Airmechanization

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Tactical and operational maneuverability need not be constrained to two dimensions if forces are light enough for transport by Army helicopters and Air Force C-130s. Does Transformation need to expand conceptually within the third dimension of tactical warfare? Does Transformation need to shrink materially to field airmechanized vehicles? While the authors describe a future force of vehicles even smaller than those the Army is now considering for the Interim and Objective Forces, Isenberg's sidebar warns that when you need heavyweights, you'd better have them.

Superior mobility must be achieved if we are to surprise our opponent, select the terrain on which we are to fight and gain the initiative. There is no alternative. If we are slow in movement, awkward in maneuver, clumsy in deployment—in a word, not mobile—we can expect to be forestalled, enveloped or constrained to launch costly frontal attacks against an enemy advantageously posted.

—Infantry in Battle, *The Infantry Journal*, Washington DC, 1939

TRANSFORMATION IS A TIME for developing new concepts, organizations and capabilities for dealing with adversaries and maintaining relevance with our national security strategy. In concert with the other US Armed Forces, the Army should have rapid global reach for conducting major theater wars, smaller-scale contingencies and peacetime military engagements. The current geopolitical environment, effects of globalization, critical regional resources, vulnerable trade routes and continued economic growth require an Army that can access landmass interiors and resolve a situation quickly and decisively with tailored overmatch. All this must be done while operating from exterior lines, a requirement no other country has on the scale of the United States.

To be strategically deployable, the Transformed Army must maximize critical airlift to move heavy, medium and light force packages anywhere in the world rapidly. This transformed force must optimize the synergistic use of US Army and US Air Force (USAF) systems for immediate operational maneuver regardless of enemy strategies to deny use of airfields, seaports and forward bases. To have tactical mobility in all types of terrain, forces must have fast-moving, protected vehicles and a vertical lift capability. A force today must have multipurpose systems for versatility, organizational flexibility to act freely throughout the area of operations and adaptability to immediately move from peace support operations to combat. It is unadvisable to depend on only one method of operation, which the enemy has been studying to counter.

Operational Reality

During the Cold War the US National Military Strategy (NMS) centered on a policy of containment, which required robust forces forwardly deployed in Europe and Asia. Extensive basing with well-developed interior lines and mature infrastructure characterized US force disposition. Mobilization and methodical phased deployment fo-

cused on sending troops to stored equipment sites to support a defensive doctrine. Rapid deployment was a relatively low strategic priority. Without the influence of two superpowers, regional stability has decreased since the end of the Cold War. Irregular forces, rogue states, terrorist groups and transnational criminal organizations have found the environment ripe to exploit. In response, US forces have conducted operations from humanitarian assistance to peacekeeping, to smaller-scale contingencies—all while maintaining readiness for major conflict—despite fiscal constraints and a massive reduction in force structure.

Today's requirements demand the ability to project forces rapidly worldwide with an overmatch capability throughout the spectrum of conflict. This means operating almost exclusively from exterior lines with versatile, substantial, joint forces capable of swift offensive action. Potential adversaries recognize our dependency on secure ports and airfields along with the time required to build combat power. It is unlikely that US forces will be allowed *Desert Storm* buildup luxuries in future conflicts. Dangerous geopolitical and technological trends, along with antiaccess weapons such as long-range missiles and weapons of mass destruction, demand an extended-range, power-projection, forced-entry capability.

The US Navy and Air Force strike capability, along with the littoral reach of the US Marine Corps, provides rapid projection of US forces, a vital component of the NMS. Projecting decisive Army land power also depends on the Navy and Air Force. Current Army force structure, built to defend against a Soviet invasion of Europe, has extremely heavy divisions that are difficult to project or extremely light forces that lack mobility, lethality and protection. US Army Chief of Staff General Eric K. Shinseki set a bold new course to correct the too-heavy, too-light force structure. His Transformation initiative is designed to field medium-size forces that have sufficient mobility, lethality and protection, and are light enough to be projected quickly into the theater. This vision will close the gap in Army landpower projection. Shinseki set specific goals of projecting a brigade-sized combat team worldwide in 96 hours and an entire division in 120 hours. These tough standards will require new paradigms and creative approaches.

For Army Transformation to remain relevant, it must be integrated into Joint Vision 2020 based on dominant maneuver, precision engagement, focused logistics and force projection, supported by information superiority and quality leadership. This Transformation is structured with three forces:

Army Transformation is focused on deploying a combat brigade via C-130 aircraft. Interim and Objective Forces will be lighter than legacy brigades but are equipped with combat vehicles that provide more mobility, lethality and protection than current Army light forces. However, as envisioned, they will rely on secured international airports, have no forced-entry capability and employ traditional two-dimensional maneuver warfare.

- A sustained, recapitalized Legacy Force.
- An Interim Force using available technology.
- An Objective Force equipped with technological breakthroughs.

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The M113LW has about the same internal space as a LAV-III and, being tracked, superior cross-country and urban mobility. Both vehicles can mount the same weapon systems, including the 105mm cannon armored turret. The band tracks for the M113LW increase the road speed over the stock M113 and make the ride smoother and quieter although the LAV-III has a slight advantage in both areas. The low-pressure footprint of the M113LW reduces mine vulnerability. The M113LW uses existing M113A3s with only minor modifications, resulting in the low acquisition cost of $250,000 each.

IBCT European Airmechanized Models

The Army selected the heavy-wheeled light armored vehicle (LAV)-III to equip the interim brigade combat team (IBCT). The LAV-III weighs about 38,000 pounds, combat equipped, which is at the extreme payload envelope of the C-130, limiting landings to long, improved runways. No US helicopter can sling load it. As with most wheeled armored vehicles, the LAV-III is very tall, barely clearing the roof of a C-130, which rules out airdrop. The LAV-III armored gun version is entirely too tall for the C-130. When the LAV-III add-on armor is mounted, the LAV-III weighs 43,000 pounds, which precludes C-130 transport altogether.

The extra weight of the LAV-III is a consequence of the typical arrangement of most wheeled armored cars. US Tank-Automotive and Armaments Command studies found that armored cars are about 28 percent heavier and larger than comparable tracked vehicles. Large wheel assemblies, multiple drive shafts and the numerous gearboxes involved in all-wheel-drive running gear—not additional armor protection—account for the extra weight. The LAV-III's heavy weight is divided among eight wheels, resulting in high ground pressure and dramatically increased vulnerability to mines. Compared with heavy tracked M1 Abrams tanks and M2 Bradley infantry fighting vehicles (IFVs), the LAV-III is far easier to maintain, has much faster road speed, runs dramatically quieter and burns less than 25 percent of the fuel. However, these advantages are only marginal when compared to light tracked vehicles like the M113 family of vehicles. Finally, as an entirely new inventory item, the LAV-III is expensive at $2 million each and will require extended time for high-rate production, mechanics' training and spare parts.

An alternative to the strategy constrained by the LAV-III, the air-mech-strike (AMS) concept achieves the strategic deployment, operational maneuver and tactical mobility necessary for a cost-effective,

US Army

I Corps soldiers training with LAV-IIIs at Fort Lewis, Washington.

progressive, joint-friendly, relevant Army Transformation. Other armies around the world have already developed this concept with far less funding than the US Army's.

AMS is the projection of protected mechanized forces by air-land, airdrop and helicopter insertion from both internal and external loads. This full-dimensional maneuver concept emphasizes air transportability to break friction with terrain and obstacles and insert maneuver forces quickly for positional advantage. Recent improvements in the lift capacity of helicopters and the performance of lightweight, armored vehicles have made vertical insertion of mechanized forces possible. Russian, British and German armies already have operational airmechanized forces. The French, Swiss, Swedish and Finnish armies have all recently purchased large numbers of airmechanized vehicles. The People's Republic of China has likewise purchased 200 airmech vehicles from Russia. In contrast, the US Army has the world's largest helicopter fleet but no airmech capability.

Russia's army has had an operational airmechanized force for more than 40 years. In fact, the term "airmechanization" comes from a Russian translation of early work Soviet Field Marshal Tuchechevsky did on this concept in the 1930s. At the height of the Soviet army's strength, there were eight airmechanized divisions equipped with motorcycles, light weapons carriers and the BMD-series armored fighting vehicles. These airborne divisions could parachute mechanized infantry units behind enemy lines or air assault these mechanized forces via Mi-6 and Mi-26 helicopters. Today the reduced Russian army has about three such divisions equipped with more than 2,000 BMD-2 airmech combat vehicles and several hundred new BMD-3s equipped with a tank-like 100-millimeter (mm) cannon. These vehicles are airdrop-capable and helo-transportable, even by US Army CH-47 helicopters.

The British army built a rapidly deployable light armored force in the late 1960s and early 1970s. Its criteria called for a brigade-sized element whose vehicles could be transported by C-130 transports,

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A Wiesel-2 sling-loaded from a UH-60 Black Hawk.

US Army

newly purchased from the United States. The British army selected an 8-ton series of armored vehicles that eventually led to the Spartan troop carrier and the Scimitar fighting vehicle equipped with a shoot-on-the-move, high-velocity, 30mm automatic cannon. The 8-ton design allowed a C-130 to transport two vehicles and a CH-47 helicopter to sling one, making Great Britain the first NATO country with airmechanized capability. A British airmobile brigade conducted an AMS 25 years later over Serbian minefields in Kosovo following the July 1999 air campaign—establishing its sector in only 24 hours. With no such capability, the US Army took several days to occupy its sector fully.

In the 1980s the German army, influenced by the earlier Russian and British efforts, decided to reorganize its foot-mobile airborne (parachute) regiment into an airmechanized force. In 1992 the Germans fielded more than 300 Wiesel armored tracked vehicles, which are light enough to sling under a UH-60 Black Hawk. Optimized as a counter-Soviet antiarmored force, these vehicles were equipped with 20mm auto cannons and heavy tube-launched, optically tracked, wire-guided missiles with all-around armor protection from 7.62mm small arms. To improve the brigade's infantry carrying capability in the post-Cold War, the German army is purchasing the Swedish airmech vehicle, the 6-ton BV-206S. This armored, articulated vehicle carries a full 11-troop squad; is still light enough for the CH-47 Chinook to carry; and detaches into two separate cabs that Black Hawks can carry. The British royal marines and the French, Swiss, Swedish, Spanish and Finnish armies are purchasing the BV-206S to gain an airmechanized capability. The US Army operates an unarmored earlier version called the small-unit support vehicle in Alaska. The small sizes of the Wiesel and BV-206S allow the entire German airmechanized brigade to deploy using only 20 Boeing 747 jets, or it can be inserted via parachute from 100 to 150 C-130 sorties.

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The AMS Concept for the US Army

An improved European-based airmechanized model can work in the US Army. This proposal uses a combination of existing combat vehicles, along with a modest purchase of European airmech vehicles already in production, lift helicopters, USAF aircraft and civilian Boeing 747s. The airmechanized concept optimizes combat vehicles for aircraft transportability. When secure airports are available, Boeing 747s can move an airmechanized brigade's entire combat power, releasing available C-17s and C-5s for transporting outsized force packages such as helicopters, tanks, artillery and multiple-launch rocket systems.

The following option focuses on the four active light divisions. Three classes of vehicles are introduced: airmechanized vehicle—medium (AMV-M) weighing 8 to 10 tons, airmechanized vehicle—light (AMV-L) weighing 3 to 7 tons and military all-terrain vehicles (MATVs) weighing 500 to 4,000 pounds. For simpler comparisons the four light divisions are centered on the three types of airmech vehicles. Actual organizations should consist of combinations in various percentages.

AMV-M design. The US Army's 10th and 25th light divisions are reorganized using a modified lightweight M113 armored personnel carrier employing band tracks and Kevlar hatches (M113LW) as the prime candidate for the AMV-M. Each division has three brigades of 300 M113LWs each. The M113LW weighs about 19,000 pounds (the M113A3 weighs 23,000) and can be sling-loaded by a CH-47 helicopter. Two M113LWs can be transported by C-130 as opposed to one LAV-III. Add-on armor carried in follow-on aircraft can increase protection up to the LAV-III's 14.5mm proof standard. The M113LW has about the same internal space as a LAV-III and, being tracked, superior cross-country and urban mobility. Both vehicles can mount the same weapon systems, including the 105mm cannon armored turret.

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The 101st Air Assault Division is reorganized around the purchase of 900 European 3- to 7-ton AMV-Ls, 300 per brigade combat team. The two leading candidates are the German Wiesel-2 and the Swedish BV-206S tracked armored vehicles. A squad would require two Wiesels, carrying six troops each, but could be sling-loaded by one UH-60 helicopter. The BV-206S is larger with room for full squads of 11 troops but requires three UH-60s to sling load two complete vehicles with cabs separated.

A Wiesel-2 mounting a 120mm mortar.

MaK System Gesellschaft mbH

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existing M113A3s with only minor modifications, resulting in the low acquisition cost of $250,000 each; a fast fielding time line; and excellent sustainability by leveraging the parts and maintenance know-how of the existing M113A3 fleet. Finally, the M113LW's low weight and compact size facilitate transport by commercial aircraft, which can deliver an entire M113LW brigade by 60 Boeing 747 sorties.

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Is Army Deployability Overemphasized?

David Isenberg

H.L. Mencken, the famed sage of Baltimore, wrote that for every problem there is a nice, neat solution, which is inevitably wrong. The same might be said for critics who claim that the US Army's new heavy weapon systems, such as the Crusader self-propelled howitzer or the M1A2 system enhancement package (SEP), are not suitable for the Army's 21st-century transformation strategy, which seeks to make major Army weapons lighter and air deployable.[1] Such single-minded critics fear that these high-tech weapon systems cannot be transported aboard a C-130. However, they fail to see the bigger problem—the breathtaking and almost hidden presumption that all future conflicts will be relatively minor intrastate affairs.

Smaller-scale contingencies will require US ground forces to be deployed overseas at unprecedented speeds: a combat brigade of up to 3,500 troops in four days and a division of 12,000 in five. The risk is simple: will future US Army forces, lacking heavy direct- and indirect-fire weapons, be ready to take on a well-armed aggressor? Historically, deficiencies in heavy fire support do not become obvious until large ground forces are deeply embroiled in combat.[2]

Without heavy forces, how does an army move forward 20 to 50 kilometers (km) a day and live to tell the tale? Transformation advocates explain that future forces will not move 20 km a day but 150, finding safety inside the enemy's observe, orient, decide, act loop. What happens if the enemy is not there at the end of a 150-km hop? What if he has the initiative elsewhere and you lose visualization of the battle? At that point, will it not be just enemy tanks against your wheels? Can we afford to commit to combat if we cannot hold our own?

The United States does not face a high probability of major interstate war. However, the probability is not zero. It was only in 1994 that Saddam Hussein once again threatened to invade Kuwait, and a few months later, Pyongyang threatened to invade South Korea.[3] Moreover, the presumption that the future will involve only low- and medium-intensity conflicts runs counter to a 250-year trend in warfare. Since the mid-18th century, armies have inexorably increased the weight of their armaments as well as their manpower requirements. The United States went from a million-man force during the Civil War, to an expeditionary force 2.8 million strong during World War I, to a gargantuan force of 12 million during World War II. History hardly disproves the claim that we have recently crossed some watershed and reached the end of an era. Such sea change is clearly possible. However, it takes more than Pentagon officials' unsupported assertions to prove the case.

In fact, criticism of the Army's deployment capabilities has entered the realm of the absurd. Because the Army has experienced problems deploying heavy ground combat power, such as the 1999 war over Kosovo, critics have illogically challenged the future relevance of major ground combat forces. More important, the Army itself has not ruled out the possibility of major combat operations. A case in point is the Army's positioning of bulky equipment. Today the Army has seven heavy-brigade sets of equipment pre-positioned: one in Italy, Kuwait, Qatar and South Korea; two in Central Europe; and one afloat.[4]

Agreeing with the Army, the congressionally mandated US Commission on National Security/21st Century noted in 2000 that future US military capabilities should still include "conventional capabilities necessary to win major wars."[5] The very fact that the United States is now the world's dominant economic and military power makes it certain that rivals seeking regional hegemony will modernize conventional forces to take advantage of US force structure vulnerabilities.[6] This is especially so because the US military shapes the international order.

Critics confuse the probability and number of future interstate wars with the likelihood of firepower-intense conflicts. It is not difficult to foresee future operations, short of a major interstate war, in which the firepower provided by Crusader and the M1A2 SEP would be necessary to counter our adversaries. States can easily obtain sophisticated weaponry. A recent study authorized by the National Intelligence Council noted that technology diffusion "will accelerate as weapons and militarily relevant technologies are moved rapidly and routinely

11 troops but requires three UH-60s to sling load two complete vehicles with cabs separated. Both vehicles offer all-around 7.62mm ball protection with add-on armor to stop 7.62 armor-piercing rounds. Light footprints make these two vehicles unlikely to set off pressure-detonated antitank mines; however, in a blast sequence, the vehicles are less survivable than the M113 or LAV-III. Low-recoil auto cannons up to 30mm can be carried along with every known antitank guided missile and the heavy 120mm mortar.

While the Wiesel and LAV-III have comparable road speeds, the BV-206S is slower. The BV-206S has superior terrain agility; its articulated track system allows it to negotiate large obstacles, swampland, wooded terrain and steep slopes. The two separate cabs of the BV-206S also

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across national borders in response to increasingly commercial rather than security calculations."[7] Deploying a force that is operationally capable and genuinely respected by its enemies ensures force protection. Getting a lightly armed force to the conflict zone—even if it arrives first—will not.

No one can be confident that the revolutions in warfare and the concomitant rush to transform US military forces allow greater reliance on air and naval standoff capabilities and less on ground forces. Using air power for nearly a decade after defeating Iraq during Operation *Desert Storm* has not removed Hussein's threat. And, using air power in Operation *Allied Force* to force Serbia to withdraw from Kosovo was plagued with enough problems to cause the Clinton administration to contemplate using ground forces almost to the very end.

Our new tanks and cannon field artillery will provide increased and more accurate firepower from longer distances and the ability to share battlefield intelligence with ships and aircraft. Moreover, using tube artillery instead of missiles does not exclude precision fires. The latest howitzers are two-fers. In addition to firing inexpensive iron rounds, advanced cannons could deliver precision submunitions inside 30-foot circles. Considering that the standard 155-millimeter projectile's normal bursting radius is around 100 feet, the cannon critics' single-minded preference for missiles seems all the more misplaced.

Finally, there is a remarkable lack of hard data backing up the presumption that US forces must be able to deploy immediately to fight successfully and defeat an opponent. Consider the cases in Iraq and Taiwan. Although air power has not unseated Hussein, it has quite capably contained him. US Central Command's ability to slow down an Iraqi attack has improved since *Desert Storm*, through regular exercises, pre-positioned materiel and the much lower readiness level of Iraqi military forces. US ground forces have more time to deploy to the theater to defeat Iraq decisively, should it attack anyone in the Middle East again.

In Taiwan, it is improbable that China could successfully mount a surprise amphibious assault against the main island because it is unlikely China can quickly achieve air superiority. While the long-term threat to Taiwan remains serious, it is doubtful the People's Liberation Army (PLA) could achieve the maneuver, surprise and strength necessary to land troops where they would not be locally outnumbered and outgunned by defenders. It is unlikely that mainland China will acquire the logistic muscle to strengthen its invading forces faster than Taiwan can reinforce its defending forces. The protracted PLA campaign necessary to put Taiwan in real jeopardy would allow more than enough time for the United States to deploy or pre-position even its heaviest forces.

Major conflicts remain not only possible but probable. However, unlike Federal Express packages, US ground forces do not really have to get there overnight. To make US forces formidable when they do arrive, heavy weapon systems, such as Crusader, are still good investments both for the 21st-century Army and national security in an uncertain world.

NOTES

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3. Donald Kagan and Frederick W. Kagan, *While America Sleeps: Self-Delusion, Military Weakness and Threat to Peace Today* (New York: St. Martin's Press), 431.
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5. Seeking National Strategy: A Concert for Preserving Security and Promoting Freedom: The Phase II Report on a US National Security Strategy for the 21st Century (Washington, DC: US Commission on National Security/21st Century, 15 April 2000), 14.
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7. Global Trends 2015: A Dialogue About the Future With Nongovernment Experts, (Washington, DC: National Intelligence Council, 2000-02, December 2000), <www.odci.gov/cia/publications/globaltrends2015/index.html>.

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allow excellent modularity for mission flexibility and increased survivability through compartmented blast areas. The 101st Air Assault Division has sufficient UH-60 and CH-47 helicopters to insert an entire brigade's maneuver strength in one lift out to a radius of about 200 kilometers (km). Both vehicles cost about $500,000 and are small enough for about 20 Boeing 747 sorties to transport the entire brigade's combat power.

The 82d Airborne Division is reorganized with 300 wheeled MATVs per brigade and 900 per division. The MATVs would be 4x4 or 6x6 wheeled vehicles, some with limited 5.56mm armor plate. The candidates are the British Supacat and the US-made Flyer 21 and Polaris RANGER. These vehicles would be easy to deploy with stacking capability; one Boeing 747 could transport about 50.

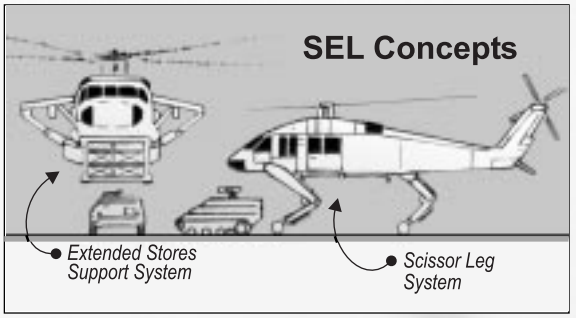
MATV design. The 82d Airborne Division is reorganized with 300 wheeled MATVs per brigade and 900 per division. The MATVs would be 4x4 or 6x6 wheeled vehicles, some with limited 5.56mm armor plate. The candidates are the British Supacat and the US-made Flyer 21 and Polaris RANGER. These vehicles would be easy to deploy with stacking capability; one Boeing 747 could transport about 50. The MATV's light weight and small size would also facilitate airdropping large numbers by relatively few T-tail USAF cargo aircraft. The light weight and compact size would facilitate long-range air assaults, employing UH-60 and CH-47 helicopters with auxiliary fuel tanks making insertions out to 400 km. The MATV can carry various weapons up to 40mm automatic grenade launchers, heavy antitank missiles and medium mortars. These vehicles cost about $100,000 and are very easy to maintain. While the MATV would not present a well-protected vehicle like the M113 or BV-206S, the ability to deploy so many in so few aircraft sorties would allow the 82d Airborne Division to be inserted rapidly with excellent ground mobility and more firepower than current foot-mobile brigades with hand-held weapons. The low cost per vehicle makes the option all the more attainable.

What About Air Defenses?

Air defense artillery affects helicopter flight as antitank defenses do armored maneuver. Both defenses must be suppressed and accounted for in risk-factor planning, but history has shown that the static nature of such defenses normally does not preclude armored or helicopter maneuver. Because AMS forces are mechanized, landing and drop zones can be displaced tens of km away from enemy concentrations and high-density air defenses. If enemy air defenses are too strong to permit helicopter operations, then the AMS brigade can maneuver at mechanized speeds. Sling-loading vehicles, which increases risk, can be replaced by streamlined external-load (SEL) technology already available in the civil helicopter market. Using SEL to carry large external loads close to the underbelly of helicopters greatly improves maneuverability, nearly doubles assault radius and reduces above-ground signatures.

Future AMS, 2008-2020

Adopting the proposed airmech option provides a foundation for developing more advanced three-dimensional capabilities in the Objective Force. In addition to meeting Shinseki's strategic deployment standards, the concept allows the force to airdrop an entire mechanized brigade in one lift and the option to insert light armor via helicopters out to a combat radius of 200 km—all using 1980s airmech vehicles and 1970s helicopter technology. Recent technological advances in information warfare, combat vehicles, weaponry, signature management and rotary- and fixed-wing aircraft point to revolutionary expansion of three-dimensional maneuver warfare. Committing now to the first stage of airmechanized capability assures institutional conversion throughout the Army that will



Sikorski Aircraft Corp.

(*Right*) A Black Hawk tailored for fire-fighting by adding a specialized SEL. (*Below*) An S-64 Sky Crane with a typical SEL payload, 1965.

US Army

drive leader training and doctrine development to keep pace with future technological maneuver advances.

The need for increased range. Army legacy aircraft have a relatively short range and require large cargo aircraft for timely deployment to a crisis theater. This limitation also increases risk in the short 200-km tactical sling-load radius of airmech vehicles. AMS proposes to remedy this shortfall by joining the Navy's vectored thrust ducted propeller (VTDP) modification to the Sikorsky H-60 helicopter series. This technology replaces the tail rotor of the AH-64 and UH-60 with a ducted fan and short wings to nearly double the cruise speed from 120 to 220 knots. This increased speed changes a worldwide, self-deployed, seven- to 10-day challenge to a four-day operation.

Adopting commercially available SEL configurations for the CH-47 and UH-60 would likewise extend the range even further, reducing the risk from enemy air defenses through closer terrain flight. The result of an aggressive 5-year VTDP and SEL program could achieve 4-day self-deployment for Army aviation and double the combat insertion radius from 200 to 400 km. The range increase greatly enhances surprise, flexibility and survivability while multiplying the area of influence of a deployed Army force. These programs would extend the viability of legacy aircraft until about 2015 to 2020 when a future transport rotorcraft (FTR) could be fielded as a CH-47 and UH-60 replacement. FTR would employ revolutionary rotor technologies such as retractable and tilt rotors to achieve 500-knot cruise speeds, same-day self-deployment and a 1,500-km insertion radius for a 20-ton armored vehicle.

Future combat system (FCS). Scheduled to arrive with the FTR in 2015, the FCS is the Army's replacement for the M1 Abrams tank and the M2 Bradley IFV. The FCS's common chassis will yield a carrier version weighing 10 tons and an attack version weighing 20 tons. The

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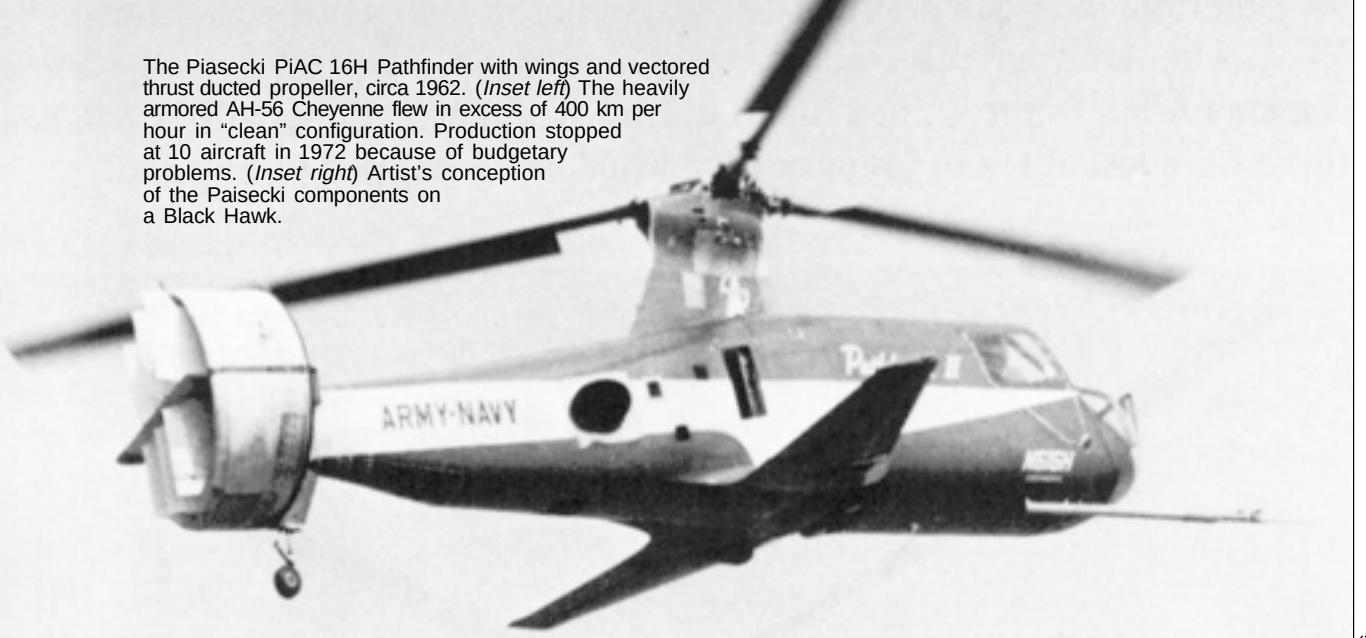

The Piasecki PiAC 16H Pathfinder with wings and vectored thrust ducted propeller, circa 1962. (*Inset left*) The heavily armored AH-56 Cheyenne flew in excess of 400 km per hour in "clean" configuration. Production stopped at 10 aircraft in 1972 because of budgetary problems. (*Inset right*) Artist's conception of the Paisecki components on a Black Hawk.

Kulair Inc.

US Army

US Army

Army legacy aircraft have a relatively short range and require large cargo aircraft for timely deployment to a crisis theater. . . . AMS proposes to remedy this shortfall by joining the Navy's vectored thrust ducted propeller (VTDP) modification to the Sikorsky H-60 helicopter series. This technology replaces the tail rotor of the AH-64 and UH-60 with a ducted fan and short wings to nearly double the cruise speed from 120 to 220 knots.

FTR will transport either two carriers or one attack FCS to mass for an operation. Instead of fielding heavy armor, advanced weapons will include hypervelocity rocket penetrators and advanced chemical energy warheads. FCS will use advanced signature-management technologies to hide from sensors and avoid being hit as the principal means of ballistic survivability. Different mission models of FCS will have the same external appearance to complicate enemy imagery calculations. Even fire support platforms, such as trailer-mounted artillery rockets, will appear to be logistic carriers.

Unmanned aerial vehicle (UAV) and unmanned ground vehicle (UGV) use. The lighter FCS and FTR force of the future will employ large numbers of UAVs and UGVs. Leaders down to platoon level will be able to launch these relatively inexpensive aerial and ground probes to greatly expand situational awareness and reduce risk to manned reconnaissance. Using ground robotics will also allow commanders to move weapons, ammunition and logistic materiel while reducing the drain on manpower and the risk on soldiers from ambush, land mines and contaminated areas. Organic flying and driving sensors will be tied into larger, more sophisticated platforms with data downlinks, further enhancing commanders' battlefield awareness. By widely using UAVs and UGVs, a two-dimensional enemy force will be especially vulnerable to standoff joint and Army precision munitions, facilitating a better overmatch when the inevitable closure with the enemy and objectives occurs.

Strategic joint projection improvements. More sophisticated cargo aircraft, such as the C-17, will be needed to project Army combat power. The aging C-130 fleet will need to be replaced with new platforms that deliver Army forces to unimproved fields employing super-short takeoff

and landing craft. A leading candidate is Lockheed's tilt-wing concept that promises to deliver up to three 20-ton FCSs. Another projecting and sustaining technology for Army land forces is the wing-in-ground (WIG) effect. Large Russian-built prototypes have demonstrated that surface-skimming aircraft can carry four times the load of a current C-5 by using the extra lift associated with ground effect. WIG is a possible replacement for the aging C-5 fleet. The aircraft would be used only over water but could substantially improve early-entry forces' projection and sustainment. Joint mobile offshore bases can also be substantially improved by linking 10 to 12 supertankers together, under a flat deck, projecting Army forces via USAF tilt-wing and FTR systems. Not intended for amphibious Marine-style assaults, these floating bases would be semipermanent as a partial solution to the lack of forward bases.

US Army relevance in the 21st century depends on the ability to deploy sizable forces rapidly from the Continental United States. Once deployed, they must quickly gain decisive, positional advantage over any adversary throughout the spectrum of conflict. The formula for such a force lies in the concept of airmechanization, which takes advantage of information superiority and provides strategic deployability, forced-entry capability, dominant maneuver, tactical agility, survivability, operations in depth and flexibility for the commander. Two-dimensional warfare will no longer give our forces the overmatch to win. Many of our European allies are already well down the airmech road. The US military already has airmechanization's most expensive element—the most robust helicopter and fixed-wing force in the world. Transformation should capitalize on that capability and enable the Army's full-dimensional maneuver—the money saved can be reallocated to other NMS priorities.

The result of an aggressive 5-year VTDP and SEL program could achieve 4-day self-deployment for Army aviation and double the combat insertion radius from 200 to 400 km. The range increase greatly enhances surprise, flexibility and survivability while multiplying the area of influence of a deployed Army force. These programs would extend the viability of legacy aircraft until about 2015 to 2020 when a future transport rotorcraft could be fielded as a CH-47 and UH-60 replacement.

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