Wheels for the Future: Should the U.S. Army Adopt an Armored Wheeled System?

A Monograph
by

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The remainder of the monograph adresses three fundamental questions linking armored wheeled systems to current battlefield requirements. These questions are: Can armored wheeled systems complement light forces in crisis operations as well as highly mechanized forces operating in war? Do armored wheeled systems provide the staying power on the battlefield? Given finite sea and airlift capabilities, can armored wheeled systems be deplcyed into a theater of operations without degrading the total amount of rapidly deployed force available to conduct immediate operations?

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ABSTRACT

WHEELS FOR THE FUTURE--SHOULD THE US ARMY ADOPT AN ARMORED WHEELED SYSTEM by MAJ Glenn W. Davis, USA, 40 pages.

This monograph discusses the importance of wheeled armored systems for the US Army's future force design. Operational ideas require future forces be designed for rapid strategic deployability, high lethality, operational mobility, survivability, versatility, and sustainability. It becomes a question of the tactical requirements that dictate whether the characteristics inherent in wheels or tracks better suits achievement of the intended results.

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SHOULD THE US ARMY ADOPT AN
ARMORED WHEELED SYSTEM (AWS)?

> Classes of ships which constitute a fleet are, or ought to be, the expression in material, of the strategic and tactical ideas that prevail at any given time, and consequently they have varied not only with the ideas, but also with the material in vogue.[1]

These thoughts were expressed by Sir Julian Corbett in Some Principles of Maritime Strategy. Corbett believed that the elements of maritime warfare could not be viewed in isolation. Rather, all warfare is a combination of all the forces available with each element used to the best effect in order to achieve the intended result. Chapter Two,--Theory of Means, The Constitution of the Fleet-- discusses the development of naval fleets from the sixteenth century to modern day. Several theoretical concepts and paradigms contained in this chapter have applicability in considering the utility of a mixed class of vehicles (i.e. main battle tank and armored wheeled system) for the US Army's future force design. One comparison is that a mixed class of vehicles, like the concept of a mixed class of "specialized" vessels can accomplish two essential activities. First, when employed in combination, mixed classes of vehicles can multiply the combat effectiveness of combat operations. Second, when employed separately, each vehicle can adequately perform unique functions in support of a range of military operations.

The purpose of this monograph is twofold. The first is to examine the essential characteristics and requirements, past and present, necessary for armored wheeled systems to have utility across the continuum of operations. The second is to determine if quick

decision/crisis action forces (light forces) require the additional tactical mobility, force protection, and firepower of an armored wheeled system to accomplish today's prevailing tactical missions.

CURRENT CONDITIONS

As current force reduction talks continue with the Soviet Union, the perceived threat of coalition warfare with NATO Allies in Western Europe against the Soviet Union grows less probable. Other areas within the world posing a potential threat to the United States interests will be the focus of future contingency operations. To meet these changing needs, future force designs will probably move toward a more compact Army with smaller, deployable, mobile units able to respond to strategic needs in areas ranging from nation development to general warfare. AirLand Battle Future Umbrella Concept (Draft) envisions five types of forces and reflects a shift in military strategy that changes the current emphasis on where forces are deployed and what capabilities they should possess.[2] Of these forces (forward deployed, reinforcing, contingency, nation development, and unique forces) the current emphasis is shifting to contingency, nation development, and unique forces with quick reaction capabilities designed for preemptive and preventive measures to stabilize a regional crisis.[3]

Field Manuel 100-6, Large Unit Operations, outlines crisis as a transitional linkage between peace and war.[4] It is interesting to note that JCS Publication 3-0, Doctrine for Joint Operations does not recognize crisis as a general state of operations, rather,

categorizes crisis as part of an operational continuum of conflict. It defines crisis as an incident or situation involving a threat to the United States, its territories, citizens, military forces, and possessions or vital interests that develops rapidly and creates a condition of such diplomatic, economic, political, or military importance that commitment of U.S. military forces and resources is contemplated to achieve national objectives.[5]

In this emerging role of operations in crisis areas, planners must have immediate options ready for decision makers. In response to threatening incidents, the US military must have strategic deployability that is both sufficient to meet given situations and rapid enough to insert viable forces. Once deployed in the theater of operations, these tailored forces must have the mobility, lethality, versatility, and sustainability to complete their mission. Current examples of the need for such forces and capabilities are evidenced in the U.S. response to crises in Grenada, Honduras, and Panama. There is, however, a fairly large amount of literature and a small body of experience which suggests the firepower, force protection, and tactical mobility of our quick decision/crisis action forces (light forces), as currently structured, are inadequate.

SELECTED REGIONAL ASSESSMENTS AND FORCE REQUIREMENTS

Latin America, the Middle East, Southwest Asia, and Africa are examples of regional areas most likely requiring US intervention or crisis assistance. The range of threat capability to challenge successful intervention efforts in these regions range from armies

with heavy forces having some degree of obsolesence through foot mobile rifle armies to guerrilla forces . Appendix A gives some idea of the number of tanks, armored cars, and fighting vehicles around the world. In short, several emerging nations have acquired a level of armor capability that cannot be ignored. The range of armored firepower extends from World War II vintage light and medium tanks to the newest, high technology wheeled fighting vehicles.

Within Latin America, the greatest threat may not be direct military intervention or exploitation, but severe economic, social, and political conditions that foster instability and promote insurgency.[6] With numerous insurgencies and counterinsurgencies ongoing, the most likely operating environment for US forces is low intensity with limited armor support (tanks or armored cars). However, during crises, operations could be directed against a force with limited combined arms capability (such as Panama). Due to the nature of the terrain and the economic status of most Latin American countries, operations will require several unique characteristics for successful mission accomplishment. Among these requirements are: timely strategic deployability, forced entry capability based on an immature theater of operations, operational and tactical mobility, multifunctional equipment, and restrained firepower. The scope of employment for US contingency forces may include: neo-evacuation, rescue, show of force, support operations against illegal drug traffickers, protection of US regional interests, peacekeeping, and assistance in counterterrorism/ counter-insurgency operations.[7]

The predominant threats to the US interests in the Middle East

and Southwest Asia include Soviet expansion, regional disputes, terrorism, and Islamic fundamentalism.[8] The operating environment dominating this theater will most likely be mid- intensity containing limited armored forces with combined arms capabilities. The probability of terrorism and insurgency operations entwined with sizeable conventional operations exists. Additionally, unconventional operations similar to those conducted by historical military leaders such as T.E. Lawrence, Nathaniel Green, and Arthur, Duke of Wellington against opposing conventional armies may distract the focus of our deployed forces.

Due to the open nature of the terrain and lack of forward deployed forces, contingency forces will require operational and tactical mobility, heavy firepower,and multi-functional equipment for a wide range of tactical operations. The scope of employment for US contingency forces may include offensive and defensive combat operations, show of force, augmentation of local forces, and security for logistics and C3I sites.[9]

In Africa, combat forces could be directed in operations protecting US regional interests, assisting in reestablishing a regional balance of power, or supporting host nation operations.[10] Numerous inter- and intrastates conflicts (some incorporating surrogate forces - mainly Cuban) dominate the present disruption in Africa. The range of conflict varies with the regional economic, health, political, and social situations. In north Africa, operations will most likely be mid intensity with surrogate forces operating with combined arms and substantial equipment reinforcement

capability. In east and south Africa, the open terrain and remote population centers will require highly mobile light and mechanized forces to operate in an environment of light infantry with varied armored support. In central and west Africa, US forces would face a low intensity threat with little armor reinforcement. The predominate scope of employment for US contingency forces within this sub-region centers on counterinsurgency operations.[11]

Forces selected to operate within the African nations will require tailoring for the region. The conceivable scope of employment for US forces may be obtaining more political or national objectives rather than military. The most probable political response actions within Africa may include peacekeeping, maintaining basing rights, and punitive military strikes.[12]

In summary, the range of threat capabilities, operations, and response measures varies greatly from region to region. Designated contingency forces must be sufficiently designed in structure, manning, and equipment to respond to tactical requirements confronting them in the assigned areas. Corbett recognized the need to create such forces distinguished by a selected design capability aligned with designated functions. Through this force design process, Corbett attempted to maximize the capabilities of a particular class of vessel specially adapted to perform appropriate functions.

A COMPARISON WITH MARITIME FLEET CONSTITUTION -CORBETT REVISITED

First, it is important to note that the rapid advance of technology during the last two decades has not invalidated Corbett's theoretical ideas and concepts. The idea of dividing the naval battlefield into a conceptual framework characterized by battle functions, control functions, and coastal activities offers a sense of understanding to today's force design and roles. According to Corbett, naval history tended to class vessels in relation to the primary function each grouping was designated to perform. Generally speaking, Navy fleet development was initially grouped into three types of vessels: battleships, cruisers, and flotillas[13].

In the theory of maritime strategy, the object of naval warfare is to secure control of communications. Once secured, the requirement then becomes a means of exercising control. Theoretically, battleships gained contact and defeated the enemy thus securing control over him and denying his capacity for interference.[14] Battleships, distinguished by large size and heavy armament, provided the specific function of fighting power. Cruisers, distinguished by mobility and specialization, were first introduced by Admiral of the Fleet, Lord Anson as a control vessel. Eventually, the cruiser's primary function became scouting. Theoretically, once battleships gained control of a communications line, cruisers assisted in exercising control over that line, freeing battleships to continue with fighting.[15] Flotillas contained unrated and small vessels capable of limited coastal and inshore work, dispatch service, and other support missions.[16] In short, each of

these vessels was distinguished by a design capability aligned with designated functions.

It is this concept of specialization that Lord Anson provides Corbett the foundation for a conceptual framework integrating the required functions of vessels--those actions requiring battle functions, control functions, or coastal activities.

> We have no longer an endeavor to adapt the fleet to its multifarious duties by multiplying a comparatively weak nature of fighting-ships, which could act in the line and yet be had in sufficient numbers to protect commerce, but which was not well fitted for either service. Instead we note a definite recognition of the principle that battleships should be as powerful as possible, and that in order to permit of their due development they must be relieved of their cruising functions by a class of vehicle specially adapted for the purpose.[17]

Inferred in this generalization is the assumption that specialization is the correct method in developing and employing a particular system. Specialization does not mean performance in isolation. It does mean maximizing the capabilities of several systems which in combination can achieve an overall intended result. Corbett's conceptual framework of battle functions, control functions, and coastal activities allowed force designers the ability to maximize the effects of a certain class of vessels (specialization) according to corresponding functions--battle functions (aligning with battleships), control functions (aligning with cruisers), and coastal activities (aligning with flotillas). However, like Clausewitz's recognition that the apparently easy can become so difficult, Corbett also recognized that the employment of

cruisers (like many systems) was subject to complexities when exposed to reality.

One such complexity was a competing desire for overwhelming force capability within a vessel to ensure its capability in securing control (a battleship designed function). This desire resulted in giving the cruisers some power of resistance[18]. Corbett recognized a dilemma in this last theoretical concept.

> This necessity once admitted, there seems no point at which you could stop increasing the fighting power of your cruisers, and sooner or later, unless some means of checking the process were found, the distinction between cruisers and battleships would disappear.[19]

In the debate of mixed class of vehicles (wheels verses tracks), corollaries and comparisons can be drawn from Corbett's theories of specialization, functions, and complexities. The link between designated roles (functions) and requisite capabilities (specialization) comes from the recognition of both requirements under METT-T and the purpose of employment. Singularly, armored wheeled systems (like cruisers) can assist a force in exercising control over an area, freeing main battle tanks for more appropriate battlefield functions. These vehicles can augment light forces with additional firepower when required. In combination with main battle tanks, armored wheeled vehicles can provide supporting battle functions including reconnaissance, the very manner that Lord Nelson used cruisers in Mediterranean operations during the early 1800s.[20]

Corbett cautions force designers against taking a system and adding more firepower and capability to handle a larger

requirement.[21] The risk becomes losing the desired capabilities and intended purpose that once made the system useful. What often happens is an in-use vehicle is ungraded or modified to meet an unexpected requirement. One example might be the M-2, Bradley Infantry Fighting Vehicle (IFV) which is a tremendous fighting vehicle but becomes suspect as a infantry protection vehicle. The IFV suffered from numerous debates over many crucial design capabilities. One such debate centered on its degree of survivability and protection in withstanding a main tank round.

To some, one solution is adding more armor protection. This would allow the IFV the capability to engage main battle tanks while acting simultaneously as an close-in infantry carrier. Certain material upgrades may be perceived as necessary, however Corbett warns when a system's use exceeds what it was designed for, its effectiveness declines. Throughout history examples exist of fighting systems employed in nondoctrinal or nonaligned roles. These systems suffered from a lack of perceived capabilities. Some of these perceptions were: insufficient firepower, lack of mobility, inadequate armored protection, misuse, inappropriate or incapable performance of doctrinal tasks. Two such examples are the armored car and the tank destroyer.

US ARMY HISTORICAL PERSPECTIVE ON ARMORED WHEELED SYSTEMS

ARMORED CARS

By the late 1930s, three types of light armored vehicles were developed and organized under the cavalry. These were combat cars, armored cars, and scout cars.[22] Combat cars (track laying vehicles), designed to close with the enemy frontally, on his flanks, or rear, assisted the horse cavalry units in maneuvering firepower on the battlefield. Armored cars were designed for great road mobility, armor protection, and armament but had no cross country mobility. These cars were not fighting vehicles but armored wheeled vehicles acting primarily as the distant eyes of the horse cavalry division commander. They reported information on enemy locations and conducted delaying missions to disrupt, delay, and disorganize the advancing enemy.

Scout cars (also wheeled vehicles) had the same general characteristics and missions as armored cars but were the regimental commander's reconnaissance vehicles. In particular, the M-3 Scout Car capitalized on the desired primary reconnaissance requirements of rapid road and cross country movement (tactical mobility), high degree of fighting power (firepower), communications ability, and protection for the crew against small caliber ground and air fires (survivability).[23] However, doctrine recognized the car's vulnerability to tank fire during close-in fighting and sustainability.

> In the employment of light and medium armored cars, it should be remembered that these are primarily reconnaissance vehicles. When employed in combat their action should be characterized by a sudden appearance, the immediate development of their maximum rate of fire accompanied by constant changes in disposition. Armored cars should never be used in an attempt to hold a locality but should be used far in advance of troops to gain contact, reconnoiter, and delay, eventually withdrawing to the flanks on a covering mission.[24]

Unfortunately, perceptions of the M3's performance characteristics centered on insufficient maneuverability and inadequate armament for mounted reconnaissance. The M3 and all other armored car developments were dropped from the US Army in 1937.[25] Periodicals contained numerous debates over the mechanization of the cavalry and the value of armored tactical reconnaissance. Fortunately the need for a lightly armored vehicle for reconnaissance units regained strength in 1939 when Germany used superior motorization/mechanization and tactics to quickly overcome Poland, France, and parts of North Africa.

By 1943, the first of 8,523 Ford built M-8 Armored Cars rolled off the production line.[26] Assigned to cavalry units, the M-8 was a lightweight (8 ton), 6x6 wheeled vehicle capable of 55 mph. Its primary weapon was the 37mm antitank gun capable of "mobile defense at ranges not exceeding 400 yards."[27] According to FM 2-20 (1944), Cavalry Reconnaissance Troop Mechanized, the armored car was not designed for offensive combat but a basic command and communications vehicle. By the close of the war, the M-8 was widely criticized by investigating panels on reported misuse. Of the missions assigned M-8 equipped units, 55% were offensive, 41% security, and only 4%

doctrinal.[28] Soon after World War II, the US Army abandoned development of a replacement for the M-8.

Post war debates again flared over the nature of armored wheeled reconnaissance in Cavalry units.[29] The recognition of the inherent capabilities and combat requirements for armored wheeled systems was lost in doctrinal disputes. The perceived indifferent performance of armored wheeled systems was overshadowed by the survivability in tanks and Corbett's proposition on the dominance of firepower; a dominance that would extent through Korea and Vietnam to today.

The extent of tank dominance upon our force design is evidenced by the shortcomings in reconnaissance elements during the Korean War. One such example comes from the 25th Reconnaissance Company operating near Unsan, North Korea in November, 1950. Elements of this unit were surrounded by an estimated reinforced battalion of Chinese Communists. The results were disastrous. Equipped with the 1/4 ton jeep, numerous soldiers were killed or wounded due to the jeep's inability to quickly maneuver, return fire, and withstand the effects of small arms and mortar fire.[30] Eventually the solution to this requirement for firepower and protection was the introduction of light tanks into the reconnaissance units. Again, post-war studies expressed disadvantages in using tracked vehicles during reconnaissance missions.

> The track and suspension adds to the size, weight, and cost. The fuel consumption of a tracked vehicle will be higher than that of a similiar wheeled vehicle. The factors of speed, noise level, and maintenance favor the wheeled vehicle.[31]

The controversy would not end here. Debates over the armored

car's utility and the need for increased firepower in reconnaissance units continued from the limited war environment of Korea to counterinsurgency operations in the Republic of Vietnam.

Vietnam era studies found the required essential characteristics of armored cars changed little since World War II. Some of the continuing performance criteria included: small arms armor protection, all around vision, high volume of fire, multiple firing selection and engagement capabilities, close-in protection measures, high road speed, long vehicle life, low weight, quietness of operation, and cross-country mobility.[32] While the US Army did not formally adopted a replacement to the M-8, armored cars were utilized by forces operating in Vietnam.

The Army of Vietnam (ARVN) units, equipped with the American made M-8 armored car, performed selected counterinsurgency missions such as reconnaissance, route and area security, light combat maneuvers, link-up operations, fire support, sector patrol, and reinforcement of infantry units. Although the missions and assigned roles were valid, the M8 was claimed not suitable for use in Vietnamese counterinsurgency operations by an Army Concept Team in Vietnam evaluation because of "lack of repair parts, lack of a swim capability, poor cross-country mobility, and inability to carry personnel in addition to the crew."[33]

Additionally, the V100 (Commando), designed by United States business firm of Cadillac Gage, was utilized by selected US Army military police units in Vietnam. Primarily, the armored cars were limited to patrol, rear area security, and convoy escort duties.[34]

Due to the V100's limited use, no formal US Army post-war evaluations could be found.

TANK DESTROYERS

In 1941, the United States War Department was shocked at Germany's ability to quickly devour Poland (1939) and France (1940). The United States countered the German "blitzkrieg" by developing a concept of massing antitank fire from mobile units with high velocity guns. This interim solution was the tank destroyer. The plan, developed by Major (later General) Albert C. Wedemeyer called for pooling currently fielded 75mm gun systems (mounted on mobile carriers) at division and G.H.Q level, positioning them centrally on the battlefield and attaching them to armies and corps as group level packages.[35]

The tank destroyer concept was supported by a elite, aggressive, offensive spirit designed to counter the German's use of massed armor for shock action and mobility. In early 1943, tank destroyer units in North Africa were initially employed as doctrine envisioned. However, tank destroyer roles, missions, and organization came under fire as significant combat action took place in El Guettar and Kasserine Pass.[36]

Tank destroyer doctrine assumed that the infantry was capable of basic self-defense against tanks, so tank destroyers were kept in reserve.[37] However, analogous to Corbett's assessments in the complexities of the battlefield:

> Tank destroyer companies and platoons attached to infantry formations were sent to the front to

> supplement the inadequate antitank guns and bazookas of the infantry regiment. With the exception of increasing rare armored counterthrusts, German tanks, on their part, tended to operate in small numbers and in conjunction with infantry forces, thus making it necessary for tank destroyers to cover wide sections of the front.[38]

Additionally, the tank destroyer concept acted on the assumption that enemy forces fought in all-armor formations. After 1942, neither the US armored force nor the German panzer forces conduct large scale, all-armored operations comparable to excercises conducted during the Carolina maneuvers just one year prior.[39]

After the Normandy breakout (Operation Cobra), the primary task for tank destroyers' changed to infantry support. The use of a combined arms approach to operations proved successful. Tank destroyers were positioned 500-800 meters behind advancing infantry, firing on suspected enemy positions ahead of the infantry's advance. In turn, the infantry would neutralize enemy antitank positions threatening the tank destroyers.[40] Tank destroyers were effective in destroying pillboxes and permanent defensive works along the Westwall or Siegfried Line, providing direct and indirect fire to reinforce artillery units, and supporting landing operations.[41] By using the tank destroyer in a divergent role, the inherent capabilities of tank destroyers (tactical mobility, speed, and rapid firepower) were channeled against a different target. This divergent approach to tank destroyer usage can be compared to Corbett's theoratical approach to warfare as utilizing a combination of forces to achieve an intended result.

Tank destroyer doctrine initially envisioned isolated operations

to destroy large all-armored formations.[42] Unfortunately, the desired result did not match the capabilities of the tank destroyer. The proximate cause for that failure was a lack of relative firepower and armor protection. The German Mark IV tank contained superior firepower and armor protection over the first expedient, M-3 Gun Motor Carriage's 75mm gun (not really an antitank gun but a artillery piece). With a maximum armor thickness of only .625 inches, the M-3 was vulnerable to all but small arms fire and its performance operating cross country was disappointing.[43] The next expedient tank destroyer, the M-6 was much worse. The only protection on this three-quarter ton truck, rear mounted with a 37mm gun, was a gun shield. The 37mm gun was minimally effective against the side and rear of the most German tanks while totally ineffective against the German Tiger.[44] Working in semi-independent roles, tank destroyers were unable to function effectively against the German combined arms style of tactics. The initial fielding of numerous expedient tank destroyers (adapted from armored personnel carriers, World War I vintage field pieces, and three-quarter ton trucks) to fill an unexpected requirement is suggestive of Corbett's caution against taking an inappropriate system and adding more firepower to handle a larger requirement.[45]

However, both armored cars and tank destroyers were useful on the battlefield. The armored cars of World War II were used for reconnaissance, carrying troops and supplies into combat, and internal security requirements. Tank destroyers, initially employed to defeat massed German armor, found greater use in the latter part

of World War II as an infantry support assault gun. However, history shows controversies in armored wheeled vehicles' employment and capabilities resulted from a perceived lack of capabilities and firm doctrinal foundation. In Corbett's terminology, the link between designated roles (functions) and requisite capabilities (specialization) were not achieved. The trade off among requirements, capabilities, and risks were never fully recognized or drawn by the US Army force designers. This lack of confidence in armored wheeled vehicles has led the US Army to abandon any adoption of such a class of vehicle. However, the United States Marine Corps (USMC) and French Army have adopted and used armored wheeled systems with confident results.

CONTEMPORARY USE OF ARMORED WHEELED SYSTEMS

FRENCH USE

On 28 June 1973, Libyan forces were accused by France of direct intervention into Chad. The Libyan government and Qaddafi denied the charges of direct intervention and warned that French intervention in Chad would provoke a confrontation with Libya.[44] With successful French intervention efforts, negotiations continued until late 1986 when French and Chad forces decisively engaged and defeated Libyan forces. Colonel Grenaudier, the French LNO to USAARMC, believes armored wheeled systems proved successful for both Chadian and French forces during these operations.

In the southern part of Chad, light armored cars (4x4, 90mm) were used as antitank support for three French battalion size task

forces. An available AMX10RC (6x6, 105mm) unit was kept in reserve to reinforce, if necessary. The area of operation spanned a 500 mile frontage. The speed and mobility of the wheeled armored vehicles resulted in the destruction of Libyan T-55/T-62 tanks from flank and rear engagements.[47]

Additionally, Colonel Grenaudier commented on the use of armored wheeled vehicles in a recent joint exercise. During a BOLD SPARROW exercise, two French units, the 6th Light Armored Division and the 9th Marine Division moved 1500 kilometers in two days to reinforce the 2D German Corps arriving with 100% availability. Overall, the French participated with over 600 wheeled vehicles (no tracks) and logged a total of 15 million kilometers with an availability rate at exercise end of greater than 98%.[48] He concluded by stating the French value speed and firepower while sacrificing a degree of armor protection. The French believe that speed and mobility enhance survivability.[49]

In both the crisis situation in Chad and the joint readiness exercise, armored wheeled systems gave French forces the staying power on the battlefield without sacrificing mobility for survivability. In these two operations, the ability to project and position combat power was achieved by the operational and tactical mobility inherent in this type of armored wheeled system. This contemporary example also underscores the fundamental concepts that armored wheeled systems have survivability (through operational and tactical mobility), relative firepower, and sustainability.

USMC USE OF THE LAV-25

The USMC light armored vehicle program stemmed from a previous joint Army-Marine Corps requirement for an easily deployable weapons system featuring tactical mobility, protection, and assault capability. The requirement was reportedly inspired by the Iranian hostage crisis when the military realized it needed a fast, transportable weapons system capable of operating effectively several hundred miles from hostile shorelines or borders. The lack of such a capability made the ill-fated Desert One helicopter operation the only military option available to the United States at the time-short of all-out war.[50]

The USMC fielded the first LAV-25 unit in November 1983. Today four Light Armored Infantry (LAI) Battalions are active containing the basic LAV-25 model plus five variants (L-logistics, R-recovery,M-mortar, AT-antitank, and C2-command and control). The USMC adopted the LAV as a heavily armed combat system with its own assault capability. USMC doctrine outlines the tactical roles for LAVs as: fire support for non-organic infantry during attack and defense; fire support for infantry in LVT7A1 amphibious track armored vehicles as part of a regimental- size mechanized force; reconnaissance and security missions, deliberate attacks against an enemy's exposed flank or rear (offensive operations); or defense of a sector/counterattack role (defense).[51]

The USMC LAV-25 has yet to prove its worth in combat. However, this type of armored wheeled system typifies the historical suggestions (earlier stated) for requisite capabilities needed in

supporting a force design. These areas include: amphibious capability, small arms armor protection, all around vision, high volume of fire, multiple firing selection and engagement capabilities, close-in protection measures, high road speed, long vehicle life, quietness of operation, and cross- country mobility. According to the Marine Corps, the above capabilities are achieved at: a lower life-cycle cost, lower noise level, less vehicle/crew fatigue, less maintenance time, longer interval between overhauls, and better fuel economy than tracked vehicles.[82]

The relevancy of readopting such an armored wheeled system for employment into future areas of conflict is coincidental to requirements, capabilities, and application (risks). All three require an encompassing philosophy for employment--doctrine. Recognizing that armored wheels systems have strengths ar ! vulnerabilities is a fundamental in battlefield dynamics. The criteria for success rests in historical precedence and current battlefield dynamics. The remainder of this monograph will address three fundamental issues tied to battlefield dynamics.

First, can armored wheeled system complement light forces in crisis operations as well as highly mechanized forces operating in war? Second, do armored wheeled systems provide staying power on the battlefield? Third, given finite sea and airlift capabilities, can armored wheeled systems be deployed into a theater of operations without degrading the total amount of rapidly deployed force available to conduct immediate operations? An evaluation of these issues starts with an analysis of the dynamics of combat power and

its impact on a force design.

DISCUSSION

> The dynamics of combat power decide the outcome of campaigns, major operations, battles, and engagements. It measures the effort created by combining maneuver, firepower, protection, and leadership in combat action against an enemy in war.[23]
>
> FM 100-5, Operations, 1986

The principal characteristics of any armored vehicle are mobility, protection, and firepower. Heavy forces achieve a relative degree of firepower, speed of maneuver, and protection utilizing currently designed armored tracked vehicles. A sacrifice in strategic deployability was accepted based on the requirements for countering the Soviet threat in a general war scenario. Light forces, on the other hand, were designed for rapid strategic deployability, sacrificing the requisite capabilities of highly mechanized forces. A key point to remember is the ability to project and position combat power is function of both strategic deployability and operational and tactical mobility.

A concern expressed earlier suggests that the US Army has sacrificed the requisite tactical mobility, force protection, and firepower of light forces, as currently structured, for strategic deployability. Light forces, once employed, are best suited in many regional and crisis areas. However, controversy arises over our light forces' ability to execute the AirLand Battle imperative of "move fast, strike hard, and finish quickly."[24]

The implications of "move fast" in light of strategic

deployability underscores the importance of quick intervention. Successful entry into a theater of operations becomes a time-space-correlation of forces challenge focusing on maximizing deployment for immediate employment. A vulnerability for forces begins with the initial incremental landing of forces into a regional area but decreases as more elements of combat power arrive. In a crisis, however, rapid closure time is vital to success. In considering the impact of deploying contingency forces into a crisis area, two fundamental questions must be addressed. First, can a designated force arrive before a crisis becomes untenable ? Second, can that force be delivered within an adequate closure time?

The answer to both questions rests with the impact that an immediate response capability has on a crisis and its decision makers. In crisis situations an immediate, continuous flow of airlifted forces arriving today has greater significance than forces arriving some time later by sea or heavy lift operations. If immediate force closure is required to gain and maintain the initiative, then force design and transportability plays an enormous role in gaining operational initiative and surprise. The longer the closure time, the more likely the antagonist's response capability will be stronger. Additionally, with a longer closure time, intervening forces are more vulnerable to defeat caused by lack of consolidated combat power.

Using an Air Force designed computer program (MPT-MAC Planner's Toolkit), relative closure times were estimated for six variants of a force design deployed into two different regional areas. Force

designs varied between light to heavy forces with one scenario portraying a light division task force augmented with an armored wheeled system (AWS) battalion (replicated by the current MTO&E of the USMC LAI (Light Armored Infantry) battalion equipped with LAV-25). Appendix B provides the standard assumptions common to both deployments and individual results for each variant.

In analyzing the results, relative closure times for passengers varied little with an increasing in manning. However, closure times increased noticeably when outsized and oversized cargo requirements increased. The difference in estimates between employing a light division and heavy division (given a set amount of air frames) is 18 days. The impact of augmenting a light division task force with an armored wheeled system battalion is an increase of 1 day in estimated relative closure time for Honduras, two days for Oman (see Appendix B). Augmenting a force design with an additional multifunctional system suggests a connecting relationship between strategic deployability and two fundamental battlefield issues.

One such precarious relationship focuses on transporting an armored wheeled system into a logistically underdeveloped theater in sufficient quantities without degrading the total amount of rapidly deployed force available to conduct immediate operations. The results in Appendix B provide an estimate on the amount of risk (in days of closure) that augmentation causes. Time is not a luxury in crisis action. Speed of deployment and quick closure are commensurate, not separate, from the tactical objectives of intervening forces.

Obviously, the percentage of total Air Force lift assets available can be increased. However, the significant point to derive from these estimates is the impact of adding cargo (not personnel) on a tailored force's ability to commence combat operations with some degree of sustainability. Whether force designers and crisis planners are willing to accept this risk should be based on the factors of METT-T-P (mission, enemy, terrain, troops, time, political situation/environment). The risk line must be drawn early to determine acceptable standards in time-space-correlation of forces. However, strategic deployability is only part of the relationship in projecting and positioning combat power.

A second relationship concerns giving a force design greater staying power on the battlefield. This equates closely to the AirLand Battle imperative ".... strike hard, and finish quickly."[55] Currently, direct fire antitank systems in the Army's five light divisions are generally limited to four TOWs mounted on light wheeled vehicles and eighteen shoulder fired Dragon missiles per light infantry battalion. TOWs and Dragons provide light infantry forces with the capacity to engage limited armor threats. Some regional threats, however, include large conventional armies utilizing combined arms supported by tanks and light armored systems employed as fighting vehicles, antitank systems, and troop carriers. This too is significant given the potential for threat forces to generate a greater range and volume of firepower than our currently structured light forces. What light forces lack is the ability to engage a large number of light armored systems listed in Appendix A (volume

targets). Light forces can only match this imbalance by using their limited number of Dragons and TOWs against these volume targets, which is more targets than the amount of ammunition or time available to overcome.

However, direct fire engagements against an armor threat is not the only emerging threat challenging successful intervention. Light forces also may be called upon to conduct neo-evacuation (as in Panama), peacekeeping operations (Sinai), raids, rescue operations (Desert One), security of fixed sites, and counterinsurgency operations in a low to mid intensity environment. All of these operations require operational and tactical mobility not organic to light forces. Given the previous analysis of emerging regional threats, large numbers of main battle tanks may be politically inappropriate or operationally inaccessible for regional use in a timely manner.

Armored wheeled systems currently may best satisfy requirements of light forces for a system with strategic deployability, operational and tactical mobility, requisite firepower, and multifunctional capabilities. From the previous analysis, light forces may require augmentation of a system which is a tank killer, a volume killer, and a multipurpose carrier. With the current threat leaning toward operations in low intensity environment, where counterinsurgency demands prevail, the US Army lacks a system which meets these requirements. The specific system performance criteria structured to meet these requirements should be supported by historical analysis and current battlefield necessities.

CONCLUSIONS

Corbett's theory that the constitution of a fleet should be the expression, in current technology material, the strategic and tactical ideas of the time, brings to light the significance of developing force designs based on strategic response, operational objectives, and tactical actions: all three forged into a system capable of achieving intended results. Current strategic ideas call for a more compact Army with deployable, mobile units able to respond to strategic needs in areas ranging from nation development to war.[56] Operational ideas require these units be force designed for rapid strategic deployability, high lethality, operational mobility, survivability, versatility, and sustainability.[57] It becomes a question of the tactical requirements that dictate whether the characteristics inherent in wheels or tracks better suits achievement of the intended results.

Main battle tanks and tracked vehicles have proven their worth throughout history when employed in general and limited war scenarios. Armored wheeled systems employed in the same scenarios have not for a variety of reasons. However, given current technological advances and a changing emphasis in the continuum of operations, the capabilities of armored wheeled systems can address the shift in military strategy and force capabilities. These capabilities now include: small arms armor protection, amphibious capability, all around vision, high volume of fire, multiple firing selection and engagement capabilities, close-in protection measures, high road speed, long vehicle life, quietness of operation, and

cross- country mobility. The above capabilities are achieved at a lower life-cycle cost, lower noise level, less vehicle/crew fatigue, less maintenance time, longer interval between overhauls, and better fuel economy than tracked vehicles and main battle tanks.[58]

There is little doubt that there are roles in which battlefield agility, required by a combination of threat and terrain, favors tracked vehicle use. Appendix C provides a snapshot of the salient characteristics of many of today's tracked and wheeled armored systems. Recognizing that armored wheeled systems have strengths and vulnerabilities is a fundamental element in determining the system's capability for success. The criteria for success rests in historical precedence and current battlefield needs. The analysis for success is based on the three fundamental questions previously addressed.

First, can armored wheeled system complement light forces in crisis operations as well as highly mechanized forces operating in war? Historically, armored wheeled systems, such as the tank destroyer, provided infantry forces adequate assault support through requisite firepower and mobility. Armored cars provided a degree of secrecy and stealth to reconnaissance but suffered from technological shortcomings. When improper roles were assigned to both systems their utility on the battlefield declined tremendously. Additionally, both systems suffered from a perceived lack of firepower, a philosophy dominated by the successful use of the tank.

The emerging threats and the projected missions and roles of light forces require a quick response capability that allows deployed forces to "move fast, strike hard and finish quickly."[59] Armored

wheeled systems can complement light forces' operations responding to crisis in a contingency area by: augmenting existing firepower systems for greater survivability; providing a greater degree of flexible operational and tactical mobility in operations; and providing a multifunctional system capable of transporting and securing neo-evacuees and noncombatants, battlefield medical transportation, command and control platform, internal security, and light armored, mobile reconnaissance. In support of heavy operations, armored wheeled systems can provide the following: highly mobile, stealthful armored reconnaissance; mobile, logistics capability able to keep pace and survive with other mechanized forces; flank security; counterattack forces; rear area protection measures (see Appendix D for a detailed analysis of requirements in rear area protection); and infantry support during assault operations.

Second, do armored wheeled systems provide staying power on the battlefield? The answer rests within two interactive measurements; the dynamics of combat power and system characteristics. Armored wheeled systems can provide the potential for increased combat power by virtue of the systems requisite features of firepower, maneuver, and protection. These three measurements of combat power are more defined in six inherent capabilities of armored wheeled systems. These are: strategic deployability (light enough to get there quickly); high lethality (able to kill a wide range of threats); operational and tactical mobility (able to move quickly and decisively around the battlefield); survivability (whether by

protection, mobility, command and control, or a combination); versatility (capable across a broad threat spectrum); and sustainability (logistically supportable within lift and theater infrastructure constraints).[40] If achieved, these required characteristics transcribe into the elements of combat power and can provide a force design the staying power on the battlefield.

Third, given finite sea and airlift capabilities, can armored wheeled systems be deployed into a theater of operations without degrading the total amount of rapidly deployed force available to conduct immediate operations? From the analysis of the Air Force closure time model, three interdependent concepts decide the outcome of intervention. First is the power of quick intervention in controlling crisis. Second is time-space- correlation of forces. Third is the ability to quickly generate the elements of combat power. The power of quick intervention in controlling crisis is the basis for rapid deployment. When a crisis occurs requiring an immediate response to subdue or contain, rapid closure time is paramount. Once deployed in the crisis area, time-space-correlation of forces dictate the operational setting. Generating immediate, overwhelming combat power in order to subdue or contain crisis is critical to success.

Given the current firepower and tactical mobility of light forces responding to crisis, evidence suggests that augmentation of an armored wheeled system increases the chances for success. The optimum word is augmentation not organic. Once light units are structured with additional tracked or wheeled systems, the very

purpose which created light forces is defeated. However, augmentation from a corps level provides a tailorable, versatile option to a force design. The risk of requiring additional closure days to achieve increased firepower, protection, and tactical mobility advantages to light forces is acceptable provided force designers understand and heed Corbett's warning on the complexities of reality. To paraphrase Corbett's paradigm, light forces are designed for a specific purpose (specialization). Once they are inherently changed...."there seems no point at which you could stop increasing the firepower of light forces. Unless some means of checking the process were found, the distinction between light forces and heavy forces would disappear."

In considering whether adopting an armored wheeled system would complement both heavy and light forces operations, one final issue must be addressed. That issue is what form should the proposed armored wheeled system assume -- a multifunctional or specialization class of vehicle? The requirements for augmenting a light force with additional firepower, force protection, and mobility translates into a tank killer, a volume killer, and a carrier. In considering whether the system design should be multifunctional or specialized, a final correlation to one of Corbett's relates. When a system is designed to fit multifarious requirements, the result often is a system not well suited for any of the requirements.[41]

A solution suggests variants -- requirements satisfied in variations from a standard model and fielded in the same force design. One variant is a volume killer or a tank killer. Another

variant is not a firepower platform but a carrier. Design issues such as the optimum number of dismountable troops should be carefully analyzed against the demands for concentrated infantry, logistics support in austere conditions, and the impact of any increase in size and weight on deployability. Clearly, these and many more unresolved issues must be throughly considered and risk lines drawn before the full implications on doctrine, training, materiel, and personnel can be determined.

IMPLICATIONS ON DOCTRINE, TRAINING, AND MATERIEL

If armored wheeled systems are not adopted into the US Army force design, no impact on training, doctrine, or materiel is foreseen. However, if accepted, doctrine and training literature addressing the prevailing principles and fundamental (FMs) as well as tactics, techniques, and procedures (TCs) should reflect the strategic, operational, and tactical peculiarities and capabilities inherent in armored wheeled systems.

If armored wheeled systems are organized at corps level, doctrine and training literature must address deployment and employment options at various levels of war intensity (high, medium, or low). In addition, missions, roles, and command and control procedures must be carefully and firmly embedded into doctrine preventing misuse or inappropriately assigned actions. The training base must be modified to accommodate the final design characteristics selected for the armored wheeled system, mainly in the areas of gunnery, tactical techniques and procedures, and light armored

wheeled maintenance procedures.

Initial implications on materiel may be the most significant. The selection of specific design and armament capabilities will dictate the armored wheeled system's perceived success on the battlefield. Design selection and capabilities will influence doctrine and training literature. An off-the- shelf armored wheeled system incorporating armament currently within the US Army inventory will not only cut down research and development costs for both but also speed up the acquisition time significantly.

It is critical that the six operational requirements expressed in tactical characteristics be achieved regardless of the final design selection. These six characteristics are: strategic deployability (light enough to get there quickly); high lethality (able to kill a wide range of threats); operational and tactical mobility (able to move quickly and decisively around the battlefield); survivability (whether by protection, mobility, command and control, or a combination); versatility (capable across a broad threat spectrum); and sustainability (logistically supportable within lift and theater infrastructure constraints).[42]

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1. APPENDIX A: POTENTIAL THREAT - MAIN BATTLE TANKS

2. TANKS	CENTRAL & SOUTH AMERICA	SUB-SARAHA AFRICA	N AFRICA/ MIDDLE EAST	ASIA FAR EAST *	TOTAL
M4A3 SHERMAN (MED)	400	130	----	50	580
M3A1 STUART (LT)	300	----	----	100	400
AMX-13 (LT)	390	50	300	610	1350
CENTURIONS	----	300	1450	----	1750
T-34/54/55	1230	1500	9700	5500	17930
T-59	----	80	1500	----	1580
T-62	----	400	2000	1020	3420
T-72	----	40	1900	300	2240
T-80	----	----	80	----	80
PT-76	25	130	400	290	845
M-47/48	----	140	1960	780	2880
M-41 BULLDOG (LT)	----	40	80	1330	1450
M60A1/2/3	----	----	2550	----	2550
CHIEFTAIN	----	----	210	----	210
VICKERS	----	150	70	----	220
SCORPIONS	40	85	460	210	795
SCIMITAR	----	5	----	----	5
M-24 CHAFFEE (LT)	20	----	100	350	470
COMET	----	----	----	25	25
VIJAYANTA	----	----	----	1100	1100
TAM	220	----	----	----	220
T-60/63	----	----	----	50	50
HURASSIER (TD)	240	----	160	----	400
OTO VCC (TD)	----	----	200	----	200
X-1/2	120	----	----	----	120
AMX-30	170	----	620	----	790
M-5	20	----	----	----	20
TOTAL	3175	3050	23740	11715	41680

3. SOURCE: MILITARY TECHNOLOGY, THE BALANCE OF MILITARY POWER WORLD DEFENSE ALMANAC 1988-89, CARL

1. APPENDIX A: POTENTIAL THREAT - LIGHT ARMORED VEHICLES

2.

LIGHT ARMORED	CENTRAL & SOUTH AMERICA	SUB-SARAHA AFRICA	N AFRICA/ MIDDLE EAST	ASIA FAR EAST *	TOTAL
MB/M20	145	80	20	25	270
COMMANDO	20	70	40	230	360
FERRETS	----	160	280	280	720
M-3	150	50	----	----	200
BTR 40/50/60/152	----	690	370	1220	2280
BRDM 1/2	600	700	1470	----	2770
OT-62	----	----	----	----	0
AML 60/90	45	675	440	145	1305
EE-9 CASCAVEL	360	140	----	----	500
VBL	----	7	----	----	7
BMP	----	40	200	140	380
SALADIN	70	50	700	80	900
MOWAG	80	70	----	----	150
SHORELAND	20	8	6	30	64
SARACAN	----	5	250	----	255
FOX	----	20	----	----	20
EBR-75	----	15	80	----	95
VXB-170	----	10	----	----	10
AML ELAND	----	1630	----	----	1630
AML 245	10	----	50	----	60
BA-64	----	----	----	140	140
SIBMAS	----	----	----	185	185
ECR 90	40	----	----	----	40
M-706E1	60	----	----	----	60
K-63	----	20	----	----	20
AMX-10P	----	----	40	----	40
TOTAL	1600	4440	3946	2475	12461

3. SOURCE: MILITARY TECHNOLOGY, THE BALANCE OF MILITARY POWER WORLD DEFENSE ALMANAC 1988-89, CARL

* MINUS VIETNAM/CHINA

1. APPENDIX B: MAC Planners Toolkit Input Data

2.

Unit	Strength	Short Tons of Cargo Outsized Cargo	Bulk/Oversized Cargo
Light Bde Task Force	3,091	226	3,506
Light Div Task Force	6,377	210	7,089
Light Division	10,792	352	11,813
Light Div + LID TF	17,092	560	18,903
Heavy Division	16,805	30,101	45,620
Light Div TF + AWS BN	7,288	210	9,152

* Information obtained from 18th Airborne Corps Deployment Guide and Air Force Planning Guide.

3. USMC LAI Battalion Data Input - Personnel - 911

Equipment	Number	Estimated Weight Ea lbs	Total Weight lbs
LAV-25	56	28,000	1,568,000
LAV-L	16	23,000	368,000
LAV-R	6	29,000	174,000
LAV-M	8	23,000	184,000
LAV-AT	16	28,000	448,000
LAV-C2	8	23,000	184,000
			2,926,000 lbs
			1463 STONS
Water Trailer	8	2,530	20,240
105 Trailer	10	2,670	26,700
Wreakers	2	38,466	76,932
5T Trucks	13	22,878	297,414
Generator Trl	6	2,720	16,320
Fork Lift	1	24,700	
	1	18,500	43,200
LVS	3	40,300	120,900
HMMWV	26	5,150	133,900
			735,606 lbs
			368 STONS
4 Line Companies Weight			45,035
1 Headquarters and Service Company			416,482
			461,482 lbs
			231 STONS

* Figures obtained from Major Williams, S-4, USMC 2d LAI Battalion.

3. Deployment Estimates

4. Common Assumptions:

- crisis occurred which requires immediate response to subdue or contain
- deployment conducted from secure support base operations and landing sites (no forced entry requirement)
-given global transport responsibilities xxx% of MAC assets available for each requirement
- 24 hour notice given with C-Day designating the day conflict is expected to begin.
- air superiority of lines of communications.
- flow of men and materiel uninterrupted.

5.Scenario One:

Five different force designs, ranging from a light brigade task force through a heavy division, were deployed from APOE Charleston, NC to APOD Palmerola, Honduras with 25% of the Air Force total lift assets available. The results expressed in estimated total closure days were:

UNIT	STRENGTH	PAX	BULK OUTSIZED CARGO	OVERSIZED CARGO
LT BDE TF**	(3,091)	1	1	2
LID TF	(6,377)	2	1	3
LID	(10,792)	4	3	5
LID + LID TF	(17,092)	4	3	7
HVY DIV	(16,805)	4	23	23

*minimum logistical support-mostly combat forces

6. Scenario Two:

A light division task force was employed from APOE Norton AFB, CA to Seeb/Masirah, Oman with 60% of the total MAC lift assets available. The results expressed in estimated total closure days were:

LID TF DEPLOYED TO OMAN

UNIT	STRENGTH	PAX	BULK OUTSIZED CARGO	BULK OVERSIZED CARGO
LID TF	(6,377)	5	1	9

7. Scenario Three:

The same light division task force was augmented with an armored wheeled system (AWS) battalion (replicated by the current MTO&E of the USMC LAI (Light Armored Infantry) Battalion equipped with LAV-25 with variants and other organic MTO&E/TDA equipment) in deployments to both Honduras (25% of Air Force lift assets) and Oman (60% of Air Force lift assets available). The estimated results were:

LID TF AUGMENTED WITH AWS BN (W/O)

UNIT	STRENGTH	PAX	BULK OUTSIZED CARGO	BULK OVERSIZED CARGO
HONDURAS	(7288)	2 (2)	1 (1)	4 (3)
OMAN	(7288)	5 (5)	1 (1)	8 (10)

1. APPENDIX C: LIGHT ARMORED VEHICLES - TRACKED

2.

COUNTRY OF ORIGIN	ARMORED VEHICLE	LENGTH (m)	WIDTH (m)	COMBAT WEIGHT (kg)	MAX ROAD SPEED (kph)	RANGE (km)	CREW
AUSTRIA	STEYR 4K7FA	5.870	2.50	14,800	62.5	520	2+8
BRAZIL	EE-T4	3.500	2.02	3,600	70	350	1
BELGIUM	COBRA APC	4.520	2.75	8,600	75	600	2+10
	COBRA 25	4.770	2.75	9,500	70	600	1+2
FRANCE	AMX-10P	5.778	2.78	14,200	65	600	3+8
ITALY	VCC 80 IFV	6.705	2.98	19,200	70	600	1+9
	OTO C13/25	5.650	2.71	15,700	70	340	9
JAPAN	TYPE 72/73	5.600	2.80	13,300	60	300	3+12
UK	SCORPION	4.930	2.24	7,738	80	480	3
	WARRIOR MCV-80	5.420	2.80	20,000	75	500	2+8
	RO 2000	6.300	2.81	18,000	55	400	1+12
USA	M113 (A2)	4.863	2.54	11,341	67	480	2+11
	M2 BRADLEY	6.450	3.20	22,680	66	480	2+8
USSR	BMD	5.300	2.65	8,500	85	300	2+5
	BMP-1	6.750	2.97	12,800	55	300	3+8
W. GERMANY	MARDER	6.790	3.24	28,200	75	520	4+6
	WIESEL	3.265	1.82	2,600	80	200	3
YUGOSLAVIA	M-980	6.400	2.59	13,000	60	500	3+7

3. SOURCE: ASIAN DEFENCE JOURNEL, MARCH, 1988

1. APPENDIX C: LIGHT ARMORED VEHICLES - WHEELED

2.

COUNTRY OF ORIGIN	ARMORED VEHICLE	LENGTH (m)	WIDTH (m)	COMBAT WEIGHT (kg)	MAX ROAD SPEED (kph)	RANGE (km)	CREW
AUSTRIA	PANDUR	5.697	2.50	10,800	105	650	2+8
BELGIUM	SIBMAS	7.320	2.50	18,500	100	1,000	3+11
BRAZIL	EE11-URUTU	6.000	2.60	13,000	95	1,000	1+13
	EE9-CASCAVEL	5.180	2.33	10,750	100	880	3
CANADA	LAV-25	6.393	2.499	12,882	100	668	3+6
FRANCE	VXB-170	5.990	2.50	12,700	85	750	1+11
	VBL	3.715	1.80	3,000	105	900	4
	AML-60	3.790	1.96	5,500	100	600	3
	MBVTT	4.450	2.40	5,800	90	600	2+10
	VAB	5.980	2.035	17,700	100	1,100	2+10
FINLAND	SISU XA-180	7.350	2.90	15,000	100	800	2+10
HUNGARY	PSZH-IV	5.700	2.50	7,500	80	500	3+6
ISRAEL	RBY MK1	5.023	2.03	5,750	100	550	2+6
ITALY	R3 CAPRAIA	5.400	2.80	3,100	115	500	---
SWITZERLAND/ CANADA	PIRANHA	5.840	2.50	9,600	100	600	3+9
UK/AUSTRIA	PANDUR	5.697	2.80	12,000	105	650	2+10
	BTR-60A	7.650	2.825	9,980	80	500	2+16
	BTR-60B	7.650	2.825	10,300	80	500	2+14
UK/BELGIUM	VALKYR	5.600	2.50	7,500	100	700	12
SPAIN	VEC	6.250	2.50	13,750	96	800	5
SOUTH AFRICA	RATEL	7.210	2.70	17,000	105	800	3+7
SWITZERLAND	SPY	4.520	2.50	7,500	110	700	3
UK	SAXON	5.170	2.49	11,600	96	480	2+8
	SIMBA FS 100	5.260	2.54	10,000	100	640	2+10
	HUSSAR	5.740	1.85	5,350	100	350	2+12
	BORDERER	4.660	1.87	3,300	110	400	3
	FOX	4.242	2.134	6,386	104	434	3
	SHORLAND	4.635	1.778	3,600	104	700	3
	VALKYR	5.600	2.50	11,500	100	700	2+8
USA	COMMANDO V150	5.689	2.26	9,880	88	640	3+9
USSR	BTR-80	7.535	2.80	11,500	80	600	2+9
W. GERMANY	RADSPAH	7.743	2.98	19,500	100	800	4
	TP Z1	6.760	2.54	17,000	105	800	1+8

3. SOURCE: ASIAN DEFENCE JOURNAL 3/88

1. APPENDIX D: PROTECTION OF REAR AREAS

2. A need exists for an armored wheeled system dedicated to protecting rear operations activities, CSS support of deep attacks, and chemical reconnaissance, smoke and decontamination. This capability is essential for the preservation and sustainment of highway transportation networks, nuclear storage activities, CSS units and operations, tactical and other assembly area usage, and selected fixed storage and services facilities. Special emphasis is placed on tactical requirements forward of the corps rear boundary where the vast majority of protection measures are required. Units affected within these boundaries include transportation units, military police, chemical reconnaissance, and tactical combat forces.

Major highway transportation networks exist primarily from the corps rear area forward. Transportation truck companies assigned to a Transportation Group/Brigade supporting a corps and the Transportation Motor Transport (TMT) company assigned to a division form the nucleus of forward support logistics resupply efforts. Missions assigned to these truck units entail basing and operations in the combat zone and transiting the battlefield in small convoys. Future doctrine envisions autonomous, self-contained fighting forces operating in the midst of threat territory and forces.[1] Transportation truck units will probably operate in unsecured areas of the battlefield in order to sustain these fighting forces. Under current force design, truck units are authorized only one driver per task vehicle

per shift. This precludes the ability to provide internal security for the convoys. A dilemma occurs that if additional personnel and vehicles are added for internal convoy security (particularly against ambushes): the "foxhole strength" of the base defense clusters declines as well as primary duties and functions are not accomplished. Additionally, truck units possess only soft-skinned vehicles making the task of survivability difficult in the face of large caliber firepower. History conveys many examples where the lack of convoy security disrupted resupply and movement efforts. Three such examples are the Russians convoy problems with German partisan ambushes from 1942 to 1944, Castro's insurgency disruption of motor convoys in Cuba from 1957 through 1958, and American and ARVN/RF problems with guerilla ambushes against convoys from 1963 to 1968.[2]

Military Police units, as currently structured, do not possess the assets, firepower, or crew protection to provide full-time, adequate security escort to the multitude of convoy operations performed by transportation units. Tactical combat force (TCF) doctrine generally provides only for reaction force operations to relieve identified threats to logistic convoys, command and control centers, and support areas. By practice, Level III threats are engaged by a centrally positioned, battalion size (or more) reaction force organized from available forces. Light forces augmented with lift assets or a mechanized unit are utilized, both with some degree of risk. Light forces are limited to the mobility capabilities of helicopters to

arrive on site, then by foot mobility once inserted. Employment of a detached mechanized unit tends to piecemeal forward combat power.

Current rear operations doctrine, FM 90-10, Rear Battle, gives the military police the task of rapidly closing with and destroying Level I and II threat forces in rear areas. In performing these tasks, the military police will possibly encounter armored vehicles, special operation forces, air assault forces, tactical reconnaissance units with missions of reconnaissance, sabotage, raid, ambush, delay, and harassment.

In searching out and destroying Level I and II threats, either in convoy security or rear area threat missions, the military poice needs an armored escort/security vehicle which contains some of the following minimum operational characteristics: protection, mobility, sustainment, versitility, and high lethality. In Vietnam, the Commando vehicle, developed by Cadillac Gage specifically for use by military police units in Vietnam and Thailand conducted a multitude of functions including convoy escort, reconnaissance, command, patrol and riot vehicle, and an eleven man personnel carrier.[2]

An additional need exists for an armored wheeled system dedicated to chemical reconnaissance, smoke, and decontamination activities. This capability is essential for the preservation and sustainment of combat, combat support, and combat service support units operating operating forward of the corps rear boundary. Currently chemical reconnaissance, smoke, and decontamination units do not have the inherent advantage of protection, mobility, sustainability, and versitility in their organization. Chemical

reconnaissance and smoke operations are conducted under the same threats as other rear and forward area reconnaissance measures. Under a doctrine of decontaminating as far forward as possible, decontamination units require the same protection and mobility measures affforded to other support operations conducted forward.

APPENDIX D ENDNOTES

[1]Tradoc Phamphlet 525-XX, Military Operations, US Army Operational Concept For AirLand Battle-Future (Heavy) 2004. Fort Monroe, VA., HQ, TRADOC, 31 March 1989.

[2] US Army Combat Developments Command Study: Wheeled Armored Escort Vehicle, US Army Combat Developments Command Armor Agency, Fort Knox, KY., p. 24

[3] Captain James B. Carroll, "The Commando Armored Car", Armor September-October 1965, p.36

Material contained in this portion was derived from FM 19-10, Military Police Operations, FM 19-1, Military Police Support Divisions and Separate Brigades, FM 90-10, Rear Battle, FM 100-16, Support Operations: Echelons Above Corps, FM 101-1, Organizational and Tactical Reference Data For The Army in the Field, and FM 101-10-2, Extracts of Non-Divisional TOE and letter, ATCD-MH, dated 23 May 1989, from Assistant Deputy Chief of Staff for Combat Development to Commander TACOM, ATTN: AMSTA-ZDM, Subject: Armored Security Vehicle (AWS) Market Investigation.