



Department of Defense INSTRUCTION

NUMBER 3100.12

September 14, 2000

ASD(C3I)

SUBJECT: Space Support

- References:
- (a) PDD-NSC-49/NSTC-8, "National Space Policy," September 14, 1996
 - (b) PDD-NSTC-4, "National Space Transportation Policy," August 5, 1994
 - (c) [DoD Directive 3100.10](#), "Space Policy," July 9, 1999
 - (d) Secretary of Defense Memorandum, "Department of Defense Policy on the Use of Former Soviet Union Propulsion in Space Launch Vehicles," May 17, 1995 (hereby superseded)
 - (e) through (o), see enclosure 1

1. PURPOSE:

This Instruction:

1.1. Implements policy, assigns responsibilities, and prescribes guidelines and procedures regarding the space support mission area, in accordance with references (a) through (c); and

1.2. Supersedes references (d) and (e).

2. APPLICABILITY

This Instruction applies to the Office of the Secretary of Defense, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as "the DoD Components").

3. DEFINITION

Space Support. Combat service support operations to deploy and sustain military and intelligence systems in space. The space support mission area includes launching and deploying space vehicles, maintaining and sustaining spacecraft on-orbit, and deorbiting and recovering space vehicles, if required.

4. POLICY

It is DoD policy under the provisions of reference (c) that:

4.1. The availability of critical space support capabilities necessary for executing national security missions shall be assured, in accordance with references (a) through (c).

4.2. Capabilities necessary to conduct the space support mission area shall be integrated into an operational space force structure that is sufficiently robust, ready, secure, survivable, resilient, and interoperable to meet the needs of the National Command Authorities, Combatant Commanders, military operational forces, and intelligence users across the conflict spectrum, in accordance with references (a) through (c).

4.3. Space Transportation. The capability for responsive, reliable, flexible, and assured access to space in peace, crisis, and through appropriate levels of conflict commensurate with national security requirements shall be assured, in accordance with references (a) through (c). This shall include operational capabilities to launch and deploy space vehicles as well as de-orbit and recover space vehicles, if required.

4.3.1. Access to space shall be provided by a mix of space launch systems and multiple launch sites at major space support facilities to ensure that single failures do not prevent access to space.

4.3.2. DoD payloads shall be launched on U.S.-manufactured launch vehicles unless specifically exempted by the President or his designated representative, in accordance with reference (b). Such launch vehicles shall be fabricated and tested in the United States.

4.3.3. Use of Former Soviet Union (FSU) Propulsion Systems, Components,

or Technology . The use of propulsion systems, components, or technology from the FSU shall be in conformity with obligations under arms control agreements, U.S. non-proliferation policies, U.S. technology transfer policies, and U.S. policies regarding observance of the Guidelines and Annex of the Missile Technology Control Regime, in accordance with reference (d).

4.3.4. Launch Ranges. DoD launch ranges are national assets, which shall be sized, operated, and maintained primarily for DoD test and operational support missions. Such ranges shall also be available to all users having a valid requirement for such capabilities, in accordance with reference (f). The space launch infrastructure shall be systematically modernized and enhanced consistent with mission needs, in accordance with reference (b). Launch range safety activities shall be conducted in accordance with references (b) and (f).

4.3.5. Commercial Space Launch. U.S. commercial space launch services shall be utilized to the fullest extent feasible that meet mission requirements, in accordance with references (b) and (g). DoD support to commercial space launches shall be provided in accordance with references (b), (h), and (i).

4.3.5.1. State and local governments as well as private sector access to DoD launch facilities and services, which are excess or otherwise not needed for public use shall be facilitated and encouraged, in accordance with references (a), (h), and (j).

4.3.5.2. Equal opportunity for all elements of the U.S. commercial space sector shall be provided for access to Federal launch property and services without the use of direct Federal subsidies. Reimbursement shall be obtained from persons authorized to acquire DoD launch property or launch services.

4.3.5.3. Recovery of design and development costs or investments associated with any existing facilities or new facilities required to meet U.S. Government needs, and to which the U.S. Government retains title, shall not be sought in the pricing structure for launch base and range use. This shall not, given appropriate statutory authority, preclude investment in launch base and range facilities from entities other than the U.S. Government.

4.3.5.4. The requirements of commercial users of U.S. space launch bases and ranges shall be actively considered and factored into decisions on operations and improvements to the launch bases and ranges as well as the operations of the bases and ranges. The right to use such facilities and services on a priority basis to meet

national security and critical civil sector mission requirements shall be reserved, in accordance with reference (b).

4.3.5.5. Unclassified space transportation technologies developed by the DoD Components shall be transferred in a timely manner to the private sector in such a way as to protect their commercial value, in accordance with references (b) and (j).

4.4. Satellite Control Operations. The capability for responsive, reliable, flexible, and assured satellite commanding of bus and payload, accurate tracking, and receipt of satellite status and health in peace, crisis, and through appropriate levels of conflict commensurate with national security requirements shall be assured, in accordance with references (a) through (c). Satellite operations shall ensure the preservation of space-based missions, mitigate the threat of in-space collisions, minimize orbital debris generation, and be conducted in a safe and responsible manner consistent with national security requirements, in accordance with reference (c).

4.5. Nuclear Power Sources in Earth Orbit. Space nuclear power sources shall not be used in Earth orbit without the approval of the President or his designee, in accordance with references (a), (c), and (k).

5. RESPONSIBILITIES

Under the provisions of reference (c):

5.1. The Assistant Secretary of Defense for Command, Control, Communications, and Intelligence/Chief Information Officer (ASD(C3I)/CIO) shall:

5.1.1. Serve as the principal staff assistant and advisor to the Secretary and Deputy Secretary of Defense and focal point within the Department of Defense for space support and related activities.

5.1.2. Develop, coordinate, and oversee the implementation of policies regarding space support, and, in coordination with the Under Secretary of Defense for Policy (USD(P)), ensure that space support policy decisions are closely integrated with overall national security policy considerations.

5.1.3. Oversee the development and execution of space support, related architectures, and acquisition programs, in support of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)).

5.1.4. Coordinate requests for exemptions to launch DoD payloads on foreign launch vehicles with the USD(AT&L), the (USD(P)), the General Counsel of the DoD (GC, DoD), and the Chairman of the Joint Chiefs of Staff (CJCS).

5.1.5. Review and coordinate all requests from within the U.S. Government to use excess ballistic missiles to place payloads into orbit with the USD(AT&L), the USD(P), GC, DoD, the CJCS, and, as appropriate, the Secretaries of the Military Departments.

5.1.6. Review and coordinate requests for national security use of the Space Transportation System with the USD(AT&L), GC, DoD, the Under Secretary of Defense, Comptroller (USD(C)), the CJCS, and, as appropriate, the Secretaries of the Military Departments.

5.1.7. Monitor all space support and related technology activities to balance risk, cost, and potential technical gains.

5.1.8. Serve as a focal point for space support systems and technology integration where the interests of more than one DoD Component are involved.

5.1.9. Prevent unwarranted duplication and ensure that space support programs assigned to one DoD Component meet the needs of other DoD Components.

5.1.10. Oversee the Director of the National Reconnaissance Office's management and execution of the National Reconnaissance Program to coordinate and, as appropriate, integrate national security satellite operations and space transportation activities.

5.2. The Under Secretary of Defense for Acquisition, Technology, and logistics shall:

5.2.1. Serve as the Acquisition Executive for space support programs that are designated Acquisition Category 1-D or designated special interest and, through the ASD(C3I)/CIO, oversee space support and related acquisition and technology programs.

5.2.2. Oversee DoD space support activities to ensure that they fully comply with arms control agreements and arrangements to which the U.S. Government is a party in coordination with the GC, DoD, in accordance with reference (1).

5.2.3. Review and approve, as appropriate, requests for limited extensions to the conversion of FSU-produced propulsion systems, components, or technologies when such items are used to launch DoD payloads.

5.2.4. Review and coordinate requests by the DoD Components for use of nuclear power sources in Earth orbit with the USD(P), the ASD(C3I)/CIO, GC, DoD, the CJCS, and, as appropriate, the Secretaries of the Military Departments.

5.2.5. Oversee the development and execution of space support science and technology programs.

5.3. The Under Secretary of Defense for Policy shall ensure that space support policy decisions are closely integrated with overall national security policy considerations, in coordination with the ASD(C3I)/CIO and the GC, DoD.

5.4. The Secretaries of the Military Departments shall organize, train, and equip forces for the satellite operations mission.

5.4.1. Review and approve use of excess ballistic missile assets by the U.S. Government Departments and Agencies for any purpose other than to launch payloads into orbit.

5.4.2. The Secretary of the Department of the Air Force shall be responsible for national security space transportation including launch and orbital operations, as well as support for national test and evaluation operations of launch vehicles.

5.5. The Chairman, Joint Chiefs of Staff shall:

5.5.1. Provide assessments of requests for exemptions to launch DoD payloads on foreign launch vehicles.

5.5.2. Provide assessments of requests to use excess ballistic missiles to place payloads in orbit.

5.5.3. Provide assessments of requests for national security use of the Space Transportation System.

5.5.4. Provide assessments of requests for use of nuclear power sources in Earth orbit.

5.5.5. Ensure that space support concepts and requirements are integrated, as appropriate, into force structure assessments.

5.5.6. Provide guidance to Commander in Chief, U.S. Space Command for the planning and employment of space support capabilities through the joint planning process.

5.5.7. The Commander in Chief of U.S. Space Command shall:

5.5.7.1. Serve as the single point of contact for military space support operational matters, except as otherwise directed by the Secretary of Defense.

5.5.7.2. Conduct space support operations.

5.5.7.3. Define mission requirements for the space support mission area.

5.5.7.4. Advocate the space support requirements of the other Combatant Commanders.

5.5.7.5. Assess and report on the operational impact of space support anomalies and degradation to ensure maximum support to the warfighter.

5.6. The Heads of the DoD Components shall ensure that their DoD Component's space support activities fully comply with arms control agreements and arrangements to which the U.S. Government is a party, in accordance with reference (1).

6. PROCEDURES

6.1. Satellite Control Operations

6.1.1. Routine satellite telemetry and commanding functions shall generally use the same connectivity as mission data operations.

6.1.2. Satellites shall use a combined space- and ground-based antenna network for connectivity during launch, early orbit, anomaly resolution, optimization of in-band commanding resource availability, and for a limited number of mission data operations at low-data-rates.

6.1.2.1. When practical, the satellite control network shall be a shared subset of the assets of enduring systems.

6.1.2.2. The network shall ensure accessibility to any U.S. Government satellite in Earth orbit and to any vehicle launched from U.S. Government facilities.

6.1.2.3. Satellite systems must meet network protocols and standards for space-to-ground, space-to-space, and terrestrial interfaces, as applicable, in order to use the network.

6.1.2.4. The network shall migrate from existing frequency bands and waveforms to a standard interface configuration.

6.1.2.4.1. As a goal, ground-to-space and forward space-to-space communications shall use the 2025-2110 Megahertz (MHz) frequency band as specified in the National Table of Frequency Allocations. Dual operations in the 1761-1842 MHz and 2025-2110 frequency bands may be considered during a transition period to facilitate satellite operations flexibility and interoperability.

6.1.2.4.2. Space-to-ground and space-to-space return communications shall continue to use the 2200-2290 MHz frequency band as specified in the National Table of Frequency Allocations.

6.1.2.4.3. The network shall be spectrum-efficient and tolerant of unintentional radio frequency interference.

6.1.2.4.4. The network shall provide a tracking capability utilizing ranging codes on the network communications link for use during anomaly resolution operations only as long as absolutely necessary. The network shall pursue and implement technologies to eliminate ground-based radiometric tracking as soon as feasible.

6.1.3. Satellite and mission data operations shall reduce non-recurring development, where practicable, through developing or adopting protocols and standards and using open architecture configurations.

6.1.4. Satellite operations shall use robust space- and ground-based autonomy capabilities, where practicable, to reduce personnel and support infrastructure costs.

6.1.5. Mission needs and analysis of cost as an independent variable (CAIV) shall determine operational connectivity path(s) from satellites to mission data

processing and satellite operations locations. The CAIV analysis shall address, at a minimum, the following:

- 6.1.5.1. Direct connectivity between a spacecraft and a ground entry point;
- 6.1.5.2. Crosslink between like satellites in a constellation;
- 6.1.5.3. Use of a U.S. Government relay satellite system; and
- 6.1.5.4. Commercially available space-based and terrestrial capabilities.

6.1.6. DoD satellites shall reduce their demand for satellite operations infrastructure by avoiding use of the technique of ranging codes on the satellite control network communications link to determine satellite location and orbits.

6.1.6.1. Alternatives to this technique shall be identified, demonstrated, and qualified.

6.1.6.2. Satellites may use this technique when no practical alternative exists to meet mission performance requirements.

6.2. Space Transportation

6.2.1. Expendable Launch Vehicles. The expendable launch vehicle fleet shall be improved and evolved, including appropriate technology development, in accordance with reference (b). The objective of this effort is to reduce costs while providing assured access to space, improving reliability, operability, responsiveness, and safety.

6.2.1.1. Launch of multiple compatible payloads shall be actively pursued to enhance launch responsiveness and flexibility.

6.2.1.2. Combined expendable launch service procurements with the National Aeronautics and Space Administration (NASA) will be encouraged when such procurements would result in cost savings or be otherwise advantageous to the U.S. Government.

6.2.2. Use of FSU-Produced Propulsion in Space Launch Vehicles. FSU-produced propulsion systems, components, or technology, made entirely overseas may be used in launch vehicles for national security missions. The use of such

FSU-produced systems, components, or technology in U.S. launch vehicles used by the Department of Defense for national security missions shall be carried out so that access to space cannot be denied by the foreign supplier. A condition shall not be permitted to exist or develop, which could result in national security space launches being jeopardized by delays or disruptions in receipt of FSU-produced propulsion systems, components, or technology.

6.2.2.1. FSU-produced propulsion systems, components, or technology used in launch vehicles for national security missions must be converted to U.S. production within four years after contract award for Engineering and Manufacturing Development.

6.2.2.1.1. Conversion of FSU-produced propulsion systems, components, or technology to U.S. production may be accomplished using licensing, co-production, or other industry-to-industry arrangements, as appropriate, while maximum care is taken to prevent the unintended transfer of U.S. technology to foreign entities or governments. Such arrangements shall ensure that U.S. manufacturers are authorized to produce the propulsion system, component, or technology after the transition to domestic sources. If such conversion is determined to be impractical within four years, then the USD(AT&L) may grant a limited extension provided that continued foreign production will not result in launch program vulnerability because of delays or disruptions in the availability of the propulsion system, component, or technology. Alternatives that minimize dependence on FSU-produced engines for national security missions in lieu of establishing a U.S. production facility requires USD(AT&L) approval.

6.2.2.2. Launch vehicles used by the Department of Defense for national security missions that incorporate FSU-proposed propulsion systems, components, or technology shall meet all flight safety, flight qualifications, and other applicable technical or performance demands.

6.2.2.3. Sufficient quantity and quality of stocks (i.e., flight articles and spares) to preclude a launch stand-down during a transition to U.S. sources shall be ensured. Domestic ability to engineer and incorporate changes to the stocks shall be ensured. Approved U.S. launch vehicle manufacturers' contingency plans shall be required for alternative sources of FSU-produced propulsion systems, components, and technology intended for use in DoD launch vehicle acquisition programs or DoD-purchased launch services.

6.2.2.4. Adequate technical information shall be provided to U.S. launch

vehicle manufacturers to resolve anomalies in a timely manner without adversely affecting overall launch system reliability. At a minimum, this shall include detailed information on the history, traceability, design, fabrication, manufacture, performance, qualification and certification testing, and acceptable operating environments for each FSU-produced system, component, or technology used on launch vehicles or launch services purchased by the Department of Defense.

6.2.2.5. Government-to-government agreements may be used as necessary to facilitate the availability of FSU-produced propulsion systems, components, or technology for DoD launch vehicles. U.S. launch vehicle manufacturers shall be held responsible for ensuring the availability of such foreign supplies.

6.2.3. Reusable Launch Vehicles (RLVs). Military-unique requirements shall be provided to NASA for incorporation into vehicle demonstration efforts, in accordance with reference (b). Critical technologies required to meet military requirements shall be developed in cooperation with NASA and U.S. industry, consistent with reference (m).

6.2.4. National Security Use of Space Transportation System. The Space Shuttle may be used to meet national security needs, in cooperation with NASA, in accordance with reference (b). Requests for such support shall be submitted through the ASD(C3I)/CIO to the Secretary of Defense (SecDef) for approval. Launches necessary to preserve and protect human life in space shall have the highest priority except in times of national emergency, in accordance with reference (b).

6.2.5. Exemptions for Launch of DoD Payloads on Foreign Launch Vehicles. Requests for exemptions to launch DoD payloads on non-U.S. manufactured launch vehicles shall be submitted through the ASD(C3I)/CIO to the SecDef for review and approval prior to submission to the President or his designated representative. Such requests shall address, at a minimum, alternative launch capabilities for performing the mission, the impact on military and intelligence activities, and overall risks and benefits to U.S. national security interests.

6.2.6. Excess Missile Assets. U.S. excess ballistic missile assets that will be eliminated under strategic arms control agreements shall either be retained for Government use or be destroyed in accordance with reference (b) and consistent with reference (n). Such assets may be used by the U.S. Government for any purpose, other than to launch payloads into orbit, upon approval by the Secretary of the Military Department. Requests from within the Department of Defense or from other U.S.

Government Agencies to use excess assets for launching payloads into orbit shall be considered on a case-by-case basis and require SecDef approval. Such use shall be consistent with reference (1). Such requests shall be forwarded through the ASD(C3I)/CIO to the SecDef for approval.

6.2.7. Mission Assurance, Risk Management, and Safety. Clear responsibility, accountability, and authority within the Department of Defense shall be assigned for delivery of spacecraft to orbit.

6.2.7.1. Lessons learned from space transportation missions shall be disseminated across launch programs and U.S. contractors.

6.2.7.2. Robust mission assurance support shall be maintained, commensurate with risk, for the duration of launch vehicle fly-out programs as well as for the transition to new launch vehicle programs.

6.2.7.3. Mission performance incentives shall be designed to realistically balance schedule and cost pressures, consistent with the value of payloads to be launched.

6.2.8. Launch Base and Range Modernization. Next-generation space launch base and range technology development and demonstration activities shall be focused on improved safety, increased flexibility and capacity, and lower costs. The use of non-Federal sources of investment shall be encouraged for the continued modernization and maintenance of launch bases and ranges to the extent allowed by law.

6.3. Space Debris. The creation of space debris shall be minimized, in accordance with references (a) and (c) and consistent with reference (o). The following debris mitigation practices must be considered, consistent with cost effectiveness and mission requirements, in the acquisition and operation of space systems:

6.3.1. Release of debris during normal operations shall be controlled in all operational orbit regimes. Spacecraft and upper stages shall be designed to eliminate or minimize debris released during normal operations. Each instance of planned release of debris larger than five millimeters in any dimension that remains on orbit for more than 25 years shall be evaluated and justified on the basis of cost effectiveness and mission requirements.

6.3.2. Generation of debris by accidental explosions during and after completion of mission operations shall be minimized.

6.3.2.1. The development of the design of spacecraft or upper stages shall seek to demonstrate that there is no credible failure mode for accidental explosion. If credible failure modes exist, the probability of the occurrence of such failure modes shall be limited through design or operational procedures.

6.3.2.2. All on-board sources of stored energy of a spacecraft or upper stage shall be depleted or safed when they are no longer required for mission operations or post-mission disposal. Depletion shall occur as soon as such an operation does not pose an unacceptable risk to the payload. Propellant depletion burns and compressed gas releases shall be designed to minimize the probability of subsequent accidental collision and to minimize the impact of a subsequent accidental explosion.

6.3.3. The probability of collision with known objects during launch and orbital lifetime shall be estimated and limited in the development of the design and mission profile for spacecraft or upper stages. Designs shall consider and, consistent with cost effectiveness, limit the probability that collisions with debris smaller than one centimeter in diameter will cause loss of control and prevent post-mission disposal. Tether systems shall be uniquely analyzed for both intact and severed conditions.

6.4. Spacecraft End-of-Life. Spacecraft disposal at the end of mission life shall be planned for programs involving on-orbit operations, in accordance with reference (c). A spacecraft or upper stage may be disposed of by one of the following methods:

6.4.1. Atmospheric reentry. Leave the structure in an orbit in which, using conservative projections for solar activity, atmospheric drag will limit the lifetime to no longer than 25 years after completion of mission. If this option is selected, either the risk of injury from the total debris casualty area for components and structural fragments surviving reentry shall not exceed 1 in 10,000 (based upon an evenly distributed human population density across the Earth), or it shall be confined to a broad ocean or essentially unpopulated area.

6.4.2. Maneuvering to a Storage Orbit. A maneuver strategy shall be used that reduces the risk of leaving a structure near an operational orbit regime. The structure may be relocated to one of the following storage regimes:

6.4.2.1. An orbit with perigee altitude above 2,000 kilometers and apogee altitude below 19,700 kilometers.

6.4.2.2. An orbit with perigee altitude above 20,700 kilometers and apogee altitude below 35,300 kilometers.

6.4.2.3. An orbit with perigee altitude above 36,100 kilometers.

6.4.2.4. Removal from Earth orbit into heliocentric orbit.

6.4.3. Direct retrieval. Retrieve the structure and remove it from orbit as soon as practical after mission completion.

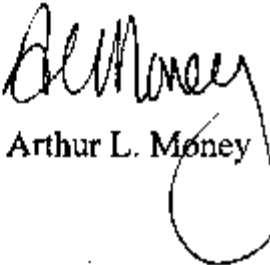
6.5. Nuclear Power Sources in Earth Orbit. Requests to use nuclear power sources in Earth orbit shall include an environmental impact analysis or nuclear safety evaluation, as appropriate, in accordance with references (c) and (k).

6.5.1. The Heads of the DoD Components may make requests to the SecDef to use nuclear power sources in Earth orbit through the USD(AT&L). The USD(AT&L) shall coordinate such requests with the ASD(C3I)/CIO, the USD(P), and the GC, DoD. The USD(AT&L) shall forward such requests and their environmental impact analysis and nuclear safety evaluation to the SecDef for approval. Such requests shall address, at a minimum, alternative satellite power sources capable of performing the mission, the impact on military and intelligence activities, and overall risks and benefits to U.S. national security interests.

6.5.2. The DoD Executive Secretary shall forward determinations to use nuclear reactors in Earth orbit, upon approval by SecDef or Deputy Secretary of Defense, to the Assistant to the President for National Security Affairs and the Assistant to the President for Science and Technology, in accordance with reference (k).

7. EFFECTIVE DATE

This Instruction is effective immediately.


Arthur L. Money

Enclosures - 1

E1. References, continued

E1. ENCLOSURE 1

REFERENCES, continued

- (e) Assistant Secretary of Defense (C3I) Memorandum, "Satellite Operations Architecture Study," February 7, 2000 (hereby superseded)
- (f) [DoD Directive 3200.11](#), "Major Range and Test Facility Base," January 26, 1998
- (g) Public Law 105-303, Commercial Space Act of 1998
- (h) [DoD Directive 3230.3](#), "DoD Support for Commercial Space Launch Activities," October 14, 1986
- (i) "Memorandum of Agreement between the Department of Defense and the National Aeronautics and Space Administration on Space Launch Coordination Involving the 2200-2290 MHz Band," May 4, 2000
- (j) "Memorandum of Agreement among the Department of Defense, Federal Aviation Administration, and National Aeronautics and Space Administration on Federal Interaction with Launch Site Operators," September 11, 1997
- (k) Presidential Directive NSC-25, "Scientific or Technological Experiments with Possible Large-Scale Adverse Environmental Effects and Launch of Nuclear Systems into Space," December 14, 1977 (as amended May 17, 1995)
- (l) [DoD Directive 2060.1](#), "Implementation of, and Compliance with, Arms Control Agreements," July 31, 1992
- (m) Joint Report of the Department of Defense, Department of Commerce, Department of Transportation, and National Aeronautics and Space Administration, "National Space Transportation Policy Coordinated Technology Plan," November 11, 1994
- (n) Assistant to the President for National Security Affairs/Assistant to the President for Science and Technology Memorandum, "Excess Strategic Ballistic Missiles," October 7, 1994
- (o) "Joint DoD/NASA Guidelines on Orbital Debris Mitigation Standard Practices," December 1997