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91-FOI-1776

JCSM-91-88
27 May 1988

MEMORANDUM FOR THE SECRETARY OF DEFENSE

Subject: Space Component of US Military Strategy and Warfighting Requirements for US Military Space Systems

1. In response to your request,* the Joint Chiefs of Staff forward the attached report on the Space Component of US Military Strategy and Warfighting Requirements for US Military Space Systems.

2. This report sets forth a specific space component of US military strategy in support of national security strategy and objectives, and is consistent with national and DOD space policy. Additionally, it provides warfighting requirements for US military space systems as part of the Department of Defense Space Systems Study, in accordance with study participation guidelines.** The report also provides information to the Defense Resources Board and the appropriate Service resource planners for use during the space program review.

3. Without attachment, this memorandum is UNCLASSIFIED.

For the Joint Chiefs of Staff:

ROBERT W. RISCASSI
Lieutenant General, USA
Director, Joint Staff

Attachment

References:
* Secretary of Defense memorandum, 20 January 1988, "Space Systems Study for DRB Review"
** CM-1161-88, 5 February 1988, "Space Systems Study for DRB Program Review"

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USD(P)
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SPACE COMPONENT OF US MILITARY STRATEGY AND WARFIGHTING REQUIREMENTS FOR US MILITARY SPACE SYSTEMS

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GLOSSARY

ADP	automated data processing
AFSATCOM	Air Force Satellite Communications
AJ	antijam
AOR	area of responsibility
ASAT	antisatellite
ASW	antisubmarine warfare
BDP	battlefield development plan
BMD	ballistic missile defense
CINC	commander of a unified or specified command
CM	Chairman's Memorandum
COMSAT	communications satellite
C2	command and control
C3	command, control, and communications
C3I	command, control, communications, and intelligence
C4	command, control, communications, and computers
DCI	Director of Central Intelligence
DE	directed energy
DEW	directed-energy weapons
DIA	Defense Intelligence Agency
DODD	Department of Defense Directive
DRB	Defense Resources Board
DSCS	Defense Satellite Communications System
D-WIP	Defense-Wide Intelligence Plan
EAM	emergency action message
ECCM	electronic counter-countermeasures
ECM	electronic countermeasures
EHF	extremely high frequency
EMP	electromagnetic pulse
EW	electronic warfare
FLTSATCOM	fleet satellite communications
FORSCOM	Forces Command
FY	fiscal year
GPS	Global Positioning System

HF	high frequency
IR	infrared
I&W	indications and warning
JCSM	Joint Chiefs of Staff Memorandum
JSPD	Joint Strategic Planning Document
JSPDSA	Joint Strategic Planning Document Supporting Analysis
JSPS	Joint Strategic Planning System
LIGHTSAT	light satellite
LPD	low probability of detection
LPI	low probability of intercept
MAC	Military Airlift Command
MC	military committee
MC&G	mapping, charting, and geodesy
MJCS	Memorandum by the Joint Chiefs of Staff
MOP	Memorandum of Policy
MROC	multicommand required operational capability
MV	miniature vehicle
NATO	North Atlantic Treaty Organization
NCA	National Command Authorities
NORAD	North American Aerospace Defense Command
NUDET	nuclear detonation
OPLAN	operational plan
OPSEC	operations security
OSD	Office of the Secretary of Defense
R&D	research and development
RF	radio frequency
SAC	Strategic Air Command
SATCOM	satellite communications
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Organization
SDS	Strategic Defense System
SHF	superhigh frequency
SIOP	Single Integrated Operational Plan

SM	Secretary, Joint Staff, Memorandum
SPADOC	Space Defense Operations Center
SPINSAT	single-purpose inexpensive satellite
SSA	space systems architecture
TACSAT	tactical satellite
TENCAP	tactical exploitation of national capabilities; tactical exploitation of national space program capabilities (USAF only)
TIAP	Theater Intelligence Architecture Plans
TIRSS	Theater Intelligence Reconnaissance and Surveillance Study
TRADOC	US Army Training and Doctrine Command
TT&C	tracking, telemetry, and commanding
TW/AA	tactical warning and attack assessment
UHF	ultrahigh frequency
USCENTCOM	US Central Command
USEUCOM	US European Command
USG	United States Government
USLANTCOM	US Atlantic Command
USPACOM	US Pacific Command
USSOCOM	US Special Operations Command
USSOUTHCOM	US Southern Command
USSPACECOM	US Space Command
USSR	Union of Soviet Socialist Republics
USTRANSCOM	US Transportation Command

EXECUTIVE SUMMARY (U)

1. (U) This report sets forth a specific space component of US military strategy in support of national security strategy and objectives and is consistent with national and DOD space policy. The report fulfills tasking* to provide warfighting requirements for US military space systems as part of the Department of Defense Space Systems Study, in accordance with the study participation guidelines.** This report also provides information to the DRB and the appropriate Service resource planners for use during space program reviews.

2. (U) The following points of agreement were reached in developing this report:

a. (U) In any attempt to establish US military space systems requirements or to identify deficiencies in the areas of force enhancement and force application, the most meaningful measure of merit is the degree to which the solution provides direct and effective support to the warfighting CINCs.

b. (U) The key to full development of the future warfighting potential of US military space systems is ensuring mission capability, which in turn, demands effective and responsive

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space control, space support, force enhancement, and force application capabilities.

c. (U) A space system is defined as an orbiting satellite, its supporting ground station(s), and the communication link among the various users.

d. ~~(S)~~ [redacted]

e. (U) A US military space system is a space system owned or operated by the Department of Defense.

3. ~~(S)~~ [redacted]

4. (U) DOD space policy supports and amplifies US national space policy. Space is recognized as a medium within which the conduct of military operations in support of US national security takes

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place, just as on land, at sea, and in the air. Similarly, it is a medium from which military space functions of space support, force enhancement, space control, and force application can be performed.

5. (U) This report provides an initial synthesis of several references relating to space strategy and space requirements with the current thinking of the Services, Joint Staff, and unified and specified commands. The overall goal is to enhance, develop, and deploy US military space systems that are so capable in their contribution to the fulfillment of global and regional US military-strategy objectives that they create a dilemma for the Soviets and threaten the success of Soviet war plans and the achievement of Soviet war aims, no matter which space-attack option the Soviet war planners choose. The following space component of US military strategy was developed logically from US national security- and military-strategy objectives.

6. (U) The space component of US military strategy is to create a major dilemma for the Soviet war planner in his decision to attack or withhold attack against the United States or US space systems that support the US and allied forces worldwide. Therefore, the United States will ensure access to and use of

space, thereby contributing to crisis stability and, ultimately, to war deterrence. Should deterrence fail, the United States will endeavor to deny the enemy the wartime use of space.

7. (U) There can be no final statement of the space component of US military strategy. Rather, the space component of strategy is necessarily dynamic and evolving, changing with increasing understanding of space and space systems and the evolving capability of ground, air, and sea forces to exploit the potential of space. Consequently, the strategy contained within this report must transition into the JSPD, the proper vehicle for keeping a dynamic strategy visible within the JSPS review cycle.

8. ~~(S)~~ In response to the tasking by the Secretary of Defense, this report identifies the following overall warfighting requirements, organized under the four functional planning areas of the military space operations and includes the views of the unified and specified commands.

a. ~~(S)~~ Space Support. [redacted] US military space systems must possess a robust, enduring satellite control capability, based on interoperability, satellite

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autonomy and crosslinks, and a global mix of mobile and fixed control stations.

b. ~~(S)~~ Force Enhancement. US space force enhancement systems must improve the effectiveness of land, naval, and air forces

[redacted]

c. ~~(S)~~ [redacted]

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[redacted]

d. ~~(S)~~ [redacted]

9. ~~(S)~~ Finally, the report lists the following specific operational deficiencies identified by the unified and specified commands, Services, and Joint Staff within the four functional areas of space operations:

a. ~~(S)~~ [redacted]

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b. (S)

[redacted]

c. (S)

[redacted]

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[redacted]

d. ~~(S)~~ [redacted]

10. (U) The findings of this report must undergo continuous review and refinement as the military utility of space systems becomes better understood by the warfighting commands. As statements of requirements evolve, they should be incorporated into appropriate Joint Staff and Service planning documents.

11. (U) The findings of this report are the result of the combined efforts of Joint Staff, Service, OSD, SDIO, and DIA representatives to the Force Structure, Resource, and Assessment (J-8) working group, with major input from representatives of the unified and specified commands.

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* Secretary of Defense memorandum, 20 January 1988, "Space Systems Study for DRB Review"

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SECTION I: INTRODUCTION (U)

(U) References: A. Secretary of Defense memorandum, 4 February 1987, "Department of Defense Space Policy"

B. SECNAVINST S5400.39, 6 February 1984, "Department of the Navy Space Policy"

C. White House Pamphlet, January 1987, "National Security Strategy of the United States"

D. White House Pamphlet, January 1988, "National Security Strategy of the United States"

1. (U) General

a. ~~(S)~~ Space systems have become an essential element in the full range of US national security capabilities, and the use of space systems to satisfy many critical national security requirements is an expanding and vital element of US national power. A space system is defined as an orbiting satellite, its supporting ground stations, and the communications links between the various users. [redacted] A US military space system is

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a space system owned or operated by the Department of Defense. The United States uses space systems to conduct a variety of activities that are essential to national security, [redacted] In many cases, the worldwide access provided by space systems makes it the only available means for accomplishing these important functions. Without the assured use of space, the US national security would be seriously jeopardized.

b. ~~(S)~~ [redacted] Like the high seas, space is an environment where the agreed rights of free passage can be quickly overturned in the event of actual or imminent hostilities. US space capabilities that are critical for strategic and tactical force operations must be survivable and enduring. [redacted]

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[redacted]

2. ~~(C)~~ [redacted]

3. ~~(C)~~ [redacted]

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[redacted]

4. ~~(S)~~ [redacted]

5. (U) DOD Space Policy. DOD space policy supports and amplifies US national space policy. Space is recognized as a medium within which the conduct of military operations in support of US national security takes place, just as on land, at sea, and in the air. It is also a medium from which military space functions of space support, force enhancement, space control, and force application can be performed.

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a. (U) DOD Space Support Policy. The Department of Defense will:

(1) (U) Develop and maintain the capability to execute space missions regardless of failures of single elements of the space support infrastructure.

(2) (U) Develop and maintain an assured mission capability through robust satellite control, assured access to space, and on-orbit spares, proliferation, reconstitution, and other means as appropriate.

(3) (U) Emphasize robust satellite control and strive to develop and maintain the capability for assured access to space in peacetime and through levels of conflict as determined by national security needs.

(4) (U) Pursue new support concepts vigorously, especially launch-related concepts aimed at substantially reducing costs while improving overall capability to operate in peace, crisis, and war. Particular attention will be given to improvements in responsiveness, reliability, and flexibility.

b. (U) DOD Force Enhancement Policy. Force enhancement capabilities will be structured to provide effective operational support to military forces in peace, crisis, and

conflict. System developments will emphasize increased responsiveness to the requirements of operational military forces.

c. (U) DOD Space Control Policy. The Department of Defense will develop and acquire operational space-control capabilities to deter or, during conflict, protect against hostile space-based threats to the United States and its allies and deny the enemy freedom of action in space. The Department of Defense will develop and deploy a robust and comprehensive ASAT capability with initial operational capability at the earliest possible date. DOD space systems will be designed, developed, and operated to ensure the survivability and endurability of their critical functions at designated levels of conflict. The Department of Defense must ensure continuing capability for the control of space by preserving or acquiring those capabilities needed to survey and monitor continuously all militarily significant activities in space.

d. (S) DOD Force Application Policy. Consistent with treaty obligations and national policy, the Department of Defense will research, plan, and develop space force application systems as necessary to further national security.

6. (U) Overview

a. (U) Section II. Section II develops the space component of US military strategy and objectives from US national security strategy and objectives, with respect to an overall warfighting perspective.

b. (U) Section III. Section III develops warfighting requirements for US military space systems, both from an overall perspective and from the point of view of each unified and specified command.

c. (U) APPENDIX A. Appendix A lists the current principal documents on space-system requirements.

d. (U) APPENDIX B. Appendix B lists the major US military space-system warfighting deficiencies identified by the unified and specified commands, Services, and Joint Staff in each space operation planning area.

SECTION II: THE SPACE COMPONENT OF MILITARY STRATEGY (U)

References: A. "DOD Defense Guidance FY 1990-1994," 29 March 1988

B. JCSM-127-87, 4 August 1987, "Joint Strategic Planning Document for FY 1990 Through FY 1997" (with 1st, 2d, and 3d N/Hs)

1. (U) General. The space component of US military strategy is developed logically from US national security and military strategy and objectives, and framed by the space policy background reviewed in Section I. The following outlines national security and military strategy and their objectives, and then sets forth a specific space component of US military strategy and objectives.

2. (U) US National Security Strategy and Objectives

a. ~~(S)~~ [redacted]

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[redacted]

b. (U) US National Security Objectives. The basic national security objective is to preserve the United States as a free nation with its fundamental institutions and values intact. Other US national security objectives are:

(1) (U) Deter nuclear attack on the United States, its forces, and allies and discourage enemy use of nuclear weapons in any war.

(2) (U) Deter, but should deterrence fail, defeat, armed aggression of any kind against the Unites States, its allies and friends, and its critical interests abroad.

(3) (U) Encourage and assist US allies and friends in defending themselves against armed invasion, insurgencies, terrorism, and coercion.

(4) (U) Ensure US access to critical resources, the oceans, and space.

(5) (U) Reduce US reliance on nuclear weapons and nuclear retaliation by strengthening the US conventional and

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chemical deterrent, by pursuing equitable and verifiable arms reduction agreements, by insisting on compliance with such agreements, and by pursuing technologies for strategic defense.

(6) (U) Where possible, reduce Soviet influence and presence throughout the world, increase obstacles to Soviet use of subversive forces, and foster changes within the Soviet Bloc that will lead to a more peaceful world.

(7) (U) Prevent the transfer of militarily significant technologies and resources to the Soviet Bloc and other hostile countries and entities.

3. (U) US Military Strategy Overview

a. ~~(S)~~ [redacted]

b. ~~(S)~~ [redacted]

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[redacted]

4. (U) The Space Component of US Military Strategy

a. ~~(S)~~ [redacted]

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[redacted]

b. (U) The overall goal is to develop and deploy US military space systems so capable that they create a dilemma for the Soviets by threatening the success of Soviet war plans and the achievement of Soviet war aims, no matter which space attack option Soviet war planners choose. If the Soviets choose to:

(1) (U) Withhold Space Attack. US space systems provide full strategic and tactical warning of ground, air, and sea attack and significantly multiply the effectiveness of US and allied forces.

(2) (U) Initiate Space Attack Prior to Earth-Based Hostilities. The robustness of US space systems would force an enemy to engage in a large, readily observable attack that would take many hours or days to achieve its

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goals. Such an attack would signal Soviet intent and allow the United States and its allies to prepare their ground, air, and sea forces and would allow US space assets to initiate actions to thwart the attack.

(3) (U) Initiate Space Attack After Earth-Based Hostilities. US space systems provide full strategic and tactical warning of an attack and significantly multiply the effectiveness of US and allied forces during the critical opening phase of a nuclear or conventional war. Delay in attacking US space systems allows time for space system defensive actions, significantly increasing the timeline and resource commitment necessary for a successful Soviet attack against US space systems.

c. (U) With this Soviet dilemma in mind, the following space component of US military strategy was developed from existing US national security and military strategy and objectives.

d. (U) The space component of United States military strategy is to create a major dilemma for the Soviet war planner in his decision to attack or withhold attack against the United States or US space systems that support US and allied forces worldwide. Therefore, the United States will ensure access to

and use of space, thereby contributing to crisis stability and ultimately, to war deterrence. Should deterrence fail, the United States will endeavor to deny the enemy the wartime use of space.

5. (U) US Military Strategy Space Component Objectives

a. ~~(S)~~ [redacted]

b. (U) To ensure free access to and use of space in peace and war, the United States will develop and deploy, as directed by the NCA:

(1) ~~(S)~~ [redacted]

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(3) ~~(S)~~ [redacted]

(4) ~~(S)~~ [redacted]

(5) ~~(S)~~ [redacted]

(6) ~~(S)~~ [redacted]

c. (U) Since the announcement in 1983 by President Reagan, SDI has stressed the potential use of space-based systems for an effective defense against ballistic missiles. The United States will actively pursue the SDI program to determine the feasibility of an effective defense against ballistic missiles and shifting the emphasis of the US deterrent posture from strictly offensive to a more balanced offensive and defensive orientation.

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d. (U) Peacetime Objectives

(1) ~~(S)~~ [redacted]

(2) (U) To sustain technology developments with applications to space, R&D must be conducted to identify military space systems that will best support space operations in the future. Key technologies that can significantly enhance the operational capability of future US military space systems should be identified, prioritized,

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and intensively pursued to support Service and DOD acquisition programs. Areas of high R&D leverage include next-generation military launch systems, survivability technologies, satellite TT&C and on-board data processing, power generation from space, and DE. The full potential of future space operations may lead to revolutionary means of launching, deploying, maintaining, and employing space-based assets in the years to come.

e. ~~(S)~~ [redacted]

f. ~~(S)~~ [redacted]

(1) ~~(S)~~ [redacted]

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(2) ~~(C)~~ [redacted]

(3) ~~(C)~~ [redacted]

(4) ~~(S)~~ [redacted]

g. ~~(S)~~ [redacted]

h. ~~(S)~~ [redacted]

i. ~~(S)~~ [redacted]

j. ~~(S)~~ [redacted]

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[redacted]

k. ~~(S)~~ [redacted]

(1) ~~(S)~~ [redacted]

(2) ~~(S)~~ [redacted]

(3) ~~(S)~~ [redacted]

l. ~~(S)~~ [redacted]

[redacted]

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SECTION III: MILITARY SPACE SYSTEM WARFIGHTING REQUIREMENTS (U)

References: A. See Appendix A for a list of the principal documents on current space systems requirements

B. USCINCLANT 102200Z Mar 88.

C. USCINCCENT/CCJ5 152222Z Mar 88.

D. USCINCEUR/ECCS 121020Z Mar 88.

E. CINCFOR/FCDJ 101850Z Mar 88.

F. CINCMAC/CV 151740Z Mar 88.

G. USCINCPAC 132343Z Mar 88.

H. USSPACECOM Report, 11 April 1988, "Military Strategy and Warfighting Requirements for United States Space Systems"

I. USCINCSOC/SOCS 162126Z Mar 88.

J. CINCSAC/CS 181900Z Mar 88.

K. USCINCTRANS/TCCS 111915Z Mar 88.

1. (U) General. The following discussion outlines US military space system warfighting requirements from an overall perspective and from the point of view of the individual unified and specified commands. The references above provide detailed descriptions of the requirements in each functional

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area. Appendix B provides a list of major US military space system warfighting deficiencies.

2. (S) [redacted]

a. (S) [redacted]

(1) (S) [redacted]

(2) (U) Satellite Control. US military space systems must possess a robust, enduring satellite control capability, based upon expanded interoperability, satellite autonomy and crosslinks, and a global mix of mobile and fixed control stations.

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b. (U) Force Enhancement. US space force enhancement systems must improve the effectiveness of land, naval, air, and space forces by providing critical support in a variety of functional areas throughout the full spectrum of conflict.

(1) ~~(S)~~ [redacted]

(2) (U) Command and Control Communications. Space-based communications systems must provide flexible, high-capacity, secure, jam-resistant, LPI, survivable, interoperable, and enduring C3 in support of DOD users and other agencies approved by the Joint Chiefs of Staff. These systems must provide critical connectivity for worldwide strategic and tactical forces through all levels of conflict.

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(3) (U) Space Surveillance. See requirement description under Space Control below.

(4) (U) Navigation. Space-based navigation systems must provide passive, precise, continuous, jam-resistant, survivable, worldwide, all-weather, three-dimensional positioning, velocity, and timing data.

(5) ~~(S)~~ [redacted]

(6) (U) Environmental Monitoring. Space-based environmental monitoring systems must detect and locate natural terrestrial, oceanic, atmospheric, and space phenomena that affect the operations and planning of the NCA, organizations, and forces and must communicate appropriate detection and location data to these or intermediate users in a timely manner. Consistent with the survivability requirements identified by the NCA authorities,

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organizations, and forces needing support, space-based environmental monitoring systems must also perform their functions reliably during various levels of conflict.

(7) ~~(S)~~ [redacted]

(8) ~~(S)~~ [redacted]

(9) ~~(S)~~ [redacted]

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[redacted]

(10) ~~(S)~~ [redacted]

(11) ~~(S)~~ [redacted]

c. (U) Space Control. Analogous to sea control or air superiority, the space environment must be controlled to the degree required for friendly forces to operate. US space control forces must provide freedom of action in space for friendly forces while denying it to the enemy when directed by the NCA.

(1) (U) Space Surveillance. The space surveillance network, which supports both space control and force enhancement operations, must provide a widely dispersed, responsive, and capable system of space- and ground-based near-earth and deep-space sensors that provides for timely

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and accurate detection, tracking, and identification of space objects and events.

(2) (U) Antisatellite Capability. A flexible, responsive mix of ASAT weapon systems must provide a US capability to permanently or temporarily deny the enemy global or selected area support from his space-based systems, thereby decreasing the effectiveness of his ground, air, and sea forces. ASAT weapon systems must provide a capability to protect US space assets and permit for a response-in-kind to any potential enemy attack against US space systems.

(3) ~~(S)~~ [redacted]

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d. ~~(C)~~

(1) ~~(S)~~

(2) ~~(S)~~

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[redacted]

3. (U) Command-Specific Requirements

a. ~~(S)~~ [redacted]

(1) ~~(S)~~ [redacted]

(2) ~~(S)~~ [redacted]

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b. ~~(S)~~ [redacted]

(1) ~~(S)~~ [redacted]

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(2) ~~(S)~~ [redacted]

(3) ~~(S)~~ [redacted]

c. ~~(S)~~ [redacted]

(1) ~~(S)~~ [redacted]

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(2) ~~(S)~~ [redacted]

(3) ~~(S)~~ [redacted]

d. ~~(S)~~ [redacted]

e. ~~(S)~~ [redacted]

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[redacted]

(1) ~~(S)~~ [redacted]

(2) ~~(S)~~ [redacted]

(3) ~~(S)~~ [redacted]

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f. ~~(S)~~

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g. ~~(S)~~ [redacted]

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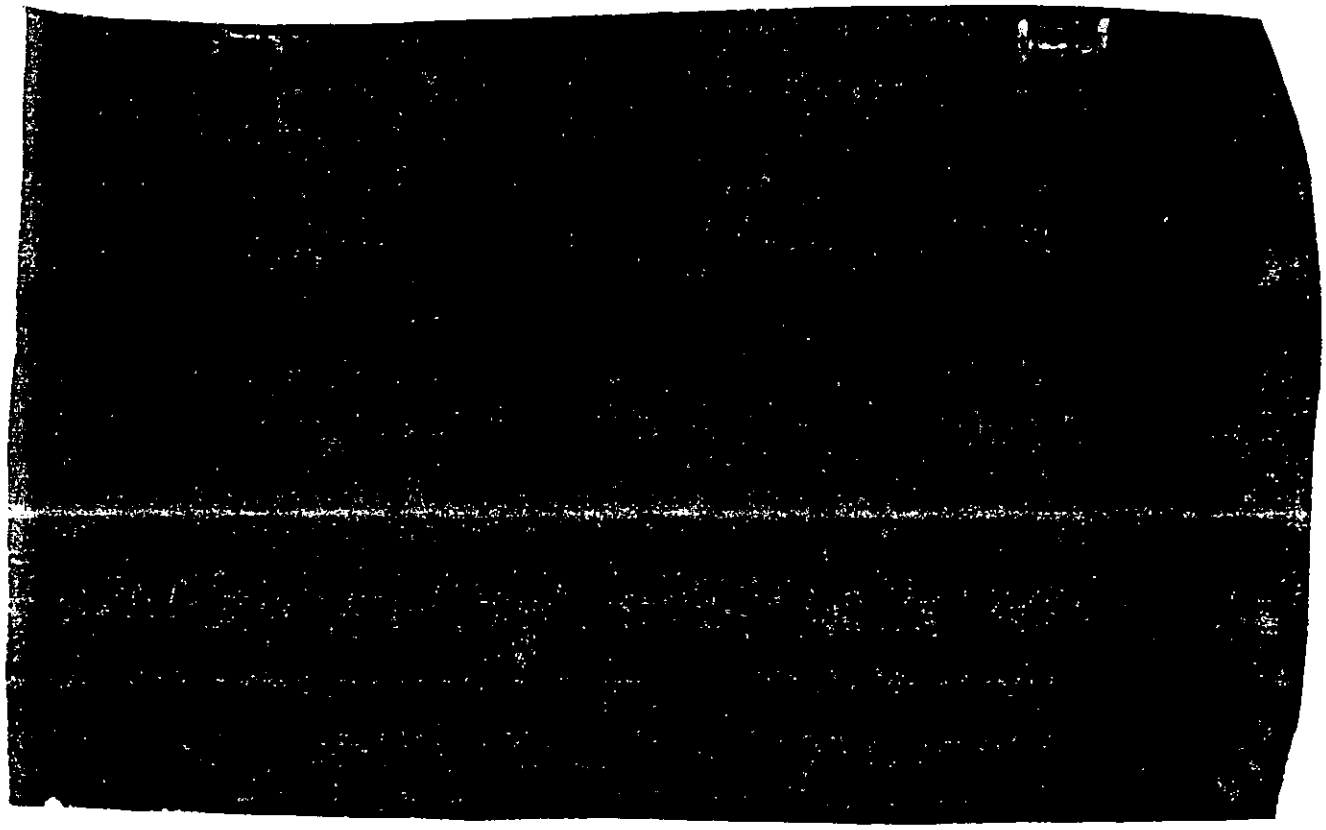

(2) (U) To effectively provide assured launch access from peace through all levels of conflict, a mix of launch capabilities is required ranging from large, heavy, manned and unmanned payload boosters as peacetime systems to small, quick, survivable, and mission-effective wartime systems.

(3) (U) To effectively control space for US and allied forces, USSPACECOM must be able to deter attacks against US and allied space systems through the threat of response in-kind. Should deterrence fail, USSPACECOM must possess

an adequate mix of active and passive space system defense measures to defeat attack on US systems. Additionally, USSPACECOM must possess sufficient reconstitution assets and supporting infrastructure to sustain vital space system support to ground, air, and sea forces.

(4) ~~(S)~~ [redacted]

h. ~~(S)~~ [redacted]

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(3) (U) General SAC requirements for space systems include the following:

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

(c) (U) Continuous availability and worldwide coverage will be required by most systems.

(d) (U) Space systems must be interoperable with other military systems.

(e) ~~(S)~~ [redacted]

j. ~~(S)~~ [redacted]

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APPENDIX B

MAJOR US MILITARY SPACE SYSTEMS WARFIGHTING DEFICIENCIES (U)

1. ~~(S)~~ [redacted]

2. (U) Assessment

a. ~~(S)~~ [redacted]

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[redacted]

c. (U) Space Support

(1) (U) Access to Space. The entire focus of launch operations has been upon the peacetime factors of cost, performance, and reliability. The lack of focus of the wartime factors of responsiveness, flexibility, and survivability has created inherent operational deficiencies.

(2) (U) Satellite Control

(a) ~~(S)~~ [redacted]

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(b) ~~(S)~~ [redacted]

d. (U) Force Enhancement

(1) (U) Command and Control Communications

(a) ~~(S)~~ [redacted]

[redacted]

(b) ~~(S)~~ [redacted]

(c) ~~(S)~~ [redacted]

(d) ~~(S)~~ [redacted]

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[redacted]

(e) ~~(S)~~ [redacted]

(f) ~~(S)~~ [redacted]

(2) (U) Navigation

(a) ~~(S)~~ [redacted]

(c) ~~(S)~~ [redacted]

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(3) (U) Environmental Monitoring

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

(c) ~~(S)~~ [redacted]

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(e) ~~(S)~~ [redacted]

(f) (U) Support deficiencies exist in launch responsiveness, data refresh rate (all data types), timeliness (all data types), vertical resolution (most data types), three-dimensional wind data, electron density profile data, visibility data, neutral-density data, and clear-air-turbulence data. Deficiencies also exist in space environmental monitoring.

(g) ~~(S)~~ [redacted]

(4) (U) Tactical Warning and Attack Assessment

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

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[redacted]

(5) (U) Nuclear Detonation Detection

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

(6) (U) Ocean and Battlefield Surveillance and Tactical Intelligence Collection

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

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(c) ~~(S)~~ [redacted]

(7) (U) Space Surveillance. (See deficiencies listed under Space Control below.)

e. (U) Space Control

(1) (U) Space Surveillance

(a) ~~(S)~~ [redacted]

(b) ~~(S)~~ [redacted]

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(2) (U) Antisatellite Capability

(a) ~~(S)~~ [redacted]

(3) (U) Survivability and Endurance

(a) ~~(S)~~ [redacted]

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[redacted]

(c) ~~(S)~~ [redacted]

f. (U) Force Application

(1) ~~(S)~~ [redacted]

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(2) (~~S~~) [redacted]

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