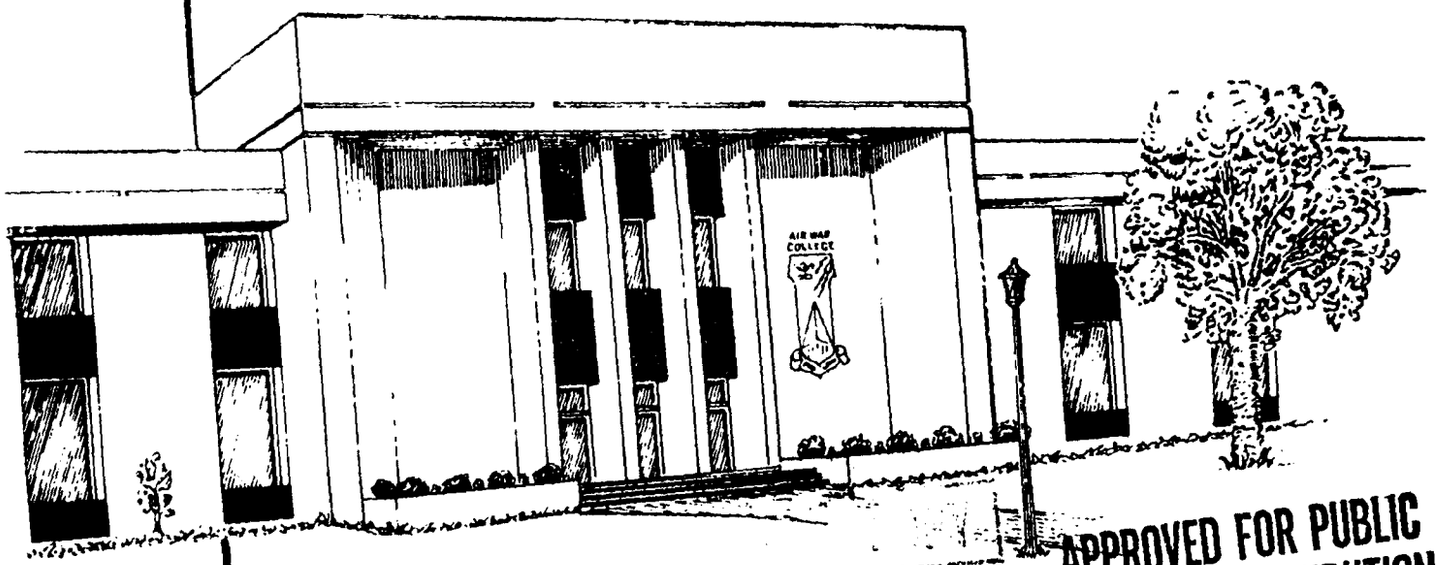
AIR WAR COLLEGE

RESEARCH REPORT

SPACE DOCTRINE

LIEUTENANT COLONEL GARY A. CHILCOTT

1990



AIR UNIVERSITY
UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

AIR WAR COLLEGE

AIR UNIVERSITY

SPACE DOCTRINE

by

Gary A. Chilcott
Lieutenant Colonel, USAF

A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Colonel Eric Sundberg

MAXWELL AIR FORCE BASE, ALABAMA

May 1990

DISCLAIMER

This study represents the views of the author and does not necessarily reflect the official opinion of the Air War College or the Department of the Air Force. In accordance with Air Force Regulation 110-8, it is not copyrighted but is the property of the United States government.

Loan copies of this document may be obtained through the interlibrary loan desk of Air University Library, Maxwell Air Force Base, Alabama 36112-5564 (telephone [205] 293-7223 or AUTOVON 875-7223).

EXECUTIVE SUMMARY

TITLE: Space Doctrine AUTHOR: Gary A. Chilcott, Lieutenant Colonel, USAF

United States military space activities have been guided by policy and technological decisions since the 1950s because little work has been done to develop and articulate coherent space doctrine. In December 1988, the Chief of Staff of the Air Force and the Secretary of the Air Force signed a new Air Force space policy which stated that spacepower would assume as decisive a role in future combat operations as airpower does today. Since doctrine represents our fundamental beliefs based on our experience, it is essential that the military formulate space doctrine so it may evolve as experience is gained in space operations. This paper looks at several space doctrinal tenets and discusses their applicability. It also points to some of the obstacles that have precluded space doctrinal development. It concludes with ideas for the future in developing a space doctrine.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Gary A. Chilcott has been associated with space operations since 1983 after a flying career as an F-4 Weapon Systems Officer in TAC, USAFE, and PACAF in a number of squadron, wing and staff level assignments. As a member of the Office of the Joint Chiefs of Staff, J-5 Plans and Policy Directorate, he served as a Space and Strategic Defense planner. Following this he was assigned to the Long Range Planning Division at Headquarters, Air Force Space Command, and was directly involved in formulating the issues which led to the CSAF Blue Ribbon Study on the future of the Air Force in space. Prior to his assignment to the Air War College he served as Executive Officer to the Commander, Air Force Space Command.

TABLE OF CONTENTS

DISCLAIMER ii

EXECUTIVE SUMMARY iii

BIOGRAPHICAL SKETCH iv

Chapter

I. INTRODUCTION 1

II. SPACE DOCTRINE TENETS 4
Principles of War 4
Space Force Employment 12
Warfighting Foundation 13
Integration of Space Forces 15
Balanced and Consistent Capability 16
Interrelationships 19
Conclusion 21

III. IMPEDIMENTS TO DOCTRINE DEVELOPMENT . . 23
Fragmentation 23
Policy 31

IV. PROBLEMS WITH EXISTING DOCTRINE . . . 37
Knowledge of War 37
Jointness 39
Technology 40
Current Space Doctrine 41

V. SHAPING FUTURE DOCTRINE 47

VI. CONCLUSION 51

BIBLIOGRAPHY 52

CHAPTER I

INTRODUCTION

Over half a century ago Giulio Douhet stated that anyone considering land and sea operations of any importance must of necessity remember that above the land and the sea is the air.(3:2-1) What Douhet also knew, but did not consider, is that above the air is space and, as air has influenced and been decisive on the battlefield, so will space impact the battlefield of tomorrow. It is only a question of time, technology, and vision. During World War II General Hap Arnold stated that we should keep our doctrines ahead of our equipment so as not to delude the nation into a false sense of security.(1:1-4) Unfortunately the DOD and the Air Force have been slow in developing space doctrine primarily because of costs, technological uncertainty and how best to operate in terms of our national security interests. Therefore the focus of this paper is to develop those fundamental beliefs based upon experience which should be used to develop doctrine.

Both the former Secretary of the Air Force, Mr. Edward Aldridge and the Chief of Staff of the Air Force, General Larry Welch, concluded on 29 August 1988, that spacepower will assume as decisive a role in future combat operations as airpower does today.(8:1) Both stated that the Air Force must make a corporate commitment to integrate space operations into the fabric of the existing Air Force. What led our leadership

to draw these conclusions is the ever increasing dependence our terrestrial forces have on space and the significant amount of the Air Force budget supporting space operations. Given the evolution of space systems, the senior Air Force leadership has articulated an important doctrinal tenet that should be included in space doctrine.

Some would say today there is a doctrinal void in space and that the Air Force, the DOD, and the nation are suffering as a result. If the CADRE definition of doctrine is accepted as representing what we believe to be the best way to do things based on an analysis and interpretation of our experience, then what are our beliefs about space? Dr. Richard Hallion has stated that producing doctrine is tough because it must "function in the present, be appropriate for the future, possess flexibility and adaptability to meet changing conditions, and be rooted in the past".(34:26) Space doctrine must meet the same criteria, however little has been achieved. To develop space doctrine is beyond the scope of this paper, however, the space arena has progressed far enough to distill its history, evaluate the present, and make sound estimates of the future. What's important is to pull together those space beliefs so they may evolve as have other doctrinal issues.

The following fundamental beliefs are provided as a basis for future space doctrine: (1) Understanding space warfare is critical. Despite unique operating characteristics of the

space environment, the traditional principles of war apply to space forces. The principles of war serve as guidelines for military forces and are the basis for military doctrine. (2) Space force employment is unique. Space is not an extension of the air, just like the sea is not an extension of the land. (3) Space warfighting principle are essential. The emphasis on space exploration and exploitation for peaceful purposes has obscured the US national security space role. (4) The integration of space forces with terrrestrial forces is necessary for success in warfare. There are no separate space missions in themselves. Space forces assist and improve the terrestrial warfighter. (5) A balanced and consistent space capability is necessary to ensure US and allied national security. (6) Partnerships and alliances are critical to global stability and future space force development.

CHAPTER II

SPACE DOCTRINE TENETS

In the absence of viable space doctrine, military space requirements have been driven by technological availability and policy statements. Fundamental doctrine should not only be what we believe based on experience, but also set the stage and provide a framework for operating space forces. This chapter supports those tenets introduced in the first chapter.

Principles of War

Military beliefs of what space warfare is and will be like must be the basis for space doctrine. The principles of war serve as guidelines in which military forces, including those in space, act.(3:2-4) While the space environment possesses unique operating characteristics apart from the land, sea, and air, the traditional principles of war continue to apply. While spacecraft are generally unmanned and operate autonomously, they are not maneuverable in a classical sense. Characteristics of air, such as speed, range, and flexibility as described in AFM 1-1, do not have the same significance in space. More appropriate characteristics of our space forces contain more global themes, such as continuousness, pervasiveness, and timeliness.(49:195) Satellites are predictable, efficient, operate under all conditions, and are always present. The following principles of war are discussed in relation to their contributions to space.

Objective

To conduct war one must have a clearly defined objective. Clausewitz stated "the first, the supreme, the most far reaching act of judgement that the commander must make is to establish the kind of war on which they are embarking..." (17:88) Sun Tzu emphasized the importance of knowing and shaping the enemy "his primary target is the mind of the opposing commander".(32:41) Air Force doctrine states that "the most basic principle for success in any military operation is a clear and concise statement of a realistic objective".(3:2-5) What is the military objective in space? Most would agree it is to preserve free access to space for peaceful purposes by the military and civilian sectors. Can this be done without space weapons and is it realistic? Another source indicates the Air Force objective is assured mission capability. Still others would list the primary objective as support to terrestrial forces from space and operation of a responsive launch infrastructure? Objectives must be realistic, attainable, and understood by everyone. Currently the US principle objective is to increase the effectiveness and efficiency of terrestrial forces.

Offensive

Historically the offensive has been the prerequisite for winning wars. Clausewitz stated "the main feature of the offensive is the outflanking or by-passing of the defender, i.e. taking the initiative".(17:530) Sun Tzu discussed the

offensive as defeating the enemy in detail.(32:69) The Army's AirLand Battle emphasizes the tenents of agility, initiative, depth, and sychronization to gain the offensive. The Navy's Maritime Strategy is offensive--forward deploy and take the war to the enemy ports. Similarly space doctrine must emphasize the offensive to be decisive. First, it represents the high ground. Sun Tzu said "ground which both we and they can traverse with equal ease is called accessible. In such ground he who takes high sunny positions...can fight advantageously ...an army prefers high ground to low...". (32:124/117) Because space represents the ultimate high ground, there is great leverage in controlling space. This applies not only to surveillance and monitoring enemy activity, but also in force projection from space where directed and kinetic energy systems are being evaluated for potential future employment.

Economy of Force

Economy of force simply means to expend no more resource or effort than is needed to accomplish an objective, i.e. don't overkill in terms of coverage or capability.(3:2-7) This principle is especially applicable to space systems where high costs to launch have driven the Air Force to design multi-purpose, longer lasting and enduring space systems. The Soviets, in contrast, launch more frequently because their systems have shorter lifespans and are single mission satellites in lower earth orbits. While the US concentrates

on larger, multi-mission systems it does not rule out smaller, single purpose cheaper satellites for theater commander use in a crisis.(26:223) Finally, economy of force could be demonstrated using space weapons.

Mass

Mass is the ability to concentrate force at the time and place of choosing to achieve victory.(3:2-7) Again Sun Tzu states "that numbers alone do not confer an advantage...do not advance relying on sheer military power".(32:122) Mass represents a capability applied at a precise time to achieve superiority, and not necessarily the traditional view of putting objects in close proximity to overwhelm an inferior force.(26:222) Space objects do not echelon like ground forces or fly formation like air forces, however space forces can be concentrated for better support of terrestrial forces. The Soviets demonstrated this principle during the Falklands Campaign when they launched additional reconnaissance satellites to support the Argentines.(41:275) Another example of mass involves possessing a reserve force to spare damaged satellites. Spares are an integral part of the US space capability.

Maneuver

Maneuver is the ability or flexibility to place an enemy in a position of disadvantage and allow you to withdraw your own force when overwhelmed.(3:2-7) Sun Tzu devoted a whole essay to maneuver and stated "War is based on deception...

move when it is advantageous and create changes in the situation by dispersal and concentration of force".(32:106) There is no argument that, in general, spacecraft are not maneuverable in a physical sense--i.e. they cannot turn or move easily. According to Sun Tzu, however, maneuver is also deception. Turning off and on a spare satellite is a form of maneuver to deceive. Dispersal of satellites throughout a wide array of orbits for better ground coverage, while in higher altitudes for survivability, is a form of maneuver. In addition, technology is improving propulsion systems and the potential of on-orbit refueling will increase spacecraft flexibility, scope, and range of operations.

Unity of Command

This principle directs a unity of effort under one commander. The recurring theme of present doctrine is centralized control and decentralized execution.(3:2-10) This concept is essential to the effective employment of space forces. Because of the global nature of these forces, their piecemeal or divided employment would result in degraded operations. Satellite constellations, whether for surveillance, navigation, or communication, collectively have a capability that generally cannot be earmarked for one particular area for a prolonged period of time. Again General White said some thirty years ago. "once we attain a space capability, a lack of centralized authority would certainly hamper our use of space and could be disastrous in time of

war".(2:10) Lieutenant General Henry, former Space Division Commander stated that one of the most important aspects of all space systems is that they service more than one user.(36:38) The US unified command with its service components are providing a unity of effort, and many believe will be the organizational structure that evolves into a separate space force.(38:74) When that occurs will be determined by how quickly the military exploits the space control and force application mission areas. The current organizational relationship is that the functional CINC for space ensures that space forces operate for the theater CINCs.

Security

Current doctrine describes security as "protecting friendly forces and their operations from enemy actions which could provide the enemy unexpected advantage".(3:2-6) Security is another imperative for space forces. There are two elements of security: security to terrestrial forces, i.e. denying information useful to the enemy and gaining information about the enemy and physical security of the spacecraft.(26:225) Once again the high ground enables a nation to gain large amounts of information about the enemy, including possible hostile intentions and provide increased warning. In contrast, physical security measures for space systems include hardening, proliferation, and deception. Hardening enhances survivability but increases weight which reduces fuel and increases the cost of replacement.

Proliferation complicates the enemy's targeting problem, while deception prevents the enemy from precisely locating the target. Negating a satellite does not necessarily mean killing it with a weapon, since electronically, satellites are extremely fragile. Additionally, ground stations that provide telemetry, tracking, and commanding can be destroyed, eliminating any continuity of operation.

Surprise

Current doctrine defines surprise as "the attack of an enemy at a time, place, and manner for which the enemy is neither prepared or expecting an attack".(3:2-6) One historian states that surprise is influenced most by secrecy, deception, and speed.(20:205) Sun Tzu says "appear at places to which he must hasten; move swiftly to where he does not expect you".(32:96) Secrecy could deceive the enemy of one's actual capability. Current space systems are always present but may not always be tracked or operated. On orbit spares could be activated in conflict and provide information to users within hours. Ultimately space weapons could be employed against a target minutes after directed by the NCA. Space weapons shift the potential balance of power dramatically because of their precision and timeliness. (31:234)

Simplicity

This principle refers to avoiding unnecessary complexity in preparing, planning, and conducting military operations.

(3:2-7) Space systems operate autonomously 24 hours a day and currently provide information to support the battlefield. However, as dependency upon future space systems increases, simple back-up plans must be developed.(20:207) Operational techniques must be developed to salvage constellations, employ spares, and launch new systems when needed. Highly technical and complex systems do not necessarily require complex operational procedures. In addition, as space systems are integrated into warfare, C3 and timing of force application will become critical.

Logistics

This is defined as sustaining men and machine in combat by obtaining, moving, and maintaining warfighting potential.(3:2-8) Logistics is the long pole in the space tent. There is limited launch, no refueling or on-orbit repair capability, and limited retrieval of malfunctioning satellites because of the cost to launch and maintain a retrieval system (the Shuttle has retrieved spacecraft only in low earth orbit).(26:226) Built-in redundacy and meticulous accuracy in design have precluded component failure and ensured high reliability rates. In most cases our satellites operate beyond their life expectancy. New technologies must focus on improved methods of logistics support of space systems so problems with highly complex satellites can be repaired rather than retired.

In conclusion the principles of war apply to our space

sytems and must be the fundamental basis for understanding warfare. In several cases, such as in mass and maneuver, the different operating characteristics of the space medium do not negate the principle. In these cases the principle is merely applied in a different way.

Space Force Employment

Space is not an extension of the air, just like the sea is not an extension of the land from a military force employment perspective. In analyzing AFM 1-1 one author reported that "...space capabilities are incorrectly derived by applying the term aerospace to what is an otherwise comprehensive airpower doctrine".(49:194) Both the air and space are distinct and separate mediums that possess certain advantages and disadvantages in military conflict. Another author has stated that " physical characteristics of space are at least as distinct from the air as the air is from the land and the sea...space is not a continuation of the air warfare environment but a separate military dimension".(35:47)

Fundamental to any discussion of space is the issue of whether space is a place, i.e. another dimension of warfare, or a mission. Air Force Chief of Staff General Thomas D. White described space as a place when he coined the word aerospace in the late 1950s. In testimony before the House Committee on Science and Astronautics he stated " air and space comprise a single continuous operational field in which the Air Force must continue to function. This area is the

aerospace...".(28:552) Doctrinally, the Air Force followed with this statement in AFM 1-2 "the aerospace is an operationally indivisible medium consisting of the total expanse beyond the earth's surface".(1:6) Some critics have held that the context of these statements surrounded land-based ICBMs, weapons that would transit space. While ICBMs may have provided the means for putting a satellite into orbit and opened the door for space development, other visionaries foresaw the space medium saturated with spacecraft. From another viewpoint space could have remained in limbo, since there was uncertainty about the medium, high costs and the nuclear mission dominated Air Force thinking.

The difficulty with White's premise about the indivisible aerospace medium is that it attempts to merge two mediums with different characteristics. Speed, range, and flexibility versus global coverage, continuousness, and autonomy are brought together under the term aerospace(46:210/49:195). General Herres, first commander of Unified Space Command, argued that "space is not a mission...(but) a place from which and within which military missions are carried out". (38:74) This argues strongly for the need for a space doctrine which describes the environment, capability, and characteristics of space forces.(58:187)

Warfighting Foundation

Space is not and never can be a military only environment, both from a US and free world perspective.

Complications and competing interests in space from the civil, commercial, and intelligence community, besides allied and non-allied nations, will place limitations and restrictions on any future battlefield in space.(31:233)

Space forces contribute toward US national security objectives of deterrence and flexible response. While historically there has been considerable emphasis on space for peaceful purposes and scientific and technical exploration, one cannot downplay the important of space forces to the US national security. Ultimately the accomplishments in civil and commercial programs and in allied space programs, is a direct result of the investment in space for national security purposes. Space forces contribute to deterring conflict just as nuclear and conventional terrestrial forces do, and if deterrence fails the US must be able to both project power, if necessary, or defend and protect its space forces.(16:61)

Following the Soviet Sputnik achievement the early formulation of US space policy focused exclusively on the passive military benefits of space.(59:47) Repeated efforts by the armed forces to support space weapon projects, anti-satellites, and ballistic missile defenses were shelved by top officials. In the late 1950's Generals Schriever and White discussed the importance of space superiority, "...in the future whoever has the capability to control space will likewise possess the capability to exert control over the earth..."(28:551) This early discussion of space control led

to rationale for an ASAT. However strong the military pushed for ASAT weapons, President Eisenhower did not advocate ASATs because he believed they would lead to space warfare.(59:52) The issue of space sovereignty was at stake and Eisenhower had the vision to preserve it. Non-aggressiveness in space was and is still fundamental to US space objectives.(63:1) One need only review the eight principles of the latest National Space Policy to replay this familiar theme.

Integration of Space Forces

There are no separate space missions in themselves. General Herres has stated that the mission is not space, but to accomplish specific tasks in space related to our national defense.(38:70) Space forces are developed and deployed to help accomplish or enhance existing combatant commanders and Service terrestrial missions. This is consistent with the long standing thrust of space for peaceful purposes. Space is a provider of information. For space systems to achieve their potential, they must be fully integrated into the present force structure.

Space forces, while global and autonomous, must be fully integrated with existing and proposed force structure of all services and allies to be effective. Because US political, economic, and military vital interests are spread throughout the world, space forces take on increasing importance for their warning, communication, and surveillance capabilities.

While the warfighting mediums (air, land, sea, and space)

are distinct, it does not mean that certain types of forces only operate in that medium. Forces should interact throughout each medium in a complementary manner. In addition, individual military services do not have sole responsibility for operation in a particular medium. While the Air Force possesses the majority of the air and space infrastructure, doctrinally they should not claim that operating medium.

In the 1980s, the Services began to focus on space integration. The Air Force formed a major command for space in 1982, followed by the Navy in 1983, and the Army Space Agency in 1985 (the Army would activate a command in 1988). These commands were primarily responsible for identifying space requirements and conducting space system operations. The organizational centerpiece for space forces was formed in late 1985, when the US Unified Command for Space was created, giving space a CINC. With the subsequent thrust of the Goldwater-Nichols Defense Reorganization Act, space became synonomous with warfighting. This new role made the component commands more than managers of data. They became directly responsible to the CINC, by law, to provide forces for space warfare.

Balanced and Consistent Capability

A balanced space capability is a prerequisite to mission success. To conduct effective military space operations rests solely on accomplishing the function of space support, i.e.

launch and satellite control.(55-10) US launch capability must be able to go when required, not when scheduled. A recent article on an effective space doctrine stated that "...very likely an operational doctrine would have as its highest priority the development of a reliable, responsive, flexible, on-demand access to space".(47:34) General Piotrowski has stated that space sytems need to be responsive. "In war, things will be consumed and the side that can replenish losses will be the side that can retain an advantage".(55:336) Space control is the next priority because of the imperative to protect the US space investment. In 1959, General White said that "As we progress into space, I feel sure that our capability to control space will assure freedom of movement on the surface of the earth and throughout the earth's atmosphere".(28:599) Accomplishing space support and space control effectively permits uninterrrupted force enhancement and force application.

A balanced and consistent capability is also affected by the threat changes in the Soviet space program which caused indecision in the US space program. While the Soviets had developed and successfully tested an ASAT, testing was halted in 1971. Whereas the US focused on the Soviets directly attacking US and allied satellites, the Soviets began to use space to increase their own warfighting and crisis reaction capability.(43:12) Both in Czechoslovakia and Chinese border hostilities, the Soviets were now concentrating on photo

reconnaissance satellites to monitor the conflict.(59:141) In 1973, in the Arab-Israeli War, Soviet reconnaissance satellites were maneuvered to capture critical terrestrial events. While this change mirrored the US approach, Soviet space systems were much more responsive.(59:141)

Other causes for imbalance included cancellation of the Manned Orbiting Laboratory and a change to larger, more capable, multiple functioning, longer lasting satellites.(29:681) This was driven in part by the high cost of launching satellites. Since NASA was finished with the drive to the Moon, they turned to fix the launch dilemma and in 1972, amid heavy Congressional lobbying, won approval and funding for the Space Transportation System. For the DOD, new military space programs could be pursued only when particular mission functions could be shown to be more cost beneficial than other methods.(59:159)

In the 1980s the Soviet space challenge continued to grow. The Soviets, who possessed more active satellites than the US, were actively exercising their space doctrine, that is multiple launches, quick turn around times, and direct space support to theaters in conflict.(41:274) The new National Space Policy held that space systems of any nation are national property and have the right of passage through and operation in space without interference. Interference with space systems would be viewed as an infringement on sovereign rights.(63:4)

In January 1986, the loss of the Space Shuttle Challenger severely set back the US space program. The US dependence on the Shuttle to launch DOD satellites created a backlog that will run into the mid 1990s. Development of a family of launch vehicles was determined by the Secretary of the Air Force as essential to an assured access to space.(21:2)

Interrelationships

The US cannot take a 'go it alone' attitude concerning global and regional space security, because the costs of getting into space just are not coming down. Space has made a big world small and permitted us to know more than we probably wanted to know about each other. Space provides information quickly and accurately. This information leads to decisions about forces, the environment, and governmental relationships. Space alliances and treaties will be necessary from a political, economic and military standpoint. Politically, alliances provide solidarity and strength to improve the state of world affairs. Economically, space alliances assist the burden sharing of small countries gaining a space capability. Militarily, alliances bind together forces for mutual security at a reduced price tag. Militarily, space systems provide indications and warning of threat activity worldwide. This information could and has been used to combat global problems such as drugs and terrorism. This exchange of information must continue to grow.

Over the years the US has shared technology with its

allies. This has come in the form of free launches for other nations' satellites and most recently in the foreign launch of a US satellite (Chinese CSS-4 launch of a US commercial satellite on 7 April 1990). Some joint ventures have strained relations, such as the US-European effort to jointly explore the solar system, delayed because of the Shuttle. There have also been concerns over the equality of effort toward the Spacelab project and considerable difficulty in coming to grips over the technology exchange concerning the Strategic Defense Initiative (SDI) program. While sharing is important, it must be done cautiously.

Another concern is the avoidance of an arms race in space. In 1967, the Outer Space Treaty was a most significant global action to ban weapons of mass destruction from space. Article III stated "all parties shall carry on activities in the exploration and use of outer space in the interest of maintaining peace and security".(40:205) Article IV called on "all parties to refrain from placing in orbit around the earth or stationing in space nuclear weapons or any other kinds of weapons of mass destruction".(40:205) It also prescribed an international forum for any nation that feels threatened from space.

Contributing to reduced space activity were the SALT I and ABM arms control agreements. SALT I specifically forbode interference with National Technical Means (NTM) which many interpreted as a ban on ASAT activity.(59:165) The ABM Treaty

provided significant restrictions in that parties could not develop, test, or deploy ABM systems or components which are mobile land, sea, air, or space based. Agreed Statement D in a follow-on 1973 Protocol to the Treaty restricted "ABM systems based on other physical principles".(40:206) This was interpreted to mean lasers, particle beams, or electromagnetic waves, however the term other physical principles is an area of debate as technology opens new possibilities.

While no subsequent treaties directly affecting the space environment have occurred, potential arms agreements in strategic forces and European conventional forces are on the horizon. The implications for treaty monitoring and verification through national technical means will greatly impact global space resources.

Conclusion

Within DOD, any discussion of space warfare must be grounded in the principles of war. US space history reflects goals and initiatives predominately for peaceful purposes. Fear of an arms race and fear of militarization of space has influenced the direction of US national security programs from the beginning.

Space warfare must also include the premise that space is not an extension of the air, but a separate operating environment with distinct characteristics. It is essential that the idea of applying air characteristics to space be carefully scrutinized in space doctrine.

Finally, to describe space as a warfighting medium one must recognize the existence of civil and commercial spacecraft, the integration of space forces with terrestrial forces, the need for a balanced and consistent capability, and the importance of future global interrelationships.

The following chapter will look at impediments to military doctrine development.

CHAPTER III

IMPEDIMENTS TO DOCTRINE

Fragmentation

There is considerable historical evidence that indicates the US space program was fragmented from its inception. While the difficulties bear resemblance to the strife incurred by military air pioneers in establishing a separate Air Force, the space story is far more complex and convoluted. Colin Gray has stated that until the 1980s the US did not have anything that resembled a military space program. (31:233)

After World War II and into the 1950s, there emerged two space efforts--a military and intelligence effort and a scientific and experiment-oriented effort.(27:9) The military initiative had few supporters, since satellites were new systems and not weapons, they did not compete favorably for funding. The Services were also reluctant to invest in space research and development because they could not forecast where the space mission would ultimately reside. Too large an investment in uncertain space technologies was considered reckless. To further squelch military play in space, the national security advisors to President Eisenhower argued for peaceful exploration of space, which initially precluded using ICBMs as space launch vehicles.(59:35)

While President Eisenhower had picked the scientific path, the Soviet launch of Sputnik I on October 1957 altered

that path. This single event was good and bad. It provided new impetus and funding for the US program, but it also created pressure for the United States to accelerate its fledgling space effort.(29:594) What had been forming as an orderly dual-track transition to space, now had become emotion-filled with "beat the Russians" and "America can't be second rate" slogans. The public was alarmed that the USSR had surpassed the US in getting into space. As Dr. James Killian, Special Assistant to the President for Science and Technology stated, "Sputnik I created a crisis in confidence that swept the country like a wind blown forest fire."(42:7) He goes on to say that there was a widespread fear that the country lay at the mercy of the Russians and that our government had lost the power to maintain leadership in the international arena.(42:7) The real truth was that our nation could have been in space up to two years earlier had it not been for national policy and inter-service rivalry.

The Soviet success forced the US to redress its space priorities and goals.(27:8) With a near crisis in public perception, the services were ready to forge ahead with their space initiatives. At the same time, however, the civilians put forth strong pressure to form a separate civilian space agency which would promote space exploration for peaceful purposes. President Eisenhower wanted the DOD to be the centerpiece for our nation's space program, but he did not want a single service to take the lead in space and did not

want a civilian agency formed.(59:41)) Growing public dissent and Congressional pressure finally forced the Chief Executive to surrender and NASA was formed in April 1958.

The difficulty in this civilian-military approach is that it did not possess any integrated goal--sort of a weapon fired at too many targets. Dr. John Logsdon of the National Space Foundation, points out in his book Decision to Go to the Moon, that the primary foci of congressional concern during the hearings (on NASA) were the interaction between civilian and military space efforts; freedom of DOD to engage in military oriented space research, and the lack of a mechanism for overall policy for the space effort.(44:23) It appears there was more concern over dividing the roles, the missions, and the budget, rather than genuine concern over the issue of national security.

The final wording of the National Aeronautics and Space Act on 2 April 1958, set the stage for space "disagreements" in subsequent decades. Section 102 stated that "space activities shall be the responsibility of and shall be directed by a civilian agency...except activities peculiar to or primarily associated with the development of weapon systems, military operations, or the defense of the United States (including research and development) which shall be the responsibility of the DOD".(29:598) What started as NASA in a secondary role doing basic research now clearly put them in the driver's seat for space activities. It appeared that DOD

would not regain space preeminence unless NASA's role was redefined or a space war occurred. This situation would lead to bitter interdepartmental battles over future roles and missions.(29:599)

Within the DOD several initiatives were underway. Space projects were initially assigned to a newly created Advanced Projects Research Agency (ARPA) to prevent duplication of effort.(27:8) Subsequently ARPA was redefined to conduct basic research and space projects were given back to the services. In mid 1959, the Chief of Naval Operations suggested a unified command for space, but it was rejected because there were no space missions yet and joint control over proposed space systems was not deemed smart.(29:594) Later that year a centralized office outside of DOD was created to manage the satellite reconnaissance program. This would further split DOD space involvement.

During the next decade there followed more restructuring. Fear of engaging the Soviets in a space arms race, President Kennedy and DOD initiated a space "blackout" to protect the fact that the US received reconnaissance information from satellites. (27:9) This event began a series of international discussions with the Soviets and the United Nations over sovereignty and rights of passage in space. It also separated the space reconnaissance activity from the other military communications and surveillance efforts. (59:69) Finally, the blackout created sharp imbalances in funding between DOD and

NASA, creating more civilian autonomy by undercutting the military claim to the space mission.

The "blackout" by President Kennedy also denied the military the ability to debate space activity in public. Openness fosters technological competition and increases public awareness and confidence. Secrecy contributed to further dividing the US program. Dr. Harold Brown outlined the space building block approach "...engage in a broad program covering basic building blocks which will develop technical capabilities to meet many possible contingencies". (29:603) Others defined the approach as gaining technical insurance, so the US doesn't get caught by surprise.(59:76) While this thinking opened doors to develop a robust space capability, the varied efforts did not produce the best results.

By the mid 1960s, the Secretary of Defense had given authority to each Service to pursue space research and development activities, including options for an ASAT interceptor.(12:262) Since this reversed the US space policy of peaceful exploitation of space, it put the Services and NASA in competition for a manned space mission. Despite limited finances, this initial ASAT program failed because the Air Force did not define the program objectives. Confusion reigned as to roles and missions. The Air Force claimed a manned space mission as a necessity for offensive space weapons, however the Secretary of Defense argued "we do not

clearly see a military requirement for men in space".(25:229) This push-pull relationship denied the Air Force a clear path to pursue its space program and formulate doctrine. While DOD was allowed to develop the Thor and Nike Zeus programs under ASAT auspices, it ended up being a hollow program with severe operational and technical restraints.(59:81) Finally it was decided that nuclear explosions in space would do as much damage to our satellites as the Soviets and these efforts were abandoned. In conclusion, despite an offensive thrust the primary goal returned to maintain space for peaceful means.

Throughout the 1970s the US dependence on satellites continued to grow. With this dependence, space system survivability became an imperative. In 1971, the Soviets had declared their capability with a co-orbital ASAT and suspended testing. In 1976, when the Soviets resumed testing of their ASAT, the issue over whether the US also needed an ASAT capability was revitalized.(12:264) Given budgetary instability, ASAT was not a top DOD concern.(50:5) The DOD attitude was summarized by the Undersecretary for Defense Policy "...we in the DOD are not clear in our own minds what to do ... it has never been clear to us that we ought to go out and develop a system that costs hundreds of millions of dollars".(50:15)

This ambiguity on the part of the DOD resulted in President Ford directing a dual track approach--develop an ASAT while working an ASAT arms control agreement.(27:9) DOD

wanted to focus less on ASAT and more on satellite survivability. They rationalized this approach as consistent with US national space policy which avoided aggressiveness in space. However Congressional interpretation was that DOD was not stepping up to the threat "...the USSR had seized the new initiative and created a new dimension for military conflict...war in space".(13:44) Low budgets, lack of research, and in general a mixed review over the threat all contributed toward little ASAT enthusiasm.

On a broader canvas there were bureaucratic and organizational problems. The senior officers in the Air Force were upset because they did not have the space mission completely. The sharing of space with the Intelligence Community, the other services, NASA, and the commercial segment intensified the rivalry. In addition there was no single proponent in the Air Force which advocated space systems. (59:176) Users had requirements in communication, navigation, and surveillance, but other than the research and development community, no operator carried the effort. Since satellite data would benefit everyone, there needed to be a focal point.

By the 1980s further fragmentation in structure and organization would occur. In 1981, President Reagan asked the National Security Council to review the US national space policy and address both the military and civil issues. Specific points he wanted resolved were launch vehicle needs,

shuttle responsibilities and capabilities, adequacy of our national and civil programs, and the future of ASAT.(60:36) What resulted was a stronger, more determined national space policy. ASAT arms control was rejected and replaced with ASAT deterrence. 'Fight and prevail' in both a nuclear and conventional war were recurring themes. The new policy even decribed projection of force from space as viable, which legitimized weapons technology efforts and space systems to ensure free access to and from space.(12:264) Even the strategic modernization program included added emphasis and reliance on space assets.(59:178)

Another organizational initiative was the Strategic Defense Initiative (SDI), started in 1983. The Presidential guidance was to explore the feasibility of those technologies which would ultimately render ballistic missiles obsolete. As the SDI Office was formed the Services viewed this new organization as threatening to the research and development programs within each of the Service POMs.(29:701) Centralizing these technologies would make them an easier Congressional target. At the same time the Services were skeptical of the power of this new organization, reporting directly to the Secretary of Defense and the President. SDI was a thorn in the Services side detracting from terrestrial force structure like 40 Tactical Fighter Wings and 600 ship Navies. The JCS only mildly embraced the initiative.

In summary, it is clear that space organizations evolved

based on unstable relationships and uncertainty over organizational roles between military and civilian needs. While military centralization improved, there still persisted a we-they confrontational outlook between services and between the DOD and NASA over the US future in space.

Policy

The problem is not confusing or inarticulate US policy, it is the proliferation of space policy. In the last decade there have been seven policy pronouncements with the last occurring on 2 November 1989. This latest US national space policy reaffirms the previous policy statements. Added emphasis is given the civil and commercial sectors, i.e. develop Space Station Freedom and the lack of federal subsidies to the commercial space segment.

The goals of the US space policy were as follows: (1) Strengthen US security, (2) Exploit scientific and technical benefits to improve our quality of life, (3) Encourage US private sector investment in space activities, (4) Foster international cooperation and work with other nations to make space free for all, and (5) Extend human presence throughout the Solar System.(63:1) The eight principles of the new policy continue to reinforce the "space for peaceful purposes" theme and acknowledge the contributions that the civil and commercial sectors make toward the US space program. The principles also restate the right of passage through space without interference, the inherent right of self-defense, and

the rejection of any nation's right to claim sovereignty over outer space.(63:9)

Four of the eight principles discuss commercial applications and international participation. Current national thinking emphasizes space for peaceful purposes and is vague on exploitation of space for military needs. General Piotrowski, USCINCSPACE, in testimony before the Senate Appropriations Committee in May 1989 said, "The US military space structure has evolved with a peacetime orientation. This must change. Our warfighting commanders require a space force structure which is oriented towards support of combat operations".(55:11)

Looking further into US space policy the national security guidelines are shallow as compared to the civil and commercial portions. The words are tough but fiscally irresponsible. For example, "The DOD will develop, operate, and maintain an assured mission capability...".(63:9) To accomplish this they discuss a mix of robust satellite control, assured access, proliferation, on-orbit sparing, and reconstitution. One must ask when was the last time these particular attributes of our space systems were accomplished? The result is that policies, while goal oriented, are not realistic or necessarily executable within existing budgets.

There are additional concerns with our current policies. Within the four functions decribed in our National, DOD and Air Force space policies, should not the following questions

be asked? Is assured access to space consistent with only an East and West launch facility? How does the US achieve freedom of action in space without an ASAT capability?

What about the space support and force enhancement aspects of US National Space Policy--the linchpins of the current force structure. Today the launch and control of satellites primarily enhance the effectiveness of the terrestrial forces. These are clearly supportive roles, and not recognized as combatant roles per se. No satellite has yet put bombs on target, but they have assisted in deploying and employing combat forces. This begs the question on the proper orientation of the space role. Is it destined for a support function only?

Former Secretary of Defense Carlucci stated in 1988 that "space systems are no different than other military systems; their effectiveness as a deterrent is directly proportional to their value in combat".(16:61) However, Colin Gray has stated that nothing coming from space is a showstopper for our terrestrial forces.(31:238) Some make distinctions between direct combat force, combat support, and combat service support. Traditionally, funding profiles champion the offensive system, that directly produces firepower. The supporter is normally relegated a subserviant role and competes unfavorably for funds.

Several versions of DOD Space Policy have emerged during the past decade, changing whenever a new National Space Policy

was issued. The DOD policy generally views space as a medium to conduct military operations.(21:4) It emphasizes control of space as essential to conducting force enhancement and force application capabilities. The bottomline is that consistent with National Space Policy, it overstates our space commitment and our capability.

Air Force Space Policy was released in December 1988, as a by product of the Air Force Blue Ribbon Panel on Space which reexamined the role of the Air Force and its commitment to the future of space. This policy is based on the premise that spacepower will be as decisive in future combat as airpower is today.(8:1) Both the Chief of Staff of the Air Force and the Secretary of the Air Force stated that spacepower would evolve from combat support (current capability) through the full spectrum of military capabilities (implying space weapons).(8:1) Finally, both indicated that the Air Force needed to make a corporate commitment to integrate space throughout the Air Force.

The Air Force reaffirmed the force enhancement and space support roles by stating it will continue to acquire, operate, and provide forces to support the terrestrial forces including space based wide area surveillance.(8:2) It should also continue its role as provider of launch and on-orbit support to military space systems. The Air Force policy commits heavily to space control and force application, however USCINCSPACE in Congressional testimony lists both of these

functions as having serious shortfalls.(55:6-10) Even the current Secretary of the Air Force, while an advocate of our space programs, has focused principally on those space programs that include surveillance, reconnaissance, and intelligence gathering.(47:36) He reasons that in an uncertain and unstable future, we should concentrate on keeping track of both world actions and intent. USCINCSPACE and the Air Force leadership would argue that space systems can leverage conflict with far greater potential than existing terrestrial systems, and that in an uncertain and unstable world a balance of space systems in all four functional areas could lead to increased stability.(57:18)

Further, the Air Force states that it must achieve assured mission capability through a balance of survivability, flexibility, responsiveness, logistics support, and strong research and technology programs.(8:1) There is no sanctuary is space. Satellite vulnerability and survivability have been major issues for DOD since the early 1970s.(59:141) USCINCSPACE recently challenged the lack of launch responsiveness and depth by stating, "too few on-orbit reserves, too few ground spares and excessive replenishment times".(58:336) Dr. Rice, the Secretary of the Air Force, has stated that "space assets will have to give users service on demand".(7:1) Logisticians describe their challenges as on-orbit servicing and assembly, reparable versus expendable spacecraft, and integrated logistics ideas. Most logisticians

put emphasis on the space station, an orbital manuevering vehicle and the National Aerospace Plane--all at least a decade away.

In summary, National, DOD and Air Force space policies offer goals at best and contribute little toward doctrine. There are significant gaps between realistic missions and capabilities of the present space forces. While policy should not drive doctrine, it should be fundamentally consistent with what is believed about space force capability.

CHAPTER IV

PROBLEMS WITH EXISTING DOCTRINE

Difficulties with our basic Air Force Doctrine are, to a large part, responsible for the absence of a coherent space doctrine. Fundamentally, Air Force basic doctrine has not provided the foundation and direction to build a space doctrine. This chapter discusses three elements lacking in basic aerospace doctrine: knowledge of war, jointness, and technology.

Knowledge of War

Since 1943, Air Force doctrine has changed very little. Considering the number of conflicts, wars of national liberation, change in economies and cultures, technological progress, and policy changes, this is alarming. Dr. Robert Frank Futrell believed Air Force doctrine in 1955 began to go stale in the very years in which dynamic studies were needed to integrate new aerospace ideas.(29:714) Couple this with a rigid doctrinal theme that prescribes airpower as self fulfilling and decisive in conflict only if centrally controlled by an airman, and one begins to see the difficulty. While this concept forged the way for an independent airpower service, it has contributed little toward providing thought provoking concepts or the best way to develop other doctrines.

The specific difficulty is that basic doctrine does not describe the how and why of warfare, but merely the what of

warfare. Aerospace doctrine should be based on war and the cumulative effects of battle on the forces.(24:45) As a foundation basic doctrine should be what works best. Instead basic doctrine provides generalizations without causes, definitions without explanations, and abstractions without examples. Basic doctrine provides little useful guidance to a commander to organize, train, or equip his forces. Statements such as "air commanders employ forces IAW doctrine that dictates their most effective use....apply doctrine with judgment ... tailor your actions to specific situations and objectives" are vague and of little value.(3:2-3) To resolve this problem, basic doctrine should describe what war is and why it is unique. To build tools of war, airman must understand the danger, uncertainty, and chance in war. One historian stated that the fundamental thinking of US aviators about the air weapon is flawed by the inability to "nurture a comprehensive understanding of war as a total phenomena". (64:63) He concludes by saying that unless we develop a better understanding of war, he questions our ability to adapt to the security needs of the late 20th Century.(64:117)

Another problem is the mechanistic approach to conflict. Without concrete examples of space warfare, military planners have sought quantifiable and logistical solutions to wage war. During the 1960's the Air Force embraced the systems engineering approach by Secretary of Defense McNamara more wholeheartedly than the other services. Engineering and point

solutions would counter the threat as opposed to an organic, whole mission approach. The Air Force was considered the technical service.(53:28) One author stated that "war is fundamentally a human phenomena, a matter of emotion, aspiration, exertion, and suffering". He further states that though physical and statistical factors play a role in determining conflict outcome, war ultimately comes down to a contest of knowledge, intelligence, willpower, and human endurance.(64:105)

Basic doctrine is also shallow and undeveloped. One author has stated that Air Force doctrine is stagnating because it has not moved beyond its traditional fixed wing missions.(34:26) Hadley, in The Straw Giant, has suggested it is because airpower is detached from killing--we don't see the battlefield firsthand.(33:66) Applying his theory to space detaches one from the battlefield even further. In short, understanding war in its totality, its aims, its nature, and the environment is essential to formulating doctrine.

Jointness

Based upon the conflicts of the 1980's, such as Urgent Fury, El Dorado Canyon, Earnest Will, and Just Cause, the conflicts of the future will comprise joint operations. However, there is limited joint doctrine and existing service doctrine makes few references to jointness. Current Air Force doctrine states "as a critical element of the interdependent land-naval-aerospace team, aerospace power can be the decisive

force in warfare".(3:2-4) But at what cost and how severe the consequences? What mediums possess capabilities to do the job of war better and more efficiently? The Air Force has forged joint linkages within the air portion of aerospace, but not with space forces.

Future conflicts will be successful only if the various air,land, sea, and space forces are sychronized. A recent article on Joint Operations states that "jointness signifies that in modern warfare there are no such things as discrete air, land, sea, or space wars".(22:5) Moreover, jointness really means that a specific theater cannot win the war all alone.

Technology

Current doctrine does not put technology and doctrine into any particular relationship. However history reveals instances where superior technology in and of itself did not translate to a decisive advantage.(5:45) Of course there are examples where it did, like the radar in World War II and the jet in Korea.

The key is not in the technology but how one uses it. (23:17) Both doctrine and technology are dynamic processes that continuously interact. In World War I, technology outstepped doctrine when the machine gun stalemated the western and eastern fronts. However the tank did not negate the machine gun until doctrinally the infantry and artillery were coordinated with the tank movement.(34:32) Until space

systems are integrated with terrestrial forces doctrinally, technically superior space forces will continue to sit on a separate shelf, waiting for doctrine to catch up.

Technology must be understood to be effective. While entering space over 30 years ago, it took until 1971 for doctrine to define the Air Force role in space and until 1979, to actually state a space mission (which was retracted in the next version) It appears the Air Force is more comfortable supporting space technically rather than doctrinally. The problem with space assets is they are survivable, autonomous, and generally reliable, but, like the repeating rifle in the Civil War, tank in World War I and the P-47 in World War II, are not fully understood by the people of their time. The doctrinal stagnation has slowed the military space program. It is imperative that doctrine provide direction along the technological path.(34:27)

Current Space Doctrine

AFM 1-6, published in 1982, was the first and only attempt at space doctrine. Most would agree it is dated, inaccurate, and actually a compilation of factual statements versus fundamental beliefs. Several find it useful as a "primer". In defense of the original authors in 1982, it wasn't a bad document--short, easy to read and understand, and most important, it increased awareness of the space dimension. Basic doctrine was under revision and most believed that the efforts of AFM 1-6 would be incorporated into a future, more

prophetic version of AFM 1-1.

AFM 1-6 never evolved because it was not doctrine when it was published. At best, AFM 1-6 was a temporary document that compiled a few policy statements, some space characteristics, and several Air Force responsibilities. It read more like a directive, i.e. "you will" and not "we believe". Several other problems contributed to this doctrinal malaise.

First, Air Force Basic Doctrine did not step up to the task of truly incorporating space, either in substance or mission. It was still air doctrine overstamped with the word aerospace. The Air Force is at fault here, since numerous directional signals were flashing to properly recognize space throughout the 1980s. The formation of space commands in all the services to focus space advocacy, the President's announcement of the Strategic Defense Initiative, renewed discussion of a unified command for space, creation of a joint planning staff for space within the OJCS, momentum in the civil and commercial sectors, rising space budgets, to name a few. Unfortunately space was viewed as a competitor against air resources and not a frontline contributor toward national security. Space stood without any firm doctrinal tenets (recall 1-6 was a primer at best).

Second, the real difficulty in developing space doctrine lies in the term aerospace, who controls it and whether it is really an indivisible entity? In 1959, General White argued that the aerospace is an operationally indivisible medium

above the earth's surface.(1:1) But like those air pioneers arguing for a separate air arm, White could have been arguing for Air Force dominance in the space mission? Remember that ICBMs dominated their thinking--missiles which would transit space. Ballistic missiles would become part of a nuclear doctrine, not a space doctrine.(29:712)

In today's environment of jointness, interservice cooperation and balance, one cannot simply coin the term aerospace and claim victory for the Air Force. Today, the majority in the military still view space as outside the warfighting medium, i.e. space is the Shuttle (despite the presence of a warfighting CINC). At best, space is viewed in terms of how it can support the terrestrial forces--where the real fight still is.

Third, asking the same air-type questions in the space context is not a good starting point. It is unimportant to concentrate on the unique characteristics of space, but rather to emphasize what space systems can accomplish across the conflict spectrum. Colin Gray discusses the battlefield in space as an area of increasing exploitment.(31:238) The more importance placed on space, and it appears we will, the more strongly the enemy will try to deny spacecraft freedom of passage.

Schools of Thought

During the last decade much discussion has revolved around Lupton's four schools of doctrinal thought--sanctuary,

survivability, control, and high ground as a basis for space doctrine.(46:209) While they are not the only schools of thought on space, they conveniently bridge the spectrum from peace to war.

The sanctuary school maintains that space is a war-free sanctuary and that the value of space forces is in their ability to preclude global nuclear war by seeing within the boundaries of sovereign states.(46:210) This school is deeply rooted in the theme "space for peaceful purposes" which is a principal pillar of our current national space policy. Most of our current space force structure closely mirrors this school--communications, navigation, surveillance, and imagery capability for national security *but also for* civil, commercial, and business needs in a closer, cooperative world. The limitations of space as a sanctuary cannot account for the growing dependence of the world on space-based systems. (46:212) It ignores the Soviet ASAT capability and believes that space systems need no protection. This school has no argument against those that would say vulnerability invites aggression. Space is a beneign environment and to place spacecraft which control or apply force for military ends will militarize space and ultimately lead to war.(46:212)

The survival school moves away from the far left and acknowledges space wars because space sytems are inherently vulnerable. They believe one must hold enemy systems at risk and be able to respond in kind. Since space systems are not

maneuverable, they would avoid multi-mission and clustering of satellites. Fundamental to this school is that since space systems may not survive conflict, one should not totally rely on them. However, the critic of this school points out that space systems have never been attacked, despite the absence of a space system deterrent.(46:213)

The control school views space warfare similar to air warfare, in that the first consideration is to achieve space superiority to assure uninterrupted support to our terrestrial forces.(46:214) Whoever controls the space also controls the terrestrial conflict. Along with sea and air control, space control is an imperative to deter war. An ASAT capability is necessary to control space. Space control battles may not be decisive in the context of a total war, only turning points. The significant limitation to this school is that the US does not possess any capability to control space. Others also see supporters of this school as creating a space arms race, costly to all nations.(46:215)

The last school is the high ground which believes wars will be won or lost in space because of the high value, high leverage space based BMD systems. With the deployment of defensive BMD systems, the center of gravity will shift away from terrestrial conflict. BMD systems will be used like a space blockade to protect friendlies and deny space replenishment to the enemy. The major limitation to this school is that it is expensive and futuristic.(46:217)

How do the schools of thought affect doctrine development? First, Lupton's schools do not get us any closer to space doctrine, because they only bound the spectrum of space force application. Most agree the US space capability never has, nor probably will, subscribed to one single school of thought. In short, these schools offer little help in stating what is believed about space and at best, offer a menu of items from which to choose.

Second, assuming one focuses on the control school, it is important to realize that control or superiority in space is a temporal thing. In space control, like sea control, it is a time-resource-space relationship and doesn't parallel the traditional Air Force view to control the air for indefinite periods of time over a theater or a region. Because of the nature and characteristics of space, one cannot control all orbits, at all times, at all altitudes. Therefore the notion of space superiority cannot be applied in an air context.

Third, Lupton misses the fundamental element of assuring a military capability to operate in space and that is having access in the first place. Without access as the pillar, the remaining space activity cannot be supported.

In short, to develop space doctrine one must abandon these schools of thought for a specific approach that represents a combination of these schools. Only in this way can progress be made in developing space doctrine.

CHAPTER V

SHAPING FUTURE DOCTRINE

This study began with the statement by the Air Force senior leadership that spacepower will be as decisive in future combat operations as airpower is today. To be decisive in combat, forces must embody the principles of war. The Presidential Commission on forming an integrated long term strategy has stated "DOD must give preference to more mobile and versatile forces--forces that deter aggression by their ability to respond rapidly and discriminately to a wide range of attacks".(18:5)

Future space doctrine must also be integrated within existing force structure. The authors of Discriminate Deterrence go on to say that any future doctrine must be an integrated one, not only looking at our space forces but how they integrate with our other combat forces including our allies.(18:7) They describe space forces as particularly suited for these future needs because of their worldwide reach, responsiveness, right of soverneignty, and ability to sustain themselves. In 1988, Secretary of the Navy Garrett stated "in the future, mobility and flexibility will be at a greater premium than ever, as we need to move swiftly, often in response to ambiguous warning. Support from space systems capable of global coverage will be crucial to our effectiveness..."(25:20)

Future doctrine should emphasize the offense-defense relationship. The nation and the military have progressed beyond Eisenhower's "open skies" and space for peaceful purposes approach. General Piotrowski gets to the point when he states that our space infrastructure does not meet future wartime needs. He appropriately describes the lack of an offensive capability to negate hostile activity and a lack of responsiveness and depth in our space support segment.(56:337) Another space advocate decribes the need to better articulate a coherent military strategy on space control, similar to the Army's AirLand Battle or the Navy's Maritime Strategy. (12:258)

Military space doctrine should also emphasize development and concentration. The fledgling infrastructure has gaps in space surveillance and rebuilding a capable launch structure is critical. To deny an enemy the use of space and project power are axioms of future doctrine. History and tradition in our land, sea, and air systems has emphasized a robust and redundant capability. The US must approach space in the same way, i.e. building the infrastructure hard, reliable, and dependable. Thusfar space systems have not withstood the test of combat.

Simultaneously it is essential that doctrine highlight known space weaknesses--especially the areas that are exploitable. These range from space-based surveillance and tracking to better distribution of space data. Warning data

will be even more critical, particularly in light of a changing Soviet threat and the probability that forward basing of military assets will not always be a response option.

Doctrine of the 1990s must discuss how space systems will leverage future conflict in a multi-polar world it must be balanced and realistic in terms of capability. It must not be so far reaching that it pushes us off technological cliffs or overstates intentions.

The more global the strategy, the more important the use of space.(34:32) Just as the seas tied together the continents centuries ago, today space is tieing together the countries of the world in minutes not years.

US space forces represent a sizable investment of taxpayer dollars and there is a multitude of policies, strategies, plans and roadmaps which justify the acquisition and procurement of these expensive space systems. However, after thirty years plus in space the US is still missing an important ingredient which is doctrine.

Currently space is a supporter to the land, sea, and air campaigns of the future. While this is a good start it is essential to think beyond this decade to power projection from space. As General Piotrowski has said we need to have the right tools for combat.(56:338) General Welch has stated that with political instability and uncertainty in the world...the US must provide forces capable of dealing with the full spectrum of conflict.(66:50) While space forces afford the US

capabilities and opportunities, space is not "war worthy" yet. It is not safe because the investment is generally not protected, either technically or doctrinally.

CHAPTER VI

CONCLUSION

General Hap Arnold warned the Air Force in 1945 to keep its doctrine ahead of its equipment and clearly the Air Force has not done that in regards to space. Currently space systems support the land, sea, and air campaigns. While this is a good start, the real key is to project power from space. To accomplish this it is imperative that spacecraft be war worthy.

Viable military space doctrine is essential to successful combat operations. History proves it. This can only be accomplished by basing space beliefs in the fundamental principles of war. Other tenets of a valid space doctrine include integration, a balanced capability, and effective relationships and alliances with allies and the other national space sectors.

There have been significant obstacles to space doctrine development, such as organizational fragmentation, outdated basic doctrine and unusable military space doctrine. There are schools of doctrine which tend to compartmentalize views. Slowly these obstacles will be overcome. The next step is to create a viable space doctrine. As former Secretary of Defense Carlucci stated last year, "our greatest challenge is to integrate military doctrine and strategy with the realities of military operations in space".(16:63)

BIBLIOGRAPHY

1. AFM 1-2, USAF Basic Doctrine, Department of the Air Force, Washington, D.C., 1 December 1959

2. AFM 1-6, Military Space Doctrine, Department of the Air Force, Washington, D.C., 15 October 1982

3. AFM 1-1, Basic Aerospace Doctrine of the USAF, Department of the Air Force, Washington, D.C., 16 March 1984

4. AFM 2-XK(Draft), Aerospace Operational Doctrine, Headquarters Air Force Space Command, 10 June 1987

5. AFM 1-1(Air Staff Draft), Air Force Basic Doctrine, 31 March 1989

6. AFM 1-1(CADRE Draft), Basic Aerospace Doctrine of the USAF, October 1989

7. Air Force Policy Letter for Commanders, Office of the Secretary of the Air force, Washington, D.C., February 1990

8. Air Force Space Policy, CSAF letter to all MAJCOM Commanders, 2 December 1988

9. Aldridge, Edward C., Jr., "The Myths of Militarization of Space", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 13-16

10. Aldridge, Edward C., Jr., "Consistency: A Vital Ingredient for National Security Space Programs", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 330-335

11. Astronautics and Space Report of the President, Government Printing Office, Washington, D.C., January 1970

12. Barker, Raymond H., "Space Control: A National Imperative", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 241-258

13. Berkowitz, Marc J., "ASATs and Strategic Stability", Airpower Journal, Winter 1989

14. Bingham, Price T., "Ground Maneuver and Air Interdiction in the Operational Art", Airpower Research Institute, Air University, Maxwell AFB, AL, September 1989

15. Blue Ribbon Panel on Space, Implementation Plan, February 1989

16. Carlucci, Frank C., "DOD's Space Policy." AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 60-63

17. Clausewitz, Carl Von, On War, Princeton University Press, Princeton, NJ, 1976

18. Commission of Integrated Long Term Strategy, Discriminate Deterrence, January 1988

19. Committee on Space Policy, National Academy of Sciences, "Towards a New Era in Space", Reprinted in Space Policy, August 1989

20. Crotty, Patrick H., "A New Environmental Military Space Doctrine: For Today and Tomorrow", AWC Readings on Space, Air University, Maxwell AFB, AL, August 1988, pp 201-208

21. Department of Defense Space Policy, Office of the Secretary of Defense, Washington, D.C., 10 February 1987

22. Drew, Dennis, "Joint Operations", Airpower Journal, Fall 1988

23. Drew, Dennis, "The American Airpower Doctrine Dilemma", Airpower Research Institute Paper, undated

24. Fabyanic, Thomas, "War, Doctrine and the AWC: Some Relationships and Implications for the USAF", Air University Review, Jan-Feb 1986

25. Frazer, Lance, "Lead, Follow, or Get Out of the Way", Space World, May 1988

26. Friedenstein, Charles D., "The Uniqueness of Space Doctrine", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 220-227

27. Fuller, Thomas, "DOD in Space: A Historical Perspective", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 6-12

28. Futrell, Robert Frank, Ideas, Concepts, and Doctrine: A History of Basic Thinking in the USAF, 1907-1960, Air University, Maxwell AFB, AL, December 1989

29. Futrell, Robert Frank, Ideas, Concepts, and Doctrine: A History of Basic Thinking in the USAF, 1961-1984, Air

University, Maxwell AFB, AL, December 1989

30. Gray, Colin, American Military Space Policy, Abt Books, Cambridge, MA, 1982

31. Gray, Colin, "Space Warfare", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 232-240

32. Griffith, Samuel B., Sun Tzu-The Art of War, Oxford University Press, New York, 1963

33. Hadley, Arthur T., The Straw Giant, Random House, New York, 1986

34. Hallion, Richard P., "Doctrine, Technology and Air Warfare", Airpower Journal, Fall 1987

35. Harvey, Jan V., "Space: The Fourth Dimension", AWC Readings on Space Issues Symposium, Air University, Maxwell AFB, AL, April 1988, pp 46-79

36. Henry, Richard C.(LtGen Ret), "Launches into LEO Should Be Economical, Routine", Aviation Week and Space Technology, 27 November 1989

37. Herres, Robert T.(General Ret), "The Military in Space: A Historical Relationship", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 49-53

38. Herres, Robert T.(General Ret), "The Future of Military Space Forces", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 69-74

39. Herres, Robert T.(General Ret), "Space Grows in Importance to the National Security", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 83-87

40. International Agreements that Limit Activities in Space, AWC Readings, Air University, Maxwell AFB, AL, November 1989, pp 205-206

41. Johnson, Nicholas L., "Space Control and Soviet Military Strategy", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 273-278

42. Killian, James R., Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President of Science and Technology, MIT Press, Cambridge, MA, 1977

43. Klass, Philip, "Soviets Push Ocean Surveillance",

Aviation Week and Space Technology", 10 September 1973

44. Logsdon, John L , The Decision to Go to the Moon: Project Apollo and the National Interest, MIT Press, Cambridge, MA, 1970

45. Luongo, Kenneth N. and Wander, W. Thomas, The Search for Security in Space, Cornell University Press, Ithaca, NY, 1989

46. Lupton, David, "Space Doctrines", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 209-219

47. Lynch, Timothy B., "Space-The Final Department", Ad Astra, March 1990

48. Mrazek, Robert J., "Rethinking Global and National Security", Space Policy, May 1989

49. Myers, Kenneth A. and Tockston, John G., "Real Tenets of Military Space Doctrine", AWV Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 194-202

50. National Security Research, ASAT Task One, November 1987 (prepared under contract for the Air Force Systems Command)

51. National Space Society Position Paper, "Crucial Reasons for Supporting Space Development", Ad Astra, March 1990

52. Newton, Richard D., "A Question of Doctrine", Airpower Journal, Fall 1988

53. Ogan, Andrew J., "Thinking About Air Power", Airpower Journal, Spring 1989

54. Pebbles, Curtis, Guardians, Presidio Press, Novato, CA, 1987

55. Piotrowski, John L.(General), Testimony before the Senate Appropriations Defense Subcommittee, 18 May 1989

56. Piotrowski, John L.(General), "The Right Space Tools", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 336-338

57. Piotrowski, John L.(General), "Space Leadership: Vision or Vanity?", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 17-19

58. Temple, L. Parker III, "How Dare They Tamper with the Sacred Functions of the Horse Cavalry?", AWC Readings on Space Forces, Air University, Maxwell AFB, AL, November 1989, pp 184-190

59. Stares, Paul B., The Militarization of Space, Cornell University Press, Ithaca, NY, 1985

60. Stares, Paul B., "Space and US National Security", Journal of Strategic Studies, December 1983

61. US Congress, Committee on Aeronautical amd Space Sciences, Hearings of the 87th Congress, June 1962

62. USAF Report to the 101st Congress of the United States

63. US National Space Policy, White House Fact Sheet, Washington, D.C., 16 November 1989

64. Watts, Barry D., The Foundations of US Air Doctrine, Air University Press, Maxwell AFB, AL, December 1984

65. Watts, Barry D. and Hale, James O., "Doctrine--Mere Words or a Key to Warfighting Competence", Air University Review, Sep-Oct 1984

66. Welch, Larry D.(General), "Global Reach in a Non-Tranquil World", Sea Power, April 1990

67. Wolfe, Thomas, The Right Stuff, Bantam Publishers, New York, 1980