organizational changes must maintain the unit's ability to accomplish it's mission.

Current doctrine and lessons learned from past antiarmor warfare stress the importance of combined arms operations. The concept of combined arms has been validated throughout the history of modern warfare and as recently as the 1973 middle east war. However, due to the ever increasing range, accuracy and manuverability of antiarmor weapons in the infantrymans hands today, the consideration of the employment of maneuver forces in a "pure" configuration is highly feasible.



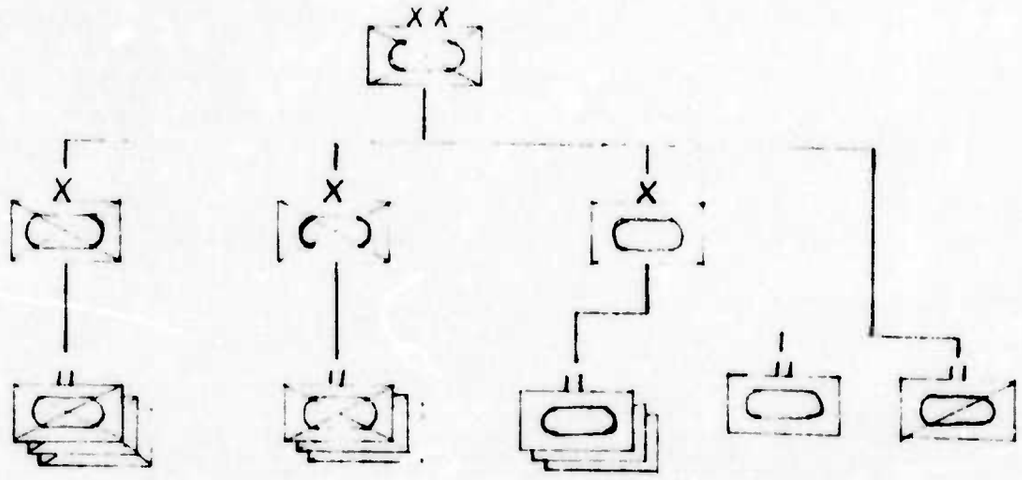
TACTICS: The anti-tank teams (T.O.W.s) would fight a delaying, attriting battle starting 3-10 km's behind the GOP force. The GOP force is made up of the pure armor forces and the cavalry units. Consideration should be given to a TOE change in this area augmenting each armor company with one platoon of armored infantry to provide the armor with the close-in protection that they need for this type mission. The GOP's mission remains unchanged other than it is now found at division level, and its area of responsibility would end at a specific point on the ground, which would be located farther forward than normal. Behind this point the attrition zone begins. Once the GOP force reaches this point they become the Division reserve, and pull back through the FEBA forces to a location where they could provide fire support to the front line troops but not be tied down. This of course would only be done where the terrain permits. Once the GOP force pulls back from their mission, the anti-tank teams assume responsibility for the area forward of the FEBA. The teams are employed in pairs through the battalion sector so as to afford protection to each other and add depth to the battle area. Their position will be selected to provide the best long range fires available in that area and offer good covered routes of withdrawal from each position. The tactic of one team firing while another is moving will be used to the maximum. The long range of the TOW must be exploited to the maximum in every instance. Each team will fire one or two rounds and then withdraw to its next delay position across a Bn. front. Up to eighteen teams would be employed if the terrain allowed. The TOW teams would be made up of the same personnel that now man the weapons, with two riflemen to afford security. The eighteen weapons found in the battalion

would be divided into four teams of four weapons each. Each section would be assigned a sector that they would have to operate in. The sectors would lie along the major armor approaches into the area. The mission of the teams would be to engage as many tanks as possible while not becoming decisively engaged. The infantry troops along the FEBA will prepare several positions in their sector for each TOW that will operate there. The infantry would also provide a prepositioned stock of ammunition to resupply each team as they fall back to the FEBA.

The pure armor forces will be employed as a counterattack force, spoiling attack force, limited objective attack force, or any other mission that the commander desires. They would also be used to add depth to the battlefield. The infantry would continue active patrolling and extensive night operations to keep the enemy off balance and make the best use of the short range anti-tank weapons such as the LAW.

Fire control would be greatly aided by placing an artillery FO with each four gun anti-tank section. These FO's would employ the long range fires to cover the various teams withdrawal and to harrass the enemy everywhere possible. The new anti-tank units would train with the artillery and infantry companies and be an organic part of the infantry battalion. Planning would be a necessity for the team members to assure they all could control the fires needed, when and where they are needed.

Command and control was discussed partially in the tactics discussion. The organization of the division is as follows:



Training would change little for the pure units other than the anti-tank sections. In these sections, emphasis on camouflage, marksmanship, artillery and mortar fire adjustment, and independent operation would be emphasized. For the Infantry units small unit tactics, night observation, agressive patrol training and extensive firing of the new LAW would be stressed. Confidence in the weapons would be stressed. Company dragon teams would work to improve marksmanship and speed of emplacement and displacement of the weapon.

The Infantrymen must be trained to operate at night. He has a distinct advantage over the tank at night in Europe. Foot mobil infantry can destroy armor if properly employed as proven by the Yon Kipper war. The infantrymen must be given the confidence to achieve this.

Security: The Infantry security mission would not change drastically. The anti-tank teams would provide their own close-in security. The armor units would have to be augmented with infantrymen to provide close-in security.

Camouflage: The importance of camouflage would have to be stressed in unit training more than ever. The anti-tank teams would have to be among the best in the world to be effective. They must see the enemy and take him under fire before they can be fired upon. The infantry, artillery and armor units must make extensive use of camouflage with the artillery units routinely using it at every stop. Perhaps camouflage sections need to be organized at battery level with their only mission being camouflage.

Field fortifications would be used int he normal manner. The anti-tank teams would prepare as many as they could with the idea that they would shoot and scoot until they reach the FEBA. At the FEBA each weapon would need several positions prepared so they could continue to move as long as possible.

Night operations were discussed above under training. The night belongs to the foot mobil infantryman. This is when he must train and fight offensively.

The armor units would be employed during daylight hours to disrupt the enemy and keep him off balance. The infantry would have that mission at night.

Our analysis has attempted to cast aside preconceived ideas whether derived from doctrine or experience. We accept the strategum that our next battlefield will be unlike the past. But it may change again befors we arrive. Thus, as is often the case, todsy's new approach may be an item for antiquity tomorrow. But one thing does not seem to change. That is man's ability to be the dominant participant in battle. Man's ideas, his application of weapons in battle, his analysis of his opponent all remain

more valuable than advances in weaponry. This study has looked at three methods by which the soldier may reamin dominant against weapons technology.

ANTIARMOR OPERATIONS

OF

COMBINED ARMS

Study Effort

VOLUME II

PREPARED BY:

LTC David Fried
LTC Mohamed Osman (Sudan)
MAJ Ali Fathi Afstair (Iran)
MAJ Edward Bruner
MAJ August Corsenberg (Belgium)
MAJ Joseph Dye
MAJ John Fielding
MAJ Cord Gehring
MAJ John McQuestion
MAJ Hugh Price
MAJ Richard Seaward
MAJ William Pattison
MAJ Gene Rafanelli
CPT Philip Kearns

INDEX

INTRODUCTION

The purpose of this report is to provide a composite collection of techniques and ideas on antiarmor warfare. The various sections of the report were compiled by members of the review group from student papers prepared in term II 1974-75 USACGSC. In some cases, the entire paper is included in the report and in others only those portions considered innovative are quoted.

To cite reference papers in each case was not possible given the variety of subjects covered and the duplication of effort found in many of the papers. In some circumstances the thoughts of members of the review group are incorporated.

The review group attempted to avoid restating thoughts and concepts found in current antiarmor publications.

Where duplication does exist between current publications and the report, it was felt that the particular technique or concept was worthy of emphasis.

SECTION I

FUNDAMENTALS OF ANTIARMOR OPERATIONS

FUNDAMENTALS OF ANTIARMOR OPERATIONS

Adherence to fundamentals of antiarmor operations will insure that effects of weapons fire will be maximized. As is true in the Principles of war there may be conflicts between two fundamentals. The commander must be able to analyse his situation in light of his forces, the terrain and the threat to determine which fundamentals apply most. Furthermore, those which apply at one command may not apply at the next command.

Maintenance of Combined Arms

Maintenance of Offensive Spirit

Maximum Use of Surprise

Maintenance of Mobility

Maximum Use of Massed Fires

Maximum Use of Continuous Engagement (Fires Planned in Depth)

Maximum Integration of Fires

Mutual Support of Weapons

Focus on Main Threat

Maximum Use of Terrain

SECTION II

ORGANIZATION FOR COMBAT

PART I

COMMAND RELATIONSHIPS

The advent of the light, medium, and heavy antitank weapons dictate a requirement to examine existing command and control doctrine as it relates to antitank weapons. The question of decentralization and centralization must be examined to determine the best means of control. The words centralized and decentralized are used to describe the types of control that may be used. Centralized control refers to the retention of control of the TOW weapons by the battalion commander. Decentralized control is the delegation of control to a subordinate unit, usually a rifle or tank company within the battalion.

Support is further defined by the terms direct support (DS) and general support (GS). Direct support is defined by FM 7-20 as "a mission or task requiring one unit, under command of its parent headquarters, to support another specific unit. The supporting unit is required to answer directly to the supported unit's request for support." General support is said to be established when "units...remain under their assigned commander, and they provide support to a force as a whole and not to any particular element of the supported force.

Decentralized control is normally considered attachment. FM 7-20 describes attachment as units "assigned temporarily to a command other than their parent unit. When one unit is attached to another, the commander of the unit to which the attachment is made commands the attached unit. Subject

to the limitations imposed in the attachment order, this includes full responsibility for combat service support, discipline, training and operations. Attachment represents the firmest control..."

Operational control as used in FM 7-20, describes units "placed under a commander for assignment of tasks and authoritative direction to accomplish the mission." This does not include such things as "responsibilities or authority for combat service support, discipline, internal organization or unit training..."

The following comments introduce command and control in 3rd Armored Division's letter, subject: MDA Training Note number 30, Antitank Operations and TOW Systems Training. These definitions are accepted as valid descriptions of the methods of command and control for TOW weapons and are used as the basis for evaluating the proposed hypothesis.

General Support: TOW units in general support remain under control of their assigned commander and they provide support to a force as a whole and not to any particular element of the supported force. TOW's positioned by AT platoon leader after coordination with company commanders.

Direct Support: TOW units in direct support remain under command of their assigned commander but respond directly to the supported unit's plan of action. TOW's positioned by the AT platoon leader at the direction of the company commander.

Operational Control: TOW Units under operational control are placed under a commander for assignment of tasks and authoritative direction to accomplish the mission. Operational control rarely used at battalion level.

Attachment: TOW units in attachment are assigned temporarily to another command and are commanded by the commander of the unit to which attached. Attachment includes full responsibility for logistical support, discipline, training and operations. Attachment represents the firmest control.

The following comments apply specifically to TOW:

General Support (GS): Control is retained by the battalion commander through the combat support company commander. The entire battalion or task force is provided support from multi-section (four or more launchers) consolidated firing position on major avenues of armor approach. Priority of fire may be assigned to the company in whose sector the sections are employed. In vague situations where the armor threat is undetermined or when tight control of assets is required, GS employment is appropriate.

Direct Support (DS): Control of TOW elements is retained by battaltion, however, individual TOW sections are assigned to support one specific maneuver element. DS TOW sections will respond directly to the fire requests of the unit supported but will remain responsive to battalion as well. Logistic support responsibility remains with the combat support company. Direct support provides flexibility and responsiveness and is appropriate where the forward units are not too widely dispersed, yet each is covering an equally dangerous avenue of armor approach or is assigned separate objectives within a narrow battalion zone. DS TOW elements may move with the supported company or provide constant fire from battalion

overwatch positions. In either case, they remain under the control of the antitank platoon leader thus allowing rapid shifting of resources with minimum notice.

Attached: Control of attached TOW elements is transferred to the commander of the unit receiving the attachment. Subject to the limitations of the attachment order, the receiving commander will exercise the same degree of command and control over attached troops as over organic units. This method is the most responsive to the needs of the supported command and is the one which will most frequently be used when the armor threat is known. It is based on the wide dispersion and rapid, semi-independent operations expected of the rifle companies, and when the battalion commander does not expect to redeploy these attached elements within the battalion sector. Company commanders receiving attachments may subsequently attach or place DS TOW elements, including his organic TOW section, to platoons or retain all assets in general support of the company. Rarely will a TOW element be attached to a rifle squad, however, this may be done if the squad plus TOW will perform an independent mission, i.e., ambush, roadblock, or flank end point security.

Command and control responsibilities of the TOW for subordinate units within the battalion are reflected in the following chart.

	TOW SEC	REC FIRE MISSIONS	ASG SEC FIRE BY	PSN'D BY	EST COMM WITH	FIRES PLAN/ CONTR BY	REQ RESUPP FROM
GS	BN TOW	AT	AT	AT	AT	AT	AT
GS	CO TOW	CDR	CDR	CDR	CDR	CDR	CA
ATCH	BN TOW	CA	CA	CA	CA	CA	CA
ATCH	CO TOW	P	P	P	P	P	P

AT=Antitank Platoon Leader; CDR=Company Commander; P=Rifle Platoon Leader; CA=Company to which attached.

CONSIDERATION FOR EMPLOYMENT.

Centralization:

It is difficult to visualize a batalion commander ellowing the TOW platoon leadar to independantly control his slement. It is envisioned that the TOWs will be controlled either by the battelion commander -- possibily from the tactical CP in coordination with the FSCC -- or the commander of an attrition unit (pletoon or company). An ideal location for the TOW platoon leader would be in the tectical CP. Under current doctrine the TOW platoon laader is givan a most criticel mission without totelly integrating him into ths fira coordination picture. By placing him in the CP he will ba located properly to pass vital information and obtain vitel decisions. At times the situation will exist whars severel weapons, possibly from diffarant units, can engege tha eame target. Economic use of ammunition and the consideretion of concealing weapone locations suggeets the need for aither centralized control or well coordinated fire control measuras.

Decentralization:

Antitank support bacomes evan more criticel over wide fronteges in a European environment. Beceuse of ths large anemy armor forces, the forwerd companies will need as much antitank support as possible. This can best be accomplished by decentrelization of the bettalion AT squade. However, the battalion commander must still retain enough antitank weapons to weigh the battle. On the modern bettlefield, command and control may become even more

difficult in an active electronic warfare or nuclear environment, and this also favors decentralization.

Electronic Warfare:

The electronic warfare threat currently facing the NATO forces will further complicate command and control. It can be anticipated that when the enemy conducts offensive operations he will employ EW assets against every command and fire control net that he can monitor and discern as being a unit directly opposing his forces. This threat alone dictates that command and control techniques be re-examined to insure every possible means of communications is explored.

Logistics:

This almost impossible logistical task for the Antitank Platoon leader makes it quite logical that one might expect to find at least a portion of the battalion AT platoon attached to line companies, and probably further attached to rifle platoons. This latter method was thee means used for the Army's most comprehensive test yet on the effectiveness of anti-tank missiles. The Tactical Effectiveness Testing Antitank Missiles Evaluation (TETAM Study) of 1974 by TRADOC's field agency the Combat Developments Experimental Command (CDEC). Thus, what might be considered current doctrine, or at least thought, envisions TOWs ultimately under the control of the foreward elements, and located within the rifle platoons for security.

Discussion of command and control problems inherent in the organization and employment of an antiarmor task force in the European environment.

The antitank platoon may be employed in general support of tha battalion task force; it may place section in direct support of company teams; or its sections may be attached. There are good arguments for each method of employment in particular situations. Since the Commadner is con cerned with how to organize and employ a task force in Europeen Thaatrs entiarmor operations in ganeral rather than how to organize and fight the unit in e specific situation on a specific piece of terrain he must consider tha normal or typical situation. The enemy has a eignificant EW capability and it is reasonable to assume that he will diract it at the command end control element directing our primary entiarmor weapons systems. This argues against GS or cantralizad task forca control of TOWs. Tha electronic signature of the antiarmor nat incraasas our vulnarability to dete:tion and suppressive fires. It is also risky to assume that enemy EW will permit tha effactiva centralized control of TOWs by the task force using FM redio. Due to the distances involved and tha mobility of tha task force the usa of tactical wire command nets at task forcce level is not feasible except on the intial battle positions. Company teams will be oparating along wide fronts with graetar indapandence than envisionad in currant doctrina. This favors decantralized employment - either DS or attachment to company teams. Tha company taam is tha key to a successful task force dafense and company team commanders should be given tha assats to do the job. Howevar, tha battelion task force commander must heve the capability to influanca the battle once enemy intentions beacome claar. In short the

company teams need more TOWs to augment their antiarmor capability and the battalion task force commander requires the retention of control over some TOWs to influence the battle. The best distribution of the TOWS - a limited and critical asset - under most situations is a combination of centralized and decentralized control. Normally the task force will retain control over two sections (2 TOWs per section), and attach one section to each of the two teams formed around the mechanized rifle companies and attach two sections to the team formed around the tank company. Each team then has a total of four TOW launchers, including the combat support company. Team commanders have TOWs under their direct control. They have been assigned a mission and have been given assets to accomplish it. At the same time the TF commander has retained control - through the antitank platoon leader - of sufficient TOWs to influence the battle when enemy intentions become clear. This distribution of limited TOW assets best satisfies the requirements of team commanders and the TF commander. It also increases the effectiveness of command and control over TOWs in a mobile, EW environment. Though based on independent analysis this allocation and assignment of TOWs is the same as recommended in a recent article on antitank tactics published by Infantry.

Employment of the combat support company as a maneuver element. Note that the combat support company has been used as a major maneuver element in phase I of defensive operations. Though FM 7-20 indicates that the combat support company commander may perform other duties such as

82

"operating a task force headquarters", it does not elaborate further. Use of the CSC as a maneuver element and the TF commander's control problems if he allows the CSC commander to employ his subordinate and attached elements. My own conclusion is reinforce by a thought provoking article in Infantry which suggest that perhaps our doctrine has not kept pace with TO&E changes and we are not normally employing the CSC in the most effective manner.

The problem of command and control is compounded with the attachment of subelements from other arms or other battalions. Under present practices of task organizing for combat with our standard mechanized infantry and tank battalions, a maneuver battalion headquarters is capable of effectively controlling from 2 to 5 subordinate elements. Command and control effectiveness becomes taxed as the task organization exceeds this range, as with the attachment of additional combat support elements. Control is somewhat impaired when subelements from other arms or other battalions are attached. This is due primarily to the differences in operational Standard Operating Procedures (SOPs). This problem can be circumvented through additional combined arms and cross training. Communications capabilities between mechnaized infantry and armor units mesh nicely. Efficiency of this concept may be adversely affected by mission changes that would require reorganization, especially with respect to the time required etc. The burden of command and control requirements placed upon the commander doesn't vary appreciably between offensive and defensive roles. The problem

53

of air-space management, though crucial, will probably remain centralized at divisional level, at least for the near future in this concept.

PART II

RESPONSIBILITIES OF LEADERS

Personnel.

Current doctrine designates six key personnel as having either command or leadership responsibility in employing the TOW ATGM. These principal characters are:

a. The battalion commander.

b. The rifle company commander.

c. The Combat Support company commander.

d. Antitank Platoon leader.

e. Rifle platoon leader.

f. TOW squad/section leader.

The battalion commander's role will not be addressed, as his responsibility is not one of direct command and control but rather of "overall employment."

Additionally, the section/squad leader's role will not be analyzed as it is felt that his duties, although critical, are more related to a crew "drillmaster" and less flexable than the other officer leaders/commanders. It is primarily the section/squad leaders job to fight his weapon and insure local camouflage and other repetative tasks are accomplished. This individual has no command and little control over ATGM assets other than his own.

The Company Commander.

The company commander's role is also somewhat general in nature. His considerations in the defense include "...matching his assets with the terrain and enemy capabilities. He plans for the use of his organic support weapons in general or direct support or in an attached role." It is the commander's task to organize for combat, designate platoon positions and identify key points of the defense. At no time should a commander be tied down to actively commanding and controlling single ATGM systems or rounds. His task is to coordinate their fires through the senior Antitank representatives present, or through his platoon leaders if he has attached TOWs to the rifle platoons.

Combat Support Company Commander.

Like the rifle company commander, the commander of Combat Support company has no direct fire control role in TOW ATGMs. Rather, the Combat Support company commander's task is to "...advise, assist and make recommendations to the battalion commander in all aspects of antitank defense."

This role appears redundant when one considers the battalion commander in USAREUR is indeed concerned and probably well versed in antiarmor operations, and has a battalion operations officer who is likewise experienced and concerned with all aspects of antiarmor defense.

The need for the commander of Combat Support company to keep the commander advised on the status of his TOW weapons also appears to be adding an unnecessary intermediate headquarters to reporting channels. The battalion communications net organization normally has the combat platoons

(Heavy Mortar, Recon, Antitank) as stations in the battalion FM command net, thus already aware of the TOW weapons "status".

The conclusion is that the Combat Support company commander might well be used to accompany a portion of the Antitank Platoon's assets to help organize and coordinate TOW fires with a team or company commander. The Combat Support company commander would probably be well employed in the tank company's sector (if so task organized as to have an armor company) since TOWs are not found in the tank battalion and the armor company commander might be generally less familiar with the weapons. This is not a firm recommendation to change doctrine, nor is it necessarily a gap in doctrine; it is presented as an observation to be considered by a battalion commander planning his defenses.

The Antitank Platoon Leader.

Current doctrine envisions the Antitank Platoon Leader as a trainer of his platoon, advisor to the battalion commander and a special staff officer under the supervision of the S3. Depending upon the role of the Combat Support company commander, this advising might appear redundant. This is particularly true after the Antitank Platoon is task organized and deployed.

This concept appears logical and adequate, but is lacking in that direct, dedicated officer leadership is not achieved for TOWs of the Antitank Platoon in all cases. The Antitank Platoon leader simply cannot be all places at once. Under current doctrine he will hopefully be in the most critical antitank sector.

The Rifle Platoon Leader.

It was previously shown in chapter two that the rifle platoon leader is the primary controller for ATGMs within his sector. He identifies primary and alternate weapons positions within his area and identifies and "hands-off" targets. This is where the actual battle is commanded/controlled and it is quite logical that the platoon leader is in charge of assets in his sector.

One disadvantage of this role is that TOWs within the platoon sector may become oriented or locked into the forward platoon positions once the fight has begun and the platoon leader is busy with indirect fires, organic fires, maneuver and fighting of his elements as well as antitank fires. It is also felt that a thorough reconnaissance of rearward overwatch or stand-off positions may not be made by the platoon leader who is primarily concerned with the organization of his own immediate battle area.

The Weapons Platoon Leader.

The weapons platoon leader has three 81mm mortar tubes to employ and two TOW ATGMs organic in his antitank section. When one considers the range and effectiveness of 81mm mortar fires against mounted T-62 tanks and BMP columns it would appear that the weapons platoon leader would best be used as the company's antitank leader or coordinator. This primary duty, instead of the mortars would be increased in importance if the company has four (1/3) battalion TOWs attached. The Weapons platoon leader

would still be charged with organizing/planning the mortar fires to support the AT plan.

It is proposed that in this case the weapons platoon leader be primarily the coordinator for TOW ATGMs. His task would not be to replace the duties or responsibilities of the company commander, but to insure reconnaissance in-depth or the battle area and assist the platoon leaders in fire planning and integration of antitank fires. Since the TOW's 3,000 meter range allows fires across adjacent platoon sectors, the weapons platoon leader would be directly responsible to designate, distribute and coordinate target reference points (TRP's) common to all. This situation would not infringe upon the platoon leader's duties, it would facilitate his task, optimize control of TOW fires and provide direct officer coordination and leadership to all TOWs in the company sector. It would also take a large burden from the company commander, making his defense more viable and responsive.

87

PART III

MISSION DEFINITION

The attrition of a superior enemy force must not be restricted to the area forward of the FEBA. Attrition of the enemy must be continuous throughout the battle area. Thus, the defensive mission should not be oriented towards specific terrain along the FEBA. Instead, it should focus on the terrain throughout the battle area which, from the security area to the rear boundary of the defensive sector, optimizes the defenser's weaponry and mobility while reducing his vulnerability. In this manner, the defender can absorb the attacker's mass with a deceptive maze of defenses in depth organized to dissipate the momentum of the enemy's attack through attrition.

The commander, therefore, must not be constrained by the mission parameters. The mission, instead, must be broad in scope in order to afford the commander the requisite latitude and flexibility to conduct a dynamic defense. Consequently, for the purpose of this paper the mission of "defend in sector" is defined as being: a dynamic form of aggressive combat which subjects the enemy force to a continuous degree of attrition by juxtaposing the defender's combat power with the terrain throughout the defensive sector.

PART IV

TOW/DRAGON

PROPOSE TYPE ENGAGEMENT FOR TOW.

It is proposed that TOW ATGMs begin the battle well camouflaged and foreward within the battle positions of the rifle platoons and engage targets as far forward as possible. Figure 2-5 on the following page shows a hypothetical defensive or delay position incorporating tanks and TOWs under attank from a typical Warsaw Pact force composed of T-62 tanks, BRDMs and BMP motorized rifle troop carriers. Notice that the TOWs are foreward and initially engage the enemy missile launcher vehicles (BMP/BRDM) at ranges greater than 2,000 metars. This is the system that presents the greatest threat (at these ranges) in terms of hit capability. Friendly tanks have withheld their fire unit the enemy closes to a more lethal range so as not to prematurely disclose their location.

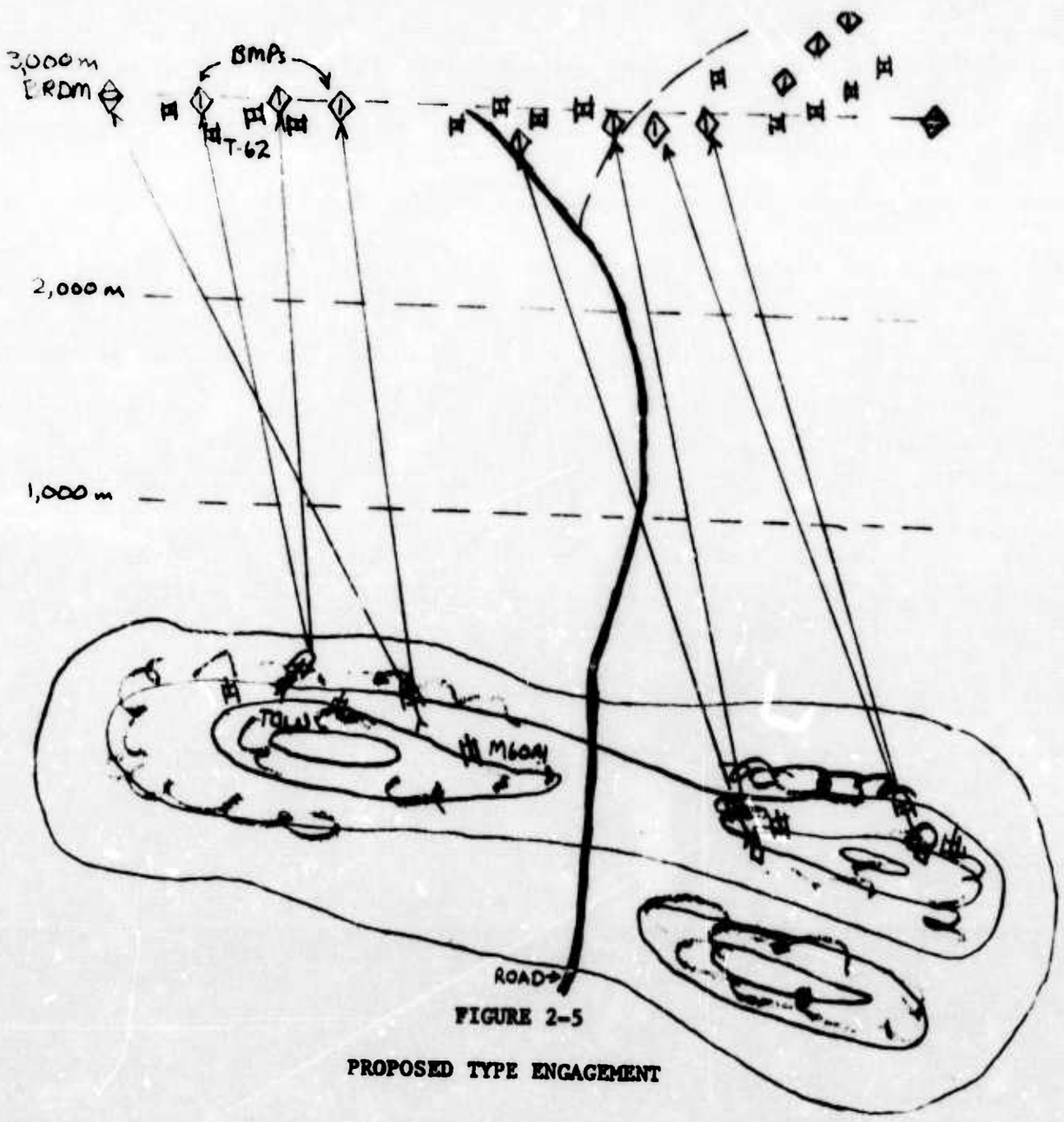


FIGURE 2-5

PROPOSED TYPE ENGAGEMENT

As the enemy forces close to less than 2,000 meters range, TOW weapons displace to alternate positions where either frontal defilade or a 3,000 meter stand-off can be achieved. Note that in Figure 2-6 (following page) two of the TOWs have moved to defilade positions, one has moved to a rear-

ward overwatch position almost 1,000 meters to the rear and one has been destroyed by enemy fire.

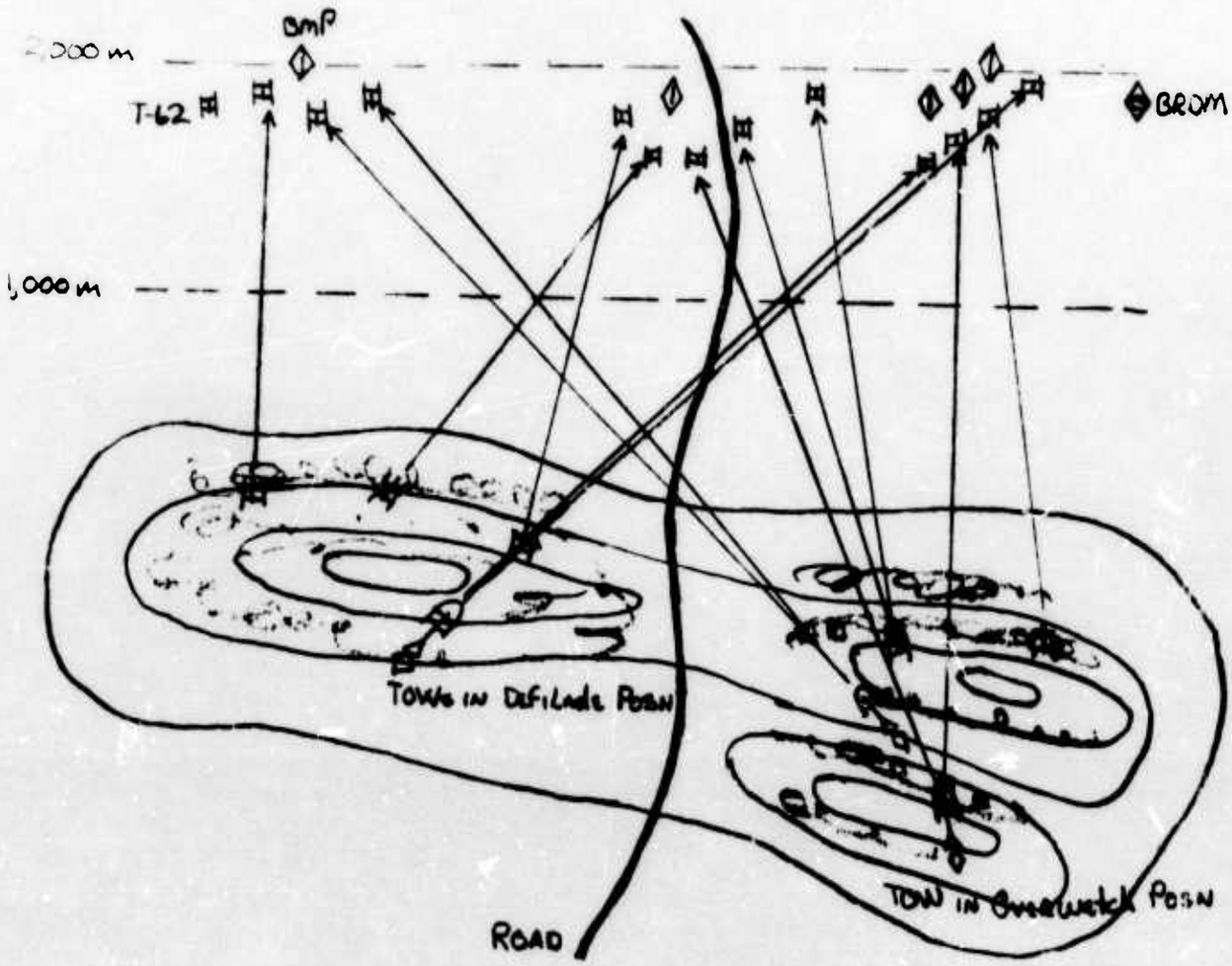


FIGURE 2-6

PROPOSED TYPE ENGAGEMENT, CONTINUED

This technique of moving from a frontal to an alternate firing position has the following advantages:

a. Initially engages enemy as far foreward as possible.

b. Achieves and retains 2,000-3,000 meter stand-off advantage for TOW ATGM.

c. As battle is joined by accurate T-62 fire, TOWs are in defilade or overwatch positions.

d. Maximizes TOW system's mobility.

e. Leaves M60A1 tanks to fight enemy with "ambush" shots within best range of main gun.

Hand-Off and Intervisibility.

Intervisibility is the amount of time an approaching target is visible to the defender before disappearing in a fold or depression of earth. Hand-off is an observer such as the platoon leader sighting an advancing target and "handing it off" to a crew or handing a designated weapon the fire mission.

With regards to invervisibility and hand-off, the TETAM tests concluded that:

a. Intervisibility conditions are highly dependent upon the choice of defensive sites.

b. The probability of target engagement is sensitive to hand-off time.

It must be concluded from a, above that the proper use of terrain and selection of firing positions must continue to be a matter of concern and is best developed by training and experience of junior leaders.

Hand-off, however, can probably be improved by using the target reference point (TRP) as a common point of reference between observer and firing crew. This point was dramatically demonstrated during the TETAM tests when British SWINGFIRE teams using TRP's were able to "hand-off" targets with less difficulty than U.S. TOW crews on the same terrain and under similar conditions.

Neither FM 7-10 nor FM 23-3 mention target reference points. However, the later text, ST 23-3-1 does describe TRPs in excellent detail.

Range Cards.

It is strongly recommended that all current doctrine for range cards be changed to include TRPs and an "imaginary" zone or range where the gunner would consider engaging the AT-3 SAGGER launcher before the T-62 tank.

Using the example of the TOW range card on page 43, FM 23-3 it would appear as shown in Figure 2-7 below, if TRPs and a zones engagement area were added.

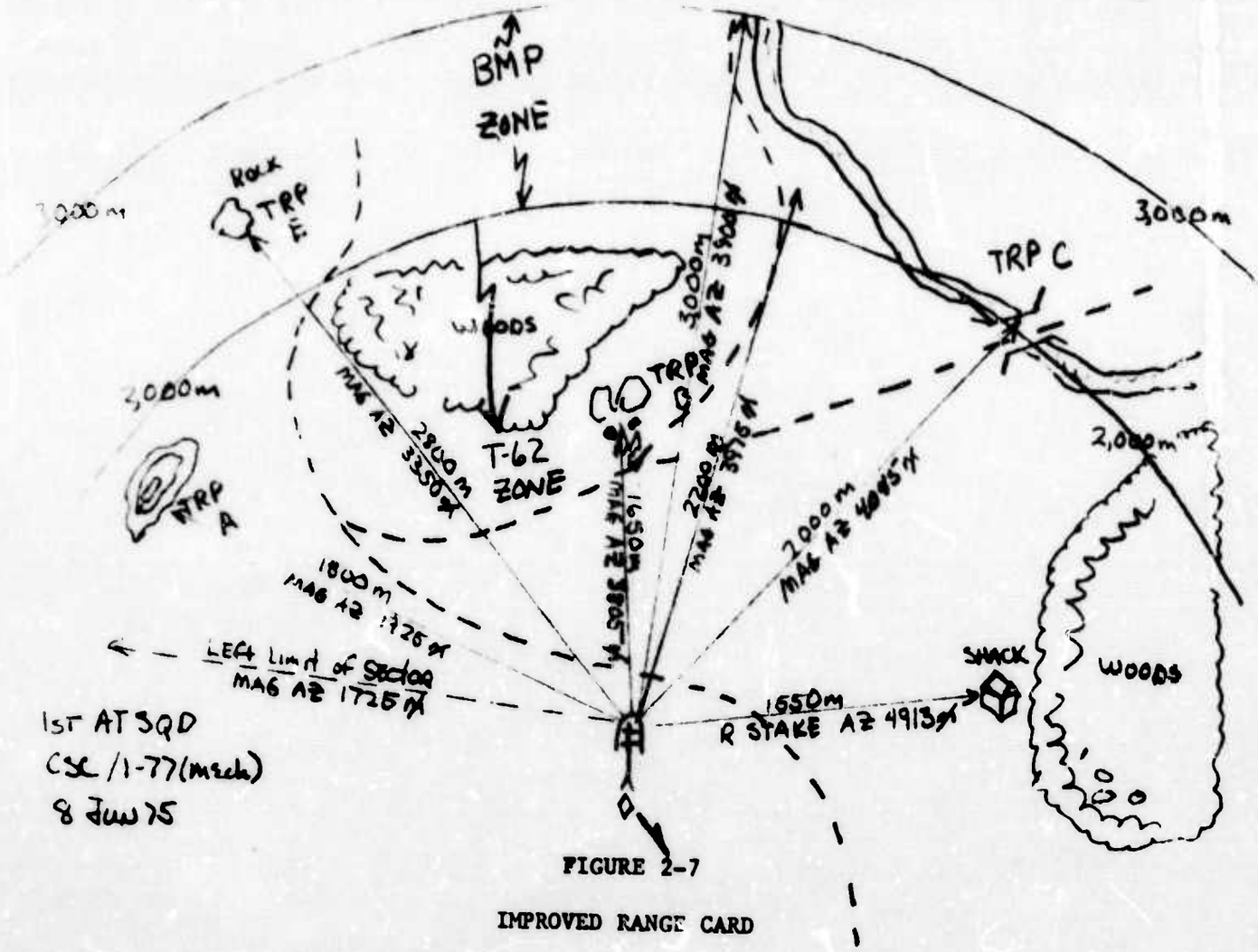


FIGURE 2-7

IMPROVED RANGE CARD

The two obvious advantages of this improved range card is the increased ease of target hand-off, and the engagement of BMPs/BRDMs at ranges where they present a greater threat than the T-62 tank. Incorporation of these two changes would increase the defenders advantage immediately for the forces in the field.

This third recommended change to technique is the previously mentioned initial/alternate placement of weapons as the fight in joined.

EMPLOYMENT OF THE TOW/DRAGON WEAPONS SYSTEM.

General. The following results of a terrain based exercise highlight the interplay of terrain, AGBMs and other supporting weapons as played in a tank heavy enemy environment. Despite the sterility of the exercise, some pertinent observations are made concerning the positioning of friendly ATGM's on the battlefield.

Except for the anti-tank guided missle (ATGM) the US weapon systems have a much higher probability of kill at long ranges. During engagements in excess of 2000 meters a US system can fire with little chance of being destroyed by direct fire aggressor. The best strategy for the defender is to engage the attacker at maximum range with all available weapons. At these ranges the only aggressor weapon that can return effective fire is the ATGM; therefore, the optimal target for the defender is the SAGGER ATGM delivery systems. This targeting priority system is identical with current doctrine. But there's always a temptation to want to engage the tanks first, if for no other reason than that they appear more impressive and forbidding. Yet, you need only to mistakenly engage tanks first and then watch the ATGM firing from an overwatch position destroy your weapon to appreciate the validity of this doctrine.

At all ranges artillery is an impressive anti-tank weapon system insofar as its ability to separate the infantry from the armor. It provides the defender an additional long range means to use to disrupt the continuity of the attack. Even if it fails to destroy or damage the attacking tanks

and BMP's it will force the attacker to "button up:, and thereby significantly reduce the tanker's field of observation. It also means the defender must be in well constructed defensive positions with overhead cover. As the attacker fires his rolling artillery barrages any exposed position is destroyed. Thus, the Dragon and TOW gunners must keep their weapons inside bunkers until the time to fire; and as soon as they fire they must move to another covered position.

Once the attacking tanks close to within 1700 meters, the defender loses his favorable probability of kill ration. It becomes increasingly harder for the infantry anti-tank weapons to engage a target and move to an alternate position without being destroyed. However, if the defender has employed artillery, the tanker's restricted vision and the resulting dead spaces does assist the defenders withdrawal. Additionally, it sometimes becomes necessary for a defender to smoke his own position to get the concealment necessary to permit withdrawal. But, the key to successfully withdrawing to a new position is to insure that another weapon is implaced in an overwatching position from which it can provide covering fire. Without a covered or concealed route of withdrawal the TOW and Dragon gunners face certain destruction.

The closer the combat, the more important the defenders position becomes. Because of the number of attacking tanks, any exposed position is immediately destroyed once the attacker moves within 2000 meters. Firing from a prepared position at the rear or side of a hill obliquely across the

front is the best. Not only does it provide the defender the greatest protection, but it also gives the defender a better and larger target to attack.

Wherever the position is located, range cards are a necessity, particularly for the Dragon. The gunner must precisely know the ranges to selected pieces of terrain to determine if he can effectively engage the target. If a Dragon gunner attempts to engage the attacker at 1100 to 1200 meters only to discover the round falls short, all he has done is needlessly expose his position. It is most important that range cards show fields of fires, as well as masked areas. What looks good on a map may be disastrous on the ground. Rolling terrain creates so many masked areas that an attacker sticking to the low ground may be able to quickly penetrate a defense because the defender's weapons employment did not really cover or adequately cover an avenue of approach.

When properly prepared barrier plans complement the defense plan and contribute significantly to the overall defensive effort. The barriers themselves destroy very few vehicles, but they served to slow up the attacker and enable a threatened defender to move to an alternate position or they channelize the attacker into the killing zones. No one defensive plan may prove to be the most effective, but rather each plan has its advantages and disadvantages. In the overall analysis, one plan may be just as effective as another.

17

PART V

THREAT ASSESSMENT

To fully understand the breadth and scope of the enemy threat, it will be assessed from both macro and micro levels which address the threat from a doctrinal and tactical perspective, respectively:

a. Macro threat: doctrine.

The threat doctrine and force structure of the Warsaw Pact nations indicate that defense against mass armored forces will play a decisive role in any European mid-intensity or high intensity conflict. The doctrinal emphasis on armored warfare is clearly reflected in the writings of Soviet military leaders. Marshal T. Z. Rotmistrov, Marshal of Tank and Mechanized Troop has contended that:

> Only armor can assure the rapid and total destruction of the enemy and that it alone can achieve swift and decisive victory under modern conditions. Therefore, armor is the basic maneuver element of the Soviet Army. Tank forces play the decisive role in the attack.

This view of Soviet doctrine has been further established and corroborated by Colonel A. A. Sidorevko, Doctor of Military Science and faculty member of the Frunze Military Academy. In his work entitled The Offensive, he states that:

> ...Offensive actions will be conducted primarily on tanks and armored personnel carriers... Battles in dismounted combat formations are only where the enemy offers strong resistance and where the terrain hinders the actions of subunits on vehicles.

These contemporary views concerning modern warfare, represent a constant in Soviet doctrine in that they reflect the same theoretical views of a book published in 1962, entitled Military Strategy. This authoritative book on Soviet military thinking, a product of fifteen leading Soviet military theoreticians headed by Marshal Vasily Sokolovsky, Chief of the General Staff from 1953 to 1960 unequivocably declared that:

An offensive should be mounted using primarily tanks, and armored troop carriers. Dismounted attack will be a rare phenomenon. Mechanized firepower and maneuvers of troops in vehicles will now reign on the battlefield.

Thus, guided by Soviet doctrine, the force structure of the Soviet led Warsaw Pact armies, has been built around the tank. Consequently, the threat armies possess a significant quantitative superiority in main battle tanks vis a vis the U.S. led NATO forces. A rudimentary comparison of main battle tanks (MBTs) in Europe reveals the stark reality that Soviet armor by itself is nearly double that of the NATO forces, to include the two U.S. armored divisions located in central Europe. Overall, the ratio of Warsaw Pact MBTs to NATO is approximately 3:1 with the Warsaw Pact armies possessing over 14,000 and NATO only 5,500.

In summary, the enemy threat doctrine and its related force structure emphasize the employment of armored forces in mass. Succinctly stated, armor is the heart and soul of the threat armies. Accordingly, the ubiquitous presence of mass armored forces will dominate defensive combat

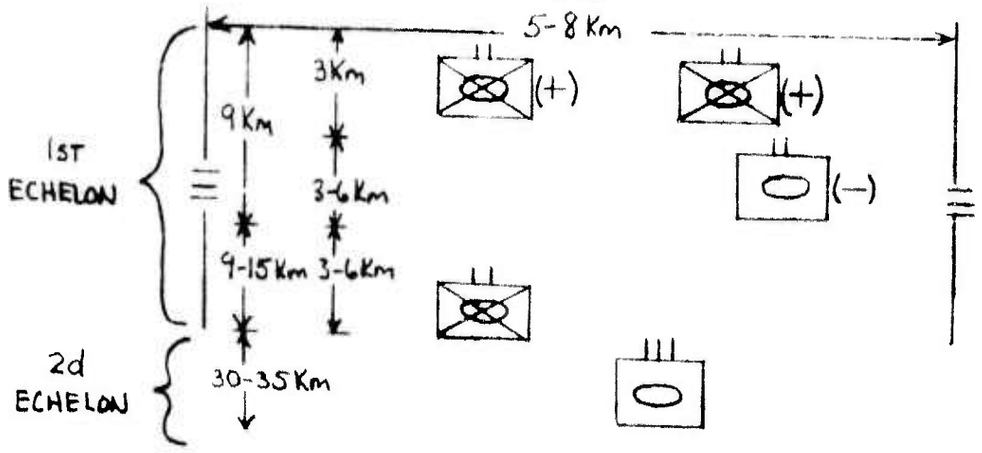
in Europe. Therefore, fighting against tanks and their destruction have, by necessity, become the primary defensive concern and mission orientation of U.S. and NATO forces.

b. Micro threat: tactics.

Based upon the terrain within the assigned defensive sector of the battalion task force, there is one likely avenue of approach available to the enemy. The width of this avenue of approach is generally eight kilometers in width. Thus, in accordance with the enemy's tactical doctrine, it can be assumed that the enemy will attack in two echelons with each echelon consisting of a regimental sized force.

The first echelon, which is our primary concern, will consist of three motorized rifle battalions and one tank battalion. The enemy battalions will probably be deployed with two motorized rifle battalions leading, with a frontage of five to eight kilometers and a depth of three kilometers. The tank battalion can be expected to follow the lead elements at a distance of three to six kilometers. This tank battalion is the commander's tank reserve and can be expected to be committed to exploit penetrations. The third motorized rifle battalion similarly will follow the lead elements at a distance of nine to fifteen kilometers and be committed from the march. In essence, then, the enemy's first echelon can be expected to attack with two battalions up and two battalions back. The second echelon will trail the first echelon by a distance of thirty to thirty-five kilometers. The enemy attack formation is graphically illustrated as follows:

REGIMENTAL FRONTAGE



SOVIET NIGHT ATTACK DOCTRINE

The Soviet leaders state that the night attack will increase in frequency and importance in modern combat. Basic to this belief is the Soviet assumption that the attack is the most decisive form of combat. Reasons for the increase in the frequency of night attacks are the inherent advantages of night attacks, mainly surprise and the reduction of the relative combat power of the defender; once an attack has started it cannot be stopped just because of darkness; and the improved night vision devices and illumination means which have enabled modern armies to turn night into day. Night driving and aimed firing is not longer viewed as a major problem. A view also shared by the British.

Unlike the Americans the Soviets consider it disadvantageous to attack at daybreak, since preparations for the attack must be made during darkness and the concealment provided by darkness exists for an insignificant segment of the attack. They feel the most advantageous time for

the attack preparations during daylight while a midnight attack may surprise a defender during a period of reduced alertness. Both attack times make it more difficult for the defender to commit his reserves.

d. Span of control.

Dependent upon the internal organization of our Combined Arms Force #1, this mix places the greatest demand upon the maneuver battalion commander's span on control. It would be difficult for a single commander to coordinate and control the activities of the four maneuver subelements plus the additional organic combat support elements in this mix. A requirement exists for additional FM radio nets to handle the control and coordination of the additional fire support and air defense assets peculiar to this organization. This radio requirement is above present requirements for the standard operations and intelligence, command and control, and administration/logistics nets. The permanency of this organization resolves many of the command and control problems particular to our present method of task organizing battalions for combat. The requirement for a larger logistics tail to support this type of organization might impede operational flexibility in offense and defense. However, the additional combat support assets immediately available to the commander make this comcept more desirable from the standpoint of responsiveness. This mix is simplified by the requirement for reorganization upon mission changes than would be the present task organization concept. Tha fact that additional air defense assets are organic in thia concept will require that air apace

management activities be pushed forward to this level. This consititues an additional command and control burden for the battalion commander.

It is much less hampered by a large logistical tail than either of the previous concepts. Its mission capability and flexibility are severely restricted without the addition of further combat support and combat service support assets.

Purely from the aspect of command and control considerations, CAF #2 is favored, while the present task organization concept is a close second, and CAF #1 is least desirable.

SECTION III

KILL ZONES

KILL ZONES

Purpose of killing zones is to maximize effectiveness of antiarmor fires at a probable point of enemy movement. Effectiveness of the kill zone may be enhanced through application of the fundamentals of antiarmor operations.

All elements of the combined arms team participate in the action. Engineers will conduct an engineer reconnaissance to determine the effectiveness of natural obstacles and those engineer efforts necessary to increase that effectiveness. Infantry plans the location of each of its antiarmor weapons, plans the use of armored tank units and artillery. Armored unit commanders plan their fires, insuring that their mobility is properly used. Artillery planners at each echelon provide fires as directed in the plan for fire support, insuring that the fires are responsive and that all the resources of artillery are applied best (smoke, illumination and high explosive for each caliber, to include mortars).

Surprise may be enhanced by holding fires until the least suspected time of engagement through placement of weapons and other command measures.

A unit may be faced with more killing zones in sector than can be reasonably planned and executed. Forces such as attack helicopers and armored units will be responsible for those alternate kill zones, while the less mobile infantry units operate against the primary kill zones.

b. Considerations.

The battalion commander considers three primary factors for kill zones--enemy capability and threat, friendly forces available, and the terrain.

Enemy threat is related to the type of equipment, the terrain and its trafficability, the commander, whether the enemy is capable of gaining local air superiority, and the effectiveness of enemy weapons systems. Enemy commanders may be capable users of smoke which tend to limit friendly fires. Part of the knowledge comes from enemy doctrine, part from experience from past conflict.

Friendly forces will consist of a mixture of elements of Combined Arms. These elements are addressed in detail in Chapter 4.

PART I

ORGANIZATION OF KILL ZONES

Paramount in the considerations of the antiarmor defense is the selection of the "armor kill zones", identified as an area where "fires may be concentrated". The area is further defined as one "that optimizes the antiarmor weapons capabilities in relation to the expected enemy threat on the armor avenues of approach and other trafficable areas". Given these definitions it is the intent of this author to further analyze the armor kill zone.

The employment considerations when using US antitank weaponry (ST 23-3-1, p2-2) discuss the necessity to position weapons so as to provide for mutual support. Examining the maximum/minimum ranges of the TOW, Dragon, and LAW the mutual support ranges can be noted as follows:

Distances Between Weapons for Mutual Support

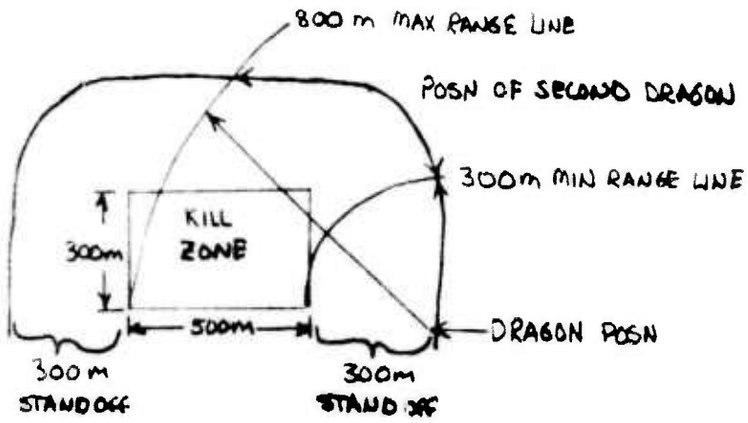
Supporting Weapons	Max Range	Min Range	Remarks
LAW/LAW	200	20	
LAW/Dragon	200	20	LAW governs
LAW/TOW	200	20	LAW governs
TOW/Dragon	800	300	Dragon governs
TOW/TOW	3000	2000	Doctrine dictates
Dragon/Dragon	800	300	

The above chart shows the ranges within which the weapons can be positioned in order to support each other. This indicates that a squad ambush position (Dragon weapon only) must be separated from a second squad with a similar weapon by a distance of not closer than 300 meters and not further than 800 meters.

Let us take the maximum/minimum ranges of each weapon and apply their use against a typical threat Motorized Rifle Company deployed in the attack. We know the company will be deployed in a 500 by 300 meter formation (ST 23-3-1, p4-9). Without any attempt to canalize or confine the formation we find that each of the antitank weapons has a maximum potential area of coverage. With the LAW weapons we find that the soldier must be at the edge of the enemy formation to employ the weapon and if coverage of the entire formation is desired then he must be dispositioned inside the enemy formation. The coverage offered by the Dragon is more suitable. It offers coverage of the formation from the front and either flank while offering the minimum standoff distance of 300 meters. The TOW is more than adequate in that it covers the formation from the front or either flank and gives the defender the opportunity to engage at the optimum range.

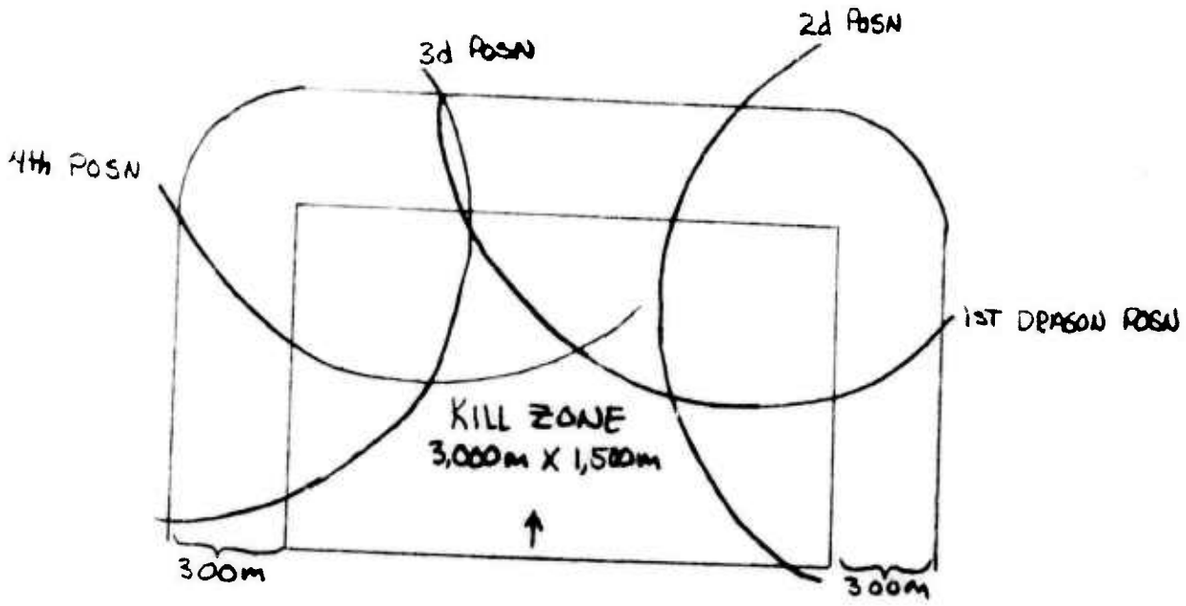
The maximum area of the kill zone for each weapon alone is limited by the coverage offered by that weapon. For the LAW the kill zone is 200 meters deep by 400 meters wide. The kill zone for the Dragon is 1000 meters wide by 500 meters deep. That for the TOW is 2000 meters wide by 1000 meters deep. Actually these data serve as a jump off point to determine the actual size of any specific kill zone. The best zone is one where the enemy is required to focus his attentions in two or possibly three different directions. Assume that two weapons positions are covering the armor kill zone while providing mutual protection to each other. If the

weapons are Dragon weapons it can be positioned as shown below:



The question becomes one of how many weapons at each firing position are needed to adequately and efficiently destroy the enemy vehicles in the kill zone. If the attacker was the threat company there would be three tanks and nine BMP's, a total of 12 vehicles. It would require six weapons to destroy one third of the enemy vehicles in the initial volley. (Using the binomial therom at .7 probability of first round hits). This assumes that fire control procedures are such that no vehicle receives more than one hit and that the first round destroys the vehicle. It would appear that two platoon positions located to the front and to the flank of the formation would do adequate damage to the attacker. Use of TOW weapons in the above example, assuming the same hit probability and engagement, would offer the same results except that the weapons would be at greater stand-off and subjected to lesser accurate enemy fire after the intiial volley. At the minimum, the TOW's could be positioned outside the maximum effective range of the threat weapons.

Use of the threat battalion in the kill zone offers some problems not encountered in the company size zone.



First, the Dragon weapons cannot over the entire kill zone. They effectively cover about sixty percent of the area. Regardless of the number of weapons employed adequate coverage cannot be achieved. TOW weapons added to the firing positions or stationed to the rear and flanks would provide adequate coverage. The number of enemy weapons in the formation would be greatly increased and the ensuing battle would be much more fierce. LAW weapons would be envisioned as close in defensive weapons. The above example subsumes that the enemy holds his formation and is not

canalized or crammed into a smaller zone.

This author concludes that there is an optimum size to the armor kill zone and the number of weapons employed. The size of the kill zone is governed by the weapons employed around the periphery of the zone and the range of these weapons. Further, the number of kill zones per battalion is more limited than the special text implies. It would appear that every attempt should be made to canalize the enemy through careful selection of good defensible terrain coupled with the use of extensive barriers and obstacles. The special text plays down the importance of the use of these techniques which in the analysis are so important.

In the European Scenario restrictive terrain compounds the selection of kill zones. Target acquisition and observation is limited by the nature of the terrain (trees and undulating terrain). At the extreme ranges for TOW the problem is particularly acute. The depth of the kill zone is limited. The enemy must be made to halt and/or pile-up. TETAM Effectiveness Summary substantiates this observation. In the European Scenario it would appear that the most effective weapon is the Dragon supported by the TOW in exceptional circumstances.

PART II

BARRIER/OBSTACLE IMPLEMENTATION

Further development of Barrier plan by Bde-Bn requires a major re-evaluation of barrier planning due to the extended frontages which U.S. units will be required to occupy. In the standard position defense, which units previously employed in accordance with existing doctrine, barrier planning has been a relatively loose amalgamation of subordinate echelon defenses coordinated at the division level. The staff analyzed the successive overlays for gaps and weaknesses and the commander then directed adjustments. These adjustments were usually time consuming and wasteful in the amount of logisitc and combat support assets required.

The extended frontages in Europe and a shrinking combat support base requires a noteworthy departure from traditional methods by which the barrier plan has been developed. The Division Barrier plan may now accompany the operation order to subordinate commanders.

The plan itself will be based on the enemy's most likely avenues of approach. Every effort will be made to anchor the barrier to "tank proof" terrain, natural obstacles and built-up areas which are expected to be reduced early in the attack by the enemy. Significant rivers and water bodies, cross road towns, built up areas and geographic bottlenecks will require special attention as the barrier plan evolves.

An accurate analysis of the terrain is mandatory. The METTT/KOCOA elements coupled with intelligence resources are carefully considered as

the commander establishes killing zones forward in the security zone and within the main battle area. All efforts are directed to denying the enemy overwatch positions.

Mines, conventional and scatterable, are employed to improve defensive positions by denying the enemy the use of covered approaches into the security zone and main battle area. Obstacles are developed which are integrated with mines and other ordnance.

The organization of the barrier in depth is directly tied to unit strong point positions and an integrated system of withdrawal routes and control measures which provide the commander with great flexibility in maneuvering his forces to support the barrier plan and deny the enemy the use of high speed avenues of approach. Sophisticated sensors provide early, well defined warning. Fuel air explosives may be employed in conjunction with sensors as a means of forcing the enemy armor to button up.

The Division Covering Force conducts an active defense in the security zone, seeking out the enemy and drawing him into terrain which in unfavorable for the attack. The initial long range fires and observation which guard the barrier are provided by the Armored Cavalry Squadron as part of the brigade task force operating forward of the main battle area. Withdrawal routes and control measures prescribed for the covering force will cause all remaining openings in the barrier to be closed during the withdrawal.

The most significant aspects of barrier planning under this revised concept are:

1. The integration of obstacles, mines, terrain and friendly forces.

2. The development of the defense by the Covering Force so as to deceive the enemy as to the form of defense and the logic of the barrier.

3. The organization of the plan at division level which coordinates the use of division assets and permits maneuver units to concentrate on segments of the barrier which complement and supplement potential maneuver areas for each battalion.

4. An economy of resources which emphasizes the use of terrain, manmade and natural obstacles, built up areas and probably enemy avenues of approach.

5. The development and construction of strong point defenses which support the barrier and in turn are supported by it as well as successive/ alternate points will support the division commanders scheme of defense.

FM 7-20 contains the statement that "Care must be exercised in siting the barrier system to avoid interfacing with the capability of shifting units rapidly to meet any threat." That statement addresses a problem of the proposed force oriented defense; and magnifies the problem when independent squad and platoon operations are considered. Most leaders understand the technical application of barriers and how to properly employ them. But, few are currently prepared to digest an extensive barrier plan (if it is even available at all) and safely navigate through them while conducting a delaying action.

Whereas in the past barriers have been associated mainly with the forward defense area in the position defense, the force oriented defense will necessitate barriers in great depth. A strong requirement exists to improve disemination techniques to include providing sufficient copies to enable the receiving unit to further diseminate the information without reproduction.

The introduction of scatterable mines into the inventory adds flexibility to barrier planning. The only foreseeable problem with the mines is insuring disemination of locations.

PART III

CAMOUFLAGE AND FIELD FORTIFICATIONS

The importance of camouflage and field fortifications cannot be over-emphasized. Today's battlefield is monitored by sophisiticated sensors of all types, and filled with extremely lethal weapons. There is a great deal of truth in the saying "if you can be seen you can be hit, if you can be hit, you can be killed". Note, however, that detection is the key: "if you can be seen...etc." The significance of camouflage should be self-evident. We believe that this situation gives the defender a significant inherent advantage. The enemy will be moving rapidly across relatively open ground. Our forces can easily detect such enemy formations. However, the reverse is not true. A rapidly moving enemy force advancing over unfamiliar terrain will have an extremely difficult time locating a well concealed defensive position. The survival of our antiarmor strong points depends on their remaining concealed until they initiate their fire. Enemy forces must not be allowed to accurately locate our antiarmor forces prior to actual engagement. Strictly enforced camouflage and concealment measures must become routine. In addition to camouflaging, we must restrict movement which can be detected and must control electronic and heat emmissions which can be picked up by sophisticated sensors. Concealment of our scheme of defense is only part of the passive measures we must adopt. Protection - cover - is the other essential. Enemy forces will make an effort to destroy or neutralize our antiarmor weapons, particularly the relatively vulnerable TOW. All TOWs and dismounted soldiers

must be in prepared positions with overhead cover to minimize the effectiveness of both direct and indirect fires. A good foxhold with overhead cover is the minimum for survival. Positions must be continuously improved as time permits. Communications trenches, wire obstacles, close-in protective minefields, and bunker type fortifications are prepared as time permits. Once a strong point is adequately prepared, work should begin on successive strong points in depth.

Present U.S. doctrine is adequate; but we are not following our own good advice. Camouflage and field fortifications are usually "weak points" in U.S. units. We can no longer operate and hope to survive without greatly increased effectiveness in both these areas. Commanders at all levels must educate the soldier as to the "why" of camouflage and field fortifications. Once he understands the necessity for these measures the American soldier can be - as previous wars attest - highly proficient in this area. A quantum improvement in our employment of camouflage and field fortifications is a major challenge and responsibility facing commanders and staff officers at all levels.

PART IV

TERRAIN

Terrain analysis is a commanders first step in organizing his defense or planning his offense. The strength of the defense or offense comes mostly from how well the commander sizes up the terrain and organizes it to his advantage, and then uses it in battle to position his firepower and movement so as to destroy the disadvantaged enemy. Skillful use of terrain is most essential in the conduct of battle.

The full competent tactician knows how to read the ground, from the map or photograph, and especially with his own eyes. The ground will tell him, in the attack, where the danger likely lies and where safety can likely be found. In the defense, it will tell him where the enemy might attack, and where the defender can best maximize the effects of his weapons. The terrain tells the tactician all this and much more, if he reads it well. He can then carefully combine the ground and his forces to his advantage, to thwart or destroy the enemy.

Tactical leaders, at each command level considers the ground differently. To the maneuvering infantry fire team, success or failure may be only a fold or ditch or small slope. The maneuvering company or battalion commander looks at this particular hillock, that woods, this farm settlement, or that ford. At higher echelons the scale of interest includes road nets, terrain massifs, urban areas, and the broader obstacles to, or avenues for, enemy and friendly movement.

The defender strives to choose the ground to fight on and to reconnoiter it thoroughly in advance. Ideal terrain is rarely available, but the defender takes every advantage of what he has. He calculates where the enemy can, or likely will, attack. He selects killing grounds, strongpoints, areas for delaying fights, and counterattacks. If his main interest is in blocking the advance of enemy tanks, he selects terrain where he can put barriers in their path, where the defenaive weapons have cover from the front, and where tanks will be vulnerable to flanking fire. His own locations should be covered and hidden from enemy observation, and wherever possible, should allow weapons and units to shift their positions under cover.

Close air support can disrupt the forward movement of tanks and through interdiction of choke points, e.g. bridges, force them to move through terrain more favorable to the defender. The defender improves natural obstacles to halt, delay, or channelize the enemy where he can be taken under fire. Wherever possible, the commander works it out so that he commands the critical terrain across his front by having his forces on each position fire to the flanks, across the fronts of their neighbors.

Ground that is firm and relatively flat and open favors attacks by armor; it should be defended by forces heavy in antitank guided missiles and tanks. Broken or heavily wooded terrain lends itself to infantry fighting; however, more forcea are needed becauae of the natural restrictiona to observation and fire support. Where passage is unlikely because the terrain is very difficult, the area can be covered by a screening force, supported by indirect fire and, when necessary, a reaction force.

12.1

The attacking enemy may be able to get forces through or around the defense deep into the defensive zone. But these forces will need open roads behind them to get fuel and ammunition. By examining the road net, terrain relief, obstacles and so on, it is possible for the defending commander to select that terrain, denial of which, will foil the attacker or cause him to mass strong forces where they can be blocked and wiped out by a well-organized defense.

The following sums up the proper use of terrain.

-- Analyze the enemy's most likely use of terrain

-- Take maximum advantage of natural terrain features which will weaken attacking formation and canalize them, while making maximum use of friendly fires.

-- Select and prepare weapons positions which permit delivery of surprise fire on the enemy from unexpected locations.

-- Select and take action to develop positions which provide good frontal protection from enemy observation and fires, provide poor cover and concealment for the attacker, and permit covered repositioning or shifting of friendly elements.

-- Improve the terrain by use of mines and obstacles.

11.2

SECTION IV

ROLE OF COMBINED ARMS SUBELEMENTS

PART I

ENGINEERS

Role of the Engr

1. Missions and Fundamentals:

The mission of combat engineers is to increase the combat effectiveness of the force they support by performing tasks of construction and destruction to improve the mobility of friendly forces and to impede the mobility of the enemy. Also, engineers fight as infantry when required.

In analyzing any organizational change effecting engineers, it is first necessary to consider some of the basic fundamentals of engineer employment. After looking at the fundamentals, the advantages and disadvantages of a major organizational change will be examined. This organizational change envisions forming an organic combined arms battalion force with a platoon of engineers in its combat support company.

These basic fundamentals of engineer employment apply:

a. Engineers are used most effectively when under centralized engineer control. The current organization provides the maximum flexibility and effectiveness of engineer effort within a force. The engineer commander has all resources under his control and is thus able to maximize engineer effort. Combined arms battalion concept would seriously reduce engineer support available to centralized engineer control.

b. Engineer units are not normally kept in reserve. Infantry/Armor units are in reserve at times, thus the organic engineer platoon, unless detached, would not be contributing to the overall effort continuously.

c. Engineers provide technical advice and assistance while non-engineers perform minor pioneer type tasks. This fundamental would probably be enhanced in a combined arms battalion because of the close relationship existing between infantry/armor and engineer units. Manpower for work on minefields and other obstacles as well as field fortifications would already be consolidated with the engineer assistance under one commander.

d. Engineers should be committed as infantry only when absolutely necessary. In a combined arms battalion there might be a tendency to use the engineer platoon more often in an infantry role. Again this could result in overall engineer effort being lost to the division.

e. When engineers support committed combat units, they are more effective in a direct support status. The many administrative and logistical problems associated with engineer support is generally the reason for this fundamental. Maintenance of engineer equipment is a particularly difficult problem. The combined arms battalion concept would place these burdens on the battalion commander.

2. Examination of the engineer role in a proposed combined arms battalion reveals certain advantages and disadvantages.

a. Advantages. There are certain advantages with the combined arms battalion organization as far as engineer effort in an increased anti-armor role.

(1) The use of mines in defensive operations could be increased because the engineer platoon could be tasked to plan for their emplacement. With infantry and engineers under one commander emplacement of large quantities of mines could be facilitated.

(2) Constructions of field fortifications and use of camouflage would be increased because engineers would always be available to give technical advice and assistance.

(3) Obstacle construction would be enhanced at a lower level because engineers with their demolitions and special tools would be more responsive to the battalion commander.

(4) The organization of the ground in a battalion defensive perimeter would be enhanced because of the special skills of the engineers.

(5) The formation of armor-killer teams would be facilitated as engineers would be readily available for the armor destroying elements, e.g., demolition teams.

b. Disadvantages. Of course there are certain disadvantages of the combined arms battalion engineers in their anti-armor role.

(1) The logistical effort involved in obtaining and transporting mines, demolitions and construction material for field fortification would tax the resources of the battalion.

(2) Larger engineer equipment (dozers, backhoes) would be more difficult to obtain because of the decentralized control of engineer effort. The engineer battalion would be receiving ten requests for equipment instead of the normal four.

(3) The overall barrier effort in the brigade would suffer because the engineer effort would be employed in more local efforts. The "extra" engineer effort would not be available for this use because of the organic platoons.

(4) Technical training of engineer personnel would be extremely difficult for the combined arms battalion commander.

c. Conclusions

If just the effects of the change in the anti-armor capabilities are considered, then having a platoon of engineers appears to give the CAF certain skills which would increase its capability to defeat enemy armor.

3. The secondary mission: fight as infantry.

a. Capability of divisional engineer battalion and another potential reorganization.

(1) Engineer units are specifically designed to accomplish their primary missions of engineer combat support. They are also trained in the entire gamut of military techniques and procedures to be able to perform in an infantry combat role. They are not, however, armed in the same manner as an infantry unit. When the situation requires the deliberate use of the divisional engineer battalion to fight as infantry, it is desirable to preserve unit integrity. It is also important that the engineer battalion should reinforced with infantry heavy weapons and tank teams, artillery liaison teams, and communications support commensurate with the situation, mission, and enemy threat.

(2) The divisional engineer battalion armed almost solely with individual type weapons, with very few crew served weapons. This lack of crew served weapons, both indirect fire and direct fire, is quite evident in a direct fire and direct fire, is quite evident in a

direct comparison with the infantry battalion of the same division. Should the engineers be employed as infantry, it is presumed that commanders would tend to use them in the same manner as they would an infantry battalion. The lack of the necessary weaponry to accomplish an assigned infantry mission is the basic premise presented in the following chart and subsequent comments:

MAJOR WEAPON SYSTEMS		
WEAPON	DIVISION ENGINEER BATTALION	INFANTRY BATTALION
Rifle, 5.56mm (M-16)	908	728
Machine gun, 7.62mm	15	49
Caliber .50, machine gun	51	73
Rifle, recoilless, 90mm	0	18*
Rifle, recoilless, 106mm	0	6*
Mortar, 81mm	0	9
Mortar, 4.2 inch	0	4
DRAGON	0	36*
TOW	0	12(16)*
Redeye	0	5

TABULATION OF MAJOR WEAPON SYSTEMS

*TOW and DRAGON ATGM systems currently replacing 90mm and 106mm systems.

(3) The impetus of engineer effort, whether in an offensive or defensive situation, it is toward support of the forces in contact in the direction of planned or actual movement. This places the engineers in

a position of having to be able to fight as infantry at the same time as they are conducting their engineer combat support functions. The division commander is responsible for the decision to commit the engineer battalion for sustained ground combat, which he does only after serious consideration of the situation or threat, the loss of engineer support, the strength of the engineer unit, weapons support, and support required after the unit is committed. The commitment of an engineer unit to an infantry combat role is not instantaneous. The unit will require time to reorganize and plan for such things as:

a. personnel and equipment not required must be relocated.

b. support must be established.

c. Additional weapons, communications and artillery liaison must be procured.

(4) An insight as to the probable threat, the employment techniques for engineers, and an evaluation of the arms organic to the divisional engineer battalion indicate that there are some inadequacies in the arms available to the unit. The engineers will have to engage in infantry operations incident to their combat support role, yet they are deficient in anti-tank missile weaponry (TOW, Dragon, or RR), have no Redeye air defense capability to provide security for their worksites, and have no indirect fire capability such as the 81mm or 4.2 inch mortars.

(5) These deficiencies in arms severely limit the battalion when assigned a direct role as infantry. The situation is magnified by the fact that they will be employed as battalion sized or company sized elements without the benefits of the TOW weapon system, Dragon weapon system, Redeye

127

air defense teams, or an indirect fire capability such as the 81mm and 4.2 inch mortars. Present doctrine calls for sufficient time for the engineers to reorganize and receive additional arms from other divisional units to make up for these deficiencies. However, the evaluation of the probable threat indicates that there will be little if any time available to accomplish the reorganization. It may well be that the divisional engineer battalion will have to act independently as infantry, facing a complete armor enemy threat, before an augmentation can take place. The division commander must have all the units that are in contact with the enemy sufficiently armed to be able to combat the large spectrum of enemy threat combinations.

(6) Engineer units conducting normal combat support operations such as obstacle construction, position preparation, bridge building, or line of communication upgrade are susceptible to enemy air or ground attack. Without the Redeye air defense system, the engineer units ability to achieve adequate air defense is degraded. The lack of any direct anti-tank capability such as the TOW, Dragon, or the recoilless rifles severely limits their capability to provide their own security against an armor threat. The engineers do have the CEV (combat engineer vehicle) which is a heavily armored vehicle mounting a 165mm demolition gun, but it is designed for use as a combat support vehicle, not as a tank. When employed in forward areas it requires protection from tank or anti-tank weapons and fire. The crew of the vehicle is trained to use the CEV in combat construction and demolition tasks, not in armor tactics.

(7) One alternative to the apparent inadequacy of arms of the divisional engineer battalion is to re-evaluate the present table of organization and equipment for the battalion and add sufficient numbers and types of arms to give it an increased capability to meet the probable threat. This would require a change in the present organization to accommodate the added weapons and skills. A constraint that must be dealt with is that the present size of units is stringently held to its present number. The addition of personnel with the weapons skills in the TWO, Dragon, and indirect fire weapons would require a corresponding reduction in personnel in other skills. This could be accomplished by reducing the size of the present bridge company, or eliminating it, and integrating the added weapons skilled personnel into a revised bridge/combat support company. If the bridge company was completely eliminated, then the new company could be called simply a combat support company. The required bridging for division operations would then be provided or augmented by Corps bridge assets.

(8) Another alternative is to leave the divisional engineer battalion in its present configuration and continue to supply the present additional weapons support from other units of the division. This would require certain modifications to the present employment doctrine because of the probable lack of sufficient time to reorganize the battalion in forward contact with the enemy. Based upon an assessment of the present threat this does not seem to be a particularly viable alternative. A more reasonable approach would be to maintain the manning level of the battalion at its present figure and to have particular personnel assume a dual capability. In addition to their present occupational specialty they would be

trained and equipped to use certain of the weapons systems needed. This would allow the battalion to increase its firepower, yet not increase its size or degrade its engineer capability.

(9) A more revolutionary concept that would encompass the entire organization of United States Army units, is to eliminate the traditional "pure" battalions. The alternative would be to adopt organizations that would reflect the doctrinal precept of combiend arms teams. A concerted effort in evaluating the concept of combined arms battalions as opposed to task organizing could be quite beneficial. It could possibly eliminate many of the problems of the arms inadequacies and provide a composite unit that is able to wage war against all threats.

(10) The divisional engineer battalion will continue to carry out infantry operations incident to the accomplishment of its combat support engineer missions and will also be tasked to perform in its secondary mission when committed to an infantry combat role. The present table of organization and equipment for the divisional engineer battalion does not include a weapons mix that will adequately provide the battalion with the combat power to survive in an infantry role against the probable enemy threat. Specifically, the battalion lacks anti-tank weapons (either Dragon devices or TOW guided missile systems), indirect fire weapons such as the 81mm and 4.2 inch mortar, and a Redeye air defense system. An infantry battalion in the same division is equipped with this weaponry and can sustain itself in its infantry combat role as a result. The divisional engineer battalion will be employed in conjunction with such an infantry

battalion when required to assume its secondary mission as infantry, and should be as adequately armed as the infatnry battalion.

(11) The envisioned future battlefield will be a composite of fluid fastmoving units employing a large array of sophisticated weapons systems. It will require that each unit be employed, be able to take immediate and direct action against enemy strikes at all times. Each unit must be self sufficient in weapons to survive and accomplish its mission.

(12) The best means to achieve this end for the divisional engineer battalion is to eliminate the bridge company from the TOE. The bridge company should be replaced by a combat support company organized with the required weapons mix as previously discussed. The battalion could be supported for bridging operations from Corps bridging assets, and still be responsive to the division needs. This change would enable the divisional engineer battalion to increase its firepower and yet not increase its personnel strength. The engineer combat support capability would remain intact except for a small degradation of response time for bridging operations. This trade-off would be justified by the benefits gained by the increased capability in firepower for the battalion.

b. Capabilities of the combat engineer battalion (heavy) (Corps or Army)

(1) In January 1974, the Office of the Chief of Engineers, U.S. Army studied the problem of maximizing combat engineering capabilities in the face of budgetary and troop strength constraints in the European theatre. One of the principal recommendations to come out of this study

and one developed by the U.S. Army Engineer School (USAES) was that the Engineer Construction Battalion should be reorganized as a heavy Engineer Combat Battalion and be given a secondary mission to conduct infantry operations.

(2) To allow a realistic appraisal of the units' assets and how they should be used; the following assumptions are made to define the study parameters.

(a) The battalion will be expected to resume its assigned engineer missions at some future date after the completion of its infantry mission.

(b) The battalion will organize as Infantry, not Mechanized Infantry, and have no need for armored personnel carriers or other combat vehicles.

(c) Equipment added to the TOE must be within the unit training and maintenance capability without further personnel augmentation.

(d) Personnel strengths must remain the same as presently authorized or decrease.

(3) Alternative A envisions a mid-intensity requirement allocating resources to secure, maintain and repair the stored equipment to upgrade the unit's engineer capability upon completion of the infantry mission. Alternative B will be for a high-intensity requirement allocating the minimum manpower required to secure the stored equipment. In both cases, the requirement to store the bulk of the battalion's equipment in an equipment pool at a specified rear location exists. Therefore, the Engineer

Combat Battalion (Heavy) should be split into four elements. These are: the fighting elements of the battalion; the combat trains element; the field trains element; and the equipment support element.

(4) Consequently, the battalion reorganization for infantry combat missions results in a three echelon deployment. These echelons are: one, the forward elements of the committed Engineer Companies (B, C & D Co's); two, the forward elements of HHC and A Co (Hq and combat trains); and three, the rear elements of all companies (the field trains and equipment support element).

(5) Alternative A provides for strengths of 429 in the forward elements, 128 in the HQ and combat trains and 298 in the equipment park and field trains. As previously stated, this alternative places strong emphasis on upgrading the battalion's engineer equipment to increase effectiveness after resumption of the engineer mission. This alternative also allows unit commanders to draw replacements from their rear elements in a short time to replace any casualties with men who are part of the committed units.

(6) Alternative B puts the maximum number of personnel forward for employment as infantry. The strengths are 528 for the forward elements (B, C & D Co's), 169 in the HQ and combat trains element and 148 in the equipment park and field trains echelon. One hundred and two of the personnel in the HQ and combat trains echelon constitute the two reserve platoons from the Equipment and Maintenance Company. This brings the total foxhole strength available to 630 men.

(7) Comparison of the Reorganized Engineer Combat Battalion (Heavy) and the Infantry Battalion.

(a) In order to provide a reasonable comparison of the physical capabilities to conduct infantry missions, the two alternative reorganizations (A & B) of the Engineer Combat Battalion (Heavy) will be examined against the TOE Infantry Battalion in the personnel, weapons and radio authorizations.

(b) The relative strengths of the two battalions are 820 for the Infantry Battalion and 845 for the Engineer Combat (Heavy). A realistic estimate of the foxhole strenght of the Infantry Battalion would be a maximum of 80% of authorized strength or approximately 646 people. This compares with a foxhole strength of 480 (Alternative A) and 630 (Alternative B) for the reorganized Engineer Combat Battalion (Heavy). Thus, on a numerical basis, the personnel available are adequate to assume a full infantry battalion mission in the high-intensity situation (Alternative B) and a reduced mission capability in the mid-intensity situation (Alternative A).

(c) A comparison of the authorized weapons in each of the battalions is as shown below:

TABLE 1

Weapon	Authorization	
	Inf Bn	Engr Bn
M-16 Rifle	678	834
.45 Cal Pistol	139	29
M203 Grenade Launcher	86	-
M-79 Grenade Launcher	-	48
M60 MG	28	28
50 Cal MG	14	9
81mm Mortar	9	-
4.2" Mortar	4	-
*90mm Recoilless Rifle	18	-
TOW Missile Launcher	18	-
REDEYE Missile Launchers	5	-

*To be replaced by the DRAGON Missile System.

It is apparent from the relative weapons authorization that in weapons up to heavy machine gun size, the firepower available to the Engineer Combat Battalion (Heavy) is slightly less than that of the Infantry Battalion. The problem areas are those of indirect fire capability (81mm and 4.2" Mortars), anti-tank capability (DRAGON and TOW Anti-Tank Missile Systems) and air defense capability (REDEYE Missile System).

(d) The problem of indirect fire capability can be solved in part by placing field artillery and/or mortar units in direct support of the Engineer Combat Battalion (Heavy) for the duration of the infantry mission. This solution would require a minimum of extra training for the engineer leaders since the primary new skill necessary would be the ability to call for and adjust artillery fire quickly and accurately.

(e) The lack of anti-tank capability is a more serious problem. Since the LAW is a short range weapon of limited effectiveness, merely increasing the number available to the unit will not compensate for a lack of DRAGON or TOW systems. The solution to this problem is beyond the scope of this study. However, the addition of the DRAGON and/or TOW systems to the Engineer Combat Battalion (Heavy) TOE must be examined for the impact of crew training requirements in man-days/year, security requirements for the storage of the systems, and the cost-effectiveness of having these systems in engineer units as compared to having special teams in the Corps area which could be assigned to any unit requiring the augmentation. In any case, an anti-tank capability must be found to augment the Engineer Combat Battalion (Heavy) for the

performance of infantry missions. If available, a tank company attached to the Engineer Battalion could satisfy the need for an anti-armor capability.

(f) An air defense capability such as the REDEYE Missile System is similar in its desirability to the TOW and DRAGON systems. A careful examination of all factors impacting on the unit would have to be done to determine if this system is needed to supplement the other systems in the area of operation such as VULCAN, CHAPPARAL and HAWK.

(g) The radio communications authorized each battalion is as follows:

TABLE 2

Radio Set	Authorization	
	Inf Bn	Engr Bn
AN/GRC-106	0 (0)	2
AN/GRC-160	33 (12)	0
AN/PRC-77	42 (37)	24
AN/VRC-46	17 (12)	21
AN/VRC-47	18 (10)	3
AN/VRC-49	1 (1)	1
AN/VRC-64	8 (1)	0
*AN/PRR-9	54 (54)	0

*Helmet mounted receiver set.
()Minus Combat Support Company authorization.

(h) It becomes apparent that the Engineer Combat Battalion (Heavy) is deficient in portable radio sets. A closer look at the Infantry Battalion's Combat Support Company reveals an authorization for twenty-one AN/GRC-160, five AN/PRC-77, five AN/VRC-46, eight AN/VRC-47 and seven AN/VRC-64 radio sets. Since this company provides indirect fire support, anti-tank capability and anti-air capabilities beyond what can be

found in the engineer battalion, these sets shoul be eliminated from the comparison. By just considering the remainder of radio sets in the Infantry Battalion, it reveals a shortage of AN/PRC-77 and AN/PRR-9 sets in the Engineer Combat Battalion (Heavy). Since the AN/PRC-77 is the squad radio and the AN/GRC-160 is the Platoon radio it follows that each squad leader, platoon leader and company commander is authorized a portable FM receiver-transmitter radio set. Additionally each fire team leader in the Infantry Rifle Company is authorized an AN/PRR-9 receiver-only radio set. Since the recommended reorganization of the Engineer Combat Battalion (Heavy) under the high-intensity scenario results in the formation of 14 platoons with 3 squads each, a total of 49 AN/PRC-77 and/or AN/GRC-160 radio sets are required to meet the same density. The need for the AN/PRR-9 sets in the engineer organization is of doubtful worth due to minimal use, lack of a transmitting capability and maintenance requirements.

(8) Conclusion:

The Engineer Combat Battalion (Heavy) can be reorganized to fight effectively as infantry with an increase in the number of radios authorized and augmentation in the areas of indirect firesupport, anti-tank capability and air defense.

4. Scatter Mines:

a. Scatter mines have enabled the Army to add a new dimension to the battlefield. Before development of the scatter mine systems, methods of interdicting supply routes and troop movements included sabotage, infiltration, artillery and aircraft to name a few.

b. Historically, minefields have been used to supplement natural or manmade obstacles. In many defensive scenarios, minefields forward of the FEBA are planned and initiated and the gaps and lanes are closed as the security forces withdraw through them. Historically it has taken valuable time to close gaps of 100 meters or more and lanes of 24 to 55 feet. Scatter mine systems are capable of accomplishing that mission in a fraction of the time.

c. Minefields often require supplemental work to increase their size and to reconstitute the field if it has been breached. Generally, this occurs forward of the FEBA.

d. Other obstacles such as craters, tank ditches, approaches to blown bridges, log cribs and river crossing sites may be augmented with scatter mines to further impede enemy movement.

e. If it becomes necessary to cut off the attacking enemy between his first and second echelons, scatter mines could be used. Such usage could be quite effective in disrupting the enemy offense.

"With a rapid mine delivery capability, the incidence of encountering minefields not previously discovered by various reconnaissance means will increase, thus degrading planned success of his tactic."
Another viable consideration for the use of scatter mines may be to close the gaps and lanes in enemy minefields if they can be located, thereby trapping the enemy between his minefield and the friendly attacking force when he is in retrograde.

f. New terminology in types of minefields includes the scatterable "point" minefield. This type blunts the enemy's main attack and can be used in the event of a penetration or on an avenue of approach believed to be the enemy's main avenue into a friendly defensive sector. The advantage of such a rapidly emplaced minefield forward of the FEBA may result in destruction of the enemy force to buy time for friendly forces to mass for the counterattack.

"The primary interest of our employment program is to provide the the Army with a reasonable mining capability and exploit developing technology so that scatterable mine concept will add what optimistically be termed a new dimension to warfare and also to increase our potential in waging mine warfare.

g. In future wars, wide dispersion and high mobility will more than likely be the rule. Today, when defending on extended frontages, wide gaps of 400 meters or more may exist between units of platoon size. "The problem is to use the mine to our best advantage in a total system context and not as a separate weapons system."

111

h. It is practical to believe that there will be enough time for protective and tactical minefields to be emplaced conventionally to cover those gaps.

"Based on its high mobility forecasts, the Army reached two sound conclusions applicable to the present (1970), essentially that: (1) large defensive and barrier fields would be appropriate under pre-engagement circumstances in places like Germany and Korea; and (2) once conflict begins, defensive and barrier fields would be inconsistant with high mobility operations, and nuisance, scattered, and route mining employing scatterable, self-sterilizing mines should be emphasized.

i. Scatter minefields should be observed and covered by fire whenever possible. The aspect of direct observation does not necessarily apply. Unattended ground sensors (UGS) and/or radar may be used in many instances. The sensors may be emplaced by hand, air or artillery. The field may then be covered by artillery registration to prevent breaching using variable time fusing. Tactical air sorties and ground forces could also be used to react to enemy breaching attempts, especially when defending on an extended front. Therefore, when employing scatter mines forward of the FEBA, the doctrine of observation and fire is not violated.

"Rapid emplacement capability in heretofore inaccessible areas is accompanied by the responsibility of detailed planning and close coordination with all command echelons before hand. Mines supplement and enhance the obstacle value of existing terrain and other types of artificial obstacles."

k. There are conditions existing that may dictate employing scatter mines in front of, on the flanks and behind the enemy's first assault echelons. When the enemy force is dispersed sufficiently and it can be predicted with a degree of accuracy that he will use a particular avenue of approach or line of communication, then interdiction missions may be flown or missions to block his withdrawal. To accompany minefields forward of the line of contact, unattended ground sensors may be incorporated to provide the requirement for observation and fire.

5. Conclusion: Examination of current and new concepts, proposal doctrines, new organizations, and new weapons systems does not reveal or suggest any completely new missions or roles for the engineer on tomorrows battlefield. However, a trend does appear toward a gradually shifting emphasis away from the current mobility accent toward improving the survivability of the supported force through barriers, minefields, field fortifications, camouflage, siting, etc. The accepted manner of employment is expected to be DS companies with committed brigades, broken down to platoon sized elements DS to forward battalions. In this concept, the company commander becomes the "brigade engineer" and will require the capability to advise the Brigade Commander and his staff on engineer matters and provide planning inputs.

PART II

ANTITANK WEAPONS PLATOON

Background

The TOW weapon system adds a new dimension to the infantry battalion. Never in the history of antitank warfare has the infantry been able to outrange armor with a direct fire antitank weapon. The TOW possesses first round hit/kill probabilities beyond 2000 meters range which are better than threat tank main gun armaments. This has led some observers to predict the death of the tank as the combat arm of decision in future conflicts. Only time will tell but certainly the new technology will modify current tank employment. There seems to be a widespread assumption that the TOW can be employed in the same fashion that older model antitank weapons.

Traditionally, the role of infantry has been to close with, and destroy the enemy (including tanks). The enemy threat and the advent of the technological revolution in weapon systems has increased the emphasis on antitank warfare to the extent that MG Donn Starry, Commandant of the U.S. Army Armor School, believes that "the primary task of infantry on the tank-antitank battlefield is tank killing."

The TOW antitank platoon organic to the infantry battalion, and the rifle company TOW section, have essentially a defensive role. They are not tank destroyers in the sense of World War II doctrine because they lack among other things the armor protection and rapid rate of fire required.

Their function is generally to deny the use of certain terrain, routes or avenues of movement to tanks, not to seek out and destroy the tanks themselves. The TOW weapon system may be used to ambush (attrit) tanks, but rarely to assault or close on them.

An appreciation of TOW characteristics and of General Starry's comment is germane to understanding the overall importance that extremely effective antitank weapons can have on future highly mobile battlefields.

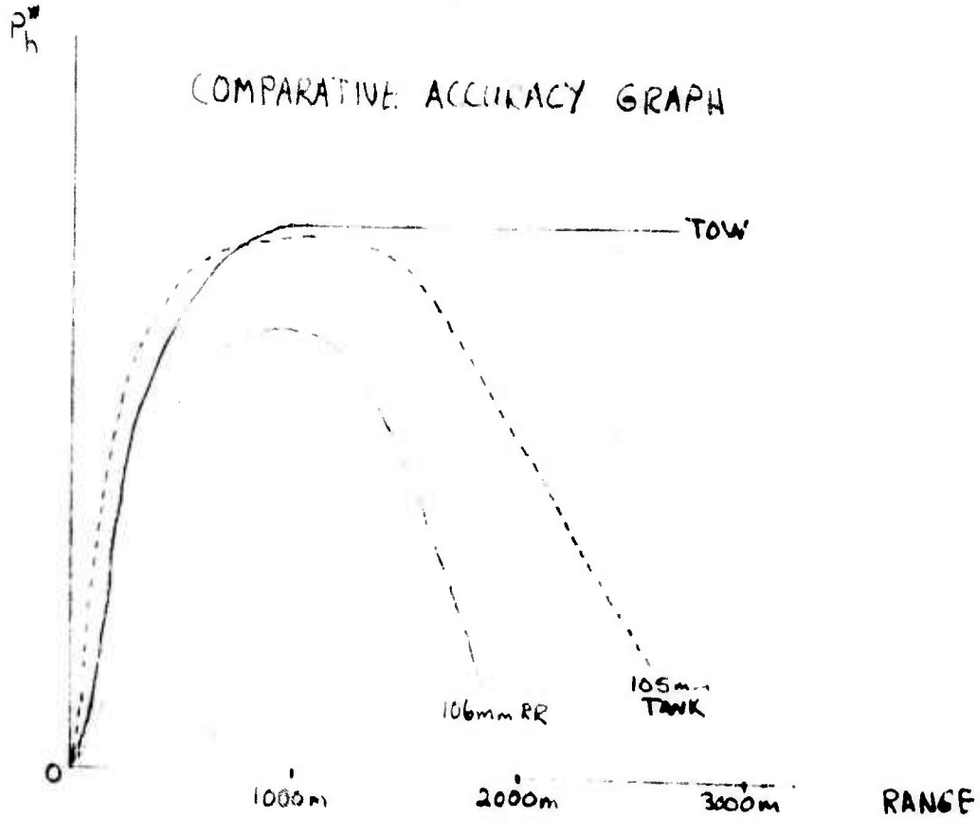
The TOW was developed to fill an urgent need. Warsaw Pact forces have an estimated 3 to 1 advantage (at least) in tanks over NATO forces. Stanley R. Resor, former Secretary of the Army, said in 1970 "NATO can never hope to match the Warsaw Pact in numbers of tanks alone." Therefore better antitank weapons were needed to counter the threat. The TOW however, was not developed to drive the tank from the battlefield.

TOW CHARACTERISTICS AND NOMENCLATURE

Most of the key performance characteristics such as missile velocity, accuracy ratings, and reload times are readily available in several classified documents. Inclusion of the exact data however, is not necessary for a comparative and working knowledge of TOW capabilities. The TOW launcher system weighs 173 pounds (missile weighs an additional 54 pounts), uses a 10X powered sighting scope, has a maximum range of 3000 meters, and can be fired from vehicle or ground mounts. It possesses very favorable accuracy and range capabilities when compared with the 106mm recoilless rifle, and 105mm main tank gun as depicted in Table 1. In the mechanized infantry battalion the TOW is mounted in the M113 APC. The carrier basic

load of missiles is 10, about 6 times fewer than the basic load of main gun ammo carried in a tank. The rate of fire is several times slower than that achievable by an average tank crew firing their 105mm gun. Although missile velocity is much slower than the 105mm tank gun, it is fast enough to make it very difficult to observe from the front and nearly impossible for a tank driver to dodge.

TABLE 1.



* Classified data, however vertical scale is representative of the positive probabilities of hit (P_h).

The M113 APC provides minimal protection for the TOW crew as a portion of the crew is exposed during firing, lunch and guidance of the missile. A problem related to crew exposure is launch signature (smoke, back-blast debris, noise, flash) caused by firing a missile, since detection or acquisition by an opponent would be made easier. The TOW launch signature is significantly less detectable than that of the 106mm recoilless rifle.

Studies indicated that the probability of detecting a TOW crew by an advancing or overwatching tank crew as a result of launch signature ranges from .008 to .034, i.e., less that 4%. A study noted that the time to complete acquisition (from launch of the TOW missile until pinpoint by an advancing overwatching tank crew) ranged from 17 to 22 seconds. Other findings indicated that detecting antitank weapon positions is highly sensitive to the time length of exposure and the number of observers searching for a target (a doubling of observers more than doubled the probablity of detection), and that the range between the observer and the antitank launch site had little effect on detecting the antitank position. These last two findings emphasize the importance of artillery fire on the tank-antitank battlefield.

In summary, the advantage of the TOW is its high hit probabilities at ranges out to 3000 meters. Limitations are (1) slower rate of fire, (2) limited basic load, (3) limited crew protection (4) inability to fire while moving, (5) and the missile velocity and wire guided principle which necessitates that the target remain visible to the gunner during the entire flight of the missile.

ORGANIZATION FOR COMBAT

Past attempts to cross attach tanks to maneuver elements often meant piecemeal use of tanks with resulting loss of armor or antitank concentration

capability. The TOW was developed to give infantry battalions an improved antitank capability, thereby reducing quantitative requirements for tanks employed in purely an antitank role.

The planned organization of infantry companies for the 1967-70 time frame called for all heavy antitank weapons to be consolidated at battalion level; none in line companies. Medium antitank weapons would be at company level and the 66mm light antitank weapon (LAW) would be at platoon level. The number of TOW's (12) for each battalion was based upon the assumption that a rifle company or a battalion could defend a certain width of terrain frontage (classified). Very little attention was paid to the role of antitank weapons in the offense, and made the tacit assumption that battalion TOW's could be placed in direct support or attached to rifle companies without undue difficulty. Studies covering the 1970-75 time frame produced the H-Series TO&E containing TOW's at company level, medium antitank weapons (Dragons) in platoons, and light antitank weapons (LAW) in squads. Thus a form of decentralization was created, coupled with greater proliferation of antitank weapons.

The TOW was envisioned as replacing the 106mm recoilless rifle and the ENTAC guided missile and designed to meet the following criteria considered as essential for survival on the modern battlefield.

a. Reduced firing signature.

b. 3,000 meter maximum range, and less than 200 meter minimum range.

c. Improved accuracy and probability of killing tanks (classified).

d. Simplified gunner training requirement.

e. Weigh less than 200 pounds.

f. Faster missile velocity (classified).

g. Night firing capability.

While the night fire capability is still undergoing testing, the remainder of the development criteria have been met or exceeded. The TOW, however, has limitation which impact upon its employment. These will be discussed later.

Summary:

Technology has provided the mechanized battalion a weapon with range, accuracy, and tank killing power not previously encountered on the battlefield. Threat forces possess weapons of near quality and capability. The TOW provides probably five times the tank killing capability to today's infantry battalion as existed in World War II. This and a realistic analysis of the threat has markedly changed the battlefield environment and led to much of the contemporary thinking concerning defense in depth, strong point defenses, antiarmor attrition zones, and numerous other defensive ideas, all of which impact on employment and control problems within the battalion.

TOW Employment Considerations

One of the objectives of anti-tank fires is to break up formations thru reducing their mass and covering them to skirmish which further degrades their maneuver and neutralizes their shock effect. Obstacles are the preferred means of accomplishing this, but when natural obstacles are not present and man-made obstacles are not feasible then effectiveantitank fire may accomplish the same purpose. Fire supports all maneuver; the

lack of fire superiority (base of fire) degrades maneuver; and effective counterfire will stop maneuver. This is the essence of effective task organization, weapons employment, and organization of the terrain in an antiarmor environment.

Listed below are some of the critical factors (based upon TOW characteristics) which limit the use and effectiveness of the TOW antitank weapons.

a. Limited crew protection.

b. Mobility--The ability to change firing locations will make the vehicle TOW a more difficult target to acquire and increase its chances of survival. Foot mobile TOW weapons will be disadvantaged in most tactical situations. Unnecessary or excessive movement, however, could be a more prevalent cause of detection than firing signatures. The advantages of not moving may outweigh the immediate risk because "movement" is generally accepted as the most common cue to target acquisition.

c. Defensively oriented. The TOW is not equally effective as an offensive/defensive weapon because of its slow rate of fire, on-board basic ammunition load, and crew vulnerability.

d. Fire control, target acquisition, and maneuver control - discussed in subsequent section.

e. Terrain--This is the single most important factor. Hull defilade or concealment are required. The term "grazing fire" is not normally considered an issue when describing TOW fields of fire, but because of the flat trajectory and missile velocity any ground fold, ditch, or ravine

which creates deadspace must be evaluated and accounted for when employing the TOW. Specific tactical aspects of terrain will be discussed later.

f. Security—TheTOW crew must provide for their own close-in security.

g. Visibility--The maximum range will be reduced during periods of reduced visibility.

Several techniques must be used by TOW unit leaders to overcome these limiting factors. Battle drill will help reduce exposure time. Discipline and self-confidence will reduce unnecessary shifting of firing positions. A liberal use of indirect suppressive fires will reduce the enemies observation ability and separate tanks from accompanying infantry support. Smoke, white phosphorus, and variable-time fuzes can suppress enemy fires and observation, and they can also be used very effectively against the TOW. Camouflage and well prepared positions will contribute to crew survival.

Terrain should be considered from two aspects. First from a standpoint which optimizes the TOW's antitank fire role, and second from a standpoint of self-protection. Concerning the antitank role, terrain should be examined and used in the sole context of how it will facilitate the destruction of the enemy. Fields of fire can be of any width, and longer than any other current direct fire weapon. Fields of fire should be free of deadspace, maximize the TOW's range, and be devoid of objects and foliage which prevents continuous tracking by the TOW gunner while the missile is in flight. Pertaining to self-protection, terrain should provide cover and concealment to the firing position. A concealed route is desired for all movement. Exposure of the firing position can be minimized by camouflage, hull defilade,

and clearing back-blast areas of debris. High ground, particularly hill tops, and forward slopes should be avoided because of the likelihood of impacting enemy artillery fire which can suppress and destroy the TOW.

Mobility of the TOW weapon must be maintained. At the same time TOW should not be employed as tanks. Terrain must be analyzed behind and to the flanks of the firing position for the purpsoe of locating covered and concealed routes for displacement. Mobility is combat power even on defense.

Security is best provided by integrating TOW's well into other forces and the overall scheme of maneuver. The TOW should never be employed in less than pairs and should always be integrated as part of the combined arms effort.

Offensive tasks which may normally be assigned include providing overwatching fire in support of maneuver, fire support destruction, and limited assault fires. Defensive tasks are more ideally suited to the weapon's characteristics. These include antitank long range fires, anti-tank protective fires, attrition zone fires, and final protective fires. The effectiveness in this later role would be restricted for the same reasons that keep the TOW from being a good assault type weapon.

Whichever task is assigned to a TOW unit, the TOW should be employed to make maximum use of its most outstanding feature, i.e., excellent accuracy at 3,000 meters. As shown in Appendix 1, there is virtually no reduction in accuracy beyond 1000 meters. Fire support positions on offense can be well back from the decisive engagement area and be just as effective and not restrict maneuver room. Continuous fire support and fire superiority is often possible at critical times because TOW's need not

displace as frequently due to their range. However, when TOW's accompany attacking maneuver elements they may often provide more responsive fires because visual target designation and acquisition may be easier, faster, and, more exact. The long range accuracy on defense allows effective fires to be placed on the enemy well forward of, and from many angles and places within, the battle area. From 3,000 meters the enemy will be receiving effective direct fires at least 500 to 1000 meters before he gets within range of his own direct fire weapons and can return the fire. This is an extremely important employment advantage which shouldn't be overlooked.

Summary: While the TOW does not require an unusual set of circumstances to insure attainment of its very high tank killing probabilities, an understanding of the TOW weapon system's characteristics, capabilities, and limitations is definitely required. This udnerstanding is essential to properly organize a TOW antiarmor force for battle and do it effectively over changing pieces of terrain.

PART III

FIELD ARTILLERY

1. Historical Background.

From W. I. to the present, anti-tank weapons and tactics have been largely a pragmatic development. As armor became more impervious to direct fire weapons, stronger, and moremobile, anti-tank weapons had to be developed accordingly. Even during W.W.I, it became evident that anti-tank work required some degree of specialization and that artillery weapons lost their traditional value when employed in the anti-tank role.

W.W.II reinforced that aspect. While the artillery at Kasserine and Kursk fought valiantly in duels against tanks, they were more effective when used as part of the combined arms team, denying the tanker his infantry protection, forcing him to button up, breaking up his formation, and causing him damage when rounds landed close to vulnerable parts. In the offense, the artillery suppressed anti-tank weapons, other artillery, and hostile infantry.

The W.W.II experience showed that artillery, except in isolated circumstances and in well organized defensive positions, was highly vulnerable to tanks conducting a direct attack upon them. But the most important conclusion which can be drawn from both W.W.I and W.W.II experience is that once artillery lowers its tubes to engage direct fire targets, it is no longer effective as artillery. It loses its ability to mass fires and to attack long range targets in defilade.

During the operations of Task Force Smith at the onset of the Korean invasion, a 105mm artillery battery was able to momentarily stop the advance

of North Korean tanks. But the damage they caused were minimal and they were eventually forced to withdraw.

Modern U.S. anti-tank doctrine virtually rules out the use of field artillery as a direct fire and anti-tank weapon. The sophistication of today's armor when compared to the vulnerability of even our most sophisticated SP weapon rules out a duel as a viable course of action.

2. Role of Artillery.

The role of Field Artillery on the Armor battlefield is that of forcing enemy formations to deploy, clearing infantry out of tank formations, causing the tank force to "Button up", providing suppressing fires on enemy anti-tank weapon systems, engaging enemy artillery in counter-battery fires, and supporting friendly forces with fires planned to further the scheme of maneuver or plan of defense.

The tank is a relatively vulnerable weapon when operating alone. It is the mission of the artillery to suppress the tank's supporting fires, thus making it vulnerable to our own specialized anti-tank weapons.

3. Target Priorities.

a. FLAK SUPPRESSION. The specific order in which various targets should be engaged by artillery will vary with the situation. However, in many instances it will be most advantageous to engage enemy air defense units first, since doing so will permit the early employment of TAC air in the close air support role. Armed with "smart bombs" and other precision guided munitions, TAC air is extremely effective against armor. For this reason, the ground force must devote appropriate assets to knock out enemy air defense weapons.

b. COUNTERBATTERY FIRES. The antiarmor defense bwill rely heavily on the ability of the friendly infantry to employ the TOW, DRAGON, LAW and other antitank weapons. Lethal and accurate though these weapons may be, they can easily be neutralized or destroyed by enemy artillery fire. It is therefore essential that supporting artillery units do everything in their power to silence the enemy guns. Obviously, the success of any counter-battery program will hinge on the unit's ability to quickly and accurately acquire targets. Present equipment--such as the AN/MPQ-4A countermortar radar, and sound ranging equipment--will not suffice. It is therefore important that target acquisition equipment be modernized and fielded in order to overcome this shortcoming.

c. FIRE SUPPORT OF COMMITTED UNITS. Priority should also be given to engaging enemy maneuver elements. Such attacks should be designed to separate accompanying infantry from the armored force, to prevent the enemy from employing wire-guided antitank missiles, to force tanks and other armored vehicles to button up, and to restrict the enemy's observation.

The importance of suppressing the enemy's antitank missiles cannot be overemphasized. Weapons such as the SAGGER missile will normally be employed to take full advantage of their "stand-off" capability. A SAGGER launched from 2,000 to 3,000 meters from a tank is deadly accurate; it is also immune from the fires of the tank being engaged. An armor force that attacks an enemy who possesses ATGM without support from the infantry, artillery and/or TAC air is inviting disaster.

d. USE OF SMOKE. As a consequence of the ability of smoke to degrade ATGM effectiveness, smoke achieves new importance on the battlefield. It

will be used by the enemy to screen the advance of their armor. Once under attack, many enemy armor vehicles have the ability to launch smoke grenades to provide individual protection while they move to cover or seek to break off an action. Smoke will be used in a similar manner by our forces. Enemy overwatch positions will be screened by our artillery as their attacking forces close with our defensive ATGM positions. Since early engagement of tanks by TOWS will be well out of range, our TOWs will engage the advancing armor with minimum risk. It is essential that our smoke screen prevent the overwatch positions from locating our ATGMs and calling in accurate suppressive mortar and artillery fires.

Artillery smoke shells in the inventory today are of marginal value due to the lengthy buildup time and number of shells needed to establish and sustain an effective smoke screen. A new type smoke using "asbestos rope" is under development. It promises a rapid deployment of smoke which is not degraded so readily by wind and remains close to the ground for a longer period of time.

e. CLGP. The most hopeful development in the evolution of artillery as a tank killer is the Cannon Launched Guided Projectile (CLGP) which can be guided on the target by a laser beam directed by a forward observer. Suppression of enemy fire will enhance the effectiveness of the friendly observer, just as it would for TOW and Dragon gunners.

Artillery is most effective in its battle against tanks as part of the combined arms team.

4. Defense of the FA Battery. One can still envision the artilleryman threatened by approaching tanks which have broken through the lines of defense.

In any potential future conflict involving United States and enemy forces, the overwhelming majority of American field artillery weapon systems will become the prime targets for immediate neutralization. While the primary mission of destroying US artillery is charged to enemy artillery, maneuver forces are similarly tasked. Tank and motorized rifle units are directed to penetrate gaps and intervals and, without permitting themselves to be drawn into other battles, quickly proceed to the enemy supporting artillery position areas and destroy both guns and crews by surprise attack and direct fire. For that reason, artillerymen must still have the capability to defend themselves.

Specialized antitank weapons must be made available to the artillery, particularly the DS battalions.

The M109 & M109A1 155-mm Howitzer equipped firing battery does not possess a credible antitank defensive capability. It lacks a sufficiently high rate of fire; it lacks accuracy, particularly for moving targets; and the M107 HE Projectile in direct fire is not a viable means of destroying or neutralizing attacking tanks.

Positive steps must be taken to provide direct support Field Artillery firing batteries with a responsive and flexible antitank defensive system. That system should incorporate the following:

-- 155-mm direct fire antitank munition.

-- An effective antitank weapon system(s) that can be emplaced independently of the firing position of the battery to enable remote engagement of tanks posing a threat to the position and to provide antitank defensive depth.

The present organization includes only the M-72 LAW, and no plans exist to include the TOW, an omission which could leave the artillery vulnerable and force it to depend heavily on its howitzers for close in antitank defense.

5. FA AND COMBINED ARMS TEAM. The heyday of artillery as a primary antitank weapon has passed, but it remains one of the most important ingredients of tank warfare in the indirect fire role. The key to its success will lie in the degree it is integrated into the combined arms team, since past experience shows that artillery has been thoroughly effective only when properly employed as part of a total combined arms team.

PART IV

Armor

This section addresses the use of tanks, and their inherent antitank capabilities, within the antiarmor battle. While it is neither a comprehensive discussion of the capabilities of armor, nor a detailed analysis of armor tactics, it is designed to provide the commander with some practical guidelines and ideas concerning employment of organic or attached armor elements in his "anti-armor" defense.

Specific subjects addressed are: the advantages of tanks as antitank weapons, characteristics and capabilities of current US tanks, qualitative performance objectives for tank crews/platoons, and some guidelines and priorities for employment of armor within a combined-arms antitank defense.

Tank versus Tank:

A tank remains the most effective weapon to use against other tanks on today's battlefield. A tank gun can kill other tanks as effectively as any other antitank weapon system, with some additional significant advantages. With its armored protection for the crew and mobility, it is the only antitank weapon system that can move while under artillery and small arms fire. It has several further battlefield staying power advantages in its relatively large ammunition carrying capacity and night firing capabilities, as well as the fact that the tank main gun possesses the only available long range antitank fire and forget capability present in the army inventory.

The tank is not without disadvantages, however. The tank is somewhat limited in types of terrain, difficult to conceal or camouflage, and when moving does create a distinctive noise signature -- and, as a potent weapon

system, does draw priority of fire from enemy weapons systems. It is also extremely expensive to procure, man and operate and, therefore, may be a relatively scarce asset. As such, it is imperative that the commander employ it intelligently, and insure that its unique strengths are maximized and disadvantages minimized when incorporating it into his antitank defense plan.

Characteristics of U.S. Tanks and Their Advantages and Vulnerabilities to Soviet Armor

There are three major types of US armored vehicles fielded in Europe at the present. The primary US tank is the M60A1 - which represents the largest number, accompanied in limited numbers by the M60A2. Cavalry Regiments and Divisional Cavalry Squadrons are equipped with the M551 Sheridan AR/AAV. Only the two tanks will be considered here for comparison since the M551 possesses many of the same characteristics of armament/gunnery capability as the M60A2 with the following exceptions; it does not have a rangefinder, employing a stadia sight to determine range, its main gun ammunition stowage capacity is less, and the Cal .50 commander's AA machinegun is not stabilized.

a. The M60A1 Tank

The M60A1 tank has been in the hands of troop units in US Army Europe since 1962. It is the present main battle tank of the US Army and is undergoing extensive product improvement with add-on modifications, particularly in terms of fire control instrumentation.

CHARACTERISTICS M60A1

Dimensions

Combat weight	53 tons
Ground Pressure	11.1 psi
Hull length	22.8 feet
Hull width.	11.9 feet
Height (Highest Point). .	10.8 feet

141

Armament	
Primary (Main Gun)	105mm (rifled)
Secondary	7.62mm Coax MG
Type ammunition/Muzzle velocity	APDS/4,820 fps HEAT/3,840 fps HEP/2,600 fps
AA Armament	Cal .50 MG, TC cupola
Ammunition Stowage	
Main Gun	63
Coax MG	5,950
AA MG	900
Fire Control	
Turret power	Electro-hydraulic with manual backup
Gun dep/elev	-10°/+20°
Gun stabilization	Not at present
Range finder	Coincidence
Ballistic Computer	Yes/Electro-mechanical
Night Capability	
Searchlight	Xenon/White/IR
Range	IR and White/2,000 met.
IR driving/range	Yes/50 meters

b. The M60A2 Tank

The M60A2 tank was first introduced in 1971 as an interim tank upon cancellation of the MBT70 development program. It was first introduced in Europe in 1972 as an operational tank.

CHARACTERISTICS M60A2

Dimensions	
Combat weight	57.3 tons
Ground pressure	12.3 psi
Hull length	22.8 feet
Hull width	11.9 feet
Height (highest point)	10.9 feet
Armament	
Primary (main gun)	152mm (rifled)
Secondary	7.62 Coax MG
Type Ammunition/Muzzle velocity	Shillelagh Missile HEAT/2,240 fps APERS/2,240 fps
AA Armament	Cal .50 MG, TC Cupola

Ammunition Stowage
- Main Gun. . . . . 46 (mixed)
- Coax MG 5,500
- AA MG 1,080

Fire Control
- Turret power. . . . . Electro-hydraulic with manual backup
- Gun dep/elev. . . . . -10°/+20°
- Gun stabalization . . . . Yes - 2 plane
- Range finder. . . . . laser
- Ballistic Computer. . . . Yes/fully integrated

Night Capability
- Searchlight AN/VSS2
- Range . . . . . 1,500 meters
- IR driving/range. . . . . Yes/50 meters

A. Advantages/Disadvantages in Tank Capabilities

Overall, Israeli experience in the 1973 Mid-East War proved the M60A1 and British Centurian tanks to be more effective than the Soviet T54/55 and T62 tanks. ARVN experience in Vietnam in 1972 against NVA crewed T54's further confirmed that fact. COL Battreall stated: "It is inaccurate to call the M48A3 'comparable' to the T54/100. It is in fact, <u>vastly superior</u> . . . ." In two separate tank engagements in 1972 US older model tanks with South Vietnamese crews soundly defeated NVA armor with 75 Soviet tanks destroyed by tank fire alone, to 0 ARVN tanks destroyed by tank fire. This factor is extremely encouraging in view of the fact that the M48A3 weapons system does not possess the same, similar but lesser, capabilities that the M60A1 tank has.

Several specific advantages in tank capability and characteristics emerge from an analysis of combat from these two most recent wars.

1. <u>Range Finder-Fire Control-Gun/Ammunition Combination</u>

M60A1 coincidence range finder-electro-mechanical balistic computer-105mm tank cannon provides it with a highly accurate lethal

combination giving US tank crews a distinct advantage over their Soviet counterparts beyond "direct shot" (Direct shot: Range at which, due to combined gun/ammo/ballistics, the rounds' flight path does not exceed or drop below, the height of the designed tank target. It is roughly 1,000 meters for the T54/115.) ranges of Soviet tanks. This combination provides a nigh hit-kill probability at ranges out to 2,000 meters and has been used by Israeli tankers effectively out to 3,000 meters and has been used by Israeli tankers effectively out to 3,000 meters. Even the lesser combination on the M48A3 (90mm gun/HEAT ammo rather than 105mm APDS) was used to obtain some first and reliable second round hit/kills at 2,000 - 3,000 meters.

The inclusion of the laser range finder integrated fire control system being retrofitted to product improve the M60A1 tank, will further increase the relative advantage to US crews since all gun/ammo/weather variables can then be calculated automatically. The results of tests conducted by the Belgian Army to determine which tank/fire control system to purchase demonstrated by a significant increase in accuracy.

"Using high velocity ammunition and with more than 100 rounds per target, an actual hit percentage of 0.5 was achieved at ranges beyond 3,000 meters. For moving targets, a 0.97 actual hit percentage was achieved at 1,800 meters. The Belgians reported to a NATO panel that 'we have doubled the first round hit probability over the range of interest, or have effectively doubled the range for a given hit probability.'"

The fire control system-gun-ammunition capability for the M60A2 and M551 Sheridan comes primarily from the Shillelagh missile system -- which

possesses a daylight hit/kill probability of 0.90 + out to its maximum range of 3,000 meters on all types of targets. However, the Shillelagh system, as presently fielded, has some definite night engagement capability shortcomings. The absence of a rangefinder in the M551 and relatively low velocity of conventional 152mm ammunition also tend to decrease the efficiency of other methods of engaging tank targets. Most of these problems have been corrected in the M60A2 by inclusion of a laser range finder, full turret stabilization and combined IR/passive night vission/sighting equipment.

On Soviet equipment the most significant deficiency in terms of the fire control-gun-ammunition combination, is the absence of a range finder. Since most misses in tank gunnery result from range errors rather than deflection, and Soviet tank gunnery relies on range estimation and a stadia (based upon height of the tank target) type sight, Soviet gunnery training and tank doctrine stress firing on the move (Stabilized and accurate for area fire — not for point type targets such as tanks/antitank weapons.), massed fires by platoons or companies at longer ranges, and quick aimed shots inside 'direct shot' ranges from a brief halt. Recent intelligence reports indicate that some later production models of the T62/115 may be equipped with a laser range finder — indicating that the Soviets recognize the equipment shortcomings demonstrated in the 1973 Mid-East War and are taking steps to correct the situation. The Soviet 115mm smooth bore gun and APDS round with a muzzle velocity exceeding one mile per second, is the fastest tank round in the world today — more than 500 feet per second faster than the US/UK/West German 105mm APDS round.

With retrofit, currently underway, of an add-on stabilization kit to present M60A1 tanks the Soviet advantage of stabilization will be negated. However, with tight budgets retrofit may not be completed until as late as 1976 or 1977.

2. Main-Gun Ammunition Stowage Capacity

The 63 round main gun ammunition stowage capacity of the M60A1 tank proved to be a decided advantage in the 1973 Mid-East War. In a massive tank engagement immediately available ammunition on board frequently determined the ability of a tank unit to fight sustained operations. Soviet tanks carry from 34 to 44 rounds. The same basic proportion was true of coaxial machinegun and anti-aircraft machinegun ammunition capacity. However, the Israelis generally carried more than the designed load of both types of ammunition, as do most US tank crews. There is sufficient room to do this in the M60A2 but not in the more cramped, smaller Soviet tank turrets.

There may be a potential, yet untried, problem with ammunition stowage on the M60A2 and M551. The M60A2 - with a capacity of 46 rounds, and M551 with a capacity of 36 rounds -- approximately one third being missiles, will rely heavily on achieving kills with all, or nearly all of its missiles, in order to fight sustained engagements.

3. Tank Height/Silhouette

The Israelis considered the height of the M60A1 an advantage since it provided the tank commander with better observation -- in defilade and the open, from which to watch the battlefield and acquire targets. However, not all armor experts or exponents consider the height of the M60A1, and therefore higher battlefield silhouette and larger presentable target, an

adv ntage. Most recent studies concerning tank design characteristics call for a reduction in tank height and silhouette under the visible= vulnerable equation of lethal modern AT warfare.

4. Armor Protection/Survivability

US and British tanks have traditionally stressed armor protection for the crew in the firepower±mobility±armor protection tank design/trade-off equation. As a result US MBTs weigh over 50 tons while Soviet, West German, French and most other MBTs average about 40 tons. The end result however has been the higher survivability of US/UK tanks -- and higher percentage of damaged tanks that are salvaged after combat operations terminate. The results of the 1973 Mid-East War demonstrated that US tanks could absorb more hits and remain operational/repairable than their Soviet counterparts -- generally with fewer crew losses.

The T54/55 and T62, because of their combined internal turret ammunition and fuel stowage, proved extremely vulnerable to hit=kill. The T62 displayed, in spite of possessing the best armored ballistic shape of any modern tank in use, a 'glass jaw' since many hits resulted in the turret completely separating from the hull.

In spite of the heavier weight the M60A1 was equally mobile to the T54/55/62 tanks in the Middle East. Weight did not appear -- because of ground pressure/footprint characteristics, to be a significant factor, while the higher US ground clearance, more reliable engine and transmission, generally made US tanks used more dependable and easier to maintain.

5. Gun Depression/Elevation Capability

Soviet tanks with a -4 degree depression capability generally had to expose more of the tank to enemy observation/fire in rolling or

hilly terrain, in order to be able to engage targets. This was particularly a disadvantage in defensive positions where frequently they had to forego good defilade positions and move up onto the crest in order to be able to shoot down. US tanks, on the other hand, with a -10 degree main gun depression capability, did not have this problem.

6. Doctrinal Factors

"A 1972 Russian study stresses the mass employment of armor for both nuclear and non-nuclear warfare. The study acknowledges that NATO countries are trying to close the numerical armor gap. The study states that tanks may be asked to perform many tasks in an offensive, and fighting tanks is the most difficult of all.... Therefore the ability of tanks to destroy enemy tanks is regarded as the main criterion of their effectiveness.... Our potential enemy regards the tank as his principle offensive weapon."

On the other hand, at least at the outset because of the disparity in numbers, we classify the tank as a weapons system which by necessity will be employed primarily in a defensive role. A recent US study indicated that "in offensive operations against NATO the Warsaw Pact force would consist of 40-60 percent tanks and hard targets, 20-30 percent thin-skinned vehicles, and the balance infantry and other soft targets.... On the defense the mix" becomes harder.

MG Starry, in a series of articles in the 'Commander's Hatch' of Armor beginning in November-December 1973, has discussed Soviet armor tactics, the effects of the proliferation of antitank weapons, and new concepts in

US armor doctrine to counter this threat at length. He observed that Soviet forces attack in echelons, every move calculated to make a penetration, gain and maintain offensive momentum, and then to exploit success. Soviet equipment is designed for that purpose -- as an offensive, rather than as a defensive weapon. Soviet training emphasizes night movement, firing on the move, avoidance of engagement outside of favorable or equal US/Soviet tank hit-probability ranges, and massing of direct fires at greater ranges by platoons or companies to compensate for recognized weapon system shortcomings. US doctrine and training, in particular tank gunnery doctrine and training, must likewise capitalize on our equipment strengths/advantages and strive to minimize our disadvantages/vulnerabilities.

CAPABILITIES OF TANK CREWS AND PLATOONS

A. TANK CREW OBJECTIVES -- PRIMARY ARMAMENT

The following definitions will be used throughout this section:

Acquire - See the target by means of optical/visual observation of the battlefield. US tanks do not have remote, elctronic or other means of target acquisition at present and must rely totally on visual methods.

Destroy - Means achieve a hit/kill; ideally with a 0.5 or greater probability on the first round; a 0.8 or greater on the second round; and a 0.95 or greater on the third round. Doctrine must prescribe, and training emphasize engagement until destruction within the maximum effective range of the weapons system in use.

Engage - Means to take under fire with organic tank weapons. Weapons selection is of course dependent upon the nature of the target, range conditions of visibility, and crew discretion.

1. Day -- Against Moving Targets

a. Defense: The tank crew must be able to acquire, and destroy moving enemy tanks and armored vehicles within its assigned defensive sector, out to the maximum effective range of its main gun within 30 seconds (1,800 + for the M60A1; 3,000 meters for the M551 and M60A2).

b. Offense:

(1) Overwatch: The Tank crew, while providing overwatch to other elements, must be able to acquire and destroy moving enemy tanks and armored vehicles out to the maximum range of its main gun within 30 seconds.

(2) Movement: The tank crew must be able to acquire, stop, engage and destroy moving enemy tanks or armored vehicles out to at least 15,00 meters (i.e., beyond direct shot range of Soviet tanks), within 30 seconds.

2. Night -- Against moving Targets

Night firing is defined as firing employing IR or passive night vision/sighting devices rather than employment of artificial illumination (flares, Xenon white light) which then become basically daylight firing techniques -- limited only by the quality of artificial illumination.

a. Defense:

(1) The tank crew must be able to plot and prepare a detailed range card including potential target locations and ranges, reference points, gun deflection/elevation data, and defensive sector limit points. It must also be able to integrate searchlight and night observation sectors into the plan and coordinate its fireplan with those of neighboring tanks or infantry elements.

(2) The tank crew must be able to acquire, engage, and destroy moving enemy tanks or armored vehicles at ranges of 1,000 to 1,500 meters within 45 seconds (i.e., beyond Soviet night firing capabilities).

b. Offense:

(1) Overwatch: Same as (2) for defense.

(2) Movement: The tank crew must be able to acquire, stop, engage and destroy moving enemy tanks and armored vehicles at ranges of 800 to 1,000 meters within 45 seconds (at least equal to or greater than Soviet capability).

3. Day -- Against Stationary Targets

a. Defense: The tank crew must be able to acquire, engage and destroy stationary enemy tank and antitank targets at the maximum effective range of its main armament within 30 seconds. (The M60A1 at ranges of 2,000 to 3,000 meters with APDS or HEAT. The M60A2 at 3,000 meters with the missile, approximately 1,800 to 2,000 meters with its conventional HEAT ammunition.)

b. Offense:

(1) Overwatch: Same requirement as defense.

(2) Movement: The tank crew must be able to acquire, stop, engage, and destroy stationary enemy tanks and antitank weapons at ranges of 2,000 + meters for the 105mm gun and 3,000 meters for the missile system, within 30 seconds.

4. Night -- Against Stationary Targets

a. Defense/Overwatch: The tank crew must be able to acquire, illuminate with IR using its own searchlight (M60A1), engage, and destroy enemy tank or antitank targets within 45 seconds at ranges of 1,000 to 1,500 meters.

b. Movement: The tank crew must be able to acquire, stop, engage (including providing its own IR illumination for the M60A1), and destroy within 60 seconds, stationary enemy tank and antitank targets at ranges of 800 to 1,000 + meters.

5. Against Low Performance Aircraft

Based upon the results of a DA funded Research Analysis Corporation study titled "An Evaluation of the M60 Main Gun Against Low Speed Tactical Aircraft (U)", performed in August 1966, classified Confidential, the following should be established as a performance objective to counter an anticipated Soviet antitank helicopter threat.

In either the defense or offense, the tank crew should be able to acquire, track, estimate or determine range, and engage with a reasonable hit/kill probability, enemy helicopters at ranges from 300 to 3,000 meters using range set beehive ammunition (APERS-T).

B. TANK CREW OBJECTIVES -- TOTAL WEAPONS SYSTEM

1. Against Enemy Infantry

a. Defense/Overwatch: The tank crew must be able to acquire, select the appropriate weapon, engage and destroy enemy dismounted infantry, day or night, within 45 seconds, using the coaxially mounted machinegun at ranges of 25 to 900 meters, the cal .50 cupola mounted machinegun at ranges from 750 to 1600 meters, and main gun with APERS-T or HEP-T ammunition at ranges from 750 to 3,000 meters.

b. While moving: The tank crew must be able to acquire, engage (and if necessary provide its own illumination), and destroy dismounted

enemy infantry or other soft area targets within 60 seconds, while moving with the coaxially mounted machinegun at ranges out to 900 meters. With the M60A2 this would include engagement of area targets with the main gun in stabilized mode out to 1,250 meters and cupola mounted cal .50 machinegun.

2. Against Thin-Skinned Vehicles

a. Defense/Overwatch: The tank crew must be able to acquire, engage (and at night provide its own illumination, if required) and destroy enemy thin-skinned vehicles or other point type soft targets, stationary or moving, at ranges from 25 meters out to the maximum effective range of the weapon employed (7.62 coax - 900 meters; Cal .50 MG - 1,600 meters, maingun to 3,000 meters), day or night within 60 seconds. (Daylight time should be under 30 seconds; night conditions would limit maximum effective ranges to the capability/range of night sighting equipment used.)

b. Movement: The tank crew must be able to acquire, stop, engage (including provide own illumination at night, if required) and destroy enemy thin-skinned vehicles or othe/ point type soft targets, within 60 seconds at ranges out to 900 meters with the coax machinegun. The M60A2, with a stabilized system, must be able to use the coax out to 900 meters, or Cal .50 MG out to 1,500 meters, day or night, while on the move.

3. In Urban/Built-up Areas

Based upon the tremendous expansion of urban areas, and on the unavoidable future employment of tanks in such areas; tank crews must be able to employ all tank weapons systems in built-up areas. To accomplish this crews must be knowledgeable of all inherent hazards and limitations in

terms of ricochet effects, blast and fragmentation side effects, potential danger areas, and vehicle vulnerabilities/capabilities when considering breaking down structures/wall or other such obstacles.

4. In An Active Chemical Environment

Tank crews must be able to perform all crew performance objectives while masked for extended periods of time with no more than a twenty-five percent reduction in capability (accuracy or time required for completion of engagement). Crews must be capable of decontaminating their tank upon departure from the contaminated area, in a minimum amount of time (to be determined) and be fully prepared to resume sustained combat operations.

C. TANK SECTION/PLATOON COMBAT PERFORMANCE OBJECTIVES

After individual tank crews have achieved the requisite level of performance on crew combat performance objectives (Combat is used to differentiate between combat related objectives and maintenance or other objectives beyond the scope of this paper.), then crews must be trained as elements of a section/platoon. These objectives provide the essential transition from pure gunnery to combat applied gunnery and are necessary to integrate teamwork, coordination and mutual support and build upon established crew capabilities. Section/platoon objectives are not just multiple iterations of crew objectives but an expansion of them to meet combat conditions on the tank-antitank battlefield of tomorrow.

1. In a Defensive Role

a. Daylight: The tank section/platoon must be able to plan for fires from all organic weapons out to their maximum effective range available within the defensive sector assigned. This fire plan must be integrated with any supporting fires, or the organic fires of any supported

unit to insure effective coordination and control, mutual support, and redundancy. Individual tank crews must be assigned sectors of responsibility for fires and observation, priorities of targets, and if required, rules of engagement.

The tank section/platoon must be able to select and prepare hull and turret defilade firing positions, to include routes between primary and secondary positions — without sacrificing effective coverage of all assigned sectors or unnecessarily exposing tanks moving between positions to enemy fire or observation.

Tank section/platoon leaders must be able to effectively coordinate and control fires delivered by individual tanks, sections, and/or the platoon in mass, to include designation of tanks to fire, weapons systems to be employed, and sequence or method of engagement (i.e., frontal, cross-fire, depth-fire, etc.) with, or <u>without</u> radio communications (because EW potential for disrupting control communications). Tank section/platoons must be capable of engagement/adjustment of main gun hypervelocity ammunition firing in pairs - with neighboring tanks providing sensings/adjustments or employing two-tank burst on target. (To take advantage of the proven techniques developed by our British and Canadian allies and already adopted by the West Germans.)

b. <u>Night</u>

(1) <u>With Artificial Illumination</u>

Tank sections/platoons must be able to prepare and integrate range cards into night fire plans to provide the same degree of coverage provided during daylight hours, at reduced ranges due to light conditions.

Such a night fire plan should designate targets and/or areas and types of illumination required for engagement.

Tank sections/platoons must be able to acquire, engage and destroy targets with all organic weapons, using daylight techniques, under artificial illumination. This must include designation of tanks to fire and/or tanks responsible for providing searchlight illumination. Tank section/platoon leaders, and individual tank commanders, must be able to call for and adjust flare illumination from mortars or artillery.

(2) Without Artificial Illumination

Tank sections/platoons must be able to prepare and integrate range cards into non-illuminated night fire plans to include designation and placement of reference points/lights (red filtered), as required. Such fire plans must designate, within the capabilities of organic passive and/or IR surveillance devices, specific sectors of responsibility and fire, and control measures to provide coverage with a minimum of duplication.

Tank sections/platoons must be able to acquire, engage, and destroy targets within the range capabilities of organic night vision/sighting devices. This should include designation of IR illumination responsibilities within sections/platoons and provision for "flicker" method of illumination to minimize detection by enemy metascope observation.

2. During Offensive/Counterattack Missions

In addition to weapons system employment and efficiency an integral part of the sections/platoons combat capability is derived from tactical movement. Offensive missions - tactical movement under enemy fire and/or

observation - and the ability of tank crews/sections/platoons to select and move rapidly along covered and concealed routes to accomplish such missions, is absolutely essential to success and survival on the modern battlefield. During all forms of offensive tactical maneuver the combination of speed, security, and mutual support are maximized to press home the attack violently with a minimum of exposure/vulnerability to enemy fires.

a. Daylight

The tank section/platoon must be able to execute rapid, mutually supported forward movement under threat of enemy fire. Tank commanders/section leaders/platoon leaders must know the movement capabilities, requirements and vulnerabilities of their vehicles in terms of trafficability, space, speed, area/terrain required to provide masking and/or cover from enemy fire and observation. During movement section/platoon leaders must have specific areas/directions of observation and responsibility for suppression (for firing on the move and reconnaissance by fire) assigned to each element (preferably by SOP). Tank sections/platoons must be able to react to and engage surprise targets instantaneously seeking covered positions from which to place aimed precise fire on the source. To accomplish this tank sections/plattons must be able to recognize the signature of known enemy AT weapons to insure quick reaction to enemy AT capabilities.

Tank sections/platoons must be able to employ/execute all forms of tactical movement by SOP developed through experience. These techniques include traveling, traveling overwatch, bounding overwatch and fire and movement. In execution of these techniques crews/sections must be able to

perform any assigned task to include: (a) As the overwatching element; (b) As the leading element; (c) As the moving element in bounding overwatch; (d) As the trailing element; and (e) As part of the assault element.

To perform these roles during tactical movement each section must be able to provide, or call for and adjust mortars or artillery to provide, suppressive fires against enemy tanks or AT weapons, or on any likely enemy AT weapons positions.

Tank sections/platoons must be able to coordinate tactical movement with other elements of the combined arms team as part of a larger element. This must include coordination of movement and suppressive fires with infantry TOW's using successive bounding overwatch techniques, or with other infantry weapons/vehicles during the assault -- to provide mutually supporting fires.

In cities, tank sections/platoons must be able to provide mutual support to other tanks/sections or infantry during movement at a halt, or in reducing obstacles. Sections must be able to employ cross-fire or supporting fire techniques to minimize exposure and provide maximum destructive fires into the target area.

b. Night

Tank sections/platoons must be able to perform all daylight offensive maneuvers under conditions of darkness or reduced visibility although at reduced speeds and ranges. Tank sections/platoons must be able to navigate, move and engage targets of opportunity as they are acquired using blackout, IR or passive vision/sighting equipment. During such

night movement missions maximum use must be made of passive and IR equipment to enhance night combat effectiveness. Organic IR searchlights, employed by overwatching elements, will be used to assist drivers, acquire and engage targets, and select routes and firing positions.

3. Against Air Targets

The tank platoon must be able to mass fires of organic cal .50 machineguns to provide a cone of fire in the path of attacking enemy high performance aircraft. Passive SOP defensive measures against enemy air attack must be established by practice using dispersion, camouflage and careful selection of covered routes and areas when under an air threat. The tank platoon must be able to recognize and engage enemy armed helicopters using the techniques described before for range set beehive ammunition.

Guidelines/Priorities for Armor Employment.

1. Security Force. The long range, rapid firing, armor protected firepower and mobility of tanks make them ideal for use, as part of a combined arms element, on covering force/security missions. Rarely should tanks be employed by themselves as the security force because of the inherent dangers of decisive engagement and loss of scarce assets to a mechanized task force. They should be used in conjunction with longer range TOW missiles and artillery, which would engage enemy tanks first, forcing them to deploy at or beyond maximum range. The tanks would then engage enemy armor with rapid, continuous fire to cover the withdrawal of the TWOs and artillery (using CLGP) laser designator observers, because of their ability to extricate themselves under fire.

These same capabilities make armor, combinations of M60A1, M60A2 and M551 tanks, useful in delyaing and rear guard missions. In combination with longer range antitank weapons systems they provide the capability of continuous, sustained, lethal antitank engagement with battlefield survivability.

2. Overwatch/Defensive Reinforcement. In terrain which does not allow longer range missile systems to be employed to their maximum capability tank sections/platoons provide the mechanized task force the capability/option of using mobile, long range 100-2500 meters) antitank fire relative to other antitank weapons in the defense. Positions behind or to the flanks of other antitank weapons systems permit the tanks to provide overwatch while retaining mobility -- the ability to reinforce other areas of the defenisve position, on a moments notice. When such a technique is demanded by the situation and terrain, tank units constitute both a committed force and a "reserve", available to rapidly move by reconnoitered routes to prepared/identified positions and reinforce threatened or more dangerous sectors.

3. Employment of tank elements to create or reinforce killing zones. While employment of tank sections/platoons as the primary antitank weapon systems in a killing zone/antitank ambush is not ideal in that there is a very real possibility that in doing so the commander sacrifices their mobility, in some situations it may be warranted. If the terrain is such that available positions concentrate flanking fire by small unit antitank as mobile elements to move into defilade positions and provide frontal fire to close off a killing zone.

If the defensive sector is so large that separate tank platoons, or tank sectors reinforced with mechanized infantry must be used as primary

commited forces to create antitank ambushes across the front, then the locations/positions should be selected to take advantage of inherent tank capabilities. In such a position, each tank should have at least two, or even three natural defilade or prepared defilade firing positions with covered or concealed routes for entrance or egress into these positions. Ideal terrain for this type of employment would be a large draw or defile, in which the tanks could remain concealed, to pull up to defilade firing positions as enemy armor enteres the killing zone, located in more open terrain.

When more potential kill zones/enemy avenues of approach into the defensive sector exist than resources available to man them, the commander should consider unmanned, on-call killing zones (ambush positions). Plans, and positions for this should be prepared or reconnoitered in advance to permit rapidly shifting tank units and all available supporting fires on a moments notice. As mentioned previously, the commanders of "static" committed ambush forces should be prepared for their supporting tanks to leave during the battle to assume mobile missions of manning alternate positions, reinforcing and counterattacking.

4. Command and Control. Ideally, tank units should not be fragmented/piecemealed out below platoon level. However, tank elements can effectively operate in defensive missions, as sections of two or three tanks. By doing so the commander sacrifices much of his mobility -- ability to immediately gather a platoon for commitment to a mobile reinforcement, counterattack mission. If a tank platoon is split between ambush positions it should remain committed to a single killing zone where it can provide mutual support between

sections and reassemble with a minimum of delay. Close cooperation between the infantry and tank platoon leaders, under the command of the same team headquarters, is mandatory, and will facilitate effective employment.

5. Counterattack. Tank units constitute the major counterattack capabilities of a task-force defending against enemy armor. Although maintenance of an effective counterattack force will not be the driving determinant when organizing a defense built around attrition and ambush across a wide sector, the capability to assemble enough tanks to mount a limited objective counterattack should be retained. If the enemy appears in an unexpected location or direction, some force must be retained to react immediately. If the enemy appear temporarily disoriented, a quick offensive thrust by a platoon or two of tanks could potentially destroy his momentum. If forward ambush positions are in danger of being cut-off or isolated, the only mobile striking force capable of extricating them is available tank units -- prepared to act before the ring has been closed.

Additionally, with the tanks current ability to operate at night, tanks provide the only effective antitank offensive punch available to the task force commander during darkness. While limited counterattacks at night may not be ideal as a rule, attacking across familiar terrain, to hit the enemy from the flank or rear, or to link-up with an isolated forward element or to cover a tactical withdrawal should be considered and employed where the situation deems favorable.

PART V

ATTACK HELICOPTER AS AN ANTIARMOR WEAPONS SYSTEM

The value of the attack helicopter in a mid-intensity environment has been the subject of controversy in the past months. Many doubt the concept can survive when exposed to the lethal battlefields of the future. Others, perhaps more realistically, try and maintain a sense of perspective, conducting thoughtful research into the problems, and making recommendations. This paper represents a composite of those efforts put forth by CGSC students in the 74-75 school year.

A great deal of testing and evaluation has taken place with regard to attack helicopter concepts of employment. The results and recommendations of these tests are presented here for consideration:

Combined Arms Combat Development Activity (CACDA) conducted a study (1972-1973) on organization and employment of the attack helicopter for the purpose of establishing a TRADOC concept for employment of attack helicopters. The key areas of investigation involved roles and missions, organization, and tactical employment. Methodology used in conducting this study involved evaluation of the three concepts submitted by the Armor School, Field Artillery School, and Infantry School. Each of these concepts was evaluated based on the European environment. The Armor concept identified the attack helicopter as a maneuver element that should be integrated into the ground commander's scheme of maneuver. The Scout was believed to be the key element, and the perceived roles and missions were strike force, recon and security, and aerial escort. The Field Artillery Concept was for centralization of the

attack helicopter at Corps level for organization and planning, and decentralization for operational purposes. Employment concepts were summarized typically, as DS, Reinforcing, GSR, GS, and attached. Roles and missions contemplated by the Field Artillery school were fire support (including anti-armor) and aerial escort. The Field Artillery school concept was based on the aerial or ground observer being the key element. The Infantry concept envisioned the attack helicopter as being a maneuver or fire support element at division level, and a maneuver element at brigade and battalion levels.

Conclusions drawn by CACDA from the study are as follows:

1. The Armor school concept is best.

2. The attack helicopter roles should be anti-armor, aerial fire support and reconnaissance and security.

3. Air Cavalry Squadrons and Attack Helicopter Battalions have separate and distinct missions.

4. Attack helicopter units should be employed in mass (platoon or company) and should be integrated into the ground commander's scheme of maneuver.

5. The habitual use of scouts with the attack helicopters maximize its capabilities and increases its survivability.

Combat Development and Experimental Command (CDEC) conducted a study in 1970 for the purpose of comparing capabilities of the Basic Attack Helicopter Team (BAHT) to acquire and attack and enemy armor columns. The study (CDEC Experiment 43.5 - Basic Atk Helicopter Team) evaluated the following

Scout/attack helicopter mixes: 1/2, 4/1, 0/2, 2/2, 2/1, and 1/2. The background for the study portrayed a tactical situation in which the friendly force was a division size element in a defensive position, with a covering force deployed. A platoon of attack helicopters and scouts was placed OPCON to the ground defensive battalion. Aggressor forces had simulated ZSU-23 and high performance aircraft. It was found that the 1/2 mix was superior due to mutually supporting fires obtained between the attack helicopters and the ability of the scout to provide reconnaissance for both. The 4/1 ratio was found to be superior in search effectiveness but it lacked the mutual supporting fires. Finally, the 0/2 ratio was found to be easily controlled but lacking in detection and acquisition capability. Conclusions drawn from the study are as follows:

1. Doctrine - BAHT should be OPCON to the ground commander.

2. Tactics - NOE flight use maximum stand-off and sneak and peak methods.

3. Techniques - Both hover and running fire are acceptable.

4. Mix Ratio - Should be one Scout and two attack helicopters.

Joint Attack Helicopter Instrumented Evaluation study was conducted in Europe during May 1972, for the purpose of determining the effectiveness of the attack helicopter team in anti-armor missions against an attacking aggressor force. Methodology used in conducting this study involved pitting forces against each other in defense, delay, and breakthrough tactical situations. The participating vehicles and aircraft had laser direct fire simulators to indicate when they were hit by the opposing force. The ratios of scouts to

attack helicopters employed throughout the exercise were 2/1 and 0/2. It was found that the kill ratios of aggressor tracks to helicopter for the Scout/attack helicopter ratio of 2/1 was four tracks in the defensive situation, nineteen in the delay situation, and eighteen in the breakthrough. By contrast, in the 0/2 Scout, attack helicopter ratio, the track losses per helicopter totaled for defensive, delay, and breakthrough, respectively, thirty-three, ten, and twelve. The 0/2 ratio was taken under fire three times more often then the 2/1.

While control networks for conduct of the play were mainly administrative in nature, there were several factors which were held constant:

"All missile launches that occurred during the evaluation were initiated from a hover. Helicopter crews flew nap-of-the-earth and attempted to attain the maximum stand off range (up to 3000 meters) that the terrain and the tactical situation afforded."

The conclusions reached by the evaluation team endorsed the battlefield viability of anti-armor helicopter teams against attacking armor formations. Briefly summarized, the team's recommendations included the following:

1. Anti-armor helicopters employing hovering fire from concealed positions at standoff ranges are extremely effective in destroying attacking armor. In a defensive role anti-armor helicopters should kill fifteen tracks for each missile firing helicopter lost.

2. European terrain and weather frequently enhance anti-armor helicopter effectiveness. Pilots successfully employed nap-of-the-earth techniques to conceal their locations, and when they were detected usually presented

fleeting targets. The overcast skies and haze prevalent in Central Europe throughout much of the year greatly reduces the ability of aggressor crews to locate attacking helicopters.

3. The inclusion of scout helicopters in the anti-armor team is vital and increases the survivability of the attack helicopters. Therefore the minimum composition of any anti-armor team should be a 1/2 mix, one scout and two attack helicopters.

4. Finally, the establishment of training programs for anti-armor team pilots in Europe was stressed. Before the full potential of this system can be realized, intensive programs in nap-of-the-earth techniques, terrain appreciation, tactics, and appreciation of threat capabilities must be instituted.

The MASSTER tests:

The ACCB I Air Cavalry Attack Platoon Test (MASSTER-1971) was conducted for the purpose of examining proposed tactics, techniques and organizations for the air cavalry attack platoon; specifically the doctrine in published training texts. The forces evaluated were test platoons consisting of Scout/attack mixes of 0/5 to 5/5. Platoon leaders accompanied the scout aircraft to the holding and firing positions. The scouts accepted handoff of targets from the ground or air elements, and selected holding, attack and firing positions. Scout aircraft performed flank security and selected other firing positions while attack helicopters engaged the targets. Only attack missions were performed; no recon and security, and NOE and pop-up tactics were used. Conclusions drawn from the study are as follows:

1. Platoon tactics and techniques outlined in published training texts form a base for further development.

2. The 3/5 mix is the optimum for performing day time missions.

3. Trail formation is the best for NOE flight.

4. Hovering fire technique was preferred over running fire.

5. The platoon leader preferred a scout aircraft for himself.

6. The 5 scouts were excessive and increased the detection of the scouts by the aggressor.

The ACCB II Attack Helicopter Squadron Test (MASSTER-1972) was conducted for the purpose of comparing various organizations and operational concepts of an attack helicopter squadron. Two organizations were compared, the air cavalry troop (10-OH58s, 9-AH-1Gs, and 8 UH-1s) and the attack helicopter troop (9 OH58s, 15-AH-1Gs, and 3UH-1s). The missions of the attack helicopter squadron, of which the two tested organizations were a part, included being part of a corps covering force, recon and security, delaying action, defensive roles, such as assist in countering a penetration, and rear area security. The air cavalry troops were task organized in teams and were rotated when involved in action, while the attack helicopter troops rotated attack platoons.

The following conclusions were drawn from the study:

1. The first detection by the attack and air cavalry troop was 61% to 39% for the aggressor.

2. Integrated Direct Support Maintenance (IDSM) at squadron or troop level is feasible. IDSM at troop level requires more personnel and equipment.

3. The attack helicopter troop can be utilized to perform offensive, defensive and reconnaissance, and security missions. This unit should consist of three platoons of 4 scouts and 7 atk helicopters each, with infantry organic or attached.

4. The atk helicopter squadron should include 3 similar attack helicopter troops with IDSM at squadron level with capability to provide a maintenance team to the troop when it operates separately.

5. In order to provide a 3/5 operational rate, assignment of 4/7 is essential.

6. There was preference for recon and security by the air cavalry troop and a preference for offensive and delay missions by the attack helicopter cavalry troop.

7. The most appropriate relationship of the attack helicopter squadron to a support unit is OPCON.

The ACCB III Attack Helicopter Squadron Test (MASSTER - 1973) was conducted for the purpose of investigating the ability of an attack helicopter squadron to conduct operations against an enemy tank and motorized threat in a simulated mid-intensity environment. The attack helicopter squadron was organized into a HQ & HQ TRP, an AMBL INF CO., an ACFT Maint. Co., and three Atk Hel. Troops. Each attack helicopter troop had assigned 12 scouts and 21 attack helicopters. Tactical situations in which the squadron was tested to include corps covering force, mobile defense, armored division attack and exploitation, and corps flank security.

USAARMS TC-17-50-1 (Draft) defines attack helicopter survivability: Combat survivability for attack helicopter teams depends upon the application of the following principal facts:

1. Attack helicopter units are normally a part of a combined arms force.

2. Attach helicopters must live and operate in a ground battle environment.

3. Nap-of-the-earth flight must be utilized in the forward battle area.

4. Suppressive fires must be directed against enemy air defense systems.

5. Enemy targets must be engaged at maximum standoff ranges.

6. Exposure time while engaging targets must be held to a minimum.

7. Targets with air defense capability must be engaged first.

8. Control and distribution of attack helicopter fires must be exercised to achieve maximum effectiveness.

9. Support elements must be configured so as to provide effective repair, rearm and refuel servicing, in order to reduce helicopter turn around and down time.

Reforger 74:

Reforger 74, held last October in West Germany, was the first time that helicopters were used extensively in an anti-armor role. Both sides (Blue and Orange) were assigned on attack helicopter company to simulate the employment of TOW/COBRAs in a tactical situation. The most successful employment of the serial anti-armor teams took place in support of Orange forces during retrograde operations. During the 4.5 days of efficient use (weather and fuel restrictions intervened) the Orange force attack helicopters accounted for some 200 Blue force tank kills.

The anti-armor teams used various aircraft mixes, the most common being the 1/2 mix, one scout and two attack helicopters. It was determined that

one scout or "Battle Captain" aircraft could effectively control up to four attack aircraft.

The employment of attack helicopter elements in mass as and integral part of the combined arms team is generally accepted. The AHC organization for combat would include three teams, composed of various scout and attack helicopter mixes, that rotate continuously until the battle is concluded: one team on station, one en route, and one at the refueling and rearming point (FARRP).

That the attack helicopter (Cobra/TOW) should be employed in mass (platoon, or company-sized elements) and should be integrated into the ground commander's scheme of fire and maneuver to form combined arms task forces and teams.

"Attack helicopter units should normally be employed in mass (platoon or company-sized elements) and should be integrated into the ground commander's scheme of fire and maneuver to form combined arms task forces and teams."

General Maddox suggests the same in his article,

"We must think of employing attack helicopters as we employ tanks - in mass - by platoon, company and battalion. And they must be integrated with other ground elements and supported by suppressive fire from artillery and tactical air."

On the other hand, the platoons of the Attack Company are already integrated. Each attack platoon has four OH-58 and seven AH-1Q aircraft, is employed as a platoon and is not piecemealed. To give the attack company some maintenance flexibility, I do not expect all eight of the platoons aircraft to be flown at the same time. Generally a mix of three OH-58 and five

AH-1Q aircraft is a good planning figure for platoon availability. However, this figure should not be set in concrete and may vary with the mission, anticipated threat, size of the area of operations, and maintenance picture.

A 3/5 mix will place a great deal of firepower forward while still allowing the company to sustain itself in the area of maintenance. For an aviation unit, proper maintenance has a direct bearing upon its ability to bring its combat power to bear.

Thus, it is possible to visualize the attack helicopter as having the chacteristics necessary to be a complimentary part of the combined arms team in support of the infantry and armor ground-gaining elements. The attack helicopter requires support itself from the combined arms team in suppression and destruction of the enemy air defense and air force weapons so that it can maximize its potential.

It's mission is to destroy enemy armor and mechanized forces by aerial combat power using fire and maneuver as an integral part of a combined arms team during offensive, defensive and retrograde operations.

The attack helicopter can survive on the mid-intensity battlefield; however, it must rely on mobility, terrain masking, nap-of-the-earth flight, maximum stand-off engagements, field artillery support, and tactical air.

The attack helicopter role will be oriented toward destruction of the enemy force: An examination of tactical situations provided a list of possible employments of the attack helicopter to defeat armor forces. All of these employments emphasized destruction of the enemy forces as the attack helicopter cannot by itself defend or seize terrain.

There are roles for it in both offensive and defensive operations, but both categories make the best use of the antiarmor helicopter when it is committed for destruction of the enemy force. The attack helicopter force is primarily oriented on destruction of the enemy forces and has very little capability by itself to secure or to seize terrain.

The employment of scout helicopters, while considered a valid concept, does present some differences as to its best utilization:

The last area for discussion concerns the concept of employing the antiarmor helicopter in conjunction with a scout helicopter. This envisions 2 to 5 attack helicopters as a tank-killing force which is directed by the scout helicopter. The aerial scout acquires the target and directs the the attack to minimize the exposure of the armed helicopters. This is a valid concept and has been very effective in tests. However, this smacks more of guerrilla tactics (which may be the desirable employment at appropriate times) and does not suffice as a decisive factor to be committed at critical places in the battle. Furthermore, this concept would probably be better executed using a scout helicopter for control but employing troop-carrying helicopters to move infantry personnel with antiarmor weapons into firing positions. The concealed troops would certainly be less vulnerable in the firing position than an exposed helicopter, and the effectiveness of the TOW would not be diminished. This employment would also be the most flexible as the helicopter can perform other missions besides being an aerial weapons platform.

Most sources agree that the scout helicopter increases attack helicopter effectiveness and survivability. The use of scouts to acquire and develop

targets was found to increase the survivability of the attack helicopters. Committing more helicopters in a simultaneous attack on enemy armor was found to increase the losses inflicted on the enemy in relation to helicopter losses inflicted. Finally, the loss ratio was found to be 10 to 1 in favor of attack helicopters.

Accepting the scout role as vital, it is my opinion that a minimum of two scout aircraft employed with each team should be the doctrinal basis upon which other task organizations are developed. I don't feel a single scout aircraft can effectively accomplish all the tasks required in an actual combat situation.

The AHC, employing its scouts, would identify targets and direct attack helicopters from holding positions, along concealed routes, to attack positions. To preserve surprise attack helicopters would move quickly from attack positions to firing positions, unmask to fire, then remask. Once exposing themselves it will be necessary for the attack helicopters to move to new firing positions or return to holding areas.

The Ansbach Trials, Reforger 74, and USAARMS are all in agreement on the importance of the scout helicopter in the employment of aerial anti-armor teams. The scout or "Battle Captain" would select targets and firing positions for the attack helicopters. Additionally, it would provide local security while targets are being engaged, coordinate with ground elements, tactical air, and artillery support. The importance of the scout role cannot be overstated. We have seen how attack helicopters operating alone are far less effective, and more vulnerable, than when scouts are employed.

At this point it will be useful to consider those elements of the enemy threat which impact directly upon attack helicopter operations.

Foremost in many aviators minds is the anti-aircraft capability that the enemy possesses, namely the ZSU-23-4. We know that this system has a high resolution radar capability and can detect rapidly moving objects even if extensive ground clutter is prevalent. How can we suppress this capability and reduce or eliminate its effectiveness? One way is by moving as little as possible, once in an attack position, until you unmask and launch a missile. The ZSU radar system would have difficulty in isolating a fairly stationary target surrounded by ground clutter.

Some of the MASSTER tests at Hood have shown that few radars can effectively track helicopters when they are flying NOE.

The fact that a sophisticated weapons system such as the ZSU-23-4 exists does not automatically make it omnipotent. It requires trained crews, is subject to maintenance problems, is vulnerable to our own weapons systems, and electronic countermeasures (ECM) can affect its target acquisition ability. In short, even the most complex weapons systems are subject to limitations on an active battlefield.

Going one step beyond the questions of NOE flight and fleeting dedection it is instructive to examine the consequences of a potential AH-1Q/ZSU 23-4 face off. The time of flight of the TOW missile is about 15 seconds at maximum range. The reciprocal time of flight for the 23mm round is about 8 seconds. It is therefore, apparent that given a mutual detection the AH-1Q would probably lose in such an engagement against a ZSU 23-4.

The forward air defense system in the division zone of action would place the ZSU-23-4, organic to the tank and motorized rifle regiments as far forward as the leading tank elements.

In summary it is apparent that when the AH-1Q nears or crosses the FEBA it is opposed by a formidable array of effective enemy weapons systems. All of these weapons pose a serious threat to the AH-1Q. But that posed by the dedicated air defense systems is particularly critical.

The standoff ranges of the TOW/Cobra provide increased survivability against many threat antiaircraft systems.

The attack helicopter employing the Tube launched, Optically tracked, Wire guided (TOW) missile has a range advantage over all these low altitude air defense weapons except the 57mm weapons, the SA-6, and the SA-7. Thus, the employment of the TOW at its maximum range greatly reduces the exposure of the attack helicopter to antiaircraft fire and does not hamper the effectiveness of the TOW. Experience in Vietnam indicated that the SA-7 was highly effective against aircraft with unsuppressed infrared generating sources.

Exposure times for the TOW/Cobra represents a critical factor in their ultimate survivability. MASSTER at Fort Hood, Texas conducted a test in 1972 to determine if a "ground based weapons system" could detect a helicopter flying at nap-of-the-earth (NOE) and react quickly enough to pose a serious threat to the helicopter. The Vulcan and a medium tank were used to represent the appropriate threat weapons. Insofar as detection was concerned, MASSTER found that, "the mean time for detection was 16.8 seconds

for the Vulcan and 26.2 seconds for the medium tank." Given a detection the probability of reacting was found to be "0.96 for both the Vulcan and the tank, caliber .50 machinegun." So it may be safely implied that given a detection a suitable reaction is highly probable.

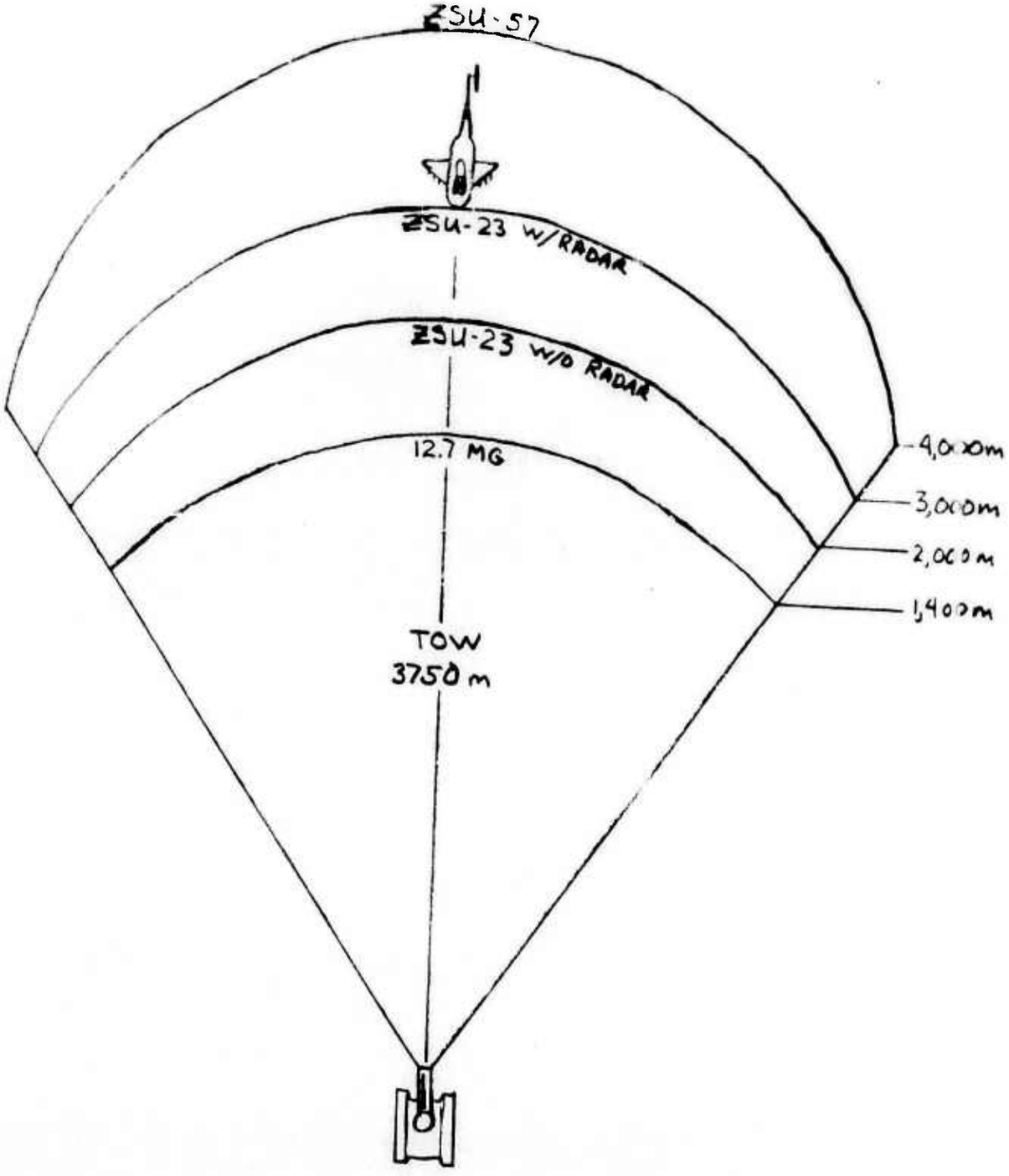
The Soviets are taking our attack helicopter doctrine seriously and developing engagement techniques. The technique to attack heliborne forces is to anticipate likely routes of flight and to assign sectors for observation and engagement to each air defense position. Then, fire will be directed at the target until it is no longer identified or is destroyed. It is stressed that anti-aircraft gunners have only 25-35 seconds to engage these helicopters. Their doctrine stresses the need to study our techniques, develop helicopter ambush tactics of their own, and engage each helicopter target at maximum tempo until it is destroyed.

In addition the Soviets seem to be adopting our aerial antiarmor concepts to their own purposes. In the past, attack helicopters and airmobile forces have generally been considered by the Soviets to be too vulnerable in the European battlefield. Such articles are a way that Soviet military thinkers promote ideas for change in Soviet official doctrine and often their increase pretends adoption of some or all of the "foreign" ideas described. Based on its characteristics, the Mi-24 seems to have been developed for an aerial fire support/anti-armor role.

5. Assault/Attack Helicopters. The Soviets have only recently developed and produced a helicopter primarily for airmobile operations and aerial fire support. It is called the Mi-24 HIND. This helicopter may be used to fly

troops to a landing zone then support the dismounted troops with its weapons systems. According to Mr. Alex, the MI-24 has a single five blade main rotor system, a tail rotor and short fixed wings. It is designed to carry eight to twelve troops plus rockets, sagger anti-tank guided missiles and a chin mounted 23mm machine bun. The rockets are about four inches in diameter and have a built-in alternating optical contrast/infrared guidance system. Like other Soviet helicopters the Mi-24 has an all weather capability and rotor de-icing systems. It alledgedly cruises at about 120 knots and has a range of approximately 250mm. The HIND has a three point retractable landing gear. Photographs of the HIND substantiate the above description except for the characteristics of the four inch rocket and navigation/deicing systems. The closest U.S. Army counterpart to the HIND is the AH-1C and AH-1Q HUEY COBRA.

A graphic portrayal of enemy weapons ranges compared to TOW/Cobra stand-off range:


ZSU-57
ZSU-23 w/RADAR
ZSU-23 w/o RADAR
12.7 MG
TOW
3750 m
4,000m
3,000m
2,000m
1,400m

IV-V-17

While it is difficult to separate attack helicopter offensive operations from the defense, since its employment is inherently offensive, I have attempted to differentiate as regards the overall mission of the supported ground elements.

The employment of attack helicopter teams as part of the reserve:

Advantages

1. Allows flexibility in task organizing ground maneuver units for placing maximum combat power forward thereby increasing the punching power of the attack.

2. Allows greater displacement of the reserve to the rear without degrading its responsiveness.

Disadvantages

1. Employment is dependent on weather conditions. (200 feet ceilings and 1/2 mile visibility - restriction primarily in terms of visibility)

2. The counterattack must be illuminated if conducted at night due to the lack of night target acquisition and engagement devices.

3. The AHC assembly areas, laager area, or attack position will be sensitive to a nuclear attack/strike, the materialization of which would result in destruction of the reserve and would require immediate reconstitution of a reserve with other assets.

4. Reduced effectiveness due to the number of aircraft in the AHC simultaneous attack which exceeds the AHC commander's span of control.

Employed as flank security during the attack:

Advantages

1. Provide greater capability for effecting engagements with bypassed enemy units.

2. Affords the commander flexibility in being able to withdraw the AHC and recommit it as the division reserve at a decisive point, in a short period of time.

3. Enhances greater survivability of the AHC through less exposure of aircraft assets to enemy air defense.

4. Promotes greater effectiveness of aircraft assets due to the reduced number of aircraft in simultaneous attacks through optimizing the AHC commander's span of control.

Disadvantages

1. Employment is dependent upon weather conditions. (200 ft ceilings and 1/2 mile visibility - restriction primarily in terms of visibility)

2. Limited effectiveness at night without artificial illumination due to the absence of night target acquisition and engagement devices.

3. Continuous operation requires an inordinate amount of POL and results in excessive aircraft flying time.

Employment in response to a counterattack by enemy armored forces:

A successful main attack will precipitate an enemy counterattack by the tank division, however. Here the use of a force of attack helicopters could disrupt the cohesion and momentum of the counterattack. The rapid movement to a critical point could be decisive in defeating the enemy. Furthermore, the counterattack would tend to have a less effective air defense system than the main defensive belt. The range advantages of the TOW system over the tanks and armored personnel carriers would weigh heavily in favor of the attack helicopter. As always, support to suppress enemy air attacks and air defense responses must be rendered to the helicopters.

Employment to reduce isolated strongpoints:

The primary attack conducted against the first defense belt generally seeks to seize terrain and to defeat the enemy. An attack helicopter force is not capable of seizing terrain no or routing an enemy in fortified positions with established air defense systems. Thus, a limited supporting role where small groups of attack helicopters integrate with the armor and infantry might be visualized. This employment would allow the use of the attack helicopter to be very responsive in defeating isolated hard targets such as a strongly defended fortified position stripped of supporting elements. However, this mission could be performed by infantry antiarmor weapons and personnel moved by troop-carrying helicopters and probably with more flexibility in the use of the available forces.

Finally, the combined arms team is once again stressed:

In all phases of the offense, the employment of attack helicopters in mass, integrated with other ground elements and supported by the suppressive fire from artillery and TACAIR is a tenet of the Brigade.

Examination of numerous papers reveals an overwhelming emphasis upon employment of the attack helicopter in a defensive role:

The conduct of the mobile defense might be the ideal role for the AHC. As part of the strike forces it could be used to destroy enemy armor formations. Additionally it could assist the withdrawal of the covering force, becoming part of reserve forces after passage through the FEBA. The AHC can be employed to blunt penetrations, attack assailable flanks, or penetrate deep to disrupt supply lines, artillery complexes, and command posts.

The area defense concept can employ the AHC to assist ground units in their COP/COP missions by placing continuous pressure upon advancing enemy units. Once enemy artillery preparations begin in earnest, helicopter elements would be attached to reserve forces. Their mobility would allow for rapid movement to threatened areas in need of reinforcement.

During delaying actions the AHC can rapidly mass its fires against advancing units, use its superior mobility to disengage and reappear at the next delay line. Once again the organization of attack helicopter teams with ground forces is stressed to enhance the survivability of both.

It is best suited for employment against moving enemy armor or mechanized formations and is least effective against a strongly fortified, dug in position.

The employment of attack helicopters as part of the reserve:

The attack helicopter platoon would be most effectively employed as a reserve force to disrupt and destroy enemy penetrations, or as a rapid reaction force designed to destroy bypassing enemy units who attempt to race to our rear areas, without regard for their flanks. The latter method of employment is easily incorporated as an "on order" requirement for the AHP employed as a reserve force in view of its speed and responsiveness.

Furthermore, the rapidity of response and the significant firepower of the attack helicopter would somewhat reduce the normal strength requirements for armor and infantry troops in the reserve. This would allow more of these assets to be committed to the forward defensive line.

Thus, the most effective use of the attack helicopter in the defense might be as a major combat element of the reserve forces. The exploiting armor as it begins to spread out in the penetration will be very vulnerable to a large attack helicopter force assailing its flank as the counterattack develops.

Attention of enemy armor formations in the attack:

When possible, the threat force will attack directly from the line of march. This attack will be launched by units making initial contact and may not be accompanied by a heavy artillery preparation. Because of the threat's emphasis on maintaining the momentum they will accept heavy losses and isolated units as normal. They prefer to overcome our resistance with the quick attack. They feel tank/MR units bypassing strong resistance can penetrate deeply into our rear areas. These quick attacks, if launched against strong defenses that stand firm could suffer certain limitations.

The lack of detailed reconnaissance can cause poor use of ground and a faulty appreciation of our positions. This, in turn, increases the vulnerability of his attacking columns, particularly if they fail to deploy at the correct time and place. It also can increase the vulnerability of bypassing units to quick counter-attacks and fires from our anti-tank positions in depth.

The likelihood of Soviet units sacrificing flank security in exchange for deep penetrations may be a technique that could work in our favor. A combined mech/armor/attack helicopter team could be devastatingly effective against an exposed enemy flank.

Should the second echelon be so close that we do not have time to destroy the first echelon before its arrival, then we shall go after the second and let the ground units have the first. It is a matter of teamwork and coordination. Enemy air defense weapons are suppressed by the Air Cavalry and the enemy armor is destroyed by the Attack Battalions.

A feasible use would be to man strong points along likely avenues of approach in order to attrit the enemy as part of the total defensive concept of operations. A few attack helicopters operating in a mutually supporting manner and moving rapidly to different firing positions could greatly increase the defensive capability of the force. This is probably an inefficient use of the attack helicopter as a tank killer, and the same benefit could be gained by moving infantry antiarmor weapons and personnel rapidly to different firing positions with a troop-carrying helicopter.

Another defensive concept worthy of consideration is to attrite the enemy as much as possible as he advances in the attack. This concept normally envisions the covering force or security echelon attacking from ambushes, using strong points to disrupt the enemy movement, and rapid deployment to new positions. This approach does not focus on retention of terrain but on maximum delay and disruption of the advance and inflicting significant casualties while suffering minimum losses. This tactic allows the attack helicopter in the defense to most effectively use its range advantage and mobility but will likely oppose the most effective use of antiaircraft weapons by the attacker. This is due to the fact that his initial attack deployment has thus far been disrupted the least. However, a commitment of a large attack helicopter force could seriously disrupt the

momentum of the attack over a wide frontage before it reaches the main defensive positions. The helicopter force will require significant support such as artillery and air weapons and its own air defense capability. The termination of this operation would be a withdrawal through the main defensive line to become a portion of the reserve forces to be further employed as previously discussed.

Use of attack helicopters in defense of a river line:

Another strong defensive use of the attack helicopter as a portion of a reserve would be in augmentation of the forces in defense along a river. The loss of momentum in the aggressor attack, the disruption of the preferred attack formation, and the effective committment of TOW weapons on the flanks at maximum range would seriously hamper the success of the river crossing.

The employment of elements of the Air Cavalry Troop to destroy enemy armor forces in killing zones:

As the first elements of the aggressor come into a killing zone, the ACTC would be in a position where he could best direct the attack. When directed to attack, all the attack helicopters would appear simultaneously and fire their TOW missiles. Obtaining alternate or secondary firing positions would be difficult in this maneuver. This large volume of fire will probably cause the enemy to deploy and begin using all available fire against the helicopters, forcing them to disengage. The loss of surprise would cause the Cobras to revert to hunter-killer tactics.

Numerous techniques are used by attack helicopters to engage targets. Although specific techniques cannot always be preplanned, certain consideration

apply to all engagements. Some important considerations in the selection of an attack pattern include the number of attacking elements, target characteristics, weapon capabilities, enemy air defense weapons, location of friendly forces, and patterns that may be used are shown in figures 1, 2, and 3.

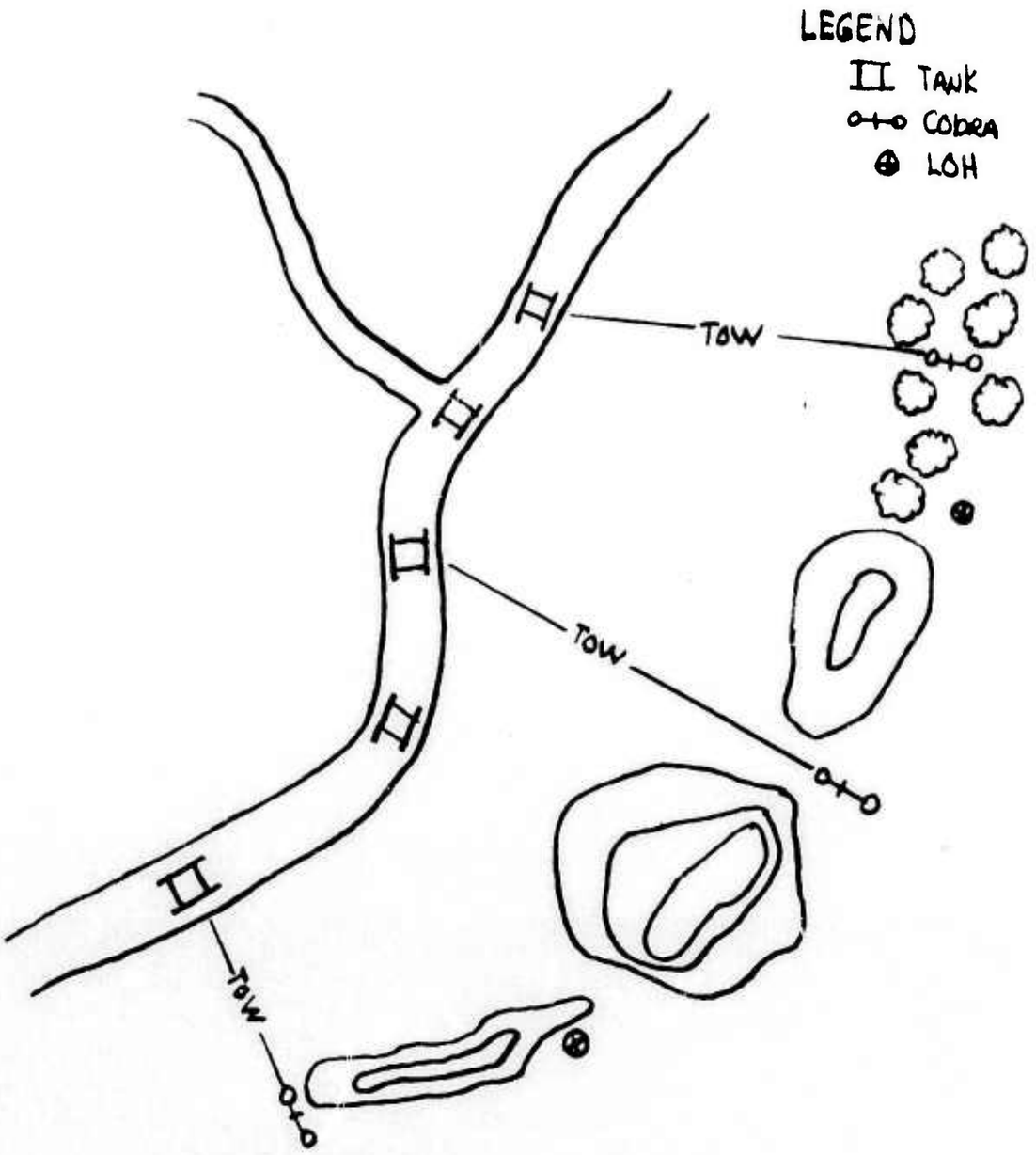


FIGURE 1. STAND-OFF TECHNIQUE

The maximum range of the TOW is utilized in this technique increasing survivability and decreasing vulnerability of the attack aircraft.

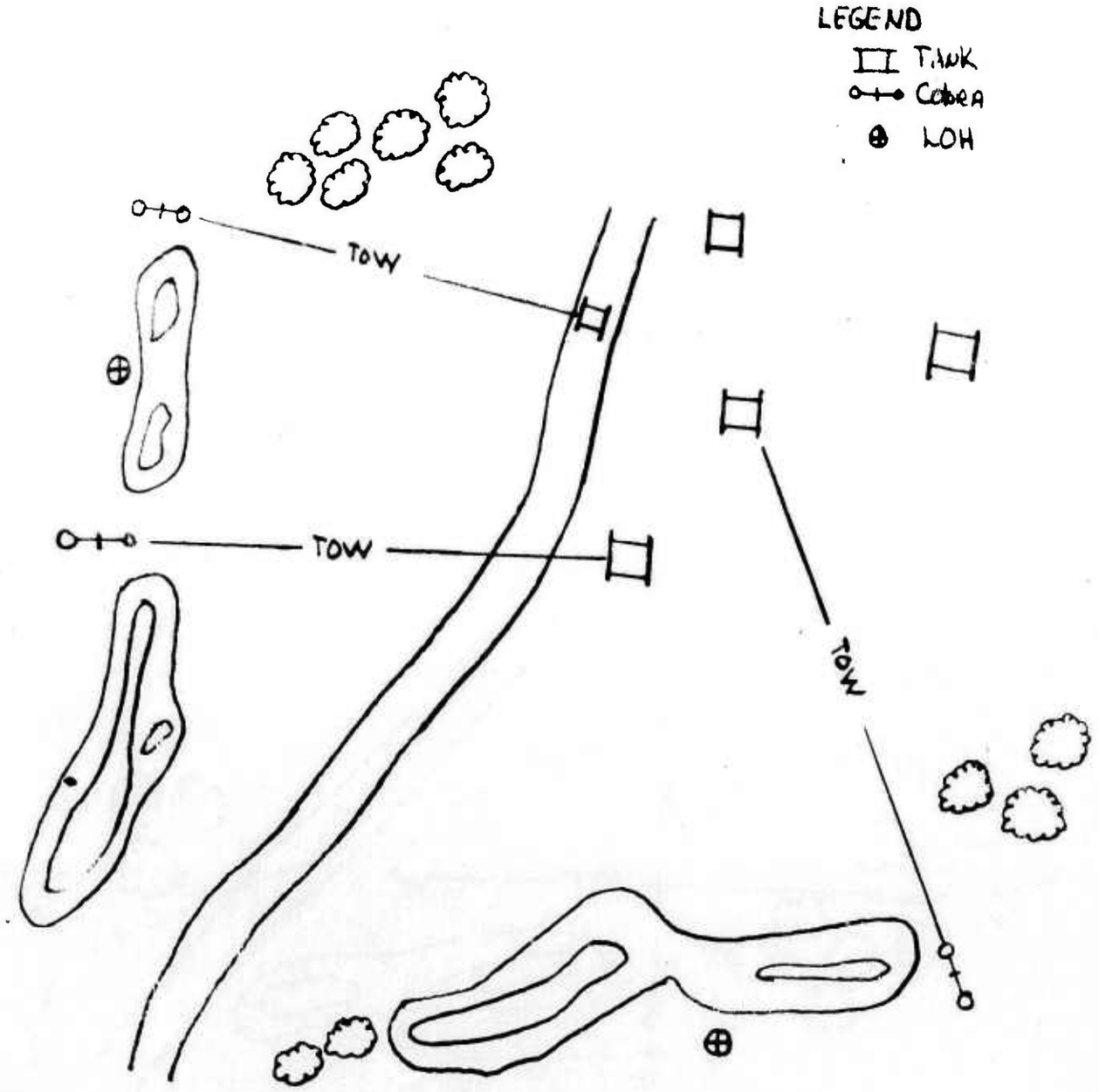


FIGURE 2. "L" PATTERN TECHNIQUE

Timing is important to insure that all weapons are engaged simultaneously.

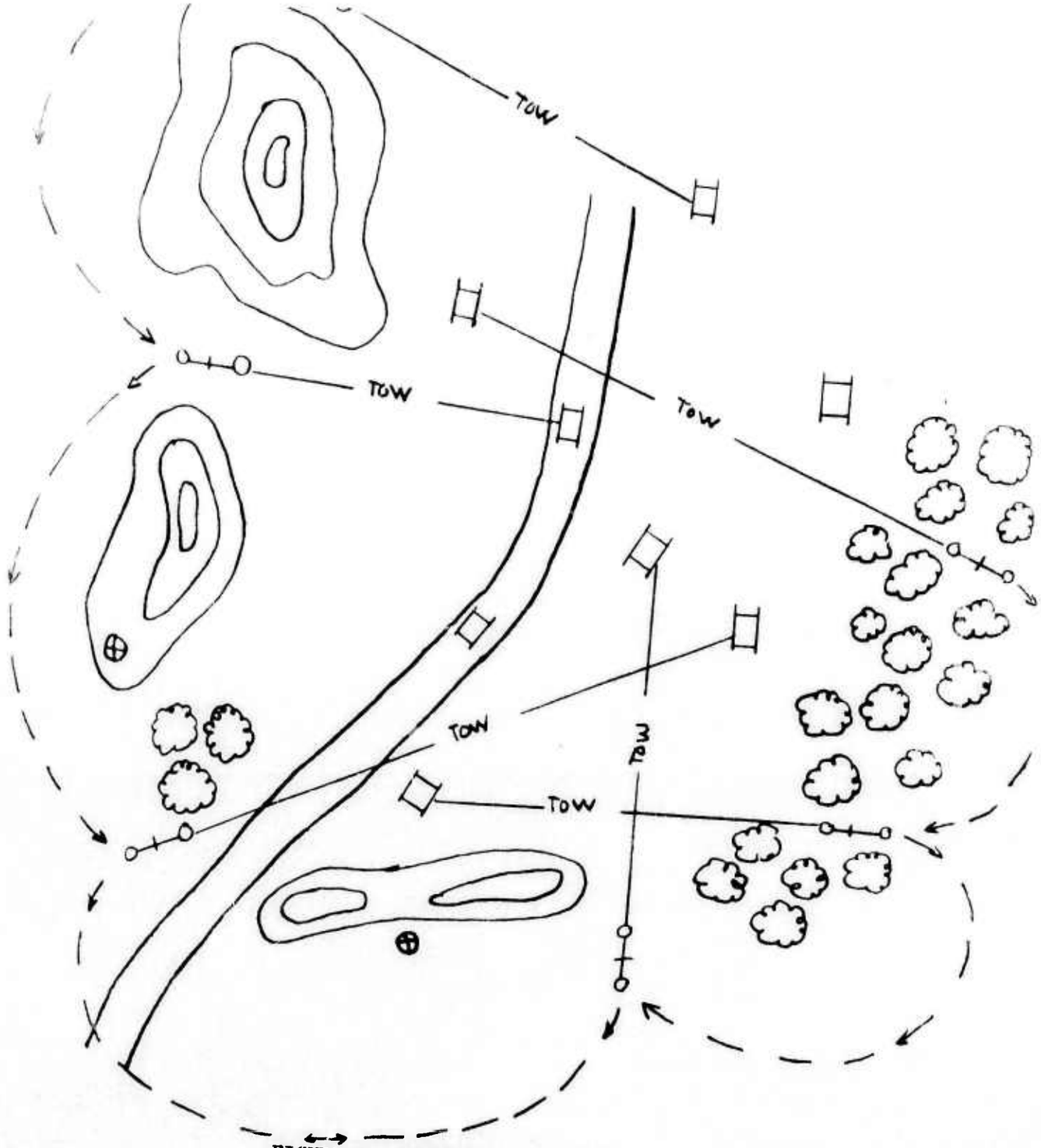


FIGURE 3. CLOVERLEAF TECHNIQUE

This technique is highly effective, but it requires coordinated teamwork. Attack helicopters must be careful not to over-fly enemy positions.

As the forward elements of the aggressor's main attack are spotted and positively identified, the information is relayed to the squadron commander. He immediately directs his air cavalry troop commander to engage the enemy. The hunter-killer teams respond by moving to their strong point positions in front of the advancing enemy. Utilizing preplanned routes and nap-of-the-earth flight techniques, the teams move to a protected holding area adjacent to the strong point positions. While enroute to this area the scout helicopter leading the team receives detailed information on the enemy from the sector team leader. If time and space permit, the helicopters may mass at the holding area for an in depth briefing. If the situation demands immediate action, the teams would move directly through the holding areas to the attack positions. The holding area is at a known location from which each team can be guided by either azimuth or identifiable terrain to the attack position.

One technique to confuse enemy air defense units would be the employment of multidirectional attacks.

Multidirectional attacks. Multidirectional attacks should be utilized to divide the enemy's attention during the attack. When the unit is engaging from several firing positions, the aircraft must arrive at these positions at approximately the same time and remain masked until the attack order is issued by the commander. When the fire command is issued, the entire unit unmasks and fires simultaneously to gain surprise and shock effect. Neither the frontal or the flank engagement tactic offers any advantage with respect to engagement range, exposure time above the mask, distance between the scout and attack helicopter or number of aircraft engagements by the enemy.

Employment of attack helicopter in built-up areas was also discussed:

The Attack Helicopter would be highly useful to the ground forces in the clearance of a city as weapons platform. The ability of the Attack Helicopter to place accurate, direct fire on a point target makes it ideal for eliminating sniper positions, penetrating walls, firing into the upper floors to taller buildings and sealing off enemy escape routes. The direct fire capability is especially advantageous in that the Attack Helicopter can place accurate fire into positions within a city that artillery, unless used in a direct fire role, cannot reach.

The role of the Attack Helicopter, in conjunction with Observation Helicopters, will be to engage advancing enemy armored units well out from the city, thus minimizing the necessity of placing ground or vehicle mounted antitank weapons too far out from the periphery where they will be in danger

of being cut off and isolated. This will enhance the ability of the defender to place these weapons in positions where he most needs them for close in defense.

The nature of city fighting will very likely dictate that tanks operate in small groups, such as sections or platoons. Additionally, tanks will tend to be canalized because of the streets, delayed by rubble, buttoned up by suppressive fires. Why can't armed helicopters, directed from holding areas by ground elements, attack such targets? They will be shot down, say the detractors. Maybe so, but the enemy might lose a lot of tanks in the process.

The need for extraordinary emphasis upon the training of attack helicopter teams in all phases of their employment was stressed:

No one really disputes the need for helicopters to employ NOE flight techniques to increase combat survivability, but I am not convinced that we are mentally prepared to accept the challenges that this type of combat presents to us. The psychological and physiological stresses that our pilots would be subjected to must be considered. The tactical necessity of launching those teams into an increasingly lethal environment, and pressing on with the mission even though other aircraft in the team have been destroyed is something we must appreciate. We must practice our survivability. We must overcome our awe of the threat and prepare ourselves to meet it and win. There is only one way I know to prepare for future eventualities, such as these, and that is to train, train, train!

Intensive preparation in NOE flight, map reading, terrain appreciation, working with mech, armor, and artillery units, night flying, target acquisition and identification, gunnery excellence, coordination and teamwork, are but part of the necessary training mission.

The need for night training using ambient light conditions is a high priority which has resulted in successful testing:

We must train our attack helicopters to conduct NOE flight using ambient light conditions. The "Owl Team" belonging to the 155th Aviation Company has conducted intensive training in night NOE techniques with great success. During the course of their experiments they determined that well trained attack helicopter teams could operate routinely over a variety of terrain at altitudes from 10 - 200 feet AGL using only ambient light conditions. Once trained, our crews could use the additional cover and concealment offered by darkness to good advantage.

Field training and integration of attack helicopter elements into the ground tactical plan is a necessity:

We are providing your Corps a maneuver unit with enormous combat potential which can capitalize upon its inherent three dimensional mobility and rapidly apply decisive combat power on any point in the battlefield. Before we can truly apply that decisiveness it is essential we train with ground units at all times. The problems of coordination in a real war without practice beforehand would be almost insurmountable. When your divisions go to the field, so must we. If you are war gaming an exercise in the Corps conference room, we must be there. It is absolutely necessary all units understand the capabilities and deficiencies of each other before actual combat.

Training in the threat capabilities for all aviators is also needed:

The potential enemy threat to army aviation addressed in this paper is general, inprecise, and incomplete because of classification. If detailed, precise, and complete threat information is required by the reader, classified authoritative sources should be consulted, however, enough unclassified information is presented to provide a good treatment of the potential threat to helicopter operations. It is generally felt that aviators as a body are not yet fully threat-conscience, therefore, they need to be trained in this area.

Without exception the student papers felt that the attack helicopter has a place on the mid-intensity battlefield. There are many problems yet to be resolved, however. The following is a discussion of areas that must be improved in order to improve attack helicopter effectiveness and survivability while reducing its vulnerability:

It would be unrealistic if I didn't discuss what I perceive to be two of the biggest stumbling blocks to successful employment of this anti-armor capability. First is not survivability, but sustainability. Helicopters use tremendous amounts of fuel and ammunition; they are thin-skinned and will require constant maintenance during a tactical situation. The FARRPs must be mobile, able to relocate quickly with battalion trains, and possess a readily available maintenance support team. If we cannot provide this support then this potent capability will be out of the fight in a very short time. Second, is the well developed jamming capability of Soviet forces. If they can successfully jam our scout aircraft they will paralyze the eyes and ears of the attack helicopter teams. The only solution that I

can see for this eventuality is intensive training in communication procedures which will enable us to operate in an ECM environment.

This means that our tactical intelligence effort - visual, electronic and communications - must be directed toward locating those enemy forward AA elements that can jeopardize the use of friendly air assets immediately forward of the FEBA.

The adverse effects of weather were discussed:

Weather presents a problem in terms of visibility. Low ceilings do not necessarily bother us a great deal, but if we cannot see far enough to engage a target then our capabilities are significantly degraded.

Unlike the ground mounted TOW, the aerial TOW has certain limitations which must be considered when the attack helicopter is being employed as an integrated part of the tactical plan. Some of these limitations are:

. Adverse weather. Ceilings of less than 200 feet, thunderstorms, freezing fog and visibility of less than one-half mile restrict the operational capability of the aircraft. Visibility of less than one mile will also seriously reduce the Cobra's capability of engaging targets at maximum standoff range. Of course, weather, if not too severe, can enhance AH-1Q operations by providing cover.

The ability of attack helicopters to perform effectively at night is an area which requires immediate attention:

. Night operations. The AH-1Q is capable of limited night operations; however, it does not have on-board night viewing and fire control devices. Therefore, night employment of attack helicopters against point targets would require assets to provide for target illumination.

A key developmental test program which addresses the night requirement for helicopters operating at low levels is the Electronics Command's (ECOM) low level night operations (LLNO) project which shows good promise for future night, and possibly all weather operations.

Artificial illumination of the battlefield is required for more effective employment of the attack helicopter at night. Until such time as an effective, all weather passive viewing system is mounted in each helicopter, attacks must rely to great extent on:

- Visible illumination
- Infrared illumination
- Passive night vision equipment.

Nap-of-the-earth flight is not viewed as a panacea as regards attack helicopter employment:

On the other hand, Major Fairweather based on his experience concludes that had the tanks he encountered employed proper tactics, "... our helicopters would have been ineffective against them." Major Fairweather was also of the opinion that the AH-1G was inadequate for NOE flight. Since the AH-1Q is basically an AH-1G with an add-on TOW missile system, his low opinion of the NOE flight capabilities of the former would probably apply to the latter.

One author feels that the survivability ratio must be increased before attack helicopters can be employed forward of the FEBA:

Also the majority of the success experienced by the AH-1Q (or AH-1Gs simulating AH-1Qs) in test and field trials have been when they were employed on or behind simulated FEBA. And when looking at the current configuration

of the AH-1Q and the lack of testing in operations beyond the FEBA its survivability is truly questionable.

In conclusion it, therefore, appears that employment of the AH-1Q beyond the FEBA is possible but not currently practical.

Greater capability for anti-aircraft weapons systems is suggested:

Addition of a 30mm turret mounted weapon to the Cobra could be used for anti-aircraft weapon suppression. If this system proved cost prohibitive, then the existing 20mm gun system with improved fuzing for greater range might be employed. Testing of the M-56, 20mm fuze at ranges up to 2500 meters took place in January 1974 at Fort Rucker, Alabama.

The development of a chaff 2.75" FFAR launched by scout aircraft would be useful.

Fire-and-forget systems are needed to increase attack helicopter survivability:

The helicopter launched fire and forget (HELLFIRE) system has recently scored significant successes in recent rapid-fire tests. Two missiles were launched from a single helicopter at an interval of eight seconds, and each struck separate tank targets illuminated by a single laser designator on the ground. The designator was located about 2300 meters from the targets, and the helicopter was at maximum range, which is classified. This series of tests will determine if the HELLFIRE enters engineering development, however, current results reflect favorable responses for its acceptance.

A better solution has long been recognized and advocated: the true fire-and-forget missile. MG Maddox said in December, 1974: "The best approach to survivability, of course, is a fire-and-forget technique." The nearest

item currently available is the Helicopter Launched Fire and Forget (HELL-FIRE) system. This developmental system is designed to operate independently on the helicopter or in conjunction with a ground sub-system utilizing laser technology. The helicopter will not have to remain exposed to guide the missile to the target and can therefore immediately mask itself by terrain upon launch.

Some other necessary system improvement considerations arose from a CDEC test:

. In CDEC Experiment 43.8 it was found that certain characteristics of the AH-1 helicopter itself increased its delectability. Some of these were the glint from the plexiglass canopy, flicker from the spinning rotor, lateral movement, and the proximity of adjacent helicopters. The importance of the likelihood of detection once exposed is critical since such exposure is necessary for the AH-1Q to accomplish its antitank mission. Since the TOW missile is a line of sight weapon the AH-1Q must gain visibility with the target prior to missile launch and maintain this visibility until missile impact.

. Other mandatory hardware requirements for operations beyond the FEBA that the AH-1Q requires are an effective infrared suppression system, a radar-illumination warning device, and (as previously noted) an effective cannon.

The following author identified four general limitation which apply to attack helicopter operations:

Limitations. There are, however, four major limitations to employing attack helicopters that must be considered by the ground commander.

1. Adverse weather. With limited visibility and low cloud ceilings the attack helicopter pilot becomes severely handicapped and must begin to divide his attention between the attack mission and basic aircraft flying techniques. His ability to choose attack routes and maneuver will be degraded. As a "rule of thumb" a combination of 200' ceilings and 1/2 mile visibility may be considered a go-no-go point for accomplishing the attack mission.

2. Night operations. Neither the attack helicopter or the scout have the ability to acquire targets or operate efficiently at nap-of-the-earth altitudes without at least limited visibility. Therefore during the hours of darkness some form of artificial illumination will have to be considered, thus possibly losing the effect of secrecy and surprise and also joepardizing the helicopter teams.

3. Survivability. Since helicopters operate in three dimensions they are more subject to detection by more enemy elements because their maneuver areas are relatively large. Much consideration must be given to the areas and environment they are committed to and the methods of maneuver that will be required.

4. Security. As helicopters are relatively large and immobile objects when not in flight, definite consideration must be given to their disposition when not actively engaged in their mission. In a fluid situation protective cover will at least be difficult. Base areas will have to be selected judiciously, giving thought to the enemy's ability to effectively attack these areas. Certain trade-offs will have to be considered with respect to time and distance and security.

It appears that the Advanced Attack Helicopter goes a long way toward solving many of the problem areas perceived by CGSC student authors:

. The AAH will be equipped with weapons capable of defeating enemy armor (TOW) and will have, for the first time in an attack helicopter, a secondary weapon system also capable of defeating armored vehicles. The secondary armament will be fitted in a centrally located belly type turnet. The gun will be the 30mm cannon developed by the Army specifically for helicopter applications. The round will be one of design, with a war head incorporating a shaped charge and a fragmentation capability, thus providing both armor and anti-personnel lethality.

The Advanced Attack Helicopter will be a twin engine, stable, manned aerial weapons system which is intended to be responsive to the ground commander. It will be capable of performing its mission at night and under adverse weather conditions.

In conclusion the following extract sums up in a generalized way how the various student authors felt about employment of attack helicopters on the mid-intensity battlefield.

Conclusion. The attack helicopter battalion can effectively perform on the mid-intensity battlefield and can reasonably be expected to survive as an integral part of the combined arms team. Tactics such as nap-of-the-earth flight, stand-off techniques, mask cresting and hovering fire when applied professionally will insure its survivability in a mid-intensity environment. These combined with its varied weapons and ability to mass their fires make it a very effective antiarmor weapon. The presently known maneuver tactics appear sufficient. However, more study in their employment and more training of the attack helicopter teams is indicated.

121

SECTION V

ANTITANK WARFARE TACTICS

ANTITANK WARFARE TACTICS

The concept of destroying the combined arms integrity of the enemy at all levels while maintaining your own force intact has received a great deal of comment and credence since the October 1973 Mideast War. Combined arms integrity implies total integration of all assets at the commander's disposal. Since the TOW is a better defensive weapon than offensive weapon most of the following discussion focuses on the integration of weapons, terrain, and organization toward defensive antitank warfare.

The mission of the defense is to slow, reduce, disorganize, and stop an attacker. There are many doctrinal ways this can be done, each with its own distinctive name, such as mobile defense, position defense, force oriented defense, defense in depth, defense on extended frontage, and many others. The distinguishing feature of each usually depends on where within the battle area the attacker is stopped, and consequently in how the terrain is organized for the defense.

Terrain Considerations

The unique qualities of the TOW and the potential overwhelming advantage in number of Warsaw Pact tanks necessitates increased emphasis on terrain organization. The psychological value of massed tank formations is important. However the shock effect can be reduced if an opponent armed with substantial antitank weapons regards tanks as "targets" rather than "tigers". This is the attitude most TOW gunners currently possess because of their self-confidence in the TOW. This attitude is predicated on a "shooting gallery" mental picture of the battlefield which is attainable if the combat force is properly organized and disposed on the terrain.

Fields of fire must take advantage of the TOW's 3,000 meter range. The best tactic for a defending force is to engage the attacker at maximum range with all available weapons. Once an attacking force closes within 1500-1800 meters, the defender loses his favorable probability of kill advantage, and it becomes increasingly more difficult for the defender to change positions without being destroyed. The closer combat becomes, the more important each weapon position becomes, along with concealed routes for movement between positions. Defensive sectors must be deep to sustain freedom of action, and avoid inopportune decisive engagements of TOW's versus tanks at ranges and in circumstances where the TOW is at a disadvantage.

The terrain should be used to provide as much protection of the firing position as possible. Firing positions which are designed to fire into the flanks of opposing forces are less likely to be detected since the opposing force's principle observation will be to its front. Firing positions which offer the TOW hull defilade or reduce its high silhouette are also desired. Therefore the most effective tactic is to fire from well prepared positions to the rear, or side of objects (natural or man-made). Fire should then be directed obliquely across the front of the defensive sector into a killing or attrition zone. These type defensive positions avoid frontal exposure from multiple locations along the attackers front. Thus it becomes possible to defend against a force many times larger when this oblique fire is used by weapons employed in pairs and mutually supporting or overwatching each other. The desire for weapons survival and protection by preparing excellent firing positions should not negate the mobility advantage which the track mounted TOW has over most tanks. It is lighter, nimbler, and faster.

JJH

It appears then that long term survival of TOW weapons depends on a detailed terrain out evaluation. It is not in the best interests of TOW unit leaders to plan for or become involved in a head to head confrontation with opposing armor, particularly at ranges within 1500 meters.

Alternative Antitank Defenses

Contemporary tacticians are placing great emphasis on tank defense in depth in the belief that retention of terrain along the FEBA is not necessarily decisive. The basic idea is akin to delay tactics where emphasis is placed on mobility and fire power to attrit the enemy but preserving friendly strength. This is accomplished by deepening the defense sector, using all the terrain in a manner which punishes the attacker, and sustaining more freedom of action by accepting decisive engagement only when it appears that the attacker has the strength to penetrate the rear edge of the battle area. The attacker is defeated by attrition from passing through successive tank killing zones. Because a large number of antitank weapons will be positioned in depth (to the rear of and in front of the FEBA) perhaps at the expense of forward deployed forces it can be expected that attacking armored forces will make penetrations. The challenge for commanders is to organize this defense so that the penetrations can be accepted without breaking down the defense.

In the area or position defense the TOW is ideally suited to place fire on the enemy quickly and accurately at great range. The intent is to force the attackers to deploy, disclose his intentions and commit his reserves prematurely. Terrain along the FEBA is considered critical and is defended. Emphasis is placed upon stopping the attacker before he penetrates the FEBA.

A disadvantage to the defender is that he usually discloses the position of his own forces early (to include antitank weapons), and his intentions. If penetrated, reserves are used to counterattack and restore the FEBA.

The force oriented defense is built on the concept that conventional defensive tactics and delays are impracticable because our potential enemies have an advantageous combat power ratio. Therefore the defense is organized around the defending force structure rather than the terrain. Terrain is traded to the enemy at a cost in his combat power. Decisive engagement is almost voluntary. A force oriented defense emphasizes centralized control of assets. Corps and division commanders select the main battle area depending on the ability of FEBA forces to reduce the attackers combat power.

CONTROL: Decentralized versus Centralized

Different degrees of control are required depending on the battalion mission and the tasks assigned to the antitank platoon. In an attack for a near objective of the platoon could be used in general support or direct support overwatching maneuver elements, or for deep objectives it could be attached to maneuver forces. Decentralized control may be preferable on defense when units are dispersed or likely to fight independent actions, such as during retrograde movements. Attachment to a forward company may be desired when the company is defending astride the major armor avenue of approach. This would be especially appropriate in an area of defense where TOW's can add depth to an area defense by attachment to reserves in blocking positions. If the battalion is disposed in great depth, the commander may prefer to maintain centralized control of the antitank platoon.

The control relationship between the battalion and the antitank platoon will delineate the antitank responsibilities within the task organization. Three of the primary responsibilities are assignment of sectors of fire, calls for fire, and establishment of communication channels. The chart below summarizes these relationships.

	Assignment of sectors of fire	Calls for fire	Communication channels
GS to Bn	AT Platoon Ldr.	From battalion	Bn to AT Plat. (thru Cbt.Spt. Company)
DS of line company	AT Platoon Ldr. (coord. with unit supported)	From supported unit	AT Plat Ldr to AT sections, Cbt Spt Co., and supported co.*
Attachment to line co.	Company to which attached	From attached unit	AT Plat to attached co.

*DS of a rifle company creates a communication problem for the antitank platoon leader because he must operate in three radionets, i.e., the platoon, supported company and that of the Combat Support Company. Possible solutions would be to increase the platoons radio capability, communicate with the combat support company only for administrative and logistical matters, or maintain physical liaison with the supported company.

Depending upon the tactical situation, centralized control is desirable

a. When the armor threat is unknown/undetermined.

b. For night attacks, flank guard, or counterattacks when tight control is required.

c. When the defense is organized in depth, centralized control is more likely to insure a more completely coordinated antitank defense.

d. To provide the battalion commander the ability to mass antitank firepower at critical points of decision, and to quickly weigh critical sectors and influence the action.

e. As an economy of force measures freeing tanks from a purely antitank role, and fully utilizing the expertise of the antitank platoon leader.

Some disadvantages of centralized control are:

a. The span of effective control for a battalion commander and his staff may be exceeded in a rapidly changing situation.

b. It is difficult to centrally control direct fire weapons on offense.

c. Less flexibility and initiative in fluid tactical situations.

d. Time required for detailed coordination and centralized fire planning may not be available.

The above advantages and disadvantages would generally be just the inverse for decentralized control. In summary, the advantages favor decentralized control of antitank weapons on offense, and centralized control on defense, particularly a defense in depth.

Maneuver Control

The antitank platoon leader has an extensive and complicated maneuver and fire control problem even assuming a high state of tactical readiness and a proper application of control principles. The platoon leader has the following specific responsibilities:

a. Direct occupation of terrain and selection of spectors of fire.

b. Coordination for mutual support with adjacent units. TOW range makes it unreasonable not to coordinate fires across unit boundaries.

c. Preparation fire plans in conjunction with section range cards.

d. Control of platoon fires.

e. Control of movement between firing positions.

f. Coordination of resupply activities.

g. Section/squad training and discipline.

The TOW battlefield will be characterized by mobility, extended frontages, and great depth. For instance, TOW weapons should operate a minimum of 300 meters apart to avoid simultaneous detection, or suppression by one artillery barrage. However two TOW's could operate as much as 6 km apart and still place fire on the same target. A TOW platoon leader has 12 launchers on 12 vehicles. It will be difficult for the platoon leader to effectively control 12 TOW systems in a combat environment, particularly when the antitank platoon is in general support of a battalion conducting and antitank defense in depth (the most probable course of action). Fast moving situations will make it difficult to maintain continuous contact. Therefore subordinates will have to show a constant concern for maintaining contact with their superiors, and have a thorough, complete understanding of the overall operations plan.

Fire Control

As stated in the introduction, weapon lethality has vastly contributed to making the fire control aspects of tactics a major consideration. The TOW shoots accurately out to ranges unheard of a few years ago when much of our current doctrine was being developed and practiced. "Control" assumes direction, assistance, and other benefits gained from being under the influence of an experienced or knowledgeable leader. Inexperienced Battalion

commanders and antitank platoon leaders, however are faced with the problem of developing fire control techniques which maximize TOW capabilities and minimize its limitations. The following fire control principles will assist in fire planning.

a. Reduce positive controls such as visual signals and rules of engagement in exchange for procedural controls such as target reference points, zones of fire/movement, and target priorities.

b. Establish SOP's such as "movement to an alternate position at the discretion of the squad leader, but movement to a supplemental position only on order."

c. Good is based upon good mission and terrain analysis. Properly applied this analysis will enable TOW fires to be massed, shifted, insure complete and adequate coverage of a sector of fire, prevent premature or erroneous engagements, and teach fire discipline (resupply of TOW missiles could become a terrible burden).

Good fire planning uses techniques which augment the above principles. Firing across unit boundaries, for example, should be coordinated and not discouraged. Gunners will naturally distribute their fire so as to maximize their chance of producing enemy casualties within their field of view. Whenever possible the field of view should not greatly exceed the sector of fire. The stand-off range (beyond 2000 meters) against most enemy enemy tanks must be built into the fire plan. Dispersal of firing positions for their own protection is a must. Dispersal should not be at the expense of, but in conjunction with, obtaining mutually supporting fires, overwatching

fires, and at least dual coverage of a sector of fire. Flanking or oblique fires should be planned rather than frontal fires.

Procedural fire controls that each TOW crew must know are the sector of fire, type targets to engage (in priority), contingencies for moving (when, where, how), target reference points, phase or fire coordination lines, fire commands (especially between mutually supporting squads), and basic rules for engaging multiple targets such as "best shot" or "lead vehicle first." A good fire plan does not require communications to be successful, but when necessary the antitank platoon command net should be used as a fire control net to pass spot reports target information and maneuver instructions.

CONCLUSIONS

a. TOW is an extremely effective antitank weapon when used with an understanding of its characteristics and limitations.

b. Battlefield survivability for the TOW weapons system will depend upon an appreciation for the use of terrain for antitank purposes.

c. The form of defense, but more specifically the intent of the commander, is a governing factor in the employment and control of the TOW antitank platoon.

d. Decentralized control of the battalion antitank platoon is generally preferred on offense while centralized control is generally preferred on defense.

e. Effective control is the basis for minimizing the critical factors which limit the employment of the TOW antitank platoon.

f. Maneuver control for the antitank platoon to a large extent depends upon reconnoitered positions including routes of movement, communications, contingency plans, and a high state of combat readiness.

ANNEXES:

A - Built-up Areas: Characteristics and Techniques of Defense

B - U.S. Anti-Armor Training

C - Soviet Anti-Armor Training

D - Defense Against the Sagger

E - Night Operations: Defense

F - Night Operations: Offense

ANNEX A

BUILT-UP AREAS: CHARACTERISTICS AND TECHNIQUES OF DEFENSE

The employment of the TOW in the defense of a built-up area will be greatly influenced by the characteristics of the area. This chapter will discuss the types of construction, street patterns, and engagement distances within a built-up area.

TYPES CONSTRUCTION

Battles in built-up areas have many unique characteristics not common to other types of warfare. "The basic reason for the destruction of the city is its strength. The defender enjoys great advantages in cover and concealment. A steel-reinforced building becomes a large matrix of pill-boxes, each indistinguishable from the other."

In the city, a unit will be confronted with large tall buidlings. Within these multistory buildings, there may be many windows. Each window or opening is a potential firing port. The buildings have different characteristics depending on their age. Many of the new buildings have very strong structures; however, much glass and this material are used in the construction. This tends to make these buildings difficult to defend. On the other hand, older buildings constructed of stone, brick, or masonry provide much more protection for the defender. Even if these buildings are destroyed and reduced to rubble, they still may provide excellent fighting positions because of the rubble that has fallen around and reinforced the

lower levels and cellars. However, some cellar construction will not have the necessary strength to support the rubble and will have to be reinforced if used.

STREET PATTERNS

Each city or town is unique in its layout. However, Soviet doctrine has identified six basic street patterns for European cities as shown at Figure 1. Most built-up areas in the world resemble one or a combination of these patterns. Street patterns are important because they influence the conduct of combat operations in the city. The radial pattern has a negative influence on combat operations because of the difficulty of lateral movement. This pattern is characteristics of older cities. The radial-ring pattern is more suitable for combat operations than the radial because it provides for lateral movement. The chassboard pattern facilitetes offensive military action; whereas, the unstructured pattern is the most difficult pattern in which to conduct operations. The unstructured pattern is also typical of older cities and is characterized by narrow roads, difficult movement, and blind alleys.

Associated with street patterns are road and street spaces. In many of the newer parts of cities, there will be more maneuver space because of the wider streets, roads, and rights of way. However, the underpasses, overpasses, bridges, embankments, and maze of roadways may bacome a major obatacle to vehicular movement. In the older cities, some streets will not be wide enough to allow tank movement. In any event, the road networks in cities will tend to canalize ground movement of vehicles.

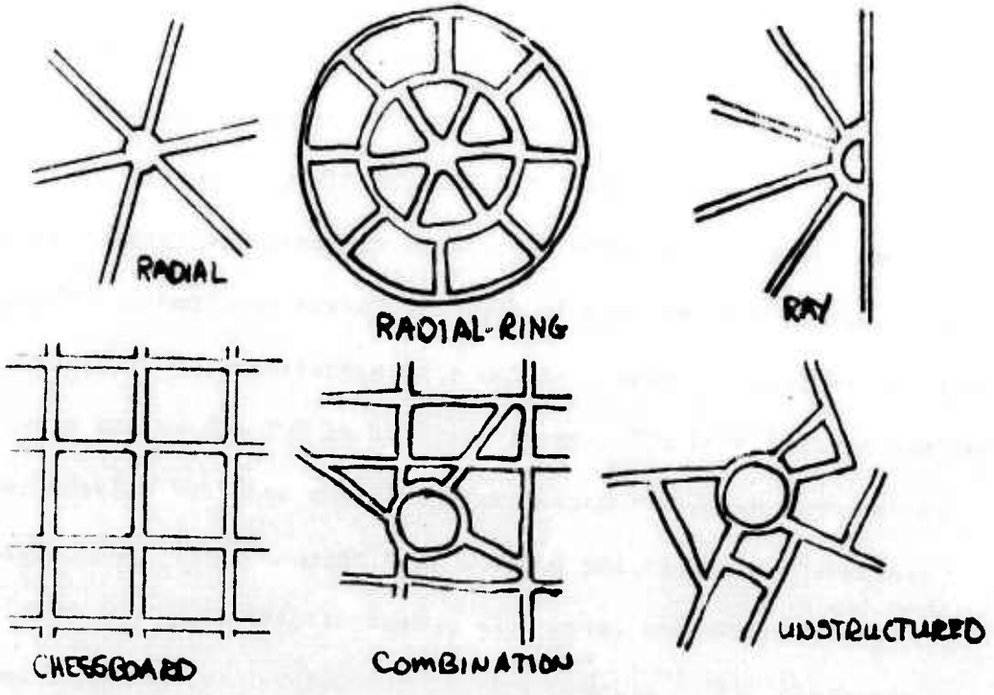


Figure 1

Basic Street Patterns for European Cities

(Reproduction from Publication)

DISTANCE OF ENGAGEMENTS

The distance at which engagements may occur is closely associated with street patterns and geometry of the area. "This is the reason only 5 percent of urban combat engagements take place at ranges of more than one hundred meters while 80 percent occur at less than thirty-five meters, according to some estimates." Of course, from selected positions on tall buildings or down long straight streets, the ranges could be increased.

DEFENSIVE EMPLOYMENT IN BUILT-UP AREAS

There are significant problems associated with the defensive employment of the TOW in built-up areas. Because of the weapon's minimum range limitation and the characteristics of a built-up area, it will be difficult to effectively employ the TOW in built-up areas. The backblast is another significant problem but does not limit the weapon nearly as much as the range restrictions. This chapter will discuss position considerations to include: (1) the range effectiveness, (2) cover and concelament, (3) mutual support, (4) protection for the crew, and (5) clearance requirements for the TOW. In addition, type positions and control problems will be considered.

POSITION CONSIDERATIONS

The TOW has a maximum range of three thousand meters and a minimum range of sixty-five meters. As was mentioned earlier, 80 percent of urban combat engagements have occurred at less than thirty-five meters. Therefore, to get the maximum utilization out of the TOW, it should be employed on the

outer limits of the built-up area so the gunner will have sufficient range in which to engage the targets. If the weapons are employed within the built-up area, positions should be selected so as to make maximum use of the weapon's range capability. In most cases, this will be very difficult. However, if the weapon is positioned so it can fire down a long open straight street, from the upper levels of a building, or across a large open area, such as a park, the effectiveness of the weapon will be increased. Nevertheless, the flight path clearance requirements will probably still limit the fields of fire because of the power lines, telephone cables, and signs that are positioned throughout the built-up area, especially along the streets.

On the other hand, a position at or near a four-way street intersection or from an upper level in a building may give the gunner an advantage of having more than one field of fire. Another aspect of range is that of tracking time. The TOW has a velocity of two hundred meters per second. The firer must be able to track the target until impact of the round. Because of the slow velocity and the characteristics of the built-up area, a firer may have difficulty tracking a target long enough, unless the target stops or is moving down a relatively straight street.

Cover and Concealment

Cover and concealment is also very important in the built-up area. In many cases, the buildings can be used for both cover and concealment.

However, when firing from a room or building, the backblast becomes an important consideration. The backblast covers a large area. The crew can fire from an inclosed area if the area is large enough or open enough to provide for escape of the backblast. The area can be enlarged by knocking out interior walls, ceilings, doors, floors, and windows to let the backblast escape. If the weapon is fired from a large warehouse, sufficient space should be available for the backblast to safely escape. All loose material such as sand, plaster, and glass should be removed from the backblast area. If this loose material is not removed, it may become lethal flying objects and cause a large dust cloud. By wetting the backblast area with water, the dust cloud, which may compromise the position, will be prevented. The following is another technique which may be employed to reduce the effects of the backblast:

a. Separate the sight system from the tube, as done for the helicopter-mounted TOW system, thereby allowing the launch tube to be in relatively exposed position while being fired by a gunner in a more protected position.

b. Use of a flexible hose or ducting such as in heating systems to vent the exhaust gases from the launch tube to the outside. This would reduce the pressure inside a closed room and reduce the fire hazard.

Some buildings can be used as fortified firing positions because of their inherent strength, or they can be fortified with sandbags or other material that may be found in a built-up area. In some cases, the defender

may even destroy the upper part of a building and let the debris fall around the bottom floors to add reinforcement. If this procedure is used, a determination must be made to insure that the lower structure can support the added weight. Sufficient space for the backblast must still be available.

If the crew uses the "hide position" as a concealment measure, the time factor for movement into the firing position and concealment along the route to the firing position must be considered.

Mutual Support

If at all possible, the TOW weapons should be mutually supporting. When these weapons are used on the outer limits of a city, mutual support is normally possible. However, if employed within a built-up area, mutual support may become more difficult because of the reduced fields of fire.

If the weapons are positioned relatively close together, then they may be mutually supporting. On the other hand, the commander must consider the vulnerability of the weapons if they are employed close to each other. The weapons should be dispersed laterally and in depth. The ideal separation distance is three hundred meters, but in a built-up area this probably will be impossible to obtain. However, the vertical aspect of the area may allow some degree of dispersion and mutual support because of positions in upper floors.

Protection for Crew

Like any other weapon, the TOW antitank weapons should have protection from enemy ground attacks and enemy indirect fire. Any fire that will

cause the gunner to flinch or lose eye contact with the target may cause him to lose control of the missile. Therefore, it is important to suppress enemy fire that could affect the gunner while the round is being tracked.

Clearance

Clearance to the target is another important consideration. The TOW needs about a 3.5 foot clearance along the flight path. This clearance area is needed so the guidance wires and control fins will not get snagged on tree limbs, power lines, telephone cables, signs, or other debris and cause the missile to become uncontrolled.

TYPE POSITIONS

In a built-up area it is even more important to have primary, alternate, and supplementary firing positions because the TOW backblast will often compromise the firing position. These positions should cover likely armor avenues of approach and any mine fields or obstacles employed to delay, canalize, or stop enemy vehicular movement. As discussed earlier, the crew will not be able to physically carry sufficient missiles for all the different firing positions. Therefore, all firing positions should have missiles prepositioned for use by the crew.

CONTROL

Control of the TOW system is more difficult in a built-up area because of the communication problems associated with the buildings. As a result, it may be more desirable to decentralize control of these weapons. The TOW can still be effectively employed when the control is decentralized.

Whether the control is centralized or decentralized, the fire control procedures used must be easily understood, responsive, and flexible.

ANNEX B

U.S. ANTIARMOR TRAINING

The following program was developed to serve as a point of departure for anti-armor training. The program is not the ultimate solution, but it provides a framework for future expansion.

I. General Principles

a. The following principles must be applied to all anti-armor training:

(1) The enemy must always be pictured realisticly. Soviet equipment, organization and tactics are to be used in scenarios on all levels.

(2) A standard maneuver mix must be used with squad "tank killer teams" and "hunter killer" platoons as basic building blocks.

(3) It must be clearly recognized that the anti-tank weapons are the main weapons and a vital consideration in all operations.

(4) The aim of all training must be to create the highest possible confidence among soldiers and junior leaders in the organization's tank killing ability.

(5) Training must be conducted in the following progression: Technical training, battle drill, formal field exercises and two-party field exercises.

(6) An effective evaluation system must be used to measure technical efficiency, terrain evaluation and operational capabilities.

142.

(7) Training must foster creative thinking and individual action in leaders at all levels.

(8) At least one third of all training must be conducted during the hours of darkness.

II. Training Aids/Installations

a. Main training aids for anti-armor training are:

(1) Training equipment set for TOW and DRAGON.

(2) Visual aids for training in recognizing enemy combat vehicles.

(3) Small caliber training system for tank guns and LAW.

(4) Cold missiles/grenades for use in weapon drill.

(5) Blank ammunition for simulation of firing under field training.

(6) Full size electronically operated targets picturing personnel, APC and tanks.

(7) True copy training mines in large numbers, preferably with marking charges.

b. Effective anti-armor training requires a well developed training area with the following installations:

(1) Simulator training ranges for TOW and DRAGON.

(2) Moving target ranges for all anti-tank weapons.

(3) Built up defensive areas with concrete firing positions and foxholes for training of action when tanks break through the lines.

(4) Standard exercise areas for defense, ambushes and raids.

(5) Standard ranges with electronically operated targets for exercises with live ammunition in defense, ambushes and raids.

(6) "Village" for training of anti-armor operations in built up area.

(7) A large area with varying terrain for "free" two-party anti-armor exercises up to battalion level.

III. Training of Anti-Armor Weapons Crews

The following should be stressed:

a. Selection of position.

b. Preparation of positions.

c. Change of position.

d. Fire discipline.

e. Firing at moving targets.

f. Distance measuring.

g. Quick firing.

Training should be conducted both in daylight and in the dark. Whole crews must be cross trained. Standards must be set at high level and each crew must be evaluated prior to proceeding to tactical training.

IV. Small Unit Training

a. Infantry, support and service support units must be trained in Armor-killing operations. The rifle squads are the basic armor killer team. They must be trained for operations alone and reinforced by DRAGON

crews. Support and service support organize and train similar teams with the personnel and means available.

b. Tactical training is initiated using battle drill techniques in order to achieve automatic and effective reaction and cooperation between the different elements of the team, i.e. the support, security element, the armor destroyer element and command and control element. Standard battle drills must be developed for hasty occupation of a defensive position, raids and ambushes. After satisfactory standard is achieved in daylight, the drill is to be repeated in the dark. Technical skill and effective teamwork are to be highly stressed during this training.

c. The next step in the training cycle is to rotate the teams through a series of relatively simple field problems. Optimal use of terrain and terrain features for defense, ambush and raids is the training aim in this phase.

d. After having learned how to apply the different techniques in the terrain, all teams are rotated through standard exercises in defense, ambush and raids with live ammunition and using electronically guided targets. Both technical performance, use of terrain and the results - i.e. number of hits are evaluated.

e. Finally, a series of exercises is conducted in unknown terrain against an enemy using Soviet tactics.

V. <u>Platoon and Company Training</u>

a. The rifle companies should be rotated through the following standard exercises.

(1) Perimeter Defense

Use of terrain and organization of defensive position against attack from tank and motorized infantry. Positioning and use of anti-tank weapons, exploitation of natural tank obstacles and use of mine barriers should be stressed.

(2) Cooperation with Tanks in Attack

The rifle company should be reinforced with a tank platoon for this exercise. Anti-tank weapons should move from one overwatch position to another. The tanks performing the attack on the enemy position must be protected by infantry deployed for neutralization of enemy anti-tank weapons.

(3) Ambush

Both platoon and company strength ambushes are taught. The following points should be stressed: Use of terrain and mine fields to channalize and stop the enemy advance, optimal deployment of anti-tank weapons, camouflage, noise and light discipline, simultaneous engagement of enemy by all weapons and disengagement.

(4) Meeting Engagement

The company is very vulnerable when meeting enemy armor while advancing. Exercise should stress optimal deployment when encounter with enemy armor is expected and swift establishment of defense against tanks by positioning of anit-tank weapons and laying of mines.

(5) Delay

Delay should be trained, using the rifle platoons reinforced and organized as "hunder-killer" groups. The exercise should provide for delaying action against an enemy armored column, advancing on a single asix. The "Hunder'killer" groups are to be deployed in ambushes and road blocks and falling back to successive delay positions.

b. When a sufficient training standard is reached in the mentioned forms for anti-armor combat, comprehensive field exercises should be carried out in unknown terrain against "enemy" tank and motorized units organized as Soviet units and using Soviet tactics.

VI. Battalion Level Anti-Armor Training

The final anti-armor training should be conducted as battalion field exercises, designed to integrate the anti-armor operations into battalion defense and delaying actions. The following aspects of operations should be given priority:

a. Command and control in mobile defense and delaying action.

b. Optimal use of tank company and anti-armor platoon.

c. Use of artillery for blinding enemy armor and separation of enemy tanks and infantry.

d. Cooperation with anti-armor helicopters and aircraft.

e. Attack with the objective of destroying enemy forces.

f. Night operations.

VII. Tank Gunnery

a. Doctrine. Current US tank gunnery doctrine fails to clearly define specific combat performance objectives or other meaningful standards to be achieved in training. The general goal of combat readiness measured in terms of "qualified" crews that successfully pass TCQC falls short of the desired, and necessary objective. TCQC in its present form, does not either qualify or realistically prepare a tank crew for combat. And, since there is no prescribed training beyond strictly crew level TCOC, sections and platoons degenerate into collections or groupings of "qualified" crews rather than trained, integrated, closely coordinated fighting units. Sepcifically, US Army tank gunnery doctrine falls short of the mark in the following areas:

(1) There is a notable lack of realism in tables IV through VIII in terms of targets (color, size, shape), aequence of targets, manner of presentation, range facilities (oiled roads, concrete target stands) and range administrative restrictions (justified on the basis of aafety -- preventing crews from going down range with the man gun loaded as would most certainly be done in combat.).

(2) There is no provision for a combat/surprise engagement type course where the tank must pick the best tactical route to take maximum advantage of cover and concealment.

(3) Present doctrine specifies engagement ranges of up to 2,000 meters. No provision is made for engagements beyond that range which have been proved feasible and practical by ARVN and the Israelis.

1/40

(4) There is no differentiation in prescribed gunnery training between gunnery requirements in defensive as opposed to offensive roles to prepare crews for implementation of our emerging new defense doctrine. (i.e., Firing from concealed reverse slope positions or at approaching targets — moving targets employed in doctrinally prescribed training ranges go laterally across the front — never come toward the firing tanks position.)

(5) There is no prescribed training/firing to prepare tank crews (or units) to engage any form of aerial target — either low performance or low flying high performance aircraft.

(6) There is no training prescribed to prepare tank crews specifically for fighting/firing in cities or urban areas.

(7) There is no requirement to have tank crews perform all gunnery tasks wearing gas masks, or buttoned-up with all hatches closed which may even be required on a non-chemical battlefield, to prepare them for sustained operations on a chemically contaminated battlefield.

(8) Night training and firing does not receive sufficient emphasis in present doctrinally prescribed training in spite of the fact that Soviet/Warsaw Pact doctrine calls for continuous twenty-four hour operations — to the point that it specifies that deliberated coordinated attacks will only be conducted at night unless extreme conditions dictate otherwise. Tank crews are not presently raquired to provide their own illumination with their own searchlight — and only one-third of all night targets are engaged using IR or passive night sighting devices.

(9) There is no provision for training tank sections in two-tank sensing/adjustment techniques to take maximum advantage of the high accuracy and velocity of hypervelocity ammunition (APDS and to a lesser degree, HEAT for the 105mm), in spite of the effectiveness of this method of engagement proved repeatedly by our allies.

(10) There is not tank section gunner/combat training live fire courses yet the tank will nearly always function as part of a section and platoon, not alone.

(11) There is no platoon combat course either prescribed or provided for by doctrine — though the manual does provide guidance for platoon fire distribution and control.

(12) There is no provision for a combined arms (tanks and mechanized infantry) combat course though all US doctrine stresses that combined arms operations are the norm and constitute the basic building block of all ground operations.

b. Gunnery.

In spite of identified shortfalls in current tank gunnery doctrine there are units that do not, or cannot meet currently prescribed standards. Much of this is blamed on personnel turbulance and the other logistical, administrative, legal and leadership requirements placed on units and unit commanders. As stated previously, to meet all of these demands and still achieve the necessary standards on TCQC, which becomes an end in itself rather than a major step towards the goal of readiness, a number of questionable stopgap practices have evolved.

(1) Shuffling of personnel to create crews especially for TCQC for the sake of paper qualification and readiness -- that will not in fact be the crews to fight the vehicles if a war started today -- is not an acceptable solution. Paper crews are self-deluding and in the long run, self-defeating, and fool no one, least of all the men who must in the final analysis do the fighting and have the confidence in their abilities - crews - sections - platoons, to face the enemy in battle and defeat him.

(2) Range administration practices designed to maximize efficiency and speed of operation and overstress safety -- to the loss of realism by oiling roads, convenient targets, unloaded guns until the target is sighted, etc. -- is also of extremely questionable value and self-defeating in terms of preparing crews for combat, and must therefore be re-examined.

(3) The conduct of gunnery training and tactical training as if they were two entirely separate areas -- rather than part of an integrated whole -- must be terminated. Somewhere, after necessary preliminary training, gunnery training and tactical training that as closely as possible duplicates combat conditions, must be merged.

(4) While tank gunnery training already receives the highest possible priority in armor units, it must also receive the highest possible priority in the Army. Tank crews, four men manning a weapons system that costs at least $400,000.00, shooting to nearly $900.00 per round, can not be treated as a quick cadre fill item. If in no other terms than because

of cost, our present system of personnel selection, training and assignment of tank crews must be examined in detail -- to insure that we get the maximum benefit/effectiveness of an increasingly expensive, scarce primary weapons system. Present policies do not lead to well trained, stable crews or we would not have official sanction, even encouragement of crew shuffling for TCQC as seen in the FORSCOM letter.

c. Recommendations

Based upon the data analyzed and personal experience as a crewman, platoon leader, company commander, training (AIT armor) company commander, and instructor of tank gunnery, the following recommendations are made.

Revise FM 17-12 or other appropriate doctrinal publication to incorporate the following specific changes in gunnery/tactical doctrine:

(1) Require use of smaller, dark, irregularily or curved shaped targets on all service and crew firing exercises.

(2) Require service and crew firing engagements to be at ranges from 1,200 meters out to 3,000 meters.

(3) Develop and require use of random surprise targets on all crew firing courses -- to simulate realistic acquisition conditions.

(4) Develop and require crews to practice defensive firing at targets from reverse slopes -- with moving targets that appear and disappear behind folds in terrain and move toward the firing tank.

(5) Provide for crews to move down range with battlesights indexed and the main gun loaded for instant reaction offensive type

engagements, permitting crews to select their own route based upon real life tactical considerations.

(6) Require tank crews to provide their own illumination for some target engagements -- both white light and IR.

(7) Require tank crews to perform all gunnery related tasks and functions on at least one course/table wearing gas masks.

(8) Require tank crews to run all of one table/course while buttoned-up with all hatches closed to familiarize them with the difficulties of control, target acquisition and adjustment under those real life conditions.

(9) Develop, and require all tank crews to complete, a new table/course engaging aerial type targets — using both the cal .50 MG and main gun with beehive ammunition.

(10) Develop and require training to prepare tank crews for employment/engagement in urban areas and to familiarize them with the capabilities and limitations of their tanks in such fighting.

(11) Provide for training tank sections in the British developed method of two-tank sensing/adjustment and BOT with present or future hypervelocity ammunition.

(12) Develop and require all crews, as part of a section, to complete a tank section offensive/defensive combat course. (Perhaps the acid test of proficiency in two-tank gunnery recommended in 11 above.)

(13) Develop, establish, and require all tank platoons to successfully complete a unit qualification combat course integrating all forms of tactical movement, fire and maneuver, and fire and movement, both daylight and night.

(14) Establish and require all tank and mechanized infantry companies to cross reinforce and run a mixed tank-infantry (combined-arms) combat course — perhaps as part of annual unit testing.

(15) Require more emphasis on night training of all types — particularily night target acquisition, IR and passive sight firing, and night movement under blackout and IR conditions.

ANNEX C

SOVIET ANTI-ARMOR TRAINING

Individual antitank training in the Soviet Army is predominantly and necessarily based on the wide experience of the Red Army in the Great Patriotic War (World War II). This training stresses the success which can be attained by the individual soldier who has been properly schooled in the characteristics and vulnerabilities of tanks and antitank weapons, and who maintains the correct mental and moral/psychological state. In essence, the Soviet contend that when the soldier can be led to believe that he can overcome a tank, he will vigorously initiate those combat actions which will enable him to be successful.

Selected articles in the Soviet Military Review magazine provide the data for the study of one example of the sort of antitank training experienced by the Soviet soldier. Generalizations from this example should be made cautiously, however, since the magazine deals with subject matter generally of battalion level and lower, and is intended primarily for non-Soviet audience.

A type antitank/anti-APC training area is capable of handling a complete company (battery) at a time. It is divided into three instructional areas which sequentially introduce the soldier to the combat characteristics of the target vehicles, the use of mine warfare and obstacles or obstructions, and practical experiences in meeting armored vehicles

under simulated battle conditions. The training sequence is also calculated to increase gradually the emotional stress applied to the soldier, a process of psychological conditioning to build the individuals confidence.

The trainee is first shown static displays and dummy vehicles.

Instruction Area No. 1 is designed to acquaint personnel with the characteristics of tanks and APCs. It contains life size stationary and mobile dummy enemy tanks and APCs. Mobile dummies are on rails and are powered by an electro-motor. For greater visualness, all parts of the dummies which are vulnerable to various types of wespons are marked. Dead areas for gun and machine-gun fire are shown by means of wire. Special stands carry drawings of the main types of enemy armour. (See Illustration.)

Trainees receive ten minutes instruction at each station, under the leadership of a platoon or section (squad) leader.

At Instruction Area No. 2 mines, explosives and nonexplosive antitank obstacles are studied. The means and methods of defanse against fire from tanks and fire are perfected. For this purpose, one of the sectors has on display antitank mines and non-explosive obstacles (hedgehogs, scarps, barriers, slashings, antitank ditches). On the other sector one can see shell holes, hillocks, ditches, trenches, and foxholes. Near it, there is a minefield where the places for laying mines are marked with the little red flags. Brief characteristics of each obstacle and obstruction, and the time required for the installation are shown on a specisl table.

(This particular variant apparently is not standard in all antitank training areas.)

The final instructional area, equipped with trenches and foxholes to simulate battlefield conditions, provides the opportunity for practical application of the lessons under realistic conditions.

In two places in which the personnel take cover while a tank is passing over, the slopes are covered with planks. The instruction area has a steel plate with holes from shells, jet projectiles and antitank grenades in it, and appearing and disappearing targets of tanks for training in firing at actual ranges.

This apparently can be a live-fire exercise, or one conducted with simulated weapons firing. Tank crews also benefit from such training by learning to operate against infantry under potentially adverse conditions.

ANNEX D

DEFENSE AGAINST THE SAGGER

1. Introduction: The following explores proven concepts and advance new ideas on how to avoid detection, and if detected, how to minimize the chances of being hit, in a Sagger missile environment. The adage, "If you can be seen, you can be hit", is very true when facing the Sagger missile at ranges of up to 3000 meters.

2. General:

a. Most of the pertinent information available pertaining to the Sagger guidance missile system is classified. However, the French ENTAC antitank guided missile system that has been phased out of use in our Army is very similar to the Sagger and is no longer classified. In order to keep this paper unclassified, the ENTAC guidance system will be disucssed in lieu of the Sagger system.

b. Both the Sagger and ENTAC missile guidance systems make use of a control stick that is used to fly the missile to the target. For purposes of this paper, the assumption will be made that the Sagger and ENTAC guided missile systems are very similar in nature and characteristics.

3. Missile Guidance System:

a. The ENTAC antitank guided missile system is a surface to surface wire-guided missile, with an effective range of between 400 and 2000 meters. The missile is propelled by a two-stage, solid propellant rocket motor

consisting of a booster and a sustainer motor. The missile has a velocity of 85 meters per second and will reach its maximum range of 2000 meters when fired in 23.5 seconds. The missile is guided to the target by a gunner, who operates a control stick. _____ vertically on the control box and is oriented so that a backward or forward movement directs the missile up or down, and a left or right movement directs the missile left or right. The command signals are transmitted through two trailing wires extending from the missile to the missile container. Ten separate missiles in their containers can be wired to the control box. This gives the gunner a capability of firing ten missiles at random before having to connect new missiles to the system.

b. The training of gunners for the system is accomplished using a simulator. The control box is connected to the simulator. When the firing mechanism is depressed, a little white dot appears on the TV-type screen that responds to the control stick exactly like a real missile. Moving the control stick moves the little white dot around on the screen. Because the missile is extremely difficult to control in flight, a gunner must train on the simulator for a period of at least four to six hours per day for two weeks before becoming proficient. Once a gunner is proficient, he must continue to practice on the simulator at least one hour per day or six to eight hours per week to maintain his proficiency. A total of six hours of simulator training per day per individual is the maximum feasible. Any training over six hours per day on the simulator tends to be nonproductive.

151

c. The missile can be set up in two basic configurations: ground mounted or vehicle mounted. In the ground mounted role, a well trained crew can deploy the system and fire a missile in less than 60 seconds. In the vehicle mounted role, the missile is ready to be fired at all times.

d. When the missile is fired, it climbs upward, reaching its maximum velocity in 0.35 seconds, until it can be controlled by the gunner. The missile normally travels between 150 and 300 meters before it reacts to the controls of the gunner. As the missile flys towards its target, the gunner visually guides it by lining up the tracking flare at the rear of the missile with the target. When the missile reaches between 800 and 1000 meters, the gunner must make a transfer from guiding the missile by means of his naked vision to the tracking binoculars mounted above the control stick on the control box. Without the use of the tracking binoculars, it would be extremely difficult for the gunner to keep the tracking flare lined up on the target, the gunner maintains this allignment until the missile hits the target. If for some reason the missile malfunctions, it automatically flys downward and to the right until it hits the ground.

4. Advantages of the Sagger: When operating in an antitank missile environment active and passive measures can be taken to minimize the missile advantages and maximize its disadvantages. The basic advantages are:

a. Accuracy. The system is very accurate at ranges beyond 1000 meters because the gunner has time to gain control of and fly the missile into a target.

b. Reliable. The system has been found to be very reliable, easy to maintain, and seldom malfunctions due to minor technical problems. The "state of the art" has almost produced a "soldier proof" weapon.

c. Invulnerable to Electronic Warfare. As a manual, wire guided system, jamming and EMP will not affect the system.

d. Ease of Employment. The Sagger system, whether ground mounted or mobile, can be rapidly employed without elaborate pre-firing checks or preparation for firing. Because of wire connections, multiple missile may be connected to one control box, and the gunner does not have to be near the missile when it is fired. Consequently, the signature of the missile being fired does not reveal the position of the gunner.

e. Lethality. The missile is capable of defeating all US/Allied armor vehicles.

5. Disadvantages of the Sagger System:

a. Less Effective at Minimum Ranges. Because the system is manually controlled, it takes from 2 to 4 seconds for the gunner to gain control of the missile after launch. Although a solution appears to be "get in close" to the launcher, caution must be exercised because the weapons are usually employed in depth.

b. Slow time in Flight. In order to allow the gunner to control and guide the missile with the eye, the speed of flight is about 280f/sec as compared to the speed of an armor piercing round of approximate 4800 f/sec. The slow velocity of the round allows a tank crew to "dodge" the missile, by taking advantage of cover or firing in the direction of the gunner.

c. Missile has Hyper-Sensitive Control. Although extremely accurate, erratic turns by a target are difficult maneuvers for the gunner to follow. The control box is extremely sensitive and gunners have a tendency to over-compensate for moving targets. This is a function of gunner training and proficiency.

d. Gunner Proficiency. The accuracy of the system is directly proportional to the gunner's training and proficiency. Any actions that would distract the gunner or obscure his vision of the target renders the system ineffective. When attacking the system, the gunner should be the target. Missiles and launchers can be replaced from stock; it takes time to produce trained gunners.

e. Need for Constant Gunner Proficiency Training. Even in combat environments, gunners are moved to the rear for daily training on the training simulator which is mounted in a van. These vehicles should be easily identifiable and targeted for air strikes. Although undocumented, experience with the ENTAC system has shown that gunner proficiency noticeably decreases within one to two weeks without benefit of the training simulator.

f. Wind. The size of the missile and rate of flight make the missile succeptible to being blown off course by high velocity wind blowing perpendicular to the direction of flight.

g. Soft Target. The Sagger missile system is not a hardened weapons system and is vulnerable to artillery and other types of supportive weapons.

6. Defense Against the Sagger Missile System:

a. Camouflage. Any measures that can be taken to prevent detection will add to survivability in a Sagger environment. Camouflage to break up the tank outline and blend with the background will compound the gunner's problem of acquiring and tracking the target.

b. Proper Use of the Terrain. The use of contours in the ground that can cause the gunner to lose "line of sight" with a target renders the system ineffective. Also, as basic as it may sound, hull defilade reduces the target size by 50% and the probability of being hit by 50%.

c. Once Exposed, Keep Moving. A fixed target is much easier to hit than a moving target. If exposed keep moving until reaching the next covered position.

d. Move in an Erractic Path. Movement in an erractic path presents a much more difficult target than straight line movement.

e. Violent Turning Movements. When the missile is launched, moving at a high rate of speed with violent turning movements causes difficult target conditions for the gunner.

f. Sagger Watch. When moving in small formations, one tank is assigned the mission of "Sagger watch". As soon as a missile is launched, all other tanks are warned to take evasive action and the "Sagger watch" tank immediately fires in the direction of the gunner.

g. Combined Arms Team. The employment of the combined arms team increases the number of eyes available to spot missiles being fired and

detecting probably gunner positions. Once these positions can be located, they can be destroyed.

h. Quick and Accurate Fire. The slow velocity of the Sagger missile allows sufficient time for tankers to fire in the direction of the gunner, after missile launch. If the exact gunner location cannot be detected, the dirt and dust from exploding tank rounds around the gunner will still block his vision and cause him to miss the target.

i. Use of Artillery. Firing artillery 1000 to 3000 meters in front of moving tanks at likely antitank positions will hinder the accuracy of the gunner.

7. Conclusions:

In a desert test of the ENTAC system by the US Army Test and Evaluation Command in 1963, the ENTAC system failed to fulfill its primary purpose of hitting and destroying targets. The main reason for missing the moving targets was obstruction of the target by dust. The deterring effect of dust occured when the missile was only within 100 meters of the moving target, especially when the target was moving in the direction of the wind. The missile could be flown to within 100 meters of the target with high reliability. However, due to the inability of the gunner of the tracking system to locate the moving target in the dust cloud, the hit probability at that point dropped off sharply. The report concluded that because of the inability of the operators to track moving targets, thus reducing accuracy, the ENTAC was unsuitable for use in the desert environment.

In conclusion, the methods for defense against the Sagger noted in this paper are not all inclusive. Means of avoiding the Sagger missile are only limited by the individual's imagination. However, the best method found in reasearch of this topic was to limit, hinder or block the view of the gunner anywhere along his line of sight from the missile launcher to the target. What gunner cannot see while flying the missile, he cannot hit.

ANNEX E

NIGHT OPERATIONS: DEFENSE

The key to a successful defense is in organizing the terrain available to us and taking advantage of every possible benefit it offers. A decision must be made on whether our main interest is in blocking the enemy advance (retaining terrain) or in destruction of the attacking forces, and then planning accordingly. In any event, we must determine where the enemy is likely to attack our position (avenues of approach) and then preparing for his advance. Each task force commander must organize his position in depth and provide subordinate commanders the freedom to do likewise. "Wherever possible, the commander works it out so that he commands the terrain across his front by having his forces on each position fire to the flanks, across the fronts of their neighbors. This allows forward elements to have frontal cover, and also covers the gaps between positions." (FM 100-5 Test, p. 3-6)

In preparing positions in depth, each subordinate unit must provide for its own all-round security and defense. Part of this effort entails the preparation of range cards by the tank crews and the anti-tank missile crews. Increased emphasis and training is required in this area and an effort should be made to automate this procedure in the tank. In other words, once the range, deflection and elevation for a particular target is determined, we should have the capability to record that data within the tank so that it could be recalled automatically by pushing the appropriate

button. This could be accomplished much the same way that pre-set radio channels are recalled on modern radios. Once the attacker is detected, maximum use of artillery should be made to separate the enemy infantry from his armor. This could be accomplished by increasing the size of artillery concentrations planned to counter such enemy attacks. We should also designate target types for each element of our defense; i.e., the infantry should concentrate on killing enemy infantry leaving the enemy tanks to our tanks and anti-tank missile crews.

As in current doctrine, the area should be fully illuminated as soon as the enemy attack is detected provided the withdrawing security forces are not jeopardized. When illumination is complete, the TOW and Dragon crews should engage enemy tanks at maximum range along with our tanks.

Depending on the desire of the commander and the situation that might develop during the attack, the reserve force may be committed to preplanned, shallow counterattacks or to reinforce threatened units. It may well be wiser to leave the reserve in prepared blocking positions and commit other, more lightly engaged units to conduct the counterattack while the reserve force fixes the enemy.

Although specific deviations have been recommended in the areas of increased artillery support, command detonated mines and range card modernization, in general current doctrine for the armor-mechanized infantry task force in the night defense against armor appears to be valid. Still, another area exists which should be given more consideration and emphasis. This is the concept of the "Reserve-Slope Defense."

The need to achieve maximum surprise and to deceive the enemy as to the true location of friendly defensive positions may dictate the use of a reserve slope defense. It may also be dictated when engagement ranges are short because of visibility limitations, when the forward slope is untenable due to enemy fire or dominating terrain occupied by the enemy, or when it is necessary to avoid defending a ganderous salient. Long-range engagement of the enemy is not normal; rather, violent, short-range engagements are to be expected. This defense depends heavily on the element of surprise and upon the strict control of fire and illumination for success. These are obtained by provisions for:

a. An effective early warning system.

b. A plan to give the position the appearance of being unoccupied.

c. Well-concealed reverse slope tank positions that facilitate flank engagement of the enemy as he assaults the position.

d. IR from tank-mounted searchlights used for the initial engagement, followed by white light. Additionally, trip flares or field expendient flane illuminators are positioned near the crest of the hill to be activated as the enemy passes the crest. This latter type of illumination is designed to silhouette the advancing enemy.

e. A fire plan that provides fire to strike the rear and flanks of the enemy, to seal off his routes of withdrawal, and to disrupt efforts to reinforce him.

f. A counterattack plan at task force level designed to complete the destruction of the enemy force, strike at reinforcement efforts, or to seize

key terrain that facilitates resumption of the offense. (FM 31-36 Test, April 1968, para. 13-9)

Each of the task force defensive areas should be analized in order to detect the most likely avenues of approach for the attacking enemy and to select the best possible terrain for the accomplishment of a successful defense. The defensive concept could best be described as a strong-point, ambush-in-depth approach. At night the task force commander would control the occupation of and the redisposition of the platoon team units which are required to conduct the defense. The platoon team strong point locations are selected along or astride suspected enemy avenues of approach in order to block, delay, attrit, ambush and/or destroy attacking enemy forces as the task force commander deems appropriate as a result of battle development.

It is obvious that some of the strong points used in the night defense are common to the daylight defense concept. At night these positions would be tightened, or pulled in closer, for security purposes. The order to occupy strong point positions which differ from day positions would come from the task force commander and be timed in accordance with his judgement on enemy observation capabilities and his ability to obscure their observation by means of smoke, deception of other measures. In most cases the moves would be conducted during dusk, but in no case should the commander establish a predictable pattern.

Since the battle which ensues following an enemy attack seldom follows preconceived enemy attack plans nor our preplanned defense, the selection

of strong points to be retained, given up and occupied must remain the option of the task force commander. Some of the most forward strong points may be retained even at the risk of isolation if the commander determines that the terrain is overwhelmingly essential to the task force mission or if the commander feels that forces occupying that strong point can deliver fire on the flank or rear of the attacking enemy force and render it ineffective.

Along the strong points closest to the FEBA care will be exercised to locate radars and searchlight armed tanks in order to detect and bring accurate fire on attacking enemy forces as early as possible. These same forces would have control of the command detonated mines if they were available to the task force.

With the plan described above it is believed that a strong and viable defense of the task force fronts can be achieved. The absence of a reserve with the exception of the one platoon strong point should not be alarming since the entire concept is based on the principle that all units not in contact are in reserve.

ANNEX F

NIGHT OPERATIONS: OFFENSE

While the commander must be prepared to defend at night, he had the option to initiate or not initiate night offensive operations. Current U.S. doctrine adequately discusses the problems and techniques of the night attack, but it does not provide guidance for the commanders evaluation of when night operations will give him a relative advantage.

1. When to Operate at Night.

The tactical commander will operate at night for one of three reasons. First, he may be ordered to attack at night to support the plans of a superior headquarters. In this instance the decision has already been made and the commander's task is to accomplish his mission. The second instance for night operations is in reaction to enemy night action. Once again the commander has little flexibility and must react. The third reason is because the commander has decided that to operate at night will give him an advantage relative to his enemy. To determine whether to operate at night, the commander must somehow evaluate the situation and determine if the circumstances are such as to provide him with a relative advantage. As noted above, this is one protion of the existing doctrine that is incomplete. Our manuals simply fail to provide the commander with criteria on which to base his estimate.

Again looking at the situation in which the commander has the flexibility to initiate night operations, he will certainly consider the factors of METT-T (mission, enemy, terrain, troops available and time) in arriving at his decision. What is needed in addition to METT-T, though, is a set of dichotomous condition statements which, when analyzed, would inform the commander of the relative advantages of night operations.

On the basis of research conducted it is possible to define a set of four conditions which favor the initiation of night operations against an enemy force. The four conditions are listed below and are subsequently discussed in turn.

-- The force with the least absolute daylight combat power will have a relative advantage when operating at night (Condition 1).

-- The force which is operating on familiar terrain will have a relative advantage at night (Condition 2).

-- The force with the superior state of night operations training and psychological conditioning will have a relative advantage at night (Condition 3).

-- The force with the superior ability to command and control its small units in fast-moving and ambiguous situations will have a relative advantage at night (Condition 4).

Condition 1 states that the force with the least amount of absolute daylight combat power will have a relative advantage at night. The reason for establishing Condition 1 may not be intuitively clear,

but one must recall that any military task, in all but the most trivial cases, is harder to accomplish at night than in daylight.

Night's action as a powerful equalizer when two forces with unequal daylight combat power oppose each other is predicted because night makes any superiority of combat power much harder to apply effectively.

Thus, under Condition 1 the commander with the inferior combat power gains a relative advantage because night minimizes the superior combat power of the enemy.

Condition 2 states that the force operating on familiar terrain will have an advantage. This condition is perhaps more obvious in that the advantages of reconnaissance and preparation of the battle area are easily understood. Successful night operations require somewhat more planning and reconnaissance than daylight operations. The force on the ground should be able to prepare operations plans and firing positions, conduct reconnaissance, mark routes, pre-stock supplies, and become thoroughly familiar with the terrain. Assuming the force occupying the terrain takes advantage of the time and freedom of movement it has, its reaction times at night should be better than that of its opponent, who is operating on unfamiliar terrain.

Condition 3 states that the force with the higher state of night training will have an advantage at night. Psychological and physiological impacts on the individual soldier operating at night were discussed

in Section VI. The force which has trained its soldiers and units for night operations will be able to minimize the debilitating effect of darkness and thus gain a relative advantage over its enemy.

Condition 4 states that the force which can command and control its small units during fast-moving and ambiguous situations will have an advantage over its enemy. Night operations are characterized by an ambiguous situation that often ends in close contact and fierce, short range fighting. Small unit commanders who are able to effectively control their forces, either through FM communications or other means, will have a decided advantage over an enemy who cannot.

2. Application of this Research to the European Scenario.

Given the European scenario and a situation in which a United States commander has the freedom to initiate night operations, is it to his advantage to do so? Assuming the conditions and the threat facing the United States forces in Germany do not change drastically, it is to the relative advantage of United States commanders to initiate night operations. This judgement is based on the reasons discussed below.

First, the terrain advantage may be exploited. United States forces in Europe are defending the same terrain on which they have lived and trained for many years. Commanders and staff planners should be intimately familiar with the terrain and with the most advantageous areas from which to operate. The fact that troops may become familiar with operation plans, proposed positions, firing sites, and routes would give the defending United States forces a decided advantage over an attacker.

Second, because of the intial numerical superiority of the Soviet Bloc forces, United States combat troops would likely be attrited to the point of ineffectiveness in a daylight "shoot-out." It would be advantageous for United States forces to conduct delay and defend operations during daylight, thereby relying on long range fires and prepared defensive positions. Then, utilizing the concealment of night, United States forces could conduct limited offensive operations against an enemy who would be hastily trying to resupply and consolidate his forces. By operating at night and forcing the enemy to engage in small unit, limited engagements, United States forces would be able to minimize the impact of the Soviet combat power.

Third, United States forces should maximize their command and control capability and take advanatge of a known Soviet weakness. United States forces have an advantage in small unit FM communications, and in a fast-moving night combat situation this advantage could be considerable. In addition to a communication problem, Soviet small unit commanders have traditionally been carefully controlled by higher headquarters; thus, when forced to operate in the absence of orders, they are at a disadvantage. U.S. Army armor commanders rely heavily on fragmentary orders and mission statements and they pride themselves on their ability to function in a fast-moving and somewhat ambiguous situation. These facts suggest that as the combat continues the Soviet forces will "outrun" their initial carefully prepared plans and will be at a disadvantage.

Finally, although at present the psychological preparation and night training of Soviet forces appear better than that of United States forces,

this is among the most easily corrected problem areas. Due to the recent increased emphasis on night operations by United States commanders, there are indications this Soviet advantage may be short lived. The individual United States soldier must be made aware of the psychological and physical advantages to be gained from night training. Certainly there is no reason, other than lack of training, why the U.S. Army has not learned to operate effectively at night.

3. Principles of Anti-Tank Defense.

a. Definitions: Within infantry small arms range

Medium - within range of tank direct fire

Long - Greater than 2000 meters

2. ATD fires shall be massed when all representative ranges can be fired simultaneously. (Long - medium - short)

3. Infantry is the best protection for short range weapons. Advantage of SRW is the high volume of fire.

4. Overhead protection is the best protection of intermediate range weapons. Advantage of MRW is ability to mass fires (non supressed, day night).

5. Movement (displacement after fires) are the best protection for long-range AT fires. Advantage of LRW is surprise against moving targets, greater selectivity.

6. Artillery fires shall be used primarily to limit effectiveness of enemy infantry and to cause armor to button up.

7. Arty fires shall be secondary to direct fires except for sealing off areas; in case of limited visibility; or in case enemy fires have dominated ATD fires.

8. Priority of targets for long-range engagement will be:

   a. Infantry carriers

   b. Armored tanks

   c. Command vehicles/recon vehicles

   d. Combat support (artillery, SP)

   e. CSS elements

9. Priority of targets for medium-range engagement should be:

   a. Armored tanks

   b. Infantry carriers

   c. Command vehicles

10. Priority of targets for short-range engagement will be: (expect special opns).

   a. Armored tanks

   b. Infantry carriers

11. No AT weapon will fire alone. Either it will be fired as a part of a number of AT weapons, or under Arty cover/fire.

12. Barriers: Maximum use is gained from any barrier by indirect fires which prevent infantry (engineers) from freedom of work, and tanks from supporting with suppressive fires. AT weapons will be used to limit maneuver of tanks to support infantry.

277