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Operations, Planning, Command and Control

SPACE SURVEILLANCE OPERATIONS - BASIC OPERATIONS

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(U) This SD implements reference (a) and it provides procedures and guidance for worldwide Space Surveillance Operations. In addition, it is in compliance with the requirements as identified in the Joint Requirements Oversight Council (JROC) approved Capstone Requirements Document (CRD). It applies to United States Strategic Command (USSTRATCOM), particularly the Global Operations Directorate; the USSTRATCOM operational component commands, and all Space Surveillance Network (SSN) sites including Royal Air Force (RAF) Fylingdales and Globus II, located in Vardo, Norway. In addition, RAF Fylingdales follows guidance specified in reference (b).

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(U) The SSN uses a set of formatted messages to facilitate information flow. Messages identified by message number can be found on-line at the Integrated Weapon System Database (IWSD) managed by Electronic Systems Center/Command and Control Directorate (ESC/NDC) at Peterson Air Force Base (AFB), CO. The SSN must use specified message format or its Advanced Data Communications Control Procedures (ADCCP) equivalent. Free text message formats are described in the attachments to this SD. Detailed information on the message construction may be obtained by visiting the IWSD website. Contact ESC/NDC for access to the database (iwsd@cisf.af.mil, Defense Switched Network (DSN) 834-2467).

(U) This SD may be supplemented as necessary. If there is conflict between this SD and unit, contractor or component command publications, this SD takes precedence. Referenced directives, interface control documents, security classification guides, and other pertinent documents are in **Attachment 1**. The reporting requirements in this SD are exempt from Report Control Symbol licensing in accordance with reference (c), controlling internal, public, and interagency Air Force information collections. Submit recommended changes to the Space Enhancement Division (USSTRATCOM/OP50), 901 SAC Blvd., Ste 1E21, Offutt AFB, NE 68113-6000.

SUMMARY OF REVISIONS

(U) This SD has been revised in its entirety. The content has been reorganized into a more logical sequence, so all procedures for each particular type of event are discussed together, and in the chronological order in which they actually occur. The text has also been rewritten for clarity, and updated to reflect current organizations. Directions and explanatory information not pertaining to all sites and not needed for standardization among all units have been removed. (Supplements to this SD should contain further details appropriate to commands below the unified level.)

(U) In the interest of clarity, the Space Control Center (SCC) will refer to the Operations Center performing the space control command and control duties at that time. There is no delineation between the SCC and the Alternate SCC except in cases of CMOC/SCC specific functions that will be identified.

(U) Significant content changes include: The SD is divided into two volumes: Volume 1 – Basic Operations, Volume 2 – Event Processing. The addition of several new chapters: Continuity of Operations, Sensor Calibration, Breakup, Satellite Separations and Deorbits, Orbital Safety. Deletion of AKAC-222 encryption/decryption requirements.

Chapter 1
INTRODUCTION (U)

1.1. (U) Space Surveillance Network (SSN) General Description. The SSN consists of a worldwide network of space surveillance sites (both terrestrial and on-orbit), a communications network, data processing, and command and control centers. Sites collect data from which position and velocity information can be directly measured or mathematically inferred, which they transmit in near real time to the data processing/command and control centers. These centers process the data to develop an accurate orbit description and status for man-made objects in earth orbit. This information is used by numerous operational and intelligence organizations, as well as by the civilian community.

1.2. (U) SSN Mission. The SSN mission is to detect, track, identify, and catalog man-made objects in space. Tracking, detection, and identification include the collection of radar, optical, and radio frequency (RF) data and the correlation of that data to known objects in orbit. Identifying objects and assessing their mission capability requires the collection of radar, optical, and RF data to determine a satellite's function and status. Such data, in terms of a satellite's elevation, azimuth, etc., in reference to the site, are commonly referred to as "metric observations." Future space-based observing systems being designed to contribute to the space surveillance mission will provide metric observations with orbiting sensors.

1.2.1. (U) Space Control Activities. Space control consists of surveillance, protection, negation, and prevention. SSN mission information is used primarily to support space situational awareness as part of the space surveillance sub-mission under space control. SSN mission information provides the following:

1.2.1.1. (U) Information needed by the Commander (CDR), USSTRATCOM to make timely and accurate space threat evaluations and decisions.

1.2.1.2. (U) Support USSTRATCOM's space control mission through satellite attack warning and verification, positional data for targeting, and payload battle damage assessment.

1.2.1.3. (U) Data needed for space intelligence assessments, particularly for the Satellite Reconnaissance Advance Notice (SATRAN) program and Naval Network and Space Operations Command's (NNSOC's) equivalent, Satellite Vulnerability (SATVUL).

1.2.1.4. (U) Conjunction analysis for space and missile launches, and orbiting satellites, to determine unobstructed windows for launches, laser testing, orbit maneuvering, and warning of possible collisions between space objects.

1.2.1.5. (U) Support to surveillance of space by detecting, tracking, characterizing, classifying, cataloging/monitoring, and disseminating/distributing information on man-made objects in earth orbit. This is accomplished via command and control of the SSN and data processing.

1.2.1.6. (U) Support to protection by detecting and reporting space events against all space systems of national interest in near real time.

1.2.2. (S) (b)(1) USSC
(b)(1) USSC
(b)(1) USSC

1.2.2.1. (U) SOI is the analysis of imagery and/or signatures from sites, to determine satellite characteristics (in terms of size, shape, and motion) and thereby determine their functions and operational status.

1.2.2.2. (S) (b)(1) USSC

(b)(1) USSC

1.2.2.3. (S) (b)(1) USSC

(b)(1) USSC

(b)(1) USSC

1.2.3. (U) Other Uses. SSN data is also provided to authorized agencies outside USSTRATCOM. This data supports the following:

1.2.3.1. (U) Scientific and technical intelligence analysis for long-term assessments of foreign space systems' capabilities.

1.2.3.2. (U) Confirmation of domestic satellite configuration and evaluation of satellite anomalies for domestic and cooperating launch agencies.

1.2.3.3. (U) Technical studies and research and development efforts on future space systems and capabilities. Supports U.S. and Allied military and commercial launches, maneuvers, deorbits, and reentry predictions.

1.3. (U) SSN Classifications. There are a variety of sites located around the world and in space that make up the SSN which are operated by the military services and civilian organizations. The sites are classified several ways: by primary mission supported, range, collector type, data type, and space intelligence mode. Also, some sites belong to specific program systems. See **Attachment 2** for a listing of all SSN sites and their basic characteristics.

1.3.1. (U) Site Categories. The SSN sites are separated into three categories. For more information about the SSN, refer to reference (d).

1.3.1.1. (U) Dedicated Sites. Sites subordinate to USSTRATCOM components with a primary mission of Space Surveillance. These sites include Ground-Based Electro-Optical Deep Space Surveillance (GEODSS), Moron Optical Surveillance System (MOSS), Midcourse Space Experiment Satellite/Space Base Vehicle (MSX/SBV), Eglin, GLOBUS II, and the Naval Space Command (NAVSPACECOM) Space Surveillance System (NSSS).

1.3.1.2. (U) Collateral Sites. Sites subordinate to USSTRATCOM components, but with a primary mission other than Space Surveillance, such as missile warning, intelligence collection or range support. These sites include Ballistic Missile Early Warning System (BMEWS), PAVE (Program acquisition name) Phased Array Warning System (PAVE PAWS), Perimeter Attack Radar Characterization System (PARCS), Kaena Point, and Ascension.

1.3.1.3. (U) Contributing Sites. Sites under contract or agreement to support the SSN, but not under the operational control of a USSTRATCOM component. These include both military and civilian sites with various primary missions (i.e., research and development). These include Lincoln Space Surveillance Complex (LSSC), Ronald Reagan Ballistic Missile Test Range (RTS), Passive Imaging Metric Sensor (PIMS), and the Maui Space Surveillance System (MSSS).

1.3.1.3.1. (U) LSSC. The LSSC is located in Westford, MA. The LSSC consists of three radars:

1.3.1.3.1.1. (U) Millstone Radar. Millstone Hill Radar contributes to the deep space component of the SSN. Primarily tasked by Headquarters (HQ) USSTRATCOM/OP50 and the SCC. Millstone is the primary communications node point for the MOSS and SBV sites.

1.3.1.3.1.2. (U) Haystack Radar. The Haystack Long-Range Imaging Radar (LRIR) is capable of imaging near earth and deep space satellites. HQ USSTRATCOM/OP23 (Production & Analysis Division) is the primary tasker.

1.3.1.3.1.3. (U) Haystack Auxiliary Radar. This is a near earth imaging radar with higher resolution than the LRIR. HQ USSTRATCOM/OP23 is the primary tasker.

1.3.1.3.2. (U) RTS. The RTS is located in the Marshall Islands. These radars are tracking stations for the Western Range (WR). Their primary mission is to support test and evaluation of developmental and operational Intercontinental Ballistic Missiles (ICBMs), space launch vehicles and aeronautical development programs.

1.3.1.3.2.1. (U) Advanced Research Projects Agency (ARPA) Lincoln C-Band Observables Radar (ALCOR) is a high-power, narrow beam, coherent, chirped, C-Band, monopulse tracking radar with a Narrowband (NB) and Wideband (WB) operating modes. ALCOR is the primary weather measurement radar with Target Resolution and Discrimination Experiment (TRADEX) designated as back up.

1.3.1.3.2.2. (U) ARPA Long Range Tracking and Instrumentation Radar (ALTAIR) was designed and developed to gather coherent data on reentry vehicles and satellites at Very High Frequencies (VHF) and Ultra High Frequencies (UHF). ALTAIR can track targets at Near Earth as small as 5 centimeters (cm) and at geocynchronous (GEO) ranges can track to 1 meter.

1.3.1.3.2.3. (U) The Millimeter Wave (MMW) radar is a dual frequency (Ka- and W-band) monopulse tracking radar. The MMW can track targets at Near Earth as small as 2.8 cm and at GEO ranges can track to 5 meters. The MMW radar is exceptionally well suited for two-dimensional imaging of satellites and reentry vehicles.

1.3.1.3.2.4. (U) TRADEX is a UHF tracker and L-band illuminator. Multi-Target Tracking (MTT) provides TRADEX the capability to simultaneously track up to 63 targets, send up to 10 track files to Kiernan Reentry Measurement System (KREMS) Control Center (KCC), and collect pulse-by-pulse data on up to six targets.

1.3.1.3.3. (S) (b)(1) USSC

(b)(1) USSC

(b)(1) USSC

(b)(1) USSC

1.3.1.3.4. (U) Maui Space Surveillance System (MSSS). The MSSS is located on Maui, Hawaii, and are contributing sensors providing Deep Space (DS) coverage. The MSSS consists of the following: Air Force Maui Optical Station (AMOS) 1.6 meter telescope, Maui Optical Tracking and Identification Facility (MOTIF) 1.2 meter telescope, 0.8 meter Beam Director/Tracker (BD/T), and the 3.67 meter Advanced Electro-Optical (E-O) System (AEOS). In addition, the Commercial off the Shelf (COTS)-based RAVEN is a small autonomous telescope the MSSS uses to perform most of its metric mission. These E-O sites on Maui are considered as one system with multiple telescopes and capabilities and are operated by Detachment 15, Air Force Research Lab.

1.3.2. (U) Range Type. Sites are separated by their range capability to collect data on near earth (NE) objects, DS objects, or both. A NE object has an orbital period less than 225 minutes, whereas a DS object has an orbital period equal to or greater than 225 minutes. An object with a 225-minute period, if in a circular orbit, would be at an approximate altitude of 5875 kilometers. **NOTE:** Near earth sites may track space objects with periods of greater than 225 minutes if eccentricity is greater than 0.1 and a portion of the trajectory falls within their collection capabilities.

1.3.3. (U) Collector Type. Sites collect data using one of the following phenomenologies: radar with frequencies between X-band and VHF, E-O, or passive RF. Passive sites can only detect and track emitting or active, satellites. The radar sites can be further differentiated into collection types, such as mechanical trackers, phased arrays, or continuous wave fence.

1.3.4. (U) Data Type. The sites may also be categorized as providing primarily Space Track (metric observations) or Space Intelligence (SOI data and imaging) data collection.

1.3.4.1. (U) Space Track. The observations are used to identify and update satellite orbital parameters. Metric observations describe the apparent position and/or velocity of a satellite relative to a site's location. For example, a particular radar site may provide observations containing measurements of time, elevation, azimuth, range, and range-rate (also called TEARR data). An example of optical site data would include the observation time, the right ascension and declination of a satellite's orbital position.

1.3.4.2. (U) Space Intelligence. Space Intelligence data is used to determine the status of space objects, assessing their mission, capabilities, size, shape, and motion. Data includes NB radar signatures, WB radar imagery, Long Wave Infrared (LWIR) signatures, S-Band signatures, photometric signatures, RF signatures, visible/infrared imagery, and hyperspectral signatures.

1.3.5. (U) Space Intelligence Mode. Sites may be categorized by the type of Space Intelligence data they provide. This includes NB or WB radar data (using coherent or non-coherent techniques), visible or Infrared (IR) data, photometry, signatures and imagery. The radar frequencies include UHF, VHF, C-Band, Ku-Band, L-Band, and X-Band. The E-O modes include LWIR, photometry (optical), and imagery.

1.3.6. (U) Specific Program Systems. Certain sites of like phenomenology belong to a specific program. They are as follows:

1.3.6.1. (U) Ground-based Electro-Optical Deep Space Surveillance (GEODSS). GEODSS are dedicated E-O sites providing DS coverage. Detachment 1 is located at Socorro, NM; Detachment 2 is located at Diego Garcia, British Indian Ocean Territory (BIOT); and Detachment 3 is located atop Mt. Haleakala, Maui, HI. Optical sites are limited to night time/twilight operations, by weather, and do not directly measure range, range rate, or Radar Cross Section (RCS). The optical system supports USSTRATCOM by providing metric observations of satellite orbits and SOI data.

1.3.6.2. (U) PAVE PAWS. PAVE PAWS' primary mission is to watch America's coasts for incoming Sea–Launched Ballistic Missile (SLBM) or ICBMs and provide appropriate warning. The PAVE PAWS sites have a secondary mission of space surveillance. The SLBM warning units are the 6th Space Warning Squadron (6 SWS), Cape Cod Air Station (AS), MA, and the 7th Space Warning Squadron (7 SWS), Beale AFB, CA. PAVE PAWS sensors are collateral two-faced phased array radars.

1.3.6.3. (U) Ballistic Missile Early Warning System (BMEWS). BMEWS consists of collateral sites with a primary Missile Warning (MW) mission monitor for ballistic missile attacks over the polar regions. The BMEWS sites have a secondary mission of space surveillance. BMEWS sites include 12th Space Warning Squadron (12 SWS), Thule, Greenland (Site I); 13th Space Warning Squadron (13 SWS), Clear, Alaska (Site II); and RAF Fylingdales, United Kingdom (UK) (Site III).

1.3.6.4. (U) Perimeter Attack Radar Characterization System (PARCS). PARCS is a very capable attack characterization site. 10th Space Warning Squadron (10 SWS) located at Cavalier Air Force Station (AFS), ND, provides detection of ICBMs over the North Pole and SLBMs out of the Hudson Bay.

1.3.6.5. (U) The Fence (formerly NSSS or NAVSPASUR). The Fence is a continuous wave fence located along a great circle inclined 33.57 degrees to the equator in a fan-shaped pattern. There are three transmitter sites located at Gila River, AZ; Lake Kickapoo, TX; and Jordan Lake, AL, and six receiver sites located in San Diego, CA; Elephant Butte, NM; Red River, AR; Silver Lake, MS; Hawkinsville, GA; and Tattnall, GA. The prime Space Control Center has Operational Control (OPCON) over the ASCC. If inoperative, then USSTRATCOM Global Operations Center (GOC) has OPCON per reference (e)

1.3.6.6. (U) Future Space-Based Surveillance Systems. Future satellite surveillance systems are planned and will comply with this SD. These systems will provide space-based observations to support space surveillance, (i.e., Space Based Surveillance System (SBSS).)

1.3.7. (U) Site Responsibilities. Sites fulfill the following general requirements in support of the space surveillance mission as defined by the current approved CRD for Space Control (multi-mission sites fulfill these requirements within mission priorities).

1.3.7.1. (U) Data Collection. Respond to tasking, and collect metric and SOI data as prescribed in this SD.

1.3.7.2. (U) Data Transmission. Send all collected data to the appropriate addressees within the time constraints specified in this SD.

1.3.7.3. (U) Data Maintenance. Maintain files and records per references (f) and (g) or service equivalents.

1.3.7.4. (U) Availability Reporting. Report site outages and availability to the SCC and/or JIC as described in this SD. Space-based systems will report on the availability of each sensor of each satellite used for space surveillance.

1.3.8. (U) Non-SSN Assets. Other systems that can track satellites may be called upon as needed to provide space track data to the SCC. These include the following:

1.3.8.1. (S) (b)(1) USSC

(b)(1) USSC

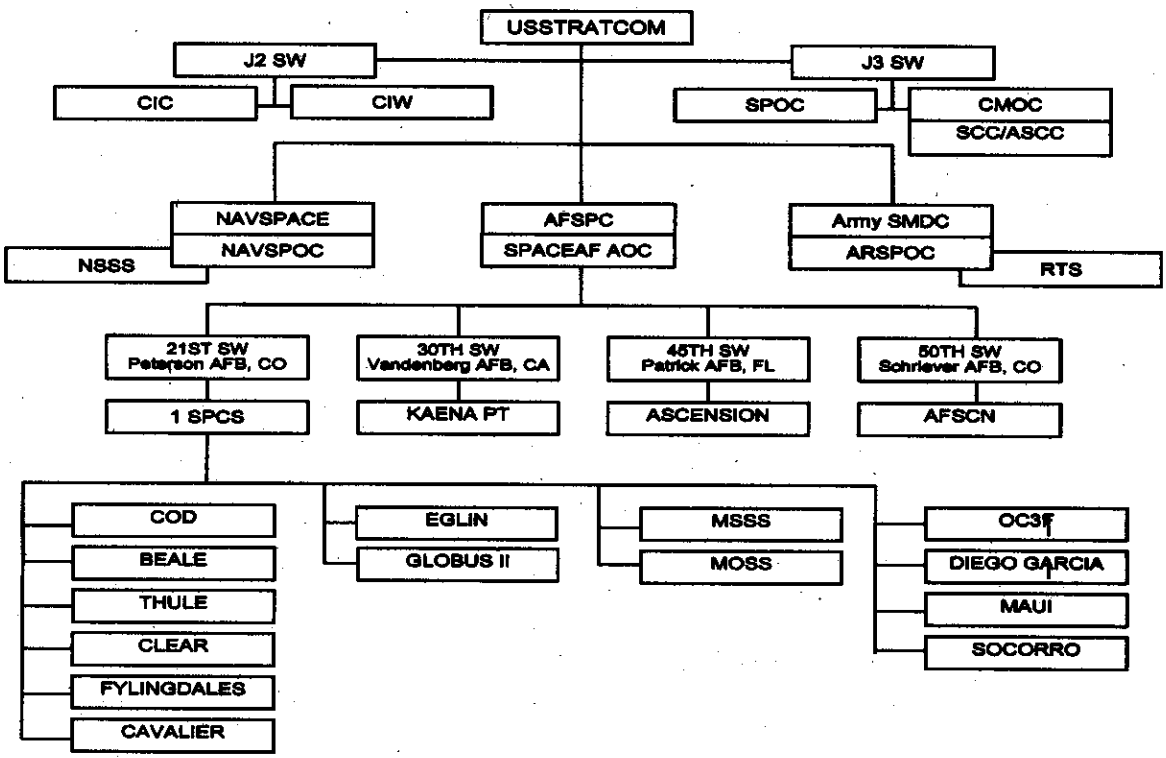
(b)(1) USSC

1.3.8.2. (U) Air Force Satellite Control Network (AFSCN). The AFSCN is operated and controlled by the 50th Space Wing (50 SW) located at Schriever AFB, CO. The 50 SW is responsible for the tracking and commanding of Department of Defense (DoD) and limited civil satellite systems. It consists of various Command and Control (C2) facilities and a network of ground stations. The 50 SW will provide high-precision radiometric track data to the SCC when requested.

1.3.8.3. (U) Research and Development (R&D)/Civilian Sites. R&D and civilian sites may be used as contributing sites as required, pending coordination with the USSTRATCOM Global Assessment Center (GAC) and SCC.

1.4. (U) Organizational Relationships. (See **Figure 1.1.**)

Figure 1.1. (U) Organizational Relationships. (U)



1.4.1. (U) USSTRATCOM. Headquartered at Offutt AFB, NE, USSTRATCOM is a Combatant Command responsible for synchronizing and integrating U.S. military space components and executing assigned missions. The assigned missions are outlined for each unified command in the reference (a). For USSTRATCOM, these include conducting space operations (force enhancement, space control, space support including spacelift and on-orbit operations, and force application), including the support of ballistic missile defense for the U.S. The CDR, USSTRATCOM, is the military commander responsible for execution of the space control mission, including space surveillance. USSTRATCOM exercises Combatant Command (COCOM) of all dedicated and collateral SSN assets. CDR, USSTRATCOM interfaces with the President and the Secretary of Defense, the Joint Staff, outside commands, and civilian and foreign entities, and provides overall direction and authority for operations involving the SSN to component commanders.

1.4.2. (U) USSTRATCOM/OP. The USSTRATCOM Director of Global Operations (USSTRATCOM/OP) is responsible to CDR, USSTRATCOM for providing guidance and policy on space surveillance operations to the components. USSTRATCOM/OP has delegated authority form the CDR, USSTRATCOM for directing USSTRATCOM operations. The heart of this C2 structure is centralized planning of all space forces at USSTRATCOM with decentralized execution through Component Commands.

1.4.2.1. (U) Director of Combat Operations (USSTRATCOM/OPA). USSTRATCOM/OPA is the commander of the GOC and oversees operational staff elements.

1.4.2.2. (U) USSTRATCOM/OP50 is the office of primary responsibility (OPR) for this SD, as well as other operational documents and agreements relating to space surveillance.

1.4.3. (U) USSTRATCOM GOC. The GOC represents the CDR, USSTRATCOM 24/7 and is overseen by the Senior Controller (SrC), an O6. The Space and Warning Operations Officer (SWOO), is the SrC's space point of contact. The mission of the GOC is to provide a single C2 center responsible for maintaining situational awareness, tracking that status of forces, information fusion, mission tasking, and providing space-based military capabilities to military and government organizations requiring support. One function of the GOC is to fully integrate space into U.S. military operations by providing focused operational support to Unified and Joint Task Force (JTF) commanders. USSTRATCOM, with its components and national agencies, ensures the space capabilities provided to the warfighting Commanders are timely, accurate, and relevant.

1.4.4. (U) Director of Intelligence, USSTRATCOM/OPB, the Joint Intelligence Center's (JIC), Global Intelligence Division (Intelligence Watch and Global Assessment Center) and Space Analysis Division (OP24), contribute to CDR, USSTRATCOM's space situational awareness.

1.4.4.1. (S) (b)(1) USSC

(b)(1) USSC

(b)(1) USSC

1.4.5. (U) Combined Intelligence Watch (CIW). The CIW is the 24-hour intelligence watch center for NORAD and USNORTHCOM. Located inside CMOC, the CIW primarily focuses its support to the NORAD mission. As such, it provides current, all-source intelligence support to the CMOC Commander, CMOC Command Directors, and remaining CMOC operation centers; component Commanders; and a host of theater-, U.S. Command-, and national-level intelligence agencies. As a member of the Defense Indications and Warning System, the CIW is also responsible for indications and warning (I&W) for worldwide ballistic missile and space system launches, and strategic aviation threats.

1.4.6. (U) Cheyenne Mountain Operations Center (CMOC) Commander (CMOC/CC). The CMOC/CC is responsible to CDR, USSTRATCOM for oversight of SCC operations. The CMOC Director of Operations (CMOC/J3) is responsible for the overall readiness of the operations functions and reports to the CMOC/CC. CMOC/J3S analysts also perform pre-event coordination and special processing.

1.4.7. (U) Space Control Center (SCC).

1.4.7.1. (U) The SCC is the central processing facility and command, control, and communications interface for the SSN. 1st Space Control Squadron (1 SPCS) located within CMOC executes the SCC mission. Air Force Space Command (AFSPC) is responsible for the performance of the SCC crew and for routine administration of SSN operations.

1.4.7.2. (U) Alternate Space Control Center (ASCC). The ASCC is the alternate processing center, command, control, and communications interface for the SSN. The ASCC is located within the Naval Space Operations Center (NAVSPOC) at Naval Network and Space Command (NNSOC), Dahlgren, VA. The ASCC performs the same functions as the SCC when required, and is operationally responsible to USSTRATCOM. The ASCC maintains a complete current database of all space objects and "hot shadows" SCC actions at all times, so it can assume control of the SSN immediately when necessary. See **Chapter 2** for details of how and when SCC functions are transferred to the ASCC.

1.4.7.3. (U) Continuity of Operations. USSTRATCOM/OP50 is the staff element responsible for continuity of space control operations. Operations will conform to this SD or as directed by the CMOC Command Director (CD)/Mission Director (MD). USSTRATCOM components will ensure continuous 24-hour space control operations in peacetime and through all levels of conflict. SCC and ASCC will regularly exercise backup operations and the transfer of responsibility for assigned space control functions.

1.4.8. (U) SCC Responsibilities. In its space surveillance role, the SCC crew processes high-priority and/or analysis-intensive objects and space events. In particular, the SCC crew is responsible for the following:

1.4.8.1. (U) Space Control Operations Support. Processing and analyzing potentially harmful or hostile events effecting space (such as satellite proximity events or the launch of anti-satellite weapons against U.S. satellites, directed energy directed against space elements, electronic warfare directed against the space system communications link or data processing support, space nuclear detonations, and ground attacks/sabotage against space system ground elements).

1.4.8.2. (U) Space Event Processing. Processing all space events (domestic and foreign) such as launches, maneuvers, deorbits, separations, conjunction analysis, reentry assessments, break-ups, and decays and reporting to national authorities as required.

1.4.8.3. (S) (b)(1) USSC
(b)(1) USSC
(b)(1) USSC

1.4.8.4. (U) Outside User Support. Providing information to authorized users in support of treaty obligations and event analysis.

1.4.8.5. (U) 1 SPCS Space Analysis Center (1 SPCS/SAC) analysts under the 1 SPCS Operations Division (1 SPCS/DO) also perform extensive analysis of breakups, lost space objects and objects which have not yet been correlated to a particular launch. In particular, 1 SPCS/SAC is responsible for the following:

1.4.8.5.1. (U) SSN. Monitoring SSN site performance and processing routine space object observations.

1.4.8.5.2. (U) Metric Tasking. Determining and transmitting all tasking for metric observations to SSN sites, at least once per day.

1.4.8.5.3. (U) Site Status Monitoring. Maintaining situational awareness of the operational status of all sites in the SSN and coordinating approval for dedicated sites to perform preventive maintenance.

1.4.8.5.4. (U) Routine Satellite Catalog Maintenance. Maintaining accurate, current element sets for man-made space objects in earth orbit not monitored by the SCC crew.

1.4.8.5.5. (U) Normal Decay and Breakup Processing. Processing decays of all small space objects into the earth's atmosphere and analyzing and cataloging the pieces from satellite breakups.

1.4.8.5.6. (U) Outside User Support. Provides information to authorized users in support of treaty obligations and event analysis.

Chapter 2

CONTINUITY OF OPERATIONS (U)

2.1. (U) General. Command and control of the SSN is performed by two centers, the SCC and the ASCC. One operates as the primary control center while the other operates in hot shadow. Hot shadow is the state of operational readiness required to immediately assume operations. Normal and hot shadow operations ensure unity of command at the operational LEVEL. Only one space control center will be primary at any given time. Responsibility for performing certain space control tasks may be delegated by the primary space control center.

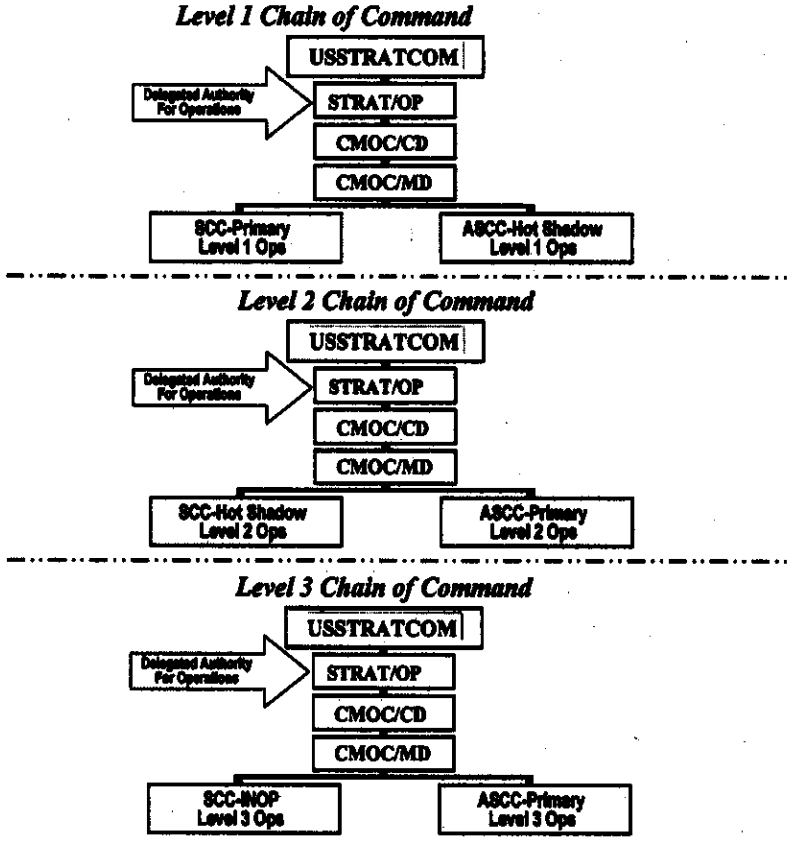
2.2. (U) Operational Chain of Command. See **Figure 2.1**.

2.2.1. (U) LEVEL 1 Operations. Operational Chain of Command flows from the GOC SrC to the MD, then to the SCC Commander.

2.2.2. (U) LEVEL 2 and 3 Operations. Operational Chain of Command flows from the GOC SrC to the MD, then to the Alternate Space Control Center Commander (ASCC).

2.2.3. (U) Space Threat Assessment. Chain of Command flows from CDR, USSTRATCOM to USSTRATCOM/OP to the Combined Command Center (CCC) MD, then to SCC or ASCC.

Figure 2.1. (U) Chain of Command at Different Levels. (U)



2.3. (U) Levels. Three LEVELs define the operational relationships between the SCC and ASCC (each LEVEL is defined in subsequent paragraphs). See **Figure 2.2.** for the LEVEL Change Matrix.

Figure 2.2. (U) Level Change Matrix (U)

LEVEL	C2	TASKING	COMPUTATION	HOT SHADOW	SITUATION
1	SCC	SCC	SCC	ASCC	Normal Operations
2	ASCC	ASCC	ASCC	SCC	ASCC proficiency operations or SCC unable to perform C2 of mission
3	ASCC	ASCC	ASCC	N/A	SCC unable to perform mission

2.3.1. (U) LEVEL 1 (Normal Operations).

2.3.1.1. (U) During normal operations, the SCC is primary for C2 of the SSN. The ASCC hot shadows the SCC surveillance and protection mission, monitoring and performing parallel operations. Under certain circumstances, such as during high-tempo wartime operations, planned or unplanned outages, or exercises, the SCC may delegate some space surveillance tasks to the ASCC, while maintaining LEVEL 1 operations. During LEVEL 1 operations, the Naval Space Operations Center (NAVSOC) is manned by orbital analysts and C2 crews remaining on call.

2.3.1.2. (U) Responsibilities.

2.3.1.2.1. (U) Command and Control. At LEVEL 1, the SCC has full command and control of the space control mission and will keep the GOC fully informed on its actions.

2.3.1.2.2. (U) Tasking. The SCC directs the SSN at LEVEL 1. The ASCC monitors tasking based on the SCC Tasking Summary and Catalog.

2.3.1.2.3. (U) Computation. The SCC performs all analysis and computations and sends all required messages. During LEVEL 1 operations ASCC analysts are always in hot shadow mode.

2.3.1.2.4. (U) Data Transmission. Sites dual-route metric observations to the SCC and ASCC via the most expedient means possible.

2.3.1.3. (U) ASCC Support. At any time, the SCC may delegate specific processing tasks to the ASCC, while maintaining overall LEVEL 1 operations. In such cases, the SCC may authorize the ASCC to task sites, to liaison directly with the sites, and to generate all Element Sets (ELSETs) and messages related to those specific tasks. In such cases, the ASCC will keep the SCC informed of its actions and the SCC will ensure it maintains awareness of the status of ASCC processing.

2.3.2. (U) LEVEL 2 (ASCC Primary with SCC Hot Shadow). There are two cases for LEVEL 2 operations. The first case is unscheduled, where the SCC has operational capabilities but cannot perform the entire mission and the other case is scheduled for ASCC proficiency training.

2.3.2.1. (U) LEVEL 2 - Unscheduled.

2.3.2.1.1. (U) During LEVEL 2 operations, the ASCC is primary for all space control functions. The SCC hot shadows the ASCC, monitoring and performing parallel operations.

2.3.2.1.2. (U) Responsibilities.

2.3.2.1.2.1. (U) Command and Control. At LEVEL 2, the ASCC has full command and control of the SSN, as well as responsibility for performing space control functions not specifically retained by the SCC. The SCC hot shadows ASCC actions. The ASCC keeps the GOC and the SCC fully informed of its actions.

2.3.2.1.2.2. (U) Tasking. The ASCC directs and tasks the SSN.

2.3.2.1.2.3. (U) Computation. The ASCC performs all analysis and computations and sends all required messages. The SCC performs parallel computations to the maximum extent possible in order to keep its internal databases current, but will not release any data or messages outside the SCC. The ASCC may task the SCC to provide back-up support, if able.

2.3.2.2. (U) LEVEL 2 - Scheduled (i.e., ASCC Proficiency).

2.3.2.2.1. (U) All actions are in accordance with LEVEL 2 - Unscheduled responsibilities.

2.3.2.2.2. (U) Weekly. Components will develop procedures to ensure ASCC proficiency activations are conducted.

2.3.2.2.3. (U) 72-Hour Activations. To exercise the ASCC in extended operations and exercise the process of providing augmentation, 72-hour proficiency activations are to be conducted at least once per year. SCC will send augmentation personnel.

2.3.3. (U) LEVEL 3 (ASCC Primary for Operations).

2.3.3.1. (U) During LEVEL 3 operations, the ASCC has full tasking and computational responsibilities, and assumes command and control of SSN operations. The SCC is unable to provide C2 of the SSN and is unable to hot shadow the ASCC.

2.3.3.2. (U) Operations Security. LEVEL 3 indicates severe degradation of operations. The fact the SSN is at LEVEL 3 is classified Secret until return to LEVEL 2 or LEVEL 1.

2.3.3.3. (U) Responsibilities.

2.3.3.3.1. (U) Command and Control. At LEVEL 3, the SCC is incapable of performing C2 of the SSN. The ASCC is delegated responsibility for SSN C2 and keeps the MD informed of its actions.

2.3.3.3.2. (U) Tasking. The ASCC tasks the SSN.

2.3.3.3.3. (U) Computation. The ASCC performs all computations and sends all required messages.

2.4. (U) Authority. The SCC Commander normally implements all operational LEVEL changes with approval from the MD. The ASCC Commander may independently initiate LEVEL 3 operations if unable to contact the SCC or CCC for more than 2 hours and if the current environmental/world situation dictates the possible need for alternate operations.

2.5. (U) Considerations. The SCC Commander, in coordination with the SrC, will decide on the appropriate LEVEL based on the current and anticipated situation, and on the estimated length of the outage. When choosing the appropriate LEVEL of operations, consider each center's capability to provide command and control of the space surveillance network and its capability to perform computations on the data received from the SSN. Command and control and tasking capabilities are primarily dependent on the status of voice and message communications links; computational capability is dependent on both communications and on internal computer and data handling systems. The SCC Commander considers a LEVEL change when one of the following conditions exist: loss of computational capabilities, inability to access vital databases, loss of power and/or air conditioning, loss of data communications, loss of internal or external voice communications, ASCC proficiency activation, or situations in which crew evacuation is required (i.e., fire, bomb threat, etc.). In the SCC, as long as voice and message communications capabilities remain intact, a LEVEL change is not necessarily mandated. The SCC could retain operational command and control and tasking of the SSN and direct the ASCC to provide computational support as appropriate. Future space-based systems may substitute automated voice reports to be repeated until acknowledged by the SCC or ACC at the receiving end. These automated voice reports are capable of activating an audible and/or visible (such as flashing light) alert signal at the receiving site until acknowledgement. Site personnel will manually initiate follow-up voice calls when automated calls are not acknowledged for more than 5 minutes. The SCC Commander will keep the SrC fully informed of his/her actions.

2.6. (U) Outages or High Operations (OPS) Tempo. If the SCC's capability to provide command and control is degraded or if operations tempo is very high, support may be required from the ASCC.

2.6.1. (U) Determination. The SCC Commander, after identifying the problem and its expected duration, determines whether to delegate tasks and remain at LEVEL 1 or whether a LEVEL change is needed. If the SCC Commander determines a LEVEL change is needed, he will request MD approval for the recommended LEVEL change. When approved, the SCC Commander implements the change and support required.

2.6.2. (U) Support. Support may consist of limited or full computational duties, complete transfer of responsibilities, or any combination necessary to support the space control mission. A complete transfer should be accomplished only if the SCC cannot maintain effective command and control of the SSN.

2.6.3. (U) Assumption of Command and Control. Two hours after initial indications of communication outage the ASCC will automatically assume command and control of the space control mission until directed otherwise by USSTRATCOM or a designated representative. Before assuming command and control, the ASCC will attempt to contact the MD.

2.7. (U) ASCC Augmentation.

2.7.1. (U) The ASCC is designed to sustain LEVEL 2 or LEVEL 3 Space Control operations for up to 72 hours without augmentation of personnel. Augmentation is the act of sending crew-qualified personnel from the SCC to the ASCC to support extended operations. The decision to request augmentation is left to the discretion of the Commander, NNSOC (COMNNSOC), ensuring the SrC is informed.

2.7.2. (U) The SCC will provide augmentation support to ASCC when required per component procedures. For details on CMOC support, refer to ASCC Augmentation Concept of Operations (CONOPs). Augmentation personnel are operationally responsible to the NNSOC operations officer and administratively responsible to the CMOC/J3S (Space Combat Analysis Branch). They will perform duties as directed by the NNSOC/N3 (Director of Operations).

2.8. (S) (b)(1) USSC

(b)(1) USSC

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2.9. (U) Implementation Actions.

2.9.1. (U) Implementation of LEVEL 2 Actions.

2.9.1.1. (U) SCC actions at LEVEL 2.

2.9.1.1.1. (U) The SCC transmits a message to all SSN sites and to satellite owner/operators notifying them of the implementation of LEVEL 2 (see **Attachment 3** for message format). The message is sent with "IMMEDIATE" precedence no later than 24 hours prior to the scheduled activation time. The messages state the date and time of the activation and also the time of return to LEVEL 1.

2.9.1.1.2. (U) Last-minute changes to the schedule, including extensions caused by unscheduled real-world activity are sent by the primary command and control center via FLASH precedence message.

2.9.1.1.3. (U) Prior to activation, the SCC coordinates with the ASCC to determine readiness of ASCC to assume operations. The SCC provides a turnover briefing to the ASCC 45 minutes prior to a planned LEVEL change.

2.9.1.1.4. (U) CMOC/MD approves initiation of LEVEL 2 operations.

2.9.1.1.5. (U) ASCC briefs LEVEL change via the Operations Loop.

2.9.1.2. (U) Site Actions at LEVEL 2.

2.9.1.2.1. (U) Sites must contact the SCC by telephone or message to acknowledge receipt of the message and the date and time of transition to and from LEVEL 2 operations. Sites do not need to call the SCC or ASCC upon the actual activation.

2.9.1.2.2. (U) Report operational status changes to both the ASCC and SCC.

2.9.1.2.3. (U) Respond to ASCC tasking and pass all voice reports to ASCC.

2.9.1.2.4. (U) Data Transmission. Sites dual-route metric observations to the SCC and ASCC in accordance with required timelines.

2.9.2. (U) Implementation of LEVEL 3 Actions.

2.9.2.1. (U) If going directly from LEVEL 1 to LEVEL 3, implementation procedures are the same as for LEVEL 2. If possible, this will be done while the SCC is still capable of communicating and giving a thorough turnover to the ASCC. If not, the MD will give as much of a status briefing to the ASCC as possible.

2.9.2.2. (U) If LEVEL 2 is already in effect, the MD may direct LEVEL 3 operations. The ASCC will transmit a message to the SSN sites and to satellite owner/operators (see **Attachment 3** for message format).

2.9.2.3. (U) ASCC briefs LEVEL change via the Operations Loop.

2.9.2.4. (U) Site Actions at LEVEL 3.

2.9.2.4.1. (U) Acknowledge receipt of the LEVEL 3 message to the ASCC via secure voice or message.

2.9.2.4.2. (U) Report operational status changes to the ASCC only.

2.9.2.4.3. (U) Respond to tasking from the ASCC and make voice reports to the ASCC.

2.9.2.4.4. (U) Data Transmission. Sites route metric observations to the ASCC. If communications at CMOC is operational, dual route data to SCC in accordance with current timelines. If the Communications System Segment (CSS) is not operational, send data to the ASCC via the most appropriate communications method available.

2.10. (U) Return to Normal Operations Actions.

2.10.1. (U) Return To LEVEL 1 Operations.

2.10.1.1. (U) Unscheduled.

2.10.1.1.1. (U) Return to LEVEL 1 immediately if the ASCC Space Operational Capability (OPSCAP) becomes RED or YELLOW and the estimated time of return to operation (ETRO) is unknown or greater than 3 hours.

2.10.1.1.2. (U) With the approval of the MD, the SCC may resume LEVEL 1 operations anytime circumstances so dictate.

2.10.1.2. (U) Scheduled.

2.10.1.2.1. (U) Return to LEVEL 1 is done at the time stated in the original LEVEL 2 message sent to the sites. If a change in time is necessary, a revised message will be sent stating the new time.

2.10.1.2.2. (U) The ASCC coordinates with the SCC to ensure the SCC is ready to resume LEVEL 1 operations. The SCC Commander informs the MD of the SCC status, and obtains approval for return to LEVEL 1.

2.10.1.2.2.1. (U) The ASCC provides a turnover briefing to the SCC.

2.10.1.2.2.2. (U) SCC briefs LEVEL change via the Operations Loop.

2.10.2. (U) Recovery from Level 3 Operations. The SCC initiates recovery from LEVEL 3 when it is capable of resuming command and control and primary computational support (for LEVEL 1) or able to provide hot shadow computational support of the SSN (for LEVEL 2). The actual requirements necessary for reconstitution of the SCC may vary based on the situation.

2.10.2.1. (U) SCC and ASCC confer on the situation, required actions, and LEVEL 1/2 implementation time. The SCC Commander obtains approval from the MD for the recommended LEVEL change.

2.10.2.2. (U) The ASCC provides a turnover briefing to the SCC.

2.10.2.3. (U) The SCC transmits a message to the SSN and to satellite owner/operators notifying them of the return to LEVEL 1 or LEVEL 2 (see **Attachment 3** for message format).

2.10.2.4. (U) The SCC briefs the LEVEL change via the Operations Loop. Sites acknowledge message receipt by telephone or message and the time of return to LEVEL 1 or LEVEL 2 operations.

2.11. (U) Operational Status Reporting Procedures.

2.11.1. (U) Operational Status Reporting. The ASCC reports all equipment outages to the CCC as described in Status Report contents below.

2.11.2. (U) LEVELs 1 and 2. The SCC and ASCC immediately report to each other any equipment outage that could cause an operational status change. Include an ETRO and recommended LEVEL change, as appropriate. Report actual status when it is determined.

2.11.3. (U) LEVEL 3. Immediately report any equipment outage that could cause an ASCC status change to the MD including an ETRO. Report actual status when it is determined.

2.11.4. (U) Status Report Contents.

2.11.4.1. (U) Outage Report. When initially reporting a status change or equipment outage, report the following:

2.11.4.1.1. (U) Equipment involved.

2.11.4.1.2. (U) Reason for outage, and status.

2.11.4.1.3. (U) Time of the outage.

2.11.4.1.4. (U) ETRO.

2.11.4.2. (U) Recovery Report. Upon return to normal operations, report the following:

2.11.4.2.1. (U) Equipment status.

2.11.4.2.2. (U) How problem was resolved.

2.11.4.2.3. (U) Actual time of return to operations.

Chapter 3

SENSOR STATUS, MAINTENANCE PLANNING AND RECALL (U)

3.1. (U) General. The GOC, SCC and GAC must be aware at all times of the operational status of each SSN sensor in order to effectively perform their missions. This chapter provides standard procedures for status reporting, planning of preventive maintenance, and recall from maintenance.

3.2. (U) Space Operational Capability (OPSCAP). OPSCAP is an assessment of a site's capability to perform its SSN mission. A site's OPSCAP is the worst case of equipment status, environmental status, personnel availability, and communications status. Specific guidelines for determining RED and YELLOW status are site dependent and are promulgated in applicable site instructions.

3.2.1. (U) OPSCAP Criteria. Report to the SCC using the following criteria:

3.2.1.1. (U) GREEN. No degradation to SSN mission accomplishment.

3.2.1.2. (U) YELLOW.

3.2.1.2.1. (U) Partial degradation to SSN mission accomplishment (includes partial degradation to communications links).

3.2.1.2.2. (U) All data lines are down to the C2 agency **OR** all means of voice communications are non-operational to the C2 agency.

3.2.1.3. (U) RED.

3.2.1.3.1. (U) Not able to detect, track, or unable to transmit data in accordance with (IAW) either the observation transmission requirements or SOI transmission requirements. (See reference (h) for transmission requirements.)

3.2.1.3.2. (U) All data lines are down to the C2 agency **AND** all means of voice communications are non-operational to the C2 agency.

3.2.2. (U) OPSCAP Classification.

3.2.2.1. (U) Outages. Ongoing sensor outages (RED and YELLOW OPSCAPS) are generally considered Secret since they denote a lack of capability within a U.S. military system. See site Security Classification Guides (SCGs) (references (i) and (j)) for guidance on classification for specific types of outages. Outages after the fact are generally UNCLASSIFIED. For sites having SCGs due to another mission, use the most stringent guidelines for outages relating to both missions. The OPSCAP tables without actual status are Unclassified.

3.2.2.2. (U) Exception. Contributing sensors with scheduled, in-progress, or requested system downtimes which result in a site RED or YELLOW OPSCAP for space surveillance are considered Unclassified. Unscheduled maintenance should be RED if the SSN mission is degraded per the on-site OPSCAP Charts.

3.2.3. (U) OPSCAP Reporting. If a site is primary for space surveillance and a space outage also affects the site's missile warning capability, crews must also report OPSCAP to the primary missile warning C2 agency following notification of space OPSCAP change to the SCC. This requirement is IAW the 14th Air Force (14AF) supplement to reference (k).

3.2.3.1. (U) When a space outage (OPSCAP change) occurs which exceeds or is expected to exceed 2 minutes, site personnel will immediately report the outage, cause, and ETRO to the SCC. Crews will contact the SCC to report an OPSCAP impacting outage no later than 120 seconds from indication of the fault. Outages not expected to exceed 2 minutes are not reported.

3.2.3.2. (U) Information about any on-going outage lasting longer than 2 minutes in duration is classified and must be reported by secure means. Upon termination, an outage becomes unclassified.

3.2.3.3. (U) Space-based observation systems outages occur only when their ground-based processing or communications outages prevent communications with the SCC for longer than 2 minutes. Normally, a partial or complete outage of a single satellite in an observing constellation will not require declaration of a space outage.

3.3. (U) Maintenance Planning. Sites will schedule outages to perform essential preventive maintenance (PM) on a regular basis, but at the same time the SSN as a whole must continue to perform the space surveillance mission. To accomplish this, PM will be scheduled in advance and centrally coordinated, so the SSN can maintain the maximum possible sensor coverage and availability. This guidance is not applicable to space-based observation systems.

3.3.1. (U) Monthly Maintenance Schedule (MMS).

3.3.1.1. (U) 21st Space Wing (21 SW) is responsible for coordinating the MMS for all dedicated and collateral sensors. 21 SW also tracks monthly downtime for each contributing sensor.

3.3.1.2. (U) Changes to the MMS. After the MMS has been published, all dedicated and collateral sites must send any changes to planned outage times, requests for additional downtimes, or requests to deconflict outages to the 21SW/Wing Operations Center Branch (DOCX). Contributing sensors will provide notification of any changes to planned outage times, requests for additional downtimes, or requests to deconflict outages to the 21 SW/DOCX.

3.3.2. (U) Downtime Approval.

3.3.2.1. (U) Dedicated sites. Prior to **ALL** scheduled maintenance, sites will obtain approval from the SCC before actually performing any maintenance degrading the sites' space OPSCAP. Site personnel will contact the SCC for approval 30 minutes and 5 minutes prior to maintenance start time. The SCC will approve initiation of the scheduled maintenance, or direct its postponement or cancellation based on anticipated launch activity and other real-world situations and requirements. The SCC Commander will coordinate with the MD to obtain approval before denying or postponing a scheduled site outage. If scheduled maintenance is disapproved, the site will reschedule as soon as possible.

3.3.2.2. (U) Collateral Sites. Before performing scheduled maintenance, the site will obtain approval from the sensor manager (14AF Air Operations Center (AOC) or 21 SW Wing Operations Center (WOC). If approval is given, site personnel will then call the SCC and report they will be going down for scheduled maintenance. The SCC monitors the MMS for collateral site outages, and will coordinate with the 14AF AOC, as required. The SCC Commander will coordinate with the MD to obtain CD approval before denying or postponing a scheduled site outage.

3.3.2.3. (U) Contributing Sites. Contributing sensors will provide downtime information and conduct maintenance IAW signed Memoranda of Agreement (MOAs).

3.3.3. (U) Site Recall. If a high-priority event, such as a New Foreign Launch (NFL), occurs during a site outage, the site may be directed to return to operations as soon as possible, subject to pre-coordinated recall times. For these high priority events, sites may be recalled from scheduled maintenance, operations training, site stand down, testing, and some corrective maintenance.

3.3.3.1. (U) Recall Approval.

3.3.3.1.1. (U) Dedicated Sites. The SCC will coordinate with the MD prior to recalling any dedicated sensor.

3.3.3.1.2. (U) Collateral Sites. The SCC will coordinate with the MD and obtain CD approval for site recall. Once approval is obtained, the SCC will notify the 14AF AOC about the site's recall.

3.3.3.1.3. (U) Contributing Sites. The SCC will obtain MD approval to recall contributing sites.

3.3.3.1.4. (U) Recall for ANCHOR FLASH. CD/MD approval for ANCHOR FLASH gives blanket approval to recall all sites. If a site is down for any reason and receives an ANCHOR FLASH message, consider the site recalled and resume operations as soon as possible (ASAP). If recall is not authorized for one or more sites, that will be noted in the message text.

3.3.3.2. (U) Site Notification. For any type of site, once recall approval is granted, the SCC contacts the site directing it to return to operations.

3.3.3.3. (U) Special Requirements for Site Recall.

3.3.3.3.1. (U) ALTAIR (or TRADEX as backup to ALTAIR). The SCC Commander will coordinate with the MD to obtain CD approval before recalling ALTAIR from scheduled maintenance or non-duty hours for a Category (CAT) 1 event at any time (7 days a week, 24 hours a day). If a NFL occurs, recall is not necessary; ALTAIR will recall itself automatically upon receipt of an ANCHOR alert. Do not recall ALTAIR for a reason other than CAT 1 tracking during its designated prime shift unless absolutely necessary.

3.3.3.3.2. (U) Ascension and Kaena Point. The SCC Commander will coordinate with the MD to obtain CD approval to recall these sites from scheduled maintenance as needed. If dedicated to supporting a domestic launch from the Eastern or Western Range, recall for coverage of that launch is not necessary, the radars will track and will send observations on the launch to the SCC on a non-interference basis with their range support mission.

3.3.3.3.3. (U) Millstone. The SCC Commander will coordinate with the MD to obtain CD approval before recalling Millstone from scheduled maintenance or during non-duty hours to track a deep space NFL or other high-interest event. The SCC must inform Millstone of a recall or anticipated recall as early as possible, if outside normal duty hours, as the radar requires up to 2 hours to return to operations. Do not recall Millstone during non-duty hours unless absolutely necessary.

3.3.3.3.4. (U) Haystack, Haystack Auxiliary Radar (HAX) and ALCOR. These imaging sites may be recalled by the GAC for events of extraordinary importance or opportunity. The GAC must inform the SCC when recalling either Haystack or HAX. Likewise, the SCC Commander will coordinate with the MD to obtain CD approval before recalling Haystack or HAX from scheduled maintenance. Inform the GAC ASAP after decision to recall imaging sites.

Chapter 4

SENSOR CALIBRATION (U)

4.1. (U) General. This chapter provides guidance for space surveillance sensors and centralized processing centers in the execution of calibrating the SSN. Calibration is a critical surveillance function to ensure the quality of space object positional data meets operational performance requirements. The space catalog of orbital descriptions is maintained at the standard general perturbations theory level of accuracy, analytic theory, and at a significantly more precise level for use with special perturbations (SP), numerical theory. In order for the **SP Space Catalog** to be as accurate as possible, the whole SSN must be deliberately and routinely calibrated to achieve optimum performance. This chapter outlines the calibration process and the calibration functions that must be performed to improve the effectiveness and efficiency of the SSN.

4.2. (U) Process. SSN calibration is an end to end process that must be performed at the sensors and the centralized processing nodes. It also requires the support/priority at the components' higher headquarters (HHQ) to ensure units have the proper calibration tools, procedures, and manpower to effectively carry out the functions as outlined in this chapter.

4.2.1. (U) Calibration Requirement. All space surveillance sensors (dedicated, collateral, and contributing) must routinely calibrate their respective systems to achieve accurate space surveillance calibration. This effort must include both metric and atmospheric (including ionospheric/tropospheric) calibration.

4.2.2. (U) Calibration Process Defined. 1 SPCS/SAC will task the sensors to track calibration satellites in order to measure the quality of sensor observations. The observations are compared with precision reference orbits (derived from the best available position and velocity data). The result is a set of values for each sensor (e.g., sigma and bias for elevation, azimuth, range, and range rate). The resulting values will be shared with the respective sensors and, if significant errors exist, sensors will correct systematic errors (biases). SCC must also accommodate sensor biases in the orbit determination process and assign weights to sensor observation data used in the appropriate mission processing system. Since a single satellite's observation sigma and bias will depend on its position in orbit as well as its sensing capabilities, special procedures will be used to calibrate space-based observing systems. The SCC may request space-based observing systems to use more than one satellite in their constellation for simultaneous or near simultaneous multiple observations, when necessary to achieve greater than usual orbit accuracy.

4.3. (U) SSN Calibration Responsibilities.

4.3.1. (U) 1 SPCS/SAC Calibration Responsibilities. 1 SPCS/SAC is responsible for managing calibration of the SSN. This includes the following specific functions:

4.3.1.1. (U) Assign a Calibration Officer to manage and conduct the calibration functions as well as provide direct liaison with sensors.

4.3.1.2. (U) Ensure the SSN is tasked to track calibration satellites.

4.3.1.3. (U) Compare the sensor observation data with precise reference orbits.