The Pentomic Transition

A Monograph

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Abstract

The Pentomic Transition, by MAJ John P. Byler, 39 pages.

This paper examines what the Army learned as it transformed to operate on a nuclear battlefield, and what elements of that transformation were and were not effective. In the examination of the lessons learned during the Pentomic transformation, three interwoven areas are prevalent in their continued impact: the lessons of doctrinal changes and how we innovated and attempted to adapt to a problem; how the atomic vision of future combat meshed with the technological acquisitions and the capabilities pursued by the Army; the recruitment, conscription, and retention of the personnel needed for the Army to fight in a new way with highly technical weapons. What the Army learned about fighting on a nuclear battlefield, ultimately confirms the dialectic between society, the people in its military, the tools they must use, and the way they use them. An army transition cannot occur in a vacuum, and the transaction between the nation and the military in that transition is a continuous and complex interchange.

Contents

The Pentomic Army

Soldiers crouched in fighting positions on a hot, dry Nevada day in the Yucca Flats about seventy miles northwest of Las Vegas. Vehicles, weapons, and mannequins lay scattered on the desert floor in front of them. Beyond the equipment a 300-foot tower stood holding a nuclear bomb. The flash of a 51.5 kiloton nuclear weapon preceded the ground shock wave by six seconds as volunteers huddled in two trenches 2,000 meters away. This is the closest living people have been to a detonation of this size. Though the bomb was twice the size of Hiroshima or Nagasaki, all eight withstood the blast.[1] Another two kilometers behind them were two brigades of Soldiers who then attacked toward an objective just west of ground zero. This was part of the Desert Rock V exercises conducted in the Spring of 1953.[2] The Army was adapting to a world with atomic weapons.

To meet the threat of nuclear weapons on the battlefield and remain effective in the atomic era, the US Army transitioned into the Pentomic Army.[3] While never tested against an enemy, what the Army learned during this transition, continues to resonate today. As the Army reorients to Large Scale Combat Operations (LSCO) the lessons of the Pentomic era remain relevant.

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[1] Without immediate ill effect: these exposures likely had long term negative health effects. A 25 roentgen limit was set for each of these men for the duration of the exercise. Today 0.62 rem (rem is a roughly equivalent modern measure) is the estimated annual dose for a civilian, a single dose of 100 rem will cause nausea, a single dose of 500 rem is fatal if untreated; US Nuclear Regulatory Commission, *Radiation Protection and the NRC*, NUREG/BR-0322, Rev 1 (Washington, DC: Office of Public Affairs, 2010), 6.

[2] Final Report of Exercise. *Exercise Desert Rock V, Volume I – Operations*, 16 July 1953. Defense Technical Information Center Accession Number ADA 078559, 8.

[3] The Pentomic Army was a restructuring of combat divisions from the familiar system of the Second World War to a battlegroup organization. Each division would have five battlegroups and each battlegroup would have five companies, each company five platoons. Pentomic comes from a combination of 'penta' meaning five and 'atomic' for the nuclear battlefield that inspired its design. In addition to the organizational changes of the Pentomic Army (wrought with problems) came associated doctrine, technology, and personnel changes that will be the focus of this monograph; A.J. Bacevich. *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 5.

The US Army is no stranger to transformation and adaptation. For much of American national history leading into the World Wars, the United States held a small, at times constabulary force principally concerned with the border defense. Surging to meet wartime manning requirements, the Army lived through the difficulties of mobilizing a large force during the Civil War, then again in the First World War. Though there had been significant developments in arms and the tools of warfare, the training, and skill needed to employ them were still relatively easy to learn and quick to train. The rapid formation of an officer corps during World War I was most challenging for the War Department throughout 1917 and 1918; leaders take time to train and develop.[4] In the Second World War, the United States again had to rapidly form a large army, with even more sophisticated instruments of war. Warfare in the Second World War was more complex, less so for the infantryman than for all the supporting combat arms, requiring more time and specialization. The detonation of the atomic weapons that ended the war were both a product of this increasing complexity and one of several factors that put the Army in crisis.

The crisis the Army faced was more complex than the Air Force's ability to destroy cities in a single sortie. The environment following the end of the Second World War was unprecedented in its complexity and rate of change. The American public expected a return to a small army following the conclusion of the conflict. Congress aimed to reduce defense expenditures while continuing to counter the growing Communist powers of Russia and China.[5] In the late 1940s, the Department of Defense believed that the United States atomic monopoly

[4] Richard S. Faulkner. *The School of Hard Knocks; Combat Leadership in the American Expeditionary Forces* (College Station, TX: Texas A&M University Press, 2012), 318-327.

[5] Later coined the 'peace dividend' in the 1990's.

would offset the large Soviet or Chinese numbers.[6] These are only a few of the kaleidoscopic array of forces working in the late 1940s and through the 1950s. The Department of Defense and Eisenhower Administration planned to use the Army as a continental defense force in a supporting role to the Air Force and Navy.[7] The Army needed to define itself in this context, and answer how to overcome the imposed budgetary and personnel restrictions while remaining effective, and capable of projecting American power on the ground.

The outbreak of the Korean War brought to light the devastating impacts five years could have on the highest performing, and well-proven combat force on the planet. Having cut from 8,267,000 to 554,000 in three years after the end of the Second World War, the Army was a skeleton of itself.[8] Fighting the North Korean Army was costly. The following intervention by the Chinese and the military stalemate that followed demonstrated that the world could not be secured with the Air Force, Navy, and nuclear weapons alone.[9] The Army concluded, in opposition to the doctrine that emerged from the Eisenhower administration, that ground forces were still relevant. The 'New Look' placed the Air Force as the predominant arm of the Department of Defense with the Navy a close second. For the Eisenhower administration, superior technology, long-range missiles, strategic bombers, and nuclear weapons would deter

[6] A belief in the scientific community was the destructive power of the atomic bomb in the late 1940s was limited to that of the Hiroshima and Nagasaki bombs. Further, that the scarcity of fissile material, expense, and bulkiness would mitigate the impact of atomic weapons. Doris M. Condit. *History of the Office of the Secretary of Defense: Volume II, the Test of War 1950-1953* (Washington, DC: Historical Office, Office of the Secretary of Defense, 1988) p. 2-6; Dr. Bernard Brodie, "Implications of Nuclear Weapons in Total War" in *Military Review,* Vol. 38, No. 3, June (Fort Leavenworth, KS: Command and General Staff College, 1958), 97.

[7] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 10.

[8] Brian McAllister Linn. *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 12.

[9] T.R. Fehrenbach, *This Kind of War: The Classic Korean War History – 50th Anniversary Edition* (Washington, DC: Brassey's, 2000), ix.

future conflict. For the Army, this meant reducing numbers and cost while adopting new technology that would complicate personnel training and the maintenance of a growing inventory.

Though the United States did not employ nuclear weapons in Korea, their potential use was a serious consideration during the 1953 peace negotiations.[10] Tests in the Nevada desert were proving that nuclear weapons could be used in proximity to troops to gain a tactical advantage.[11] United States' policy of "Massive Retaliation" depended on the immediate use of the full US nuclear arsenal in response to Soviet aggression.[12] The Army did not fit with this national security policy. Rather than work to fit within the structure of the NSC 162/2, the Department of the Army envisioned a new way of fighting.

In 1954 the Army Vice Chief of Staff, Charles L. Bolte, postulated that the Army's new way of war would allow for discriminatory flexibility and center on initiative, self-reliance, and leadership. Fighting in highly mobile mechanized and airborne units, the Army would blitz deep in the enemy's rear and flanks in fast, with violent battles relying on the use of tactical nuclear weapons.[13] General Maxwell D. Taylor inherited this Army vision for a highly mobile atomic force, championed by the Army Chief of Staff, General Matthew B. Ridgeway. General Taylor announced the Army's transformation into the 'Pentomic' in October 1956. This directive transformed the Army from a combat-proven formation to a mostly untested organization that would last a little more than six years. However, it also provided an opportunity for expanded

[10] Richard M. Leighton, *History of the Secretary of the Department of Defense: Volume III: Strategy, Money, and the New Look, 1953-1956* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2001), 1-4.

[11] Final Report of Exercise, Exercise Desert Rock V, Volume I – Operations. 16 July 1953. Defense Technical Information Center Accession Number ADA 078559, 14-15.

[12] The Soviet Union successfully tested their first Hydrogen bomb 12 August 1953, a little less than one year after the first successful United States 1 November 1952 'Mike Shot' thermonuclear bomb test.

[13] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield*. (Cambridge: Harvard University Press, 2016) p. 81.

innovation and testing to prepare for a nuclear war. The Army implemented this transformation with serious consideration of how to fight future wars and how best to operate in the atomic environment.

The Army of the 1950s did not train to fight in an unlimited nuclear war with the exchange of hundreds of high yield thermonuclear tipped Intercontinental Ballistic Missiles. The Army had a more nuanced vision of future conflict.[14] The Army thought it more likely that warfare would include the use of small atomic devices approximately the size of the Hiroshima bomb (20 kiloton) to gain a tactical advantage over the enemy. As such, the Army's focus was not in line with the policy of Massive Retaliation. The intended highly mobile and flexible nature the Pentomic organization was better suited for the "Flexible Response" policy under President John F. Kennedy.

This monograph will examine how the Army transformed to fight on a nuclear battlefield and what it learned. It will examine what elements of this transformation were or were not effective. In the examination of the Pentomic transformation and lessons learned, three interwoven areas are most prevalent: the lessons of doctrinal changes and how the Army innovated and attempted to adapt to a problem; how the atomic vision of future combat meshed with the technological acquisitions and the capabilities pursued by the Army; the recruitment, conscription, and retention of the personnel needed for the Army to fight in a new way with highly technical weapons. What we learned about fighting on a nuclear battlefield, ultimately confirms the dialectic between the nation, the people in its military, the tools they must use, and the way they will use them on the international stage. These elements endure today as the Army refocuses for LSCO. An army transition cannot occur in a vacuum, and the transaction between the nation and its military in that transition is a continuous and complex interchange.

[14] "Dr. Strangelove and How I Learned to Love the Bomb" released in 1964 is a satirical movie that while mocking the policy and logic of nuclear exchange also underwrites how the understanding of it in the general public was limited to large scale exchanges.

Doctrine

Pentomic development occurred during Eisenhower's New Look and the defense appropriations of the 1950s. The policy of Massive Retaliation, a perceived rising Soviet threat, and a nation that just endured the Second World War and the conflict in Korea underscored the national and international environment in which the Army was working.[15] The Army doctrine of a highly mobile, lethal, and flexible atomic force capable of operating across the spectrum of conflict in both atomic and conventional exchanges required the recruitment, training, and retention of the right people. It also required the incorporation of envisioned, but not developed technology. Some of this occurred, much did not. The Army learned that the development of doctrine must account for the kaleidoscopic array of variables that exist within a nation. The Army also found that, though it may be contentious, doctrinal developments do not need to be in line with the national policy, in this case, Massive Retaliation.

National economic considerations were a central force in the shrinking defense budget, particularly for the Army. The 1953 national security policy specifically directed any governmental expenditures to be scrutinized and measured against their impact on the economy.[16] Eisenhower believed that the Cold War would continue for decades, and the economy would have to remain healthy if the United States were to beat the Soviets. The Army was, again, drastically reduced in manpower and funding. The Army budget was only 22 percent of the defense budget by 1957, less than half that allotted to the Air Force that same year. The Army was the most straightforward and least contentious force to cut. Many in government and society believed that the Army was waning in its utility as the United States as the Soviet Union developed more powerful atomic and thermonuclear bombs. The Korean War proved that world

[15] Richard M. Leighton, *Strategy, Money, and the New Look* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2001), 65-68, 231-237, 359-378, 471-483

[16] The White House, *A Report to the National Security Council*, 162/2, 30 October 1953 (Washington, DC: Government Printing Office: 1953), 14.

powers could fight limited wars without the use of atomic weapons. However, national leaders and many in the Department of Defense, believed that the Army would no longer be of much use in an all-out exchange between the United States and the Soviet Union.

The Air Force and Navy were the two departments that could employ the atomic weapons central to Massive Retaliation. Unlike today, governments planned to use nuclear weapons in large scale conflict during the 1950s. The Air Force, Navy, and Eisenhower Administration saw atomic weapons principally as deterrent devices and, in the event of war, weapons of annihilation. The Army's vision was much different and would require a force inconsistent with what the Eisenhower administration thought was necessary. The vision was one that would prove difficult to draw from a war seasoned society that also believed and feared atomic detonations would be an integral part of a war with the Soviet Union.

The Army assumed atomic weapons would not end the war as they had in August of 1945, but be a fundamental component of it. In this regard, the Army viewed atomic bombs as a more powerful form of artillery.[17] It was with an artillery piece that the Army first demonstrated its capability to deliver tactical nuclear effects on the battlefield in 1953. In 1949 the Army began developing a nuclear artillery shell for the M65 'Atomic Annie' from an existing experimental 280mm cannon. In 1953 the US Army successfully fired the first nuclear artillery shell.[18] At 83 tons, the M65 was slow to move and not transportable by aircraft. It had a short, 17-mile range that would require deployment very close to the front line of troops. While 'Atomic Annie' did not bring much practical application, it did demonstrate the Army had some play in the nuclear

[17] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations*, Change 3 (Washington, DC: Government Printing Office, 1958), 40.

[18] A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 82-86.

weapons game.[19] In concert with the development of new technology, the Army set to define how it would fight on a new battlefield.[20]

The Army rapidly updated doctrine in the mid-1950s. Over several revisions of FM 100-5 *Operations,* the Army endeavored to transition from the tactics and procedures of the Second World War and Korea into the modern atomic battlefield. Army leaders at the time envisioned a very different battlefield than what the nation had seen previously. Descriptions were varied and, in some cases, challenging reality. General Taylor described the battlefield as having "much greater depth than the battlefields of the past. "There will probably be a checkerboard disposition of units with considerable gaps between combat elements."[21] In Taylor's grounded description, commanders would destroy the enemy through either conventional or atomic weapons dependent on the situation. Not all descriptions were as tame. General Willard G. Wyman, the commander of the Continental Army Command, described a deep battlefield like Taylor's vision but went further. He included the elimination of reserves and combat trains, a battlefield devoid of a front with a depth of 100 miles. "We see small mobile units deployed at intervals measured in miles instead of yards…their firepower can exceed that of our old regiments and include all the trajectories of divisional artillery."[22] Wyman expanded further, stating, "When units move they

[19] While it would not have been practical to employ, more than a half dozen were deployed to the European theater in the mid 1950's. The technical, logistic, and personnel costs were not worth the limited tactical effects that could have been gained.

[20] Lieutenant Colonel Fred Walker, an officer in the Research and Development department of the Pentagon, describes this vision as "Armies…unhampered by boundaries and distances will strike unheralded, with lightning speed, both from within and without. Airborne, air-supplied, air-mechanized striking forces will swarm like hornets over a nation" in the *Infantry Journal*. Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 76; Fred Walker, "Your Next War" *Infantry Journal: A Magazine for the Ground Combat Forces*, June 1947 (Washington, DC: Infantry Journal Book Service, 1947), 78.

[21] Maxwell D. Taylor, *Military Review*. Vol 37, No. 3 (Fort Leavenworth, KS: Command and General Staff College, 1957), 35.

[22] John P. Rose, *Evolution of U.S. Army Nuclear Doctrine, 1945-1980* (Boulder, CO: Westview Press, 1980), 64.

are guarded against radiation and blast by a protective skin."[23] Statements like this that describe tactics reliant on technology not yet available. They presented a significant problem for doctrine writers who would have to either anticipate evolutionary or revolutionary technological developments.

To be successful, units would have the be highly mobile, lethal, and flexible. The shift in doctrine aimed both to ensure dominance on the atomic battlefield against a numerically superior enemy and out of a moral rejection of the policy of Massive Retaliation. General Ridgeway and later General Taylor, believed credible, yet flexible, force would better deter conflict. The Army needed to demonstrate that it was still a needed and necessary component of the national security policy.

With guidance that conflicted with available technology, the Army rewrote its operational doctrine, with the first revised publication of *Operations* in 1954. Additionally, the Army published a host of supporting doctrine.[24] These revisions and surrounding professional writing moved away from the large-scale army of the Second World War to a more agile and flexible army capable of fighting across the spectrum of conflict. These revisions were the product of leaders' recent experiences. These experiences convinced the leading military minds such as General Gavin and General Ridgeway that the future of ground conflict would not mirror what they had seen. Atomic weapons would transform the nature of ground conflict. General Gavin went as far as to write that:

> Never in the history of mankind, certainly, has anything affected man's thinking and his probable military behavior so drastically as the atomic bomb. It changes--must greatly change--our whole military thinking, organization, and tactics.[25]

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[23] John P. Rose, *Evolution of U.S. Army Nuclear Doctrine, 1945-1980* (Boulder, CO: Westview Press, 1980), 64.

[24] With minor updates in 1956, 1958, and a full revision in 1962.

[25] James M. Gavin, *Airborne Warfare* (Washington, DC: Infantry Journal Press, 1947), 140.

He goes on to describe an airmobile army much like the 101st and 82nd Airborne in the Second World War, but operating in a more rapid pace and more dispersed manner.

The tactics envisioned by General Taylor, General Wyman, and to a lesser degree, General Gavin, depended on revolutionary leaps in technological development. The vision of Army leaders did not align with available or soon to be available technology. While the concepts of dispersed movement and rapid convergence were not new, the speed and scale envisioned by these men were.[26] This dissonance between the Army's vision and available technology would nullify the concept of the dispersed Pentomic battle groups. It was not possible to disperse mass coordinated fires, exploit opportunities created by these fires, and disperse again before the enemies' atomic fires annihilate the formation. This contributed to the concept of the Pentomic Army falling apart.

Agile, flexible, mobile, and adaptable have not left the army's lexicon. Drone swarms, artificial intelligence, hypersonics, autonomous fighting vehicles, among many other near-future technologies, promise to enhance the lethality, adaptability, and flexibility of the US Army. The promise of technology in the 1950s and its development in the decades that followed did not have revolutionary effects on warfare. Nor are the technologies on our horizon likely to bring a revolutionary change to how we fight. More likely is the evolution of warfare within the kaleidoscopic array of variables that includes evolving technologies, but encompasses much more.

Guidance in the 1958 change to FM 100-5 *Operations* directed commanders to consider maneuver and the employment of atomic weapons concurrently. Doctrine directed commanders consider atomic weapons as a form of additional firepower of enormous magnitude. Commanders

[26] Dispersed movement and convergence at the critical point date back to Napoleon. Field Marshall Slim also discussed the evolution of his tactics in Burma from 1943-1945 in line with this, but not with anything approaching the speed and scale discussed by army leaders in the late 1950s.

must exploit advantages generated by their use rapidly, and expect the enemy to do the same.[27] This logic did not significantly change throughout the Pentomic Army's existence. Significant changes in doctrinal considerations for the employment of atomic weapons did not appear in FM 100-5 until the Army rewrote it in 1962. A threefold increase from 1958 to 1962 in the number of references to atomic or nuclear weapons sheds light on the evolution of thought for the employment of atomic weapons.[28]

This increase in specific directives greatly refined the guidance given to commanders regarding the use of nuclear weapons. In addition to defining the spectrum of war, and the differences between limited and general war, the 1962 manual defines the difference between intermediate and unrestricted use of nuclear weapons.[29] The intermediate use of nuclear weapons would be selective in quantity and yield and not reach a level that would not broadly reduce the ability of combat units to maneuver effectively. The unrestricted use of nuclear weapons would be sufficiently high that it broadly degrades combat unit's ability to maneuver.[30] In differentiating between the scale of use of nuclear weapons, the manual inherently implies that militaries can wage tactical nuclear warfare without unavoidable escalation into strategic nuclear bombing and the annihilation that would follow. However, the irradiation of the countryside with many small nuclear devices is not much more palatable to the public, particularly those that live in Europe

[27] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations*, Change 3 (Washington, DC: Government Printing Office, 1958). 2-3.

[28] Change 1 to FM 100-5 in 1964 changed all references of atomic to nuclear; the 1962 publication had already changed the verbiage throughout with a few isolated instances. Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1962).

[29] The 1954 publication of FM 100-5 makes two references to limited war and one to general war both in paragraph 6, Employment. These are the only references to different forms of conflict along the spectrum of conflict. While the wording of paragraph 6 makes clear that the Army did understand a difference in limited and general war the terms were not defined or used beyond their general English meaning leaving a great deal to be interpreted regarding the extent of Army nuclear weapons use.

[30] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1962), 61-62.

where the expected this fighting would take place. The Army was not ignorant of the impact of these weapons on civilians and greatly expanded guidance regarding the employment of nuclear weapons in proximity to local populations.

FM 100-5 (1954-1958) provided nothing regarding considerations of the effects or protective measures or actions to take regarding the employment of atomic weapons in proximity to local populations.[31] Notably, in the FM 100-5 (1954-1958) towns are described as being highly susceptible to destruction by air or artillery bombardment, and atomic weapons.[32] Further direction pertains to advantages given to defenders by various construction, basements, and sewers. There is no mention of civilians, though the effects on a civilian population following the August 1945 attacks on Hiroshima and Nagasaki were well known and in recent memory.

The 1962 *Operations* manual goes into much greater detail regarding the employment of nuclear weapons at the tactical level and near local populations.[33] Civilian considerations also appear in professional military writing. A January 1958 article in the *Military Review* "CMAG Operations in the Atomic Age" discussed the importance to measure the destructive use of force and the civilian population, the impact of the use of force on a civilian population, and the need to measure it such that the operational environment remains permissible after occupation.[34] FM 100-5 increased considerations for the population by stating, "In employing nuclear weapons, the

[31] Guidance is given regarding protective measures to take to protect friendly Soldiers against the effects of chemical, biological, atomic, or radiological attack. Impacts on friendly maneuver is also discussed. The manual did not ignore civilian considerations in other areas of warfare. There is extensive guidance regarding civilians and the local population in chapters about defense against guerrilla action and infiltration as well as in Airborne operations, occasions of enemy air attacks, deception operations, and psychological operations. All of these chapters include methods of countering hostile or unwanted civilian activity as well as measures to take in order to protect the civilian population.

[32] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1954), 152.

[33] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1962), 131-133, 115, 139, 153, 40, 5.

[34] Storm Thurmond, "CMAG Operations in the Atomic Age" *Military Review*, Volume 37, number 10, January (Fort Leavenworth, KS: Command and General Staff College, 1958), 3.

effect on the civilian population must be considered and plans made for their control and evacuation."[35] Considerations regarding the civilian population were not the only significant changes made during the Pentomic.[36]

In 1954 Ridgeway advocated the creation of a balanced Army that was ready for a broad spectrum of military action as the best deterrent to war. The result of his efforts was general distrust within the administration and Eisenhower's recommitment to Massive Retaliation.[37] The divide between the position of General Ridgeway and President Eisenhower was not a product of a difference in military experience between the President and his military advisors, but a difference of perspective. Eisenhower, less than a decade before, was serving as the Supreme Allied Commander in the Second World War. At the same time, General Ridgeway replaced MacArthur as Commander of United States forces in the Korean War.[38] While the President and Army Chief of Staff shared familiar wartime experiences and responsibilities, they were approaching national defense from very different vantage points. Both were correct in their approach from their seat of responsibility. Eisenhower's long view, outlined in the *Report to the National Security Council,* 162/2, and the whole of nation approach to endure a protracted conflict between the United States and the Soviet Union was appropriate. It proved mostly correct over the coming decades.[39] General Ridgeway disagreed with the policy of Massive Retaliation

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[35] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1962), 90.

[36] In July of 1956, with the publication of change 2 to FM 100-5, the Army removed the statement, "Army combat forces do not support the operations of any other component."[36] The 1962 publication changed the discussion from the Army's role to the role of military forces and land forces with expanded discussion on flexibility and adaptability. Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1962), 6-10.

[37] A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 37-39.

[38] David Halberstam, *The Coldest Winter: America and the Korean War* (New York, NY: Hyperion Press, 2007), 588, 613, 624-630.

[39] The White House, *A Report to the National Security Council,* 162/2, 30 October 1953 (Washington, DC: Government Printing Office, 1953), 14.

and believed the Army needed to provide more flexible options; this also proved correct over the coming decades.

After Ridgeways' retirement in 1955, General Taylor continued the vision of a highly mobile, adaptable, flexible army with the Pentomic, capable of fighting tactical atomic warfare. However, he believed that atomic weapons would not be authorized for the defense of western Europe.[40] These beliefs were later proved justified and further influenced Army doctrinal thinking. Complex national and international forces did not negate all the doctrinal development and thinking in this period. Much of the discussion regarding mobility, dispersion, convergence, and survivability was productive and advanced Army tactical and doctrinal thought through the era and continue to influence Army thinking today.[41] However, they relied on personnel and technological capabilities, not in tune with existing equipment or personnel.[42]

These evolving characteristics of Army doctrine were a result of the Army's dynamic relationship with the Department of Defense, the United States government, as well as an international concern. The interplay between these groups heavily influenced the development of Army doctrine in both direct and indirect ways. General Taylor's vision, and the vision of other senior leaders such as General Wyman, were bounded by the physical limits of technology and the Army's budget. These men did consider the perceived impacts of atomic warfare fought and the effects it would have on the countries near the battlefield. However, European nations were resistant to the Army's vision of warfare despite its far less destructive implications relative to the consequences of Massive Retaliation.

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[40] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 90.

[41] Training and Doctrine Command, US Army, *The U.S. Army in Multi-Domain Operations 2028,* 6 December 2018 (Washington, DC: Government Printing Office, 2018).

[42] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge: Harvard University Press, 2016), 229.

As the Army advanced through the 1960s, it gained newfound support from the Kennedy administration under the policy of Flexible Response. The advancements made in doctrinal thought through the Pentomic Era contributed to the employment of the Army through the 1960s. As helicopters and better radios became available, and the United States identified the need for limited national responses, the decades-old concepts of dispersion and convergence found new life. The Army formed Airmobile units and deployed in relatively small numbers to South East Asia to counter the expanding communist threat.[43]

As the Army continues to refine its operational doctrine and understanding of what warfare in the future may hold, it must continue to do so within the context of the period. Artificial intelligence, hypersonics, drones, and a plethora of other emergent technologies are combining and threaten to create advancements that challenge our current vision of warfare. Russia and China continue to challenge American power and compete for economic and, in some cases, physical control around the world. As the Army's vision of warfare changes with the evolving nature of both national and international reality, doctrine must evolve to capitalize on the new environment. The lessons of the Pentomic Era offer a useful lens through which to answer the question of how our doctrine should evolve. Doctrine must remain grounded in the technological and international realities of the period. The national security strategy should not define it. Rather the professional and experienced perspectives of proven leaders must inform it, while the national and international realities of today bound what is and is not acceptable.

The President and Army leaders did not often agree on the best course for national defense. The extensive Army service experience of President Eisenhower did not ease the civilian-military disagreements with the Army in the 1950s. The tension existed and has persisted because it developed from the different perspectives of Army leaders and the President. Ridgeway was not able to accommodate this difference in perspective, and Eisenhower generally

[43] Relative to Korea or the Second World War.

distrusted him, mitigating General Ridgeway's influence. The military experience of the President and his administration does not reduce the civil-military tension. Understanding the differing perspectives between the Army and the Administration is essential to effectively delivering military advice.

The development of doctrine in the Pentomic Era could not be insular. A multitude of dynamics outside the control of the Army affected its doctrine. The variables the Army could control was smaller than believed, while what the Army influenced was much more significant than understood at the time. General Taylor and others believed they could control more than they did; what they controlled influenced more than anticipated.[44] General Ridgeway and General Taylor both knew the new Army vision of warfare was inconsistent with national policy. They were right in believing they could successfully implement doctrinal changes and thinking that were inconsistent with policy but at the cost of credibility with the President. The Army could not overcome the physical realities of what was possible and credible as a doctrine. Nor could the implications the doctrine had on the national and international societies in which the Army expected to fight. The doctrine that anticipated evolutionary developments in technology was likely sound. However, when it relied on revolutionary changes, doctrine departed from what could be implemented. Army doctrine does not need to align with national policy but must with the realities of the national and international environment. Intellectual developments during the Pentomic, when tempered by the realities of what was possible in the 1950s and 1960s, proved sound under the Kennedy administration's flexible response and the international realities of the 1960s and 1970s.

[44] Today this would be described as a failure to understand the Army's transactional environment. Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture* (Burlington, MA: Morgan Kaufmann, 2011), 31.

Technology

A familiar dilemma confronted the Army coming out of the Korean. A conflict fought far from home was over, and it was time again to return to a small, peacetime army. Further, the entering Eisenhower administration needed the reduce spending. By 1957 the Army was not a force to repel Soviet forces in Europe but a tripwire force ensuring commitment of the United States to the defense of Europe.[45]

The Eisenhower administration and the other services faced severe issues as well. The rapid advancement of missile technology appeared to forecast the obsolescence of the manned bomber and the Soviets though the 1950s seemed to be ahead in missile technology. In 1958 General Gavin falsely described a 'missile lag' in which the Soviets were so far ahead in the development and procurement of missile technology that it placed the United States in great peril.[46] The United States government and military officials believed the Soviets had a missile force capable of striking Washington DC from the Soviet Union. The United States remained dependent on Intermediate-Range Ballistic Missiles deployed in Europe and other countries to make Massive Retaliation a credible deterrent.

The Army saw warfare with atomic weapons in a very different way than the Eisenhower administration, as described previously. The Department of the Army set out to acquire new technologies and weapons that would enable it to fight the highly mobile form of warfare capitalizing on dispersion and convergence promised by technologies that had not been invented. With the smaller budget, the Army could not pursue all that it would be needed to fully modernize the entire inventory, which in 1952 consisted of over 1.5 million different items.[47] At

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[45] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 595.

[46] James M. Gavin, *War and Peace in the Space Age* (New York, NY: Harper and Brothers, 1958), 4.

[47] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 100.

the expense of modernizing individual Soldier equipment and conventional technology such as tanks, the Army invested in the development of advanced rocket and missile technology in highly contentious and often duplicative efforts with the Air Force and Navy.[48] Rivalry in the development of missile systems came at the cost of Army readiness. While the Army did produce highly capable rocket and missile technologies, the Army was not equipped or prepared as a force to fight an atomic or conventional war.[49] The Army discovered that technological development must focus on those systems unique to the Army and necessary for it to employ its doctrine. Army development and procurement must not be isolated from the needs of civilian society.[50] There are mutually beneficial efficiencies where Army and civilian needs are similar.

Army Research and Development Priorities

Advanced rockets and missiles were one of many technological advancements needed to allow the Army to fight the highly lethal, dispersed, warfare described by General Taylor and other Army leaders. Advancements in communications, ground vehicles, vertical lift aircraft, sensors, and individual soldier equipment were also needed if the Army was to realize its vision of a new atomic force. Further, a war without the employment of nuclear weapons would compound shortcomings in the Army's conventional equipment. The Army senior leaders had experience in the Second World War and Korea. They understood the importance of individual Soldier equipment and conventional weaponry. Despite this, the Army over committed to the

[48] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 598-600; US Congress, *Inquiry into Satellite and Missile Programs: Hearings before the preparedness Subcommittee*, 85th Congress, 1st and 2nd session (November 25, 26, 27, December 13-17, 1957 & January 10, 13, 15, 16, 17, 20, 23, 1958) (statement of Lieutenant General James M. Gavin, Army Deputy Chief of Staff for Research and Development), 490.

[49] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 100.

[50] Needs such as transportation, communication, medical support, et cetera.

development of rocket and missile technology at the expense of conventional capability development. As a result, narrowing the capability of the force designed to broaden its abilities.[51]

In 1957 rocket and missile research alone constituted 25.1 percent of the Army research and development budget. Together with nuclear weapons, it constituted 43 percent of the Army research budget, yet vehicles only constituted 4.5 percent.[52] Army aircraft research, critical to a highly mobile army, was only 4 percent.[53] The results of this disproportionate investment are readily apparent. General Gavin testified in congress in December 1957 that the Army's investment in the ballistic missile program required the Army to cut back in other areas, such as tanks.[54]

Tanks

Army doctrine identified the tank as the best vehicle to exploit the immediate aftermath of an atomic weapon.[55] As such, it would be an ideal platform to accompany the developing nuclear-capable missiles. The M48 Patton tank illustrates the shortcomings of the American inventory of the 1950s. The Patton tank produced in 1952 was an improvement over the M26 Pershing that the Army employed in the last months of the Second World War. However, it suffered severe drawbacks that made it ineffective in the Army's vision of future warfare. The

[51] US Congress, *Inquiry into Satellite and Missile Programs: Hearings before the preparedness Subcommittee*, 85th Congress, 1st and 2nd session (November 25, 26, 27, December 13-17, 1957 & January 10, 13, 15, 16, 17, 20, 23, 1958) (statement of Lieutenant General James M. Gavin, Army Deputy Chief of Staff for Research and Development), 490.

[52] A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 100.

[53] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 602.

[54]A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam.* (Washington, DC: National Defense University Press, 1986), 100.

[55] Department of the Army, *Field Manual 100-5; Field Service Regulations Operations* (Washington, DC: Government Printing Office, 1954), 16.

initial production version of the M48 required about three gallons per mile, which limited its range to 75 miles.

The M48 engine was prone to failure after roughly 1,000 miles.[56] These issues significantly increased the logistical tail required to maintain the tank. While the issues of the M48 were not a problem for a static tripwire force in Europe, but they were not manageable if the Army was to realize or conduct warfare in a highly mobile fight without a clear forward edge of the battle area.

The Army improved the M48 engine in 1955. This was the result of the Army lifting restrictions on diesel fuel in large army combat vehicles. The M48 suffered from other fundamental issues that would limit its effectiveness in a highly mobile fight, especially one in Europe. It was too wide for passage through European tunnels, and at 45 tons could not be air transported. These shortcomings were indicative of many technological issues facing the Pentomic Army in the 1950s. The disparity in the realities of Army tank development and the doctrinal requirements were significant. The disconnect between recent combat experience, doctrinal development, and army procurement can quickly develop.[57]

While the Army improved its tanks through the 1950s, no significant advancements were made until the fielding of the M60 main battle tank in 1960. This was the first mass-produced American tank to integrate nuclear, biological, and chemical protection – a significant shortcoming for an atomic force of the 1950s.

Doctrinal concepts often called for technology that did not yet exist, and Army research and development funding was not substantively committed to resolving many of these problem areas. There were areas of research and development that did facilitate the production and

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[56] Robert Cameron, "American Tank Development During the Cold War" *Armor Magazine, July-August 1998*, PB. 17-98-4, Vol. CVII No. 4 (Fort Knox: Armor Magazine, 1998), 32.

[57] Albin F. Irzyk, "Tank versus Tank" *Military Review*, Vol. 25, No. 10, January (Fort Leavenworth, KS: Command and General Staff College, 1946), 11-14.

acquisition of technologies supporting the conventional and atomic vision of the Pentomic Army. These technologies were concepts built on existing, grounded ideas and worked in concert with civilian research and development.

Vertical Lift

At 4.5 percent of the Army research budget, vehicle development was still better off than the Army aircraft development. Necessary for rapid movement around the battlefield, tactical commanders would require vertical takeoff and landing or very short takeoff and landing aircraft. The Army used helicopters in Korea as medical evacuation platforms, for observation, and to adjust artillery fire. General Gavin envisioned them used along with airborne troops to bring into effect the highly dispersed forces rapid concentration on the enemy. Regardless of the paltry aviation budget, 1961 saw the production of one of the most successful Army helicopters in history: the UH-1 Iroquois, commonly called the Huey. Army aviation development was successful despite a small budget and competition with the Air Force. Army aviation was successful because it sought evolutionary, not revolutionary change to solve the issues presented to the Army in the 1950s and capitalized on technologies that the civilian sector was also developing.

The incorporation of rotary-wing aircraft into Army maneuver fits very well with the Army's vision of future warfare. It would also be effective in both atomic and non-atomic warfare, as demonstrated in the Desert Rock tests and experience in Korea.[58] General Gavin asserted that technologically the United States could have had helicopter-borne infantry employed in Korea in "Calvary, and I don't mean horses."[59] General Gavin stated that the reasons we did not have helicopter-borne infantry was a failure in imagination. The Army had come to deify

[58] Final Report of Exercise, Exercise Desert Rock V, Volume I – Operations, 16 July 1953. Defense Technical Information Center Accession Number ADA 078559.

[59] James M. Gavin, "Cavalry, and I don't mean horses" *Harper Magazine,* April 1954.

heavy armor and supplanted cavalry with it. As a result, the Army was unable to see the opportunity and capability offered by the helicopter in Korea.[60] The specifics of its role and the delineation between the Army and Air Force helicopters evolved through the early 1950s. Further, the acquisition and development of the helicopter benefited from other forces where the tank did not.

Nations draw their armies from the people and industries of their society. The development of the helicopter carried tremendous value to the private industry as well as the military. While some components of tank development may translate into civilian use, a tank as a system does not. A helicopter useful for medical evacuation in Korea is useful for civilian medical evacuation at home. Helicopters used for artillery spotting in Korea are useful in fire spotting, remote ecological assessment, or crop dusting. No significant changes to the fundamental technologies are needed to adapt from one role to the other. Civilian utility lends more significant incentives for industry to research and develop helicopters and allows the Army to capitalize on ongoing development. By tapping into existing developmental trends in the department of defense and American society, the Army was able to further the technological development and acquisition of necessary technology. The incorporation of the helicopter was one of many components the Army would need to develop and acquire to fight decentralized, highly mobile, maneuver warfare effectively. Long-range atomic and non-atomic fires would also be essential to counter the massive numerical advantages presented by the Soviet Union. However, there is little civilian use for long-range rockets as there are for helicopters.

Missiles and Rockets

Missiles and rockets, like the tank, did not have many direct civilian applications, though like the helicopter did have a competing interest with the Air Force, and were seen as the tools of modern war. Missiles and rockets most directly fit in with the strategy of Massive Retaliation and

[60] James M. Gavin, "Cavalry, and I don't mean horses" *Harper Magazine,* April 1954, 54.

our dependence on assured nuclear destruction in the event of war. Investment in them provided the Army leverage to argue for their piece of development and acquisition funding. However, this resulted in duplicative efforts between the Army and the Air Force and Navy, which was neither efficient nor generally beneficial from a service or national standpoint.

On October 4, 1957, the Soviet Union successfully put the first satellite named Sputnik I into orbit.[61] Not long after, on November 3, 1957, the Soviet Union successfully placed Sputnik II in orbit. A 1,118-pound satellite with life support systems carrying a small dog named Lakita.[62] These events had a tremendous impact on the national psyche. Many polled stating they would be willing to see the national debt limit raised to counter the perceived growing Soviet advantage.[63] The crisis of confidence and the American people's willingness to take drastic action to counter the perceived threat was a direct affront to the Eisenhower administration's economic policy.[64] The first United States response was the launch of the Navy's Vanguard rocket on 6 December 1957, with a 3.2-pound grapefruit-sized satellite. It exploded on the pad.[65] About two months

[61] At 184 pounds it was small but not an insignificant weight, indicative that the Soviet Union had the capacity to launch meaningful payloads into orbit. Paul Dickson, *Sputnik: The Shock of the Century* (New York, NY: The Berkley Publishing Group, 2001), 1.

[62] Without any planned manner for the spacecraft to return to earth, Lakita was expected to die after 10 days in orbit when her oxygen ran out. However, a failure in the thermal regulation of the spacecraft resulted in Lakita's death after only four days in orbit. Lakita's planned death is relevant because while the Soviets could put a large payload into orbit, they could not perform a controlled deorbit necessary to effectively deliver a nuclear payload on the United States.

[63] Paul Dickson, *Sputnik: The Shock of the Century* (New York, NY: The Berkley Publishing Group, 2001), 23, 110-112.

[64] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 391; The White House, *A Report to the National Security Council,* 162/2, 30 October 1953 (Washington, DC: Government Printing Office, 1953), 6.

[65] Paul Dickson, *Sputnik: The Shock of the Century* (New York, NY: The Berkley Publishing Group, 2001), 156-157; Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 391.

later, on 31, January 1958, the Army successfully launched Juno I, a Jupiter C rocket carrying Explorer I into orbit.[66]

While effectively demonstrating the Army's lead in missile technology, the Army, even in the Pentomic structure and doctrine, had no practical need for an orbital capable missile. While the Jupiter SM-78 was not orbitally capable with its 1,600-pound warhead, it still possessed a range of 1,750 miles.[67] A 1954 agreement between the Joint Chiefs of Staff limited the Army's surface to air missiles to fifty miles and less in support of its point defense mission within the continental security force. The Army was permitted to develop surface to surface missiles with a range 'within the Army combat zone of operations.'[68] Though not defined, this did not necessitate the range that an orbital capable rocket such as the Jupiter would allow. The attempt to reduce duplication of effort by Joint Chiefs and Eisenhower administration continued to falter. Technologies and service ambitions overcame the Armed Services Policy council 1953 agreement and Joint Chiefs of Staff 1954 agreement to minimize interservice duplication in missile development.[69] The 1956 agreement further restricted the Army's missile responsibilities. The Army's tactical zone of operations would not extend more than 100 miles beyond the front

[66] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 592-594.

[67] Norman Polmar and Robert S. Norris, *The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems since 1945* (Annapolis, MA: Naval Institute Press, 2009), 169.

[68] Robert J. Watson, *History of the Secretary of the Department of Defense: Volume IV: Into the Missile Age, 1956-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 1997), 41.

[69] Waste and duplication in missile development were increasingly a concern within the DoD. The Armed Forces Policy Council discussed and agreed to eliminate duplication. Secretary Wilson directed an inquiry into existing rocket and missile programs in 1953. Its conclusions presented in January 1954 contributed to the Joint Chiefs agreement in June of 1954 to decide on service responsibilities intended to further reduce duplicative research and development. Robert J. Watson, *History of the Joint Chiefs of Staff and National Policy; 1953-1954* (Washington, DC: Historical Office, Office of the Chairman of the Joint Chiefs of Staff, 1998), 183.

lines, or 100 miles back.[70] It is not clear how the Army translated this into a battlefield with no definable front line, as described by General Taylor. It also did not encompass the range of missiles the Army was developing.[71] The effect was a waste of Army talent and time.[72] While a benefit to the national pursuit of spaceflight, the research did not further the Army's efforts or develop the needed highly mobile long-range artillery.

The Army saw effective results in development where it aligned both its vision of warfare, national policy, and technological development. The 280mm 'Atomic Annie' and the slow 46 foot long 'Corporal' missile did not meet the needs of the Pentomic Army.[73] However, the Army continued to develop and fielded the MGR-1 "Honest John" in 1954 and the MGR-3 "Little John" in 1961.[74] The development of these later systems was the product of an existing alignment between national policy and Army doctrine. Thus ongoing research fell under the Army. The work being done on guided missiles by the Army started in the late 1940s. Advanced Army missile developments in this context are understandable. However, the development of

[70] On 26 November 1956 Secretary Wilson issued a memorandum addressing the overall roles and responsibilities of the services. As a part of this clarification he further detailed services roles in the development of rockets and missiles, explicitly limited the Army to tactical targets within its zone of operations not to extend more than 100 miles to the front and rear of the front lines. Robert J. Watson, *History of the Secretary of the Department of Defense: Volume IV: Into the Missile Age, 1956-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 1997), 43.

[71] A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 88.

[72] When formed in 1958, the administration transferred the Jupiter missile to the National Aeronautics and Space Administration (NASA) along with Wernher Von Braun. Von Braun was the German rocket scientist responsible for the development of the V1 and V2 rockets. Brought to the United States as a part of operation paperclip, Von Braun was the head of Army rocket design and research from the conclusion of the Second World War until the formation of NASA. He went on to direct NASA and was the leading mind behind the development of the Saturn V rocket that ultimately won the race to the moon.

[73] Norman Polmar and Robert S. Norris, *The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems since 1945* (Annapolis: Naval Institute Press, 2009), 229.

[74] Norman Polmar and Robert S. Norris, *The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems since 1945* (Annapolis, MA: Naval Institute Press, 2009), 229-230, 232.

intercontinental ballistic missiles cannot be explained outside the context of bureaucratic inertia and interservice rivalry that was ultimately wasteful for the Army.[75]

The Army pursued the development and acquisition of several rockets and missiles to fit into their new concept of war and to meet existing national security requirements. A significant part of that was the local air defense of critical areas, such as cities, a responsibility shared with the Air Force.[76] These included nuclear-capable systems such as the Nike Hercules. Program development was broad and rapid, impressive from a technological standpoint, but came at the expense of a focus on the broader need to modernize the Army.[77] Tank development, Army individual soldier equipment such as protective uniforms, small arms, and the man carried missile systems remained mostly unchanged from the end of the Korean war until the Kennedy administration's shift in focus from massive retaliation to flexible response.

Summary

The Army abandoned the Pentomic organization and embraced the Reorganization Objective Army Division (ROAD) beginning in 1960, though many of the core concepts of the Pentomic era endured.[78] Increased funding provided to the Army whose operating concept now aligned with national strategy allowed for investment in the development of Soldier systems

[75] The research did significantly contribute to the United States winning the Space Race. Not only was the first American satellite put into orbit by an Army missile, the first American astronaut (second human) to fly in space was launch on a heavily modified version of the Redstone missile. In 1958 these programs, and Von Braun were transferred to the newly founded National Aeronautics and Space Administration. There are examples of the Army capitalizing on the synergistic possibilities of interservice cooperation in weapons development. The Marine Corps initiated the Lacrosse surface to surface nuclear-capable missile and the Army developed it. It was adopted for use by both services in 1960. The Army and Marine Corps cooperation in these areas highlight that intense interservice competition is not necessary to develop better and more capable arms. Military notes Around the World, *Military Review*, Vol 38, no 5, October (Fort Leavenworth: Command and General Staff College, 1958), 65.

[76] Elliot Vanveltner, *Rearming for the Cold War, 1945-1960* (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012), 595-596.

[77] A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 100.

[78] John B. Wilson, *Maneuver and Firepower: Evolution of Divisions and Separate Brigades* (Washington, DC: Center of Military History US Army, 1998), 293-303.

necessary to fight on the nuclear and nonnuclear battlefield. The Army overcame the investment shortcomings in tanks and vertical lift in the following decades. Had the Army found itself in a war with the Soviet Union in the late 1950s, the disparity in technology and Army doctrine and capability would have severely hindered the United States' ability to fight a conventional war.

Where the Army invested in technology that did support its doctrine, it developed enduring systems that proved effective in a variety of capacities, such as the M60 main battle tank. Where Army and civilian technological development aligned, low budgetary commitments did not prevent the creation of enduring and effective systems such as the UH-1 helicopter. Apparent alignment with national policy made funding for rocket and missile technology easier to acquire. Many of the systems, such as the Jupiter C, never served Army purposes and were wastefully duplicative. Where the Army constrained its initiatives to systems that nested with its doctrine, it was able to develop effective systems such as the Honest John and Little John. However, the investment of research and development funds for these systems was disproportionate relative to the capability gained and degraded developmental impacts on other Army systems.

Personnel

The vision of atomic warfare in the Pentomic era focused on speed, dispersion, and destructive force. Lieutenant General Clyde D. Eddleman, later the Deputy Army Chief of Staff, described: "In atomic war, the battlefield will be larger, and combat action will be characterized by rapid movement and extended intervals between units. Formations will be dispersed but will be capable of fleeting concentration to seize and objective."[79] Within this vision of warfare, the principles directing it had evolved, but not fundamentally changed. Atomic weapons magnified fundamentals such as dispersion, concentration, flexibility, mobility, and lethality. As these fundamental evolved, they magnified the need for Soldiers who were intelligent, flexible, agile, and able to capitalize on the opportunities presented in a rapidly evolving and lethal atomic battlefield.

Warfare has changed throughout history. Despite warfare's evolution, it has remained a contest of will, a human endeavor. Through the Pentomic era, the Army discovered several critical elements. Despite having won the Second World War and demonstrated the United States' commitment to stem the spread of communism in Korea, the increasing Soviet threat was insufficient for the American public to enlist in the numbers needed to fill the ranks of the Army. Retention would be essential to achieving a level of readiness needed to win wars in the future.

Retention

Retention in the Pentomic was critical as the higher the turnover, the larger the continued induction training requirement. Technology that requires highly trained maintenance personnel that cannot be retained is useless, and doctrine that relies on trust and initiative that cannot be fostered because of high turnover and unit turbulence is ineffective.

[79] Lieutenant General C.D. Eddleman, *Military Review*, Vol. 37, No. 7, October (Fort Leavenworth, KS: Command and General Staff College, 1957), 21.

The Army made efforts to improve Soldier retention and recruitment to build and maintain a force of highly trained and capable personnel. They were needed to operate and maintain the new machines and execute doctrinal techniques of an atomic army. In the transition to the Pentomic force, they were willing to rewrite Army core doctrines and fundamentally reorganize. This flexibility and adaptability can be essential for organizations to survive and become more robust.[80] However, in devising new doctrines of highly mobile, lethal, agile units and acquiring technologies that reshaped the understanding of Army capabilities, the Army struggled to attract and retain the high caliber Soldiers needed.

Conscription

One of the realities of the 1950s Army was conscription. Soldiers could enter service through two avenues; they could volunteer for the regular forces or enter through the selective service agency. The Army and Congress did not see conscription as a permanent method to fill the ranks, but as a stopgap until the Army could build an all-volunteer force. Though the Army aspired to eliminate the need for conscription, it remained a necessary element to meet even the reduced force requirements of the post-war era. Conscription accounted for 32.6 percent on inductees in 1957, 61.4 percent in 1958, and 49.5 percent in 1959.[81] Arguably these conscripts did not constitute the worst of the Army. They brought the broadest range of abilities, and in some cases, constituted the best talent at any given time. Given the significant reduction in forces through the 1950s, this speaks volumes for the national will to volunteer for Army service. Further exacerbating the manning problems were the terms of service. Regular Army volunteers served for three to six years, depending on the contract, while conscripts served for two.

[80] Nassim Nicholas Taleb, *Antifragile, Things than Gain from Disorder* (New York, NY: Random House, 2012), 100-102.

[81] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield*. (Cambridge, MA: Harvard University Press, 2016), p.135.

Volunteers had more control over their occupational specialty and assignment, which likely attracted a number that may have otherwise entered service through conscription.

Throughout the 1950s, conscripts were diverse, many of high-quality, a cross-section of society that brought in some highly talented and skilled personnel that may have otherwise not served. This was not unique to the 1950s.[82] Voluntary enlistment to avoid conscription into the combat arms was a common trend in recruitment.[83] The compounding effect the Army needed to counter was the lower quality less desired recruits were volunteering and therefore remaining in the service longer. At the same time, some of the most highly qualified were brought into the service through conscription, incurring only a two-year commitment.

The two-year commitment of the conscript included training, movement, and discharge processing. Since many of the highest qualified came in through conscription, they also filled many of the technical specialties. 1959 Colonel William S. McElhenny estimated the technical specialist and junior officer turnover in 1957-1958 to be 85 percent.[84] This turnover in investment was not sustainable; the complex Army inventory needed the right personnel to fix and maintain its equipment. The Army never reached the 40 percent first-term reenlistment rate is assessed necessary for a steady influx of trained and experienced noncommissioned officers to undergo more advanced technical training.[85]

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[82] When forming the American Expeditionary Force in 1918, conscription brought a broad spectrum of Americans to service, significant in both the diversity of talent and that it was necessary to meet force requirements. Also similar was the higher number of volunteers when perceptions were that volunteering gave a degree of control over the specifics of one's service. December 1917 saw the most significant number of volunteers for Army service, tied to the 15 December 1917 amendment to the selective service act that only allowed men the selective service had not already called to register for the draft to continue to volunteer for service in the regular army; Richard S. Faulkner, *Pershing's Crusaders: The American Soldier in World War I.* (Lawrence: University Press of Kansas, 2017), 14-15.

[83] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 137.

[84] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 156.

[85] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 157.

The Army was also competing with other services. The Air Force was new, better funded, and appeared modern. The Navy has long competed for qualified personnel, but in the 1950s seemed more relevant and less dangerous than marching through mushroom clouds. The generation of the 1950s had just endured the Second World War and Korea and had a sober perspective on war. They would not seek service with the same enthusiasm or romanticism that drew many in the very early days of "The Good War."[86] Despite these competing forces, with conscription, the Army was not short of the needed human capital to fill its ranks.[87] The Army's problem was principally in retention. The issue of retention compounded the issues associated with the capacity to rapidly expand if general war with intermediate use of atomic weapons were to occur: a large-scale war without the exchange of strategic nuclear weapons.

The doctrine and vision of warfare the Army had developed required intelligent, flexible, highly trained professionals. As a result of the acquisition of increasingly technical equipment, the increased requirements in competence and professionalism applied at nearly all levels of the force. The Army knew it took time and investment to grow competent leaders. Now the time to train Soldiers to a level of technical competence on the newer Army systems such as the new rocket and missile forces was significantly longer. This added dynamic compounded the issue of retention to a whole of force issue, not just a leadership issue. The Army recognized the need to retain quality personnel and desired to transform into an all-volunteer force. However, the higher training and competence requirements and inter-service competition for recruits prevented the Army from achieving its vision of an all-volunteer force in the 1950s and 1960s.

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[86] Richard S. Faulkner, *Pershing's Crusaders: The American Soldier in World War I* (Lawrence, KS: University Press of Kansas, 2017), 15-16.

[87] The averaged a 1 in 4 rejection rate of Army inductees. The Army rejected them for a variety of reasons, generally categorized into physical limitations or lack of mental aptitude; Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 135.

Unable to create an all-volunteer force, the Army did attempt to stretch the personnel they did have to meet national security requirements while also transitioning into the Pentomic force. Rotational models were one possible solution to both readiness and retention problems.

Army Rotational Models

In July 1955, the Army attempted a unit rotational model called "Gyroscope," which began with the 1st Infantry Division's rotation to Europe. The program had three objectives; improve the morale of the Soldiers and their families, increase combat effectiveness, and reduce the cost of maintaining forces in Europe.[88] While reports at the time indicated that the project was successfully meeting the designed objectives, anomalies indicated otherwise.[89] The Army assigned officers, non-commissioned officers, and soldiers to Gyroscope units within weeks of the deployment of that unit. Gyroscope units could not maintain unit strength while deployed. This required individual Soldier deployments from CONUS or personnel transfers from units returning to the United States to US Army Europe to meet unit strength requirements.[90] More families than housing could accommodate arrived in Europe.[91] In some cases, the Army relocated units returning to the United States to an installation that was different from the one the unit departed. These issues were symptomatic of a solution derived with a focus between rotational units, not the Army, as a whole. It was unable to adjust to the variables that would prevent the realization of the stated objectives, most critically in unit readiness and personnel retention.

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[88] US Army Europe, *Operation Gyroscope in the United States Army Europe* (Carlisle Barracks, PA: U.S. Army Military History Institute, 1957), 2.

[89] George E. Martin, *Final Letter Report for Operation Gyroscope* (Washington, DC: Government Printing Office, 1956), 15; John M. Williams, *Gyroscope Report, 3rd Armored Division* (Washington, DC: Government Printing Office, 1956), 1-3.

[90] Donald A. Carter, *Forging the Shield: The U.S. Army in Europe, 1951-1962* (Washington, DC: Center for Military History US Army, 2015), 227.

[91] George E. Martin, *Final Letter Report for Operation Gyroscope* (Washington, DC: Government Printing Office, 1956), 5.

Project Gyroscope failed to provide service regulars with the stability and benefits that it promised. Married housing was one the principal G1 issue for the 10th Infantry Division and 3d Armored Division arrived with thirty-six more married families than projected, leaving them with no billeting options.[92] Further, often Soldiers and leaders were reassigned to other units on the units return negating any unit cohesion built. Exchanging, unlike units, only exacerbated the issue overseas while not alleviating the tremendous issues it was creating with units that remained in the continental United States.[93] From 1962 to 1964, the Army attempted another unit rotational plan called ROTAPAN.[94] The plan failed for several reasons. The introduction of Pentomic structured Battle Groups did nothing to alleviate the building issues of readiness and cost. The plan increased Soldiers and family hardship and increased the volume of US government money flowing out of the country as the Army did not authorize family accompaniment under ROTAPLAN.[95]

Unit climate also contributed to issues with retention as well as complicating the Commander's ability to understand the readiness of this unit. The Army possessed tremendous human capital in the experience of the Korean War veterans, whose numbers were rapidly diminishing in the manning cuts of the New Look. The talent and quality mix of incoming Soldiers pressured some leaders to exert increasing levels of control on lower echelons. This environment drove leaders to deceive their higher headquarters, adjacent units, and in some cases,

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[92] George E. Martin, *Final Letter Report for Operation Gyroscope* (Washington, DC: Government Printing Office, 1956), 5; Donald A. Carter, *Forging the Shield: The U.S. Army in Europe, 1951-1962* (Washington, DC: Center for Military History US Army, 2015), 229.

[93] Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 155.

[94] US Congress, *Department of Defense Appropriations for Fiscal Year 1988: Hearings before a Subcommittee of the Committee on Appropriations*, 100th Congress, 1st Session (February 3 – May 19, 1987) (statement of Chapman Cox, Assistant Secretary of Defense, Force Management and Personnel), 575-576.

[95] Donald A. Carter, *Forging the Shield: The U.S. Army in Europe, 1951-1962* (Washington, DC: Center for Military History US Army, 2015), 463.

themselves.[96] The micromanagement and over-centralization formed a climate of deception and contributed to the continued low retention rates through the 1950s. The doctrine of the day called for highly mobile and adaptive units to maneuver on an atomic battlefield, yet in some units, the culture and administrative requirements formed the opposite. This, in turn, deterred otherwise highly competent officers from continuing service.[97]

With an enduring retention issue, the Army continued to field more advanced equipment, which required more training and specialization to maintain and employ. The American people remained reluctant to voluntarily join the Army, even in the reduced numbers in the New Look. Relying on conscripts to fill out the remaining numbers of the force brought a great deal of talent to the service. However, this worked against the long-term readiness of the Army by consequently ensuring an unsustainable turnover in junior personnel. Despite recognizing the importance of retaining talent and the desire to move to an all-volunteer force, policies designed to do precisely this often exacerbated the problem. With the increasing technical requirements of the Army rocket and missile forces necessary to defeat the Soviets and the aging and so more maintenance-intensive equipment that constituted most of the inventory, making the high turnover environment unsustainable.

The Army has since changed to an all-volunteer total force with 479 thousand on Active Duty and another 331 thousand Natural Guard and 191 thousand in the Reserves.[98] The need to rapidly grow the force to conduct LSCO operations against a near-peer is not far-fetched. The

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[96] LTC Bruce C. Clarke, commander of 7th Army in 1956 published such a cornucopia of memoranda that subordinate units disregarded it, he furiously inspected units through 7th Army often relieving leaders and their superiors on the spot. There are examples of units deliberately deceiving him during inspections. Brian McAllister Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 129-130, 211-212.

[97] Brian McAllister Linn. *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016), 189-190.

[98] Defense Manpower Data Center. "Armed Forces Strength Figures for January 31, 2020" https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp. Accessed 15 February 2020; Defense Manpower Data Center. "Number of Military and DoD Appropriated Fund (APF) Civilian Personnel Permanently Assigned" https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp. Accessed 15 February 2020.

efforts of the Pentomic force serve both as a cautionary example of the effects of flawed personnel and rotational strategies it also reminds us that, if coupled with the right doctrine and technology, a rapidly grown force can be effective.

The Army was not able to fix the retention issue in the Pentomic era but did discover the personnel policies and management are interwoven into all other aspects of Army decision making, particularly doctrine and technology. Without the right people in the force doctrine cannot be carried out, and equipment cannot be maintained or employed effectively.

Conclusion

The theories of Pentomic Division employment and the lessons learned in preparing the Army for combat in a nuclear environment still carry value today. Nuclear conflict remains unlikely, but its absence from future conflict is not a foregone conclusion. Increased proliferation, destabilizing states, malevolent actors' acquisition of nuclear devices and delivery systems, increased tensions between major nuclear powers, and the dissolution of the Intermediate-Range Nuclear Forces treaty demonstrate the relevance of once planning to fight in a nuclear environment. Further, the assumption that any employment of nuclear weapons would trigger such a massive response rendering the battlefield impossible to navigate wishes away the more dangerous, insidious, and likely contingencies. That the use of tactical nuclear weapons is not feasible, in a time when Russia is behaving much more like the previous Soviet Union, is dangerous.[99]

A surge of new technologies such as hypersonics, artificial intelligence, and drones becoming available both to the United States and our likely future adversaries add further complexity to an evolving Army and Department of Defense. All of which would require more specialized training. The Doctrine we use today after principally focusing on counterinsurgency for two decades has shifted to large scale combat operations. The Army transition through the Pentomic organization under the Eisenhower administration's New Deal and policy of Massive Retaliation brought to light several interwoven lessons. These critically prevalent lessons from the development of doctrine, acquisition of technology, and recruitment and retention of personnel necessary to execute the developed doctrine and employ the new tools of war shaped the Pentomic Army and the ROAD transition in the early 1960s.

United States national strategy and international systems must inform Army doctrine. As the Army incorporated atomic weapons into doctrine and transitioned into the Pentomic structure,

[99] Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 2008), 31.

the Army did not give all considerations the necessary weight, particularly the international community. The Army recognized the tremendous power of atomic weapons and correctly assessed they would both change how superpowers wielded their power; the Army correctly saw that wars of the future would not be wars of annihilation. While tactical atomic weapons were not a part of future wars, the evolution of dispersion and convergence endured and continues to influence Army thinking today, as demonstrated in Army Multi-Domain Operations publications. The Pentomic Army, however, failed to accurately weigh how effective international resistance would be to the philosophy of the use of many small nuclear weapons within their countryside.

The technological systems that best supported force dispersion and rapid convergence continued to be valid after the Army returned to a divisional structure. The continued success of systems such as the M60 tank, UH-1 Huey, and Honest John demonstrate they transcended the requirements of a temporary force structure and addressed how warfare had changed since the introduction of the atomic bomb. They complimented the longer evolutionary and enduring elements of warfare. Nuclear-armed rocket and missile technologies were the cutting edge and very public military technologies. While the atomic and thermonuclear bombs fundamentally changed how nations weighted military power, they did not prevent future wars. The Army expended tremendous resources to develop and acquire the best cutting-edge technology, but it was limited to a narrow range of military capabilities. The Army's disproportionate pursuit of the newest technology at the expense of conventional capability should serve as a cautionary example. While the Army committed tremendous resources to rocket and missile technology, they were ill-prepared for a large war with the Soviets.[100]

Investment in new technology and weapon systems is an enduring element of the Army's evolution. The Pentomic Army's disproportionate investment in the newest technology of the day should advise caution to today's leaders. New technologies did not fundamentally change all

[100] The Soviets had continued the development and mass production of tanks, planes, and other instruments of both conventional and tactical atomic warfare.

aspects of the battlefield. Tanks, rifles, radios, helicopters, and other components of the conventional battlefield remained dominant. The most effective systems were those that leveraged emerging technologies to improve and develop systems that nested with how the Army planned to fight. These factors persist today as drones, artificial intelligence, hypersonics, and other cutting edge technologies increasingly enter the Army lexicon.

Without the right people, the best doctrine and technology are useless. The Army must develop doctrine and technology for the force that will employ it. The Pentomic Army envisioned the employment of many small units operating independently but coordinated in tactical atomic warfare. This doctrine required highly trained, adaptable, and intelligent personnel who trained together for long periods necessary to build the trust and unit cohesion necessary to execute decentralized tactics. The Army did not have, nor would they be able to build such a force rapidly. Personnel turnover and turbulence made building teams of that nature and caliber impossible. Further, had the nation entered a large-scale war during the Pentomic, with or without the employment of nuclear weapons, the nation would have needed to grow the force rapidly. While rapid force growth itself is unlikely to be an issue in the case of a large war, it would not allow building the competence and cohesion necessary to carry out the Pentomic doctrine General Taylor described.

Today the US Army is about half the size it was during the late 1950s. If the United States were to enter a large-scale war with a near-peer, even with the recall of all National Guard and Reserve forces, it is likely the force would need to be rapidly expanded. As the Army transitions to large scale combat operations, the doctrine and technology developed must be readily and effectively employable by the existing highly trained force and the rapidly grown force. The pursuit of cutting-edge technology should not outweigh the evolutionary development of conventional concepts and technology. While new technologies promise significant advantages how the Army believes it will fight with the force it expects to have must drive the acquisitions of

technology. The pursuit of new technologies must not be at the expense of more conventional advancements in the systems that will be used in future wars.

The Pentomic transition in the late 1950s occurred in a very different national and international stage, but many of the lessons learned still apply today. The Army continues to evolve its doctrine, now with a focus toward large scale combat operations. This doctrine must holistically drive the technological acquisitions that it needs to fight effectively. The doctrine and technologies must be effectively employable by the Army that will use them, which may include a rapidly grown force, not only the small, highly trained, and professional force that makes the Army today.

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