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OBJECTIVE FORCE VULNERABILITIES

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Employing the Critical Vulnerabilities method, this SRP will identify potential critical vulnerabilities within the Army's Objective Force concept, what strategies adversaries may exploit against those vulnerabilities and the possible strategic implications these strategies may generate.

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PREFACE

I wish to thank Dr. Douglas Johnson for his advice and patience during the writing of this paper. His understanding of my need to balance my professional development objectives with my personal and family goals made this educational experience very enjoyable and rewarding.

OBJECTIVE FORCE VULNERABILITIES

> "Our forces will be strong enough to dissuade potential adversaries from pursuing a military build-up in hopes of surpassing, or equaling the power of the United States."[1]
>
> —The National Security Strategy of the United States of America

INTRODUCTION

The 2002 National Security Strategy clearly asserts the global dominance of United States' military forces. The current military capabilities gap between the United States and its closest competitor is unequaled in the recent history of warfare. The National Security Strategy also declares the United States' unmistakable intent to remain the world's preeminent military power. Currently supporting this policy is a massive transformation campaign throughout the United States military. The Department of Defense's break-away transformation strategy is designed to ensure a dominance of capabilities for the United States military over any future adversary for the next 20-30 years.

Leading this campaign, the United States Army is in the initial stages of its' most important transformations since the advent of mechanized warfare. Driven more by the necessity for strategic mobility than the emergence of any peer competitor, the way the Army intends to wage future wars, is itself revolutionary.[2] The Army's concept for how it will resource, train and fight in the future, is encompassed within its' emerging doctrine known as the Objective Force. Designed for strategic responsiveness and full spectrum dominance, the Objective Force is the means by which the United States Army intends to retain land warfare supremacy throughout the early part of the 21st century.

The focus of this research paper is not to question the necessity, the timing or the way in which the Army is pursuing it's Objective Force. Nor is the intent to reveal some silver bullet which makes the Army's Objective Force obsolete. This paper does assume future adversaries are closely studying the Army's transformation toward it's Objective Force and are taking note of the growing decisive overmatch of United States military ground combat capabilities. This overmatch and the consequent irrelevance of most adversaries ground forces will certainly compel future enemies and even current allies to search for Objective Force vulnerabilities.

This research paper parallels the approach an adversary may employ to find those weaknesses. This procedure, outlined by Dr. Joe Strange, writing at the Marine Corps War College, advocates an analytical approach for determining vulnerabilities by the identification of a Center of Gravity and the subsequent determination of the Critical Capabilities and the Critical

Requirements supporting that Center of Gravity. Once Critical Requirements are identified the determination of Critical Vulnerabilities is possible by recognizing those "Critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack in a manner achieving decisive results."[3]

Employing the Critical Vulnerabilities method, this paper will identify potential critical vulnerabilities within the Objective Force concept, what strategies adversaries may exploit against those vulnerabilities and the possible strategic implications these strategies may generate.

OBJECTIVE FORCE BACKGROUND

The development of the Army's Objective Force concept is a direct response to a dramatically changing world environment. Unlike the bi-polar focus of the Cold War period, the United States can no longer depend upon the forward basing of heavy ground forces to either deter aggression or quickly respond to crisis. First outlined in his October 12, 1999 transformation speech, Army Chief of staff, General Eric Shinseki, called for the development of a force which could meet the strategic responsiveness required of the Army to remain relevant in the 21st century. The clear challenge faced by the Army is the development of a Force which can achieve the rapid power projection capabilities of light forces while retaining the firepower, the protection and the maneuver capabilities provided by today's heavy forces.

The plan to accomplish this challenge prescribes the transformation of the Army along three parallel axes. The first axis involves the modernization of current operational forces and is termed the Legacy Force. This Legacy Force will provide a known warfighting capability and will serve as a deterrent to any near term competitor who may assess the United States military as potentially vulnerable during the Army's transformational period.

The second axis creates the Interim Force and is designed to meet the near term requirement for more strategically responsive medium forces. As the Interim Forces centerpiece, the Stryker Brigade Combat Teams (SBCT) bridges the capabilities gap between today's light and heavy forces. These Interim Forces will additionally provide the test bed not only for technology but also for the tactics, techniques and procedures which will be passed forward into the future force.[4]

The significance of both the legacy and interim forces is not only that they will enable the transformation of the Army by providing viable near term deterrent capabilities and lessons learned, but it is almost certain they will constitute, at some varying percentage, a portion of the Army's operational and tactical formations in the foreseeable future.

The main axis for the Army's transformation plan is the Objective Force concept. Currently the Army's Training and Doctrine Command (TRADOC) is in the final staffing process of TRADOC Pamphlet 525-3-0. This manual is intended to describe in more exacting detail the concepts forwarded by the Chief of Staffs' vision on how the Army will fight in the future. The Objective Force concept describes a force which, " is a full-spectrum force, organized, manned, equipped and trained to be more strategically responsive, deployable, agile, versatile, lethal, survivable and sustainable across the entire spectrum of military operations. Objective Force units will conduct operational maneuver from strategic distances; deploy through multiple unimproved points of entry, forcibly if necessary; overwhelm hostile anti-access capabilities; and rapidly impose our will on the enemy. They will arrive in the theater of operations immediately capable of conducting simultaneous, distributed and continuous combined arms operations throughout the battlespace, day and night, in any terrain. They will employ the full range of national and joint capabilities to see first, understand first, act first and finish decisively at the strategic, operational and tactical levels."[5]

Facilitating the Army's Objective Force concept is the development of the Army's Future Combat System (FCS). As the centerpiece for the Objective Force, the Future Combat System is doctrinally defined as "a team of teams, employing integrated procedures, offensive, protective and cybernetic systems that may or may not include aerial or ground mobile vehicular platforms."[6] In more understandable terms, FCS is more an effects generated operational environment than any one platform or system. The Future Combat System concept envisions a tactical and operational environment dominated by the information network. This network of systems provides the war-fighter informational dominance through near perfect situational awareness of the battlespace, the enemy and the friendly situation. This dominance allows friendly forces to continually outdistance the enemy's decision cycle through their ability to see first, decide first, act first and finish decisively, and is often referred to as the "quality of firsts".[7]

In addition to the "quality of firsts," the Future Combat System is additionally designed for strategic responsiveness. Intended to allow the equivalent projection of a Brigade anywhere in the world in 96 hours, a division in 120 hours, and five divisions in 30 days, the FCS is required to meet the parameters for transportation by the Air Force's C-130 aircraft. To achieve this, Future Combat System concepts substitute the current survivability capabilities of heavily armored platforms with lighter, smaller and more deployable systems. Combining platform active and passive protective measures and the capabilities achieved thru the "quality of firsts," FCS Objective Force formations conceptually achieve the same level of survivability as today's less strategically mobile heavy forces.

Driven to meet global and rapid force projection requirements, the Army's Objective Force concept is a revolutionary transformation of how the Army intends to conduct operations and wage future wars. This transformation is a combination of enhancing present force capabilities, fielding interim capabilities and dramatically leveraging emerging technologies for a future capabilities dominance. This future Army concept will, for the foreseeable future, execute operations and campaigns with a mixture of Legacy, Interim and Future Combat System equipped units. As the centerpiece of the Army's Objective Force, the Future Combat System is an operational environment which leverages informational dominance. This dominance provides the warfighter the capability to set the conditions of battle disproportionably ahead of the enemy both in terms of time and physical space. This capability consequently allows the use of more rapidly deployable units and platforms in lieu of today's heavy armored forces.

> "Centers of Gravity: primary sources of moral or physical strength, power and resistance."[8]
>
> — Dr. Joe Strange, Marine Corps War College.

OBJECTIVE FORCE FORMATIONS AS OPERATIONAL CENTERS OF GRAVITY

Although it seems improbable to attack what we perceive as a strength, could future adversaries determine Army Objective Force formations as potential operational Centers of Gravity? Evaluating this potential first involves a review of some of the commonly held perceptions concerning United States vulnerabilities.

Recent U.S. military operations, particularly in Somalia and the Balkans, have fostered some general beliefs regarding exploitable U.S. strategic weaknesses. These ideas generally highlight the United States unwillingness, both domestically and politically, to accept heavy losses. Consequently this risk aversion, it is believed, predominately leads to an over reliance upon technology. This technology reliance provides the capability for the use of stand off weaponry, diminishing the need for American forces in direct combat. Additionally there exists the common perception that the American population displays an apparent lack of commitment over time and is sensitive to domestic and world opinion. Although some senior leaders believe these perceptions have been dispelled with subsequent military operations within Afghanistan and the Global War on Terrorism, many intelligence analysts and military theorists believe they still persist.[9]

Applying these perceptions, an adversary could reason that domestic and or international willpower, could potentially constitute a United States strategic Center of Gravity. Linked with

that Center of Gravity is the United States' capability to decisively win any conflict with minimal cost, particularly in terms of American lives. This leads to the assumption that the high risk potential, in terms of wounded and killed in action, would undoubtedly occur during the decisive ground operations phase of any campaign. Consequently the critical requirement from an American strategic perspective would necessitate that the United States military rapidly defeat the enemy ground forces while incurring minimal friendly losses. From an enemy's perspective, this swift defeat would in all probability be synchronized around the optimal use of Objective Force formations. Therefore, what we see as one of our decisive strengths, could very conceivably from an enemy's perspective, be seen as an operational Center of Gravity, which has direct and relatively quick linkage to a strategic vulnerability.

The ability of current and future adversaries to match the transformation efforts of the United States across the entire spectrum of military capabilities is all but impossible. Any challenger to U.S. military supremacy will therefore focus research and development efforts toward those capabilities which will generate decisive effects against a perceived United States' weakness. The impact of an adversary possessing the means to destroy or neutralize U.S. Objective Force Units of Employment and Units of Action is likely one of those essential capabilities future adversaries will pursue.

Key to the development of these capabilities is therefore the identification of those Critical Capabilities inherent within the Objective Force Units of Employment and Units of Action which enable them to function as Centers of Gravity at the operational and tactical level.

> Critical Capabilities: "Primary abilities which merits a Center of gravity to be identified as such in the context of a given scenario, situation or mission."[10]
>
> — Dr. Joe Strange, Marine Corps War College

OBJECTIVE FORCE CRITICAL CAPABILITIES

One of the simplest ways to determine Critical Capabilities is to simply ask the question "what is it that a particular enemy force can do to us to prevent us from accomplishing our mission in this particular situation/context? What particular capabilities are we especially concerned about?"[11]

Pursuing the earlier discussion of an adversary identifying the destruction or neutralization of Objective Force formations as a means to attack a United States strategic Center of Gravity, what then are the particular Objective Force capabilities which especially concern an enemy?

An appropriate starting point to answer this question is to basically assess first what Objective Force doctrine itself says is critical.

A review of Objective Force concepts clearly demonstrates the Army's doctrinal conviction that regardless of all it's technological advantages, the success or failure of how the Army will fight future conflicts resides with the ability to win close combat. Objective Force doctrine states "Ultimately, all Objective Force decisive operations are based on success in close combat, the ability of the Objective Force to seize and control key terrain and to close with and destroy enemy forces." Objective Force doctrine further states "Barring major disproportion in force strength, and frequently despite it, two conditions invariably influence success in close combat: the ability of the winner to prearrange the conditions of the fight to his advantage, and his ability to strike the enemy with decisive maneuver while limiting the enemy's ability to effectively engage friendly forces."[12] Supporting this statement, Objective Force doctrine further addresses how to achieve the conditions for winning the close fight, "To produce this result, Objective Force tactical engagements will be characterized by new tactical principles based on the development of the situation out of contact and the balanced combination of standoff fires, greater mutual support, skillful maneuver and close assault to achieve tactical decision simultaneously at multiple locations across the JOA."[13] Whether this tactical principle of developing the situation out of contact with varying means is truly new or not, is a topic worthy of it's own lengthy discussion. Regardless, Objective Force concepts do repeatedly emphasis it as an essential condition for tactical and operational success.

There are two primary reasons why Objective Force concepts heavily emphasize the criticality of developing the situation out of contact. The first and most impelling reason is that it is feasible. During no other time in warfare has the ability existed to find and strike an enemy force at greater and greater distances. Emerging technologies with regards to intelligence, targeting and delivery provide the means to achieve decisive effects against an enemy, not only at the operational and strategic level, but more importantly at the tactical level. Within current Objective Force concepts, the setting of conditions for battle before an enemy can react is critical. Any diminution of that capability would have serious effects. Unlike the first however, the second reason for stressing the development of the situation out of contact is more a matter of necessity than of feasibility.

The second reason for the development of the situation from a position out of contact remains so critical to Objective Force concepts, relates to the survivability versus deployability capabilities of the Future Combat System. The FCS survivability theory evolved from the necessity to utilize available and emerging technologies to replace the Army's spiraling reliance

upon heavy armor. This evolution of survivability concepts is responsible for pushing the Objective Force increasingly toward the shaping of close combat through the development of the situation out of contact. This emphasis is due to a combination of the inability of present and near future armor development to counter anti-armor threats and the FCS strategic mobility requirements of platform weight and size. The inability to meet both deployability requirements and attain the adequate level of survivability with armor platting forced the evolution of survivability concepts from "survive the first hit" to "avoid being hit."[14] This fundamental change pushed the Objective Force concept toward the necessity for shaping close combat by successfully developing the situation from operational and tactical sanctuary.

This doctrinal approach aligns closely with the worldwide perception of U.S. forces exclusively relying upon the use of standoff technology to mitigate and reduce the risks of close combat. An adversary, whose operational design is predicated on the destruction or neutralization of Objective Force Units of Employment or Units of Action as a means to strike American domestic willpower, cannot succeed if Objective Force formations retain the capability to set the terms of battle with immunity. This ability to predetermine the conditions for engagements and battles thru the application of combat power while at the same time prohibiting the use of an opponent's capabilities, certainly from an adversary's advantage point, constitutes an Objective Force Critical Capability.

Following our methodology of linking Critical Capabilities with Critical Requirements for eventually determining vulnerabilities, it is essential next to determine Objective Force Critical Requirements. Applying the definition of Critical Requirements as" those essential conditions, resources and means for a critical capability to be fully operational,"[15] what would an adversary determine are the essential conditions which allow Objective Force formations to attain their Critical Capability of successfully developing the situation from a position out of contact and what are the means for attaining these conditions?

OBJECTIVE FORCE CRITICAL REQUIREMENTS AND CRITICAL VULNERABILITIES

After reviewing Objective Force doctrine there seems one overall essential condition which must exist in order for Objective Force formations to attain their Critical Capability. This condition recognized as the "quality of firsts" is the necessary precondition required for Objective Force formations to successfully develop the situation out of contact. Although briefly discussed earlier, what does this "quality of firsts" entail and why is it so critical?

Objective Force doctrine states "The nature, pace and scope of the close combat fight will change significantly. Its central feature is the quality of firsts: the capability to see first,

understand first, act first, then finish decisively through tactical stand-off, fire and maneuver, and tactical assault. Exploiting a layered constellation of advanced sensors, target acquisition, and C2 enablers, maneuver Units of Action tailored to the Unit of Employment will:

See first. See/sense the entire environment before and more clearly than the enemy, while countering the enemy's ability to do the same.

Understand first. Rapidly process and distribute knowledge; identify a pattern and/or critical elements; understand significance of dispositions, intent, etc.; while denying the same knowledge to the enemy.

Act first. Retain freedom of action to shoot, move, and re-engage while denying the enemy freedom to act or even to respond effectively.

Finish decisively. Destroy enemy in detail through combinations of mounted and dismounted assault. "[16]

Basically a rejuvenation of the Boyd cycle or the Observe-Orient-Decide-Act (OODA) loop, this ability provides Objective Force formations the capability to continually out pace enemy decisions and their subsequent actions. This essential condition of attaining and maintaining a "quality of firsts" is the critical requirement for Objective Force formations to set the circumstances for closing with and decisively finishing an enemy. From an adversary's perspective, without the "quality of firsts" the feasibility of Objective Force formations to successfully develop the situation from a position out of contact is extremely problematic.

If attaining and maintaining this "quality of "firsts" is the decisive condition essential for Objective Force success, what then are the particular means by which Objective Force formations achieve it? Objective Force doctrine immediately identifies both information dominance and precision strike as the two critical means for achieving the condition of "firsts." Objective Force doctrine maintains "Information superiority and situational understanding will allow friendly units to maneuver without loss of momentum or coherence, identify high-payoff fights and enter contact at the time and place of their choosing. Friendly forces must be able to develop the situation out of contact, before making physical contact with the enemy. To do so, every tactical formation down to squad, team and individual level, must have access to real time information on the terrain, obstacles, and the composition and disposition of relevant enemy and friendly units, as well as noncombatants. This capability depends on an ISR system capable of providing integrated, multi-discipline information collection, processing, analysis and presentation, tailored to task and purpose, of each echelon of command."[17]

This competence, sometimes referred to as network centric warfare, provides the basic means for the coordination of efforts within all echelons of the Objective Force, regardless of

time or distance. The generation and dissemination of a Common Relevant Operational Picture (CROP) allows for rapid and decisive self synchronization and furnishes, from the strategic to the tactical level, the capacity to out distance both enemy decisions and actions.

Alongside information dominance, within the “quality of firsts,” is the vital component of precision strike. Objective Force doctrine asserts, “during decisive operations, precision strike compels the enemy to disperse, restrict maneuver, and seek sanctuary, making him vulnerable to piecemeal destruction by U.S. ground forces.”[18] Critically complimentary to one another, precision strike and information dominance enable the accurate targeting of enemy forces, achieving the maximum effect to enemy forces well before contact occurs in either time or distance. Again Objective Force doctrine reinforces the criticality of shaping the outcome of combat before contact occurs, “While out of contact, Objective Force units maintain freedom of action, identify those fights with the highest payoff, and once selected, establish and shape the tactical battlespace. Supported by information derived from detailed reconnaissance and surveillance by redundant and integrated sensors, units then maneuver to positions of advantage out of contact, simultaneously employing standoff precision fires to isolate targeted enemy forces from reinforcement and attack high payoff and most dangerous capabilities.”[19]

An adversary’s examination of the necessary conditions which must exist for Objective Force units to achieve the Critical Capability of developing the situation out of contact could certainly identify the requirement to attain and maintain information and maneuver dominance. Accomplishing this condition requires Objective Force formations to employ the means of network centric warfare and the application of precision engagement. From an adversary’s perspective these conditions and means logically constitute the Critical Requirements inherent within Objective Force concepts and formations. Consequently applying the definition of Critical Vulnerabilities as “the Critical Requirements or components thereof which are deficient or vulnerable to neutralization, interdiction or attack in a manner achieving decisive results” an adversary’s ability to significantly effect network centric information systems or counter precision engagement would certainly define them as potential Objective Force Critical Vulnerabilities.

VULNERABILITIY STRATEGIES.

The prosecution of any successful campaign against Objective Force Critical Vulnerabilities will depend on the development and application of technologies and weapons which provide the means to attack or negate the effects of network centric warfare and precision strike. Do the technology bases exist today or will they exist in the near future which can provide the means to achieve decisive effects against these Critical Vulnerabilities ?

ELECTROMAGNETIC WEAPONRY

Recently many nations around the world including the United States have experimented with and developed the capability to attack network centric informational systems. These capabilities have ranged from the ability to hack into a system to the ability to physically destroy critical nodes within it. One particular capability, which has received significant attention lately, is the development of non-nuclear electromagnetic weapons.[20]

Electromagnetic weapons technology is the result of years of experimentation by the world's nuclear powers. The United States and the Soviet Union were particularly interested in the significant second and third order effects generated by a nuclear detonation. Following the Second World War, the high altitude nuclear testing period revealed one of these significant effects known as Electromagnetic Pulse or EMP.[21]

Electromagnetic Pulse is characterized by the creation of a very intense energy pulse which radiates out from its point of origin with diminishing strength. This energy shock wave does not physically destroy either people or structures but does significantly cripple a wide array of electronics based equipment. The military benefits of using and the necessity to defend against the effects of EMP were quickly recognized by the United States, the Soviet Union and numerous other nations around the world. Several countries through out the cold war period experimented with ways to produce non-nuclear electromagnetic weapons with the United States and to some extent Russia remaining at the forefront of non-nuclear EMP weapons development. The result of this experimentation was the creation of a substantial technological base which supports the current production and the future development of improved Electromagnetic weaponry.[22]

There are several divergent designs for electromagnetic weapons. These designs include the Flux Compression Generator (FCG), the Magneto-Hydrodynamic generator (MHD) and a range of High Powered Microwave (HPM) devices. Each of these designs has it's own benefits and shortcomings.[23]

Electromagnetic weapons or bombs which are based on the Flux Compression Generator design are certainly the most mature from a weapons technology standpoint. Due to the availability of FCG technology, their relatively simple construction and their low cost, Flux Compression Generator designed bombs have recently been elevated as a growing and credible terrorist threat against governmental and commercial information networks within the United States. Because of their utilization of sensitive semiconductor technology commercial information networks are particularly susceptible not only from FCG designed bombs but from all electromagnetic weapons. This sensitive semiconductor technology is extremely susceptible

to low levels of electromagnetic pulse making commercial information system components extremely vulnerable to Electromagnetic weapons.[24]

Conventional weapons development based on a Flux Compression Generator design do however have several critical issues. The first issue involves the output of FCG weapons below 1 MHZ which limits its ability to attack targets and the overall ability to focus an FCG weapons output. These issues impact FCG designed weapons optimal use against certain military targets. Once these issues have been adequately addressed the development of FCG operational and tactical designed weaponry by a number of future adversaries is certainly feasible.[25]

Magneto-Hydrodynamic generator (MHD) designed weapons are the least developed from an existing technologies standpoint and the challenges associated with their practical near term use from a military perspective are limited. However the combination of MHD as an enabler to FCG technology may provide additional capabilities and improvements for Flux Compression Generator based weaponry.[26]

High Power Microwave (HPM) technology offers the most promise for the development of Electromagnetic weapons. Although almost all electromagnetic weapons programs are classified, it is believed High Power Microwave technology has been the main effort for experimentation and development within the U.S. military for the past 10-20 years. Open source media recently cited HPM weapons configured in tomahawk missiles as the ultra secret weapon the U.S. forces will use to destroy the Iraqi electronic command and control system overseeing their Weapons of Mass Destruction.[27]

High Powered Microwave weaponry provides the capability, far better than FCG or MHD, to tightly focus the effects of EMP at a specific target. Additionally High Powered Microwave weapons can effect more targets than FCG or MHD weapons because of its' increased ability for coupling. Coupling is the term used for the means by which the Electromagnetic Pulse enters a system. Electromagnetic Pulse can enter a target generally thru its' antenna system or thru secondary connections such as power cables, telephone lines and in the case of High Powered Microwave weapons even thru ventilation apertures. Because of the increased capabilities of High Powered Microwave over either FCD or MHD, adversaries around the world will certainly continue to advance HPM potential thru experimentation and weapons development.[28]

Like any new weapons technology, Electromagnetic weaponry has several challenges to overcome before it can effectively be employed. The technical requirements of developing an efficient means to package the weapon dependent upon which technology base is used, FCG,

MHD or HPM. This packaging would require an optimal design which allows the maximum generation and coupling of the electromagnetic pulse against a target.[29]

The development of a suitable targeting and delivery means which optimizes both the effects of the EMP weapon and the probability of finding and striking the appropriate target is easier said than done. These are significant challenges depending heavily upon an efficient and robust Intelligence, surveillance and reconnaissance capability. The simple task of selecting and then finding the High pay off target within an Objective Force formation which will generate decisive effects is no easy mission. Additionally unlike other weapons systems, which afford the ability to determine Battle Damage Assessment (BDA) by gauging the effects of physical destruction, Electromagnetic weapons BDA will present a significant challenge precisely because of its' lack of physical destruction.[30]

Electromagnetic weaponry challenges are indeed daunting. However, they do not constitute an obstacle which cannot be overcome by future adversaries. The technological base currently exists which permits adversaries who choose to apply the appropriate combination of experimentation, proliferation and espionage the ability to possess effective electromagnetic weapon systems in the near future. The future development of strategic, operational and tactical non-nuclear electromagnetic weapons is technically feasible, as is the proliferation of these weapons between both nuclear and non-nuclear countries

The ability of future adversaries to apply electromagnetic weapon capabilities against the information systems supporting Objective force formations is a potentially serious threat. The capacity of objective force units to fully achieve the critical requirement of the "quality of firsts" is questionable if an adversary possesses the capability to defeat information systems with EMP weaponry. These weapons could provide a potential advantage to any adversary who developed the ability to adequately target and deliver them against Objective Force Units of Employment or Units of Action.

COUNTER PRECISION STRIKE

Coupled with the degradation of informational dominance as result of the use of electromagnetic weapons is the additional degradation of precision strike. The ability of Objective Force formations to influence the conditions of battle while out of enemy contact is predicated on the capability to see, decide and strike targets before the enemy can react. This linkage of information between sensors to shooter provided thru network centric operations is the foundation supporting precision engagement. The degradation of information or the flow of information anywhere within that linkage is significant. This disruption can be as simple as

camouflage or as complicated as attacking an enemy's satellite capabilities. Aside from the second and third order effects of an successful attack upon the information network supporting precision strike operations, what is the current or emerging technology which negates or degrades the capabilities of precision munitions?

Like electromagnetic weapons, recently one area of technological development, which has received considerable visibility lately, is the Global Positioning System (GPS). The expansion of GPS technology has proliferated throughout both the global and the U.S. commercial sectors. Everything from jet airliners to wristwatches utilizes Global Positioning Systems. The result of this GPS usage explosion is the steady increase in the knowledge base concerning both the inherent capabilities and the inherent vulnerabilities within the Global Positioning System. [31]

One key vulnerability of GPS which has alarmed some military and civilian leaders is the relatively simple means by which it can be jammed. Because the Global Positioning System is a significant technological component of any precision guided munitions, an adversaries ability to degrade or jam GPS is potentially critical. Government assessments have stated that GPS jamming can affect initial acquisition of precision guided munitions at distances out to 600 miles. Even after the missile has acquired a track to the target, GPS jamming can affect that tracking 28 miles away from the source of the jamming. Media reports of GPS jammers currently inside Iraq point to the propagation of such technology since the last Gulf War.[32]

Like the challenges faced with electromagnetic weapons, GPS jamming has its hurdles. The ability to focus jamming over large areas and at sufficient distances to effect military weapons is certainly one of those problems. Additionally the defense of jamming systems against attack by electronic warfare preemptive strike means is also critical. Finally the challenge of jamming an enemy's GPS capability while at the same time avoiding the degradations of your own GPS dependent systems is difficult. Global Positioning System jamming technology does have its' challenges. However, the steady increase in dual use technologies around the world both commercially and within the United States military will presumably provide a knowledge base for the continued development of increased GPS jamming capabilities into the near future.

The capability to protect strategically high valued assets thru the use of GPS jamming technology is significant. Even more critical to the Army's Objective Force, is an adversary's ability to extend that capability down to the operational and tactical levels. From an adversary's perspective the impact of a counter precision strike capability inherent with the use of GPS jamming against Objective Force operational effectiveness is considerable.

CONCLUSION

Will future adversaries identify Critical Vulnerabilities within the Army's Objective Force concept? With no peer competitor with the capacity to match the enormous transformation effort currently underway within the United State's military it is extremely likely future adversaries will devout significant effort and resources to identify those essential capabilities which will provide the maximum opportunity to leverage any U. S. military weaknesses. While the Army's Objective Force concept is indeed revolutionary and will certainly assure the United States Army's land warfare dominance thru the early part of the 21st century, there are potentially certain Critical Vulnerabilities, which could significantly degrade and even negate the Objective Force's operational and tactical advantages.

Because of prevailing worldwide perceptions of the United State's aversion to risk, especially in regards to potentially large numbers Americans casualties, Objective Force formations could feasibly be assessed by future adversaries as operational and tactical Centers of Gravity effecting United States strategic weaknesses. Enemy campaign development based upon the destruction or neutralization of these formations will focus on the identification of Critical Capabilities and Critical Requirements, which systematically will reveal Objective Force Critical Vulnerabilities. An adversary's examination of current Objective Force doctrine reveals a critical reliance upon the ability of Objective Force formations to decisively develop the operational and tactical situation from a position of sanctuary. Objective Force formations achieve this Critical Capability thru the "quality of firsts:" seeing first, deciding first, acting first and finishing decisively. The two primary components essential to achieving these conditions of Information and maneuver dominance are network centric warfare and precision strike. Certainly from an enemy's perspective, this dependency on the generated effects of information dominance and precision engagement, identify them as Critical Vulnerabilities.

Although no silver bullet, the development of current and advance technologies which degrade the Objective Force capabilities of network centric warfare and precision strike offer future adversaries the optimal strategy to counter United States military transformation. Far from perfect, Electromagnetic weaponry and Global Positioning System jamming are two viable technologies which provide future adversaries the most advantageous means to decisively effects Objective Force vulnerabilities.

STRATEGIC IMPLICATIONS

An adversary's systematic approach to identify Critical Vulnerabilities within the Army's Objective Force will undoubtedly reveal similar vulnerabilities throughout the transformed United

States military and can lead to a near term proliferation of electromagnetic and counter-precision weaponry and strategies.

Adversaries increasingly believe they can deter United States regional intervention if they possess or are believed to possess the capability to inflict significant U.S. or coalition causalities. Several strategy theorists point to this belief as one of the driving factors currently forcing emerging regional powers to pursue nuclear armament programs. The recent revelations of nuclear development programs within both North Korea and Iran certainly lend credibility to this argument. Obviously the expense, the additional international scrutiny and the chance of United States preemptive action or international sanctions are significant risks future adversaries will have to carefully weigh before developing a nuclear deterrent strategy.

However the pursuit of non-nuclear programs based on the development or procurement of weapons capable of negating United States military supremacy in Information Operations and precision strike are extremely viable and acceptable. The development of electromagnetic and GPS jamming capabilities clearly will not alarm the international community anywhere close to the level of apprehension as with nuclear weapons. Emerging regional powers therefore will find it ,compared to a nuclear option, relatively easy to proliferate electromagnetic and counter-precision strike technology. The recent international division between the United States and several regional powers concerning military actions against Iraq has clearly demonstrated the concern by several nations with what they believe is the unbridled global domination of the United States. If this concern is strengthened and prevails, it is extremely feasible numerous nations, not only adversaries but even our allies, will view the proliferation of any non-nuclear capability which lessens the United States ability to militarily influence regions outside the western hemisphere as potentially beneficial to their own national interests.

The development of electromagnetic and counter-precision strike weaponry by future adversaries can provide a feasible and affordable means to counter United States military transformation capability overmatch. A state or even a faction possessing the capability to significantly effect Information Operations and precision weapons use by the United States military considerably limits the options for U.S. strategic and operational intervention. Faced with an adversary who ,for lack of a better term, has adopted a strategy of dumbing down the operational and tactical environment with the use of EMP and counter precision strike weapons. The United States would be forced to seriously weigh the risk for higher than normal casualties, the level of U.S. interests and the necessity for intervention.

WORD COUNT= 6,125

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[4] Binnendjik, 109-12.

[5] Department of the Army: TRADOC Pamphlet 525-3-0: The United States Army Objective Force Concept (DRAFT). (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 17 Jan. 2002),4-5.

[6] Department of the Army: The Era of the Objective Force. Objective Force Task Force, 2003. DVD.

[7] Department of the Army: The Era of the Objective Force. Objective Force Task Force, 2003. DVD.

[8] Strange, 3.

[9] Department of the Army: TRADOC Pamphlet 525-3-92: The United States Army Objective Force Unit of Employment (Final Coordinating DRAFT). (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 17 Jan. 2002),12.

[10] Strange, 3.

[11] Ibid., x.

[12] Department of the Army: TRADOC Pamphlet 525-3-0: The United States Army Objective Force Concept (DRAFT). (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 17 Jan. 2002),32.

[13] Ibid.

[14] The ideas in this paragraph are based on remarks made by a speaker participating in the Commandant's Lecture Series.

[15] Strange,3.

[16] Department of the Army: TRADOC Pamphlet 525-3-92: The United States Army Objective Force Unit of Employment (Final Coordinating DRAFT). (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 17 Jan. 2002), 27.

[17] Department of the Army: TRADOC Pamphlet 525-3-0: The United States Army Objective Force Concept (DRAFT). (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 17 Jan. 2002),33.

[18] Ibid.,23.

[19] Ibid.,33.

[20] Paul Eng "E-Bombs Could Spell Digital Doomsday": available from http://abcnews.go.com/sections/scitech/CuttingEdge/empbombs011019.html. Internet accessed 21 November 2002.

[21] Jim Wilson "E-BOMB": available from http://popularmechanics.mondoserach.com. Internet accessed 21 November 2002.

[22] "Electro-Magnetic Pulse Systems": available from http://www.tfd.chalmers.se/~valeri/EMP.html. Internet accessed 21 November 2002,1.

[23] Carlo Kopp "The Electromagnetic Bomb-a Weapon of Electrical Mass Destruction": available from http://www.cs.monash.edu/~carlo/. Internet accessed 21 November 2002,2.

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[25] Ibid.,5.

[26] Ibid.

[27] Ibid.

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[29] Ibid.,6.

[30] Ibid.,6-11.

[31] John A. Gentry "Doomed to Fail: America's Blind Faith in Military Technology." Parameters, 28 (Autumn 1998), 91.

[32] Thomas K Adams "GPS Vulnerabilities", Military Review, 81 (March-April 2001),10-16.

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