

WHERE SHOULD WEAPONS RELEASE AUTHORITY RESIDE
FOR SPACE WEAPONS?

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE
Military Space Applications

by

CHARLES T. ANDERSON, MAJ, USA
B.S., University of Maryland System, European Division, GE, 1994

Fort Leavenworth, Kansas
2003

Approved for public release; distribution is unlimited.

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

Name of Candidate: Major Charles T. Anderson

Thesis Title: Where Should Weapons Release Authority Reside for Space Weapons?

Approved by:

_____, Thesis Committee Chairman
Major Keith L. Phillips, M.A.

_____, Member
Mr. Jefferson H. Barker, M.S.

_____, Member
Colonel (Retired) Jack D. Kem, M.P.A., Ph.D. (Candidate)

Accepted this 6th day of June 2003 by:

_____, Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

WHERE SHOULD WEAPONS RELEASE AUTHORITY RESIDE FOR SPACE WEAPONS, by MAJ Charles T. Anderson, 54 pages.

The U.S. has a huge reliance on space. This reliance, combined with a leaner more rapidly deployable military, makes space weapons an appealing prospect. Space weapons technology continues to advance, and as improvements occur, the weaponization of space becomes more of a reality. This thesis answers the question of where should weapons release authority reside for space weapons. The results of the research was that this authority should reside with the joint forces commander, in all but very select instances regarding the targeting and destruction of space assets belonging to neutral countries or multinational consortium. In those cases, the authority remains with the president due the potential negative impacts to America.

ACKNOWLEDGMENTS

It is impossible to thank everyone involved in this effort. I would like to thank God for watching over me and for making this and other efforts in my life a success. To my loving family; Matthew my oldest son who lived with me here during this past year and who must have wondered if dad would ever get off the computer. Son, you are the light of my world and a real trooper. Thanks for your support and love. To my wife Tara and youngest son Gabriel who endured this year apart. Even though we were apart, you were here with me every step of the way. Your love and words of encouragement keep me going and are the reason this thesis is a reality. I love you all more than words can express.

Special thanks to my committee, Major Keith Phillips, Mr. Jefferson Barker, and Colonel (Retired) Jack Kem. Without your guidance, support, and encouragement, I would not have been successful.

To Dr. Brookes and Mrs. Helen Davis, thanks for always having an open door and being willing to listen. Your constant encouragement ensured I would stay the course, even during those times I was not sure of that fact myself.

To mom and dad (squared) thanks for always having time to look over the work that I was doing and having faith in me. You are the greatest and I love you all.

TABLE OF CONTENTS

	Page
THESIS APPROVAL PAGE	ii
ABSTRACT	iii
ACKNOWLEDGMENTS	iv
ACRONYMS	vi
ILLUSTRATIONS	vii
TABLES	viii
CHAPTER	
1. INTRODUCTION	1
2. LITERATURE REVIEW	12
3. RESEARCH METHODOLOGY	27
4. ANALYSIS	31
5. CONCLUSIONS AND RECOMMENDATIONS	43
BIBLIOGRAPHY	50
INITIAL DISTRIBUTION LIST	54
CERTIFICATION FOR MMAS DISTRIBUTION STATEMENT.....	55

ACRONYMS

AFDD	Air Force Doctrine Document
AFSC	Air Force Space Command
AOR	Area of Responsibility
ASAT	Antisatellite
C2	Command and Control
CJCS	Chairman of the Joint Chief of Staff
DOD	Department of Defense
GPS	Global Positioning System
JFACC	Joint Forces Air Component Commander
JFC	Joint Forces Commander
JP	Joint Publication
JTMD	Joint Theater Missile Defense
JSST	Joint Space Support Team
KE	Kinetic Energy
SST	Space Support Team
USAF	United States Air Force
U.S.	United States
USSPACECOM	United States Space Command
USSR	Union of Soviet Socialist Republics
USSTRATCOM	United States Strategic Command

ILLUSTRATIONS

Figure	Page
1. Directed Energy Weapons Methodology.....	33
2. Kinetic Energy Weapons Methodology.....	37
3. Conventional Weapons Methodology.....	40

TABLES

Table	Page
1. Weapons Effects.....	34

CHAPTER 1

INTRODUCTION

Why Space Weapons

It is a military axiom to “take the high ground”--and space is the ultimate high ground. In the Gulf War, U.S. space forces were virtually unopposed, but in the future that may not be the case. . . . Without question it was fortunate that there were six months to get ready. The next time that luxury may not exist, and we must be prepared. . . . The first need is a key element--development of space doctrine to provide guidance and direction at all levels of war, across the full spectrum of conflict.¹

Lieutenant Colonel Steven J. Brugger

Technology has brought about tremendous change associated with how America wages war. The United States has long enjoyed a marked advantage when it comes to space assets at its disposal. As the military has transformed, its reliance on space assets in support of combat operations has increased. Communication, intelligence, weather, and precision munitions are but a few of the ways space-based systems provide support to military operations. As technology has advanced so have the weapons used by the U.S. military. Smart bombs, global-positioning system (GPS) munitions, and laser designators to mark targets are now commonplace on the battlefield.

The debate over space weapons is not new; it has gone on for at least thirty-five years. As technology and research into space-based weapons have continued to increase, a great debate has grown regarding whether the United States should pursue placing weapons into space.

There are three reasons the author contends the U.S. will develop and deploy space weapons. The first is the United States economy and military relies heavily on space assets. The protection of these assets is critical to U.S. national interests.

Additionally, in chapter 2 the author discusses current national security and strategy documents that mandate the military to exercise “space control.” By the very nature of this direction, it becomes inevitable that the U.S. place weapons in space in order to accomplish this mission. Third, as the U. S. military moves towards a power projection force, capable of responding rapidly to any location in the world on short notice, space weapons offer an excellent means of projecting U.S. power on a global scale. Weapons positioned in orbit above the earth could provide the U.S. the capability of striking targets rapidly without placing military personnel at risk.

These reasons provide the foundation for the procurement and proliferation of space weapons by the U.S. As with all weapons systems, it is critical to have a means to control their employment on the battlefield. The U.S. must consider who would have the authority to fire these weapons. This thesis seeks to answer that very question.

Thesis Question

The purpose of this thesis is to attempt to answer the question: Where should weapons release authority reside for space weapons? In order to address the thesis question there are a number of subordinate questions that the author must answer. They are:

1. What is the target set of the weapons in question? Is the target space based, air breathing, or terrestrial based?
2. Are the effects of the weapons permanent or temporary in nature?
3. Are there other weapons in the United States military inventory that provide a template for employment of space weapons?

4. What joint doctrine, if any, currently addresses the employment of space weapons?

Definitions of Key Terms

Assured Access to Space: The “on-demand use” of space lines of communication to enable unimpeded operations in and through space. Assured access involves three key tasks: (1) transporting mission assets, (2) operating on-orbit assets, and (3) service and recovery.²

Antisatellite (ASAT): A weapon designed to destroy or disable enemy satellites in orbit.

Counterspace: Those operations conducted to attain and maintain a desired degree of space superiority by allowing friendly forces to exploit space capabilities while negating an adversary’s ability to do the same. Counterspace operations consist of two elements--offensive and defensive.³

Global Engagement: Integrated focused surveillance and ability to apply force against a limited number of terrestrial targets from space.⁴

Kinetic Energy Weapons: Weapon designed to target and negate hostile satellites; other potential uses include targeting terrestrial targets.

Negation: Measures to deceive, disrupt, deny, degrade, or destroy an adversary’s space systems and services or any other space system or service used by an adversary that is hostile to U.S. national interests.⁵

Offensive Counterspace: The use of lethal or nonlethal means to neutralize an adversary’s space systems or the information they provide. According to a recent

Department of Defense study, offensive counterspace operations achieve five major purposes:⁶

1. Deception--manipulate, distort, or falsify information
2. Degradation--permanent impairment of the utility
3. Denial--temporary elimination of the utility
4. Destruction--permanent elimination of utility
5. Disruption--temporary impairment of utility

Space: Many different definitions exist. There is no universally accepted definition of where space begins and ends. Many people consider space to be the region above the earth's atmosphere, but there is no tangible boundary because the atmosphere gradually thins with increasing altitude. The United States awards astronaut status to anyone who flies above 50 miles or 80 kilometers in altitude. Many flight engineers, dealing with the effects of friction and heating of spacecraft due to atmospheric molecules, define the boundary to be at 75 miles or 120 kilometers.⁷ Joint Publication 1-02 defines space as "A medium like the land, sea, and air within which military activities shall be conducted to achieve U.S. national security objectives."⁸ For the purpose of this thesis, the author defines space as the medium within which military activities originate or are conducted above an altitude of 70 miles or 112 kilometers.

Orbit: The path described by a body in its periodic revolution around another object. Earth satellite orbits with inclinations near zero degrees are equatorial orbits because the satellite stays nearly over the equator. Orbits with inclinations near 90 degrees are called polar orbits because the satellite crosses over (or nearly over) the north and south poles.

Space Control: Combat, combat support, and combat service support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space.

Space-Based Laser: Any of several devices based in space that convert incident electromagnetic radiation of mixed frequencies to one or more discrete frequencies of highly amplified and coherent radiation.

Space Weapon: For this thesis, space weapons are systems or platforms that have an offensive or defensive capability, are in the region we previously defined as space and may be capable of engaging targets in space, on the ground, in the air or at sea.

Space Superiority: The degree of control necessary to employ, maneuver, and engage space force while denying the same capability to an adversary.⁹

Assumptions

1. The Department of Defense will pursue the development, procurement, and fielding of offensive space weapons.
2. Using only unclassified material will not influence research for this thesis.
3. Current Joint Doctrine regarding military operations is accurate and valid.

Limitations

The time allotted to complete the research, thesis is due May 2003.

Delimitations

There are a number of delimitations associated with this thesis.

1. This thesis contains only unclassified material. The author did not include classified information on this topic because, in the opinion of the author, the classification of information or technology is not relevant to the location of where

weapons release authority should reside. While protection of U.S. technologies and capabilities is important, the inclusion of classified information would not aid in answering the primary thesis question. However, it would limit the distribution of the thesis.

2. This thesis will not address the technical aspects associated with weapons in space. Problems with orbital mechanics, command and control, cost, and targeting are all important issues that merit the millions of dollars spent on research; however, they are not relevant to the thesis question. At least two nations--the United States and the Union of Soviet Socialist Republics (USSR)--have successfully addressed some of these challenges and have demonstrated a space weapons capability in the form of anti-satellite weapons.

3. This thesis will not address the legal arguments surrounding space weapons. There are numerous and varying opinions on the legal issues surrounding space weapons. While these arguments may be morally and legally sound in their origins, and provide an interesting perspective, they are not relevant to this thesis.

4. Research cutoff is 1 February 2003.

5. This thesis will use joint doctrine in order to avoid service specific bias.

Significance of This Study

Weapons in space are a hotly debated topic. The opinions on the topic vary greatly, depending on who you ask. The current National Space Policy says we will protect space assets by any means necessary. The means of this protection is where the divergent opinions arise. Given America's reliance on space systems, the protection of these systems is becoming a growing concern. As a leader in the early years of the space

race and one of the leading users of space assets today, the U.S. military has a critical interest in how to ensure the protection of space assets. The future is now and the U.S. continued status as a world power and leader, as well as the success or failure of future joint operations, hinges on the action taken in regards to this issue. Combining the U.S. reliance on space and the existing technological capability, which now makes space weapons a reality and the result, is a viable means of protecting this vital military and national interest.

Having the capabilities for space weapons is not nearly enough. The U.S. must plan for and understand the employment of these weapons. The U.S. military must develop doctrine that addresses the concept of employment of these weapons. This thesis seeks to develop a portion of that concept of employment. By evaluating the weapons technology, the affect of the weapon on its intended target, and applying the principle of conducting joint operations, this thesis seeks to establish a doctrinally sound answer to where release authority for such weapons would reside.

According to *Air Force Magazine 2001*, as of 31 December 2000, there were 980 U.S.-owned satellites in orbit and deep space, of those, 435 are military satellites.¹⁰ The military's reliance on space assets provides a compelling reason to look at using space weapons to protect America's economy and ability to wage war. General Lance Lord, Commander Air Force Space Command (AFSC), offered his thoughts on whether the U.S. military would fight a war in outer space. With so much of the U.S. economy relying on satellites, "It's not a matter of if this will happen but when," said Lord. "We don't want to get caught with no options."¹¹

The U.S. must answer this question now, or risk the potential of developing space weapons and then trying to figure out by whom and how they should be employed. Now is the time to ponder these questions. Each of the services has a stake in space and each will have a different position on who should control weapon release authority of space weapons. Since the military does not fight single service conflicts, service biases are not relevant and joint doctrine must form the framework used to evaluate this question.

Why does the military have a leading role in ensuring space is protected? The U.S. government in the Department of Defense (DOD) Directive 3100.10, *Space Policy*, and *Joint Vision 2020* has directed the military.

DOD Directive 3100.10, *Space Policy*, states the following:

1. Space is a medium like the land, sea and air....
2. Ensuring freedom of space and protecting U.S. national security interest in the medium are priorities. . . .
3. Purposeful interference with U.S. space systems will be viewed as an infringement on our sovereign rights. . . .
4. Ensuring that hostile forces cannot prevent the United States' use of space.
5. Countering, if necessary, space systems, and services used for hostile purposes.¹²

While *Joint Vision 2020* states the Chairman of the Joint Chief of Staff (CJCS) vision as:

Dedicated individuals and innovative organizations transforming the joint force for the 21st Century to achieve full spectrum dominance:

1. persuasive in peace
2. decisive in war
3. preeminent in any form of conflict¹³

A year ago, America's view on war took a dramatic turn. The 11 September 2001 terrorist attacks on the Pentagon and World Trade Center seemed to echo the CJCS vision. The era of asymmetric warfare had arrived at America's front door step. While

force-on-force wars may occur, other nations have learned they are no match for the American military and have chosen other more effective means of attacking the U.S. America must be prepared; possessing the most advanced military in the history of the world is no longer enough to deter terrorist and enemies of the U.S. from attacking. The U.S. must use the technology it possesses to support the achievement of its national interests. The time is now to expand the technological advantage that the nation enjoys.

Conclusion

The U.S. military clearly has the mandate to protect this country's space assets and national interests. Space weapons technologies provide the means to perform these and other power projection missions. These facts provide the rationale for the development and deployment of space weapons. Key to any such deployment will be the concept of employment for these technologies. Failure to develop this concept and answer the question of where space weapons release authority should reside makes the development, procurement, and fielding of space weapons by the U.S. an exercise in futility. Analyzing the facts and information related to this topic in order to determine the best location for weapons release authority to reside is the focus of this thesis.

The format of this thesis is as follows. Chapter 2 details the literature reviewed while researching this topic. Chapter 3 defines the methodology used during the research. Chapter 4 is the analysis of the information. Chapter 5 contains the conclusions reached during the analysis and recommendations for additional research topics related to this thesis.

¹ Frank Gallegos, “After the Gulf War: Balancing Space Power’s Development,” quoted in *Beyond the paths of Heaven: The Emergence of Space Power Thought* (Maxwell Air Force Base, Alabama: Air University Press, September 1999), 63.

² U.S. Space Command, *Long Range Plan, Implementing USSPACECOM Vision for 2020* (Peterson Air Force Base, Colorado: U.S. Space Command, March 1998), 22.

³ Department of the Air Force, AFDD 2-2, *Space Operations* (Washington, D.C.: U.S. Government Printing Office, November 2002), 27 [document on-line]; available from: <http://www.e-publishing.af.mil/pubfiles/af/dd/afdd2-2/afdd2-2.pdf>; Internet; accessed on 1 October 2002.

⁴ Department of Defense, *Joint Vision 2020* (Washington, D.C.: U.S. Government Printing Office, June 2000), 129.

⁵ The Joint Staff. Joint Publication 3-14, *Doctrine for Space Operations* (Washington, D.C.: U.S. Government Printing Office, 9 August 2002), GL 5.

⁶ Tom Wilson, “Threats to United States Space Capabilities,” in *Report of the Commission to Assess United States National Security Space Management and Organization. Appendices: Staff Background Papers* (Washington, D.C.: Department of Defense Studies, 2000), 3.

⁷ John F. Graham, *Space Exploration from Talisman of the Past to Gateway for the Future* (John Graham, 1995) [article on-line]; available from http://civiliancomms.tripod.com/spacecomms/space_exploration/; Internet; accessed on 5 October 2002.

⁸ The Joint Staff, Joint Publication 1-02 *Dictionary of Military and Associated Terms* (as amended through 14 August 2002) (Washington, D.C.: U.S. Government Printing Office, 12 April 2002), 406 [document on-line]; available from http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf; Internet; accessed on 1 October 2002.

⁹ AFDD 2-2, 70.

¹⁰ Tamar A. Mehuron, “Space Almanac”. Air Force Magazine Online, Journal of the Air Force Association 84 no. 8 (2001): 30.

¹¹ Diedrich, John, “General Oversees Nation’s Satellite,” The Colorado Spring Gazette in *U.S. Plans For Wars In Space*. News and Headlines ARSPACE Public Affairs, (Colorado Springs, Co: 23 August 2002) [article on-line]; available from <https://www.armyspace.army.mil/news/>; Internet; accessed on 1 October 2002.

¹² Department of Defense, Directive 3100.10, *Space Policy* (Washington, D.C.: U.S. Government Printing Office, 9 July 1999), 5-7 [document on-line]; available from <http://www.fas.org/spp/military/docops/defense/dodspcpolicy99.pdf>; Internet; accessed on 5 October 2002.

¹³ Department of Defense, *Joint Vision 2020*, 2.

CHAPTER 2

LITERATURE REVIEW

If the Air Force can not embrace space power, we in Congress will drag them there kicking and screaming as necessary or perhaps set up an entirely new service.¹

Senator Bob Smith

The review encompassed literature related to the research of the thesis question: where should weapons release authority reside for space weapons? First will be the review of documents that establish the requirement for space weapons. Determining the location of weapons release authority is not relevant unless there is an established requirement for space weapons. Establishing this requirement will confirm the need to answer the primary research question.

The second step in the literature review will focus on answering the secondary questions in order to establish the criteria the author will use during the analysis of the thesis question. This step will center around weapons location, target location, effects of the weapon on the target and the parallels of other U.S. weapons systems release authority. The questions that require an answer during the review are:

1. What is the target set of the weapon in question? Is the target space based, air breathing, or terrestrial based?
2. Are the effects of the weapon permanent or temporary in nature?
3. Are there other weapons in the United States inventory that provide a template for employment of space weapons?

The final step in the literature review is a review of joint doctrine that will serve as the primary framework for evaluating the thesis question.

Requirement for Space Weapons

Numerous national level documents outline the need for space weapons. While not all these documents use the term “space weapon,” the capabilities or effects they speak of clearly indicate a weapons capability. Additionally, many U.S. leaders and experts have expressed concerns related to potential threats to critical U.S. space systems. While few of these individuals identify ‘space weapons’ as a specific solution, there is a common theme that points toward the need to ensure the U.S. freedom and access to space while denying the same to the adversary.

In the 2002 National Security Strategy President Bush states, “The broad portfolio of military capabilities must also include the ability to defend the homeland, conduct information operations, ensure U.S. access to distant theaters, and protect critical U.S. infrastructure and assets in outer space.”²

President Bush clearly recognizes and articulates the importance of protecting our critical space assets. He further states, “The United States must and will maintain the capability to defeat any attempt by an enemy whether a state or non-state actor to impose its will on the United States, our allies, or our friends.”³ These two statements leave little doubt that the President understands the importance of our space assets, and is committed to protecting them. While he does not use the term space weapons, there is no doubt in the author’s mind that the President intends to use any means at his disposal to ensure the protection of vital U.S. interests.

The former Chairman of the Joint Chiefs of Staff, General John Shalikashvili, also recognized the potential threat to U.S. space assets. General Shalikashvili talked about the challenges we might face which include enemies “threatening our space-based

systems, interrupting the flow of critical information, and denying our access to strategic resources.”⁴ General Shalikashvili further stated, “The strategic environment facing us is complex, dynamic, and uncertain. It is in this environment that U.S. Armed Forces must carry out their tasks to protect America and its interests.”⁵

In *Threats to United States Space Capabilities*, Report of the Commission to Assess United States National Security Space Management and Organization, Tom Wilson states “The U.S. reliance on space coupled with the growing amount of information available about our space systems increases the likelihood that our adversaries will employ counterspace weapons technologies. Of concern is the likelihood that today, the U.S. has neither the doctrine nor the means to respond to potential counterspace threat situations.”⁶

In an interview published in the Colorado Springs Gazette, General Lance Lord, Commander Air Force Space Command, offered his thoughts on whether the U.S. military would fight a war in outer space. With so much of the U.S. economy relying on satellites, “It’s not a matter of if this will happen but when,” said Lord. “We don’t want to get caught with no options.”⁷

These are a few of America’s senior political and military leaders who clearly feel there is a threat to U.S. space assets. Because of this acknowledged threat DOD military organizations have developed and published carefully crafted plans, directives, and visions to address this threat.

The Defense Department published DOD Directive 3100.10, *Space Policy* stating the following:

1. Space is a medium like the land, sea and air. . . .

2. Ensuring Freedom of space and protecting U.S. national security interest in the medium are priorities. . . .
3. Purposeful interference with U.S. space systems will be viewed as an infringement on our sovereign rights. . . .
4. Ensuring that hostile forces cannot prevent the United States' use of space.
5. Countering, if necessary, space systems, and services used for hostile purposes.

In *Joint Vision 2020*, General Henry H. Shelton, former Chairman of the Joint Chiefs of Staff, described the joint force of the future as “Dedicated individuals and innovative organizations transforming the joint force for the 21st Century to achieve full spectrum dominance: persuasive in peace; decisive in war; preeminent in any form of conflict.”⁹

He further stated full spectrum dominance “implies that U.S. forces are able to conduct prompt, sustained, and synchronized operations with combinations of forces tailored to specific situations and with access to and freedom to operate in all domains – space, sea, land, air, and information.”¹⁰

United States Space Command's *Long Range Plan, Implementing USSPACECOM Vision for 2020* states, “Early in the 21st Century, space will become another medium of warfare.”¹¹ The long-range plan discusses the negation of enemy space assets and capabilities in detail. It further states, “The United States will need to develop national policies supporting space warfare, weapons development and employment and rules of engagement. Clearly as DOD's lead military agency for space, USSTRATCOM is well aware of the challenges that the U.S. faces.”¹² Finally, the topic of space weapons is addressed as means of negation. “In addition to ground, air, and space-based lasers, radio-frequency transmitters, and microwave technologies, the

military Space Operations Vehicle and space-based weapons would give the United States enough flexibility to meet future negation requirements.”¹³

The President, the Chairman of the Joint Chiefs of Staff, other military leaders, and researchers all agree on the potential threat to U.S. space assets. Agencies within the government such as DOD and USSTRATCOM have received this message and are developing plans and programs to address the issue. As shown in the *Long Range Plan, Implementing USSPACECOM Vision for 2020*, space weapons are a part of the plan. There is a very real threat to U.S. space assets and one of the ways to negate this threat is with space weapons.

Space weapons have the potential to do much more than protect U.S. space assets. They could enhance the power projection capability of the U.S. striking targets anywhere in world in minutes, depending on the orbit and number of weapons deployed. They could potentially acquire, track, and destroy both ballistic or cruise missiles.

These facts clearly established that the United States is considering the use of space weapons, and therefore the thesis question of where weapons release authority should reside clearly merits exploration.

Valid Target Sets and Desired Effects

Two of the key elements to determining at what level of command weapons release authority would reside are the location of the targets and the effect the weapon has on the targets. The focus this section is research relating to potential target sets and effects of space weapons against those targets. An examination of current and future space weapons technology, potential targets, and weapons effects provides the information that serves as a data pool from which to build target sets and a potential

effects list. The analysis of compiled data on targets and weapons effects will result in the creation of logical groupings of like targets and the definition of potential effects based on weapons capabilities.

In *Space Weapons Earth's Wars*, Bob Preston and his colleagues write about two general types of weapons and discuss potential targets for each set. The first weapons type is directed energy weapon. These weapons direct destructive energy to their target. Laser technology is the most likely candidate for direct energy weapons. The second set is those weapons that deliver significant mass to the target. Mr. Preston categorized these weapons as mass-to-target weapons, also called kinetic energy weapons.¹⁴

Preston said the following about direct energy weapons targets: "targets will generally have to be relatively soft, such as aircraft and missiles (not armored vehicles), but may be very swift. The weapons' effects may range from temporary interference to permanent destruction."¹⁵ Later in the analysis of this capability, Preston states: "a laser whose wavelength is chosen to penetrate low enough into the atmosphere could be used against airplanes or cruise missiles in flight or even against terrestrial targets, such as aboveground fuel tanks, missiles still on their launchers or transporters, fuel trucks, and other relatively thin-skinned or flammable targets."¹⁶

Mass-to-target weapons are the second type of weapons that Preston discusses. Under the category of mass-to-target weapons, Mr. Preston discussed two weapons, kinetic energy weapons against both space and terrestrial targets, and conventional weapons from space. Preston focus on kinetic weapons against space targets is restricted to intercepting ballistic missiles as they traverse through space. His discussion of kinetic energy weapons against terrestrial targets is much broader. Preston states, 'suitable

targets would include tall buildings, missile silos, ships and hardened aircraft shelters but not runways; deeply buried bunkers; bridges, and long low buildings.¹⁷

The last type of weapons discussed is conventional weapons from space against terrestrial targets. Preston states: “The targets for this class of weapons depend on the capability of the conventional munitions delivered to the proximity of their target.”¹⁸ This means the munitions on the weapon would limit the potential targets. Since these are space based weapons, changing munitions would be extremely difficult. Preston further identifies this type of weapons as “focused on targets fixed on the ground or moving slowly enough that they would not escape the footprint of the cluster of weapons aimed at them.”¹⁹

In *Threats to United States Space Capabilities*, Report of the Commission to Assess United States National Security Space Management and Organization, Tom Wilson focuses in the detail of different weapons against space targets and the purpose of these weapons. While a number of the weapons he discusses are terrestrial based, he does address some ASAT weapons, space mines, and space-to-space missiles that are space based.²⁰ These and the other weapons discussed are framed under the heading of counterspace operations. The major purpose or effect of these operations is deception, disruption, denial, degradation, or destruction.²¹

While a research fellow with the Airpower Research Institute, Lieutenant Colonel Michael R. Mantz, United States Air Force (USAF) wrote *The New Sword A Theory of Space Combat Power*. Mantz addressed the possibilities of space combat from a no-holds-barred perspective, focused on what might be, rather than what is. His research developed two space combat capabilities that are relevant to this thesis. Mantz discussed

space-to-space attacks and space-to-earth attacks. In the description of space-to-space, attacks Mantz states “Spaceborne and space based platforms using kinetic energy, directed energy, and counter-C2 weapons attack enemy space-traversing, spaceborne, and space-based platforms.”²² Under the arena of space-to-earth attacks, Mantz addresses, land, sea, subsurface, subterranean, and airborne type operations. Mantz identified the following as potential targets: tanks, troops, artillery, ships, submarines, aircraft, communication, transportation, and energy systems.

In evaluating target sets, it was necessary to look at what the military defines as a target. Joint Publication 1-02, *Dictionary of Military and Associated Terms*, defined a target as “An area, complex, installation, force, equipment, capability, function, or behavior identified for possible action to support the commander's objectives, guidance, and intent. Targets fall into two general categories: planned and immediate.”²³ The use of this definition alone created a list of potential targets too large to effectively access. It was necessary to look at the capabilities of current and future weapons systems that met the definition of space weapon as defined earlier in the thesis.

In *Star Tek-Exploiting the Final Frontier: Counterspace Operations in 2025*, the authors provided examples of both kinetic and direct energy weapons. These weapons range from antisatellite (ASAT) systems, which destroy objects by impacting with the target, using energy generated by a moving mass to destroy the target it impacts to the futuristic Alpha Strikestar transatmospheric vehicle.²⁴

Kinetic energy weapons for space application in the form of ASAT systems date back to the mid-to-late 1960s when both the U.S. and Union of Soviet Socialist Republics (USSR) were testing ASAT weapons. Both the United States and the USSR have

demonstrated ASAT weapons technology.²⁵ USSPACECOM currently identifies kinetic energy antisatellite (KE-ASAT) technology as a candidate technology for accomplishing negation of enemy satellites.²⁶ Additionally, U.S. Army Space and Missile Defense Command has tested and plans further testing on KE-ASAT technology.

The authors of *Star Tek-Exploiting the Final Frontier: Counterspace Operations in 2025* envision that the futuristic Alpha Strikestar vehicle could transition between air and space environments repeatedly. It would carry multiple types of weapons that include kinetic energy antisatellite missiles and laser cannons, which is capable of disrupting, denying, degrading, or destroying unfriendly satellites. The Alpha Strikestar is also air and space to ground capable using precision guided weapons to take out hard targets anywhere in the world on short notice. The vehicle is flexible enough to enter low earth orbit en route to a ground target, reenter the atmosphere to deliver ordnance, and then return to orbit to overfly the target and conduct battle damage assessment. If necessary, the Alpha Strikestar can then reengage to complete the designated mission.²⁷

Barry D. Watts in *The Military Use of Space: A Diagnostic Assessment* states: “Space based weapons, though do have a military utility in terrestrial conflicts and, unlike thermonuclear weapons, they do not threaten destruction so widespread that the victors will be indistinguishable from the losers of a conflict in which they are employed.”²⁸ Watts discussed both kinetic and directed energy weapons, focusing on the possible military use. Interesting to the author was the source cited repeatedly by Watts during this section. This source was Bob Preston, one of the authors of *Space Weapons Earth’s Wars*.²⁹ Since Mr. Watts cites a source already used by the author, the author chooses not to repeat weapons description and potential targets.

Current Weapons Command and Control as a model for Space Weapons

This section focuses on the evaluation of the command and control structures of current weapons systems. The author evaluates three systems: nuclear operations, joint theater missile defense, and joint fire support. The intent was to examine command and control (C2) structures for these systems and the reasons behind the control measure for each in an attempt to identify critical components that might be applicable for space weapons.

Two joint publications address nuclear weapons operations: Joint Publication (JP) 3-12, *Doctrine for Joint Nuclear Operations*, and JP 3-12.1, *Doctrine for Joint Theater Nuclear Operations*. According to both publications, the president and his successor are the only individuals who may authorize release of nuclear weapons. Theater commanders are responsible for planning associated with the employment of nuclear weapons and for submitting requests for employment. There are strict control measures in place to preclude unauthorized release of nuclear weapons. These measures include a dedicated media message delivery system, permissive action link, coded switch set controller, sealed authentication systems, personnel reliability program and sensitive keys.³⁰

Missile Defense operations provided the second example. JP 3.01.5, *Doctrine for Joint Theater Missile Defense* states, “component commanders plan, and execute JTMD operations under the guidance and in support of the objectives of the Joint Forces Commander (JFC). The JFC uses the joint force staff to plan, monitor, advise, and coordinate the overall operations.”³¹ The publication focuses on the importance of communications and coordination of units assigned the mission of missile defense. While component commanders plan and execute the mission, the JFC J3 is responsible for

establishing and prioritizing JFC approved targeting guidance and objectives. This includes high priority targets, sensitive targets, and rules of engagement.³²

Fire support operations discussed in JP 3-09, *Doctrine for Joint Fire Support*, are the final capability reviewed, by the author. The JFC provides guidance on type of targets and priorities and type of effects of fires on the enemy. Additionally, the JFC provides targeting guidance on munitions usage and restrictions.³³ Similar to a missile defense operation, The JFC controls fires operations targets and priorities. Subordinate units execute the missions within the boundaries established by the JFC. Coordination, integration, and de-confliction of both operations are critical to ensure maximum effects and to protect friendly forces.

Joint Doctrine and Space Weapon

JP 3-14, *Joint Doctrine for Space Operations*, is the joint publication governing space operations. The term “space weapon” does not appear anywhere in the publication. Currently, the Commander United States Strategic Command is responsible to plan, direct, coordinate and control space assets and forces.³⁴ Support for theater operations is enhanced by the fact each geographic combatant commander has space experts resident on the staff. A space liaison officer, Joint Space Support Team (JSST), and tailorable Space Support Teams (SST) may provide additional support.

JP 3-0, *Doctrine for Joint Operations*, is the primary document governing the conduct of joint military operations. JP 3-0 states, “The overarching operational concept in JP 1, *Joint Warfare of the Armed Forces of the United States*, is that the JFC integrates and synchronize the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated joint campaigns and major

operations.”³⁵ It further states, “Control is inherent in command. To control is to regulate forces and functions to execute the commander.”³⁶ The overarching theme is the need for a single commander to control forces, assign missions, set priorities, and ensure the allocation of resources, while focusing on the principles of war, to ensure the success of U.S. forces in combat.

The author opines that JP 3-0 fails to address the true value of space operations. JP 3-0 contains one paragraph that addresses space operations. The paragraph refers to space as a “critical enabler that may be used to support all joint warfare areas.”³⁷ While, space does enable and support many other aspects of military operations the potential exists for space to contribute on a higher level.

Conclusions

Space weapons are a real technological possibility for negating the threat to U.S. space assets, as well as means of striking other targets. This fact warrants asking the question; where should weapons release authority for space weapons reside?

To answer this question requires identifying the types of space weapons, the location of the targets and the effects of the weapons on the target. The literature review identified a number of weapons systems. The author will group these systems into two categories: directed energy weapons and kinetic energy weapons. A review of target locations provides a list of targets that the author organized into four groups: space targets, air target, terrestrial target (surface and subsurface), and sea target (surface and subsurface). The potential effects of the targets varied using terms like deny, disrupt, or degrade. The author organized the potential effects into three groups: interruption, disable, and destruction. The evaluations of other weapons systems command and control

measures and joint doctrine revealed some valuable information that the author will apply to the research during the analysis phase.

¹ Linda de France, "Sen. Smith Lambastes AF lack of Support for Space Power," *Aerospace Daily*, 15 May 2000, 245, in *The Military Use of Space: A Diagnostic Assessment* (Washington, D.C.: Center for Strategic and Budgetary Assessments, February 2001), 107.

² George W. Bush Jr., *National Security Strategy* (Washington, D.C.: Joint Session of Congress, 20 September 2001), 30.

³ *Ibid.*, 30.

⁴ GEN John Shalikashvili, USA, *National Military Strategy: Shape, Respond, Prepare Now—A Military Strategy for a New Era* (Washington, D.C.: U.S. Government Printing Office, 29 September 1997) 7. [article on-line]; available from <http://www.dtic.mil/jcs/core/nms.html>; Internet; accessed on 29 October 2002.

⁵ *Ibid.*, 8.

⁶ Tom Wilson, "Threats to United States Space Capabilities," in *Report of the Commission to Assess United States National Security Space Management and Organization. Appendices: Staff Background Papers* (Washington, D.C.: Department of Defense Studies, 2000), 6.

⁷ Diedrich, John, "General Oversees Nation's Satellite," *The Colorado Spring Gazette in U.S. Plans For Wars In Space*. News and Headlines ARSPACE Public Affairs, (Colorado Springs, Co: 23 August 2002) [article on-line]; available from <https://www.armyspace.army.mil/news/>; Internet; accessed on 1 October 2002.

⁸ Department of Defense, Directive 3100.10, *Space Policy* (Washington, D.C.: U.S. Government Printing Office, 9 July 1999), 5-7 [document on-line]; available from <http://www.fas.org/spp/military/docops/defense/dodspcpolicy99.pdf>; Internet; accessed on 5 October 2002.

⁹ Department of Defense, *Joint Vision 2020* (Washington, D.C.: U.S. Government Printing Office, June 2000), 8.

¹⁰ *Ibid.*, 8.

¹¹ US Space Command, *Long Range Plan, Implementing USSPACECOM Vision for 2020* (Peterson Air Force Base, Colorado: US Space Command, March 1998), 7.

¹² *Ibid.*, 46.

¹³ Ibid.

¹⁴ Bob Preston, et al., *Space Weapons Earth Wars* (RAND 2002), 24 [book on-line]; available from <http://www.rand.org/publications/MR/MR1209/>; Internet; accessed on 6 September 2002.

¹⁵ Ibid., 25.

¹⁶ Ibid., 34.

¹⁷ Ibid., 40-41.

¹⁸ Ibid., 45.

¹⁹ Ibid.

²⁰ Wilson, 25-35.

²¹ Ibid., 17.

²² Lt Col Michael R. Mantz, *The New Sword: A Theory of Space Combat Power* (Maxwell Air Force Base, Alabama: Air University Press, May 1995), 41-49.

²³ The Joint Staff, Joint Publication 1-02, *Dictionary of Military and Associated Terms* (as amended through 14 August 2002) (Washington, D.C.: U.S. Government Printing Office, 12 April 2002), 406 [document on-line]; available from http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf; Internet; accessed on 1 October 2002.

²⁴ Lt Col Robert H. Zielinski, et al., *Air Force 2025, Star Tek-Exploiting the Final Frontier: Counterspace Operations in 2025*. August 1996. [article on-line]; available from <http://www.fas.org/spp/military/docops/usaf/2025/v3c9/v3c9-1.htm>, Internet; accessed on 29 October 2002.

²⁵ Roger C. Hunter, *A United States Antisatellite Policy for a Multipolar World* (Maxwell Air Force Base, Alabama: Air University Press, October 1995), 17-24.

²⁶ US Space Command, *Long Range Plan, Implementing USSPACECOM Vision for 2020*. (Peterson Air Force Base, Colorado: US Space Command, March 1998), 44.

²⁷ Lt Col Robert H. Zielinski, et al., *Air Force 2025, Star Tek-Exploiting the Final Frontier: Counterspace Operations in 2025*. August 1996. [article on-line]; available from <http://www.fas.org/spp/military/docops/usaf/2025/v3c9/v3c9-1.htm>, Internet; accessed on 29 October 2002.

²⁸ Barry D. Watts, *The Military Use of Space: A Diagnostic Assessment*. (Washington D.C.: Center for Strategic and Budgetary Assessments, February 2001), 110.

²⁹ *Ibid.*, 88-91.

³⁰ The Joint Staff, Joint Publication 3-12.1, *Doctrine for Joint Theater Nuclear Operations* (Washington, D.C.: U.S. Government Printing, Office 9 February 1996), II-3.

³¹ The Joint Staff, Joint Publication 3-01.5, *Doctrine for Joint Theater Missile Defense* (Washington, D.C.: U.S. Government Printing Office, 22 February 1996), ix.

³² *Ibid.*, II-3.

³³ The Joint Staff, Joint Publication 3-09, *Doctrine for Joint Fires Support* (Washington, D.C.: U.S. Government Printing Office, 22 February 1996), I-2.

³⁴ The Joint Staff, Joint Publication 3-14, *Joint Doctrine for Space Support* (Washington, D.C.: U.S. Government Printing Office, 9 August 2002), II-2.

³⁵ The Joint Staff, Joint Publication 3-0, *Doctrine for Joint Operations* (Washington, D.C.: U.S. Government Printing Office, 10 September 2001), II-4.

³⁶ *Ibid.*, II-18.

³⁷ *Ibid.*, III-31.

CHAPTER 3

RESEARCH METHODOLOGY

In determining the research design method of where weapons release authority should reside for space weapons, the author will use the following approach: (1) research and define space weapons, (2) research the effects of space weapons, (3) research and develop clearly defined target set, and (4) research existing joint doctrine for current weapons systems to determine if a correlation current weapons and space weapons exist. If so, does this correlation lend itself to the use a similar weapons release authority structure?

Research and Define Space Weapons

The first task was to define the term “space weapons.” While this would appear to be a simple task, that was not the case. There are weapons that reside in space and those that merely transit through space. Additionally, there are airborne or terrestrial based weapons that target assets in space. There was also the secondary problem of defining space in terms of this thesis. Finding two sources that define the term space in the same way proved to be a challenge. Even within the military community, no two services define space weapons the same way.

In order to complete a review of literature, the author defined space weapons as systems or platforms that have an offensive or defensive capability and are in the region defined in chapter one as space. With this definition in place, it was possible to conduct a thorough literature review of systems that met the definition of space weapons. This review revealed numerous types of space weapons. The number of weapons required that the author group them into categories based on their operations. The three categories are:

(1) directed energy weapons, (2) kinetic energy weapons, and (3) conventional weapons employed from a space platforms. These three categories of space weapons will serve as the foundation of the research.

Research the Effects of Space Weapons

After defining and categorizing space weapons, the next task was to continue the literature review to determine the possible effects the weapons systems were capable of having. In the literature review, potential effects caused by the weapons systems on the targets were addressed using terms like deny, disrupt, degrade, and destroy. The definition of these terms varied depending upon the source. In analyzing these terms the author was able to categorize the effects into three groups: (1) interruption--temporary causing the target not to function as it was designed, (2) disable--cause the target to operationally fail, and (3) destruction--the physical destruction of the target. This provides the second piece of the data critical to the analysis.

Research and Develop Clearly Defined Target Set

After defining and categorizing space weapons and their effects, the next task was to determine the possible targets for the weapons. The literature review resulted in numerous possible targets ranging from satellites, aircraft, ships, and tanks to buildings and bunkers. In order to make the number of targets manageable, the author categorized them into four groups: (1) space targets, (2) air targets, (3) terrestrial targets (surface and subsurface), and (4) sea targets (surface and subsurface). The creation of this target set is the final piece of what becomes the foundation of the research.

Current Weapons Command and Control as a model for Space Weapons

An evaluation of current weapons systems and the C2 structure for each revealed a common theme, with one noted exception. The common theme was that for both theater missile defense systems and joint fire support systems the JFC was the authority for selecting targets and approving the engagement of the target. Delegation of this authority to the commander in theater is consistent with the principles of war and results in the most effective use of combat power.

The noted exception to this rule was in the case of nuclear weapons. For nuclear weapons, the president was the approving authority for their employment. The author was unable to discover any definitive rationale for this high level of authorization. However, the author opines that it is due to the destructive nature of nuclear weapons, their global impact, and world opinion surrounding their employment.

Joint Doctrine

In reviewing literature for this thesis, the focus was on current joint doctrine. Space forces are not unique to a specific services and the nature of current military operations focuses on joint operations. The identification of the proper location for weapons release authority will center on the joint command structure. While the specific service may own the weapon system, as is the case with Air Force aircraft or Army Armor, the JFC commands and controls the employment of these systems.

Conclusions

In the end, the author will use the information gathered from the literature review to evaluate and determine the best location for weapons release authority to reside. The author will evaluate each weapons type based on the effect created by the weapon, the

target set, its similarity to joint doctrine for current weapons systems. The results will be a comprehensive analysis resulting in a proposed location for the weapons release authority. The proposed locations will then be subject to analysis to determine if a pattern exists and the results logically grouped resulting in a single location.

CHAPTER 4

ANALYSIS

Background

The research for this thesis clearly supports the assertion by the author that space weapons in the United States offer numerous benefits to the U.S. military. Humankind has proven extremely adept at improving the weapons he uses to wage war. Throughout the course of history, warfare has transitioned proportionately to the technology of the era. As technological advancements have allowed for the improvement of weapons, humans have seized the opportunity. The technology necessary for space weapons will be no different.

This technology presents itself at a time when the United States faces increasing threats from numerous enemies around the globe. The operational tempo of the U.S. military has never been higher. The U.S. Army is transitioning to a rapid deployment force capabilities are paramount to success. Assured access to U.S. systems in a timely manner is critical. All of these facts combine to make space weapons a viable means of support to U.S. national interest.

The use of space weapons provides the U.S. with an unmatched power projection capability. A constellation of space weapons in the proper orbit would provide the U.S. the ability to strike targets anywhere in the world at any time. However, the same flexibility provided by orbiting weapons complicates the control of such weapons. Normally, combatant commanders receive forces that permanently reside in the commander's area of responsibility (AOR). Equipment, personnel, and other resources arrive in theater or within range of the theater to affect operations. In most instances,

personnel and equipment remain committed to the commanders for the durations of the conflict. Space weapons are unique because in most instances, the weapon will traverse the globe unless the weapon is in a geostationary orbit. The weapon systems may only be over the combatant commander's AOR for a short duration of the day. Should weapons release authority for that weapon constellation be under the control of a combatant commander or should authority reside at some higher level, due to the global reach of space weapons?

The author will study the research completed in the previous chapters in order to answer the question of where weapons release authority should reside. The analysis will consider the effects of the weapon on the target sets, as well as the target sets themselves. The command and control structure for current weapons systems provides a historical baseline against which the author will compare space weapons. These three factors will result in the recommended location for weapons release authority.

Analysis of Directed Energy Weapons

Directed Energy weapons are the first group of weapons that the author will analyze. Figure 1 is a graphic representation of the methodology applied by the author.

Consideration of a number of factors is required in order to determine where weapons release authority should reside. The first factor is the effects of the weapon on the target. The author grouped potential effects into three categories in table 1.

The second factor is target sets. In *Space Weapons Earth's Wars*, Bob Preston said the following about directed energy weapons targets, "targets will generally have to be relatively soft, such as aircraft and missiles (not armored vehicles), but may be very swift. The weapons' effects may range from temporary interference to permanent

destruction.”¹ Later in the analysis of this capability, Preston states, “A laser whose wavelength is chosen to penetrate low enough into the atmosphere could be used against airplanes or cruise missiles in flight or even against terrestrial targets, such as aboveground fuel tanks, missiles still on their launchers or transporters, fuel trucks, and other relatively thin-skinned or flammable targets.”² In *The New Sword A Theory of Space Combat Power*, Lieutenant Colonel Michael R. Mantz, USAF, identified tanks, troops, artillery, ships, submarines, aircraft, communications, transportation, and energy systems as potential targets.³

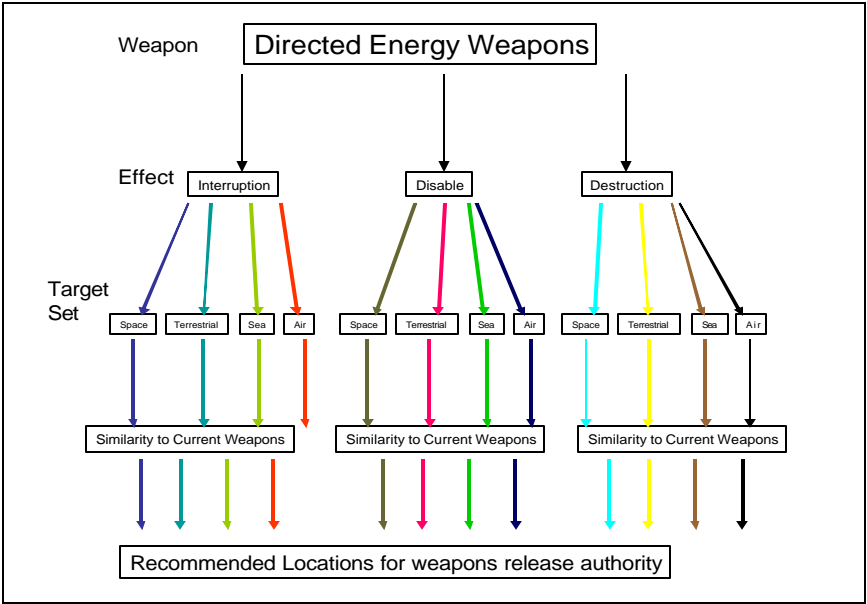


Figure 1: Directed Energy Weapons Methodology

In order to make the analysis of targets manageable, the author grouped the numerous targets into four sets that appeared in chapter 2. The four groups are space

targets, air targets, terrestrial targets (surface and subsurface), and sea targets (surface and subsurface).

Table 1. Weapons Effects

Effects	Definitions
Interruption	Temporary denial of the target, without causing permanent damage
Disable	Causing the target to be non-functional, without the physical destruction of the target
Destruction	The physical destruction of the target

Space targets are the most complex situation. While the military has destroyed numerous targets from the other target sets in previous conflicts, the destruction of a space target is a new unexplored arena. It is possible to apply the same principles of current joint operations to the destruction of space targets. Take for instance the following scenario: A satellite owned and operated by an enemy of the U.S. has been discovered supporting enemy military operations within the AOR. The JFC determines that the elimination of this support is critical to the success of his military operation.

Under the scenario above, there exists a military target that if neutralized would support an ongoing military operation. What should the effect be that the military desires to inflict on the target? Who should make that determination? The application of joint doctrine provides a clear answer to this question. JP 3-0 states, “The overarching operational concept in JP 1, *Joint Warfare of the Armed Forces of the United States*, is that the JFC integrates and synchronizes the actions of air, land, sea, space and special operations forces to achieve strategic and operational objectives through integrated joint

campaigns and major operations.”⁴ The theme of a single commander is clear throughout joint doctrine. Under the scenario described, the most appropriate location for weapons release authority to reside would be with the JFC or his designated representative.

There are instances when space targets might require that weapons release authority reside at a higher level. These instances include the targeting of neutral country or multinational consortium owned space systems. It is clearly possible in today’s world that an enemy of the United States could be using a satellite of a neutral country or a multinational consortium. In this case, the targeting of such a space system by the United States could have far reaching global effects. In these cases the potential diplomatic and economic repercussion against the United States may be so great that in order to protect U.S. interests the president rather than a military commander should retain weapons release authority.

The opinion of the author is that current joint doctrine reveals the answer of where weapons release authority should reside for all air, sea, and terrestrial targets a directed energy weapon could strike. The U.S. military destroys targets, such as tanks, building, bridges, planes, and ships during every conflict. The method of their destruction may vary greatly, from air attacks to ground forces, to armor or field artillery weapons.

What is consistent is that the JFC has the authority and responsibility to set target priorities. JP 3.01.5, *Doctrine for Joint Theater Missile Defense*, supports these facts. It states, “Component commanders plan, and execute JTMD operations under the guidance and in support of the objectives of the JFC. The JFC uses the joint force staff to plan, monitor, advise, and coordinate the overall operations.”⁵ While component commanders plan and execute the mission, the JFC J3 is responsible for establishing and prioritizing

JFC approved targeting guidance and objectives to include high priority targets, sensitive targets, and rules of engagement.⁶ JP 3-09, *Doctrine for Joint Fire Support*, provides additional support. It states, The JFC provides guidance on types of targets, priorities, and types of effect of fires on the enemy. Additionally, the JFC provides targeting guidance on munitions usage and restrictions.⁷ Similar to a missile defense operation, the JFC controls joint fires operations' targets and priorities. Subordinate units then execute the joint fires operations within the boundaries established by the JFC.

Joint doctrine is clear in the intent to provide the JFC all the authority required to accomplish the assigned task. Space weapons are just an additional capability at the disposal of the commander. Commanders currently destroy targets using the most effective means available to them. The use of directed energy space weapons against a terrestrial, air, or sea target is no different than destroying any of those targets with munitions in the current military arsenal. So long as the target is a legal target, as defined by the rules of engagement and use of the space weapon does not violate the rules of proportionality, the JFC should retain weapons release authority for space weapons against the target. There is no difference between using air, sea, ground, or space weapons to accomplish that destruction.

The JFC could delegate this authorization to an even lower level as is currently done with air operations. While the JFC retains command of the force, he assigns responsibility for planning and day-to-day operations to whichever service has the preponderance of aircraft. Because of this, the JFC normally selects the senior Air Force commander as the joint forces air component commander (JFACC), in charge of flying operations. The JFC could apply a similar principle to space operations and space

weapons. In this case the JFC selects a single space representative to plan and conduct operations with space weapons.

Analysis of Kinetic Energy Weapons

Kinetic energy (KE) weapons are the second group of weapons that the author will analyze. Figure 2 is a graphic representation of the methodology applied by the author.

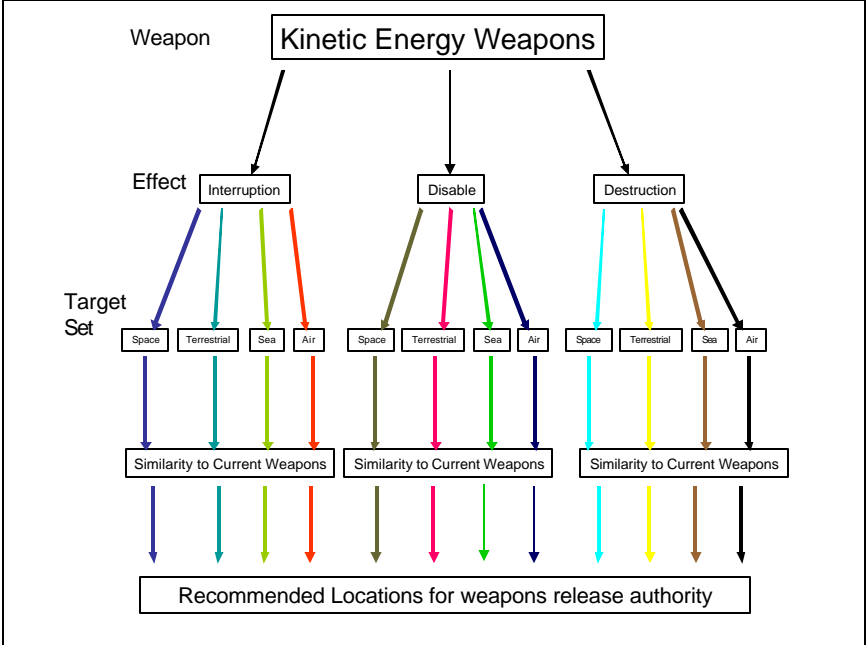


Figure 2: Kinetic Energy Weapons Methodology

The effects of kinetic energy weapons are proven but limited due the nature of the weapon. Both the United States and the USSR have demonstrated kinetic energy antisatellite (KE-ASAT) weapons technology.⁸ USSPACECOM currently identifies KE-ASAT technology as a candidate technology for accomplishing negation of enemy

satellites.⁹ Additionally, U.S. Army Space and Missile Defense Command have tested, and plans further testing on KE-ASAT technology. Kinetic energy weapons function by delivering significant mass to the target. In nonprofessional terms, KE weapons destroy things by running into the target. Due to this fact KE weapons are not suitable to cause the effects of interruption or disable, without destroying the target. Therefore, the author will only consider destruction as an effect of KE weapons.

The second factor is the target sets. The literature review revealed numerous types of targets. In *Space Weapons Earth's Wars* Bob Preston states, "Suitable targets would include tall buildings, missile silos, ships and hardened aircraft shelters but not runways; deeply buried bunkers; bridges, and long low buildings."¹⁰ He further states that KE weapons could potentially intercept ballistic missiles as they traverse through space. In order to remain consistent, the author will use the same four groups of targets for kinetic energy weapons as was used for directed energy weapons.

Similar to directed energy weapons, targeting space targets with kinetic energy weapons presents the most complex situation. Since kinetic energy weapons can only destroy the target rather than provide other less lethal effects, the potential negative impacts to the U.S. are increased.

The analysis of kinetic energy weapons will utilize the same scenario provided early: A satellite owned and operated by an enemy of the U.S. has been discovered supporting enemy military operations within the AOR. The JFC determines that the elimination of this support is critical to the success of his military operation.

Joint Doctrine remains unchanged when the type of weapon changes. The overarching operational concept in JP 1, *Joint Warfare of the Armed Forces of the United*

States, is that the JFC integrates and synchronizes the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated joint campaigns and major operations.¹¹ The theme of a single commander is clear throughout joint doctrine.

The concerns relating to targeting of neutral country or multinational consortium owned space systems are even greater. This is because the only effect that the weapon can achieve is the physical destruction of the target. The destruction of a neutral country or multinational consortium owned space systems, even one providing support to U.S., adversaries could have far-reaching global effects. The potential diplomatic and economic repercussion against the U.S. may be so great that weapons release authority of U.S. space weapons against these targets requires it to reside at a level higher than the JFC.

The same principle of destroying air, sea, and terrestrial targets that a kinetic energy weapon could strike are somewhat different from those addressed in the direct energy weapon analysis. The difference is the method by which the weapon destroys the target. KE weapons destroy the target, by slamming into the target. This method of destruction increases the potential of collateral damage when using kinetic energy weapons. While this fact alone does not change the location of weapons release authority, it is a fact that requires consideration. The laws of war require that the level of destruction or force be proportional to the situation or target. As long as the KE weapon does not violate the principle of proportionality, then joint doctrine should be the primary basis for determining the location of weapons release authority.

Joint doctrine clearly identifies the need for a single location of command responsible for the overseeing all aspects of military operation. Joint doctrine does not change based on the type of weapon being employed rather it remains consistent and focused on a synchronized operation.

Analysis of Conventional Weapons from Space

Conventional weapons are the last group of weapons the author will analyze.

Figure 3 is a graphic representation of the methodology applied by the author.

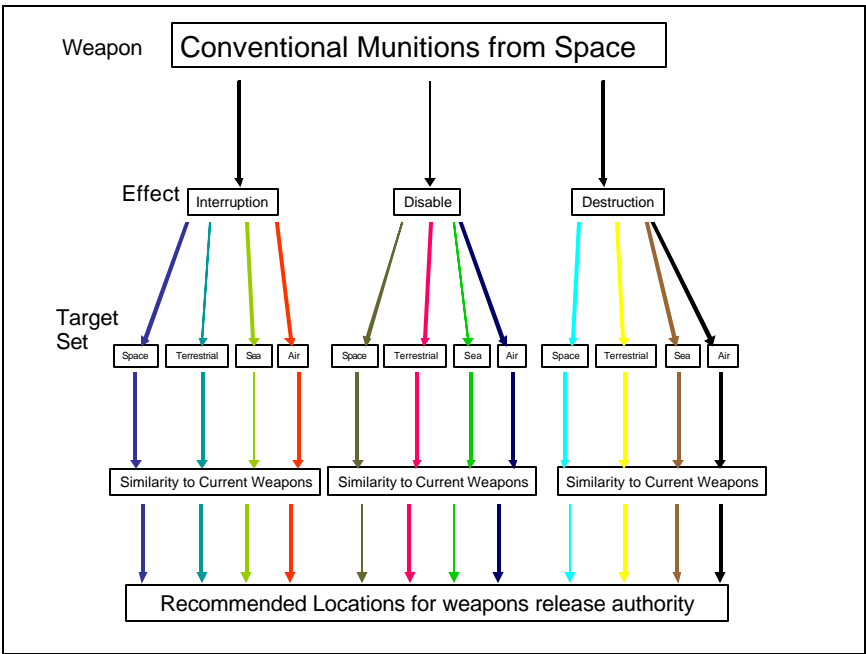


Figure 3: Conventional Weapons Methodology

The effects of conventional weapons are proven but limited in nature due to the restriction of placing nuclear weapons in space. This fact does not limit the potential

effects of conventional weapons; therefore, the author will consider all the effects listed in table 1.

The second factor is the target sets. The literature review revealed numerous types of targets. In *Space Weapons Earth's Wars*, Bob Preston states, "The targets for this class of weapons depend on the capability of the conventional munitions delivered to the proximity of their target."¹² This means that the capability of the munitions on board will determine the potential target sets. Since these are space-based weapons, changing munitions would be extremely difficult. Preston further identifies this type of weapon as "focused on targets fixed on the ground or moving slowly enough that they would not escape the footprint of the cluster of weapons aimed at them."¹³

The analysis of conventional weapons utilizes the same scenario provided earlier: A satellite owned and operated by an enemy of the U.S. has been discovered supporting enemy military operations within the AOR. The JFC determines that the elimination of this support is critical to the success of his military operation.

As with directed and kinetic energy weapons targeting space targets with conventional weapons present the most complex situation. Since changing munitions is extremely difficult obtaining a desired effect would depend on the proximity of a weapon with that particular capability to the target. Despite this challenge, the same principles of joint doctrine previously presented would still apply.

The concerns relating to targeting of neutral country or multinational consortium owned space systems are the same. As previously discussed, the destruction of a neutral country or multinational consortium owned space system could have far reaching global effects. The potential diplomatic and economic repercussion against the United States

may be so great that weapons authority of U.S. space weapons against these targets should not reside at the JFC level.

The factors concerning the destruction of air, sea, and terrestrial targets by a conventional weapon are similar to those addressed during the analysis of direct energy weapons. The difference is the method by which the weapon destroys the target. The same principles would apply from joint doctrine.

¹ Bob Preston, et al., *Space Weapons Earth Wars* (RAND 2002), 25 [book on-line]; available from <http://www.rand.org/publications/MR/MR1209/>; Internet; accessed on 6 September 2002.

² *Ibid.*, 34.

³ Lt Col Michael R. Mantz, *The New Sword A Theory of Space Combat Power* (Maxwell Air Force Base, Alabama: Air University Press, May 1995), 41-49.

⁴ The Joint Staff, Joint Publication 3-0, *Doctrine for Joint Operations* (Washington, D.C.: U.S. Government Printing Office, 10 September 2001), II-4.

⁵ The Joint Staff, Joint Publication 3-01.5, *Doctrine for Joint Theater Missile Defense* (Washington, D.C.: U.S. Government Printing Office, 22 February 1996), ix.

⁶ *Ibid.*, II-3.

⁷ The Joint Staff, Joint Publication 3-09, *Doctrine for Joint Fires Support* (Washington, D.C.: U.S. Government Printing Office, 22 February 1996), I-2.

⁸ Roger C. Hunter, *A United States Antisatellite Policy for a Multipolar World* (Maxwell Air Force Base, Alabama: Air University Press, October 1995), 17-24.

⁹ U.S. Space Command, *Long Range Plan, Implementing USSPACECOM Vision for 2020* (Peterson Air Force Base, Colorado: U.S. Space Command, March 1998), 44.

¹⁰ *Ibid.*, 40-41.

¹¹ The Joint Staff, Joint Publication 3-0, *Doctrine for Joint Operations* (Washington, D.C.: U.S. Government Printing Office, 10 September 2001), II-4.

¹² Preston, et al., 45.

¹³ *Ibid.*, 45.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this thesis was to answer the question, Where should weapons release authority for space weapons reside? The analysis resulted in two possible locations. In the majority of instances, the authority should reside with the JFC. However, in limited instances the authority should reside with the president or his designated representative. The following summary and conclusions will explain how the author reached this outcome.

The author answered several questions in reaching this conclusion. The first question was, What is the target set of the weapons in question? Since there are currently no space-based weapons deployed, an analysis of emerging technologies and the potential target for these weapons was required. The list of potential targets was extensive and included tanks, troops, artillery, ships, submarines, aircraft, communication, transportation, energy systems. Also included were airplanes or cruise missiles in flight, above ground fuel tanks, missiles still on their launchers or transporters, fuel trucks, tall buildings, missile silos, ships, and hardened aircraft shelters, but not runways deeply buried bunkers bridges, and long low buildings. Different types of weapons were effective against different targets. In order to facilitate the analysis, the author grouped the potential targets into four groups based on location. These groups were space targets, air targets, terrestrial targets (surface and subsurface), and sea targets (surface and subsurface).

The second question was, Are the effects of the weapons permanent or temporary in nature? The answer to this question is both. The potential effects of the weapon are dependent both on the weapon and on the target. After completing the literature review regarding potential effects, the author grouped like effects together in order to streamline the research process. The effects and the definitions of those effects appear in table 1.

The third question was, Are there other weapons in the United States military inventory that provide a template for employment of space weapons? The answer was yes, and those weapons included joint missile defense and joint fires systems. The author also selected nuclear weapons, due to the destructive nature of the nuclear weapons and the current controversy surrounding weapons in space. Nuclear weapons have long been one of the most closely controlled weapons in the military inventory. In the author's judgment the inclusion of nuclear weapons enhances the analysis process by forcing a comparative analysis against the most destructive weapon in the military arsenal. The three systems selected formed the baseline against which the author would compare space weapons, the target sets, and the effects.

The final question was, What joint doctrine if any, currently addresses the employment of space weapons? Currently no joint doctrine addresses the employment of space weapons. JP 3-14, *Joint Doctrine for Space Operations*, governs space operations, but does not address space weapons. It does assign responsibility to plan, direct, coordinate, and control space assets and forces to U.S. Space Command. U.S. Strategic Command recently assumed this authority when U.S. Space Command merged into USSTRATCOM. Both JP 3-0 and JP 1, reference space by stating that: "The JFC integrates and synchronizes the actions of air, land, sea, space, and special operations

forces to achieve strategic and operational objectives through the integrated joint campaigns and major operations.”¹ Joint doctrine provides the final and perhaps most critical piece to answering the thesis questions. Since almost all military operations are joint in nature the author’s judgment was that it was critical to the validity of the research that joint doctrine serve as the foundation for the research, this fact would avoid potential service biases and ensure the solution was relevant to current joint doctrine.

Location of Weapons Release Authority for Directed Energy Weapons

The conclusion of where weapons release authority should reside for directed energy space weapons resulted in two locations. The two locations are the Joint Force Commander for all air, sea, and terrestrial based targets and for space targets own by enemy forces. For space targets that are owned by a neutral country or multinational consortium the weapons release authority to target these types of space targets would reside with the president.

The author based these conclusions on three facts. First and most important is joint doctrine. In every instance except for nuclear weapons which the author researched joint doctrine, repeatedly emphasized the importance of a single commander responsible for the integration, synchronization, deconfliction, prioritization, and control of weapons systems. Joint doctrine repeatedly identifies the JFC as the commander responsible for accomplishing these tasks.

The second fact was that joint doctrine, outlining operations of current weapons, such as missile defense and joint fires systems, assigned responsibility to the JFC for controlling and employing these systems.

The last fact is space weapons offer no significant deviation from the weapons systems the U.S. military employs today. The location of weapon is different, but the target sets and potential effects are consistent military weapons in use today.

The targeting of space assets owned by neutral countries or multi-national consortium companies is the noted exception to these facts. Targets of this type present a new area of targets. While the space asset may be supporting enemy operations, a neutral party may in fact own it. The destruction of such a target could have implications to the United States that are well beyond those of traditional military targets. These implications require that U.S. treat these types of targets with extreme caution.

Since the destruction of the space target set is outside the realm of traditional military targets and the potential impact to the U.S. so great, the author selected the current weapons systems, with the most stringent control. Nuclear weapons remain under the control of the president. The global impact and destructive nature of the weapons are such that while combatant commanders control the planning for the employment of these weapons the authorization for the use of them resides with the President.

The destructive effects of a directed energy space weapon may not equal the destructive force of nuclear weapons; however, the destruction of a neutral countries or multi-national country's space asset could result in negative world opinion similar to using nuclear weapons. Therefore, the U.S should use the same weapons release authority.

Location of Weapons Release Authority for Kinetic Energy Weapons

The conclusion of where weapons release authority should reside for kinetic energy space weapons resulted in two locations. The two locations are the JFC for all air,

sea, and terrestrial-based targets and for space-based targets own by enemy forces. For space-based targets that are own by a neutral country or multinational consortium the weapons release authority to target these types of space targets would reside with the president.

These conclusions are consistent with those reached in the analysis of directed energy weapons. The destruction of air, sea, and terrestrial targets are common place in military operations. Kinetic energy weapons merely provide the commander additional choices to consider.

The same concerns are present when considering the destruction of space targets and more stringent control measures are required in order to protect America's national interest. Kinetic energy weapons are only capable of destroying a target. Just as with directed energy weapons the use of kinetic energy weapons against a neutral country or multinational consortium owned space assets could have dramatic impact on America. Therefore, the U.S. should apply the same controls previously recommended for control of directed energy weapons.

Location of Weapons Release Authority for Conventional Weapons

The conclusion of the analysis for where weapons release authority should reside for directed energy space weapons resulted in two locations. The two locations are the JFC for all air, sea, and terrestrial based targets and for space-based targets owned by enemy forces. For space-based targets that are owned by a neutral country or multinational consortium the weapons release authority to target these types of space-based targets would reside with the president.

Conventional weapons, by the very fact they exist in the military's arsenal, made this the most straightforward conclusion. As previously, stated joint doctrine is clear in its requirement for a single commander of forces and resources. Conventional weapons currently fall under the control of the JFC, and nothing in joint doctrine or the research conducted revealed to the author a need to change this fact. Firing the weapon from space does not affect the weapon or its capability. Concerns regarding striking space targets are the same as previously discussed.

Further Research

Areas that need further research are:

1. How the emergence of space weapons will effect the possible development of a separate space force. An analysis of the emergence of air power and the rise of the Army Air Corps could serve as a foundation against which to conduct the comparison.

2. The composition and location of space weapons constellations. The research could address the number, type, and orbits of the weapons to determine what would best meet the needs of the United States.

3. The impact of transferring space operations functions to U.S. Strategic command will influence future space operation. While space operations lose or gain creditability, focus, or importance due the change.

4. How to best integrate space weapons into the joint targeting process. How and at what level are fires de-conflicted and coordinated. What impact will space weapons have on current targeting processes?

5. Consider whether space weapons will trigger a separate Revolution in Military Affairs.

6. Research what, if any, types of weapons in the current military arsenal will be obsolete because of space weapons. Would space weapons replace existing airborne, ground or sea based platforms?

Conclusion

The answer to where should weapons release authority for space weapons reside is in most cases the JFC. Although space weapons are new, the U.S. should treat them like other weapons in the military arsenal and place them under the control of the JFC, in support of military operations. In instances when the target is a space target belonging to a natural country or multinational consortium, the authority should reside with the president, due to the potential negative implications to U.S. national interests.

¹ The Joint Staff, Joint Publication 3-0, *Doctrine for Joint Operations* (Washington, D.C.: U.S. Government Printing Office, 10 September 2001), II-4.

BIBLIOGRAPHY

Articles

- Graham, John, F. *Space Exploration From Talisman Of The Past To Gateway For The Future* (John Graham, 1995) [article on-line]; available from http://civiliancomms.tripod.com/spacecomms/space_exploration/; Internet; accessed on 5 October 2002.
- Mehuron, Tamar A. "Space Almanac," *Air Force Magazine Online Journal of the Air Force Association* 84, No. 8. (2001): 30.
- Diedrich, John. *General Oversees Nation's Satellites*. The Colorado Spring Gazette In *U.S. Plans For Wars In Space News and Headlines ARSPACE Public Affairs*,. (Colorado Springs, Co: August 23, 2002). [article on-line]; available from <https://www.armyspace.army.mil/news/>; Internet; accessed on 1 October 2002.

Books

- Gallegos, Frank. *After the Gulf War: Balancing Space Power's Development*. In *Beyond the paths of Heaven The Emergence of Space Power Thought*. Maxwell Air Force Base, Alabama: Air University Press, September 1999.
- Grabbe, Crockett L. *Space Weapons and the Strategic Defense Initiative*. Ames, Iowa: Iowa State University Press, 1991.
- Grossman, Karl. *Weapons in Space*. New York. Seven Stories Press, 2001.
- Johnson, Dana J., Scott Pace, and C. Bryan Gabbard. *Space Emerging Options for National Power*. Washington, D.C.: RAND National Defense Research Institute, 1998.
- Preston, Bob, Dana J. Johnson, Sean Edwards, Jennifer Gross, Michael Miller, and Clavin Shipbaugh. *Space Weapons Earth Wars*. (RAND 2002), [book on-line]; available from <http://www.rand.org/publications/MR/MR1209/>; Internet; accessed on 6 September 2002.
- Lupton, David E., Lt Col, USAF. *On Space Warfare: A Space Power Doctrine*. Maxwell Air Force Base, Alabama: Air University Press, June 1998.
- McDougall, Walter A. ...*The Heavens and the Earth: A Political History of the Space Age*. New York: Basic Books, 1985.
- Spires, David N. *Beyond Horizons A Half Century of Air Force Space Leadership*. Maxwell Air Force Base, Alabama: Air University Press, 1998.

Stares, Paul B. *The Militarization of Space: US Policy, 1945-1984*. Ithaca, New York: Cornell University Press, 1985.

Waxman, Matthew C. *International Law and the Politics of Urban Air Operations*. Washington, D.C.: RAND, 2000.

Wilson, Tom. "Threats to United States Space Capabilities." In *Report of the Commission to Assess United States National Security Space Management and Organization. Appendices: Staff Background Papers*. Washington, D.C.: Department of Defense Studies, 2000.

Government Documents

Bush, George, W., Jr., President of the United States, National Security Strategy Washington, D.C.: Joint Session of Congress, 20 September 2001.

De France, Linda. "Sen. Smith Lambastes AF lack of Support for Space Power," Aerospace Daily, May 15 2000, In *The Military Use of Space: A Diagnostic Assessment* Washington, D.C.: Center for Strategic and Budgetary Assessments, February 2001.

Department of the Air Force. AFDD 2-2, *Space Operations*. Washington, D.C.: U.S. Government Printing Office, November 2002). Document on-line. Available from: <http://www.e-publishing.af.mil/pubfiles/af/dd/afdd2-2/afdd2-2.pdf>; Internet. Accessed on 1 October 2002.

Department of the Army. FM 100-18, *Space Support to Army Operations*. Washington, D.C.: U.S. Government Printing Office, July 1995.

Department of Defense. Directive 3100.10 *Space Policy*. Washington, D.C.: U.S. Government Printing Office, 9 July 1999, 5-7 [article on-line]; available from <http://www.fas.org/spp/military/docops/defense/dodspcpolicy99.pdf>; Internet; accessed on 5 October 2002.

_____. *Joint Vision 2020*. Washington, D.C.: U.S. Government Printing Office, June 2000.

Hunter, Roger C. *A United States Antisatellite Policy for a Multipolar World*. Maxwell Air Force Base, Alabama: Air University Press, October 1995.

Mantz, Richard, R., Lt Col. *The New Sword A Theory of Space Combat Power*. Maxwell Air Force Base: Air University Press, May 1995.

The Joint Staff. Joint Publication 1-02, *Dictionary of Military and Associated Terms* (as amended through 14 August 2002). Washington, D.C.: U.S. Government Printing Office, 12 April 2002. Document on-line. Available from http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf. Internet. Accessed on 1 October 2002.

_____. Joint Publication 3-0, *Doctrine for Joint Operations*. Washington, D.C.: U.S. Government Printing Office, 10 September 2001.

_____. Joint Publication 3-01.5, *Doctrine for Joint Theater Missile Defense*. Washington, D.C.: U.S. Government Printing Office, 22 February 1996.

_____. Joint Publication 3-09, *Doctrine for Joint Fires Support*. Washington, D.C.: U.S. Government Printing Office, 22 February 1996.

_____. Joint Publication 3-12.1, *Doctrine for Joint Theater Nuclear Operations*. Washington, D.C.: U.S. Government Printing, Office 9 February 1996.

_____. Joint Publication 3-14, *Doctrine for Space Operations*. Washington, D.C.: U.S. Government Printing Office, 9 August 2002.

Shalikashvili, John, GEN, USA. *National Military Strategy: Shape, Respond, Prepare Now—A Military Strategy for a New Era*. Washington, D.C.: 7. [document on-line]; available from <http://www.dtic.mil/jcs/mns/strategi.htm>; Internet; accessed on 29 October 2002.

United Nations. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*. Office for Outer Space Affairs. Vienna, Austria: October 1967. [article on-line]; available from: <http://www.oosa.unvienna.org/SpaceLaw/outerspt.htm>; Internet; accessed 10 October 2002.

U.S. Space Command. *Long Range Plan, Implementing USSPACECOM Vision for 2020*. Peterson Air Force Base, Colorado: U.S. Space Command, March 1998.

Watts, Barry D. *The Military Use of Space: A Diagnostic Assessment*. Center for Strategic and Budgetary Assessments, Washington D.C. February 2001.

Zielinski, Robert H., Lt Col, Lt Col Robert M. Worley II, MAJ Douglas S. Black, MAJ Scott A. Henderson, and MAJ David C. Johnson, *Air Force 2025, Star Trek—Exploiting the Final Frontier: Counterspace Operations in 2025*. August 1996. [article on-line]; available from <http://www.fas.org/spp/military/docops/usaf/2025/v3c9/v3c9-1.htm>, Internet; accessed on 29 October 2002.

Other Sources

Hunter, Roger C. *A United States Antisatellite Policy for a Multipolar World*, Maxwell AFB, Ala.: Air University Press, October 1995.

INITIAL DISTRIBUTION LIST

Combined Arms Research Library
U.S. Army Command and General Staff College
250 Gibbon Ave.
Fort Leavenworth, KS 66027-2314

Defense Technical Information Center/OCA
825 John J. Kingman Rd., Suite 944
Fort Belvoir, VA 22060-6218

Major Keith L. Phillips
DJMO
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

Mr. Jefferson H. Barker
DJMO
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

Colonel (Retired) Jack D. Kem
DJMO
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

CERTIFICATION FOR MMAS DISTRIBUTION STATEMENT

1. Certification Date: 6 June 2003

2. Thesis Author: Major Charles T. Anderson

3. Thesis Title: Where Should Weapons Release Authority Reside For Space Weapons?

4. Thesis Committee Members: _____

Signatures: _____

5. Distribution Statement: See distribution statements A-X on reverse, then circle appropriate distribution statement letter code below:

(A) B C D E F X SEE EXPLANATION OF CODES ON REVERSE

If your thesis does not fit into any of the above categories or is classified, you must coordinate with the classified section at CARL.

6. Justification: Justification is required for any distribution other than described in Distribution Statement A. All or part of a thesis may justify distribution limitation. See limitation justification statements 1-10 on reverse, then list, below, the statement(s) that applies (apply) to your thesis and corresponding chapters/sections and pages. Follow sample format shown below:

EXAMPLE

<u>Limitation Justification Statement</u>	<u>/</u>	<u>Chapter/Section</u>	<u>/</u>	<u>Page(s)</u>
Direct Military Support (10)	/	Chapter 3	/	12
Critical Technology (3)	/	Section 4	/	31
Administrative Operational Use (7)	/	Chapter 2	/	13-32

Fill in limitation justification for your thesis below:

<u>Limitation Justification Statement</u>	<u>/</u>	<u>Chapter/Section</u>	<u>/</u>	<u>Page(s)</u>
_____	/	_____	/	_____
_____	/	_____	/	_____
_____	/	_____	/	_____
_____	/	_____	/	_____
_____	/	_____	/	_____

7. MMAS Thesis Author's Signature: _____

STATEMENT A: Approved for public release; distribution is unlimited. (Documents with this statement may be made available or sold to the general public and foreign nationals).

STATEMENT B: Distribution authorized to U.S. Government agencies only (insert reason and date ON REVERSE OF THIS FORM). Currently used reasons for imposing this statement include the following:

1. Foreign Government Information. Protection of foreign information.
2. Proprietary Information. Protection of proprietary information not owned by the U.S. Government.
3. Critical Technology. Protection and control of critical technology including technical data with potential military application.
4. Test and Evaluation. Protection of test and evaluation of commercial production or military hardware.
5. Contractor Performance Evaluation. Protection of information involving contractor performance evaluation.
6. Premature Dissemination. Protection of information involving systems or hardware from premature dissemination.
7. Administrative/Operational Use. Protection of information restricted to official use or for administrative or operational purposes.
8. Software Documentation. Protection of software documentation - release only in accordance with the provisions of DoD Instruction 7930.2.
9. Specific Authority. Protection of information required by a specific authority.
10. Direct Military Support. To protect export-controlled technical data of such military significance that release for purposes other than direct support of DoD-approved activities may jeopardize a U.S. military advantage.

STATEMENT C: Distribution authorized to U.S. Government agencies and their contractors: (REASON AND DATE). Currently most used reasons are 1, 3, 7, 8, and 9 above.

STATEMENT D: Distribution authorized to DoD and U.S. DoD contractors only; (REASON AND DATE). Currently most reasons are 1, 3, 7, 8, and 9 above.

STATEMENT E: Distribution authorized to DoD only; (REASON AND DATE). Currently most used reasons are 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

STATEMENT F: Further dissemination only as directed by (controlling DoD office and date), or higher DoD authority. Used when the DoD originator determines that information is subject to special dissemination limitation specified by paragraph 4-505, DoD 5200.1-R.

STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals of enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25; (date). Controlling DoD office is (insert).