DoD INSTRUCTION 3100.11

MANAGEMENT OF LASER ILLUMINATION OF OBJECTS IN SPACE

Originating Component:	Office of the Under Secretary of Defense for Policy
Effective:	October 24, 2016
Releasability:	Cleared for public release. Available on the DoD Issuances Website at http://www.dtic.mil/whs/directives.
Reissues and Cancels:	DoD Instruction 3100.11, "Illumination of Objects in Space by Lasers" March 31, 2000
Incorporates and Cancels:	Directive-type Memorandum 07-002, "Routine Laser Illumination for Operational Space Situational Awareness (SSA)," December 28, 2012 Deputy Secretary of Defense Memorandum, "Approval of F-35 Joint Strike Fighter (JSF) Activities under DoDI 3100.11, Illumination of Objects in Space by Lasers," November 6, 2011
Approved by:	Brian P. McKeon, Acting Under Secretary of Defense for Policy

Purpose: In accordance with the authority in DoD Directive (DoDD) 5111.1 and the November 30, 2006, Deputy Secretary of Defense Memorandum, this issuance:

- Establishes policy, assigns responsibilities, and provides procedures, in accordance with DoDD 3100.10, for the DoD management of risks associated with laser illuminations of objects in space.
- Establishes the requirement for a quantitative probabilistic risk assessment (PRA) process to categorize DoD-owned or -operated lasers that could direct energy above the horizon or in space and implements risk acceptance standards for DoD-owned or -operated resident space objects (RSOs).
- Establishes an exempt category of lasers that do not require coordination, notification, or permission before use due to the minimal risk they pose to RSOs.
- Provides guidance on management of DoD-owned and -operated lasers that have transitioned from research, development, test and evaluation (RDT&E) status into DoD weapon systems.
- Supersedes the unclassified information in the May 15, 2014, Commander Joint Functional Component Command for Space (JFCC SPACE) Memorandum; and the 2011-01 Director, National Reconnaissance Office (NRO) Memorandum.

TABLE OF CONTENTS

FIGURES

SECTION 1: GENERAL ISSUANCE INFORMATION

1.1. APPLICABILITY.

This issuance applies to:

a. The OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint 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 DoD (referred to collectively in this issuance as the "DoD Components").

b. All DoD-owned or -operated lasers, whether land-, air-, sea-, or space-based systems, conducting lasing operations in space or intending to direct energy above the horizon that may unintentionally illuminate RSOs.

c. All DoD-owned or -operated lasers that deliberately illuminate points in space or RSOs for any purpose.

d. All DoD-owned, -leased, or -operated RSOs, and other RSOs as specified by the Commander, United States Strategic Command (CDRUSSTRATCOM).

1.2. POLICY.

a. DoD laser activities must not be intentionally designed for, or used to cause, permanent blindness in humans, in accordance with the January 17, 1997, Secretary of Defense (SecDef) Memorandum.

b. DoD laser activities in space, or other DoD laser activities that may direct energy above the horizon, must be conducted in a safe and responsible manner, consistent with national security requirements, in order to manage the associated risks to space systems, those systems' mission effectiveness, and humans in space.

c. DoD RSO activities must implement mission assurance measures to minimize the risk of damage from intentional and unintentional laser illumination from any source, taking into consideration the proliferation of foreign and domestic commercial and government laser systems. DoD activities leasing satellite services are encouraged to utilize providers that implement mission assurance measures to minimize the risk of damage from laser illumination.

d. DoD will use a risk management approach to control unintentional laser illumination of RSOs. This approach will:

(1) Support efficient development, acquisition, testing, and fielding of laser systems, including weapon systems that meet the requirements in the Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3230.01, while ensuring the risk of damage to RSOs or mission degradation of RSOs that support DoD missions due to unintentional laser illumination is minimized to the greatest extent practicable.

(2) Promote the safe and responsible use of lasers by non-DoD laser owners and operators, as illustrated by this instruction, to balance the benefits of laser and RSO activities.

1.3. INFORMATION COLLECTIONS. The Deconfliction (DECON) database, referred to in Paragraph 2.10.l, has been assigned report control symbol DD-POL(AR)2619 in accordance with the procedures in Volume 1 of DoD Manual 8910.01. The expiration date of this information collection is listed in the DoD Information Collections System at https://apps.osd.mil/sites/DoDIIC/Pages/default.aspx.

SECTION 2: RESPONSIBILITIES

2.1. UNDER SECRETARY OF DEFENSE FOR POLICY (USD(P)) The USD(P):

a. Coordinates approval of all laser activities that require SecDef approval, as specified in this issuance.

b. Notifies the SecDef when CDRUSSTRATCOM reports that a lasing outside authorized parameters (LOAP) event likely resulted in harm to RSOs or to humans in space.

c. Manages notifying, or consulting, foreign governments, as appropriate, for laser activities that require SecDef approval.

d. Coordinates implementation of space policy-related responsibilities of the CJCSM 3230.01.

e. Promotes standards and norms of responsible behavior with stakeholders in the DoD Components, other U.S. departments and agencies, commercial companies, and academic institutions, as well as external stakeholders such as foreign military and government partners and commercial entities, with which DoD has relevant cooperative agreements to maximize RSO safety and promote responsible laser operations.

f. Coordinates with the CJCS on developing reasonable expectation standards for risk assessment using appropriate assumptions, thresholds, and dynamics.

2.2. UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS (USD(AT&L)). The USD(AT&L):

a. Oversees all SecDef-approved laser activities to ensure full compliance with arms control treaties and associated international agreements, in accordance with DoDD 2060.1.

b. Oversees the implementation of mission assurance, through resilient approaches, into satellite technology development and acquisition to protect DoD RSO activities and their missions from damage or interference that could be caused by laser illumination.

c. Oversees the development and deployment of laser notification, coordination, deconfliction, and modeling software and information technology systems that:

(1) Assure effective coordination with and notification of CDRUSSTRATCOM as defined in this issuance.

(2) Provide a deployable, mobile, and decentralized deconfliction solution.

(3) Are compatible with fielded systems and enable operational timelines.

(4) Model the interactions between laser activities and RSOs, including appropriate assumptions, thresholds, and dynamics to:

(a) Categorize laser types and activities.

(b) Perform quantifiable PRA.

(c) Support coordination efforts.

d. Ensures that all new DoD laser activities are compliant with this issuance through evaluation during milestone review.

2.3. UNDER SECRETARY OF DEFENSE FOR INTELLIGENCE (USD(I)). The USD(I):

a. Coordinates intelligence-related matters with appropriate Principal Staff Assistants, the Principal DoD Space Advisor, DoD Component heads, the Director of National Intelligence, and others, as needed, to:

(1) Promote safe use of lasers above the horizon or in space.

(2) Ensure resilience against laser activities that may adversely impact the operation of space-borne intelligence, surveillance, and reconnaissance or related intelligence systems.

b. Coordinates with CJCS on developing reasonable expectation standards. Coordinates the implementation of reasonable expectation standards with CDRUSSTRATCOM. Ensures risks to, and mission degradation of, RSO activities that support DoD missions are minimized to the greatest extent practicable.

2.4. DOD COMPONENT HEADS. The DoD Component heads:

a. Register DoD laser activities that may direct energy above the horizon or in space with CDRUSSTRATCOM for categorization.

b. Coordinate with CDRUSSTRATCOM, in accordance with Paragraph 3.1, to develop and implement reasonable expectation standards and risk assessment criteria to categorize laser types or activities:

(1) In space; or

(2) Intended to direct energy above the horizon or in space.

c. In accordance with Paragraph 3.2, notify CDRUSSTRATCOM before using Category II laser types or conducting Category II activities per procedures established by CDRUSSTRATCOM unless the laser activity is waived.

d. In accordance with Paragraph 3.2, notify and coordinate with CDRUSSTRATCOM before using Category III laser types or conducting Category III activities per procedures established by CDRUSSTRATCOM unless the laser activity is waived.

e. Submit any requests for laser activities requiring SecDef approval, in accordance with Paragraph 3.4, through USD(P).

f. Develop and implement RSO standards to support laser testing, training, exercising, and maintenance on lasers integration into a DoD "weapon system," as defined in Joint Publication 1-02, in coordination with CDRUSSTRATCOM.

g. Notify CDRUSSTRATCOM of all LOAP events that propagate energy above the horizon or in space.

h. Ensure records management practices adhere to DoDI 5015.02.

2.5. DIRECTOR OF THE NATIONAL RECONNAISSANCE OFFICE (DNRO). Under the authority, direction, and control of the USD(I), and in addition to the responsibilities in Paragraph 2.4., the DNRO:

a. Participates in CJCS development, and CDRUSSTRATCOM implementation, of reasonable expectation standards for risk assessment using appropriate assumptions, thresholds, and dynamics.

b. Deconflicts NRO operations from special use space ranges established in support of laser activities.

c. Plans and provides for survival, recovery, and reconstitution of NRO mission-essential functions pursuant to DoDD 3020.26.

2.6. SECRETARIES OF THE MILITARY DEPARTMENTS. In addition to the responsibilities in Paragraph 2.4, the Secretaries of the Military Departments:

a. Field laser weapon systems for operational employment according to procedures in DoDI 5000.69 and CJCSM 3230.01.

b. Develop and deploy software and information technology systems identified in Paragraph 2.2.c, in collaboration with CDRUSSTRATCOM and the other Military Departments, and under the oversight of the USD(AT&L).

c. In accordance with CDRUSSTRATCOM procedures, conduct risk assessments and establish safety requirements for DoD RSO activities, ensuring risks to and mission degradation of DoD RSOs are minimized to the greatest extent practicable.

d. Establish processes for their respective Military Departments to implement this issuance while keeping CDRUSSTRATCOM informed.

2.7. SECRETARY OF THE AIR FORCE. In addition to the responsibilities in Paragraphs 2.4 and 2.6, and in his or her capacity as the Principal DoD Space Advisor, the Secretary of the Air Force:

a. Oversees development of requirements for mission assurance through resilient approaches that protect DoD-owned, -leased, and -operated RSO activities and their missions from damage or interference that could be caused by all types of laser illumination.

b. Oversees and assesses the integration of mission assurance requirements into space system technology development and acquisition.

2.8. CJCS. In addition to the responsibilities in Paragraph 2.4, the CJCS develops procedures and updates CJCS Instruction 3225.01 to implement this issuance, including the development of a tailored risk management process consistent with Military Standard 882E and Section 3 of this issuance. The procedures must include laser activity characterization as well as the assessment, mitigation, and acceptance of risk to DoD RSO activities from DoD laser activities.

2.9. COMBATANT COMMANDERS OTHER THAN CDRUSSTRATCOM. In addition to the responsibilities in Paragraph 2.4, the Combatant Commanders will submit initial laser weapon system operational employment proposals to CDRUSSTRATCOM in accordance with the procedures in CJCSM 3230.01.

2.10. CDRUSSTRATCOM. In addition to the responsibilities in Paragraph 2.4, CDRUSSTRATCOM:

a. Ensures appropriate risk mitigation, as described in Paragraph 3.1.b, of intentional or unintentional laser illumination of RSOs by DoD laser activities.

b. Implements the procedures developed by the CJCS, including laser activity characterization, and the assessment, mitigation, and, per Paragraph 3.1.c, acceptance of risk to DoD RSO activities from laser illumination, in coordination with the DNRO, other relevant DoD Component heads, and other applicable non-DoD stakeholders.

c. Provides timely and accurate data to support notification, coordination, and deconfliction services as required in Paragraph 3.1.

(1) Data and services will be provided in a manner to support normal operations of fielded laser activities and RSO activities.

(2) Notification services will include notifying satellite owners or operators of upcoming laser activities.

d. Develops and implements standards, in coordination with the CJCS, DNRO, and other appropriate DoD Component heads:

(1) To protect RSOs from laser illumination.

(2) That enable laser testing, training, exercising, and maintenance of lasers integrated into a DoD weapon system.

e. Develops and distributes requirements for notifications to, and consultations with, foreign governments and associated SecDef approval to DoD Component heads in accordance with Paragraph 3.4.

f. Manages the safe and responsible conduct of DoD laser activities in space, or directed above the horizon, to ensure that the risks to RSOs are mitigated appropriately. May designate an appropriate commander to oversee the management of these laser activities and associated risk mitigation measures.

g. Exercises authority to grant notification and coordination waivers to laser owners and operators for laser activities above the horizon, in accordance with this issuance.

(1) Waivers will specify the time period and the activities permitted.

(2) Time periods will be flexible enough to ensure effectiveness of the intended activity, but narrow enough to ensure oversight by the granting authority.

h. Encourages safe and responsible laser operations when there is a reasonable expectation that such operations could damage DoD RSO activities by developing and distributing guidance to use with foreign military partners, foreign defense entities, and commercial and civil entities, in coordination with the USD(P), CJCS, and other appropriate DoD Component heads.

i. When requested by non-DoD laser owners and operators, and as resources allow, provides notification and coordination services for illumination above the horizon by ground-, air-, sea-, or space-based lasers.

(1) A CDRUSSTRATCOM-developed prioritization method will be used to ensure resources remain available to DoD Components.

(2) CDRUSSTRATCOM will emphasize providing services to non-DoD laser activities corresponding to Category III.

j. Supports efforts by the USD(AT&L) and appropriate DoD Component heads to use measures such as resiliency to protect DoD RSO activities from all laser illumination.

k. Supports the development and maintenance of DoD-standard software and information technology systems identified in Paragraph 2.2.c.(l).

l. Maintains technical database DECON, in coordination with DoD Components, on:

(1) Capabilities of worldwide lasers that are or may be employed above the horizon or in space and that could damage or interfere with DoD RSO activities.

(2) Appropriate worldwide RSOs, including non-DoD U.S. Government RSOs that may be susceptible or vulnerable to damage or interference from unintentional laser illumination.

(3) Incidents that involve actual or suspected damage from laser illumination to DoD RSO activities.

m. Ensures that approval of testing, training, exercising, and maintenance is made at the lowest authority level consistent with guidelines in this issuance.

n. Reports all known arms control non-compliant laser activities to USD(AT&L) and USD(P) per guidance provided in DoDD 2060.1.

o. When notified of an LOAP event:

(1) Coordinates with RSO owners and operators to determine if the LOAP resulted in harm to RSOs or humans in space.

(2) Reports the determination to CJCS, USD(P), and the Principal DoD Space Advisor when it is likely that the event caused harm to RSOs or humans in space. Such reports must include a summary of the laser event and an assessment of likely impacts to any humans or RSOs.

p. Conducts legal reviews, as necessary, of proposed illumination of non-DoD RSOs by DoD laser activities.

q. Consults with the DoD Component heads on laser system design features, operational procedures, security, and system safety rules to minimize damaging illumination to, or interference with, RSOs.

r. Maintains a lasing approval list (LAL) of RSOs that may serve as targets for laser illumination. Upon request, provides the LAL to relevant DoD Component heads.

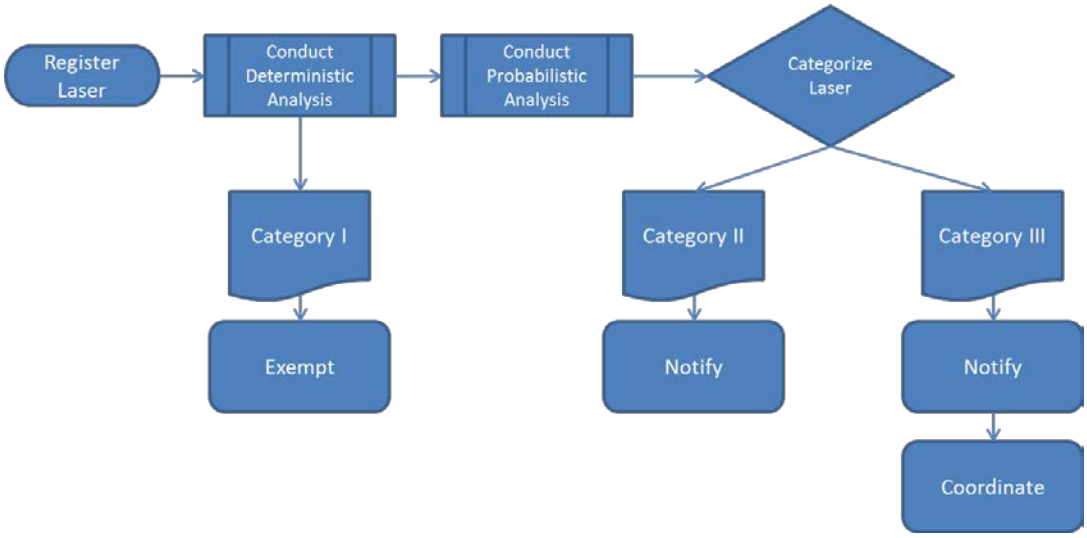
s. With input from appropriate DoD RSO activities, approves requests for special use space ranges in support of testing, training, exercising, and maintenance on DoD laser activity. Notifies appropriate satellite owners and operators of the establishment and parameters of the established special use space range.

t. Maintains a master test and operations schedule of upcoming events that deliberately illuminate RSOs. CDRUSSTRATCOM provides appropriate RSO owners with access to the master test and operations schedule.

SECTION 3: PROCEDURES

3.1. RISK MANAGEMENT. The following procedures, in conjunction with the tailored risk management practices established in CJCS Instruction 3225.01 and consistent with Military Standard 882E, will be implemented to reduce the risk of adverse effects due to unintentional laser illumination of RSOs and to ensure DoD laser activities are conducted in a safe and responsible manner.

Figure 1. Laser System Classification Process



a. Risk Assessment. CDRUSSTRATCOM will implement a two layer risk assessment approach. A deterministic methodology will be used to identify laser activities that do not pose a risk to RSOs. A probabilistic methodology will then be used to determine the probability of occurrence and hazard severity for those laser activities that do pose a risk to RSOs as determined by the deterministic analysis. Figure 1 illustrates this process.

(1) All DoD laser owners and operators directing energy above the horizon or in space will register basic system parameters and concepts of operation with CDRUSSTRATCOM.

(2) CDRUSSTRATCOM will conduct a risk assessment to categorize the laser type and activity. Analysis supporting this assessment will include, but not be limited to, reasonable atmospheric conditions, simplified laser platform dynamics, and duration of expected interactions.

(a) Category I. Laser activities in this category are exempt from further coordination with, or notification to, CDRUSSTRATCOM. Laser types and activities will be in Category I when they meet one or more of the following criteria:

1. Laser activities that are assessed, by deterministic analysis, as posing no risk to RSOs.

2. Laser activities that are not directed above the horizon.

3. Laser glints from test targets that may be sea-, land-, or air-based and inadvertent space based glint.

4. Hand-held tactical lasers.

5. Operational employment of laser activities, in actual use, that are approved, accepted, and integrated into a DoD "weapon systems" as defined by Joint Publication 1-02, including laser weapons approved for operational use.

(b) Category II. Laser activities in this category require CDRUSSTRATCOM notification before use, but do not require further coordination unless deliberately targeting an RSO. Laser activities will be in Category II when they meet one or more of the following criteria:

1. Laser activities conducted from a defined location, found, by deterministic analysis, to pose no risk to RSOs, not operated in accordance with Category I, and assessed, by probabilistic risk assessment, to pose a risk to RSO activities no greater than other nominal safety of flight and mission risks.

2. Testing, training, exercising, and maintenance of laser activities conducted within the constraints of a special use space range as defined by CDRUSSTRATCOM.

(c) Category III. Laser activities in this category require CDRUSSTRATCOM notification and coordination before use. Laser types and activities will be in Category III when one or more of the following criteria are met:

1. Laser activities found to pose a risk to satellites by deterministic analysis that do not meet any Category I or II criteria and are assessed by probabilistic risk assessment to pose a greater risk to RSO activities than other nominal safety of flight and mission risks.

2. Planned testing, training, exercising, and maintenance of laser activities that are approved, accepted, and integrated into a DoD "weapon system," as defined in Joint Publication 1-02. This includes laser weapons approved for operational use and that pose a greater risk to RSO activities than other nominal safety of flight and mission risks.

3. Laser activities found, by deterministic analysis, to pose no risk to RSOs, not operated in accordance with Category I, and assessed by probabilistic risk assessment to pose a risk to RSO activities no greater than other nominal safety of flight and mission risks but for which no defined operating location is provided to CDRUSSTRATCOM.

(3) DoD laser owners and operators may request CDRUSSTRATCOM support to establish additional system or operational risk mitigations.

b. Risk Mitigation. Mitigation of risk to RSO activities may include, but are not limited to:

(1) Mission assurance and resilience measures taken by DoD RSO activities consistent with DoDD 3020.26.

(2) Procedures undertaken by DoD RSO activities when CDRUSSTRATCOM provides notification services of Category II laser activities.

(3) Coordination services provided by CDRUSSTRATCOM to balance laser and RSO mission requirements.

(4) Timely and accurate data to support deconfliction for DoD Category III laser activities.

c. Risk Acceptance. The authority to accept the residual risk for Category II and III laser systems will be commensurate with the risk category. CJCS Instruction 3225.01 will define these acceptance levels.

3.2 COORDINATION.

a. Category II Notification. DoD laser owners or operators conducting Category II laser activities, as defined in Paragraph 3.1 of this issuance, must comply with the following procedures:

(1) DoD laser owners and operators must provide notification of upcoming laser events in accordance with CDRUSSTRATCOM procedures and timelines.

(2) If targeting an RSO, the laser owner or operator will:

(a) Request approval for laser operations in accordance with Paragraph 3.4 of this issuance.

(b) Only illuminate:

1. Targets from the LAL in accordance with any required restrictions;

2. U.S. rocket bodies or debris for non-destructive illumination;

3. RSOs approved for illumination by the RSO owner through written permission using a CDRUSSTRATCOM-approved format; or

4. RSOs authorized by CDRUSSTRATCOM in safety-of-flight situations.

b. Category III Notification and Coordination. Laser owners and operators conducting Category III laser activities, in accordance with Paragraph 3.1 of this issuance, and DoD owners and operators of RSOs, must comply with the following procedures:

(1) DoD laser owners and operators will:

(a) Notify CDRUSSTRATCOM of upcoming laser events in accordance with CDRUSSTRATCOM procedures and timelines.

(b) Implement coordination direction received from CDRUSSTRATCOM.

(c) If targeting an RSO, the laser owner or operator will:

1. Request approval for laser operations in accordance with Paragraph 3.4.

2. Only illuminate:

a. Targets from the LAL in accordance with any required restrictions;

b. U.S. rocket bodies or debris for non-destructive illumination;

c. RSOs approved for illumination by the RSO owner through written permission using a CDRUSSTRATCOM-approved format; or

d. RSOs authorized by CDRUSSTRATCOM in safety-of-flight circumstances.

(2) DoD RSO activities will:

(a) Coordinate with CDRUSSTRATCOM to deconflict RSO tasking with requested laser activities when deemed appropriate by CDRUSSTRATCOM.

(b) Implement direction received from CDRUSSTRATCOM as a result of coordination services.

(3) CDRUSSTRATCOM will:

(a) Coordinate between laser activities and RSO taskings to maximize the probability of completing each mission.

(b) Provide coordination services to DoD laser and RSO activities.

c. Waiver Request. DoD laser owners or operators will submit requests for waiver of notification and coordination requirements for specific laser activities to CDRUSSTRATCOM in the CDRUSSTRATCOM-specified format.

d. LOAP. DoD laser owners and operators will immediately report any LOAP incident or unauthorized illumination of a target above the horizon or in space to CDRUSSTRATCOM.

3.3. TRANSITION OF LASERS FROM RDT&E TO INTEGRATION INTO DOD WEAPON SYSTEMS.

DoD laser activities intended for integration into a DoD "weapon system," as defined by Joint Publication 01-02, must comply with the following procedures before and subsequent to integration for each phase:

a. RDT&E Period. DoD laser owners or operators will:

(1) Register the laser with CDRUSSTRATCOM by providing the laser system parameters using a CDRUSSTRATCOM-approved process and format.

(2) Obtain CDRUSSTRATCOM categorization assignment (i.e., Category I, II, or III) or operate in accordance with any approved waivers.

(3) Coordinate with or notify CDRUSSTRATCOM for testing, training, exercising, and maintenance of laser activities according to categorization and other procedures in this issuance.

b. End of RDT&E Period and Transition to DoD Weapon System Integration. DoD laser owners or operators will:

(1) Submit initial weapon system operational employment proposals to CDRUSSTRATCOM for information.

(2) Submit initial laser weapon system operational employment proposals to CJCS according to procedures in CJCSM 3230.01 for approval.

(3) In accordance with this issuance, coordinate with and notify CDRUSSTRATCOM for laser testing, training, exercising, and maintenance when such activities involve lasing above-the-horizon or in space.

c. Full Integration into DoD Weapon Systems. DoD laser owners and operators will:

(1) Operationally employ authorized DoD weapon systems without the need for further coordination, in accordance with applicable rules of engagement, and execute orders.

(2) In accordance with this issuance, coordinate with and notify CDRUSSTRATCOM for testing, training, exercising, and maintenance of laser activities within an authorized DoD weapon system that lase above-the-horizon or in space.

(3) Coordinate with and notify CDRUSSTRATCOM in accordance with the laser activity classification for laser activities not governed by rules of engagement and execute orders.

3.4 AUTHORIZATION OF DELIBERATE LASER ILLUMINATIONS OF RSOS.

a. Operational illuminations: Deliberate laser illuminations of RSOs for space situational awareness, detection, pointing, ranging, tracking, communications, and imaging will be conducted as follows:

(1) Illuminations will only be conducted on objects on the LAL using procedures established by CDRUSSTRATCOM. Illuminations will be captured in the master test and operations schedule. Such laser operations must not interfere with the RSO's operation or place the illuminated objects at undue risk.

(2) Laser illumination of any RSO may be authorized by CDRUSSTRATCOM without prior consent of the RSO's owner to address safety of flight risks.

b. Test illuminations: Deliberate laser tests illuminating RSOs will be reflected in a master test and operations schedule maintained by CDRUSSTRATCOM and approved at the following levels:

(1) SecDef approval is required for any use of Category III lasers to conduct testing, training, exercising, and maintenance activities designed to illuminate RSOs when:

(a) The DoD Component head determines that the activity may have an impact on foreign relations or foreign partners;

(b) The activity raises an issue of compliance with arms control treaty obligations or other international legal obligations;

(c) The activity requires coordination with other U.S. Government departments and agencies;

(d) The activity may result in adverse media coverage; or

(e) CDRUSSTRATCOM or USD(P) otherwise determines the laser activity requires SecDef approval.

(2) Secretaries of the Military Departments are the approval authority for, and must notify the USD(P) of, laser activities from all categories that are:

(a) The first test, series of tests, demonstrations, or exercises of a kind.

(b) Vulnerability tests illuminating an RSO in space.

c. RSO owner permissions: RSO owners may approve deliberate routine laser illumination of their own assets.

GLOSSARY

G.1. ACRONYMS.

CDRUSSTRATCOM	Commander, United States Strategic Command
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
DNRO	Director of the National Reconnaissance Office
DoDD	DoD directive
DoDI	DoD instruction
LAL	lasing approval list
LOAP	lasing outside authorized parameters
PRA	probabilistic risk assessment
RDT&E	research, development, test, and evaluation
RSO	resident space object
SecDef	Secretary of Defense
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USD(I)	Under Secretary of Defense for Intelligence
USD(P)	Under Secretary of Defense for Policy

G.2. DEFINITIONS.

Unless otherwise noted, these terms and their definitions are for the purpose of this issuance.

above-the-horizon. Direct laser energy that is not terminated by land, water, or other terrestrial backstop.

air-to-air. Laser energy from an airborne platform that is directed towards a separate airborne object and that may continue to Earth's surface or into space.

air-to-surface. Laser energy from an airborne platform that is ultimately terminated by land, water, or other terrestrial backstop.

coordination services. A process by which CDRUSSTRATCOM will balance laser and satellite mission requirements to mitigate potential hazards and maximize joint force capability.

deconfliction. A procedure that governs the firing of a laser that may intentionally or inadvertently illuminate RSOs. The procedure may be conducted using a centralized, decentralized, or other approved method.

deterministic analysis. A quantitative analysis of the effect on RSOs by a specific laser system or activity when the laser is modeled as illuminating the RSOs. The analysis will utilize simplifying and conservative assumptions.

DoD laser activities. Laser activities receiving resources, manpower, or funding from a DoD department or agency for RDT&E purposes, or for operational employment purposes after integration into DoD weapon systems.

DoD RSO activities. RSO activities receiving resources, manpower, or funding from a DoD department or agency, including leased space services when appropriate.

exempted laser. A laser registered with CDRUSSTRATCOM that has been determined not to require further notification or coordination with CDRUSSTRATCOM due to meeting one of the caveats of a Category I laser, in accordance with Paragraph 3.1.a.(2) of this issuance.

glint. Laser energy reflecting off the surface of an intentional or unintentional target.

hand-held lasers. Laser systems held and directed, aimed, fired, or otherwise operated by a single human being with no mechanical support.

illumination. A laser light incident on the surface of an intentional or unintentional target.

laser. Devices that emit coherent electromagnetic radiation of wavelengths between 10nm and 1mm, developed through a process of stimulated emission.

LAL. A list of satellites that may serve as targets for non-destructive laser activities such as ranging, tracking, calibration, and imaging.

LOAP. Any deviation from CDRUSSTRATCOM-approved lasing parameters that results in laser energy being directed above-the-horizon or in space.

mission assurance. A process to protect or ensure the continued function and resilience of capabilities and assets, including personnel, equipment, facilities, networks, information systems, infrastructure, and supply chains critical to the performance of DoD mission-essential functions in any operating environment or condition.

notification services. A process by which CDRUSSTRATCOM compiles and distributes information -- which has been provided by laser owners and operators to CDRUSSTRATCOM about upcoming laser activities -- to satellite owners and operators, and satellite owners and operators are provided the opportunity to adjust mission parameters to mitigate potential risks.

operational employment. The tactical use of laser capabilities for offensive or defensive purposes after the laser has been integrated into DoD weapon systems in accordance with CJCSM 3230.01 or other laser-based capabilities that enable DoD operations.

probabilistic analysis. A quantitative analysis using probabilistic distributions to estimate the effect on RSOs by specific laser systems or activities.

PRA. An analysis to estimate risk by computing real numbers to determine what could go wrong, how likely is it that something will go wrong, and what the consequences would be if something did go wrong. Specific to this issuance, PRA is a quantitative analysis of the potential illumination of, and effect on, RSOs by specific laser systems or activities. The analysis will utilize reasonable expectation standards and a probabilistic approach. Laser categorization and subsequent risk reduction measures will be based on this assessment.

protection. Active and passive defensive measures to minimize adverse effects to space objects due to intentional or unintentional laser illumination.

reasonable expectation standard. A group of modeling parameters that will be applied to calculations in the probabilistic risk assessment. Using these parameters, the analysis will return a low risk of damage to illuminated space objects where the laser operations could only cause damage through extraordinary circumstances or an improbable chain of events. These parameters will include variables such as frequency of accidental illuminations, degree of severity of a possible accidental illumination, probability of exposure to the space object population, and possible effects of an accidental illumination.

RDT&E. All tests, series of tests, demonstrations, or exercises of a laser, laser technology, or emerging laser technology for the purpose of advancing the understanding of a laser capability or the object upon which the laser is used.

resilience. The ability of an architecture to support the functions necessary for mission success with higher probability, shorter periods of reduced capability, and across a wider range of scenarios, conditions, and threats, in spite of hostile action or adverse condition, as defined in DoDD 3100.10.

risk acceptance. A risk handling option exercised by an official with appropriate authority who acknowledges that the risk event or condition may be realized and willingly accepts the risk with its consequences.

risk management. A method that enables informed decisions about laser illumination above the horizon or in space to accept, reduce, or offset risk, and subsequently make decisions that weigh overall risk against mission benefits, and which includes identification of mitigation measures that can be taken to reduce risks.

RSO. A manufactured object intended to orbit the earth, the moon, or another celestial body (e.g., spacecraft) or an object that remains in orbit as a result of that intent (e.g., rocket bodies debris, whether functioning or non-functioning).

RSO operator. The organization, individual, or entity responsible for directing a space object at a given time.

RSO owner. The organization, individual, or entity responsible for a space object at a given time. For DoD satellites, the organization with operational control

safe and responsible operations. Procedures undertaken, using the reasonable expectation standard, to protect space objects from harm by either intentional or unintentional laser illumination.

space systems. Any actively functioning spacecraft orbiting the Earth, including satellites and humans in space.

space-to-surface. Laser energy from a space-based platform that is ultimately terminated by land, water, or other terrestrial backstop.

special use space range. A specified three dimensional region defined in earth coordinates during a specified time period in which DoD laser operations will occur. Notification of satellite owners and operators of these parameters will allow operational tactics to minimize risk.

surface-to-surface. Laser energy from a land-based or water-based platform that is aimed at a land-based or water-based target.

target. Any object or point serving as the aim-point for intentional laser illumination.

unintentional illumination. Non-deliberate illumination of an object by a laser beam.

unauthorized illumination. Laser illumination of an object without first receiving permission from the proper authority when such permission is required in advance of the illumination.

unwaived laser. A laser that poses a potential risk to space systems and that requires use of CDRUSSTRATCOM-approved methods and procedures during illumination above the horizon or in space.

vulnerability test. A test designed to determine satellite damage-threshold information from laser illumination.

waived laser. A laser approved per CDRUSSTRATCOM standards for RDT&E; organize, train, and equip activities; training; maintenance; and exercises for a specific period of time.

waiver. A determination made and documented by CDRUSSTRATCOM to authorize a laser owner or operator to conduct a specific laser activity without the need for further coordination, notification, or risk mitigation measures for a specific period of time.

weapon system. Per Joint Publication 1-02, a combination of one or more weapons with all related equipment, materials, services, personnel, and means of delivery and deployment (if applicable) required for self-sufficiency.

REFERENCES

Chairman of the Joint Chiefs of Staff Instruction 3225.01, "Illumination of Objects in Space by Lasers," February 12, 2013

Chairman of the Joint Chiefs of Staff Manual 3230.01, "Directed Energy Weapon Initial Operational Employment Review and Approval Process," October 7, 2015

Commander JFCC Space Memo, "(U) Satellite Protection Direction for the Laser Clearinghouse (LCH)," May 15, 2014

Deputy Secretary of Defense Memorandum, "Delegations of Authority," November 30, 2006

Deputy Secretary of Defense Memorandum, "Designation of the Principal DoD Space Advisor," October 5, 2015

DoD Directive 2060.1, "Implementation of, and Compliance with, Arms Control Agreements," January 9, 2001, as amended.

DoD Directive 3100.10, "Space Policy," October 18, 2012

DoD Directive 3020.26, "Department of Defense Continuity Programs," January 9, 2009

DoD Directive 5101.02E, "DoD Executive Agent (EA) for Space," January 25, 2013

DoD Directive 5105.23, "National Reconnaissance Office (NRO)," June 28, 2011, as amended.

DoD Directive 5111.1, "Under Secretary of Defense for Policy (USD(P))," December 8, 1999

DoD Directive 5134.01, "Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L))," December 9, 2005, as amended.

DoD Directive 5143.01, "Under Secretary of Defense for Intelligence (USD(I))," October 24, 2014, as amended.

DoD Instruction 5000.69, "DoD Joint Services Weapon and Laser System Safety Review Processes" November 9, 2011

DoD Instruction 5015.02, "DoD Records Management Program" February 24, 2015

DoD Manual 8910.01, Volume 1, "DoD Information Collections Manual: Procedures for DoD Internal Information Collections," June 30, 2014, as amended

Joint Publication 1-02, "DoD Dictionary of Military and Associated Terms," March 15, 2015

Military Standard-882E, "Department of Defense Standard Practice for System Safety"

National Reconnaissance Office Memo 2011-01, "(U) Satellite Protection from Inadvertent Lasing" February 14, 2012

Secretary of Defense Memorandum, "DoD Policy on Blinding Lasers," January 17, 1997