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**THE CASE FOR ARMY XXI
"MEDIUM WEIGHT"
AERO-MOTORIZED DIVISIONS:
A Pathway to the Army of 2020**

**John Gordon IV
Peter A. Wilson**

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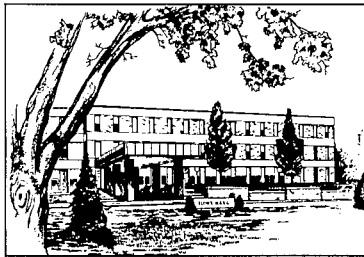
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What distinguishes a vision from a fantasy is that a vision is achievable. There will be an Army beyond Force XXI. The challenge is to think beyond the parameters of the present, but to do so in a reasoned and logical way to structure a vision for the Army After Next.

The Army After Next Project (AANP) is an Army War College Special Program. Its purpose is to initiate and facilitate research dealing with strategic trends in the security environment, the nature of warfare, technology, military theory, and other strategic factors that will affect the Army 10 to 25 years in the future.

The AANP will explore a vision for the Army beyond Force XXI by focusing on topics important to Army leadership but beyond the scope of most staff agencies. The project will concentrate on strategic trends, broad concepts and those issues and challenges that are important to national security for the longer term. Conclusions drawn from these broader strategic issues will then be used to investigate more specific topics and themes.

The monographs, essays, and books published by the AANP are derived from papers written by Strategic Studies Institute (SSI) analysts, students at the Army War College, faculty, and participants at Conferences and Roundtables devised by the AANP or by SSI's Academic and Business Outreach Initiatives. Published studies and monographs are also available on the Internet.

The Army After Next Project welcomes your submissions. A range of illustrative topics of interest to the AANP might include subjects like alternative structures of the future global environment; future forms of land warfare; the impact of technology on the Army; recruitment in the 21st century, and the priority of warfighting versus other uses of landpower.

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**THE CASE FOR ARMY XXI "MEDIUM WEIGHT"
AERO-MOTORIZED DIVISIONS:
A PATHWAY TO THE ARMY OF 2020**

**John Gordon IV
and
Peter A. Wilson**

May 27, 1998

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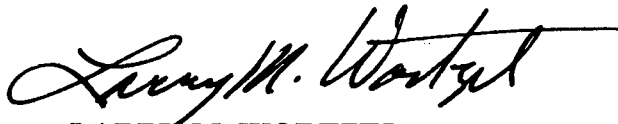
FOREWORD

Since the end of the Cold War nearly a decade ago, there have been repeated calls for the U.S. Army to make major changes to accommodate to a transformed geo-strategic environment. Specifically, advocates of major change believe the Army should become strategically agile while maintaining a high in-theater combat and mobility capability. For example, much of the design work associated with the Army After Next (AAN) exercise series has focused on the development of a next generation of combat forces which have very high strategic/theater mobility and dramatically enhanced combat power. Unfortunately, some of the concepts associated with the AAN are true “leap-ahead” technologies that even in the most favorable budgetary circumstances and development schedules will not likely be available during the 2020 timeframe. At present, the Army appears to have settled on the selective modernization of its current force structure that is a mixture of very light and ultra-heavy combat formations; a “barbell posture.” This approach provides an inadequate strategy for dealing with near-term political military challenges and acting as a transition to a true next generation Army.

The purpose of this monograph, therefore, is to stimulate a debate within the Army as to whether there is a credible transition strategy to modify a portion of its force structure to gain some ANN-like attributes—enhanced strategic responsiveness coupled with enhanced theater agility and combat power. The authors believe there is a mix of extant and near-term combat systems and technologies that will allow the Army to create a number of “aero-motorized” divisions within likely budgetary constraints by the end of the next decade. These medium weight combat units would exploit the large investment the Air Force is making to modernize its strategic and theater airlift fleets during the first decade of the 21st century. The authors believe that forces equipped with light armored vehicles, next generation combat aviation, and enhanced indirect fire

support will provide the Army with a strategic “fist.” Aero-motorized forces can be used either as part of a leading edge of a large and inherently slower to deploy expeditionary force or as a central combat component of future lesser contingencies including operations other than war. Finally, the aero-motorized concept will allow the Army to develop thoroughly the doctrine and concept of land forces operations that have the strategic agility of current light forces and approach the combat power of current heavy forces—major features of a desired next generation Army.

The Strategic Studies Institute strongly encourages readers to participate in a continuing discussion on the future of American land power and the challenges it holds for the U.S. Army.



LARRY M. WORTZEL
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JOHN GORDON IV graduated from The Citadel in 1977 with a bachelor's degree in history. He also holds a masters in international relations from St. Mary's University in San Antonio, Texas, and a masters in business administration from Marymount University in Arlington, Virginia. Currently, he is a candidate in George Mason University's Public Policy Ph.D. program. Following graduation from The Citadel, he entered the Army as a Field Artillery officer. His assignments included the 82d Airborne and 2d Infantry Divisions, the Field Artillery School, and Training and Doctrine Command Headquarters. For the last 4 years of his Army career, he served at Headquarters, Department of the Army where he was the Chief of the Doctrine Team in the Office of the Deputy Chief of Staff for Operations and Plans (DCSOPS). He was also the leader of the Army's Deep Attack/Weapons Mix Study (DAWMS) team. While in DCSOPS, Mr. Gordon was a member of the Army's Roles and Missions Commission team and represented the Army at several Quadrennial Defense Review (QDR) panels. He is the author of over 30 articles in various publications such as *Army*, *Military Review*, *Joint Force Quarterly*, *Naval Institute's Proceedings*, and *Georgetown University's National Security Studies Quarterly*. He joined RAND in May 1997.

PETER A. WILSON graduated from Princeton University in 1966 with a B.A. in political science. He then attended the University of Chicago where he earned an M.A. in political science in 1970. Mr. Wilson is a member of the senior staff at RAND. During the last several years, he has been working on a number of interrelated projects including the co-authorship of the "The Day After" policy exercise series which have explored the implications of major challenges (counterproliferation, strategic information warfare, and electronic commerce) to post-Cold War national security planning. Mr. Wilson is co-teaching a course at Georgetown University's School for Foreign Service that will use the RAND exercise experience to examine the implications of these new technologies to a significant change of the early 21st century definition of national security. Mr. Wilson's written works have appeared in *Parameters*, *Naval Institute's Proceedings*, *National Defense University Press*, the *Progressive Policy Institute*, *Washington Quarterly*, and include the co-authorship of several major RAND studies.

THE CASE FOR ARMY XXI "MEDIUM WEIGHT" AERO-MOTORIZED DIVISIONS: A PATHWAY TO THE ARMY OF 2020

The ability to project lethal forces—in the air, on the sea, or on the land—will be essential. Toward that end, our ability to project combat power anywhere in the world will require new technologies, operational concepts, and capabilities to meet new challenges. First among these new challenges is the need for much smaller force "footprint" characterized by fewer but more capable attacking troops and platforms supported by an even smaller logistics element. Priority challenges will also include an enhanced military responsiveness distinguished by its increased range of employment and resulting in reduced exposure of our forces.

National Defense Panel Report
December 1997

Overview.

The authors contend that today's Army is essentially a "barbell" shaped organization: very light or very heavy forces with little in the form of "middleweight" units. One of the fundamental decisions that the Army must make in the coming decade is whether it intends to continue this organizational structure or modify it modestly or radically. If major modification is appropriate, what are the options? Fortunately, the Army has several years to consider such issues.

Probably for at least a decade the United States and its allies will not be confronted by a major military competitor or a collection of medium-sized states that are capable of successfully threatening our vital interests with "conventional" combined arms forces.¹ That does not mean that some regional adversary could not achieve a short-term success by invading and seizing territory from its neighbor. Furthermore, that "smash and grab" strategy could be

reinforced by the deft threat or actual use of nuclear, biological, chemical (NBC) weapons—a feature described as a plausible major theater war (MTW) scenario by both the Quadrennial Defense Review (QDR) and National Defense Panel (NDP). Additionally, future opponents are likely to exploit long-range missile systems (both ballistic and cruise) armed with advanced non-NBC munitions to threaten the military viability of any future U.S. expeditionary force. Such a victory could certainly be reversed; for the foreseeable future the United States and its friends can certainly turn back overt aggression if they choose to do so. The critical strategic question is whether the United States and its allies will be prepared to reverse this act of aggression. Under the shadow of a NBC/missile threat, the cost might be perceived as very high especially if the United States has not adapted its forces to that plausible contingency.²

One of the clear premiums of future U.S. combined arms forces will be their ability to rapidly deploy into a menaced theater and operate in the face of enhanced NBC and long-range missile threats. The early deployment of a high performance combat force will have a profound impact on the probability, duration, and overall cost of a major campaign.³

More probable than MTWs is the possibility that the United States will be confronted by a whole series of lesser crises or small-scale contingency (SSC) operations. Civil wars that threaten to spill into other nations, relatively limited armed struggles between religious and/or ethnic groups, and breakdowns in civil order within “failed states” are all examples of the kinds of operations where U.S. forces could conceivably be deployed. Significantly, many areas where such breakdowns in order could occur are where the United States does not have forces permanently stationed ashore. Finally, many of these future conflicts will take place in an urban environment, which reflects the global migration from the countryside to the cities. Should the United States elect to intervene with ground force, deploy-

ments from distant locations would have to take place. This changing reality has a significant impact on how the future Army should be configured.⁴

The “Barbell” Army.

The Army has undergone at least four major organizational eras since the end of World War II. First was the immediate post-World War II force. This was the Army that fought the Korean War. Organizationally, doctrinally, and in its equipment, this force was virtually identical to the World War II Army. Second was the mid-1950s “Pentomic” army that was a controversial attempt to organize the land force for nuclear combat. The “Pentomic” era is generally regarded as a failure.⁵ Third came the Vietnam-era force. Organizationally, the Army of the 1960s owed much to the World War II model and was a large conscript force whose divisions were modeled on the armored division of World War II and whose fundamental tactics were based on massive application of firepower and armored shock tactics. The most important innovation for “high intensity” ground war was the creation of the mechanized infantry division with each infantry battalion equipped with organic armored carriers.⁶ In Vietnam, the Army focused on the exploitation of helicopter technology to free it from the “tyranny of terrain.” Following our geo-strategic defeat in Vietnam, the Army slowly moved into the successful *Army of Excellence* period, which is still in effect.

During the 1980s some experimentation included the permanent assignment of an attack helicopter brigade to the armored and mechanized divisions, the creation of the 9th “high technology light division” (motorized infantry division) and the Light Infantry Division.⁷ The air combat brigade concept became institutionalized while the motorized concept died during the late 1980s due to a lack of investment in a light armored vehicle family and hostility from both the Armor and Infantry branches of the Army. The light infantry division concept became the Army’s

model for air transportable units. Structurally, today's Army is quite similar to the force at the end of the Vietnam period—a mix of very light and very heavy units. This is the force that is on the verge of being transformed into Army XXI with a focus on major upgrades in command, control, communications, and computers (C⁴) and improved intelligence, surveillance, and reconnaissance (ISR) systems. Currently, this concept does not call for any major change in organization or concept of operations for either the light or heavy combat formations.⁸

With the brief "Pentomic" era and 9th Motorized Infantry Division experiments being the exceptions, a hallmark of the post-World War II Army is that it has had a "barbell" characteristic. The Army has been generally configured into either very heavy armored and mechanized units armed with large numbers of heavy fully tracked vehicles or very light infantry-type units that are primarily foot mobile. One division, the 101st Air Assault remains as a positive legacy of the Vietnam experience. Of course, both types of forces include a wide variety of sub-units, artillery, aviation, all kinds of support organizations. A glance at today's Army is illustrative.

The Current Army

Light Forces	Medium Forces		Heavy Forces	
82nd Airborne 10th Light 25th Light	101st Air Assault		1st Armored 1st Cavalry	1st Inf (M) 2nd Inf 3rd Inf (M) 4th Inf (M)

The 10-division Army of 1998 has six "heavy" armored or mechanized divisions on one end of the spectrum and three air transportable or light divisions on the other end. The single airmobile division lies somewhat in the middle. While

the 101st Airborne (Air Assault) division is not encumbered with large numbers of armored vehicles, it is nevertheless logistically equivalent to a heavy division and difficult to move strategically due to the large numbers of current generation helicopters that are difficult to self-deploy over long distances.

The Need for Medium Forces.

What the Army has lacked since 1945 are "medium" forces that combine a degree of mobility, firepower, and protection greater than the generally foot-mobile light forces, yet are less strategically and operationally cumbersome than the heavy armored and mechanized units. The latter require either prepositioning, relatively slow sealift, or wide-scale rail/heavy equipment transporter (HET) support in order to deploy into areas where forces are not already stationed.

During the Cold War, the primary and potentially most challenging Army missions were the defense of Western Europe and Korea. In both locations the Army had relatively large forces in place. The deployment penalty associated with armored units weighed heavily on military planners and led to a great dependence upon prepositioned equipment sets (POMCUS) and sealift. When the Gulf crisis took place in August 1990, the United States was fortunate to be confronted by an incompetent opponent who yielded the strategic initiative once his initial objectives were seized. This afforded the U.S.-led coalition the time (nearly 5 months) that was needed to deploy by sea the heavy forces that would eventually lead the counteroffensive to retake Kuwait. The operational immobility of heavy forces was further revealed during Operation JOINT ENDEAVOR, the deployment of Army forces to Bosnia during the winter of 1995-96. The deployment of a reinforced brigade of only four armored and mechanized infantry battalions from southern Germany via rail and roads took nearly 2 months.⁹

The Gulf War exposed several features of the Army's light-heavy force structure. First, the Light Infantry Divisions, a major Army initiative in "strategic power projection," were noteworthy by their absence. Their very lightness to facilitate their transoceanic mobility lead to a table of organization and equipment (TOE) which provided no tactical or operational mobility and very modest firepower for such a "high intensity" theater. While the 82d Airborne Division did deploy, it quickly assumed the title of "speed bump" in the face of an enemy with huge numbers of armored vehicles. Ironically, the 9th Motorized Infantry Division, specifically designed for early deployment, had been disbanded the summer before Operation DESERT SHIELD.¹⁰

If there is any doubt of the potential fate of foot-mobile infantry such as the 82d Airborne when confronted by a large enemy armored force in desert conditions, one has but to look at many battles that took place in the desert in World War II. The "bagging" of large numbers of foot-mobile infantry units by more mobile armored and motorized forces during the North African and Eastern Front campaigns comes to mind.¹¹

It took roughly a month before the Army had its first division-sized heavy force ready for operations in Saudi Arabia. Fortunately, the enemy was totally passive during the strategic deployment of U.S. forces. Unquestionably all potential future U.S. opponents took note of the fate that befell the Iraqis due to ceding to the United States a lengthy, undisturbed deployment period.

Since 1991 the Army has taken certain steps that have enhanced the strategic deployability of its traditional heavy forces. Prepositioning afloat and ashore has led to the capability to deploy roughly a division-size heavy force in about a week's time. Anything more than a division, however, will have to rely on medium-speed shipping to move units from some combination of the U.S. and other overseas locations. That will take several weeks. In any

area outside the Gulf, Korea, or Western Europe, the lack of ashore prepositioning will also constrain the ability of the Army to rapidly deploy heavy forces.

What is a "Medium" Aero-Motorized Force?

Before we elaborate on some options for moving the Army away from the "barbell" model into more of a medium force, it is necessary to add some definition to what such a force might look like. Characteristics of a medium force follow.

More rapidly deployable than a traditional heavy unit. While it is physically possible to deploy main battle tanks and tracked infantry combat vehicles on C-5 or C-17 aircraft, it is a very inefficient process. Either aircraft mentioned above can lift only one main battle tank. To move even a single battalion-sized heavy armor unit will require virtually the entire C-5 fleet of 120 aircraft. A medium force would be able to deploy platoons of (4-12) armored fighting vehicles on a single C-5 or C-17, thereby allowing the deployment of a brigade-sized task force with the use of approximately 100 sorties of either wide-body airlifter.¹²

Greater firepower, survivability and mobility. New technologies associated with the Revolution in Military Affairs (RMA)—over the hill targeting sensors coupled with stand-off firepower—can provide medium forces with enhanced combat power. A medium force built around light and medium weight armored fighting vehicles will provide infantry and cavalry units with a wide range of protected mobility.

Operate Under a Hostile Long-Range "Artillery Fan." Future regional opponents will be able to put U.S. expeditionary forces under long-range ballistic and cruise missile fires with and without the use of NBC. Light armored vehicles, especially wheeled, will allow the deployment of combined arms air and ground forces with a smaller intra-theater logistics footprint with their lower

demand for POL than heavy armored forces. These lighter forces can rely more heavily on the “just in time” delivery of both long-range fires and logistics support. This will be especially important where combined arms units have to rapidly deploy over long intra-theater distances such as the Saudi peninsula, Eastern Europe, or the Balkans.

The characteristics listed above argue for a medium weight force that can deploy quickly to a potential trouble spot via transoceanic range airlift, have a substantial amount of mobility and firepower upon arrival, and be more survivable than a foot mobile, dismounted unit. Such a force could be the initial element of a global maneuver of land power as part of a joint expeditionary force. In some circumstances such as an SSC, the medium weight aero-motorized force may be sufficient to deal with the crisis. In other circumstances tending toward a MTW class conflict, the aero-motorized forces will be the tip of the Army’s spear, to be followed by heavier Army armored and mechanized forces. The basic picture of what a medium aero-motorized force would look like is as follows:

- Brigade sized combined arms forces that are easily deployable on C-5/C-17 type aircraft. Some brigades would be optimized as motorized infantry while other brigades would be organized as cavalry formations.
- Ground combat elements that are built around wheeled armored vehicles that provide transport, fire support, command and control, and direct/indirect fire capabilities. In the last case, artillery brigades would be equipped with variants of the lightweight 155m howitzer and the wheeled High Mobility Artillery Rocket (HIMAR) launchers.
- Attack helicopters that provide speed and long reach to the force.
- High reliance on indirect fire and air/missile active defense support from the USAF and USN combat

aircraft, USN missile armed warships, and Army ATACMs, MLRS and AD units.

- Combat engineering units optimized for airlift that can provide early deployers some field expedient protected positions for key units such as air defense and USAF aircraft.
- Pallet Load System (PLS) trucks, lift helicopters, STOL cargo aircraft, and Logistics Over the Shore (LOTS) to provide for Just in Time (JIT) intra-theater logistics.
- Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C⁴ISR) systems that are built around the Army XXI initiatives, can reach back to other out of theater bases for many of their needs, and are capable of operating with coalition forces.

Armored Fighting Vehicle Options.

There are available in the world today a wide variety of wheeled light and medium weight armored vehicles in the 5-25 ton weight class.¹³ There are two principal tactical disadvantages to the wheeled armored vehicles. First, in some types of very adverse terrain they have cross country mobility that is inferior to tracked systems, and, second, while they offer a degree of protection far better than a dismounted soldier has, such vehicles are still far less protected than a main battle tank (MBT).

Studies by the Army Corps of Engineers indicate that the all terrain mobility "break-point" between wheeled and tracked armored vehicles is around 20 tons. That is to say, wheeled vehicles have similar cross-country mobility attributes as track laying vehicles below the weight of approximately 20 tons. Even heavier wheeled vehicles will have superior mobility on road surfaces. Further, there have been some interesting innovations in wheeled armored

vehicle designs, which suggest that the break point may move upward.¹⁴

Contemporary wheeled vehicles rely upon a combination of a diesel engine and a complex hydro-mechanical transmission-suspension system. Within a decade, a next generation of diesel electric powered vehicles is plausible. This technology is likely to flow from the massive investment (prompted by global environmental concerns) that the global automotive companies will make in hybrid vehicles—many of which will be a mix of internal combustion engines, high density energy storage/generation systems, and electric drive motors. If successful, hybrid propulsion may provide the next generation of armored vehicles with longer combat operating ranges with important low observability features.¹⁵

On the issue of protection, lighter armored vehicles will be inferior to super heavy fighting vehicles of the MBT class without breakthroughs in either material technology and/or active protection. One of the clear weaknesses of the 9th Motorized Infantry Division was the fact that all of its personnel and weapon carriers were modified unarmored HMMWVs. These vehicles could be “swept away” by air bursting artillery and mortar fire and proved very vulnerable in contested urban terrain from Somali irregular automatic weapon and rocket propelled grenade (RPG) fire.¹⁶ More useful is to examine the issue of passive protection from the full spectrum of killing threats.

As noted, wheeled armored personnel carriers (APCs) will provide a measure of protection against a wide range of infantry and indirect fire anti-personnel weapons. Furthermore, the hull of wheeled armored vehicles can be designed to be resistant to anti-vehicle mines. All of these threats are likely to be a part of any future SSC operations. Necessity and doctrine would use the APCs only as “battle taxis” during intense combat operations. One advantage of this infantry/vehicle configuration is that a motorized battalion will have a higher density of useable infantry than

a comparable mechanized battalion—a likely advantage in urban and broken terrain combat situations. Some units might be organized as pure cavalry brigades. All direct fire units would be complimented by vehicles armed with a variety of stand-off weapons including fiber optic guided missiles (FOGMs) and mortars armed with guided munitions.

Some passive protection against higher performance direct fire weapons is possible especially with further development of reactive and active armor arrays. Passive protection against large caliber missiles or kinetic energy weapons will likely remain very problematic. This will require that light fighting vehicles in confrontations with MBTs will either have to shoot first with a high performance direct fire weapon or operate from a stand-off distance. For example, a portion of the wheeled armored vehicles could be armed with indirect fire weapons such as FOGMs or mortars equipped guided munitions. This would allow the vehicles to remain behind cover and engage heavier enemy armor, thus avoiding exposing themselves to a direct fire battle where their inferior armor would be a disadvantage. Targeting could be provided by UAVs, helicopters, other vehicles in hide positions, or dismounted elements.¹⁷

Lighter vehicles can be designed to have much lower thermal, electromagnetic, magnetic, and acoustic signatures than heavy tracked vehicles. There is a prospect that the next generation of light armored vehicles can use hybrid electric propulsion and ceramic type armor to reduce their signature, especially to thermal imaging sensors. The issue of low observability will loom larger in ground warfare with the proliferation of a wide range of top attack munitions, which can destroy the heaviest MBT. The latter may prove very difficult to make “stealthy” from overhead surveillance and top attack guided munitions.¹⁸

The direct fire battle will not be abandoned. There is a wide range of options of powerful direct fire systems that could be mounted on medium weight wheeled armored

vehicles including missiles, 105mm or 120mm low recoil cannons, and automatic small caliber guns available to both cavalry and motorized infantry brigades. Advances in top attack munitions will allow 105mm and 120mm cannons high killing power against upgraded versions of contemporary generation MBTs.¹⁹

A series of air defense, command and control, and support vehicles would be needed. Many of the models of wheeled armored vehicles in production already have command and medical versions available.

Finally, light-medium armored vehicles can be designed to be inherently amphibious, provide overpressure protection from NBC contamination, and a measure of flash, blast, and electromagnetic pulse protection from nuclear detonations.²⁰ If NBC weapons are employed in future MTWs or SSCs, then the protected mobility of medium weight forces will be of vital necessity to allow the Army to operate in a "dirty" combat environment.

The Aero Component.

The second major component of the force would be transport and attack helicopters. Today an entire battalion of AH-64 *Apache* attack helicopters, with appropriate support vehicles and a basic load of ammunition, can be transported on 10 C-5 or 21 C-17 aircraft. When RAH-66 *Comanche* is fielded, its smaller size and reduced support requirements will facilitate moving *Comanche* Scout/attack units long distances in USAF transports. With greater range (1200 nms.) than the *Apache*, *Comanches* may be able to self deploy to many theaters and meet their ground support elements, thus reducing the burden on the airlift fleet.

Beyond 2010, it is possible to foresee the exploitation of tilt-rotor technology derived from the development and deployment of the MV-22 assault transport and the BB-609 executive aircraft. Variants of both could be seen as

follow-ons to the UH-60 *Blackhawk* and the *Apache-Longbow*. Additional aerial logistic support could be provided the Army CH-47s and USAF C130Js. Given an adequate commitment of resources, a heavy lift Joint Transport Rotorcraft (JTR) or Advanced Theater Transport (ATT) might be developed by the post-2010 time-frame.²¹ From the strategic deployment perspective, tilt-rotor technology could provide Army medium forces great benefit by facilitating the transoceanic deployment of airmobile assets without relying as heavily on USAF strategic airlift assets. On the other hand, the cost of developing and procuring any new theater airlift aircraft after 2010 will likely lead to a joint program operated primarily by the USAF.

Recent studies by the Army and the Joint Staff have clearly shown the power of the modern attack helicopter.²² Indeed, the attack helicopter may be *the* best anti-armor platform among the many tank-killing systems currently available to U.S. forces. A rapidly deploying U.S. force may have to react to an enemy advance along many axes that are widely separated. A dismounted infantry-heavy force has little ability to rapidly shift to new locations to oppose different enemy thrusts. The mobility of the attack helicopter in conjunction with agile motorized infantry and cavalry units is ideal under such circumstances.

A critical variable affecting rotary wing operations will be the density and sophistication of the battlespace air defense environment. An important synergistic role for the motorized ground units is to direct fires against local air defenses to facilitate air combat operations.²³

Many of the potential crises that a medium Army force could be deployed to include opponents who do not possess large numbers of armored vehicles. The opponent could be infantry heavy, relying on dispersion in difficult terrain. The attack helicopter in support of dismounted motorized infantry is probably a better platform than medium or high

altitude fixed-wing aircraft to seek out such dispersed forces.

Attack helicopter units consume fuel at prodigious rates. If a deployment was being conducted into an area where there are no prepositioned supplies awaiting the U.S. force, the number of attack helicopter units would have to be carefully considered and based on the nature of the threat, the amount of strategic transport aircraft available, and the logistics challenges associated with that deployment. Certainly, the concept of just in time POL logistics will have to be fully developed including the employment of STOL aircraft such as the C-130J as refuelers. Under appropriate military circumstances, the use of C-17s should not be excluded from these and other combat logistic missions. A future JTR or ATT could play this role as well.

The Exploitation of Sealift.

Although the focus of the argument in favor of aero-motorized forces is their capacity to be airlifted rapidly, the very important role of sealift should not be ignored in many contingencies. The Military Sealift Command's current modernization and expansion plan is on the acquisition of very large (50,000-ton) medium speed (25 knots) roll-on roll-off (ro-ro) cargo ships. Depending upon the speed with which a future political military crisis develops, it may be appropriate to use sealift to deploy some aero-motorized units along with airlift. Wheeled fighting units will be able to more rapidly embark and debark from ro-ro ships than their heavier mechanized and armored counterparts. Further, the motorized units will be able to rapidly move over operational distances (more than 100 miles) without relying upon heavy equipment transporters or railcars. By 2010, there may be a revolution in large cargo ship design that will allow ro-ro ships to cruise at 40 knots in adverse sea conditions. If realized, a fleet of fast sealift might be used to deploy substantial aero-motorized forces to a wide range of plausible military contingencies.²⁴

Long-Range Fires and C⁴ISR.

To further facilitate the use of medium forces during an anti-invasion or "halt phase" of an MTW, the aero-motorized units would rely heavily upon indirect fires delivered by Army missile units, USAF and USN aviation, and USN missile armed warships. Consistent with philosophy of the use of aero-motorized combat, Army units will be able to exploit the likely deployment of Short Take-off and Vertical Landing (STOVL) variants of the USAF's Joint Strike Fighter (JSF) in the post-2010 time-frame. To survive in an MTW shadowed by the NBC/missile threat, USAF early deployers will have to work closely with Army aero-motorized forces and be prepared to operate from dispersed field sites.²⁵

The command and control of such a force should be based on information systems flowing from the Army XXI initiatives. Technologies are already well advanced that would permit the maximum use of "reach back/information pull." Thus the size of the headquarters elements actually deployed could be minimized; data links to distant sensors and information systems would be substituted in large part for deployed capabilities. Nevertheless, such an aero-motorized task force would almost certainly need a suite of tactical UAVs, battlefield radars, and other systems that would contribute to situational awareness.

Since aero-motorized forces would be optimized for deployments into areas where the United States does not have a permanent presence, a premium could be placed on ability to work with the forces of impromptu *ad hoc* coalitions. One could envision that the headquarters of such a unit would need personnel proficient in various languages, for example.²⁶

Medium Forces as a Transition to the Army of 2020.

A powerful argument for moving to the aero-motorized concept described above is that it is an organizationally

comprehensible, technologically feasible, and financially plausible transition from the contemporary Army design to an Army of 2020. Already, there have been several large-scale strategic war games sponsored by the Army After Next (AAN) program that explored the implications of very high performance air-ground units which might be procured and deployed by 2020. The current design concept being explored by the AAN is based upon "air-mechanized" units that assume the rapid development and procurement of a post-2010 generation of technologies far in advance of those required to create the medium weight aero-motorized units described in this essay. To see some variant of the AAN era force posture deployed within 25 years, the Army will have to seriously consider the intermediate transition process. That transition process points to an Army which decisively moves away from its current ultra light/ultra heavy force "barbell" posture by 2010.

At a minimum, the Army of 2010 might be a mix of light, medium, and heavy units. The prospect is plausible that most light units will have been converted to medium units. More radical and controversial is the conversion of several heavy units to medium weight forces by 2010.

Choices Available to the Army.

This essay has tried to make the case that the Army, currently of a "barbell" configuration, should change at least a portion of its structure into a lighter, yet still potent, medium force by 2005 with extant or nearly developed combat vehicles and systems. The essential elements of a medium force were described as having strategic/operational mobility superior to traditional heavy forces and better firepower, operational/tactical mobility, and survivability than present light forces.

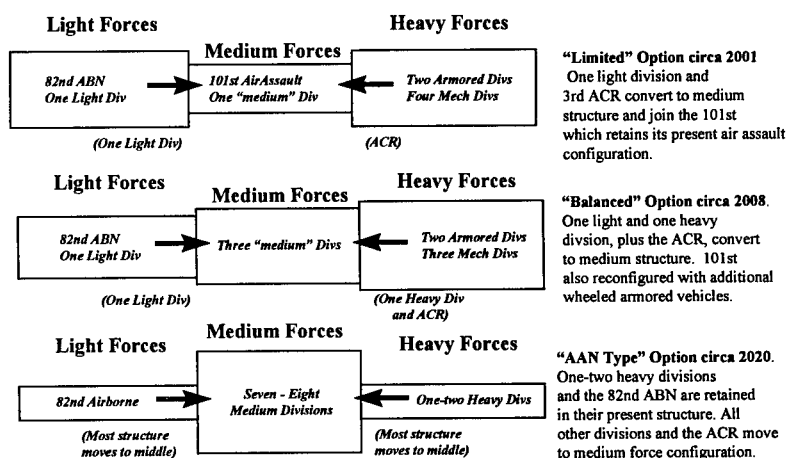
Several questions must be answered. First is the issue of whether this is a correct course of action for the Army. The organization has been successful for the past 50 years in roughly its present barbell configuration. Any change of this

type would require some existing forces, either heavy or light, to be reconfigured.

The second major question concerns the speed and scale of converting heavy and/or light divisions into medium weight units. In those areas of the world where the Army has some combination of in-place heavy units and/or prepositioned equipment available, a traditional heavy unit will play an important, if not central, role for the near future. Looking out a decade, even prepositioning concepts may become increasingly questionable once future opponents have potent long-range missile capabilities. Prepositioned equipment—ashore and afloat—could be menaced by accurate missile and aircraft strikes even without the use of NBC warheads. Additionally, in some parts of the world, such as heavily forested, mountainous, and some urban areas, specially trained (Ranger type) light units that are centered on dismounted infantry are still very appropriate.

Below is an outline of how the Army shift to medium-weight forces might occur over the next 20 years.

Organizational Options



Third is the cost of these initiatives. The type of medium force discussed in this essay will require recapitalization of a portion of the Army division/brigade structure.²⁷ While the Army already has the best fleet of attack helicopters in the world, it has virtually no wheeled armored vehicles. Several thousand vehicles would have to be procured from U.S. and/or overseas sources. Additional indirect fire weapons would have to be bought, for example, adding a vehicle with an FOGM-type capability. These are difficult times for the Army budget, and without additional funding during the next 10 years, some other less appropriate systems such as the heavy *Crusader* self-propelled gun/howitzer would have to be radically scaled back if not eliminated in order to initiate a wheeled armored vehicle program. Any option to move the Army in the direction of becoming a more middle weight force, whether along the lines described in this article or toward a more radical AAN type force must take into account affordability and realistic budget assumptions.

Whether the Army will move to a nearly pure medium weight-type force by 2020 remains uncertain. Several key technological and operational questions will have to be answered. The fate of the ultra heavy units which rely upon land "dreadnought" (50+ tons) armored fighting vehicles will critically depend upon whether the investment in the next generation of combat vehicle and weapons technology will lead to an Army consisting of primarily medium weight aero-motorized forces. Several major advances if not breakthroughs will have to be made in active/passive protection and propulsion efficiencies by 2010 to allow medium weight ground forces to fight in all combat environments. Second is the question about the risks and benefits of low altitude combat and maneuver aviation. Low altitude aerial fighting vehicles can be neutralized by dispersed and effective battlefield air defenses. A key question is whether the United States will be able to devise effective suppression of enemy air defense (SEAD) capabilities to facilitate low altitude air combat operations

without heavy attrition. Third is the question as to whether reconnaissance strike combinations will dominate the battlefield even down to the close engagement regime. Fourth, there remains the question about the size, configuration and role of future infantry forces and how they interact with the next generation of combat vehicles (with and without human operators) and long-range fire systems.

Conclusion.

A decision to transform a portion of the Army into aero-motorized divisions and brigades appears compelling. The geo-strategic environment will likely call for the rapid deployment of high performance combined arms forces over trans-oceanic distances. Even in Europe, NATO expansion east to Poland, Hungary, and Czech Republic highlights the need for operationally agile ground forces since classic prepositioning options may be precluded for geo-strategic and cost reasons.

In many small-scale contingencies, aero-motorized units appear more versatile than pure light infantry units, especially if there is any expectation of intense local combat.

Additionally, there will be the need to have theater forces that have high firepower, operational agility, and a low logistics "footprint." This provides them the capacity to operate effectively in a military environment under the "artillery fan" of long-range ballistic and cruise missiles and possibly "dirtied" by the use of NBC weapons. Finally, a move toward the medium weight aero-motorized concept would put the Army firmly on the path toward a more strategically and operationally agile force of 2020 without calling for either technological or budgetary magic.

ENDNOTES

1. The possible exception to this "10-year" rule is the prospect that the PRC will acquire a substantial air and naval capability to menace Taiwan by circa 2005. To be credible the Chinese would have to

efficiently exploit a wide range of contemporary air and naval weapons, largely acquired from the Russian Federation. The Chinese military—not noted for high technology innovation—would have to selectively master elements of the contemporary “revolution in military affairs.” Even if a Chinese “regional strategic threat” rapidly matured by 2005, it is likely that the geo-strategic focus of possible future confrontations with the United States will have primarily aerospace and naval features with U.S. ground forces playing a secondary-supporting role. The nuclear capability of China should not be forgotten.

2. U.S. forces in Korea face the immediate prospect that a second Korean War would involve the substantial if not massive use of chemical and biological weapons by the North Koreans. During 1997, a major shift in attitude toward the DPRK’s CW and BW capability occurred both within the region and the U.S. Joint Staff. By the winter of 1998, there was wide concern about the need to enhance both the U.S. and South Koreans’ joint capacity to operate in a theater “dirtied” by wide scale CW and BW use.

3. In an important shift emphasis from the Bottom-Up Review (BUR), the strategic analysis contained in the Quadrennial Defense Review (QDR) acknowledged that CW and BW use was *likely* in future Major Theater Wars (MTWs). This shift in strategy was strongly endorsed by the National Defense Panel.

4. See the *Strategic Assessment 1997, Flashpoints and Force Structure*, Washington DC: Institute for National Strategic Studies, National Defense University.

5. With hindsight, the “Pentomic” concept of five infantry battle groups without organic armored mobility and protection made little operational sense in the context of a battle fought primarily with nuclear weapons. See A.J. Bacevich, *The Pentomic Era*, Washington, DC: National Defense University Press, 1986.

6. By the early 1960s, the Infantry Branch had adopted the concept of mechanized warfare if only to provide its forces with protected mobility in a European Theater nuclear war. With the 1960s heavy division concept, the distinction between an armored and mechanized division became trivial. Both had a mix of armored and mechanized battalions in three brigades. It was during this time the concept of the armored self-propelled gun-howitzer fully matured as key supporting arm to the armored and mechanized brigades with a heavy division.

7. The Light Infantry Division’s table of organization and equipment (TO&E) was sized so that the entire division could be

airlifted by 500 C-141 sorties. This resulted in a very light division structure with little organic mobility and modest anti-tank and artillery assets.

8. See Major P. H. Herbert, "Deciding What Has to Be Done: General W. E. DePuy and the 1976 Edition of FM-100-5," 1988; and Major R.A. Dougherty, "The Evolution of US Army Tactical Doctrine, 1946-76," Command and Staff School, Fort Leavenworth, KS, 1979.

9. Both Operations DESERT STORM and Operations JOINT ENDEAVOR revealed the very large intra-theater logistic support needed to provision and move heavy armored and mechanized forces. The now famous "left hook" of the 100-hour DESERT STORM ground campaign required a massive shift of supplies to pre-dumped sites through the use of thousands of heavy cargo trucks and heavy equipment transporters (HETs). Operation JOINT ENDEAVOR required the extensive use of rail and road support to move *one* reinforced heavy Army brigade out of southern Germany to Bosnia over a 90-day period. Aero-motorized units would have had far better operational agility in a similar circumstance, especially in a military environment with a substantial road net.

10. One brigade of the 9th Motorized was operational during the fall of 1990 during Operation DESERT SHIELD. It was not deployed! The 82d was deployed without organic trucks. Unlike the HMMWV equipped 9th ID, the 82d would have been either overrun and/or bypassed if the Iraqi Army had moved south during the first six weeks of the U.S. build-up. It is noteworthy that trucks were provided the 82d when it participated with the 6th French Motorized Division as the furthest element of the left hook into Iraq during the 100-hour ground war.

11. The Italian, British, and American Armies had several disastrous experiences during the North African campaign where foot mobile infantry units were either overwhelmed or bypassed by opposing armored and motorized units. Much of the German infantry and their allied forces suffered similar military disasters along the Eastern Front especially after the battle of Stalingrad in 1943. The Marines discovered this reality during a number of NATO exercises in the 1980s when their then foot-mobile infantry regiments were overrun or bypassed by West German armored and mechanized units. This "lesson" prompted the Marines to use their amphibious assault vehicles as armored personnel carriers during the Marine offensive into Kuwait during Operation DESERT STORM.

12. See various RAND studies by John Lund and others for analyses of the role of wide-body aircraft to carry light armored fighting vehicles. For an earlier discussion of these issues see Peter A. Wilson, "U.S. Reinforcement Options" in *European Security Policy After The Revolution of 1989*, Jeffrey Simon, ed., Washington, DC: National Defense University Press, 1991.

13. See *Jane's Armor and Artillery*, 1997, for a description of the wide range of extant light and medium weight wheeled armored fighting vehicles and new developments. Also see R. M. Ogorkiewicz, "Armored Reconnaissance Vehicles: Finding the Right Capability Mix," *International Defense Review Special Report*, May 1995.

14. See Dennis W. Moore, *The Influence of Soil Surface Conditions On The Traction of Wheeled and Tracked Military Vehicles*, U.S. Army Corps of Engineers, Report GL-89-6, 1989. During the 1980s, major advances in off-road wheel technology occurred with the deployment of radial/run flat tires and central tire inflation systems.

15. See Victor Wouk, "Hybrid Electric Vehicles" and Harold A. Rosen and Deborah R. Castleman, "Flywheels in Hybrid Vehicles" in *Scientific American*, October 1997, for a discussion of innovations in land vehicle propulsion systems. Fuel cell technology appears to be on the verge of major advance, which should further facilitate the mass deployment of low emissions/high fuel efficient hybrid power plant combinations for automobiles and utility vehicles by 2010. Variants of these hybrids are likely to present the next generation of armored fighting vehicle designers with some economically and technologically attractive propulsion options. See Joe Feese, "Race on for Clean Cars," ABCNEWS.com, October 24, 1997. In the future, it is possible to imagine that each wheel of a fighting vehicle will be powered by an electric motor. This will allow dynamic braking (using the motor as a generator) which will increase overall fuel efficiency. If damaged in combat, these powered wheels might be jettisoned to insure survival mobility for the battle-damaged vehicle.

16. Proponents and participants of the 9th Motorized Division experiment freely acknowledged the vulnerability of the force to artillery fire while being equipped only with soft skinned vehicles, the HMMWV. Attempts by the Army to develop and deploy an air transportable Armored Gun System (AGS) have failed twice—once with the Marines during the 1980s and most recently with the 1997 cancellation of the XM-8.

17. For a more detailed analysis of Rapid Force Protection Technologies see R. Steeb, J. Matsumura, *et al.*, *Exploring New*

Technology Concepts for Light Forces, DB-168-A/OSD, RAND 1997; and R. Steeb, J. Matsumura, *et al.*, *Rapid Force Projection Technologies: Quick Look Analysis of Advanced Light Indirect Fire Systems*, DB-169-A/OSD, RAND 1997. Unlike the aero-motorized concept, this RAND concept calls for the deployment of very few combat troops and primarily relies on air deployed weapon "pods" which have no tactical mobility.

18. Radically lowering the signature of the next generation of armored fighting vehicles to detection by overhead surveillance and top attack systems will likely be a major design requirement. 70-ton class MBTs may become just "too big and too hot" to hide from top attack threats. See George Seffers, "DoD Wants Stealthy Hybrid Electric Vehicles," *Defense News*, December 1-7, 1997, p. 4.

19. See R. Steeb, J. Matsumura.

20. As the United States relies upon silicon-based weapons, sensors, computers, and communications to affect a revolution in military affairs, technologically competent military opponents may rely more heavily upon weapons which generate high-powered electromagnetic effects. These include both nuclear and non-nuclear driven electromagnetic pulse (EMP) and high-powered microwave (HPM) weapons. Future Army wheeled fighting vehicles should be designed to minimize these weapons effects especially if the next generation of fighting vehicles relies upon hybrid electric propulsion systems. See F. Gassman and EMC Baden, "High Power Microwave: The Silent Threat" in *Armada International*, August/September 1997, p. 70.

21. See "JTR to be 'Chinook' for US Army of 2025" in *Jane's Defense Weekly*, September 10, 1997. An interesting alternative to various tilt-rotor and large helicopter JTR concepts is the Boeing Super STOL (SSTOL) concept for the Advanced Theater Transport (ATT) which would replace the C-130 family. See Bill Sweetman, "A rising imperative: more demands on airlift" in *Jane's International Defense Review*, 2/98, pp. 28-29.

22. Recent computer driven wargames such a TACWAR used during the QDR highlighted the killing power of helicopter gunships during the Deep Attack Weapons Mix Study (DAWMS).

23. The threat of manportable surface to air missiles to low altitude fixed and rotary wing aircraft is very serious and will likely continue to mature. A major objective of the RAH-66 *Comanche* gunship is to produce a low observable combat helicopter. A major joint activity of all four services will be to conduct suppression of enemy air defenses

(SEAD) operations. Well-armed motorized units can play an important role in this regard. In those circumstances where there is a severe air defense threat, motorized units will have to rely more heavily upon long-range stand-off missile fire support from platforms operating outside of the effective envelope of the local air defenses.

24. For a description of the next generation 40-knot cargo ship, see David L. Giles, "Faster Ships for the Future," *Scientific American*, October 1997.

25. Current USAF plans for the Air Expeditionary Force (AEF) which calls for the rapid deployment of short-range F-16 class fighter-bombers to bare (unprotected) bases may be viewed as a bit operationally naïve. Future long-range missile threats will likely require that USAF units equipped with the STOVL version of the JSF will operate out of dispersed and hidden sites. Both the Royal Air Force while operating the GR-5/7 *Harriers* and the USAF while operating the *Gryphon* Ground Launched Cruise Missile discovered that dispersed logistics to support air units in the field was a major chore. Even the USMC tends to operate its *Harrier* fleet from a fixed airfield or from a large amphibious ship to minimize the logistics burden.

26. See R. Steeb, J. Matsumura.

27. Implicit in the proposals made in this article is the question as to whether the Army should move to an all brigade structure, which eliminates the division as an echelon. The authors are somewhat agnostic and do not believe the argument in favor of the Army moving to medium-weight combat formations stands on the outcome of this debate. For a call to change the Army to a brigade structure with forces having features described in this article, see Douglas A. Macgregor, *Breaking the Phalanx: A New Design for Landpower in the 21st Century*, Westport, CT: Praeger, 1997.

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