

UNCLASSIFIED



AD NUMBER

AD-B105 345

NEW LIMITATION CHANGE

TO **DISTRIBUTION STATEMENT - A**
Approved for Public Release; Distribution Unlimited.

LIMITATION CODE: 1

FROM **DISTRIBUTION STATEMENT - B**
Distribution limited to U.S. Gov't. agencies only.

AUTHORITY

Ms. Martha A. Davis, Director, Combined Arms Library
U.S. Army Command & General Staff College,
Ft. Leavenworth, KS via ltr. dtd September 17, 1998.

THIS PAGE IS UNCLASSIFIED

✓
AD-B105 345

**THE ARMY AND SPACE: HISTORICAL PERSPECTIVES
ON FUTURE PROSPECTS**

**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

by

**John Robert Wood, MAJ, USA
B.S., United States Military Academy, 1972
M.B.A., University of Chicago, 1981**

**Fort Leavenworth, Kansas
1986**

**DTIC
ELECTE**

SEP 24 1986

DTIC FILE COPY

**"Distribution limited to U.S. Government agencies only;
Administrative/ Operational Use; Restriction applied, 9 May 1986.
Other requests for this document must be referred to: U.S. Army
Command and General Staff College, ATTN: ATZL-SWD-GD, Ft
Leavenworth, Kansas 66027-6900."**

86-3482

86 9 24 046

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution limited to U.S. Gov't agencies only; Administrative/ opn'l use; Restriction applied. 9 May 1986		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
4. PERFORMING ORGANIZATION REPORT NUMBER(S)					
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Command and General Staff College		6b. OFFICE SYMBOL (if applicable) ATZL-SWD-GD		7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Attn: ATZL-SWD-GD Ft Leavenworth, Kansas 66027-6900				7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (if applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)				10. SOURCE OF FUNDING NUMBERS	
PROGRAM ELEMENT NO.		PROJECT NO.		TASK NO.	
				WORK UNIT ACCESSION NO.	
11. TITLE (Include Security Classification) The Army and Space: Historical Perspectives on Future Prospects					
12. PERSONAL AUTHOR(S) Major John Robert Wood					
13a. TYPE OF REPORT Master's Thesis		13b. TIME COVERED FROM 8-1985 TO 6-1986		14. DATE OF REPORT (Year, Month, Day) 1986 June 6	
15. PAGE COUNT 185					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Space, Army and Space, Military Space, Space Operations, Space Strategy		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) (See reverse side)					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS				21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL				22b. TELEPHONE (Include Area Code)	
				22c. OFFICE SYMBOL	

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

19. ABSTRACT

3. DISTRIBUTION/AVAILABILITY OF REPORT (Continued)

Other requests for this document must be referred to U.S. Army Command and General Staff College, Attn: ATZL-SWD-GD, Ft Leavenworth, Kansas 66027-6900.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

**THE ARMY AND SPACE: HISTORICAL PERSPECTIVES
ON FUTURE PROSPECTS**

**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

by

**John Robert Wood, MAJ, USA
B.S., United States Military Academy, 1972
M.B.A., University of Chicago, 1981**

**Fort Leavenworth, Kansas
1986**

**"Distribution limited to U.S. Government agencies only;
Administrative/ Operational Use; Restriction applied, 9 May 1986.
Other requests for this document must be referred to: U.S. Army
Command and General Staff College, ATTN: ATZL-SWD-GD, Ft
Leavenworth, Kansas 66027-6900."**

86-3482



Approved For	
NTIS GRA&I	☒
DTIC TAB	☒
Unannounced	☐
Justification	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special
B-3	

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

Name of candidate Major John R. Wood

Title of Thesis The Army and Space: Historical

Perspectives and Future Prospects

Approved by:

Frederick M. Downey, Thesis Committee Chairman
Major (P) Frederick M. Downey, MA

Mason E. Smith, Member, Graduate Faculty
LTC Mason E. Smith, MA

David C. Skaggs, Member, Consulting Faculty
LTC David C. Skaggs, Ph.D

Accepted this 6th day of June 1986 by:

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

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

THE ARMY AND SPACE: HISTORICAL PERSPECTIVES ON FUTURE PROSPECTS:
An analysis of the Army's early involvement in space to find historical lessons to help guide today's growing Army interest in renewed space operations, by Major John R. Wood, USA, 185 pages.

→ This study reviews the Army's involvement in the nation's space activities during the late 1950's when the Army went from being the clear leader in space research and operations to a position of relatively minor significance by 1961. The purpose of this analysis is to reveal those forces responsible for the rapid departure by the Army from the space field. Such an analysis is important now since the Army appears ready to dramatically increase its activities in space. Unless Army leaders account for the existence of these same forces today, this service may be destined to repeat past mistakes, refight old battles, and, in the end, find important Army space aspirations frustrated.

The forces identified include inter-service rivalry, national strategy controversy, and political and bureaucratic disputes. Each of these forces is examined and the consequences on the Army detailed. When the final bureaucratic and political battles are waged in 1961, the Army proves willing to trade off most of its space activities to fund much needed conventional force modernization.

The reasons for the renewal of Army interest in space are examined along with the emerging organizational and policy initiatives concerning space undertaken by the Army. In a number of appendices, current Army statements of policy, organizational proposals, and study summaries are presented.

The final chapter contains over 24 conclusions concerning potential problems facing Army leaders as the Army increases its involvement with space activities. These conclusions are all drawn based on historical antecedents and observations of emerging Army space intentions discussed in the thesis.

Overall, the Army can expect opposition when its actions cross perceived or actual boundaries between "accepted" roles and missions in space or threaten the existence of USAF or USN space systems that support "vital" air or sea operations. The Army's strongest bureaucratic position seems to be as spokesman for the space needs of the ground commander fighting at the operational level of war. Only so far as the Army can show space and space systems support the ground attack throughout the operational depth of the battlefield can it expect to have Air Force and Navy support of its space operations. Without this willingness to champion space systems that meet the conventional needs of ground forces, even internal Army support for Army space aspirations is suspect.

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
Title page	i
Approval page	ii
Abstract page	iii
Table of Contents	iv
 Chapter 1: Introduction	 1
 Chapter 2: Review of the Literature	 6
Army Publications	8
Inter-Service Conflict	11
The Debate Over National Security Policy	16
The Politics of Space After Sputnik	20
 Chapter 3: The Army's First Space Effort	 22
The Army Space Program	23
InterService Conflict Between Army and Air Force	29
National Defense Strategy-Limited Wars vs New Look	39
Domestic and International Political Forces	50
Conclusion	60
End Notes	63
 Chapter 4: Today's Army Space Effort	 67
AirLand Doctrine and the Army 21 Concept	67
Army Organizations Involved With the "New" Space Effort	78
Evolving U.S. Army Space Policy and Doctrine	83
Conclusion	97
End Notes	99

Chapter 5: Conclusions	100
Inter-Service Rivalry	102
The National Defense Strategy Debate	106
National and International Politics	107
Bureaucratic Pressures Internal to the Army	111
Appendices	
Appendix 1: Organizational Involvement	1-1
Appendix 2: Army Space Agency	2-1
Appendix 3: Army Role in Space; Conclusions and Recommendations	3-1
Appendix 4: Army Space Initiatives Study; Executive Summary	4-1
Bibliography	5-1
Initial Distribution List	6-1

CHAPTER 1: INTRODUCTION

The United States Army is, once again, venturing into space. In 1984, the world witnessed the first intercept of a ballistic missile warhead in space by a ground launched terminal homing warhead. Essentially, one bullet was hit by another over 600 miles above the earth. The Army Ballistic Missile Defense Organization based at Huntsville, Alabama, achieved this significant feat in space. In addition to this dramatic demonstration of an emerging strategic defense capability, the Army in 1985 has sponsored space symposiums for senior commanders, authorized a space initiative study, and approved a space concept designed to guide development of the Army's future force structure. But, the Army is not a newcomer to this arena. The first U.S. satellite was launched by the U.S. Army aboard an Army Redstone missile on January 31, 1958. For the Army, recent events actually represent a reawakening of what was during the early years of this nation's space efforts an avid Army interest in space exploration and development.

It may be difficult now to think of the Army rather than the Air Force as the military leader in space. Since 1961, the Air Force has been the designated proponent for military space activities. Aerospace operations are now thought of chiefly as an Air Force function. Yet, there was a time during the 1950s when the connection between the Air Force and space was not so clear and the word aerospace had not been coined by the service in blue. Space exploration was dependent on missile boosters and the Army was ideally positioned to assert *de facto* control of the space role based on its

own predominant technical and scientific expertise as well as its clear ability to operate static ground launch facilities. The fact is the Army was rapidly evicted from the majority of space activities from 1958 until 1961.

The causes for the Army's exit from space during this earlier experience range from inter-service conflict and political maneuvering to strategic policy disputes and bureaucratic infighting. The Army and the Air Force were chief protagonists, but forces external to the services and the Department of Defense also acted on Army space interests. The "politicization" of space after Sputnik turned a small adjunct of the service missile programs into a topic of national debate.

There is every reason to believe the Army's new attempts to move into space will suffer from similar pressures. One notices certain historical parallels between conditions and events facing the Army space efforts in the 1950s and the 1980s. Once again we see the Army predominant in space endeavors central to political debates in the country. Where in the 1950s, the Army led the research community in missile technology, today the Army leads in certain fields of strategic defense. In fact, the Army has renamed its Ballistic Missile Defense Organization the U.S. Army Strategic Defense Command. With its special expertise in the field of ballistic missile defense, the Army is anxious to expand its role in the strategic defense effort under President Reagan's Strategic Defense Initiative. A little less than 30 years ago in the same place, Huntsville, Alabama, similar pride in Army capabilities and desires for expanded responsibilities prompted the creation of the Army Ballistic Missile Agency.

Conflicts between the Army and the Air Force in the 50s over missile and space responsibilities centered over the Army's infringement into the strategic strike mission of the newly independent Air Force. These earlier struggles are mirrored today by potential conflicts between these two services over Army encroachment into a mission area belonging to the Air Force since 1961 -- space operations. Today the Army is drawn to space by tactical requirements of its emerging battlefield doctrine. For very similar reasons, the Army sought its own long range missile capability in the earlier decade.

One pressure ever present in any time period is, of course, fiscal restraints. Space operations are expensive and take place, practically speaking, at the expense of something else. Nationally, these trade offs are argued within the budget process on the floor of Congress. The intrinsic merits of space enterprises are debated along with intangible issues like increased national prestige and national destiny. On a smaller, but no less intensive scale, the space operations compete with other requirements within budgets of bureaucratic institutions like the Army. Unlike the Congress, however, the Army lacks the power to tax or overspend its income. The Army's view of space missions is heavily influenced by how the Army leadership feels toward other demands on scarce resources.

In the late 1950s, the Army was suffering from six years of neglect in the modernization of its conventional forces capabilities as a direct result of the "New Look" national defense strategy. To limit defense spending and preserve a healthy national economy, this approach to national defense emphasized

"massive retaliation" with nuclear weapons and discounted the possibility of U.S. involvement in so called "limited wars." Well aware of the alarming growth in the worldwide Soviet conventional threat, the Army's leadership worried about the mounting costs facing the Army to restore conventional readiness. But, Congressional and Presidential unwillingness to increase conventional defense spending left these costs unfinanced. Ultimately, expensive space aspirations had to be sacrificed to restore Army capabilities to fight limited wars. Similar dilemmas confront today's Army leadership.

In present terms, limited wars are called low intensity conflicts. The Army feels the probability of such conflicts is high and is designing new force structure like light infantry divisions and special operations forces to wage war at this low end of the combat spectrum. Fiscal restraint in the form of the Gramm-Rudman-Hollings amendment threatens severe cuts in defense spending. Something must be sacrificed to build conventional strength. Could it, once again, be space operations?

In light of these historical similarities and the "new" Army interest in space, this thesis proposes to review the first Army experience in order to find applicable lessons which may help Army leaders as they reenter an arena from which this service has been effectively excluded since 1961. Having studied historical events and isolated certain forces acting against the Army's space involvement, the thesis then turns to an analysis of current evolving Army space doctrine. The purpose of this comparison between historical experience and present plans is to highlight potential conflicts facing Army leaders as Army space activities are increased. Some

conclusions are then drawn concerning likely difficulties facing Army planners as this service expands its operations in space.

The thesis is organized in chapters along a logical timeline. Following a short chapter dealing with a review of the literature in this field and research methodology, Chapter #3 commences the historical analysis. This historical description of the Army's early space and missile program sets the background for the examination in the rest of the chapter of various key forces acting against the Army's space involvement in the 1950's. Chapter #4 addresses space issues facing today's Army leadership. The doctrinal forces behind the renewed Army interest in space sets the backdrop in this chapter for the discussion of the current Army organization for space activities and emerging Army space doctrine. The final chapter, Chapter #5, contains conclusions.

CHAPTER 2: REVIEW OF THE LITERATURE

The subject of the Army and space is not evenly documented in available literature. The logical explanation for this observation is the very nature of the Army's experience with the medium of space. From an early involvement with ballistic missiles, through the halcyon satellite years of the late 1950s, into its primary focus on ballistic missile defense, the Army's space interests have undergone great change in emphasis and scale. The body of literature detailing the early and middle period is adequate but is dominated by descriptions of the scientists and engineers who designed the early experiments and the research projects on which they worked. Supplementing this body of descriptive literature are personal accounts, Congressional testimony, and journalistic articles describing the dispute over U.S. space policy which raged between the various services and agencies of the government. Some books published subsequent to this time period detail the chronology of space activities. There are also some excellent works examining the bureaucratic controversies of the the period which proved especially valuable for this thesis.

The Army's departure from active involvement in space exploration in 1961 resulted in a simultaneous dramatic decrease in available writings on the Army's space activities and policy. Ballistic missile defense (BMD) is the only subject addressed in any detail and even this topic is overshadowed by a

debate in the literature over the impact of BMD on arms control. The ABM treaty, signed in 1971 by the U.S. and the U.S.S.R., stopped deployment of Army ABM systems and caused a further decrease in literary attention to the Army and space. The recent renewal of interest in an Army space role has not yet prompted a significant resurgence in published material about the Army and space. Indeed, this thesis attempts to fill a small portion of the void which exists in the area of contemporary analysis of Army space policy.

Fortunately, this thesis intends to use historical analysis to draw applicable lessons to guide the Army's present space involvement. The holes in the body of literature are most pronounced in the periods of least importance to this study. The material available describing the Army's role in the early years of the space program and the strategy and political debates surrounding the national space effort is certainly adequate. Time has passed and some scholarly examinations of the space debate in the 1950s have been published. The strategic pressures facing the Army as it fought for a space role are especially well documented. The lack of internal, unclassified DoD and Army memorandums dealing with the events of this period is the one particular resource weakness.

This problem is not easily overcome. To limit the impact of this shortage of primary source material, several steps were taken in the writing of this thesis. Opposing accounts of the same event were reviewed if possible. A search was conducted for Congressional testimony or public statements made by the primary actors. References which quoted a large amount of primary source material were used. Overall, the analysis does not suffer serious

problems. The intent of the thesis is to spot the significant forces that shaped the Army's earlier involvement with space. The personalities and the specifics of their decisions are less important. Hopefully, the actions taken by these former decisionmakers were caused by the forces which this thesis identifies.

While a broad range of resources were surveyed for this thesis, the literature search ultimately focused on, basically, three types of historical accounts and one contemporary body of literature. The contemporary literature included Army doctrinal publications and emerging policy statements concerning the Army's involvement in space. The historical accounts covered the inter-service conflict between the Army and the Air Force over missiles and space, the debate over national security policy in the 1950s, and the politics of space after Sputnik. The review of literature below discusses some of the works used in this thesis and highlights works of particular value. Other material used for development of the body of the text is, of course, indicated in the Bibliography.

Army publications:

As already mentioned in the introduction chapter, the Army is just beginning to actively investigate how space systems and space in general can serve its needs both now and in the future. The available literature describing Army needs in space is limited. The material available which substantiates a growing Army interest in space is not so restricted.

Of particular interest to this study are two publications which describe the current operational doctrine of the Army. The first is Army Field Manual 100-5, Operations, and the second is the Army 21 Concept. Both publications are unclassified. Field Manual 100-5, Operations, is the book which describe the Army's AirLand Battle doctrine and as such it is essential in determining the operational needs of today's Army. The introductory chapters describe the nature of battle in the future and emphasize certain force characteristics which can help to ensure victory. In its call for improvements in force capabilities in such areas as sensors, communication and command and control, this manual leads, naturally, to the consideration of space systems. It should be stressed, however, that the subject of space is never, specifically, addressed in this book.

While the field manual, Operations, establishes the doctrinal need for force improvements which may necessitate increased involvement in space, the second text, Army 21 Concept, clearly confirms the role of space in the Army's future. Annex J, "Space", is especially noteworthy. Although much of this annex is classified, that which is not outlines the trends which are moving the Army back to a more active space role. This manual, as an approved concept statement, guides the Army as it designs the forces needed for the first quarter of the 21st century. The importance of space and space systems in the augmentation of Army strengths and capabilities is well presented in this text.

Some other internal Army publications or memorandums which were useful in this research include:

1. Memorandum to Vice Chief of Staff of the Army dated 13 Dec 1985 entitled "Organizational Involvement". (Appendix 1 to this thesis)
2. Memorandum for Chief, Army Space Office dated 21 January 1986 entitled "Army Organization for Space". (Extract reproduced in Appendix 2 to this thesis)
3. U.S. Army War College Study Project dated 5 June 1984 entitled The Army Role in Space (S) by Walter J. Moran, et. al. (Recommendations reproduced in Appendix 3 of this thesis)
4. The Army Space Initiatives Study dated 13 December 1985. (Executive Summary extract reproduced in Appendix 4 to this thesis)
5. Interim Operational Concept entitled "Army Space Operations (S)" dated August 1985.
6. Statement of the Army Space Policy by Chief of Staff of the Army, General John A. Wickham and Secretary of the Army, Honorable John O. Marsh dated 5 June 1985. (Reproduced in full in Chapter 4 of this thesis)

The Army Space Initiatives Study was conducted at Ft Leavenworth, Kansas in response to a directive of the Army Space Council. The goal of the study was to provide a master plan for Army involvement in space. Specifically, the study was to make recommendations on material investment, personnel education, training, career management, and organizational structure. These challenging tasks were successfully accomplished and this study will, no doubt, serve to guide the Army's steps back into space in the years ahead. While the study is overall classified

secret, there are many portions which are unclassified and can serve the researcher interested in pursuing a range of topics concerning the Army's activities in space. The executive summary of the study, minus some excised classified text, is presented for the readers use in Appendix 4 to this thesis.

One other of the above list of documents deserves specific mention. The Interim Operational Concept entitled "Army Space Operation (S)" is a valuable source of mid to long range thinking about potential Army involvement in space operations. In fact, this document is far more bold in its view of future Army space policy and space activities than the Army Space Initiatives Study. This difference between the two documents is best explained by the differences in perspectives between the two. The Initiatives Study is forced to consider immediate practical steps the Army needs to take to move back into space. The Interim Operational Concept takes the steps prescribed by the Initiatives Study as given and adopts a more visionary approach to the mid and long range period. In any event, the Interim Operational Concept reveals the intent of Army policy more dramatically than the Army Space Initiatives Study and, therefore, is probably more interesting to the researcher attempting to discern the Army's future policy goals in space. The Interim Operational Concept is classified but does contain unclassified text found useful for this thesis.

Inter-Service Conflict Between the Army and Air Force Over Missiles and Space

The literature in this area falls into three areas. The first is descriptive writings, the second is personal accounts, and the last is journalistic articles.

The most significant work used in this thesis falling in the first category is The Politics of Weapons Innovation: The Thor-Jupiter Controversy by Michael Armacost. This examination of the Army-Air Force rivalry for the missile mission contains an excellent review of the Army's early interest in ballistic missiles and uses this early interest as a base on which to build the Army's case for ballistic missile control. Numerous internal Army and Defense Department documents are cited to demonstrate the tenor of the arguments and to support the bureaucratic positions underlying the events of the time. The book is footnoted throughout and a major topic index is provided. There is no bibliography, but the footnotes are sufficiently detailed to allow easy location of references. The focus of the book was to examine the bureaucratic dynamics underlying a major debate in the U.S. government. The attention paid to the interests of each actor in the controversy make this book extremely valuable in the search for forces which ultimately moved the Army out of space.

A second book which contained useful material was Developing the ICBM by Edmund Beard. This book also reviews the historical background of the debate over control of the ballistic missile mission. Written in 1976, it details the argument over missions and roles between the services and contains numerous quotations from internal Army and Air Force documents. Although more attention is paid to the Air Force positions in the conflict, the

account of the Army's developmental work on ballistic missiles is still substantial. Footnotes are less detailed than in the Armacost book, but they successfully amplify points raised in the text and lend credibility to the overall analysis. The bibliography provided contains numerous books and articles published during the 1950s.

Three books and one research paper were used primarily for their descriptive content. The books, Space from Sputnik to Gemini by Lester A. Sobel, The National Space Program; From the Fifties into the Eighties by Cass Schichtle, and The Space Race; from Sputnik to Apollo...and Beyond by Donald Cox, as well as the research paper, Organization for Military Space - A Historical Perspective by John R. Hungerford, all provided extremely useful detail about the events shaping the debate about space and its uses during the 1950s. The book by Sobel is a Facts on File Publication and as such contains virtually no analysis. It does, however, organize the relevant material in short, readable citations according to the year of occurrence and generally by topic. The reader is quickly made aware of the subject, in this case U.S. space activities, although the depth of knowledge is superficial. The texts by Schichtle and Cox provide the needed detail to the story about early U.S. space efforts. The Cox book is a sardonic, lengthy description of the individuals and institutions, military and civilian, responsible for putting the U.S. in space. No shortage of detail is evident in this book. No endnotes are offered although there is a good index. The Schichtle book is more oriented toward the services and does contain endnotes as well as useful tables and copies of documents relating to past and present U.S. space activities. This

book belongs to the National Security Affairs Monograph Series 83-6 published by the National Defense University in Washington. It appears to be a modified version of an earlier paper by the author on the same topic also published by the National Defense University. The evolution of space policy from Eisenhower to Reagan is easy to trace through this text and some analysis is presented throughout. Finally, the research paper by Hungerford merits special mention as a thorough analysis of specifically military space involvement from WWII until 1962. Well footnoted and clearly written, this report is available from the Air Command and Staff College, Maxwell Air Force Base. While the focus may stray toward an Air Force slant at times, the overall tone is objective. A full bibliography is presented and many official Air Force documents of the period are cited to support the text. Any one interested in delving into the history of military space involvement should start with this document.

No list of personal accounts of this era would be complete without Countdown for Decision by General John B. Medaris. This book was written by General Medaris in 1960 after he had retired from his command of the Army Ballistic Missile Agency (ABMA). His description of events is quite defensive in tone and often strays from the major topic at hand. Despite these literary "flaws", this book contains first hand impressions of a major actor who was intimately involved in the Army's missile development program and its bid for the space mission. There are no footnotes, index, or bibliography, so one must read through some rambling accounts before finding useful material. Intermixed with the stories and recollections are occasional diatribes against

the Joint Staff, defense management, and other actors who complicated Gen. Medaris' job at ABMA. The book merits attention by any serious scholar of this controversy, but the observations offered should probably be verified against other sources. This practice was followed in this thesis.

Another account which helped "personalize" the debate was War and Peace in the Space Age by James Gavin. From his position as Deputy Chief of Staff for Army Plans and Research, he presided over the development of the ballistic missile. He was an innovative Army planner who understood the potential of ballistic missiles and, thus, he fought to retain operational control over this potent new weapon. His struggle to protect both the Army's stake in ballistic missile development and its share of the Defense budget in the face of changes in national strategy are well documented in this book. It was published in 1958 at the height of the debate over missions and roles, so the observations contained in the book mirror closely the feelings of Army leaders on the issue of ballistic missiles. It should be stressed that the book discusses far more than the Army's missile interests. Most of the book contains Gavin's analysis of the threat posed by the Soviet Union and the necessary United States response. His arguments against the doctrine of massive retaliation and the "New Look" of national security policy lends itself to the development of another element of discussion in this thesis - the national strategy debate and its impact on the Army's role in space.

The final category of resource material in this area, journalistic articles, is difficult to characterize. Those articles examined from the

service journals such as the Army, Navy, Air Force Journal and Military Review, and Air Force do offer useful service or DoD viewpoints but seldom provide the kind of background material which helps to clarify the reasons behind a particular decision. Professional journals which cover the field such as Missiles and Rockets published during this period do contain better analysis, but the amount of this material is limited. The popular magazines such as Time and Newsweek which focus on the problems of organization which hindered missile and space development do a credible job of describing the effects of the controversy on the national effort and, occasionally, offer helpful analysis. This type of material was primarily used in this thesis as a source of public statements made by primary actors.

The Debate Over National Security Policy in the 1950s

This debate was central to the Army's involvement in space during the decade of the 1950s since the Army found itself arguing for the continuation of its traditional missions in the face of a strategy of nuclear massive retaliation. It was extremely difficult to support additional missions for the Army like space and long range missile development when such missions depleted already scarce budget resources needed to modernize the Army's land forces. Eisenhower's "New Look" strategy conflicted with the Army's need to fight "limited wars" with conventional forces. This debate over defense strategies lasted from the start of the Eisenhower administration through both of his terms into the beginning of the Kennedy era. President

Kennedy's willingness to acknowledge the emerging balance of terror between the superpowers and the resulting increase in the threat of wars short of general nuclear conflict allowed the U.S. Army to regain some of the funds needed to correct years of neglect of its conventional strength. There is no lack of good analysis of this debate. The problem in writing this portion of the thesis was which of the many books to select. In the end, many works were reviewed and those which were selected contained Army viewpoints, viewpoints of the Eisenhower administration, or both. The scholarly debate over which strategic view was correct, massive retaliation or limited wars, while interesting was not central to the purpose of this thesis. Description of the dilemma facing the Army as it saw its budget share shrinking and the conventional threat growing was more important. Accordingly, books by key Army leaders, White House staff members, and historians were the most useful.

Russell F. Weigley's book, The American Way of War, provides an excellent account of the entire debate. Part five of the book entitled "American Strategy in Perplexity, 1945" contains several chapters which skillfully present the problems confronting senior U.S. civilian and military policy makers in the nuclear era. While space is only briefly mentioned, the pressures confronting the Army as it considered its future are covered in detail. By presenting the inter-service rivalries of this era against the backdrop of competing strategic theories, the author succeeds in showing why the debate was so heated and the consequences so feared. This whole strategic controversy is seen as another stage of evolution in America's

history of United States military strategy and policy. The book's index is first rate as are its bibliography and footnotes. This scholarly reference is essential to work in the area of U.S. strategy.

The 1950's produced books by two Army Chiefs of Staff, Ridgeway and Taylor, and several senior Army R&D officials, Gavin and Medaris. The book by General Medaris has already been described. It was once again useful in helping to comprehend the issues confronting Army leadership during this period. Maxwell D. Taylor's book, The Uncertain Trumpet, was even more helpful in its analysis of the "New Look". This book was written shortly after General Taylor retired from his position as the Chief of Staff of the Army. His retirement was hastened by his outspoken opposition before Congress to the strategy of "massive retaliation" and its consequences on the readiness of Army land forces. He makes his case for land forces in this book and along the way reveals the severe frustrations he faced in preserving the Army budget and programs during his tenure. General Gavin's book, War and Peace in the Space Age complements the Taylor book since he too suffered early retirement due to his outspoken comments on the same subjects before Congress. Gavin was Medaris' boss so their accounts of the bureaucratic battles are somewhat similar although Gavin's view was a level higher.

Within the Eisenhower administration, accounts by both the President and the Vice President helped to illuminate the strategic questions as well as the questions over how best to move the nation into space. President Eisenhower's book, The White House Years; Waging the Peace, 1956-1961, is a compendium of anecdotes and reflections written after the President left

office. The "New Look" as well as the controversy surrounding this decision is adequately addressed and worth investigating in this reference although President Eisenhower's intransigent stance on modifying this strategy in light of mounting criticism is poorly explained. Vice President Nixon's book, The Challenges We Face does a slightly better job at confronting the issue of the continued relevance of the doctrine of "massive retaliation". A good academic analysis of the actions of the President and his assistants in defining and managing strategic policy is contained in Douglas Kinnard's book, President Eisenhower and Strategy Management: A Study in Defense Policy. As the title suggests, the services' stakes in the debate and the President's feelings on the issues involved are covered by this text. The focus is on how the New Look came to be and how it was subsequently challenged by critics and world events. The post-Sputnik era is specifically covered in the last chapter. This part of the book was helpful in the writing of the thesis since Presidential actions affecting the Army are described.

A modern version of this debate worthy of mention is the book by John L. Gaddis entitled Strategies of Containment. Written in 1982, this book has the advantage of time to improve perspective on the issues involved. The book offers a critical appraisal of postwar American national security policy. Information regarding the implementation of the New Look starkly portrays the pressures facing the Army leadership of the period. The events of the time are presented in an organized, readable fashion and the author provides objective analysis throughout. This scholarly work contains an outstanding index and bibliography and is a necessary reference for anyone interested in

the strategic debate underlying our present day understanding of deterrence and service missions.

The Politics of Space After Sputnik

Previously mentioned works such as the research paper by Hungerford, Nixon's book, and the Weigley book all help to explain the politics of space after Sputnik. This period is significant in the development of this thesis since political forces unleashed in the U.S. by popular sentiment after Sputnik ultimately helped to strip vital space resources away from the Army and move it out of the space arena. Space and the nation's space program became a topic for discussion in Congress and in the media. Gone were the days when the Army and the other services worked in relative obscurity to develop first the boosters necessary to enter space and later the satellites to orbit the earth. The "space race" moved these programs before a national audience. The President and Congress sought to provide leadership in the area of space policy.

President Eisenhower's decision to separate the military and "peaceful" uses of space ultimately led to the creation of NASA. The political forces behind the formation of NASA were most obvious within the committees of Congress and before the United Nations. Reports of Congressional committees on space issues like The National Space Program written in 1958 for the Select Committee of the House on Astronautics and Space Exploration and

Organization and Management of Missile Programs written in 1959 for the House Committee on Government Operations, reveal the disposition of Congress to preserve space for "peaceful" uses. The raw politics of this issue are clearly shown in the Hearings on Missiles, Space, and Other Major Defense Matters held by Senator Lyndon B. Johnson's Senate Preparedness Investigating Subcommittee in 1960. The various witnesses testify to a broad range of sentiments regarding the pursuit of the nation's space program, interests facing the various space organizations, and disagreements dividing the people involved with space.

CHAPTER #3: THE ARMY'S FIRST SPACE EFFORT

Faced with a growing Soviet threat, expanding regional objectives and responsibilities, and the prospect of limited budget growth, the Army is searching for tactical and technical solutions which expand its capabilities at least cost. The new AirLand doctrine is one such solution. By emphasizing such battlefield elements as initiative and maneuver, this new doctrine attempts to increase the tactical combat power of American forces. The large force modernization program now underway will provide Army commanders with the modern technology weapon systems needed to fight on the AirLand battlefield. These recent changes, while impressive, represent short to mid-term corrective measures. To meet long range technological requirements, the Army is focusing, once again, on space.

The Army was, indeed, preeminent in this field in 1958. The Dr. Wernher Von Braun research team working for the Army Ballistic Missile Agency designed and launched America's first satellite, the Explorer I, on 31 January 1958. The launch vehicle was an Army Redstone Missile. The scientists, engineers, and technicians assembled at Redstone Army Arsenal in Huntsville, Alabama, gave the Army a marked advantage over the other services who might challenge the Army's claim to the military's space mission. Yet, by 1961, this dominance was all but ended and the Army was virtually out of the space business. Where the Army was formerly involved across the breadth of this country's space activities, it found itself

responsible for only ballistic missile defense research and development and, to a lesser degree, the research and development of satellite communication facilities. The U.S. Air Force and NASA inherited most of the Army's technical assets and mission responsibilities. In light of the renewed Army interest in space, this chapter reviews the Army's first attempt to become involved with space and then determine how certain pressures ultimately convinced the Army to abandon its quest to be America's space force. In particular, the influence of inter-service rivalry, competing organizational demands within the Army, and domestic and international political forces will be examined. Existence of the same types of pressures today if unaccounted for in Army planning could delay achievement of Army aims in space.

THE ARMY SPACE PROGRAM

The Army's serious involvement with space began with its post war ballistic missile development program. The satellite emphasis would come much later. It would be the ballistic missile, after all, which allowed the Army to venture into this new arena. The German use of V rockets at the close of WWII had amply confirmed for the U.S. Army the military utility of ballistic missiles. Interest in ballistic missiles had grown throughout the war as development efforts by the Army Air Forces and the Army Ground Forces (Ordnance Corps) produced encouraging results. Interdiction of deep targets using missiles appealed to the Air Force who by war's end were firmly convinced of the importance of long range "strategic" bombardment¹. The Army Ground Forces, on the other hand, viewed these weapons as long

range artillery which gave the field army commander potentially devastating firepower. Additionally, the missile assured a role for the ground force in future conflicts².

The decision by Dr. Wernher Von Braun to surrender to U.S. forces at the end of WWII accelerated America's, and particularly the Army's, research into missile technology. Dr. Von Braun, his staff, and over 300 box cars of V2s and spare parts moved to the Army's White Sands Proving Grounds after the war. Here, Dr. Von Braun conducted his first experiments for the U.S. Army Ordnance Corps using the captured German V2 missiles. On May 10, 1946, the first V2 was successfully launched from White Sands. Ultimately, 47 V2s would be launched³.

Development continued and in 1949, the Von Braun team was moved from White Sands to larger and more modern research facilities at Huntsville, Alabama. Here, the Army established its first missile arsenal, the Redstone Arsenal. The Ordnance Missile Laboratories (OML) created at the arsenal and within OML the Guided Missiles Division under Dr. Von Braun's direction began work on the Redstone ballistic missile. Larger than earlier missiles, the Redstone was designed as a mobile, liquid fueled weapon capable of delivering a nuclear warhead against area targets at a maximum range of 200 miles. It was not meant as an alternative to the newly independent Air Force's Atlas intercontinental ballistic missile (ICBM) also under development. The Redstone launch in August 1953 was America's first successful launching of a heavy ballistic missile⁴.

Results from 1952 tests of thermonuclear devices on Eniwetok Atoll in the

Pacific Ocean prompted the Army, as well as all the other services, to place new priority on missile research. Following WWII, opponents argued against the ballistic missile claiming cost, lack of accuracy, and small yield made the missile inferior to a manned strategic bomber. The Pacific test results supported Dr. Edward Teller's contention that light thermonuclear weapons of enormous power and relatively low cost would eliminate the need for high accuracy and would make ballistic missiles equal, if not superior, to bombers⁵. In 1954, President Eisenhower established the Technological Capabilities Panel chaired by Dr. James R. Killian to explore the balance between Soviet and American forces in light of the new thermonuclear technology. In its report to the National Security Council, the Killian Panel warned of impending Soviet superiority in air atomic power and urged immediate U.S. emphasis on matching Soviet long-range missile capabilities. Because of fewer technological problems, an intermediate range ballistic missile (IRBM) with a range of 1500 miles became the favored weapon to quickly close the developing "missile gap". Deployed overseas in allied countries, the IRBM posed a nuclear threat to offset the perceived Soviet lead in the ICBM field⁶. Although the JCS recommendation excluded the Army from a role in developing an IRBM, Secretary of Defense Wilson directed otherwise. In November 1955, he ordered the Air Force and an Army-Navy team to independently develop IRBMs. His decision was based primarily on findings by an internal DoD panel of scientists (the Robertson panel) which favored multiple tracks of research to speed overall missile development⁷.

The Army, anticipating a favorable decision, reorganized its Huntsville

operation in October 1955 to allow coordinated management of two major missile programs, the Redstone and the expected IRBM. The Army Ballistic Missile Agency was created here and Major General John B. Medaris was placed in command. Secretary Wilson's directive to this new organization was to pursue "a joint Army-Navy program (IRBM No. 2) having the dual objective of achieving an early shipboard capability and also providing a land based alternate to the Air Force program"⁸. The Army Navy partnership was brief, however. When the Atomic Energy Commission announced in September 1956 that thermonuclear warheads could be produced even smaller and lighter than earlier believed, the Navy withdrew from the joint program to pursue independent development of what became known as Polaris.

Despite the Navy's action, the Army continued development of its long range missile, now named the Jupiter. Based on the Redstone, the Jupiter was a mobile, liquid fueled, multi-staged missile capable of achieving a range of 1500 miles. On September 20, 1956 a Jupiter C, an elongated Redstone with solid fuel upper stages, achieved an altitude of 600 miles and a range in excess of 3000 miles. To prevent the missile's entry into space, the fourth stage had been left inert. This shot convinced the ABMA scientists that the Army had the capability to reach space and to orbit a satellite⁹. Subsequent tests of the final Jupiter design in the spring of 1957 further persuaded Army officials that the problems of space flight could be solved¹⁰. This first U.S. space flight, of course, would be made not by a man but by a satellite. The Army's launching of the Explorer I satellite on

January 31, 1958, was the nation's first step into the modern era of space exploration.

Explorer I reached orbit aboard a Jupiter C missile following approximately 90 days of intensive work by ABMA. The idea of orbiting such a package was not a new idea to the Army. There was post WWII interest by the Army in such a venture but JCS disapproval of a 1945 Army Air Force satellite proposal and the Army's disposition to view missiles as primarily ground based artillery dampened early efforts¹¹. Compared to the ballistic missile, the military utility of satellites was far less apparent to people both inside and outside the government. Mention of satellites in the first DoD Annual Report had been greeted by a public outcry against so frivolous an expenditure. DoD refrained from again mentioning the term satellite publically until 1954¹². Still, there was great interest, especially within ABMA, in the communication and surveillance potential of an orbiting satellite. In particular, Dr. Von Braun retained his enthusiasm for this program¹³.

Two events dramatically increased national commitment to the satellite venture. The first event was the announcement of goals by an international committee of scientists responsible for planning for the International Geophysical Year (IGY). This group designated the orbiting of small satellite vehicles to obtain scientific information about the upper atmosphere as a key objective of the IGY which was scheduled to last from July 1957 through December 1958¹⁴. The Eisenhower administration embraced this goal in 1954 and all three services began to design satellite systems in earnest. The

Army's proposals centered on a Redstone booster missile, an 18 pound payload, and a January 1957 launch¹⁵. The Air Force design utilized its Atlas ICBM missile while the Navy suggested a modification of its Vanguard system. Fear that Air Force involvement would interfere with their priority ICBM program caused DoD to favor the Army and Navy proposals. In the end, Vanguard, despite its immature development, was chosen. Unlike the other two options, Vanguard was not designed for a specific military mission and, therefore, it seemed better suited for its "peaceful" mission during the IGY¹⁶. The Army, knowing full well the technological challenges facing the Vanguard, persisted in its fight for the satellite mission. After the September 1955 decision by DoD to use Vanguard, the Army submitted to DoD five more proposals for a Redstone launched satellite¹⁷.

The Soviet's launch of Sputnik I on October 4, 1957, was the second critical event that focused national attention on satellites. Vanguard was woefully behind schedule and the Army's assertions about its readiness to launch a system were, at last, heard. On November 8, 1957, five days after the Sputnik II was launched, Secretary of Defense McElroy directed the Army to prepare for a satellite launch. Even though these instructions had been passed to the Army, the Eisenhower administration hoped the problems with the Vanguard would be corrected and this "peaceful" system could reassume the satellite launch mission. The Vanguard, however, continued to suffer setbacks and, finally, in early January 1958, the ABMA was granted authority to launch¹⁸.

Although Explorer I's liftoff on January 31, 1958, was a year later than

the original Army plan, it clearly had the potential to solidify the Army's primacy among the services in space. The fact that it did not was due, in large measure, to a successful campaign by the Air Force to strip the Army of the long range missile role and with it the ability to enter space.

INTERSERVICE CONFLICT BETWEEN ARMY AND AIR FORCE

The presence of inter-service rivalry predated the creation of the Department of Defense in 1947. Before this time, the peacetime forum for this confrontation most often was Congress. Here the Departments of Navy and War justified their budget requests before sympathetic, but separate authorization and appropriation committees. The debate over appropriate missions and roles took place on the floor of Congress. The 1947 Defense Reorganization Act changed the circumstances and setting for this debate since the Department of Defense now submitted a consolidated budget to a single authorization and appropriation committee in each house. Budget priorities now were established within DoD according to missions and roles assigned by the Secretary of Defense to the services. The relative fiscal independence of the services was ended. The 1947 Act, however, had done more than consolidate the budget and internalize the debate. It also created a separate Air Force, and granted this new service equal status in the annual battle to protect and, if possible, expand its portion of the budget. Air Force efforts to protect its "fair share" by assuming DoD responsibility for development and operation of ballistic missiles would, ultimately, help drive the Army from space.

The conflict between the Air Force and the Army over ballistic missiles existed while both were still under the Department of War during WWII. For the purposes of this paper, however, it would be useful to begin the description of this struggle with a memorandum signed by then Deputy Chief of Staff of the Army, Lt. General Joseph T. McNarney. In this memorandum issued on October 2, 1944, General McNarney attempted to delineate the developmental responsibilities for missiles. Recognizing first the widely held War department view that missile research and development must proceed before clear operational roles could be assigned, he continued by directing,

- a. That the Commanding General, Army Air Forces, have research and development responsibility, including designation of military characteristics, for all guided or homing missiles dropped or launched from aircraft.
- b. That the Commanding General, Army Air Forces, have research and development responsibility for all guided or homing missiles launched from the ground which depend for sustenance primarily on the lift of aerodynamic forces.
- c. That the Commanding General, Army Service Forces, have research and development responsibility for guided and homing missiles launched from the ground which depend for sustenance primarily on the momentum of the missile.¹⁹

The effect of this memorandum was to assign ground launched ballistic missiles to the Army and air breathing cruise missile (relying as they did on lift surfaces) to the Air Force. The Ordnance Corps interpreted this

directive broadly and created consternation in the Air Force by undertaking development of relatively long range missiles. This infringement on the "strategic" delivery of weapons threatened the Air Force at the very moment it was gaining its autonomy and asserting its unique right to the strategic mission. Such an assertion was, of course, based on the WWII strategic bombardment role assigned the Air Force. Critics who had questioned the efficacy of strategic bombardment could now be silenced by citing the demonstrated devastation of aerial delivered nuclear weapons. If the Army gained operational control of ballistic missiles capable of carrying these nuclear weapons to strategic depths, the Air Force lost claim to a primary reason for its existence²⁰.

The conflict also turned on the matter of weapon guidance. The Ordnance Corps, working with Dr Von Braun, was inclined to use the fin concept proven on the V2 missiles. This ability to control the missile in flight, necessary for weapon effectiveness in the Army's view, was a direct threat to the job of a pilot. Adding to the Air Force concern were claims by such noted air advocates as General Hap Arnold that WWII would be the last war fought by pilots²¹. Missile advocates were postulating future battlefields where this new technology would dominate operations to the detriment of piloted aircraft and conventional ground forces²². Clearly, the Army and the Air Force had strong incentives to keep a hand in the evolving missile technology in order to protect against future reduction in service overall defense responsibilities.

Further clarification of responsibilities was needed and throughout the late 1940s a series of directives attempted to streamline the missile

development effort and delineate missions and roles. The Air Force's claim to the strategic mission was affirmed, finally, by a Joint Chiefs of Staff decision on March 15, 1950 which granted the Air Force formal and exclusive responsibility for strategic guided missiles²³. The Army retained the ability to develop tactical missiles which supported the attack of targets important to the field army commander. The range distinction between strategic and tactical missiles remained debatable. This mission assignment, however, took on much more importance when lighter warheads were proven feasible by the Pacific tests mentioned earlier and accurate intercontinental ballistic missiles loomed as the weapon of the future. The Air Force, drawing on this earlier assignment of strategic responsibility, began research and development of the Atlas ICBM. The Korean War, the Soviet detonation of a thermonuclear weapon, and evidence of Soviet success in the heavy ballistic missile field all convinced President Eisenhower to assign this Air Force program the highest national priority in mid-1955. In December of the same year, he added both the Air Force IRBM, the Thor, and the Army IRBM, the Jupiter, to the top of the national priorities list²⁴. Since both the Jupiter and Thor were designed to accomplish the same mission, the two services were clearly on a collision course.

The Army was determined to maintain control of both the development and the operation of the Jupiter missile. Not only did this missile provide the Army field commander with an all weather deep strike strategic weapon, it also was capable of boosting payloads into orbit. The Army's continued space involvement was heavily dependent on the outcome of the growing dispute

between the Air Force and the Army.

The Army based its claim for control of this long range weapon on a number of arguments. The contention that ballistic missiles were natural extensions of artillery is one argument already mentioned. Others concentrated on the nature of the threat facing Army commanders and the necessary command and control of combat support forces. The Army claimed that it faced an enemy threat capable of attacking its theater base of operations with nuclear missiles. The enemy launch facilities presented a new set of targets which threatened theater operations. Such a threat jeopardized effective employment of land forces in pursuit of national objectives. The Army asserted its right to possess adequate weapon systems to destroy this serious threat to its operations. The Army also borrowed the Air Force argument for centralized control of aerial strike forces. Missiles were portrayed as potent combat forces of the future which should not be placed outside the control of the commander who could best determine the most effective employment of air delivered weapons in the battle area²⁵. The Army adopted a strategy of accelerated weapon development to complement the effectiveness of these arguments. Reasoning that the first service to demonstrate a usable system would be granted operational control, the Army granted General Medaris, as commander of ABMA, extraordinary freedom of action, direct access to senior Army leadership, and top claim on Army resources²⁶. With a proven system and its recognized ability to sustain and protect land based weapons, the Army hoped to secure its hold on its own long range missiles.

The Air Force challenged the Army's arguments with claims of their own. As mentioned earlier, the ballistic missiles threatened the role of bombers and pilots. In particular, the Air Force felt that the Jupiter would replace medium range bombers designed to interdict railheads, supply depots, and troop concentrations in an Army theater of operations. These missions were strategic in nature in the Air Force view and, thus, fell naturally to this service based on the 1950 JCS strategic mission directive cited above. By defining these targets as strategic, the Air Force was then able to claim Army involvement in IRBM systems diluted command and control of strategic delivery systems. The Air Force had been granted autonomy based, to a large degree, on the strength of the argument which favored centralized control of strategic assets. Given the likely mix of bombers and missiles (ICBMs and IRBMs) on the future battlefield, the Air Force argument to centralize control of strategic systems was compelling²⁷.

Soviet missile and space developments, increasing costs of the services' competing IRBM programs, and Congressional pressure to consolidate missile development convinced DoD leadership that a decision defining operational control of IRBMs was needed. The Army's argument was under mounting attack. President Eisenhower throughout 1956 was growing impatient with the inter-service bickering over the missile issue. He was skeptical of the Army's ability to employ a missile with a range of 1500 miles since it lacked an adequate reconnaissance capability to effectively identify enemy targets²⁸. The Navy's defection from the joint development program with the Army stripped the Army of needed support during JCS deliberations on the

assignment of IRBM operational responsibilities. Perhaps the most crippling blow to the Army cause was the lukewarm endorsement of the Jupiter program by top Army leadership. General Medaris would later claim that very few leaders in the Army understood the potential capabilities of ballistic missiles and, therefore, failed to persuasively argue the Army position²⁹. In November, 1956, Secretary of Defense signed a memorandum which among other things limited the Army jurisdiction over ballistic missiles to 200 miles and assigned operational responsibility of the IRBM to the Air Force³⁰. It was a serious setback for the Army. The Jupiter program, however, was still intact and the Army continued its development. Army hopes for a space role now rested with its team of ex-German specialists working on the Jupiter program.

The Soviet launching of Sputnik I, besides providing an opportunity for the Army to display the abilities of its ABMA design team, also prolonged the life of the Jupiter program. This demonstration of booster technology by the Soviets accentuated the perceived missile gap between U.S. and Soviet forces. Up until Sputnik, pressure had been mounting within DoD to select one missile over the other. The forces causing pressure to decide were quite similar to those which forced Secretary Wilson to assign the IRBM mission to one of the services. Secretary of Defense McElroy had difficulty making a clear choice in late 1957 since tests of both systems had shown no clear technical superiority of one over the other. After Sputnik, Secretary McElroy chose not to cancel either. He, essentially, wanted to preserve his missile options. The Jupiter was well along in successful development and

could be retained to back up the Thor in the event this system suffered setbacks. While the Thor had greater potential for future IRBM upgrades, the Jupiter could be fielded earlier. Finally, both systems showed promise as boosters for the space program³¹.

The Army and the Air Force, as well as the Navy moved forward on multiple paths to put the United States ahead of the Soviets in space. The Department of Defense decided to create an internal defense "space agency" to coordinate and manage these diverse space programs. One week after the launch of Explorer I, the Advanced Research Projects Agency (ARPA) was created by Secretary McElroy. The primary job of ARPA was to initiate and fund space projects with military value. Once research revealed promising technology, ARPA would assign developmental responsibility to one of the services. The Air Force had an excess of Thor boosters available and began to actively seek new space missions. As the Army's General Medaris at ABMA would lament, "The Thor program, having been started on the "lots of hardware" concept, had produced a large number of missiles that were not needed for the IRBM. These became our competitors for the next generation of space boosters. The hardware was offered virtually free"³². The Army, however, had committed most of its spare Jupiter boosters to the Explorer program. Additionally, most of its engineers were involved in a crash program to deploy the Jupiter by the end of 1958.

A new civilian challenger for space operations appeared with the President Eisenhower's signing of the National Aeronautics and Space Act of 1958. The National Aeronautics and Space Administration (NASA) established

by this act was activated on October 1, 1958. President Eisenhower was convinced that military and civilian activities in space should be managed by separate agencies. NASA was granted research, development and management responsibilities for all non-military activities in space³³. The first director of NASA, Dr. T. Keith Glennan quickly moved to assume control of all space projects deemed "civilian scientific". The facilities and engineers to pursue these projects would be transferred by Presidential order to NASA from the services. Dr. Glennan requested the transfer of both the Army's Jet Propulsion Laboratory in California and the Army Ordnance Missile Command facilities. This request, if approved, would have eliminated virtually the entire top structure of the technical bureaucracy which kept the Army involved in space. The Deputy Secretary of Defense, Don Quarles, believing the Army no longer belonged in space was prepared to tell the President that DoD agreed to this transfer. Last minute lobbying by the Army prevented the transfer of all of these facilities and personnel. The Executive Order signed by President Eisenhower moved only the Jet Propulsion Laboratory to NASA³⁴. As it turned out, the Army had only succeeded in delaying the inevitable.

The Soviet Union continued to score the big "firsts" in space. The U.S. space program was faulted in the national press as suffering from a handicap of "organizational confusion", an "arbitrary, irrelevant division of space programs into 'civilian' (Glennan's NASA) and 'military' (Johnson's ARPA)", and "a misbegotten organizational web that at last count included 42 committees."³⁵. In an effort to streamline responsibilities, Secretary of

Defense McElroy decided to move management responsibility for military space projects from ARPA back to the services. His memorandum dated 23 September 1959, however, went further than simply reestablishing earlier service positions. He assigned to the Air Force "the responsibility for the development, production, and launching of military space boosters"³⁶. General Medaris felt that this decision was a victory for the Director of Defense Research and Engineering, Dr. Herbert York, who according to General Medaris was determined to move the Army out of space³⁷. The press had been speculating prior to the McElroy action that the Army leadership had decided to sacrifice the space mission to gain money for needed conventional force improvements³⁸.

Although the exact reasons for this decision by McElroy are difficult to discern, the outcome was clear. The only significant future oriented space development program that belonged to the Army prior to the McElroy memorandum was the Saturn. The Saturn was, essentially, a cluster of missiles designed to lift heavy payloads into space. The loss of control of this program to the Air Force removed the Army's last transport into space and ceded to the Air Force the top spot in this arena. The Army received the authority to continue engineering development of the Saturn for the Air Force. However, failure by the Defense Department to justify a military role for this missile led, ultimately, to the transfer of the Saturn program to NASA. With Saturn went the Von Braun engineering team and the heart of the Army's space program³⁹. The transfer was directed by President Eisenhower and became effective on March 14, 1960. The White House press

spokesman admitted at the time that the effect of the move was "to take the Army out of the field of space exploration"⁴⁰.

One last decision concerning space missions and roles was yet to be made. All services still retained the right to initiate and conduct independent research and development of space systems. Secretary McNamara was alarmed upon assuming control of DoD by the apparently uncoordinated announcement of extensive and expensive satellite development programs by both the Air Force and the Navy. He asked the newly created DoD Office of Organization and Management Planning Studies to assess the state of space research and development planning and to recommend any necessary changes. This group recommended that the Air Force should be assigned responsibility for all space research and development after approval of the Secretary of Defense. This finding was based on the fact that the Air Force already was responsible for over 90% of space research and was significantly involved with boosters and launch support of the remainder. Allowing only one week for service comment, Secretary McNamara approved this recommendation in March 1961 over Army and Navy objections⁴¹. The Army's departure from any substantial active involvement in space system development and exploration was complete. The Air Force now had undisputed military claim to space.

NATIONAL DEFENSE STRATEGY - LIMITED WARS vs "THE NEW LOOK"

Although the Army's plans to develop its space capabilities were thwarted in 1961, there is reason to believe that the Army's leadership welcomed the

final decision. During most of the Army - Air Force struggle over space and missile roles, the Army was engaged in another, more fundamental struggle to maintain a meaningful role in the overall national defense strategy. Years of neglect resulting from uncertainty about the Army's basic defense role in the nuclear environment had left the Army's equipment and force structure badly deteriorated and poorly prepared to wage conventional limited war against growing worldwide Communist threats. Since 1953, a national security strategy dependent on "cheaper" strategic forces had prevented the Army from modernizing its tactical capabilities. The Army's expensive space aspirations were increasingly difficult to reconcile with mounting evidence of the Army's diminishing readiness. By 1961, the U.S. government was becoming convinced that what the Army and the new President, John F. Kennedy, had been arguing for years was true -- that the developing nuclear balance between the U.S. and the U.S.S.R. made conventional war more likely and urgent steps were needed to strengthen Army conventional forces. It is important to realize that throughout the 1950s the Army program to assume new space and missile responsibilities was a secondary concern to Army leaders attempting to limit the negative impacts of Eisenhower's "New Look" defense strategy on more fundamental Army responsibilities on earth. Ultimately, the Army may have been willing to sacrifice space systems as billpayers for the "more essential" and long neglected modernization of land forces.

From its inception, the "New Look" strategy was a threat to the Army's mission and budget. President Eisenhower arrived in office in 1953

determined to reduce government expenditures. He had promised in his campaign to reduce taxes and reduce the government budget. Having concluded peace in Korea on July 26, 1953, he turned his attention to reducing defense spending. When the last Truman defense budget (FY1954) was examined and the savings produced by "management improvements" summed, the savings of \$6 billion were too small to satisfy the President and Senate Republicans⁴². Dramatic savings could only be produced by a fundamentally new defense strategy. In the search for an answer to what Eisenhower called the "great equation" or the balance between defense and domestic needs, the maintenance of large land armies came under increasing attack from budget minded strategists.

The attack on the Army's force structure was led by Eisenhower. He disputed the Truman notion of building up forces to wage war in "the year of maximum danger". While he believed that the Soviet threat was real and growing, he felt that the U.S. must not "peak" in its preparations for conflict, but instead must prepare for the "long haul". To sustain the struggle with Communism for years to come, the U.S. force structure would have to be affordable as well as effective since in his mind U.S. national interests were threatened as much by a weak economy as by overt enemy aggression. The President advocated cost saving achieved by reducing the Army's strength, relying more on allies to combat local wars, and emphasizing nuclear technology⁴³. Eisenhower was unconvinced of any substantial role for the Army in either nuclear or limited conflicts. He felt the deployment of large land armies overseas in time of nuclear conflict would be "extremely difficult

and foolish". Army forces would be needed to police domestic disorders in time of nuclear war and rebuild industrial capacity. In the event of limited war, allied efforts would be supported by at most "a few Marine battalions or Army units." He concluded that, "if it grew to anything like Korea proportions, the action would become one for the use of atomic weapons. Participation in small wars ... is primarily a matter for Navy and Air." 44

Eisenhower's beliefs about the utility of Army forces should not be construed as hostility toward this service. The president was, after all, an Army hero and well aware of the effectiveness of large land armies. His beliefs, instead, reflected the widely held notion that the very nature of conflict had changed when the first atomic bomb dropped on Hiroshima. Henceforth, wars would escalate quickly to nuclear exchanges. Weapons of such vast destruction could and would be used to deter aggressors from starting wars and to quickly destroy an enemy should they attack the U.S or U.S interests. Strategic forces and not conventional ground forces would determine the final outcome in future wars. Since in the early 1950s the U.S. held a clear superiority over the U.S.S.R. in these nuclear weapons, such a view of future wars was reassuring.

These beliefs about deterrence of war by threatening immediate nuclear retaliation were codified as U.S. policy as a result of National Security Council action in the fall of 1953. President Eisenhower had directed the Joint Chiefs of Staff to review defense requirements and suggest ways to reallocate resources and restructure priorities based on a greater reliance on nuclear deterrence. After this exercise, the FY 1955 budget remained \$6 billion too

high. The Chairman of the JCS, Admiral Radford, defended this outcome before the NSC claiming no service chief was willing to sacrifice requirements without specific assurance that nuclear weapons would be used at the outset of future conflicts. As it turned out, he was speaking only for himself without the support of the Army or Air Force.⁴⁵

To obtain reductions in defense spending, the NSC agreed to provide such an assurance of early and total use of nuclear weapons in NSC directive 162/2 signed by President Eisenhower in October 1954. This document was the basis for what became known as the "New Look" in national security strategy. Under its provisions, the defense budget would decrease, Army strength would drop from 1,481,000 to 1,000,000, and six Army divisions would be eliminated. A range of nuclear options would be developed that allowed the U.S. to cut back on large land armies and conventional arms. The Air Force, meanwhile, would be increased in manpower and strategic forces.⁴⁶ Its share of the defense budget jumped from 34.2% in the Truman administration to 46.2% under this new policy.⁴⁷

While numerous Eisenhower administration figures attempted to explain the "New Look" strategy to the public, the best remembered description was contained in a speech delivered by Secretary of State, John Foster Dulles before the Council of Foreign Relations in January 1954. In the speech he stated that,

"We want, for ourselves and other free nations, a maximum deterrent at bearable cost....

Local defenses must be reinforced by the further deterrent of

massive retaliatory power....

The way to deter aggression is for a free community to be willing and able to respond vigorously and at places and with means of its own choosing....

The basic decision was [made] to depend primarily on a great capacity to retaliate, instantly, by means and at places of our choosing.⁻⁴⁸

Based on what became known as Dulles' "massive retaliation" speech, the New York Times the next day concluded that the strategy placed "more reliance on deterrent power and less dependence on local defensive power."⁴⁹

It was no surprise that General Twining, Chief of Staff of the Air Force was the only service chief comfortable with the new strategy. Air Force bombers alone were capable of delivering "massive retaliation" and, therefore, were now the primary instrument of U.S. deterrent power. He supported "massive retaliation" calling it "the answer" to how best to interpret the "New Look" into national strategy.⁵⁰ General Ridgeway, the Army Chief of Staff, was dismayed. He had offered his support of the "New Look" contingent on two assumptions: no deterioration of international security conditions and the agreement of our allies to increase their contributions to international security.⁵¹ Neither of these two conditions existed, yet the transformation of defense policy according to the "New Look" proceeded.

Ridgeway's misgivings were quickly confirmed when Secretary of Defense Wilson approved a new defense budget for FY1955 which called for the

elimination of three Army divisions and the expansion of Air Force wings from 120 to 137.⁵² Of the \$4.8 billion cut from the defense budget, \$4.1 billion came from the Army's budget.⁵³ Ridgeway was reluctant to voice his opposition before Congress, but when repeatedly questioned about his support of the new strategy, he pointed out that Army requirements were increasing in light of the growing Soviet threat. Having publicly voiced his opposition to the doctrine of "massive retaliation", General Ridgeway felt compelled to retire from the service. His letter to Secretary Wilson explaining his opposition to the new strategy contained the fundamental arguments voiced by "New Look" opponents throughout the remainder of the 1950s. He pointed out:

(1) His own experiences in Korea convinced him that limited wars were possible and further that tactical nuclear weapons could not offset the Communist advantages in manpower. Limited wars fought with tactical nuclear weapons demanded more not less soldiers because of the potential of large casualties and the necessity to disperse forces.

(2) The U.S. must maintain forces capable of fighting and winning conventional limited wars in the event nuclear deterrence failed.

(3) The evolving nuclear balance of terror between the U.S. and the U.S.S.R. made the use of nuclear weapons in conflict less and less likely "in recognition of the mutual disaster which would follow."

(4) Soviet forces were sufficient to achieve their aims in limited wars without resort to nuclear forces.⁵⁴

General Ridgeway was not alone in his opposition to the "New Look" strategy. A growing chorus of "defense intellectuals" including Henry

Kissinger, William Kaufman, and Robert Osgood were openly challenging the tenants of the new strategy. George Kennan, in his 1954 book, The Realities of American Foreign Policy, set the tone of these academic arguments when he stated, "the day of total war had passed....from now on limited military operations are the only ones which could conceivably serve any coherent purpose." In time other authors from B.H.Liddell Hart to Bernard Brodie would join in the attack on a strategy which they felt ignored the changing nuclear balance and limited the U.S. ability to combat Communist aggression against other than U.S. vital interests.⁵⁵

It fell to Ridgeway's successor, General Maxwell Taylor to continue the Army's struggle against the strategy of "massive retaliation". The Army's situation was serious. From 1953 to 1955, Army expenditures had been cut from \$16.3 billion to \$8.8 billion and by 1956 army units as far separated as Hawaii and Georgia were being put together on paper as divisions.⁵⁶ He was encouraged by a 1955 NSC review of its 1953 statement of the "New Look" in which it acknowledged that under the condition of mutual deterrence conventional forces capable of rapid deployment would be necessary to combat limited aggression. His hopes were certainly dampened in early 1956 by President Eisenhower's strong support of the "New Look" strategy in his State of the Union message. The President affirmed his belief in the maximum use of science and technology to minimize manpower requirements and the need to buildup ready reserves at the expense of active land forces.⁵⁷ Still, in March 1956, Taylor boldly proposed his policy of "flexible response" as part of his National Military Program. Taylor cautioned that U.S. conventional

force weaknesses might force early use of nuclear weapons and cause limited wars to develop into general war between the superpowers, and he called for enhanced capabilities and flexibility to wage limited wars.⁵⁸

His proposal to develop forces with the flexibility to wage war across the spectrum of conflict was poorly received by his military and civilian compatriots in the Department of Defense who were under Presidential pressure to restrain defense spending. The Chairman of the JCS, Admiral Radford was determined to gain defense economies at the expense of conventional forces. Over Taylor's objections, he convinced the JCS to eliminate from defense planning any notion of a conventional conflict with the Soviet Union. The way was now clear for Radford to propose deep cuts in "nonessential" defense forces. This he did in July 1956 in what became known as the Radford proposal. This proposal to the JCS called for withdrawal of Army forces deployed overseas and drastic decreases in Army force structure. The Army would be redesigned around small atomic task forces capable of resisting limited ground attacks and the mission of the Army would be reoriented toward primarily civil defense missions. What overseas missions remained for ground forces would be handled by the Marines.⁵⁹ His proposal, leaked to the New York Times, so enraged U.S. allies that it was quickly dropped. That it was even considered reflects the extreme pressures on the Army at this time.

Secretary of Defense Charles E. Wilson was also not an ally to be trusted by the Army. Around this time he stated, "We can't afford to fight limited wars. We can only afford to fight a big war, and if there is one, that is the

kind it will be." ⁶⁰ These sentiments were confirmed in the summer of 1957 when he resurrected another version of the Radford proposal and presented it before the NSC. This plan for defense spending from FY 1959 to FY1961 was developed without JCS participation and it struck the Army unaware. The plans purpose, according to Wilson, was to preserve expansion of missile and bomber strategic forces capable of waging general war at the expense of manpower. Two thirds of the manpower cuts would come from the Army as its strength decreased from 900,000 to 700,000 and four divisions were eliminated. Modernization of conventional forces capable of fighting conventional wars was unfunded. Defending his program before the NSC, Secretary Wilson referred to the "approved" policy to "maximize air power and minimize the foot soldier". ⁶¹ While the program was never formally approved or disapproved, it guided DoD guidance to the Army over the next several years.

With the exception of a small, transitory increase in funds in response to the launching of Sputnik, General Taylor's attempts to secure adequate funding to rebuild conventional capabilities were futile. Across FY 1955-FY 1959 the Army continued to receive the smallest share of the defense budget (23%). More telling is the fact that across this same period the Army received only 10% of the defense funds spent on the procurement of new equipment (modernization). The Air Force, by comparison got 60% of the procurement funds. ⁶² General Taylor, shortly before his retirement from the service, complained before the Congress that the Army had gotten less money for modernization in the FY 1959 budget than it needed to replace worn

out and obsolete equipment. He saw no relief in sight for FY 1960.⁶³

As should be apparent from this discussion of the fiscal pressures and strategic debates assailing the Army, space and the Army's role in space exploration was a side issue to the Army leadership. By the time of Kennedy's election, the divergence between Army conventional capabilities and the Soviet threat had grown to alarming proportions. Throughout this entire period, the Army was literally struggling to maintain what it considered its core responsibility to wage effective ground combat. As Ridgeway and later Taylor had argued, once the Soviet Union achieved nuclear parity with the United States, conventional conflict became more not less likely. As a senator, Kennedy had attacked the "New Look" strategy stating,

"Our reduction of strength for resistance in so called "brushfire" wars, while threatening atomic retaliation had, in effect, invited expansion by the Communists in areas such as Indochina through those techniques which they deem not sufficiently offensive to induce us to risk the atomic warfare for which we are so ill prepared defensively." ⁶⁴

As President, Kennedy would likely be willing to send the Army to fight a "brushfire" war in Vietnam. The Army saw this possibility and knew of its weaknesses in force structure and equipment.

Taylor's replacement as Army Chief of Staff, General Lemnitzer testified before Congress that he felt that, " we are reaching the era of mutual deterrence in the field of the types of big missiles, bomber aircraft..." and

such a situation "renders more likely the limited type of war." His solution was to accelerate modernization of the Army to lessen risks in the event deterrence failed.⁶⁵ In 1961, something had to give in the Army budget to fund postponed modernization. The Army's space aspirations paid the bill.

DOMESTIC AND INTERNATIONAL POLITICAL FORCES:

Space and space programs during the 1950s captured the attention of the world. Especially toward the latter part of the decade following the launching of Sputnik by the Soviet Union, national space efforts became identified with national prestige. The United States was shocked out of a certain complacent state regarding "superior" U.S. technology by the small Soviet metal moon passing overhead every ninety minutes. President Eisenhower had initially tried to downplay the Russian achievement, but to his surprise there was a national clamor "to do something" to restore the nation's pride.⁶⁶ Man's conquest of this new frontier somehow caught the nation's imagination. The reasons for this reaction, while fascinating, are not germane to this thesis. What is important is the fact that the formerly arcane subject of space was thrust onto the center of the political stage.

Space programs encompassing satellites, space probes, and manned flight were too expensive for individual enterprise and by their very expensive nature required government sponsored programs. With national prestige at stake and a budget to fund, space became a creature of Congress. The time of formulating space policy in consultations between specialists was

over after Sputnik. Policy choices were now argued on the floor of Congress, in the popular press, and before international forums. While the attention dramatically boosted the money available to conduct space exploration, the number of constituencies to appease also increased.

For the Army this "politicization" of space would have dramatic consequences. Space exploration became a national undertaking rather than a minor adjunct of the military missile effort. Activities in space now reflected national policy and as such were influenced by national as well as international political pressures. Suddenly, scientists, military leaders, and politicians found themselves in a "space race" with Communism. New policy questions about space management, international cooperation in space, and space law were laden with political overtones. Settlement of some of these questions established a fundamentally new framework for pursuing the nation's space programs. The political forces which led to the creation of the National Aeronautics and Space Administration were not specifically aimed against the Army's involvement. Yet, the outcome was the loss of expertise and the Army's hastened departure from space. The political considerations supporting NASA's creation overpowered any concern about a future role for the Army in space.

The period between the launching of Sputnik in October 1957 and the creation of NASA in the spring of 1958 while relatively short in duration was full of political maneuvering. Despite the Eisenhower administration's reluctance to join the "space race", the U.S. Congress was eager to engage in the competition. The clamor was simply that "something must be done" to

restore national prestige. Congress feared that the nation's security was at risk due to the Soviet Union's advances in technology. The Democrats, in particular, demanded action by the administration. Ex-President Truman led a group of 19 members of the Democratic Advisory Committee in a call for the administration to recognize the gravity of the threat and the magnitude of the necessary American response. Stuart Symington (D-Mo.) called the situation a "national emergency".⁶⁷ Criticism of the space program was not limited to perceived flaws in our national defense preparations. Senator Lister Hill (D-Ala.) offered a new ideological explanation for Eisenhower's unwillingness to aggressively pursue the launch of a U.S. satellite. The Senator in a speech to his constituents blamed the slow pace on the administration's unwillingness to use Army scientists since by using these scientists the administration would appear to endorse "creeping socialism".⁶⁸

The principal forums used by various government officials to make pronouncements about space and the nation's space interests were the committees of Congress. The preeminent committee was the Senate Preparedness Subcommittee chaired by Senator Lyndon B. Johnson (D-Tx). He established the committee to investigate the apparent gap developing between the Soviet Union and the U.S. in space and other advanced technologies. His announced goal was "to find out what has to be done" about the "satellites whistling above our heads."⁶⁹ A more cynical interpretation of his motives would center on his political aspirations in the upcoming Presidential primaries. Witnesses before his committee revealed the

disparity of views and interests then existing among government officials involved or concerned in the space business. Their comments succeeded in arousing controversy and attracting press attention.

Dr. Edward Teller complained to the committee about the late U.S. start in the missile development program and credited the Soviet Union's advances in the space field to their advanced "technical foundations" and the Soviet willingness to "work harder." Lt. General James H. Doolittle, chairman of the U.S. Air Force Scientific Advisory Board, testified to the committee that he admired the coordinated space effort of the Soviet Union. He warned that the Soviet's rate of progress exceeded U.S. efforts in some areas and threatened to "pass us in all." When the committee questioned Dr. James P. Hagen, director of the Navy run Vanguard satellite program about his progress, he faulted "higher authorities" for failing to give him the support and priority he needed to orbit a satellite sooner. He confirmed a growing suspicion that space and satellite efforts, when controlled by the military, were subordinated "to higher priority ballistic missile projects." Yet, Garrison Norton, Assistant Navy Secretary for Air in his testimony rejected talk of manned space exploration. He advocated that space efforts be subordinated to the development of ballistic missiles. He stated, top priority should be "to get a warhead from here to its target with accuracy. Nothing should dilute that effort." In other testimony, the committee heard of a growing shortage of U.S. scientists according to the CIA director, Allen Dulles, and a shortage of large missile engines according to General Medaris, director of the Army Ballistic Missile Agency.⁷⁰

Having heard this disparity of views and seen an apparent lack of a coordinated effort, Senator Johnson on January 7, 1958 called privately for a space program which would beat the Soviets in the control of space. He indicated then that the testimony before his committee had convinced him that "control of space means control of the world...far more totally than any control that could be achieved by weapons or by troops of occupation."⁷¹

On the world political scene, the U.S. space program was receiving pressure from primarily the Soviet Union. Soviet Union Party chief, Nikita Khrushchev, in his address before the Supreme Soviet on November 6, 1957, called on the U.S. to join the U.S.S.R. in a "commonwealth of sputniks."⁷² His idea was, apparently, for the U.S. and the U.S.S.R. to compete in the satellite field rather than in nuclear arms. Such a noble thought was lost in his willingness to chide the U.S. for its faltering space efforts. Following the failure of the Vanguard's highly publicized first launch attempt in December 1957, the Soviet Union offered to aid the U.S. in its space program through a plan the Soviet Union presented to the U.N. aimed at providing technical assistance to backward nations.⁷³

The U.N. was the setting for other international political maneuvering regarding the growing space programs of the U.S., the U.S.S.R., and other nations. Senator Johnson was willing to speak before the U.N. on U.S. space policy at the request of Secretary of State Dulles. He told the U.N. Political Committee that there were "no differences with our government, between our parties, or among our people " on "the goal of dedicating outer space to peaceful purposes for the benefit of all mankind."⁷⁴ There were obvious

differences in his own mind based on his earlier confidential appeal for the U.S. to seek control of space.

Still, the U.S. had been pursuing initiatives within the U.N. which seemed to verify the veracity of the Senator's words. On January 14, 1957, the U.S. had presented a plan for world disarmament before the U.N. General Assembly's Political Committee which proposed restricting experiments in man's use of space "exclusively to peaceful and scientific purposes." U.S. delegate to the U.N., Harold Stassen submitted another plan in April 1957 which called for the control of space missiles to prevent an arms race in space. In August of 1957, Stassen had cosponsored additional proposals with Britain, France, and Canada which presented possible inspection regimes designed to ensure that space would be used only for peaceful and scientific purposes.⁷⁵ In January of 1958, Secretary of State Dulles asked for the creation of an international commission to control space and ensure its use for peaceful purposes.⁷⁶ The Soviet Union followed the U.S. lead and made its own counterproposal before the U.N. on March 15, 1958. Like the U.S. proposal, the Soviet plan's aim was to ensure space was used only for peaceful purposes. It proposed to ban military missiles from outer space. U.N. Secretary General Dag Hammarskjold ultimately urged all nations to renounce any claims on space.⁷⁷ The underlying premise of his proposal was that a policy of freedom of space meant that military force would not be used to protect a nation's claim of sovereignty in space.

President Eisenhower was, of course, in the final analysis responsible for the U.S. plans to reserve space for peaceful uses. The genesis of the U.S.

space program had been, after all, Eisenhower's decision to orbit a small satellite in honor of the International Geophysical Year. The civilian character of the IGY effort meant to Eisenhower that the U.S. space program must be free of a military character.⁷⁸ This initial significant space policy decision created a division (at least in the mind of the President) between military and peaceful uses of space. His clear endorsement of ballistic missile programs demonstrated, however, that he recognized that space could not be completely free of military hardware. The President's ability to maintain an artificial distinction between peaceful and military space functions was overcome by Soviet space achievements and a growing demand from Congress, newspapers, and the public to organize the nation's space activities and "catch up." It was growing clear that Eisenhower must soon choose either a civilian or military manager of national space activities.

The launching of Sputnik 2 in November 1957 prompted Eisenhower to act. His first action was to name Dr. James Killian, President of MIT, to head a national program to keep the U.S. ahead of Soviet scientific achievements. He tasked Killian to coordinate U.S. science programs and to promote sharing "appropriate scientific information" with allies.⁷⁹ After the dismal failure of the first Vanguard launch before a watching world audience in December 1957 and severe criticism of the U.S. space efforts by Congressional Democrats, President Eisenhower decided to go beyond simply naming a coordinator of a national scientific program. In February 1958, he designated the Advanced Research Projects Agency (ARPA) within the Department of Defense to manage all U.S. space activities. This was only logical since the military, at this

point, controlled all of the nation's existing space capabilities.⁸⁰

This plan was shortlived, however, since the naming of a military manager for space conflicted sharply with the U.S. proposal before the U.N. reserving space for peaceful purposes. Within the administration, Vice President Richard Nixon appeared to lead the appeal to the President to create a civilian space agency. At a meeting on February 4, 1958, Nixon told the President that the pressure from the public and Congress to create a civilian space agency was becoming overwhelming. Nixon saw a growing alliance between scientists and Democrats united in their demand that the space program have some nonmilitary component.⁸¹ Nixon would later write that he feared military control of space activities since "[c]ontrol of space development by a military agency would mean that peaceful exploration of space would assume a minor role."⁸²

Five options for space management emerged from various proposals before Congress and within the administration.⁸³ These five options included:

1. The establishment of a single agency managed by the military, most likely the Air Force, which would control all government programs in space.
2. The creation of a cabinet level Department of Science and Technology to manage the civilian space effort.
3. The assignment of space to the Atomic Energy Commission.
4. The assignment of space activities to the existing National Advisory Committee on Aeronautics (NACA).
5. The creation of a civilian agency with the responsibility for government space activities except those specifically related to defense.

Each option had its own particular champion in Congress, the press, the public or the Eisenhower administration.

Although the president favored simply expanding the activities of an existing organization the most likely candidate, the NACA, was ill suited according to his advisors. This agency was thought to be too independent of Presidential influence. At this point, space policy had become too important politically to rest in the hands of any agency whose political loyalty was suspect. On April 2, 1958, the President made his decision and sent his proposal to the hill. His solution was the creation of an entirely new agency called the National Aeronautics and Space Administration. Its authority would include the ability to contract for systems development and procurement of hardware, to launch satellites and other systems, and to immediately acquire existing government facilities able to support its space programs. The relationship between the Department of Defense and NASA was left vague as the distinction between military and peaceful uses of space still begged adequate definition.⁸⁴

The President's proposal was passed in early summer 1958 and with some Congressional modifications has become known as the National Aeronautics and Space Act of 1958. In its final form, it conformed to President Eisenhower's desire to separate military and civilian space activities and to ensure civilian control of most of the nation's space efforts. Congressional attitudes about the control of U.S. space activities evidently were also served by this new arrangement. These attitudes were apparent in a report

submitted to the Select Committee on Astronautics and Space Exploration and endorsed by its chairman, House majority leader Congressman John W. McCormack. This report stated that, "It is imperative that the primacy of non military space exploration be recognized, and enforced, by having a national civilian space authority in undisputed, overall control - in conformance with the President's message (April 2, to Congress)."⁸⁵ The National Aeronautics and Space Act of 1958 as passed stated clearly that , " It is the policy of the United States that activities in space should be devoted to peaceful purposes for benefit of all mankind." The defense department was left to manage only those space activities "peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States..."⁸⁶

All of this political posturing and legislative maneuvering resulted, in a final analysis, in a sharp reduction in the military control of space activities. International covenants were on the negotiating table that preserved space for "peaceful uses" and Washington now had a new civilian agency responsible for all except clearly military applications of space technology. Political rhetoric had built political reputations dependent on continuing the "peaceful" exploration of space. The military still held the authority to proceed with military programs in space, but the budget for national space activities now was split between two chief actors, DoD and NASA. Of particular importance to the Army was a section of the National Aeronautics and Space Act dealing with the authority of NASA to secure needed research facilities. Under Section 8 of the act, the director of NASA

was given 3 years to request the transfer of other government activities (subject to the President's approval) to NASA.⁸⁷ This authority was used, as seen in earlier parts of this chapter to gut the Army's research community and lab structure. The mood of Congress and the President was to centralize control of space activities to improve efficiency and catch up with the Russian space achievements. Army requests to maintain control of significant space functions and research capabilities were less and less acceptable to Washington leaders intent on improving U.S. performance in space.

CONCLUSION

From a position of relative strength in the business of space, the Army by 1961 was relegated to a minor role. Certainly, some important space and missile functions remained within the Army's responsibility at this time. Ballistic missile defense and the development of appropriate technology remained an Army function. The Army's Pershing missile was not yet fielded and its development would keep the Army's Huntsville operation active throughout the sixties. The creation and use of ground based satellite communication facilities continued. Still, McNamara's 1961 directive left the majority of responsibility for fielding space and long range missile systems with the Air Force. Space was essentially defined as a mission captured within the Air Force term, aerospace. Much of the Army's research strengths were stripped away and delivered to NASA for use in peaceful pursuits in space. The Army's attention was, more and more, directed

toward correcting deficiencies in its conventional force structure caused by years of underfunding.

The Air Force waged a strong fight to preserve its primary role in the development of long range missiles in order to prevent Army encroachment on its ability to carry out attack of "strategic" targets. The Army move into missiles threatened this core mission which had helped the Air Force achieve its independence after the war. Missiles were, by their very nature, a threat to the Air Force identity relying as they did on other than human guidance. Bombers and bomber pilots worried that their role in the nation's defense would diminish if missiles achieved predicted ranges and accuracies. Light hydrogen bombs of enormous destructive power soon were a reality as were missiles capable of traveling between the continents. In the end, the Air Force saw control of this technology as central to the preservation of important Air Force missions and force structure. Allies within the Department of Defense and contractors anxious to continue their Air Force missile and space business formed a potent political force opposing the Army's continued involvement in these activities.

The Air Force position was significantly strengthened by the Eisenhower concept of "massive retaliation" contained in the "New Look" strategic policy. Founded on a notion of a "cheap" but effective means of deterring Soviet aggression and expansion, the "New Look" favored less expensive nuclear forces over large standing armies deployed overseas. This strategy necessitated delivery means with the capabilities of bombers and long range missiles. All wars were seen as quickly escalating to nuclear exchanges.

The ability to deploy armies or, for that matter, for armies to wage prolonged conflict was suspect according to this line of reasoning. Although support for this strategy waned throughout the latter part of the 1950s, the President remained firmly committed to his "New Look" philosophy. The Army watched as its budget and force structure were decreased to fund the buildup of strategic delivery forces and weapons needed to implement this strategy. As interested as the Army was in space and missile technology, its leadership could not deny the growing crisis it faced as its conventional forces grew obsolete. The bill came due just as the final struggles for space missions and roles moved to the center of the political stage.

Sputnik turned the nation's attention to the management of space operations and the development of a national space policy. Before this Russian triumph, the services labored in relative isolation to achieve the modest goals set for the International Geophysical Year. The onset of the "space race" moved the issue of space into Congress, onto the front page of newspapers, and before international bodies like the United Nations. The nation's peaceful intentions for space became codified in proposals before the U.N. and in legislation passed by a Congress eager "to do something". The Army's control of its own destiny in the space debate slipped quickly away as politicians like Lyndon Johnson and John F. Kennedy wrapped the national destiny around the nation's space aspirations.

ENDNOTES

1. Edmund Beard, Developing the ICBM: A Study in Bureaucratic Politics (1976): 29.
2. Beard, ICBM: 33.
3. Major General John B. Medaris, Countdown for Decision (1960): 53.
4. U.S. Cong., House, Committee on Government Operations, Organization and Management of Missile Programs, 86th Cong., 1st sess. (1959): 36.
5. Beard, ICBM: 142.
6. Michael H. Armacost, The Politics of Weapon Innovation: The Thor-Jupiter Controversy (1969): 51.
7. Armacost, Controversy: 71.
8. Medaris, Countdown: 74.
9. Medaris, Countdown: 122.
10. Medaris, Countdown: 147.
11. John B. Hungerford, Jr., "Organization for Military Space - A Historical Perspective," Diss. Air Command and Staff College, Maxwell Air Force Base, Alabama 1982: 7.
12. Hungerford, "Military Space": 8.
13. Armacost, Controversy: 49.
14. Organization and Management of Missile Programs: 128.
15. Hungerford, "Military Space": 21.
16. Medaris, Countdown: 67.
17. Hungerford, "Military Space": 22.
18. Medaris, Countdown: 200.
19. Beard, ICBM: 22.
20. Beard, ICBM: 29.
21. Beard, ICBM: 35.
22. Armacost, Controversy: 63.
23. Beard, ICBM: 102.
24. Hungerford, "Military Space": 11-14.
25. Armacost, Controversy: 94.

26. Armacost, Controversy: 92.
27. Armacost, Controversy: 96-103.
28. Armacost, Controversy: 114.
29. Armacost, Controversy: 122.
30. Armacost, Controversy: 119.
31. Armacost, Controversy: 171-175.
32. Medaris, Countdown: 230.
33. Dwight D. Eisenhower, The White House Years: Waging Peace, 1956-1961 (1965): 257.
34. Hungerford, "Military Space": 34.
35. "Space: The Maze in Washington," Time (October 19, 1959): 27.
36. William Leavitt, "New Ground Rules for the Space Mission," Space Digest (October 1959): 56.
37. Medaris, Countdown: 257-263.
38. James Baar, "Army Faces Exodus from Space," Missiles and Rockets (August 31, 1959): 11.
39. Medaris, Countdown: 267.
40. Felix Belair, Jr., "Eisenhower Acts to Strip the Army of its Space Role," New York Times (October 22, 1959): Sec. 1, p. 1, col. 4.
41. "Deputy Secretary Gilpatric Explains Pentagon Space R&D Directive," Army Navy Air Force Journal (March 25, 1961): 16-18.
42. Douglas Kinnard, President Eisenhower and Strategy Management: A Study in Defense Politics (1977): 5.
43. Kinnard, Strategy Management: 10.
44. John L. Gaddis, Strategies of Containment (1982): 167.
45. Kinnard, Strategy Management: 24.
46. Russell F. Weigley, The American Way of War: A History of United States Military Strategy and Policy (1973): 402.
47. Weigley, American Way of War: 171.
48. Kinnard, Strategy Management: 27.
49. New York Times (January 13, 1954): Sec. 1, pp. 1-2.
50. Kinnard, Strategy Management: 27.

51. Kinnard, Strategy Management: 25-32.
52. Kinnard, Strategy Management: 29.
53. Gaddis, Containment: 166.
54. Weigley, American Way of War: 419.
55. Maxwell D. Taylor, The Uncertain Trumpet (1959): 26.
56. James M. Gavin, War and Peace in the Space Age (1958): 87.
57. Kinnard, Strategy Management: 48.
58. Taylor, The Uncertain Trumpet: 58.
59. Taylor, The Uncertain Trumpet: 40-42.
60. Gavin, Space Age: 89-90.
61. Taylor, The Uncertain Trumpet: 49-51.
62. Taylor, The Uncertain Trumpet: 65-67.
63. Taylor, The Uncertain Trumpet: 72-75.
64. Gavin, Space Age: 86-87.
65. U.S. Congress, House and Senate, Preparedness Investigating Subcommittee of the Committee on Armed Forces in Conjunction with the Committee on Aeronautical and Space Sciences, Hearings on Missiles, Space, and Other Major Defense Matters, 86th Cong., 2d Sess., (1960): 258.
66. Donald W. Cox, The Space Race: From Sputnik to Apollo...and Beyond (1962): 21.
67. Lester A. Sobel, ed., Space: From Sputnik to Gemini (1965): 7-8.
68. Sobel, Gemini: 12.
69. Sobel, Gemini: 13.
70. Sobel, Gemini: 13-16.
71. Sobel, Gemini: 31.
72. Sobel, Gemini: 10.
73. Cass Schichtel, The National Space Program: From the Fifties into the Eighties (1983): 46.
74. Sobel, Gemini: 31.
75. Sobel, Gemini: 19.
76. Sobel, Gemini: 30.
77. Sobel, Gemini: 31.

78. Schichtle, The National Space Program: 45.
79. Sobel, Gemini: 11.
80. Schichtle, The National Space Program: 48-49.
81. Stephen E. Ambrose, Eisenhower (2 vols, 1984), 2: 458.
82. Richard M. Nixon, The Challenges We Face (1960): 145.
83. Schichtle, The National Space Program: 47-48.
84. Schichtle, The National Space Program: 51.
85. U.S. Congress, House, Select Committee on Astronautics and Space Exploration, The National Space Program, Report No. 1758, 85th Cong., 2d Sess. (1958): 7.
86. Schichtle, The National Space Program: 53.
87. U.S. Congress, Report No. 1758: 71.

CHAPTER #4: TODAY'S ARMY SPACE EFFORT

This chapter looks at the Army's reawakening interest in space from several different perspectives. The initial portion discusses AirLand Doctrine and the Army 21 Concept and portrays the various battlefield requirements and planning procedures which have led Army leaders to seriously consider the development of new space systems to support the ground commander. The next part provides a brief description of the major Army actors involved in space functions - research, planning, operations, etc. The chapter concludes with an examination of the Army's evolving space policy.

AIRLAND DOCTRINE AND THE ARMY 21 CONCEPT: THE PUSH AND PULL TO SPACE

Faced with a growing Soviet threat, expanding regional objectives and responsibilities, and the prospect of limited budget growth, the United States Army today is searching for tactical and technical innovations which significantly increase combat power and assure victory in future wars. A new doctrine, AirLand Battle, "pushes" one to consider space systems. The path to this conclusion begins at operational requirements, winds through critical deficiencies, and ends in space. Moreover, a conceptual plan, Army 21, "pulls" the Army toward its future battlefield configuration. This future specifically encompasses space operations.

According to the Army's own operations manual, FM 100-5, the nature of

conflict is rapidly changing and Army leaders face new challenges as they design the force structure and operational doctrine needed to wage war on future battlefields. FM 100-5 states:

The U.S. Army must meet a variety of situations and challenges. In the 1980s it can expect to be committed in either of two environments. It may fight on a sophisticated battlefield with an existing infrastructure of communications, air defense, logistic facilities, and ports. Or, on a relatively unsophisticated battlefield, it may have to create an infrastructure or choose to fight without one. It must be ready to fight light, well equipped forces such as Soviet-supported insurgents or sophisticated terrorist groups. It must be prepared to fight highly mechanized forces typical of Warsaw Pact or surrogates in southwest or northeast Asia. In the areas of greatest strategic concern, it must expect battles of greater scope and intensity than ever fought before. It must anticipate battles fought with nuclear and chemical weapons.

Such battles are likely to be intense, deadly, and costly.

In particular, the "scope" and lethality of these "battles of greatest strategic concern" is especially troubling to the Army leadership. The future battlefield will be characterized by considerable movement of forces across vast distances complemented by intense volumes of fire. FM 100-5 warns, "linear warfare will most often be a temporary condition at best and...distinctions between rear and forward areas will be blurred." The lethality of weapons on the battlefield continues to increase. Precision guided munitions, sophisticated aerial weapons and aerial platforms, and

advanced tactical ballistic missiles support enemy forces which already enjoy a quantitative edge over the forces of the United States and its allies. The enemy's potent combat power is poised in multiple echelons to strike at decisive points on the battlefield. The years ahead promise no relief from this ominous buildup of threat force capabilities. Advances in laser technology, robotics, and computer assisted decisions (artificial intelligence) will, no doubt, be incorporated into emerging weapon systems.

The Army's search for tactical innovations to overcome these challenges has already produced a significant new operational doctrine - the AirLand Battle doctrine. This doctrine is designed specifically to retain the initiative in battle, to attack deep into the enemy force with decisive maneuver, and to destroy the enemy's ability to fight and organize in depth. According to FM 100-5, the doctrine stresses offense against key enemy weaknesses, since "[t]he best results are obtained when initial blows are struck against critical units and areas whose loss will degrade the coherence of enemy operations, rather than merely against the enemy's leading formations." Success will depend on adherence in battle to the basic tenants of AirLand Battle: initiative, depth, agility, and synchronization.

Initiative is vital to this doctrine since the speed of our decisions and actions can disrupt the methodical, centralized planning of our enemy. Battle leaders are encouraged to react to battlefield situations based on a sound understanding of the U.S. commander's intent or desired ultimate operational outcome. Detailed orders can be important but so too is personal innovation directed toward well understood battle goals. Emphasis on

initiative fosters an offensive spirit, ensures freedom of action, and capitalizes on a historically strong trait of American soldiers¹.

Depth has multiple dimensions. Time, distance, and resources are mentioned in FM 100-5. Course of action development by U.S. commanders requires accurate knowledge of force dispositions and relevant time - distance movement factors. Because of the absence of linear battlefields and the depth of threat forces opposing the U.S. commander, distance no longer relates just to traditional lines of communication. Attack now must include deep thrusts by maneuver forces or weapon systems. These strikes are designed to delay, disrupt, and destroy uncommitted enemy forces before their combat power can be employed decisively by the threat. Target surveillance and identification must be accomplished at far greater distances. Resource depth applies to adequate material stockpiles and reserves to sustain intense battles and assure flexibility of operations².

Agility is the Army capability to quickly execute the plans resulting from battlefield initiative of the commanders. This agility is fostered within the Army by the design of its basic force structure, by the mix of weapon systems, and by the training of soldiers and their leaders. The most desirable characteristic of the new tactical doctrine and technology is flexibility. Leaders must be able to act faster than the enemy and the equipment in the hands of soldiers must enhance this ability. FM 100-5 refers to this ability when it states, "[Leaders] must know of critical events as they occur and act to avoid enemy strengths and attack enemy vulnerabilities. This must be done repeatedly, so that every time the enemy

begins to counter one action, another immediately upsets his plan."

The last basic tenant of Airland Battle doctrine, synchronization, describes "an all prevailing unity of effort throughout the force."³ The intent of the commander is the unifying factor and the aim is to limit the use of any asset which does not further the commander's designated main effort. By coordinating the many systems on the battlefield in a way that synchronizes execution, the commander can magnify the combat power of forces available. To ensure such a synchronization of systems, the commander must be able to spot transitory opportunities to exploit success and, equally importantly, because of prior preparation be able to marshal the necessary forces to take advantage of these opportunities.

Airland Doctrine is an important development in the Army's effort to adapt force structure and operations to the realities of a changing battlefield. Significant demands are placed on the individual leader and on the systems which he uses to fight the battle. FM 100-5 points out some specific system capabilities which must be enhanced to allow the commander to fight and win using this new doctrine.

Command and control improvement is one such enhancement since as the FM 100-5 states, "the commander who continues to exercise effective command and control will enjoy a decisive edge over his opponent." Information and intelligence requirements of a doctrine which stresses agility and synchronization are great. To spot the enemy weakness, to mass available forces, to exploit to the depths required, and to assure flexible operations contribute to the commander's main effort, command and control

systems must quickly receive, analyze, and pass information to appropriate commanders widely dispersed on the nonlinear battlefield. Sensors remote from ground forces will assist in the assembly of necessary battlefield intelligence. Not only can these sensors spot developments as they occur, the information they send can allow attack of approaching ground force echelons or air transported forces which threaten operations at the front or support areas in the rear. FM 100-5 goes so far as to say that, "sensors and communications that make them possible are particularly valuable."

A second force enhancement critical to the successful employment of AirLand Battle doctrine is the improvement of air systems. The ability to project forces through the air to great depth and attack enemy vulnerabilities is a vital force requirement. The agility of aerial systems and their capability to quickly mass significant offensive combat power make these weapons a dominant force on the AirLand battlefield. FM 100-5 concludes, "Effective air defenses or air superiority by one combatant could represent a significant advantage in the conduct of operations."

In its effort to field the equipment necessary to implement AirLand Battle doctrine, the Army has, since 1980, undergone a modernization program without recent parallel. Over this period the Army has purchased 3800 M1 tanks, 2550 Bradley fighting vehicles, 790 Blackhawk helicopters, and 300 Multiple Launch Rocket launchers. While impressive, these efforts to field systems developed in years past have not been well directed. Evidence of this fact is apparent based on a statement made in the Army's own manual used to guide future force development. The Army's Training and Doctrine

Command (TRADOC) in its 1985 revision of the regulation which governs the development process pointedly states that,

In years past, the introduction of new materiel systems determined the requirements for training, organizations and doctrine development within the US Army. However, in recent years, attempts to use the systems designed during the previous decade revealed their inability to fit the force structure, organizations and doctrine prescribed by more recent developments; i.e., AirLand Battle doctrine. It was clear that a more comprehensive approach to Army requirements was needed in order to attain the Army goal of balance between readiness, modernization, sustainability, and force structure.⁴

The manual goes on to detail the Army's new Concept Based Requirements System (CBRS). Essentially, the process described by this system begins with the visualization of how the Army intends to fight and support (eg. AirLand Battle doctrine). This visualization is called a concept and this concept is next further defined based on threat analysis, historical perspective, and technological forecasts. Senior commanders' guidance and approval occurs at progressive stages as the concept is refined by war gaming and functional analysis (i.e. what are requirements for fire support, air defense, close combat, etc.). The approved concept statement, now expanded to include detailed explanations of all functional areas that relate to the basic concept, consists of a listing of functional area operational concepts. The basic visualization of the future war has been converted into requirements that must be fulfilled in order to assure success. The next

step, called Functional Area Analysis, takes the functional area operational concepts mentioned earlier and determines specific tasks and identifies force deficiencies in the area of doctrine, training, organization, and material. This analysis results in proposed corrective actions the Army must take to achieve its concept goals. This entire process has been accomplished with regard to AirLand Battle doctrine and its vision of how the Army will fight and support in the next 10-15 years. Prescriptive steps the Army must take are contained in the TRADOC Battlefield Development Plan (BDP).

The corrective measures, while classified, understandably follow to a great degree the focus of force enhancements emphasized in FM 100-5. Improvements of command and control capabilities, intelligence and sensor assets, deep battle weapons, and air defense/air superiority systems are all addressed. These very requirements have led the Army, in its search for solutions, to space. This comes as no surprise if one considers the Army's historical ties to this medium and the evolving U.S. space policy. From the time of its first involvement in space, the reconnaissance and communication potential offered by space systems has attracted the Army's interest. The Army's involvement with satellites grew out of this attraction. Additionally, the Army's early involvement in space was helped most by its quest to develop the ultimate deep strike weapon - nuclear armed ballistic missiles. This missile expertise would allow the Army to design boosters to lift Army payloads. Finally, the Army's historical involvement with ballistic missile defense and point defense of tactical systems has led to Army leadership in a space program with the highest national priority -- President Reagan's

Strategic Defense Initiative. Thus, when confronted with challenges of the sort outlined above, historical predisposition has put space back on the minds and in the budget of the Army.

While the Army's involvement in space in the near term will not be inconsequential, the role of space in the 21st century promises to be far greater. This conclusion is supported by statements contained in the Army's concept designed to guide force development into the first quarter of the next century. Called Army 21, this TRADOC concept is the product of the Concept Based Requirement System. It describes how the Army will fight in the early 21st century and identifies those capabilities needed by the Army to conduct combat operations. The roots of this new concept are in AirLand Battle doctrine. But, as a concept and not a doctrine like AirLand Battle, Army 21 is intended primarily to guide research and development of new systems and technologies that will enhance the combat power of Army forces fighting on the envisioned battlefield of the future. Doctrine will evolve that integrates these new capabilities with those of the other services and U.S. allies. The tenants of AirLand Battle may remain inviolate but the systems to fight the battle will have changed in response to the futuristic vision of the battlefield contained in Army 21.

This vision is heavily influenced by space and space systems. Discussing the role of space for future Army operations, the Army 21 concept statement draws several conclusions. These include:

First, the Army's reliance on space support activities will increase. Currently, space systems are used primarily

for force enhancement. Communications, intelligence, electronic warfare, and navigation are examples of current force enhancements gained from space assets. However, as the Army evolves to Army 21, the application of new space technology systems must be conceptualized and developed to increase force enhancement capabilities. Also, new capabilities such as force application from space will emerge. As space systems are designed to be fully integrated with earth-based systems, multi-capable sensors and associated communications become integral to the land battle. New capabilities will also be employed to counter space threats to land battle operations. Accordingly, the Army must develop its role in force enhancement and force application missions which may lead to a growing role in space control and space support missions.⁵

The trend toward more dependence on space systems and the emergence of new links between space and land force operations is clearly highlighted in this extract from the Army 21 concept document. With such strong relationships imagined between space and land forces, the issue of control of space systems must be addressed. The Army 21 document does not disappoint the reader on this issue. It states,

[The] growing importance of space systems to combat operations on the battlefields of the future will lead to more involvement by and among functional proponents in the design, development, and control of space systems. To exploit emerging technology provided by space systems and apply crossover technology from research and development in other areas, Army participation in space programs will increase. Greater participation will ensure capabilities

increasingly critical to Army operations are fully incorporated into space systems. Army requirements not met by national programs, joint programs and programs assigned to other services and agencies could be satisfied by capabilities developed and fielded by the Army.⁶

(Emphasis added)

Army 21, founded on AirLand Battle tenants, is the Army's concept designed to "set an azimuth for combat developments in sufficient time to field responsive capabilities."⁷ This azimuth extends through space to its vision of the future battlefield. There is little question that this path is charted by the Army's own internal publications. In citing the Army's interest in the "emerging technology provided by space systems and ... crossover technology from research and development in other areas," the authors of Army 21 also reveal a fascination with the same technological possibilities which prompted President Reagan to pursue his Strategic Defense Initiative. Advances in lasers, high speed computing, kinetic energy systems, optics, and sensor technology all prompted the President to call for research designed to review the feasibility of an effective defense against ballistic missile attack of the United States. This same technology holds great promise for the solution of Army problems on the future battlefield.

And so, the Army is concerned now with defining its space needs and assuming its necessary space responsibilities. Army 21 hopes to provide Army planners "sufficient time" to correctly forecast and develop the needed Army space capabilities. There is also sufficient time to examine how the Army should go about the development of its vital space responsibilities.

This examination has already begun in two particular areas; the Army's organization for space and the Army's space policy.

ARMY ORGANIZATIONS INVOLVED WITH THE "NEW" SPACE EFFORT

The Army's organization for space today is highly decentralized. The most likely explanation for this characteristic is the very nature of the Army involvement in space since 1961. As discussed in chapter 3 of this thesis, 1961 was the year in which Secretary of Defense McNamara announced his directive granting the Air Force responsibility for the development of space programs for the Department of Defense. As sweeping a decision as this at first appears, provisions were made in it for case by case deviations and "exceptional circumstances." Specifically, the memorandum states that, "[t]his assignment of space development program and projects does not predetermine the assignment of operational responsibilities for space systems which will be made on a project by project basis as a particular project approaches the operational stage, and which will take into account the competence and experience of each of the services and the unified and specified commands."⁸

The memorandum allowed the Army to conduct preliminary research to develop space systems it felt could enhance accomplishment of its assigned missions. Once a system advanced beyond this preliminary stage and was approved by DoD for further development, the Air Force assumed the

responsibility for additional research, test, development, and engineering.

In effect, this decision left the Army with a need to develop new ways to use space technology in the performance of its mission. A system of labs remained within the Army structure to conduct this preliminary effort. To integrate the work of these labs with the needs of the Army, staff elements concerned with space systems remained within many Army headquarters organizations. Also remaining were responsibilities for systems in being under Army control or still within other recognized Army missions. In particular, the Army's Advent communication satellite system remained under Army control as did the development of the Pershing missile system and the Nike-Zeus anti ballistic missile system. Satellite communications, tactical ballistic missiles, and ballistic missile defense systems formed the core of Army involvement with space throughout the 1960s and 1970s. McNamara's directive was modified in 1970 (DoD Directive 5160.32, 8 Sept 1970). This change permitted the assignment of program management responsibilities on a case by case basis to other services but the Air Force retained responsibility for the coordination of the program's execution by DoD.⁹ This new directive did little, however, to alter the basic distribution of Army space involvement among staff elements, labs, missile development agencies, and ballistic missile defense agencies.

The difficulty of outlining the nature and scope of the Army's present involvement in space was recognized by Army leadership during the 1985 General Officers' Space Seminar at Ft Leavenworth. The Army's Deputy Chief of Staff for Planning tasked the Army Space Initiatives Study Group to

"compile (an) inventory of all Army organizations working on space to include project list, funding, and number of personnel." In the report submitted by the study group to the Vice Chief of Staff of the Army, Gen Maxwell R. Thurman, the director of the study group, BG William J. Fiorentino, notes some surprising statistics and observations were revealed when this job was completed. One such observation was that the Army lacked any definition of "space activities." To solve this problem, the study group defined "space activities" as "that research, procurement or operation of any system that directly interfaces with or relies upon a space based segment." It quickly became apparent from applying this definition to Army activities that the Army was more deeply involved in "space activities" than at first realized. BG Fiorentino points out "that the Army's level of effort in space activities amount (sic) to over 5000 manyears and \$1.8 billion," and that while "the funding levels associated with space activities are predominantly for Research and Development and Acquisition, the personnel involvement is substantially in the operation and maintenance of already fielded systems." This report appears to be the first of its kind in many years and serves to accurately define the nature of the present Army involvement in space. For that reason, it is reproduced in its entirety in Appendix 1 to this thesis.

A new, more centralized organization for the Army's future involvement in space is evolving. Component responsibilities assigned by the new U.S. Space Command, proposals contained in the completed Army Space Initiatives Study Group, and directives from the U.S. Army Space Policy Council within Headquarters, Department of the Army have all prompted proposed designs

for a new Army space organization framework. Three cornerstones of this organization will determine the basic structure although the specific responsibilities and personnel makeup of each part await final resolution. Each of these three cornerstones center on a functional aspect of Army space involvement.

The first cornerstone involves Army space operations. The proposed organizational element designed to handle this functional area is the Army Space Agency. This agency is seen as an expansion of the U.S. Army Space Planning Group which presently serves as the Army component office of the USSPACECOM in Colorado Springs, Colorado. According to a Memorandum for the chief of the Army Space Office at DCSOPS, Department of the Army, from the chief of the U.S. Army Space Planning Group dated 21 January 1986 entitled Army Organization for Space the mission of the proposed Army Space Agency would be:

"to consolidate management, operational advocacy and planning for Army space operations, to ensure appropriate interface between combat and material developers to optimize use of space-related technology across the spectrum of Army missions in support of Airland Battle doctrine and to serve as functional area proponent for strategic defense."

Additional details regarding this agency to include a proposed personnel and office breakout are contained in Appendix 2. The clear purpose of this organization is to assume operational responsibility for Army space initiatives and to operate in the joint arena to assure Army space needs are

served by DoD space programs controlled by USSPACECOM.

The second cornerstone deals with the training and combat development function. The proposed organization designed to handle these functions under the Training and Doctrine Command is the Army Space Institute based at the U.S. Army Combined Arms Center, Ft Leavenworth, Kansas. As envisioned, this institute would be the Army's schoolhouse for space and the center for Army space studies. As the schoolhouse, the institute would:

1. Develop, refine, and coordinate programs of instruction for joint and Army space training.
2. Develop exportable training courses.
3. Provide instructors to joint space courses.
4. Provide instructor training.
5. Provide mobile training teams.
6. Develop training plans for emerging systems.

As the center for Army space studies, the institute would:

1. Develop space doctrine for the Army.
2. Conduct Army Regulation 5-5 studies.
3. Participate in joint space studies.
4. Participate in wargames, simulations, and exercises.

Other functions performed by the Institute would include acting as Army proponent for personnel matters involving soldiers with space skills, development of space operational concepts, definition of Army space force structure, and documentation of threat space capabilities.

The final cornerstone of the evolving Army organization for space is an

organizational element concerned primarily with the research and development of space systems to serve Army needs. While the Army recognizes the need for some sort of organization devoted to accomplish tasks in these functional areas, no formal structure has been proposed yet. The most likely arrangement may be an agency which combines all or part of the current U.S. Army Missile Command and the U.S. Strategic Defense Command located at Huntsville, Alabama. This organization would probably be subordinate to the Army Material Command and would serve as the Army's single coordinator and developer of space material items.

EVOLVING U.S. ARMY SPACE POLICY AND DOCTRINE

The U.S. Army's evolving space policy and doctrine is based on a small number of relatively recent decisions, studies, and publications. While the Army has certainly maintained a presence in such space operations as satellite communications, ballistic missile defense, and intelligence collection, the existence of a clearly articulated Army space policy has been conspicuously absent until late. Indeed, the directive from the Army's Deputy Chief of Staff for Operations and Plans dated 15 May 1985 which initiated the Army Space Study flatly states in the opening sentence that "[t]he Army lacks a single coherent plan for space activities." The outcome of this study, renamed the Army Space Initiatives Study (ASIS), was the Army Space Master Plan. It is one of the defining documents in the evolution of current Army space policy. Others include:

1. U.S. Army War College Study Project dated 5 June 1984 entitled The Army Role in Space (S) by Moran et. al.
2. Statement of the Army Space Policy by General John A. Wickham and Secretary of the Army, John O. Marsh, Jr. dated 5 June 1985.
3. Interim Operational Concept entitled Army Space Operations (S) dated August 1985.

In an effort to trace the current development of the Army's space policy and doctrine, all four of these documents were consulted. This listing does not pretend to be exhaustive, but it is, without question, representative of the material that currently exists for researchers interested in pursuing the subject of Army space policy. The classified nature of some of these documents necessitates extensive quotations of specifically non-classified text in order to avoid problems. The clarity of the argument, of course, will not suffer by the use of the text.

The first document, chronologically, in this set is the Army War College Study Project which produced the report, The Army Role in Space. Conducted by six students at the War College with various service and civilian backgrounds, this report was written to show that the Army had a role in space, but lacked an organization and policy to execute that role. From visits with personnel "across the Army structure" and with Navy, Air Force, and Space Command personnel, the group collected information to help it compile the final report.

The group found that the Air Force and Navy were well ahead of the Army

in stating policy goals, organizing to manage space activities, and man space oriented organizations with qualified, skilled personnel with appropriate backgrounds in space related training. As the report dryly notes, "Over time the Army has gone from being the pioneer and leading service in space (as late as 1961) to the most fragmented and ineffectual service across the entire service spectrum." ¹⁰ Two exceptions to this indictment are made. The Tactical Exploitation of National Capabilities (TENCAP) program for intelligence and the satellite communications ground terminals developed by the Army's Satellite Communications Agency (SATCOMA) are singled out as notable Army successes in space activities. Still, the report found no single coordination point in the Army for space activities and no clearly defined space policy or doctrine.

After reviewing the potential of space to support functional areas of the Army's mission such as mapping, intelligence, and communications and examining how the other services have organized for space, the group presented its conclusions and recommendations. It offered three distinct aspects that it felt should be considered when determining Army space policy and doctrine. These three aspects were space support to earth operations, intraspace operations, and space support to operations on other celestial bodies. Continuing, the group recommended four performance levels within each of the areas above that should be considered when setting Army requirements. The four performance levels were operational control, hands on system control, system(s) capability, and joint/single service operations concept. The full text of the report's recommendations are contained in

Appendix 3 to this thesis. In brief form, the group recommended that:

"To insure that Army requirements are understood and met, the Army must:

- (1) display awareness and basic interest in all three aspects of space and must formulate a policy, doctrine, and organization that considers each aspect of space to include the four performance levels;
- (2) support a strong unified space command with equal service representation;
- (3) establish an autonomous and technically potent Army space organization;
- (4) consider and incorporate where appropriate technological discoveries to other Army programs.

Exactly one year later, the U.S. Army published the Army Space Policy on 5 June 1985. This policy was the result of work coordinated and led by the Army's space General Officer's Working Group and Army Space Council. The space council consists of Deputy Chiefs of Staff representation chaired by the Vice Chief of Staff tasked with the responsibility of providing broad policy guidance for Army involvement in space. The General Officer's Working Group is chaired by the Deputy Chief of Staff for Operations and is tasked with establishing routine guidance and resolving internal problems related with Army space matters. The Army Space Policy is a short statement of principle and is reproduced here in full. It states:

"Since the Sixties, space has become increasingly important to our national interests, joining the traditional land, sea, and air dimensions of National Defense. Space is host to advanced systems critical to this nation's security. Space systems already make essential

contributions to AirLand combat operations and can play an even greater role in Army missions. Future Army operational doctrine must capitalize on emerging space capabilities.

Consistent with National and Department of Defense policies and in cooperation with other Services and agencies, the Department of the Army will exploit space activities that contribute to the successful execution of Army missions. The Army supports assured access to space and will use space capabilities to enhance the accomplishment of strategic, operational, and tactical missions.

Successful implementation of this policy will require development of a pool of Army space expertise and judicious planning, to include development of concepts, requirements and a long term management strategy. Army plans and evolving space architecture must capitalize on national and joint programs, preserving options to support initiatives that fulfill Army requirements. Implementation of this policy demands a visionary outlook to exploit fully evolving space capabilities."

The third item examined in an effort to define the evolving Army space policy and doctrine is the Interim Operational Concept entitled Army Space Operations which was published by the Army in August 1985. This document is a product of the Concepts Based Requirements System mentioned earlier in this chapter. In its own statement of purpose, the document states that "[i]t

is the initial step to provide a basis for Army doctrine, training, organizational structure, and material acquisition efforts for U.S. Army space operations." Continuing, it states that "[t]his concept provides the conceptual base for the Army Space Master plan, the development of other space-related operational concepts (such as Ballistic Missile Defense), and future efforts to better define the Army's role in space." A classified document, the Interim Operational Concept still contains unclassified text which clearly reveals the overall importance of space to the Army's future and the Army's general plans to become involved more actively in space activities.

It is important to point out here that this operational concept views the Army's space involvement in an intentionally broad context in order to encompass the full breadth of potential space operations and applications of potential benefit to the Army's future battlefield needs. The document is meant to raise questions for future research and pose challenges for possible technological solutions. An important disclaimer stated clearly in the text of this document emphasizes, however, that:

Existing treaty agreements limit the employment and use of space systems and activities in space. This concept is not a plan to integrate or deploy systems in violation of these agreements." (Emphasis provided)

The premise used by this document to substantiate the inevitable dependence by the Army on space is much the same as the one used at the beginning of this chapter. AirLand Battle doctrine and the Army 21 concept both call for improvement in functional capabilities in support of Army

missions which have traditionally been areas of strength for space systems. Such functional areas as communications, command and control, and intelligence which are particularly enhanced by space platforms receive attention in this interim report. The story does not stop here, however, since the intent of this document is as much visionary as practical.

Space mission areas are first defined and then the Army's potential contributions and involvement are detailed. The space mission areas and definition offered in the report are:

1. Space Control Operations - Operations providing freedom of actions in space for friendly forces while denying it to the enemy. It consists of two parts:

a. Counter space operations - those operations conducted to gain or maintain control of, and dominance over, the space medium.

b. Space interdiction operations - those operations conducted to destroy, neutralize, or delay the enemy's military space potential before it can effectively be brought to bear against friendly forces.

2. Space Support Operations - Operations in support of systems in space and operations by space systems to support terrestrial forces. Such operations include:

a. Operations to launch, maintain, sustain, and recover space systems.

b. Operations in space which directly support terrestrial functions. Such support can be further subdivided into two additional categories. They are:

(1) Force application - The engagement of terrestrial or aerospace targets to include enemy ground assets, aircraft, and space systems by weapons on space platforms.

(2) Force enhancement - The conduct of combat support operations involving the use of space systems to improve the effectiveness of

functions performed principally by terrestrial forces.

The purpose of this whole exercise of definitions becomes apparent when the interim concept report continues and first describes the Army's operational concept for space in the terms offered above and then details the evolution of Army involvement in the spectrum of space mission areas over the near, mid, and far term. Few limits are apparent as the Army extends its operations into what is called in the document, the fourth medium (air, land, and sea being the first three) and across the entire spectrum of conflict fought at the strategic, operational, and tactical levels.

The Army space missions are described as follows:

"The Army has an interest in both the Space Control and Space Support mission areas. While Space Control is primarily the purview of other services at this time, it has a significant impact on the land battle. The denial of space to the enemy will soon become as important to the Army as control of the air over the battlefield is today. The Army continually monitors Space Control operations and is sensitive to opportunities to participate. Within the Space Support mission area the Army will be much more actively involved. The launching and recovery of satellites and operation of the Space Transportation System can be compared to today's airlift operations. The Army is actively involved in determining requirements but does not fly the missions. However, space transportation support responsive to future Army needs may lead to Army capabilities to deploy and recover space assets. Other space support missions, such as extraterrestrial mining and construction (both in space and on celestial bodies) may well be functions for the Army. Additionally, the development of an education system and viable career progression for personnel involved in space

operations, and a support organization to request, monitor, and control the use of space systems are already being explored. In the near future the most significant role for the Army space operations is in the area of force application and force enhancement."

The role of the Army operations in force application and force enhancement noted in the last sentence above is one of the current trends highlighted by the report. The rationale for stating that the Army's involvement is bound to increase in these areas is based on the Army's need to configure lighter, more easily deployed units to support worldwide commitments. Space systems can handle communications and enhance firepower, for instance, while actually decreasing the load carried in deployments. Another trend influencing the Army in the near term is based on the growing importance of space systems to ground operations. Inevitably, as more and more Army operations are dependent on a space link Army functional proponents like the Field Artillery, Signal, or Aviation will increasingly insist on more active involvement in the design, development, and control of space systems.

These stated missions and developing trends lead to an evolution in Army space operations across time. In the near term, the Army will be primarily a user of space systems relying on other agencies as owners and operators. The Army influences control of existing space assets by articulating requirements, designing ground based terminals to interface with space systems, and participating in the newly formed unified Space Command. Army space requirements must be supported with the procurement and

designation of personnel, both civilian and military, in appropriate skills. The Army will continue participation in the US Manned Space Flight Program."

The Army's involvement in a broader range of missions is evident as the document describes the Army's roles in the mid-term. It states that in the mid-term:

"Increasing ground force enhancement and emerging force application capabilities require the Army to continue to expand its share of space support. The Army may continue to be primarily a user, rather than an owner, of space systems; but a user with increasing needs and demands. Requirements, and corresponding obligation for resources, will continue to increase, and applications for space systems will spread to new functional areas. This includes the development of extraterrestrial construction capability, and the application of measures to ensure critical space assets are protected. As research and technology mature the Army will have an increased role in ballistic missile defense."

Finally, in the far term, the Army moves into further space mission areas. Army roles at this distant date are described as follows:

"A significant Army role in ground force enhancement and force application missions, space operations support, and participation in space control will require the Army to be a full and equal partner in the development, design, and control of multi-mission systems....Requirements not met through joint systems will be filled through development and employment of Army systems."

Additionally, in the area of space support, the Army envisions the potential for a greatly expanded role. The point is made that, "[r]equirements for

responsive launch capabilities will encompass a greater role for the Army in the operation of space transportation systems. Army requirements may lead to Army capabilities to launch, operate, and recover Army space assets."

The Interim Operational Concept summarizes with an appeal to Army commanders to consider, plan for, and employ new technologies and new concepts based on space activities to enhance the accomplishment of Army missions. It concludes by saying, "The Army should define its role, identify its requirements, plan strategies for involvement, and begin working with the other services to make maximum use of the Fourth Medium."

The most recent document to discuss the Army's space policy and doctrine was prepared in response to this call to action contained in the Interim Operational Concept. It is called the Army Space Initiatives Study and it was published 13 December 1985 by the Army Space Initiatives Study group at Ft. Leavenworth, Kansas. This report is the Master Plan for the Army's exploitation of space through the first quarter of the twenty-first century. According to its charter from the Army Space Council, the study group was to make recommendations on material investment, personnel education, training, career management, and organizational structure.

The study is still out to the field for comment at the time this thesis is being written. Despite this uncertainty about the shape of the final product, it is clear that the report will serve as a comprehensive plan of action for the Army in its development of its space capabilities. Of particular interest here are several statements contained in the document which advance the definition of the Army's space policy and reveal the evolving view of space as

seen by Army planners and leaders.

One sentiment which serves to guide the development of this plan throughout the report is captured in the phrase which opens chapter V of the report, "Space is a place, not a mission." This statement of fact is used to convey both the unique attributes of this place which can benefit the Army commander and to assert that this place is not an arena for contentious battles between services over missions and roles.

Some new functions are described to help guide future thinking about the Army's space policy. The exploitation of space to support Army missions requires the performance of "four vital functions":

1. Focus - emphasis on space and space related systems to ensure maximum utility. Designation of a proponent for space within the Army would provide the necessary emphasis.
2. Interaction - emphasis on coordinated development and use of expensive space assets within the Army and between the Army and outside services and agencies.
3. Integration - emphasis on blending the space products developed into the established framework of the Army.
4. Operations - emphasis on enhancement of the Army's ability to deter war and defeat the enemy with space systems in the event deterrence fails.

Another contribution made in the policy area in this report is the statement of the Army space goal. In the section on organizational development, the goal is said to be that, "[t]he Army will exploit space activities and opportunities that contribute to the successful execution of

Army missions." In a later section on organizational requirements, an interesting distinction is made between the way the Army views space and the way space is viewed by other services. Terming the difference in viewpoint as the "Fundamental Factor", the report notes:

"The Air Force and Navy define space system as the orbital component and the communication and control systems that directly control the orbital component. Systems using signals from the orbital payloads, such as Global Positioning System receivers and satellite communication receivers, are not considered by those services to be space systems, but rather navigation systems and communication systems. They do not recognize space-related systems as a separate category. In short, the Navy and Air Force have a space system orientation in their space activities, whereas the Army has user orientation for space activities. Space has value to the Army only as it has value to users in the ground forces."

The Army Space Operational Concept put forward in the report is a new addition to thinking in the policy area. This operational concept was developed apart from the process described in the Concepts Based Requirements System portion of this chapter, but it certainly complements the material contained in the Interim Operational Concept outlined above. This statement of the operational concept was developed jointly by the members of the study group and the Combined Arms Combat Development Activity at Ft. Leavenworth. The operational concept states that:

1. Space operations are a logical extension of the battlefield.

2. Space offers the commander a substantial increase in operational capabilities.

3. Space control and use will be directly linked to success on the terrestrial battlefield.

4. Space based command and control systems could provide the means for true battlefield synchronization of all combat functions.

5. Space provides a unique view of the battlefield that offers the commander a significant operational and tactical advantage.

6. Space-basing provides unique security advantages in support of all combat functions.

One other advance in policy definition contained in the report is a listing of certain policy and legal tenants which impact the plan for the Army's move into space activities. The listing states that the Army space program will:

1. Not change the Army's basic mission.
2. Reflect the increasing importance of space.
3. Be consistent with national and DoD policies.
4. Enhance accomplishment of strategic, operational, and tactical missions.
5. Capitalize on national and joint programs.
6. Make the Army proactive in space.
7. Exploit space as an additional dimension of national defense.

The unclassified sections of the report's executive summary have been extracted and placed in Appendix 4 of this thesis. This material is provided to show the direction of the plan of action contained in this report. Evolving

Army space policy has prompted the outcome shown in this summary and, without question, future changes in space policy will be caused by implementation of recommendations contained in the Army Space Initiatives Study.

CONCLUSION

The Army today must consider expanding its activities in space in order to meet growing requirements for its ground based forces. Tactical and operational doctrine now guiding the Army's preparation and conduct of combat emphasizes functions like reconnaissance, command and control, communications, and aerial attack which have traditionally been strengths of space based systems. The Army's own blueprint for the battlefield of the next century envisions an expanded and critical role for Army systems in space. This blueprint is presently driving the development of equipment and doctrine. Like a self fulfilling prophecy, the idea of increased reliance of the Army on space will move closer to reality as new systems dependent on a space link are fielded and integrated into ground operations.

The Army is well prepared to expand its activities in some areas of space technology like strategic defense. Years of experience underlie Army expertise in this area of technology. As strong as the Army is in strategic defense, it is undeniably weak in the area of space operations, space support, and space personnel management and training. This condition is less the result of poor or incorrect decisions and more the natural

consequence of the Army's past tendency to view itself as a customer rather than an operator of space systems.

This attitude is changing as evidenced by recent Army statements and research initiatives. The Army's announced space policy asks Army leaders to adopt a visionary approach in their search for new ways to exploit space to meet Army requirements. The development of space expertise is established as a goal of Army official policy. Published summaries of present Army space activities show convincingly that the Army already is deeply involved in this arena although its efforts are highly decentralized. Organization proposals for the Army's space involvement are now appearing. It is clear from these proposals that operations, research, and training responsibilities will be centralized and placed beneath existing Army commands.

The future prospects for Army space involvement as described by its own literature are relatively unbounded. While anxious to become an active member of the new unified Space Command and to cooperate jointly with the other services in space endeavors, the Army appears willing to consider independent development, launch, and operation of its own space systems. The question remains whether such efforts attempted by the Army in the future will retrace old steps or move along different, more productive paths.

ENDNOTES

1. U.S. Army, FM 100-5, Operations (1982): 2-2.
2. U.S. Army, Operations: 2-2.
3. U.S. Army, Operations: 2-3.
4. U.S. Army, Training and Doctrine Command Regulation 11-7 (1985): 2-1.
5. U.S. Army, Concept Statement: Army 21 (1985): p-2.
6. U.S. Army, Army 21: p-2.
7. U.S. Army, Army 21: 1.
8. "Sec'y McNamara Decides: AF Will Be Supreme in RDT&E Space Tasks," Army Navy Air Force Journal 98 (March 11, 1961): 771.
9. Cass Schichtle, The National Space Program: From the Fifties into the Eighties (1983): 36.
10. Walter J. Moran, et. al., The Army Role in Space (U) (1984): 3.

CHAPTER 5 : CONCLUSIONS

Having now presented both a historical sketch of the Army's early involvement with space and space technology and a review of present day developments in Army space efforts, certain conclusions can be drawn concerning likely difficulties facing Army leaders as this service expands its space activities. The limitations of these conclusions are freely acknowledged by the author resting as they do on interpretations of historical precedents and analysis of selected forces responsible for the Army's earlier departure from largescale involvement in space operations. In defense of these conclusions, however, it should be pointed out that the forces examined such as interservice rivalry, strategic debates, bureaucratic dissent, political maneuvering, and fiscal constraints remain everpresent within U.S. society and the American government. Care was taken to analyze the circumstances of the first Army space experience in terms of these constants of American life.

In the conclusions which follow as, perhaps, in the account preceeding this chapter one might perceive something of a "sour grapes" attitude regarding the diminished Army role in space. Such an impression is understandable since the story of the Army's earlier departure from this arena includes adversaries and allies, winners and losers. Still, it must be stated that the author found no sign in his research that the Army feels particularly embittered over past decisions regarding missions and roles in

space. The intent of this thesis was to portray disharmony which thwarted Army efforts in the past in order to warn of potential trouble areas in the future. Such a theme should not be misconstrued as a call to battle those forces which caused past defeats. The hope is rather that the Army will be spared similar battles in the future which may inevitably lead to the same unproductive outcomes. The space needs of the Army are greater than ever, yet resources of all kind remain constrained. Cooperation on space activities between services is essential and the prospects for such harmony are heightened by the newly established unified Space Command. The conclusions will hopefully help the Army to chart its way toward renewed involvement around potentially irreconcilable differences and bureaucratic or political realities.

The conclusions presented below are generally summary statements relating back to historical experiences or emerging policy points. They are grouped into four categories depending on the effects or implication drawn in the conclusion. Three categories relate back to the forces in the 1950s acting on the Army in its conduct of space activities which were highlighted in the chapter three of the thesis. These forces are inter-service rivalry, the national defense strategy debate, and national and international politics. One other grouping is presented. This force is bureaucratic pressure internal to the Army. This pressure certainly existed in the earlier era and was described although it was not specifically highlighted. At the end of this detailed listing of conclusions are several general closing observations. Conclusions and observations reached in each area are presented for the

consideration of Army policy makers as they consider future Army steps back into the space arena.

INTER-SERVICE RIVALRY

1. As the Army seeks to develop its ability to "see deep and strike deep" in order to accomplish operational objectives on the AirLand battlefield, the control of weapons and systems needed to accomplish such deep battle tasks will be in dispute. The definition of strategic versus tactical targets may once again cause disagreement over who should direct the attack of a particular enemy strength using systems based in or traveling through space. The Air Force can be expected to defend its control of such systems based on the strategic nature of the potential targets. The Army, on the other hand, may adopt the argument used to defend Army control of the Jupiter IRBM and call any enemy capability to destroy the theater logistical base a legitimate tactical target whose attack must be directly controlled by the ground commander. Range restrictions on weapons were used in the past to delimit responsibilities of different services in the attack of various battlefield targets. Altitude of may be added to this scheme in the future. The Air Force can be expected to strongly oppose the replacement of manned aerial systems under its control by unmanned space systems with force application capabilities under the control of other services.

2. The Air Force today has devoted much time and money on the development of intercontinental range missiles and launch facilities for

military space systems. Force structure has been designed to support accomplishment of these missions. Army reentry into long range missile development or operations might threaten Air Force missiles and missilemen in much the same way the first Army venture threatened bombers and their pilots. While a move by the Army back into development of long range missiles is hard to imagine, an attempt by the Army to control launch operations for long range missiles supporting Army systems is not. The Air Force can be expected to resist Army attempts to gain operational control of launch capabilities which appear to diminish Air Force responsibilities in this activity.

3. Just as in the 1950s the Army used its superior technological abilities to maintain its claim to the space role, the Air Force can be expected to assert its "unique" expertise in present day disputes which may arise over service requirements. This argument may be even more convincing today given the recognized Air Force top position in space since 1961. The Army long ago lost the technical experts which gave it an ability to challenge solutions offered by other services to space problems. The McNamara decision to assign research and development responsibilities to the Air Force assured this service the power to effectively veto system designs which fail to conform to Air Force specifications. These specifications naturally are written based on mission requirements envisioned by primarily Air Force planners. In the battles of the 1950s between the Army and the Air Force, both had claimed unique battlefield requirements necessitated independent missile and space programs. It is difficult to imagine that these

requirements today are any less dissimilar. Despite such differences, Army systems will, most likely, have to fit into Air Force packages until the Army rebuilds its capabilities to not only design but also launch and operate its own space hardware.

4. The Army will be faulted on its ability to employ weapon systems beyond the range of its own reconnaissance assets. President Eisenhower used this argument against the Army's long range missile involvement in earlier years. This is essentially a "Catch 22" since without weapons capable of striking deep the Army lacks a need for deep reconnaissance assets and *vica versa*.

5. The Air Force and Navy can claim survivable launch platforms to access space. The Army can not. As the nation's defense becomes increasingly dependent on space and the access to space, the Army may become less able to substantiate the continued existence of large land forces. This happened under the auspices of a "massive retaliation" strategy when the Army lacked a key capability judged vital to national defense; in that case, the ability to attack strategic targets. Only renewed interest in limited war fighting capability prompted by President Kennedy's pronouncement to "go anywhere and pay any price" in the defense of freedom reversed the trend against large, deployable land forces. The Air Force and Navy will always be able to show how a cut in modernization funding will adversely affect their ability to access space using their integral launch platforms. The Army's own lack of a launch capability makes any loss in USAF or USN launch facilities more severe. While the Army would be a natural and energetic ally

for the other services in their fight to preserve modernization funds for launch platforms, it is not clear that these other services would be equally committed to preserving Army ground systems dependent on a space link.

6. Space systems are potentially superior to manned aircraft flying within the atmosphere. For example, space systems can remain in orbit, unattended until needed. Reaction time against ground targets anywhere on the earth is measurable in minutes rather than days. Survivability is excellent for such systems and can be enhanced by engineering. When or if weapons are placed in orbit, most if not all Air Force missions (reconnaissance, air interdiction, battlefield air interdiction) performed to assist the corp commander in his battle can be performed at potentially less cost by space systems. All of this points toward direct threats to the core missions of the Air Force. Even close air support becomes problematic if each side acquires effective strategic defense technology capable of defeating incoming ballistic missile warheads. Once such technology for point defense is readily available on the battlefield, defense against relatively large attacking aircraft may well become a trivial, secondary function for strategic defense assets. The Air Force can be expected to fight vigorously for control of the development, operation, and employment of systems which so threaten its air force.

7. Aerial systems are termed a dominant force on the AirLand battlefield due to their agility and ability to strike to the full depth of the enemy forces. Depth for the corps commander now extends to ranges in excess of his available tactical weapons. The tactics dictated by AirLand

depend heavily on the defeat of enemy elements in the "deep battle". There is little doubt that the Army appreciates the Air Force desire to first win the air battle to allow subsequent support of land operations. Yet, the pressure to strike against encroaching echelons could force Army commanders to demand weapons like space systems which are unmanned, accurate, and capable of being effectively employed regardless of air superiority or parity in that sector of the battlefield. This is obviously a zero sum development for as the Army gains the ability to strike deep targets with assets under its control, the Air Force loses targets which for years have supported development of Air Force force structure.

8. Definitions could once again be used to co-opt Army prerogatives in space. Aerospace was a term coined by the Air Force to emphasize that air and space were simply different points along a continuum over which the Air Force exercised rightful control. Additional terms such as space control operations, counter space operations, space support operations, and force application have entered the military lexicon since the earlier days of military space activities. All of these terms imply missions. Although the Army would prefer to claim that space is a place and not a mission, there will, no doubt, be continued debate between the services over rightful roles in the activities mentioned above and others as yet undefined.

THE NATIONAL DEFENSE STRATEGY DEBATE

1. Overemphasis on strategic systems and strategic deterrence will

diminish the funds available for conventional arms despite the clear growth of the conventional threat. The Army's struggle to reverse the trends brought about by the "New Look" demonstrate this conclusion. The more defense space activities are cast as strategic efforts and space as a strategic medium, the more services with "strategic" roles benefit. The Army will be the clear loser and must first and foremost champion the principle that space systems enhance the conventional forces of all services.

2. Any final or best strategic solution to the nuclear balance whether called massive retaliation or strategic defense only makes conventional war more likely. The Army must keep this idea central to its thinking as it designs force structure or embarks on quests for new missions or roles.

3. Eisenhower's attempts to solve the "great equation" between military readiness and economic solvency show that in an era of politics dominated by concerns about deficits and economic consequences strategic threats to U.S. survival receive top priority within our government. While this is an entirely appropriate decision given the potential devastation weakness in this area could bring, the effect of placing strategic concerns first in a period of austerity is to make conventional force needs a very distant second. This tendency is only exacerbated as the top priority strategic systems become more and more expensive.

NATIONAL AND INTERNATIONAL POLITICS

1. The Army will require champions within and without the service to

advance Army space positions before Congress, with other members of the executive branch, and to uniformed Army leaders. Ventures into space will be risky and of limited apparent short term benefit. Roles and missions controversies sparked by Army moves into new operational areas in space pose risks here on earth. Congressional testimony which contradicts JCS or DoD positions has damaged and ended careers in the past. Senior Army leaders alone can overcome internal reluctance to significant changes in operations and technology. These same leaders as well as ranking officials within DoD and other agencies of the Executive branch (NSC, OMB, NASA, etc.) must support Army positions or differences discovered before Congressional committees can strand the Army without bureaucratic allies in the fight for budget authority. The executive branch in particular must understand why the Army is in space. The hard resource tradeoff decisions are made here based on understandings of roles and missions.

2. Count on a notable Soviet space triumph like a space station or an orbiting weapon platform to prompt renewed interest in and criticism of existing U.S. space efforts. The service with the best technological answer to the Soviet move will get the greatest emphasis in terms of added resources and strategic priority. But, political good will is transient and should not be counted on indefinitely.

3. A "space race" with the Soviets may well be in an area of technology or systems far different from that which best serves the needs of the ground commander. This is significant since there is only so much the nation is willing to spend on space activities. For example, it could be argued that the

"race" to the moon satisfied the nation's spiritual needs directly and the military's needs only indirectly. This argument is not against the utility of going to the moon but rather deals with the opportunity costs of this expensive noble adventure. Political considerations and political posturing can lock the nation into expensive space programs in the name of peace which actually by sapping funds for prudent development of space systems for national defense only increase the likelihood of war.

4. The suspicion voiced first within the White House by Vice President Nixon and later before Lyndon Johnson's Senate Preparedness Subcommittee by Vanguard program director Dr. Hagen about the ability of the military to subordinate military priorities to purely scientific needs still lingers. "Excess" military involvement in space at the expense of purely scientific research is still a popular theme with the press. This theme pervades recent accounts about how the shuttle disaster and the resulting delays in shuttle flights has caused the schedule of subsequent flights to be dominated by military missions. This sentiment will always enter debates in Congress over how much is enough for military space activities. The Army must realize that there are very real politically defined limits to the military's involvement with national space efforts.

5. Beware the strong space proponent. Senator Lyndon Johnson felt that control of space translated to control over troubled areas in a manner far superior to control by troops of occupation. Enthusiasm carried to this extreme, while beneficial to Army space efforts, dilutes or damages arguments for the continued presence of large land forces.

6. Initiatives before world organizations like the U.N. or World Court can impact on military uses of space. U.S. actions must conform to its pronouncements about the peaceful use of space. Arms control agreements, legal briefs, scientific accords, etc., all define the U.S. position concerning space and its uses. In fact, history shows a U.S. track record of "peaceful" proposals. "Peaceful" uses are politically more acceptable than military uses. The Army's efforts may be thwarted by political attitudes built on the premise that space must be preserved for peaceful uses rather than uses for peace.

7. The desire to centralize control of space systems and space operations in order to improve efficiency and eliminate redundancy moves space activities and the control of space activities away from small actors (the Army) and toward the large actors (NASA and the USAF). The impulse to centralize control will grow when the U.S. must "catch up" to Soviet accomplishments or correct problems with the performance of space systems whether they are Vanguard satellites or space shuttles.

8. Although not emphasized in the account of the historical involvement of the Army with space, there was a distinct difference between how the Army and Air Force handled R&D for its missile and space systems. The Army relied on its "in house" expertise within its arsenal system. Specifically, the Army used its teams at Huntsville, Alabama and at the Jet Propulsion Laboratory in California to conduct research and development before handing off production to outside contractors. The Air Force, on the other hand, used outside contractors from the start of its R&D process

through production. The political constituency was obviously broader behind Air Force systems and, therefore, Air Force involvement with space systems in general. The same difference in R&D styles persists today.

BUREAUCRATIC PRESSURES INTERNAL TO THE ARMY

1. If the Army's space expertise is not built on a broad base of technical capability and professional staff support, its hold on independent space activities will be weak. As with the transfer of the Dr. Von Braun team to NASA, the loss or reassignment of a single team or research cell could severely hurt the Army's efforts to pursue its needs in space.

2. Complaints by General Medaris in the 1950s about the lack of appreciation within the Army for the potential of missiles and space are probably no less valid today. The Army's long absence from active involvement in space has certainly compounded any lack of awareness perceived by General Medaris. The need to modernize the force to fight on the AirLand battlefield is urgent and will not be accomplished cheaply. It will be difficult to battle for space hardware of unproven worth the longer deferred purchases of major combat systems threaten force readiness.

3. While in development, competing systems give decision makers a range of choices and, therefore, are more likely to be provided needed funding. But tolerance of "redundant" system during research and development does not mean tolerance of multiple systems in the operations

stage of the hardware lifecycle. False expectations built on R&D tolerance can sap support for future space efforts if the Army leadership witnesses the loss of operational control upon fielding. Serious credibility problems arise if the likelihood of operational control is oversold.

4. As the loss of Saturn development demonstrated, the Army must have a clearly defined military role for any space hardware it seeks to develop. Otherwise, as expenses mount the program will either be cut by Congress or it will be assigned to its appropriate "civilian" master, NASA. It is especially dangerous to tie the heart of Army research expertise to any single program. Transfer of the program besides causing the loss of expertise also makes any remaining professional staff appear to be superfluous. Subsequent reassignment or reduction of these "excess" personnel with critical skills only compounds the Army's loss of skilled space technicians.

5. The Army's hold on independent research and development for space is tenuous at best since any comparison of space research activities between services demonstrates the small size of the Army effort in dollars compared to the other services. When McNamara discovered that the Air Force was conducting 90% of space research in 1961 he decided to consolidate all such research under this service. Similar efficiency moves made by future DoD officials in response to Congressional or public criticism could again restrict the expansion of Army research and resultant space activities.

6. Real and potential restrictions on the Army budget caused by Gramm-Rudman are much like the restrictions imposed under the "New Look" strategy of Eisenhower. Neglect of conventional force structure in order to

fund strategic (defensive or offensive) strength causes increasing alarm among Army leaders who remain painfully aware of growing threat conventional capabilities. The longer the delay in funding modernization, the greater the pressure to sacrifice "marginal" programs (eg. space) with distant or uncertain benefits in order to fund necessary modernization of present equipment and force structure. A hypothetical Army space system begun today would not be ready for fielding for 7-11 years. If, coincidentally, fiscal restraints were imposed on the Army over the same time period in the area of conventional arms and force structure modernization, the decision to field the hypothetical Army space system would be considered at a time when conventional force modernization needs were paramount. This scenario, while hypothetical, seems quite plausible in light of Gramm-Rudman and overall Congressional concern over the budget deficit. The fielding of unique Army space systems under Army control will, no doubt, be controversial. Just when the Army would need a concerted effort in support of Army needs in space, more pressing conventional needs may loom and demand top priority at the expense of space.

7. Involvement by the Army in the Strategic Defense Initiative will remain acceptable to Army leadership as long as funding is off budget. As soon as Army force structure must be committed to deploy and operate ground based strategic defense components, Army leadership may balk. If, however, the Army has built its case for Army space operations on its special SDI expertise, there may be no choice left but to man ground based CONUS and OCONUS strategic defenses. Army involvement in CONUS and

OCONUS operation of strategic defenses will come at the expense of conventional force modernization unless fiscal constraints are lifted on Army budgets. The Army may have to choose between the added SDI mission and conventional force modernization.

A few final observations seem appropriate at this stage of analysis in this thesis. These observations, while primarily based on historical insights gained during the research of this thesis, do not necessarily fit neatly into the categories for conclusions offered above. Nevertheless, these observations deserve mention if for no other reason than to complete the accounting of research into questions raised in this thesis.

The Army is currently operating in space on the authority of DoD Directive 5160.32 dated 8 September 1970. This is, in fact, probably an overstatement since this document is out of date and seldom if ever referenced by the Army as it progresses towards its goals in space. The fact is there has not been a need to review or rewrite this directive until just recently given the Army's limited involvement with space activities. A clarification of roles and missions is overdue. This will not be an easy task. In the 1950s, space was more a mission and less a place to operate since the technological barriers were not yet conquered. Routine access and use of this arena today by all services complicates any delineation of responsibilities. The needs of all the services in space with regard to reconnaissance, surveillance, communication, and command and control overlap. As new capabilities in the realm of space support, force

enhancement, and force application are fielded and integrated into the operations of all services, the problem of specifying who operates and controls what systems will grow more difficult. The U.S. Space Command is certainly a promising step toward solving such present and future problems but for all the reasons detailed in the conclusions above, bureaucratic, political, and strategic pressures will continue to influence military space activities.

Clearly, the Army can expect opposition when its actions cross perceived or actual boundaries between "accepted" roles and missions in space or threaten the existence of USAF or USN space systems that support "vital" air or sea operations. The Army's strongest bureaucratic position seems to be as spokesman for the space needs of the ground commander fighting at the operational level of war. Only so far as the Army can show space and space systems support the ground attack throughout the operational depth of the battlefield can it expect to have Air Force and Navy support of its operations. Without this willingness to champion space systems that meet the conventional needs of ground forces, even internal Army support for Army space aspirations is suspect.

The key to effective utilization of space in support of Army goals is cooperation with the other services, not confrontation. From the Army's point of view, the expensive space systems should have a dual role -- nuclear strategic and conventional force support. The Army's main purpose in space should be to enhance its mission capabilities while accommodating other services in the enhancement of theirs. Thus, for example, we need to

insure Air Force space assets support the Army much the same way the Military Airlift Command and Tactical Air Command support the Army today. Alternatively, Army space systems could relieve the Air Force from certain battlefield tasks at times when the Air Force is committed to higher priority tasks (eg. counterair) or in places where the Air Force has difficulty operating for extended periods(eg. Southwest Asia). This bureaucratic "backscratching" is essential to achieve successful space support of ground operations.

APPENDIX 1

APPENDIX 1

ORGANIZATIONAL INVOLVEMENT

Compiled and Prepared by
The Army Space Initiatives Study
Ft Leavenworth, Kansas
13 December 1985

1. This report addresses a task which resulted from the General Officers Space Seminar, conducted at Fort Leavenworth, Kansas on 8 and 9 October 1985. The tasking was to "compile (an) inventory of all Army organizations working on space to include project list, funding and number of personnel."

2. Space is an operational dimension in which the Army must operate if it is to successfully execute its mission of land combat power in the future. This operational medium provides the Army many advantages and will continue to grow in importance. The Army Space Master Plan provides a blueprint of the actions necessary for the Army to exploit the opportunities provided by the space dimension. This report shows where the Army is today, and thus provides a starting point from which to start the implementation of the Master Plan.

3. To accomplish this study a definition of what is meant by Space Activities was required. This was needed because it was found that the Army was dealing with space systems and did not realize it. Therefore, to be as comprehensive as possible the definition was simply stated as "that research, procurement or operation of any system that directly interfaces with or relies upon a space based segment". Also counted was any work being performed by the Army for the Strategic Defense Initiative since it is believed that the SDI is closely related to this nation's space efforts.

4. The Army's involvement with space touches all types of activities from planning staffs, to research, development, acquisition and testing activities, to operational units. Table I identifies the levels of effort within Army major commands and also those Army personnel assigned to other DOD agencies/commands that are performing space functions. Table II depicts this information in another fashion, a profile of total Army involvement. This profile shows the elements within each of the major commands that are involved with space activities.

5. The results of the study indicate that the Army is executing nearly \$1,820 million and has 5,235 people involved in space activities. Of the \$1,820 million, over \$824 million is from within the Army budget while nearly \$996 million is being executed for other DOD agencies by the Army. By far the largest share of other DOD funding is provided by the Strategic Defense Initiative, over \$860 million, yet of this total only \$21.4 million of funding work being conducted by Army RDT&E organizations other than the Ballistic Missile Defense Program. The Army budget funds consist primarily of efforts in the SATCOMA and TENCAP Program. Table III depicts the Army funding profile. The \$76 million difference between Table III and the aggregate funding shown in Table I occurs because some funds are reported by more than one activity engaged in program execution.

6. The total Army personnel involvement in space related activities is divided into four categories: staff planning; research and development; evaluation and training; and operations. It would have been thought that the largest percentage of involvement today would be in the planning and RDT&E areas; however, it is clear that a trend toward the operational use of space systems, especially communications, intelligence and navigation systems, is already well established. Table IV is a recap of Army personnel involvement by function.

ARMY SPACE INVOLVEMENT

DA STAFF				
55 MY				
TRADOC	USAREUR	8TH ARMY	FORSCOM	AMC
91 MY	47 MY	94 MY	436 MY	879 MY \$785.7 M
COE	INSCOM	ISC	MTMC	FOA'S
99 MY \$52.9 M	1543 MY \$7 M	803 MY \$27.3 M	0	947 MY \$1022.7 M
HSC	USARJ	NGB	USAR	WESTCOM
6 MY \$0.03 M	0	0.2 MY	0	0
OTHERS				
235 MY				

TABLE I

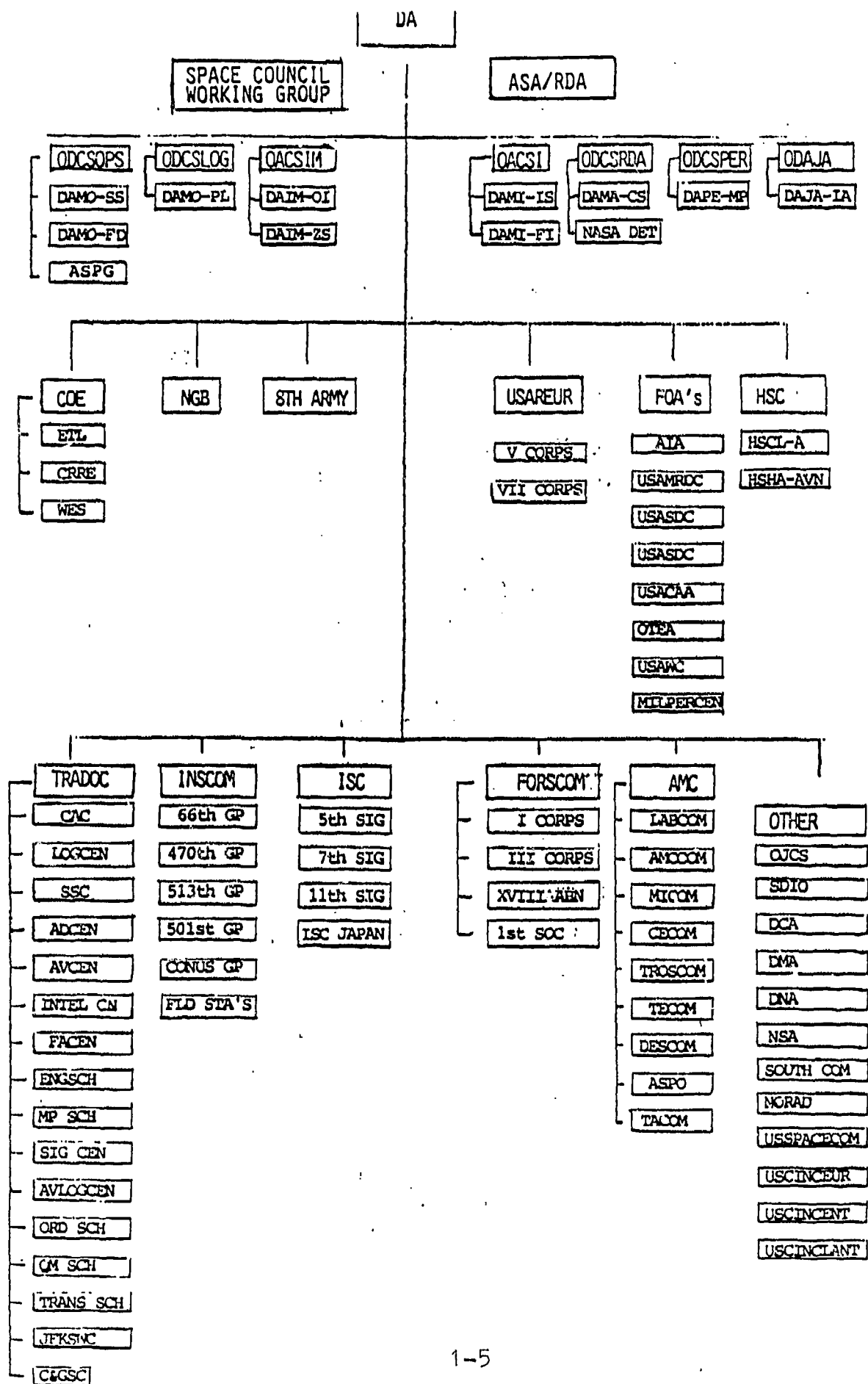
DA STAFF

ASA/RDA	ODCSOPS *	ODCSLOG	OACSIM
1.5 MY	20 MY	0.25 MY	4 MY

OACSI	ODCSRDA **	ODCSPER	ODAJA
13 MY	15 MY	.05 MY	.05 MY

* INCLUDES 11 PERSONNEL ASSIGNED TO ARMY SPACE PLANNING GROUP, COLORADO SPRINGS, CO.

** INCLUDES 11 PERSONNEL ASSIGNED TO THE NASA DETACHMENT, HOUSTON, TX.



FUNDING PROFILE

AGENCIES PROVIDING FUNDING (MILLIONS)

Army Budget	\$824.09
Strategic Defense Initiative	860.3
National Aeronautics & Space Admin	0.75
Defense Mapping Agency	0.2
Defense Advanced Research Projects Agency	4.5
Other Department of Defense	130
TOTAL	1819.84

FUNDS UTILIZATION

Operations & Maintenance	66.681
Procurement	455.995
Research & Development	1261.138
Military Construction Authority	36.026
TOTAL	1819.84

TYPE OF FUNDS BY THE PROVIDING AGENCY

	ARMY	SDIO	OTHER
O&M	66.681	0	0
PROCUR	355.995.	0	100
RDT&E	365.388	860.3	35.45
MCA	36.026	0	0
TOTAL	824.09	860.3	135.45

TABLE III

PERSONNEL PROFILE

PERSONNEL FUNCTIONAL AREA INVOLVEMENT (MAN YEARS)

Operation & Maintenance	2846
Research & Development	1488
Procurement	305
Staff Planning	600
TOTAL	5235

7. The space activities being accomplished within each of the major commands is varied and in most instances extends throughout the command. Below is a brief description of these activities by major command.

A. Training and Doctrine Command. The TRADOC involvement is primarily concerned with combat development activities at nearly all of the schools and centers. However, three of the schools go beyond this.

(1) The Signal School. In addition to combat development activities the Signal School is responsible for developing and conducting training on space communications and navigation systems. These systems include the SHF Multichannel System, the Special Communications System, the UHF Single Channel System (MANPACK), the EHF TACSATCOM Scott System, and the NAVSTAR Global Positioning System.

(2) The Intelligence School. The Intelligence School is currently providing courses of instruction in Telemetry Analysis, Electronic Processing Dissemination (TENCAP), EW/SIGINT Noncommunication Collector and the Space Collection Operators Course.

(3) The Air Defense School. The Air Defense School has established a branch within the Combat Developments Directorate to develop the conceptual requirement documents concerning Strategic Aerospace Defense. Also, a TRADOC System Manager for Ballistic Missile Defense has been established at Fort Bliss.

B. The Army Materiel Command. Nearly all of AMC's subordinate commands are involved to some extent with RDT&E or the procurement of space or space related technologies and equipments. Following is a listing of those efforts.

(1) Laboratory Command. The various laboratories within LABCOM are currently active in conducting research in both classified and unclassified programs.

(2) Armament, Munitions & Chemical Command. The major activity within the AMCCOM is being conducted at Picatinny Arsenal. The program at Picatinny is research and development of an electromagnetic gun and is being funded by both the Army and the Defense Advanced Research Program Agency.

(3) Missile Command. MICOM is presently involved in programs for both the Army Strategic Defense Command and the Strategic Defense Initiative Organization. Work is being conducted for the ASDC on kinetic energy weapons and for SDIO, MICOM is also involved in the Directed Energy Weapon Program.

(4) Communications-Electronics Command. The CECOM is involved primarily in the procurement of Satellite Communications ground terminal equipment. Nearly twenty percent of the procurement is being funded from outside the Army budget.

(5) Troop Support Command. The TROSCOM Laboratories are involved in many programs to include soldier life support systems, laser protection devices and meal packaging. Past and present efforts are funded by NASA and the Air Force as well as the Army.

(6) Test and Evaluation Command. The White Sands Missile Range is active in testing ballistic missile intercept programs for both the Army and the Strategic Defense Initiative. It is very likely that their current level of effort will expand significantly in the future. Current programs include the High Energy Laser System Test Facility (HELSTF), Small Radar Homing Interceptor Technology (SR-HIT), High Endoatmospheric Defense Interceptor (HED-I), and the Bradus-Kill Interceptor Concept (BIC). Additionally, White Sands Missile Range is involved with the NASA manned space flight tracking facility and maintains an alternate shuttle landing facility which is used for training and contingency purposes.

(7) Depot System Command. Tobyhanna Army Depot is involved in the special fabrication and refurbishment of satellite communications equipment. Tobyhanna is the prime depot for providing satellite communications support to the Tri-services, NATO signatories, White House, National Security Agency and the Central Intelligence Agency.

(8) Tank and Automotive Command. TACOM is active in four programs with significant application to the Army's space and high technology efforts. These programs are Real Time Sensor Fusion, Agile Wavelength Laser Protection, Long Wavelength LWIR probe and Radar Discrimination Technology and Data Base.

(9) Army Space Program Office. Although not actually an activity of AMC, the ASPO has been added within this section because of its current operating arrangements with AMC. The

ASPO is the Army's executive agency for the execution of the Tactical Exploitation of National Capabilities (TENCAP) program. As such it is involved in classified programs dealing with RDT&E, procurement and operations and maintenance of systems that provide support to the field Army.

C. Corps of Engineers. The US Army Corps of Engineers Agency primarily involved in space research and development is the Engineer Topographic Laboratories (ETL). Principal areas of space activity are Radar Exploitation for Terrain Data and Targeting, Multisensor Remote Sensing of Earth Environment, Global Positioning System exploitation, Field Army Mapping, support to the Army Space Program Office, transmission of mapping, charting, and geodesy information via satellite, camouflage of fixed installations and signature dynamics and constraints on sensor performance. Although the ETL is the lead agency for these efforts, both the Cold Regions Research Laboratory and the Waterways Experiment Station are also involved.

D. Information Systems Command. USAISC has responsibilities to perform operations and maintenance functions of Army Military Satellite Communications facilities worldwide. These facilities include the Defense Satellite Communications System, the Echelons Above Corps of the Ground Mobile Forces Super High Frequency Multichannel Initial System and the Ground Mobile Forces Satellite Communications Control Subsystem. These functions are performed by personnel assigned to the 5th, 7th and 11th Signal Commands and the USAISC-JAPAN.

E. Intelligence and Security Command. The USAINSCOM provides space derived intelligence data to US Army units worldwide. Subordinate commands responsible for this effort include the 66th, 470th, 501st, 513th and the CONUS MI Groups as well as various Field Stations.

F. Field Forces. The Army's major field commands are currently involved in the use of communications and intelligence systems that utilize space based segments. Within FORSCOM, the XVIII Abn Corps, I Corps, III Corps and the 1st Special Operations Command utilize Tactical Satellite Communications equipment and have tactical Exploitation of National Capabilities equipment and tasking authority. Additionally, a FORSCOM element, the 235th Signal Detachment, is responsible for world wide Emergency Action Communication Contingencies. Like FORSCOM both the US Army Europe, and Eighth US Army use TENCAP and Tactical Satellite Communications systems.

G. Field Operating Agencies. A number of the Army's Field Operating Agencies are involved with space related activities.

(1) Army Intelligence Agency. Within AIA both the Foreign Science Technology Center and the Missile and Space Intelligence Center are involved with space related activities.

(2) US Army Medical Research and Development Command. The AMRDC is currently involved in space related projects such

as Pharmaceuticals and Bioprocessing, Remote Habitat Sensing, Casualty Location, Physiology of Wound Healing and Health and Sustained Performance.

(3) US Army Strategic Defense Command. USASDC is currently working on space and space related activities to support the President's Strategic Defense Initiative (SDI). In addition to working on SDI programs USASDC manages, operates and maintains the Kwajalein Missile Range (KMR). The KMR supports SDI programs, Navy Sea launched Ballistic Missile testing, Air Force Intercontinental Ballistic Missile development and operational testing, and data collection on objects in space such as the space shuttle.

(4) Concepts Analysis Agency. The CAA is involved in studies to identify where and how space systems may interact within the Army and what the effects might be.

(5) Operational Test and Evaluation Agency. The OTEA is currently involved in test and evaluation of the NAVSTAR Global Positioning System and the Single Channel Objective Terminal (SCOTT) and MIISTAR Satellite. Additionally, OTEA is preparing for possible test and evaluation of any Strategic Defense Initiatives systems.

(6) US Army War College. The USAWC is currently conducting three space studies programs.

(a) Military Studies Program: "Army Role in Space: A Study of Missions."

(b) Army Fellow Study: "Space, The Fourth Dimension of Warfare."

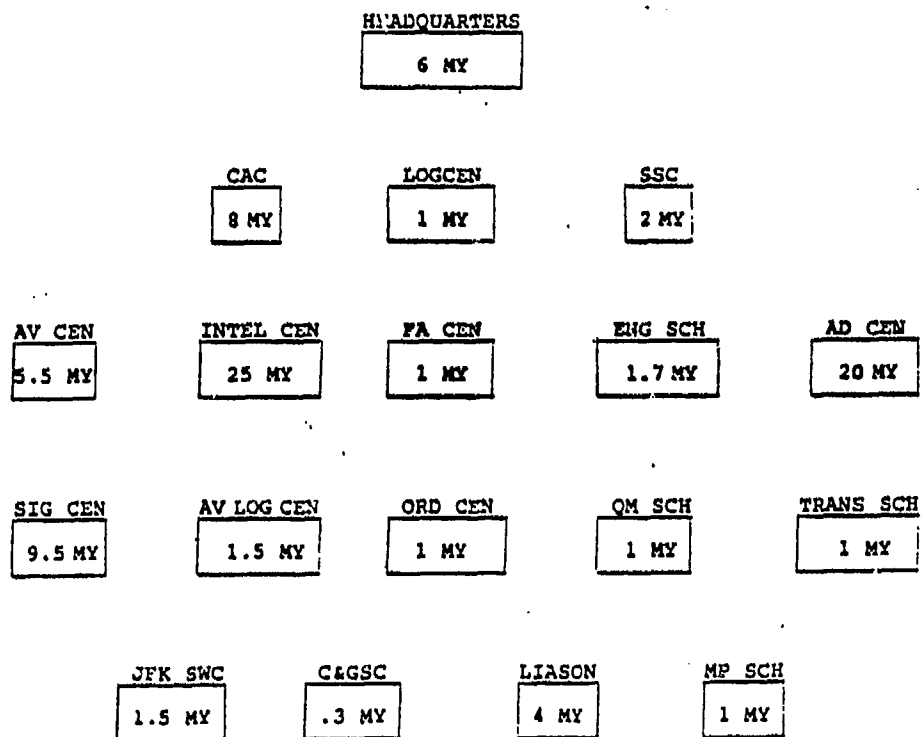
(c) Core curriculum instruction and advanced course entitled "Space - The High Ground."

8. The Charts that follow show the level of effort within each major command and other Department of Defense activity.

DEPARTMENT OF ARMY

ASA/RDA 1.5 MY	ODCSOPS 20 MY	ODCSLOG 0.25 MY	OACSIM 4 MY
OACST 13 MY	ODCSRDA 15 MY	ODCSPER .05 MY	ODAJA .05 MY

TRAINING AND DOCTRINE COMMAND



ARMY MATERIEL COMMAND

HEADQUARTERS

4 MY
\$.4 M

AMC COM

16 MY
\$10.3 M

CECOM

270 MY
\$549.9 M

DESCOM

250 MY
\$34.38 M

LABCOM

41 MY
\$14.5 M

MICOM

36 MY
\$18.8 M

TACOM

\$.785 M

TECOM

218.5 MY
\$53.4 M

TROSCOM

1 MY
\$11.155 M

ASPO

42 MY
\$92.103 M

FIELD FORCES

FORCES COMMAND

I CORPS

26 MY

III CORPS

27 MY

XVIII
ABN CORPS

110 MY

1st SOC

136 MY

235th
SIG DET

137 MY

UNITED STATES ARMY EUROPE

V CORPS

26 MY

VII CORPS

21 MY

8th UNITED STATES ARMY

94 MY

FIELD OPERATING AGENCIES

ARMY
INTELLIGENCE
AGENCY

24 MY
\$2.0 M

ARMY MEDICAL
RESEARCH AND
DEVELOPMENT COMMAND

7 MY
\$1.4 M

CONCEPTS
ANALYSIS
AGENCY

2 MY

OPERATIONAL
TEST AND
EVALUATION AGENCY

8.8 MY
\$1.823 M

ARMY
WAR
COLLEGE

2.5 MY

US ARMY
STRATEGIC DEFENSE
COMMAND

903 MY
\$1,017.63 M

MILITARY
PERSONNEL
CENTER

0.25 MY

OTHERS

OJCS
28 MY

SDIO
30 MY

DCA
14 MY

DMA
53 MY

DNA
7 MY

NSA
2 MY

SOUTHCOM
15 MY

NORAD
16 MY

USSPACECOM
47 MY

USCINCEUR
4 MY

USCINCENT
14 MY

USCINCLANT
5 MY

APPENDIX 2

ARMY SPACE AGENCY

I. Organizational Mission:

The US Army Space Agency (USASA) mission is to consolidate management, operational advocacy and planning for Army space operations, to ensure appropriate interface between combat and materiel developers to optimize use of space-related technology across the spectrum of Army missions in support of AirLand Battle doctrine and to serve as functional area proponent for strategic defense. USASA will serve as the Army component element to USSPACECOM and be under the operational control of USCINCSpace.

II. Organizational Functions and Objectives:

A. Management.

1. USASA will develop, coordinate through ODCSOPS with the ARSTAF, and execute a long range transition plan to assume management of Army programs involving TENCAP, MILSATCOM and GPS/Pos-Nav.

2. USASA will integrate PPBS inputs for Army space-related programs and serve as ARSTAF advocate in POM actions for these programs.

B. Operational Advocacy.

1. USASA will serve as focal point to coordinate Army operational requirements for space systems which support ground forces with weather, mapping, communications, reconnaissance/surveillance, and positioning and navigation information. This function includes

a. Collection of requirements from Army MACOMs and agencies and coordinating these requirements with appropriate Army and other Service operational and research and development activities.

b. Improving space-related requirements development by increasing Army awareness of space system capabilities.

2. USASA will develop procedures and assist Army tactical forces in coordinating requests for space-systems support for training and exercises.

3. USASA will assist functional area proponents and other TRADOC activities in developing operational concepts to capitalize on space systems support and space-related technologies.

4. USASA will advocate modification of assigned assets and monitor space system RDT&E to ensure that operational capabilities meet requirements and support Service interoperability.

C. Planning.

1. USASA will develop an Army Space Master Plan which addresses Army roles, missions, strategy, policies and doctrine with regard to space both as a dimension of conflict and as a unique medium for force application and force enhancement missions. The Master Plan must include an architecture and an investment strategy for the incremental development of space system capabilities to support Army forces.

2. USASA will train and assist Army tactical forces in planning for use of space systems in OPLANS, CONPLANS and TACSOPS.

D. Combat/Materiel Developer Interface.

1. USASA will monitor space-related concepts/requirements and materiel development efforts of Army MACOMS to ensure appropriate coordination.

2. USASA will investigate and report to appropriate Army MACOMS and agencies on space-related technology research and development programs of other Services and DOD activities which may apply to the mission requirements of Army forces.

E. Strategic Defense.

1. USASA will represent Army interests in the development of strategic defense operational requirements and planning in OSD, JCS and other Service-led activities.

2. USASA will focus theater ballistic missile defense requirements on Army-conducted, SDI-technology research efforts.

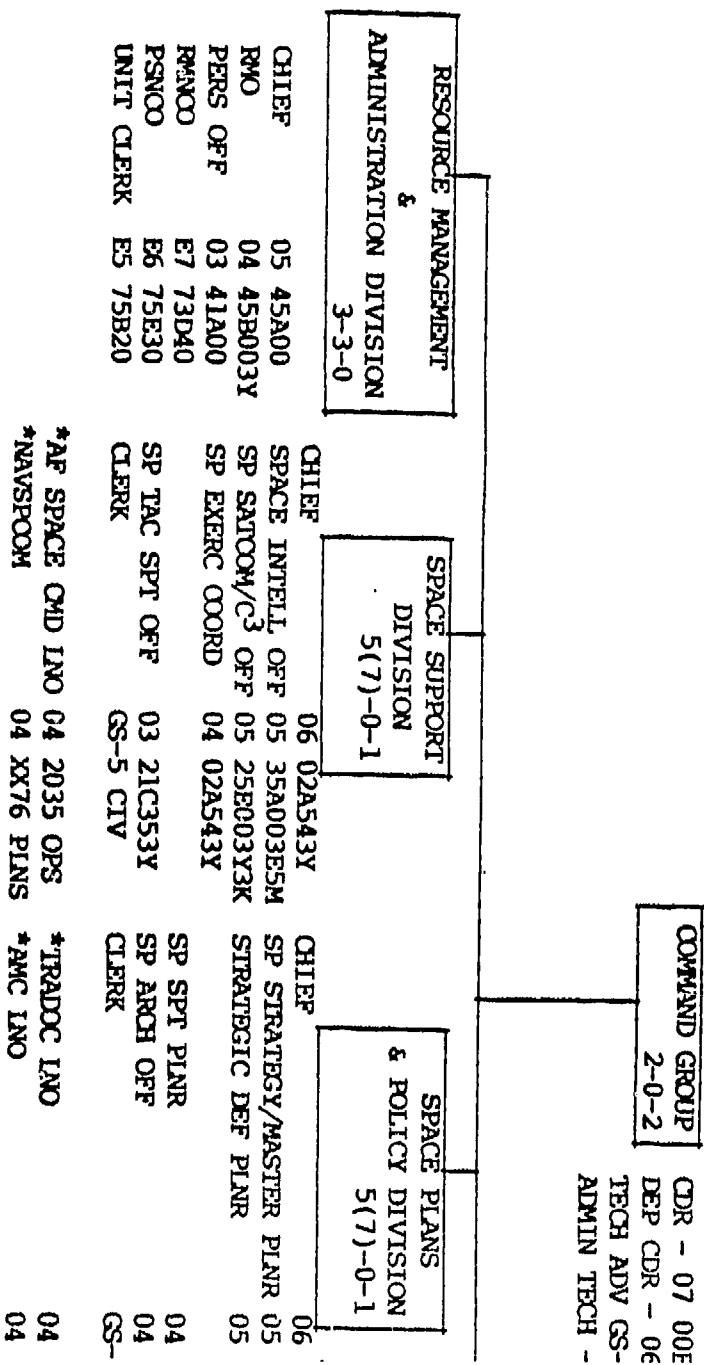
F. USSPACECOM.

1. USASA will provide USSPACECOM with information on Army plans and requirements for space support and strategic defense (including ballistic missile defense).

2. USASA will ensure integration of Army requirements into USSPACECOM planning and operations and coordinate USSPACECOM plans with Army activities.

3. USASA will respond to USCINCSpace taskings and coordinate USSPACECOM plans with the ARSTAF and other appropriate Army commands and agencies.

ARMY SPACE AGENCY



* - EXTERNAL EXCHANGE/LNO
 ** - ASA EXCHANGE/LNO TO EX

IV. Division Functions

A. Command Group.

1. Provide command supervision of Agency to accomplish assigned mission.
2. Supervise the development and execution of plans to manage Army space programs.
3. Direct the conduct of studies and analyses to identify and advocate space system support of Army forces in traditional and non-traditional areas.
4. Coordinate through ODCSOPS with the ARSTAFF for management of Army space programs.
5. Oversee PPBS input for Army space-related programs.
6. Ensure the Army exploits extant space capabilities.
7. Coordinate and ensure the transfer of space related high technology for increased ground force effectiveness.
8. Ensure appropriate share of space support is provided to support ground forces by USSPACECOM.
9. Ensure the Agency develops and/or participates in, as appropriate, operational capabilities related to space.
10. Provide Army advocacy for operational requirements for space systems which support ground forces, and support exploitation of space capabilities to enhance accomplish the Army mission.
11. Provide for the health, welfare, morale, training, and discipline of assigned and attached personnel.
12. Ensure Army support of NASA fulfills requirements and is productive for the Army exploitation of space.
13. Ensure accountability and optimum utilization of Agency funds and resources to accomplish the Agency mission.
14. Supervise and direct exchange of liaison officers and their activities.
15. Ensure appropriate integration of the efforts of scientific and technical advisor into USASA activities.
16. Act as USASA and Army spokesman for Army space activities.

B. Resource Management and Administration Division

1. Control and management:
 - a. Headquarters administrative procedures.
 - b. Military and civilian personnel resources.
 - c. Planning, programming and budgeting activities.
 - d. Headquarters POM development, program definition and procurement strategy.
 - e. Logistical, financial and
 - f. History program.
2. Integrate PPBS inputs for A and serve as ARSTAFF advocate in POM ac

C. Space Support Division

1. Identify, consolidate, and of Army component commanders for space in OPLANS, CONPLANS, etc. This include
 - a. use of both DOD and Nor
 - b. determination of commur and reconnaissance, topographic and cli presently required.
2. Provide the focal point for obtaining, and for assisting Army elements in planning, the support of space systems for exercises and contingency operations to include
 - a. communications, reconnaissance/surveillance.
 - b. satellite derived weather and climatological data.
 - c. digital imagery of terrain/multi-spectral imagery.
3. Develop and coordinate procedures to obtain space system support such as
 - a. repositioning and reprogramming of surveillance systems.
 - b. enroute communications.
4. Assist TRADOC in the development of a C³ architecture to support theater combat operations through consideration of space system capabilities and limitations.

5. Develop and implement a program to promulgate space system awareness/capabilities throughout the Army to include:

- a. PA program.
- b. Briefings, visits, lectures.

6. Assist US Army Detachment, NASA, and ODCSRDA in determining operationally oriented experiments to be conducted by Military Man In Space Program such as:

- a. Shuttle experiments to determine usefulness of manned low earth orbits (LEO) in support of ground operations.
- b. Operational needs of space station support.

7. Review threat estimates.

8. Assist ACSI and other Intelligence Agencies in the development of space-related intelligence and EW plans and requirements such as:

- a. Threat Development.
- b. Systems Integration Architectures.
- c. Support to Theater Forces.

D. Plans & Policy Division.

1. Develop, maintain and implement the Army Space Master Plan which prescribes

- a. How the Army must organize and operate to exploit space as a dimension of conflict and a medium for support of Army forces.

- b. An architecture and investment strategy for developing space system capabilities that will provide force economies for Army 21.

2. Assist functional area proponents and other TRADOC activities in

- a. Increasing the awareness of space system capabilities;
- b. Developing operational concepts which use space systems and space-related technology to support Army tactical forces in their employment of AirLand Battle doctrine; and
- c. Consolidating future mission requirements of Army forces for support by space systems.

3. In coordination with TRADOC and SDC, initiate and conduct actions required to:

a. Promulgate HQDA strategy and policy for strategic defense;

b. Develop appropriate operational concepts for strategic defense;

c. Consolidate mission requirements for ballistic missile defense for Army theater forces; and

d. Represent Army interests in other Service and DOD agency efforts to develop BMD/strategic defense operational requirements and planning.

E. US Army NASA Detachment.

NOTE: This detachment consists of all Army personnel assigned to Johnson Space Center to include: Astronauts, Payload/Mission Specialists, Technical Administrators, Flight Controllers, Engineers, and Liaison Officers.

Personnel will remain OPCON to NASA and assigned to the detachment for command and administrative purposes.

1. Coordinate the integration of Army operational requirements into NASA planning.

2. Recommend improvements for professional and career management of Army astronauts and other personnel assigned to NASA.

3. Recommend and conduct manned space STS experiments in support of Army research and development programs.

4. Assist in selection of Army astronaut and mission specialist candidates.

5. Review and analyze recorded flight data of STS missions to identify new operations and procedures having potential Army applications within the space mission areas (with emphasis on force enhancement of Theater forces).

6. Coordinate and conduct orientation visits to NASA for Army personnel.

F. Liaison Element

1. Represent the Commander, United States Army Space Agency, to other Commands and Agencies concerned with the use and/or employment of space systems to accomplish Department of Defense missions.

2. Provide for exchange of information and participation in activities relative to Army space and it's support of the Army mission.

3. Represent the Army Space Agency during visits to subordinate units.

4. Represent the Army Space Agency at meetings and conferences relating to the development and acquisition of resources to be used by space activities to support the Army.

5. Monitor research, development, test and evaluation (RDT&E) activities of benefit to the Army Space Agency and the Army space mission.

6. Provide a central file of Army space publications and other information which will assist in incorporation of Army space into support unit plans and programs.

7. Prepare and/or provide inputs to supported unit publications, particularly those having Army space interest or application.

8. Provide technical space information to the supported unit.

9. Monitor, when applicable, combat developments including concepts, doctrine, materiel systems, test, experimentation and evaluation, and organization.

10. Monitor, when applicable, educational and training development to include concepts, doctrine, programs, operations, tests, evaluations, aids, devices and new technological efforts.

11. Provide regular reports and briefings to the Commander, USASA, and his staff of all liaison activities.

APPENDIX 3

UNCLASSIFIED

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

SECTION 1 - CONCLUSIONS

Policy and Doctrine

The Army has not articulated comprehensive policy or doctrine for space and space related Army interests. There are three broad aspects of space which affect policy and doctrine considerations and must be addressed:

(1) Space as an environment supporting earth operations in which the Army has vital service interests.

(2) Space as a medium for point-to-point transportation in which the Army presently has a monitoring interest only.

(3) Space as an environment supporting operations on other celestial bodies in which the Army has a primary role.

These aspects must be viewed in terms of Army operational control, system responsiveness, system survivability and system capability.

The Army needs policy and doctrine that will emphasize both the service and joint nature of space and advocate strong autonomous capability to study, monitor, develop doctrine and concepts, develop requirements and use technology as required.

Organization

The Army has no focal point for space nor an effective organization to implement such an effort. The Army is viewed as fragmented regarding

UNCLASSIFIED

space activities and initiatives. As a result, the Army is often poorly represented during multiservice space discussions.

Personnel and Training

There is no comprehensive personnel management program regarding Army (military and civilian) personnel. In addition, there are no training or professional development programs for personnel involved in space initiatives.

Ballistic Missile Defense

BMD is an RDTE effort and this general mission probably will remain unchanged due to the 1972 ABM Treaty. Since it is oriented toward R&D and is not an operational command, BMD should not be the Army component to the Unified Space Command.

Communications

The Army does not control totally satellite communications system assets which could be detrimental to effective responsiveness of service related C3 issues. Satellites could be used by the Army to a greater degree than they are currently. Potential C3 capacity, redundancy and flexibility are needed at the operational and tactical level.

Electronic Warfare

An effective EW capability is a necessary combat multiplier to help defeat second and third echelon forces in the AirLand battle.

Intelligence

The Army's intelligence function regarding space initiatives is an organized and effective effort. Additional effort is required to ensure that joint requirements are recognized by all services.

UNCLASSIFIED

Mapping, Charting, Geodasy and Weather

There are valid Army requirements for satellite systems that provide accurate, real time weather data, topographical references, and individual, unit and asset position location.

SECTION 2 - RECOMMENDATIONS

Policy and Doctrine

1. That the Army formulate a formal space policy that permits the evolutionary formulation of doctrine and the means by which current and future Army space requirements can be developed and satisfied. That the policy:

(a) Contain support for the Unified Space Command in which the Army is an equal partner as both a joint owner and user of space assets. Space support of earth operations can be visualized as a parking area for satellites which are designed to operate in either a joint or single service/agency environment. Launch, inter and intra-space transportation, and manned piloting functions in space do not appear today to be an Army responsibility. System capability determination and survivability are a joint responsibility involving all services.

(b) Establish the Army as the primary service in support of future exploration and exploitation of other celestial bodies. The Army has a traditional role of assisting, planning, supporting and leading military, civilian, or joint expeditions in the exploration, colonization, settlement and development of land territories as an extension of US policy and influence.

(c) Establish the Army's capability to study, monitor, and develop on a joint or independent basis the requirements, operational concepts and technology in all aspects of space endeavors.

UNCLASSIFIED

2. That the Army develop a broad, evolutionary space doctrine that accommodates all areas of Army policy in current and future operations.

3. That the Army formulate a Space Master Plan to provide a comprehensive blueprint of all Army space activities and interests which is updated regularly, e.g. comparable to the TENCAP Master Plan.

Organization

1. That the Army establish a Field Operating Activity (FOA) in DCSOPS under General Officer direction. See Appendix 5 for the organization chart.

2. That the organization be the single focal point for all Army space matters. The organization would include the Army Space Program Office (ASPO) which would continue to execute the TENCAP program under the TENCAP GO WG guidance. Additional subdivisions include a Requirements and Training Division at least partially staffed by TRADOC; a Science and Technology Division including representatives from SATCOMA, USACC, and the BMDPO as a minimum; an Army Astronaut Program Branch from DCSRDA; and, a Personnel and Administrative Branch partially staffed from ASPO.

3. That the office provide army representation to the VPSS for Unified Space Command Planning.

4. That the Director be added as a member to the TENCAP GO Working Group.

5. That the Deputy positions throughout the organization be civilianized to enhance continuity, and that the organization have a prudent mix of military and civilian expertise.

6. That representatives assigned to other service space commands be knowledgeable of requirements and engineering aspects of space matters.

UNCLASSIFIED

7. That the organization and charter emphasize streamlined management similar to that found within the TENCAP program office.

8. That the FOA be funded with a mixture of R&D monies (e.g. 6.1, 6.2 and 6.3 funds) for the conduct of space activities, and that there be adequate Federally Controlled Research Centers (FCRC) support.

9. That the Army Astronaut Program come under the auspices of the Army Space FOA.

10. That MACOMS and the TRADOC schools form space cells similar to those in TENCAP to expedite coordination and staffing functions.

Personnel and Training

1. That a Space professional development program be developed and implemented for military and civilian personnel.

2. That a Space specialty code and MOS be established and awarded to qualified personnel. Care must be taken to ensure there are career incentives and promotion potential for those in the field.

3. That an Army astronaut be considered for immediate promotion to O-7.

Ballistic Missile Defense

1. That Army maintain control of BMD; whether earth or space based.

2. That BMD not be the Army component to the Unified Space Command (USC).

3. That BMD continue as an Army R&D effort. The Unified Space Command could become a potential "customer" of BMD.

4. That the BMDPO be fully involved with the Army Space FOA and the USC.

5. That BMD develop an operational concept that integrates all aspects of missile defense: launch, mid and terminal phases.

UNCLASSIFIED

Communications

1. That all space platforms be evaluated for potential communications use in the broader context of communications redundancy, capacity and flexibility.

2. That the Army investigate the feasibility and advisability of establishing its own dedicated satellite communications system to complement DOD, other service and civilian industry efforts.

Intelligence

1. That the TENCAP program continue on a compartmented basis.

2. That the TENCAP Program increase its emphasis on "futures" combat and materiel development efforts to include joint concepts and R&D.

Mapping, Charting, Geodesy and Weather

That the branch schools examine how to utilize the current systems and to develop the necessary interfaces.

APPENDIX 4

UNCLASSIFIED

ARMY SPACE INITIATIVES STUDY

VOLUME I

EXECUTIVE SUMMARY (U)

A. (U) INTRODUCTION

1. (U) Background

a. (U) In the late 1950's the Army led the United States into the space age. The first US ballistic missile and the first US satellite in orbit were Army achievements. The first American astronaut was put into space by a slightly modified, operational Army missile system. The Army conducted the first Anti-Satellite (ASAT) demonstration and later provided the scientists and engineers who formed the nucleus around which NASA was formed. In contrast, a 1984 committee of the Army Science Board examined the Army's utilization of space and concluded that the Army was only a minor user of available space systems, without a great deal of influence in the design and operation of the systems. The Army's role and influence in space activities had declined as the importance of space to military operations grew.

b. (U) If the Army is to now regain an active role in space, it must be based upon national and defense space policies and objectives. Inherent to these is the pursuit of national security and the right to self defense. Accordingly, an Army Space Policy was established by the Army's Secretary and Chief of Staff in June 1985. It calls for the full exploitation of space capabilities which will enhance and contribute to the successful accomplishment of strategic, operational, and tactical Army missions. To this end an Army Space Operational Concept was developed, building upon AirLand Battle Doctrine and the emerging Army 21 concept. According to that concept, the Army's activities in space would expand logically from an early emphasis on force enhancement to the addition of space operations support and space control to, ultimately, the inclusion of the application of firepower from space.

2. (U) Study Genesis. In May of 1985 the Deputy Chief of Staff for Operations and Plans, responding to Army Space Council guidance, directed the establishment of the Army Space Initiatives Study (ASIS) group at Fort Leavenworth to develop a Master Plan for the Army's exploitation of space through the first quarter of the twenty-first century. That plan was to include recommendations on materiel investment; personnel education, training, and career management; and organizational structure. Chapters III, IV, V, and VI of Volume II, Main Report, constitute that Army Space Master Plan.

UNCLASSIFIED

UNCLASSIFIED

B. (U) STUDY METHODOLOGY. The study began with a week of intense classroom education which developed a background on space for the team members. The team members researched the Mission Area Analyses (MAA) from their functional areas and studied the Army's overall Battlefield Development Plan (BDP). In addition they made information collection visits to the field in order to determine deficiencies with potential space solutions. The field visits contributed additional problem statements not covered by the documented deficiencies. Independent research by the team members into space technology, and extensive consultations with industry and the ASIS supporting contractors, generated concepts for partial or total space solutions to many of the deficiencies and problems. Additional opportunities to use space or high technology to improve Army capabilities were also revealed. Table 1 summarizes the results of the deficiency analysis. It shows that approximately 41% of the Army's BDP deficiencies could be addressed, partially or totally, by space solutions. Ballistic missile defense was not evaluated in this context. Section G of this Executive Summary provides a complete listing of all the study recommendations.

TABLE 1. (U) Mission Areas Recommended for Funding
MAA (BDP '85) ANALYSIS

<u>MISSION AREA</u>	<u>TOTAL DEFICIENCIES</u>	<u>RECOMMENDED SPACE SOLUTIONS</u>	<u>%</u>
AVN	77 (57)	22 (19)	28 (33)
CCL	74 (27)	12 (6)	16 (22)
CCH	80 (29)	10 (8)	12 (28)
SOF	55 (19)	17 (13)	31 (68)
NBC	40 (27)	15 (11)	38 (41)
IEW	53 (17)	16 (10)	30 (59)
ADA	53 (35)	17 (20)	32 (57)
C2	39 (14)	21 (11)	54 (79)
COM	40 (42)	21 (23)	52 (55)
EMW	46 (38)	8 (9)	17 (24)
FS	59 (49)	23 (23)	39 (47)
CSS	262 (83)	64 (27)	24 (33)
SS	15 (6)	6 (3)	40 (50)
TOTAL	893 (451)	252 (183)	28 (41)

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

C. (U) INVESTMENT STRATEGY.

1. (U) The investment strategy is a presentation of recommended space and space-related programs and technologies, to be funded primarily by RDTE and procurement appropriations. However, there is one immediate OMA recommendation to acquire a leased satellite communications capability. Implementing these recommendations will also require changes in doctrine, training, and organization.

2. (U) The materiel investments are prioritized at three levels. Level 1 investments have the highest potential benefit and address the most serious deficiencies of the Army. They are considered a minimum essential commitment. Level 2 investments provide substantially enhanced tactical capability and significant technological advances. Together, Level 2 and Level 1 form the study's recommended investment package. Level 3 investments are highly desirable but require an enhanced funding level. The investments may also be grouped according to the time of expected Initial Operational Capability (IOC). Near term extends through FY92, mid term from FY93 through FY02, and far term from FY03 through FY25. Other nonspace technologies or programs judged essential for development or highly competitive with space solutions are also presented. Clearly, the farther into the future one looks, the less definitive the programs become. Table 2 lists the three sets of recommended Level 1 programs. Section G provides a complete listing. Table 3 shows the breakout of investment initiatives by priority level. Funding levels are estimated in Table 4. Appendices C through I of Volume II, the Main Report, provide the underlying basis for these recommendations.

UNCLASSIFIED

UNCLASSIFIED

Table 2. (U) Level 1 Investment Package

Near-Term Programs

- Digital Topographic Support System (DTSS)
- Leased Satellite Communications
- RPV/UAV
- Advanced Computer Technology
- Artificial Intelligence Technology
- Counter-Terrorism/LIC System
- SCOTT/MILSTAR
- Space-Related Research*

Mid-Term Programs

- Improved Space-Based Communications
- Space-Related Research*

Far-Term Programs

- Army Communications Satellite
- Global Integrated Surveillance/Weapons Systems
- Space-Related Research*

UNCLASSIFIED

*Space opportunity to significantly enhance capability

UNCLASSIFIED

UNCLASSIFIED

Table 3. (U) Number of Investment Initiatives
by Priority Level

PRIORITY LEVEL	Near Term (FY86-92)	Mid Term (Thru 2002)	Far Term (Thru 2025)
Level 1 (Minimum Essential Commitment)	8	1	2
Level 2 (Recommended Package)	12	10	2
Level 3 (Enhanced Funding)	8	7	3

UNCLASSIFIED

Table 4. (U) Cost Summary Thru POM 88
(RDTE + PROC + OMA, in Millions)

LEVEL	FISCAL YEAR						
	86	87	88	89	90	92	92
1	12	39	58	86	93	90	107
1 + 2	18	65	146	211	267	287	339
1 + 2 + 3	18	65	327	424	516	578	613

UNCLASSIFIED

D. (U) EDUCATION, TRAINING, AND PERSONNEL MANAGEMENT. Army personnel must understand the application of space concepts to Army missions and have the training to use the related technology and equipment. They must also have the opportunity for progression in a military space career. The Combined Arms Center in TRADOC should serve as Speciality Proponent for space-related classifications. While all Army personnel, both military and civilian, may participate in space-related training and careers, the Officer Corps is expected to experience the greatest near-term impact. Education and training should be provided through the ROTC, USMA, Basic and Advanced Courses, CGSC and Senior Service Schools. Instruction on the space operational environment and applicable high technology also should be integrated throughout warrant officer and enlisted professional military education. Functional training requirements will be met by courses offered at a variety of Army or other service schools. Required postgraduate instruction is available through the Naval Postgraduate

UNCLASSIFIED

UNCLASSIFIED

School, the Air Force Institute of Technology, and civilian institutions. Finally, the Training with Industry program teaches participating officers the management practices and techniques of civilian space corporations. Civilian personnel training requirements should be incorporated into the annually updated Individual Development Plans. To fill the ranks with space knowledgeable personnel, the Army must assure its members of promotion and education opportunities, appropriate classifications, and stable tours. Figure 1 summarizes the impact of the proposed program on the Army.

UNCLASSIFIED

- POSTURES ARMY PERSONNEL TO CAPITALIZE ON OPPORTUNITIES
 - INCREASES AWARENESS OF SPACE
 - PROVIDES TECHNICAL SKILLS REQUIRED
 - GROWS CADRE OF QUALIFIED PEOPLE
 - KEEPS ARMY ABREAST OF DEVELOPMENTS
 - EMPHASIZES JOINTNESS OF SPACE WHILE SATISFYING ARMY REQUIREMENTS
 - FACILITATES EVOLUTION OF PERSONNEL MANAGEMENT

UNCLASSIFIED

FIGURE 1. (U) Impact of Proposed Education, Training, and Personnel Management Program on the Army

E. (U) ORGANIZATION.

1. (U) Introduction. The organization proposed by this study had to meet four basic objectives:

- Provide a single voice and proponent for the Army space effort.
- Facilitate the interaction and transfer of knowledge among space-concerned Army institutions so that they could profit from each other's activities and exploit emerging technologies.
- Integrate space technologies, concepts, and operations smoothly into the framework of the Army.
- Prepare the Army for space operations.

UNCLASSIFIED

UNCLASSIFIED

2. (U) Development of Space Organization. The development of a suitable organizational structure began with a determination of all the tasks the Army's space organization must perform. The task list was derived through a sequential analysis of the organization's mission, functions, and activities. Similar tasks were then grouped, with the expectation that an implementing organizational structure would logically follow. The result was a simple, top down structure, joining research and development, acquisition, and requirements functions in a single command. However, when policy, organizational, and other real-world constraints were considered, this structure was judged to be unacceptable. In particular, its operation would differ substantially from current Army practices. The required tasks were re-examined, therefore, to determine if they could be fitted into the current Army organization, thus allowing their performance with minimum turbulence and realignment of current functions. The constructs presented in Figures 2 and 3 accomplish that purpose.

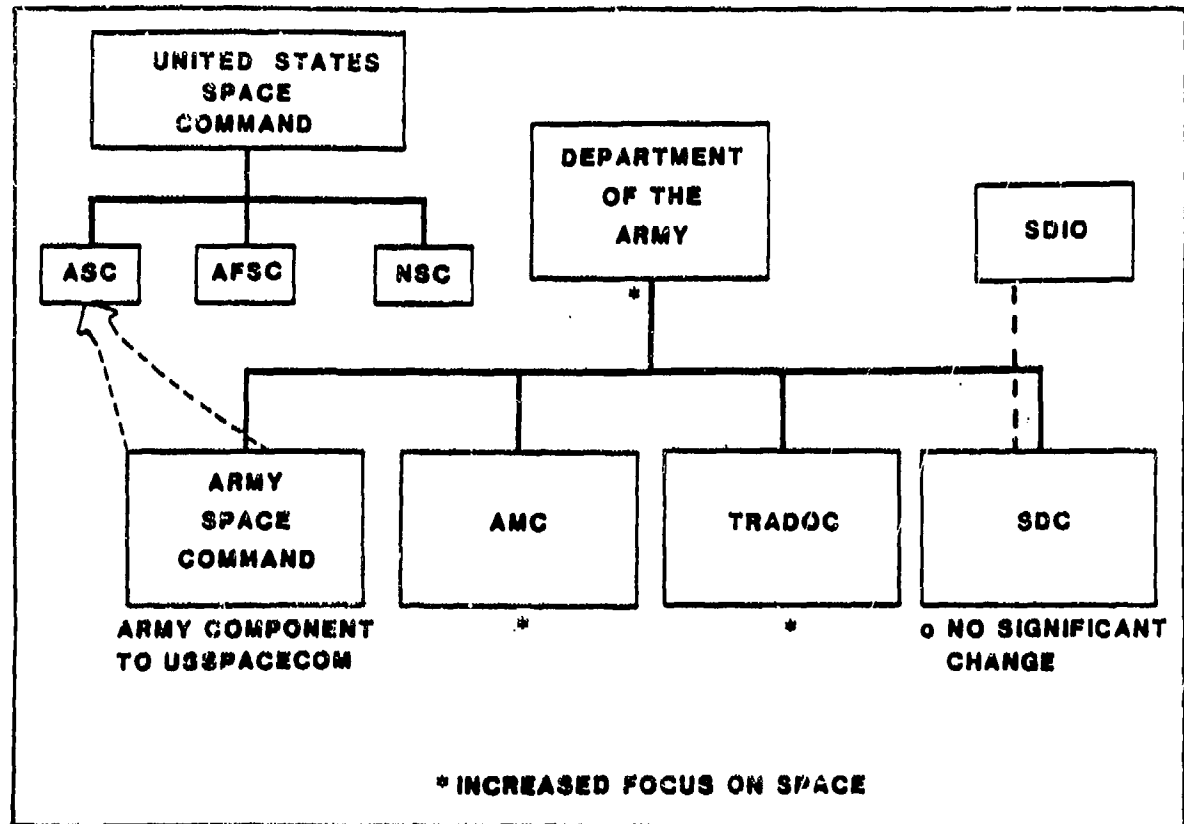
3. (U) Army Space Command. First, as shown in Figure 2, the study group recommends the formation of an Army Space Command (ASC), which will be the Army's component to the United States Space Command (USSPACECOM). By establishing ASC as a major command at Colorado Springs, it is placed on an equal organizational level with the Air Force and Naval Space Commands. The mission of the Army Space Command, as a component of the US Space Command, will be to provide operational space support to joint forces worldwide. In addition, it will serve as a focal point for the Army's exploitation of space.

a. (U) Operations Directorate. As seen in Figure 3, the command is composed of several directorates and operational elements. The Operations Directorate contains experts in such areas as communications, navigation, and TENCAP. The directorate will be responsible for expediting operational support to Army field elements and for performing the day-to-day coordination with the USSPACECOM. It will also be the primary point of contact for the space support staff officers.

b. (U) Plans and Policy Directorate. The Plans and Policy Directorate will assist the USSPACECOM in planning for the enhancement of space support to ground force components. It will provide input to the strategic planning process and assist in determining Army space roles and activities.

UNCLASSIFIED

UNCLASSIFIED

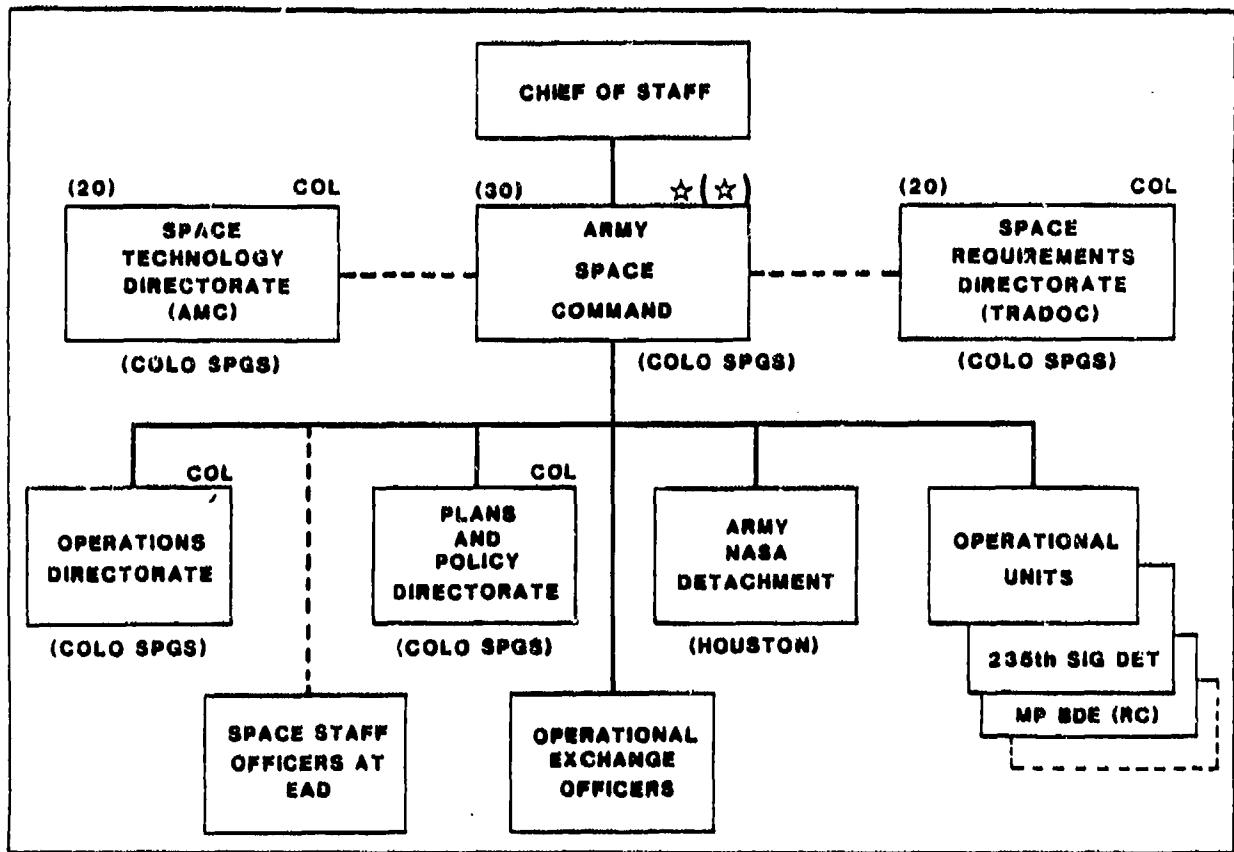


UNCLASSIFIED

Figure 2. (U) Major Army Space Players

UNCLASSIFIED

UNCLASSIFIED



UNCLASSIFIED

Figure 3. (U) Army Space Command

c. (U) Army NASA Detachment. One group of space experts the Army has now are those officers assigned to the Johnson Space Center. This NASA detachment consists of Army astronauts, technical administrators, controllers, and engineers. The detachment will enhance the integration of Army operational requirements into NASA planning and allow for improved professional and career management of astronaut personnel.

d. (U) Operational Units. One active duty unit with a space mission-is the 235th Signal Detachment. It is located at Fort Monmouth, has a worldwide satellite communication mission and should be assigned to the ASC. ASIS is also recommending that a reserve component Military Police unit be attached to the Army Space Command during times of increased readiness status to provide ground security support to critical space control facilities.

UNCLASSIFIED

UNCLASSIFIED

e. (U) Space Staff Officers. To provide improved support to the operational commanders, the study group is recommending the designation of a Space Staff Officer at corps level and above. The Space Staff Officer will be the commander's space expert and will have direct access to the ASC for solving operational support problems as well as for obtaining technical advice.

f. (U) Operational Exchange Officers. To insure maximum technology transfer between various operational elements within DOD and national agencies, the study group recommends that all Army officers assigned to space positions in non-Army organizations, such as Air Force, Navy, and NASA be assigned to the Army Space Command.

4. (U) Department of Army Staff Responsibilities

a. (U) Before discussing the roles of AMC and TRADOC in the space organization, discussion of proposed Department of Army (DA) staff assignments for space is in order. First, during the study it was proposed that a Deputy for Space be designated within the office of the Assistant Secretary of the Army for Research Development and Acquisition. His primary concern would be the development of a scientific and technical base for space systems. This has already been done independent of the study. The DCSOPS himself should be designated as the senior Army staff representative for space. The ADCSOPS (FD) should be the staff proponent and focal point for Army space activities. Within FD, a Deputy for Space should be appointed with sufficient staff to coordinate staff activities and to monitor the implementation of the Space Master Plan.

b. (U) A Deputy for Space, reporting to the ADCSRDA, should be appointed with the responsibility to integrate space research and development and advise the ADCSRDA on development of space policy as it relates to materiel acquisition. Also, each of the remaining staff agencies should form space cells, as required, to integrate space activities across their functional areas of responsibility.

5. (U) AMC and TRADOC Elements.

a. (U) One of the most important attributes of this organization is that it collocates the combat developer, operator, and materiel developer (Figure 3), making the front end of the system acquisition cycle more efficient. This is done through an AMC Space Technology Directorate and a TRADOC Space Requirements Directorate at Colorado Springs.

(1) (U) The AMC Space Technology Directorate will be responsible for developing the Army's space technology base, managing the space research program, and integrating space technology throughout AMC. Other important functions performed by the Directorate are coordination with the TRADOC Space Requirements Directorate and the development of technology to support advanced concepts. The Space Technology Directorate will be supported by a technical support contractor with an initial level

UNCLASSIFIED

UNCLASSIFIED

of effort of approximately 30 manyears. The Directorate will establish interfaces with the Corps of Engineers Laboratories, Army Medical Research and Development Command, and the Ballistic Missile Defense Program Office of the Strategic Defense Command to ensure maximum interchange of technology and research data. Each major subordinate command of AMC will establish a space point of contact or office, based upon its level of effort. In addition, ASIS recommends that AMC designate a lead laboratory for space vehicle technology.

(2) (U) The Space Requirements Directorate will be the TRADOC center of space expertise. Its primary function will be to work closely with AMC representing the user in development of new systems concepts for space support of combined/unified operations. This directorate will be the TRADOC focus for space and space-related operations at echelons above corps. In that capacity, the directorate must develop long range plans and operational concepts for a strategic defense. That includes logistics, personnel, and training concepts as well as operational concepts. The directorate will manage studies to determine the operational feasibility and cost effectiveness of new system concepts and make recommendations on future systems development. The organization will be jointly manned by representatives of the Tactical Air Command and TRADOC. In order to expedite the early stages of systems development, both the TRADOC Space Requirements Director and the AMC Space Technology Director will be rated by the commander of the Army Space Command and senior rated by the appropriate general officer in their respective MACOM headquarters..

b. (U) In addition to having field directorates at Colorado Springs, both AMC and TRADOC will continue to develop their headquarters staffs to perform the necessary supervisory and coordinating activities their increasing space responsibilities demand. Details of the organizational construct and responsibilities may be found in Chapter V of Volume II, Main Report.

6. (U) Personnel Requirements. The study group was sensitive to the current Army end strength limitations. Accordingly, it recommends that, initially, 30 professionals be assigned to ASC and 20 each to the AMC and TRADOC directorates at Colorado Springs. This will demonstrate the Army's commitment to space and adequately support initial space utilization activities.

F. (U) SAGE ANALYSIS

1. (U) The ASIS team, in conjunction with the BDM and Rand Corporations, took a success-oriented approach to the generation of an Army Space Master Plan and a blueprint for its implementation. The objective was to determine everything which must be done to support the Army's use of space to accomplish its missions. Sage Institute International, on the other hand, was contracted to provide a failure prevention analysis to determine those actions which must be taken to avoid Army failure to effectively utilize space.

UNCLASSIFIED

UNCLASSIFIED

2. (U) The Sage analysis was based on an extensive series of interviews with individuals having expertise in one or more space-related areas, both technical and managerial. The interviews led to the development of an extensive set of possibly inimical actions which could interfere with the accomplishment of the study's objectives. These actions were then presented to the original interviewees for validation and subsequent ranking. A computer analysis provided a listing of the potential key obstacles and the order with which they must be addressed. While 58 of the 785 terminal events were considered significant, the Sage study generally supported the ASIS conclusions and recommendations. The concerns raised in the Sage study dealt mainly with general policy issues, such as transfer, career specialization, staffing, and promotion. Broader solutions are required than those provided by the Space Master Plan.

G. (U) RECOMMENDATIONS

1. (U) Army Space Master Plan recommendations fall mainly in three categories: Investment Strategy; Education, Training, and Personnel Management; and Organization. The recommendations are listed in Tables 5 through 7 by category. For more detail the reader is referred to the indicated chapters and pages of Volume II, Main Report.

UNCLASSIFIED

UNCLASSIFIED

Table 5. (U) Investment Strategy Recommendations
(Volume II, Chapter III)

	Page No.
1. Digital Topographic Support System	III-7
2. Leased Satellite Communications	III-9
3. RPV/UAV	III-11
4. Advanced Computer Technology	III-13
5. Artificial Intelligence Technology	III-15
6. Counter Terrorism/LIC	III-17
7. Space-Related Research	III-19
8. SCOTT/MILSTAR	III-21
9. Improved Space-Based Communications	III-23
10. Army Communications Satellite	III-27
11. Global Integrated Surveillance/Weapons System	III-31
12. Position/Navigation Systems	III-35
13. Conformal Phased Array Antennas	III-37
*14. MOPP Equipment	III-39
15. ECM/DEW Vulnerability/Susceptibility Research	III-41
16. Cheapsats	III-43
17. TENCAP Systems	III-45
18. C ² /Airspace Management System	III-47
19. Nuclear Detection and Tracking System	III-49
20. Space Test Program	III-51
21. Medical R&D Program	III-53
22. NASA ACTS	III-57
23. Space-Related Air Defense Equipment Training/Demonstrations	III-59
24. Integrated Closed Loop Intelligence and Target Acquisition System	III-61
25. Automatic Target Identification System	III-63
26. Smart Sensors	III-65
27. Automatic Multisensor Integration	III-67
28. Commercial Reserve Comsat Program	III-69
29. Space-Based Processing Centers	III-71
30. Kinetic Energy Weapons	III-73
31. UAV/Hunter Killer Teams	III-75
32. Military Aerospace Vehicle	III-77
33. Decision Aids	III-79
34. Cooperative Autonomous Systems	III-81
35. Satellite Communications Terminal Technology	III-83
36. Air Defense Multiple Sensor Integration System	III-87
*37. Composite Materials	III-89
38. CB Detection System	III-91
39. PSYOP Broadcast Satellite	III-93
40. HUMINT Support Systems	III-95
41. Improved Reserve/National Guard Training	III-97
42. SHF Improvements	III-99
43. Alternate Means of Communication	III-101
44. Equipment Monitoring and Reporting System	III-103

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

Table 5. (U) Investment Strategy Recommendations
(Volume II, Chapter III) (Cont.)

	Page No.
45. Multispectral Orbital Sensor Constellation	III-107
46. ASAT	III-109
47. Space-Based Munition Guidance	III-111
48. Autonomous Collection Systems	III-113
49. Space Station	III-115
50. Atmospheric Monitoring System	III-117
51. Power Generation and Transmission Systems	III-119
52. Tactical Weather Support System	III-121
53. Advanced Technology Weapons	III-123

UNCLASSIFIED

*Non-Space Related

UNCLASSIFIED

UNCLASSIFIED

Table 6. (U) Education, Training, and Personnel
Management Recommendations (Volume II,
Chapter IV)

	Page No.
1. ROTC Orientation Course	IV-3
2. ROTC Cadets: Space Degrees	IV-3
3. USMA Orientation Course	IV-3
4. Principles of Astronautics	IV-3
5. BS Degree in Space Sciences	IV-3
6. TRADOC Common Course	IV-3
7. CGSC Space Considerations	IV-4
8. CGSC Common Course	IV-4
9. AWC Regular Course	IV-4
10. Military Studies Program	IV-5
11. Warrant Officers Space Institution	IV-5
12. JO Senior Level Course	IV-5
13. AIT Orientation Course	IV-6
14. Proponent Schools	IV-6
15. Elective for USMA	IV-6
16. Training Requirements for DACs	IV-7
17. DACs Education Process	IV-7
18. 3430th Technical Training Group	IV-8
19. TRADOC and AMC POIs	IV-8
20. Exportable Cassette on Space	IV-8
21. Joint Space Fundamentals Course	IV-8
22. Utilize NPGS and AFIT	IV-15
23. Civil Schools	IV-16
24. TWI Space Considerations	IV-16
25. TWI New Programs	IV-17
26. Exchange Officers	IV-17
27. Modified TWI	IV-17
28. Modified 3Y Skill Code	IV-18
29. Skill Code Proponency	IV-19
30. Develop SQI: Warrant Officers	IV-20
31. Develop SQI: Enlisted Personnel	IV-20
32. DACs Duty Descriptions	IV-21
33. Standardized Job Descriptions	IV-22
34. Automated System Space Code	IV-22
35. Area of Concentration Code	IV-23
36. New ASI/MOS: Warrant Officers	IV-23
37. New ASI/MOS: Enlisted Personnel	IV-23
38. Functional/Material Codes	IV-24
39. Far Term Functional Codes	IV-24
40. Enlisted Career Management Field	IV-24
41. Single and Dual Tracking	IV-25
42. Separate Branch Possibility	IV-27
43. 3Y Promotion Floors	IV-27

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

Table 6. (U) Education, Training, and Personnel
Management Recommendations (Volume II,
Chapter IV) (Cont.)

	Page No.
44. Career Group Progression: Warrant Officers	IV-27
45. New Career Group: Warrant Officers	IV-28
46. Career Group Progression: Enlisted Personnel	IV-29
47. New Space Career Pattern	IV-29
48. DAC Intern Program	IV-29
49. DAC New Intern Program	IV-29

UNCLASSIFIED

Table 7. (U) Organization Recommendations
(Volume II, Chapter V)

	Page No.
1. Deputy for Space (Office of the Assistant Secretary of the Army for RD&A)	V-15
2. DCSOPS: Representative for Space on ARSTAFF	V-15
3. ADCSOPS (FD): Army Staff Proponent for Space	V-15
4. Assign an O-6, Deputy for Space, to ADCSOPS (FD)	V-15
5. Assign an O-6, Deputy for Space, to ADCSRDA	V-15
6. Organize the Army Space Command	V-17
7. Army Space Command, commanded by a MG, be initially filled with a BG	V-17
8. Establish a space office in all major subordinate commands and separate reporting activities within AMC	V-17
9. Establish a Space Technology Directorate within AMC	V-19
10. Establish a Space Requirements Directorate within TRADOC	V-21
11. AMC establish a Space Research Center	V-21
12. Establish a Space Integrating Cell at CAC, LOGCEN, and SSC	V-22
13. Establish a Space Office at all schools within TRADOC	V-22
14. CAC be the lead center for space	V-22
15. CGSC act as the lead school for space education	V-22

UNCLASSIFIED

2. (U) Not included in the first three categories as fully recommended for funding, but still considered by the study members as useful and feasible, were a large number of additional space-related recommendations, of both materiel and non-materiel efforts. These are offered in Tables 8 through 15 and are supported in the indicated appendices and pages of Volume II, Main Report or Volume III, Technology Assessment.

UNCLASSIFIED

UNCLASSIFIED

Table 8. (U) Maneuver Recommendations
(Volume II, Appendix C)

	Page No.
<u>Aviation (Annex 1)</u>	
1. Ground/Aircraft-Based Intelligence Monitoring System	C-1-6
2. Advanced Digital Avionics System	C-1-7
3. Cockpit-Mounted Digital Topographic Display	C-1-7
4. Search and Rescue System	C-1-7
5. LHX Environmental Protection Cockpit	C-1-8
6. RPV/UAV Space-Based Sensor to Perform Scout Helicopter Functions	C-1-8
<u>Close Combat (Heavy) (Annex 2)</u>	
*1. Interface with Tactical Air Force	C-2-6
2. Astronaut Geologist on Shuttle Missions	C-2-7
3. Improved Communications Doctrine	C-2-9
<u>Close Combat (Light) (Annex 3)</u>	
1. Deployment Enhancement	C-3-3
<u>Engineer, Mine Warfare (Annex 4)</u>	
1. Corps of Engineer Infrastructure Support	C-4-7
<u>Special Operations Forces (Annex 5)</u>	
1. Spread Spectrum Satellite Communications	C-5-4
2. Light Weight Video System	C-5-5
*3. Ability to Sense Through Materials	C-5-6
<u>Nuclear, Biological, and Chemical (Annex 6)</u>	
*1. Individual & Vehicle NBC Detector	C-6-6
2. Multispectral Obscurants	C-6-7
3. High Obscurants	C-6-7
4. Wrist Radio/NBC Alarm	C-6-8
5. Electronic Tactical Deception System	C-6-8
<u>Military Police (Annex 7)</u>	
1. Robotic Surveillance/Sentry System	C-7-3

*Non-space related

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

Table 9. (U) Air Defense Recommendations
(Volume II, Appendix D)

	<u>Page No.</u>
1. Define Army Role in Strategic Defense	D-2
2. Integrate Space into Doctrinal Development	D-7
3. Develop Strategic Level Army Doctrine	D-7
*4. Develop Joint Air Defense Doctrine	D-8
*5. Develop More Realistic Simulators	D-8
6. Conduct Analysis of Strategic Defense Requirements	D-8
7. Army Become Proactive in SDA 2000 Study	D-8
8. Establish Requirements for Exploitation of National Sensors for ADA	D-11
9. Participate in Space Development Programs of Other Services	D-11
10. Develop Requirements and Conduct Technical Feasibility Analysis of an Army ASAT	D-16
11. Develop Requirements for a Weapon Control Terminal (WCT)	D-22
12. Develop Requirements for a Follow-On to the AN/TSQ-73	D-22
13. Develop Offensive AD Doctrine in Far Term	D-24
14. Develop Requirements for a Joint C ² System	D-30

UNCLASSIFIED

*Non-space Related

Table 10. (U) Fire Support Recommendations
(Volume II, Appendix E)

	<u>Page No.</u>
1. Operational Concept for Low Cost Satellites	E-7
2. Operational Concept for DTSS Integration	E-7
3. Operational Concept for Additional Satellite Communications Equipment	E-8
4. Operational Concept for F3 Use of a GPS/PADS Hybrid and the DRU/GPS Hybrid	E-8
5. Operational Concept for Second Generation RPVs and UAVs	E-8
6. Determine Feasibility of Employing TKIM	E-10
7. Develop a GPS Enhancement for Meteorological Data System	E-10
8. Operational Concept for the MET RPV	E-10
9. Operational Concept for the NRT Situation Display	E-10
10. Operational Concept for Enhanced EHF Satellite Communications	E-11
11. Determine Feasibility of a Coordination and Targeting Center (CTC) and a "Closed-Loop" Targeting System	E-11

UNCLASSIFIED

*Non-space related

UNCLASSIFIED

UNCLASSIFIED

Table 4. (U) Intelligence and Electronic Warfare
Recommendations (Volume II, Appendix F)

	Page No.
1. Requirements for Advanced Systems	F-6
2. IEW System for LIC/Terrorism	F-7
*3. Phased Array Antennas	F-7
4. Satellite Communications Terminals	F-7
5. Low Cost Satellites	F-8
6. Geopositioning Requirements	F-8
7. TENCAP	F-8
8. TACIES	F-8
*9. Downsize System Configurations	F-8
10. Space Station	F-9
11. Weather Capabilities	F-9
12. Tactical Weather Reporting/Forecasting	F-11
*13. Release Conditions for Intelligence	F-11
14. Tactical Weather Support System	F-13

UNCLASSIFIED

*Non-space related

Table 12. (U) Combat Service Support Recommendations
(Volume II, Appendix G)

	Page No.
1. Enhanced Supply Accounting/Processing System	G-7
2. Enhanced Maintenance Control System	G-8
3. Equipment Monitoring and Reporting System	G-9
4. Spaceborne Water Sensor System	G-10
5. POL Data Link	G-10
6. Position Location/Navigation System	G-11
7. C ² Collection & Distribution System	G-11
8. CSS Communications Satellite System	G-12
9. Supplies in Low Earth Orbit	G-13
10. Satellite Reflector System	G-14
11. Space-Based Data Processing Network	G-14
12. Space-Enhanced Movement Control Center Operation	G-15
13. Automated Battlefield Payments	G-16
14. Enhanced Personnel Accounting and Administration System	G-17
15. Army Space Transportation Systems	G-19
16. Space-Based Depots	G-19

UNCLASSIFIED

*Non-space related

UNCLASSIFIED

UNCLASSIFIED

Table 13. (U) Health Services Recommendations
(Volume II, Appendix H)

	Page No.
1. Remote, Non-Invasive Casualty Diagnostic System	H-5
2. Remote Consultation/Teleradiography	H-5
3. Medical Surveillance	H-5
4. Medical C ³	H-5
5. Medical Materiel Automated Systems	H-6
6. Medical Research and Development	H-7
*7. Technology Spinoffs	H-7
8. AMEDD Space Office	H-8

UNCLASSIFIED

*Non-space related

Table 14. (U) Command, Control, and Communications
Recommendations (Volume II, Appendix I)

	Page No.
1. C ² Interoperability	I-10
2. Multipurpose Satellite	I-11
3. Satellite Network Control Vans	I-15
*4. New Technologies	I-18

UNCLASSIFIED

*Non-space related

Table 15. (U) Technology Assessment Recommendations
(Volume III, Appendix J)

	Page No.
1. Validate and Publish Technology Assessment	J-1
2. Periodically Update and Re-Publish Technology Assessment	J-1

UNCLASSIFIED

H. (U) IMPLEMENTATION PLAN. Implementation of the Army Space Master Plan will require the coordinated efforts of various staffs, organizations, and agencies. Implementation taskings were derived from Chapters III, IV, and V of Volume II. Appropriate staffs, organizations, and agencies have been matched to all taskings. A "General" section has been added to this plan

UNCLASSIFIED

UNCLASSIFIED

for those taskings not derived from the above indicated chapters. The major sections of the plan are:

- General
- Investment Strategy
- Personnel, Education, and Training
- Organization

Figure 4 summarizes the key taskings of the plan. Chapter VI of Volume II presents the entire plan.

I. (U) CONCLUSIONS

1. (U) In July 1985 the Army Space Initiatives Study Group undertook the development of an Army Space Master Plan for delivery by December 1985. The purpose was to provide the Army with a blueprint for its future involvement and investment in space. During the study numerous ideas were proposed as partial or full solutions to recognized mission area deficiencies. Ideas were also proposed which were not deficiency oriented but, based upon the understanding gained by the study participants of the advantages of space operations and spinoffs, were opportunities to help the Army improve its mission performance. These initiatives were then classified as to their probable worth to the Army by identification as Level 1, 2, or 3 investments.

2. (U) The potential of the application of space to revolutionize the Army's capabilities to project landpower is beginning only now to be realized. As a supporting dimension of modern warfare, the opportunities provided by space must be understood, analyzed, and competed for in order for the Army to meet the goal of fully exploiting the potential of space. To this end, the Army must train, equip, organize, and sustain a professional Army Space Command to conduct Army space activities. The orderly development of an expanded space capability requires long range planning, deliberate action, and the investment of Army resources. This Army Space Master Plan provides the foundation for that effort.

UNCLASSIFIED

UNCLASSIFIED

<u>ACTION</u>	<u>AGENCY</u>	<u>COMPLETION DATE</u>
● GENERAL		
●● DESIGNATE ODCSOPS TO IMPLEMENT STUDY	VCSA	31 DEC 85
●● DISTRIBUTE EXECUTIVE SUMMARY TO ALL GENERAL OFFICERS	ODCSOPS	JAN 86
● INVESTMENT STRATEGY		
●● PROGRAM FUNDS TO SUPPORT APPROVED INITIATIVES	ODCSRDA/ODCSOPS	JAN 86
●● INITIATE NEW FUNDING LINES AS REQUIRED	ODCSRDA	MAR 86
● EDUCATION, TRAINING, AND PERSONNEL MANAGEMENT		
●● INCORPORATE REVISED SC 3Y IN APPROPRIATE REGULATIONS	ODCSPER	MAR 86
●● DEVELOP ASI-SQI FOR WARRANT OFFICERS AND ENLISTED PERSONNEL	ODCSPER	JUN 86
● ORGANIZATION		
●● ESTABLISH AUTHORIZATION DOCUMENT FOR RECOMMENDED ORGANIZATION	ODCSOPS	MAR 86
●● REVISE TDA FOR ARSTAFF WITH RECOMMENDED SPACE POSITIONS	MANAGEMENT DIRECTORATE	MAR 86

UNCLASSIFIED

Figure 4. (U) Implementation Plan

UNCLASSIFIED

4-23

BIBLIOGRAPHY

BIBLIOGRAPHY

Ambrose, Stephen E. Eisenhower Vol.2. New York: Simon and Schuster, 1984.

Armacost, Michael H. The Politics of Weapons Innovation: The Thor-Jupiter Controversy. New York: Columbia University Press, 1969.

Baar, James. "Army Faces Exodus From Space." Missiles and Rockets, 31 August 1959, pp. 11-12.

Beard, Edmund. Developing the ICBM: A Study in Bureaucratic Politics. New York: Columbia University Press, 1976.

Belair, Felix Jr. "Eisenhower Acts to Strip the Army of its Space Role." New York Times, 22 Oct. 1959, Sec. 1, p. 1, col. 4.

Cox, Donald W. The Space Race: From Sputnik to Apollo...and Beyond. New York: Chilton Books, 1962.

"Deputy Secretary Gilpatric Explains Pentagon R&D Directive." Army Navy Air Force Journal, 98 (25 Mar. 1961), pp. 16-18.

Eisenhower, Dwight D. The White House Years: Waging the Peace, 1956-1961. Garden City, New York: Doubleday & Company, Inc., 1965.

Gaddis, John L. Strategies of Containment. New York: Oxford University Press, 1982.

Gavin, James M. War and Peace in the Space Age. New York: Harper & Brothers, 1958.

Hungerford, John B., Jr. "Organization for Military Space - A Historical Perspective." Diss. Air Command Staff College, Maxwell Air Force Base,

Alabama 1982.

Kinnard, Douglas. President Eisenhower and Strategy Management: A Study in Defense Politics. Lexington, Kentucky: The University Press of Kentucky, 1977.

Leavitt, William. "New Ground Rules for the Space Mission." Space Digest, October 1959, p. 56.

Medaris, John B., Major General. Countdown for Decision. New York: G. P. Putnam's Sons, 1960.

Moran, Walter J., et. al. The Army Role in Space (S). Carlisle, Pa.: The Army War College, 1984.

Nixon, Richard M. The Challenges We Face. New York: McGraw-Hill Book Company, Inc., 1960.

Schichtle, Cass. The National Space Program: From the Fifties into the Eighties. Washington: National Defense University Press, 1983.

"Sec'y McNamara Decides: AF Will Be Supreme in RDT&E Space Tasks." Army Navy Air Force Journal, 98 (March 11, 1961), p. 771.

Sobel, Lester A., ed. Space: From Sputnik to Gemini. New York: Facts on File, Inc., 1965.

"Space: The Maze in Washington." Time, 19 October 1959, p. 27, col 2.

Taylor, Maxwell D. The Uncertain Trumpet. New York: Harper & Brothers, 1959.

U.S. Army. Field Manual 100-5, Operations. Washington, D.C.: GPO, 1982.

U.S. Army. Training and Doctrine Command Regulation 11-7. Ft. McPhearson, Ga.: 1985.

U.S. Army. Concept Statement: Army 21 (S). Washington, D.C.: GPO, p-2.

U.S. Cong. House. Committee on Government Operations. Organization and Management of Missile Programs. 86th Cong., 1st sess. Washington, D.C.: GPO, 1959.

U.S. Cong. Preparedness Investigating Subcommittee of the Committee on Armed Forces in conjunction with the Committee on Aeronautical and Space Sciences. Hearings on Missiles, Space, and Other Major Defense Matters. 86th Cong., 2d sess. Washington, D.C.: GPO, 1960.

U.S. Cong. Select Committee on Astronautics and Space Exploration. The National Space Program. 85th Cong., 2d sess. Washington, D.C.: GPO, 1958.

Weigley, Russell F. The American Way of War: A History of United States Military Strategy and Policy. Bloomington: Indiana University Press, 1973.

"Dulles Sets Goal of Instant Rebuff to Stop Aggressor." The New York Times, Late City Ed., 13 January 1954, Sec. 1, pp. 1-2, col. 8.

INITIAL DISTRIBUTION LIST

1. Air University Library
Maxwell Air Force Base
Alabama 36112
2. Combined Arms Research Library
U.S. Army Command and General Staff College
Ft. Leavenworth, Kansas 66027
3. Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314
4. Major Fred Downey
Department of Joint and Combined Operations
USACGSC
Ft. Leavenworth, Kansas 66027
5. Lt.Col. Mason Smith
Department of Joint and Combined Operations
USACGSC
Ft. Leavenworth, Kansas 66027
6. Col. David C. Skaggs
4201 S. 31st St.
Arlington, VA 22206
7. United States Military Academy Library
West Point, N.Y. 10996