

**TECHNICAL REPORT 2004-017**  
**Version 1.2**

**Joint Single Integrated Air Picture  
System Engineering Organization (JSSEO)  
Common Reference Scenario (CRS)  
North East Asia (NEA) III 2003  
JDEP Patriot Pilot Excursion**

**January 2004**

**Joint Single Integrated Air Picture  
System Engineering Organization (JSSEO)**

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JDEP Patriot Pilot Excursion

23 January 2004



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## FOREWORD

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This Technical Report is the result of collective efforts of members of the Joint Single Integrated Air Picture System Engineering Organization (JSSEO) Common Reference Scenario (CRS) Team, who drafted the content of the report, in conjunction with developing the scenario, in early 2003. The following individuals contributed to the report:

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## EXECUTIVE SUMMARY

**PROBLEM** Effective system engineering requires appropriate, standardized, operational scenarios that have been approved by the Joint Community. Using these scenarios, engineers can make engineering and investment trades and objectively evaluate integrated system performance. Jointly developed operational scenarios support military analysis.

**OBJECTIVES** When defining campaigns, scenario vignettes, and excursions for Modeling and Simulation (M&S), Hardware-in-the-Loop (HWIL), Operator-in-the-Loop (OITL), and live exercises to assist in analyses, a common operational context provides assessment consistency across the various analytic venues available to JSSEO. To ensure credibility within the Joint Community, the operational context of the Common Reference Scenario (CRS) reflects current Defense Planning Guidance and Commander-in-Chief (CINC) concurrence, thus reflecting real world priorities. The CRS allows for greater analytical flexibility, since not all block issues can be assessed with the same systems in the same analytical venue. The CRS Technical Report, *SIAP SE TF Technical Report 2002-003 SIAP CRS, July 2002*, documents the CRS development procedures for future SIAP Block assessments and defines a standard, digital product.

**APPROACH** The JSSEO used earlier service and agency work such as the Joint Theater Air and Missile Defense (JTAMD) Master Plan, Missile Defense Agency (MDA) *North East Asia III 2003 Campaign Scenario*, *JSSEO North East Asia 2003 Scenario Vignette* (NEA III 2003), *Version 2.0*, and guidance from the Joint Distributed Engineering Plant (JDEP) Test Planning Working Group to develop the *JSSEO CRS NEA III 2003 JDEP Patriot Pilot Excursion*. The JSSEO chartered a CRS working group composed of representatives of the Services and involved agencies. These individuals determined relevant friendly platforms and concepts of operations to establish a credible scenario for engineering-level and military utility analyses. The JSSEO used the JTAMD Process in the creation of the *CRS NEA III 2003 Vignette*, the parent product of this excursion, to ensure accuracy and Service concurrence.

**FINDINGS** The *JSSEO CRS NEA III 2003 JDEP Patriot Pilot Excursion* provides an operationally credible scenario for engineering-level analysis by the JSSEO.

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## 1. (U) Introduction

This technical report (TR) documents the *JSSEO CRS NEA III 2003 JDEP Patriot Pilot Excursion*. To ensure credibility within the Joint Community and frame an operational context for engineering-level analysis, the JSSEO CRS Team, a working group composed of representatives of the Services and involved agencies, used earlier service and agency work such as the JTAMD Master Plan, Missile Defense Agency Campaign Scenarios, and the MDRM. The operational context of this CRS reflects current Defense Planning Guidance and CINC concurrence, thus reflecting real world priorities. The *JSSEO CRS NEA III 2003 Vignette* was staffed through the JTAMD process. The *JSSEO CRS NEA III 2003 JDEP Patriot Pilot Excursion* is designed for JSSEO's engineering-level analysis.

## 2. (U) Scenario Overview

### 2.1 (U) Function

The excursion modifies the *JSSEO CRS NEA III 2003* by improving the locations of Patriot batteries and including missile calibration flights in a separate file. The modifications make this excursion especially useful for Patriot-related analysis.

### 2.2 (U) Sources

JSSEO worked with Service representatives from LTPO and Software Engineering Directorate to develop this scenario. Threat consistencies are an unmodified extraction from the *North East Asia (NEA) III Campaign Scenario, 2003 Era*, and the *Ballistic Missile Reference Document 2000 (BMRD 2000)*.

### 2.3 (U) Setting

The *JDEP Patriot Pilot Excursion* takes place in the Northeast Asian theater, circa 2003. The geography encompasses land, sea, and air battle spaces, and Red and Blue forces represent a Jointly developed laydown of systems.

## 3. (U) Format

### 3.1 (U) Technical

This product comes as a collection of 6 SECRET // NOFORN compact discs (CDs).

The CRS data format and structure include the following:

- Scenario Documentation: Adobe Acrobat files, with some duplicative text files;
- Detailed scenario description and tables summarizing the simulation data (also provided as percent delimited ASCII text files);
- EADSIM Element and Scenario files (for visualization purposes only);

- ASCII text files that identify each objects' position and velocity in space, with acceleration included for Theater Ballistic Missiles (TBMs). The files are percent-delimited ASCII text files compatible with MS excel;
- Earth model: WGS Earth Centered Inertial / Rotational (ECI / ECR);
- J2 oblate, J4 oblate, and J0 spherical Earth gravity models with Digital Terrain Elevation Data (DTED) Level 1;
- Data Rates - 1 Hz and 10 Hz.

### **3.2 (U) Force Structures**

The excursion pits the two forces' most mature theater laydowns against one another on the same day. In the excursion, Red is the aggressor. Its laydown comes from the vignette's D+0 day, which represents the Red force structure on the day of the Red attack; and it consists of air and missile attacks using TBMs, cruise missiles, and piloted aircraft. The Blue laydown comes from the vignette's C+30 day, which represents the Blue force structure in theater 30 days after Blue started preparing for conflict.

The CRS data files include detailed information about the systems in the scenario. The excursion documentation on the product CDs provides detailed information on the excursion, the interface requirements specifications for the threat modeling and simulation system, and an overview of the general CRS structure. The excursion assumes that the user has a copy of the *JSSEO CRS NEA III 2003* vignette, which includes the tables that describe the specifics of the weapons systems and flights used in the excursion.

#### **3.2.1 (U) Air-Breathing Systems**

Air-breathing systems come in two high-resolution formats in the following directories:

- ac\_j0sp directory - contains a set of air systems high resolution files that fly using the WGS84 datum, a J0 spherical earth gravity model, and an ECI, rotating earth with DTED;
- ac\_j2ob directory - contains a set of air systems high-resolution files that fly using the WGS84 datum, a J2 oblate earth gravity model, and an ECEF, rotating earth with DTED.

### 3.2.2 (U) Blue Forces

The respective Service representatives provided blue force laydowns for the Army, Navy, Air Force, and Marine Corps systems of interest in theater. Aircraft flights depicted in the scenario vignette represent a typical day of operations: Intelligence, Surveillance, and Reconnaissance (ISR) aircraft fly standard orbits and fighter aircraft orbit in pre-designated Combat Air Patrol stations. Table 1 shows the systems included in this excursion.

Navy		Air Force	
CG		TPS-75	
DDG		JSTARS	
FFG		F-15	
DD		AWACS	
CVN		Rivet Joint	
F-14			
F/A-18			
E-2C (Group II & Hawkeye)			
P-3 / EP-3			
Army		USMC	
Patriot		TPS-59	
Linebacker			
Avenger			
GB-Sentinel			
BDE TOC			
<b>All SIAP Block 0 Systems</b>			

(U) Table 1 - NEA III 2003 Systems

### 3.2.3 (U) Red Forces

The excursion's Red forces consist of scripted strike aircraft missions, cruise missiles, TBMs, and rockets. Service representatives developed friendly force laydowns from a provided Red force structure and laydown. The Red force structure and air object flights are unchanged from the *JSSEO CRS NEA III 2003* vignette.

### **3.2.4 (U) Ballistic Missiles**

The BMRD 2000 was used as the source for the ballistic missile flight characteristics for the threat systems. The ballistic missile behavior used for TBM modeling is included in the scenario documentation.

The ballistic missile portion of the media contain three sets of high resolution files in the following format:

- msl\_j0sp directory - contains a set of missile/artillery rocket high resolution files that are flown using the WGS84 datum, a J0 spherical Earth gravity model, and an ECI rotating earth with DTED;
- msl\_j4obeci directory – contains a set of missile/artillery rocket high resolution files that fly using the WGS84 datum, a J4 oblate Earth gravity model, and an ECI, rotating Earth with DTED (1 Hz);
- msl\_j4obecef directory - contains a set of missile/artillery rocket high-resolution files that fly using the WGS84 datum, a J2 oblate Earth gravity model, and an ECI, rotating earth with DTED (both 1 Hz and 10 Hz).

### **3.3 (U) Communication protocol**

The Joint Network Design Team (JNDT) did not create a Link 16 network design for this excursion.

### **3.4 (U) EADSIM Visualization**

The scenario CDs provide the appropriate scenario, laydown, and element data files to view the CRS in EADSIM v5.01 or better (v10.0 is recommended). This data is intended for visualization purposes only, not for analysis or to validate the use of EADSIM as an analysis tool. Though the elements associated with the EADSIM data are representative of the contents of the high-resolution simulation files that define the CRS, the file names do not correlate.

## **4. (U) Limitations and Assumptions**

There are no communications networks, command chains, fighter engagement zones, missile engagement zones, areas of responsibility, etc., set up for the scenario. These depend on tactics and rules of engagement that, in turn, depend on the analysis the users will perform.

A CRS product is only appropriate for a given analysis if it meets three criteria. First, it must have an operationally credible level of air activity. Second, it must implement reviewed and approved air tactics, policies, and procedures. Third, the activity within the scenario must be sufficiently rigorous to support the analysis objectives. Thus, a scenario that supports one SIAP analysis activity

may be totally inappropriate for another analysis activity. The CRS developers and the analysis team work together to address and resolve the specifics of the analysis effort.

To comply with Theater and Air Missile Defense Capstone Requirements Document SIAP Key Performance Parameters analysis, the JSSEO Technical Director must review the application and implementation of this excursion in any analysis activity.

## 5. (U) Summary

The CRS NEA III 2003 JDEP Patriot Pilot Excursion provides the following:

- systems implemented in a distributed and integrated simulation to support joint interoperability analysis;
- a common threat environment consistent with Defense Planning Guidance (DPG) identified threat regions;
- a representative employment of Joint systems;
- improved locations of Patriot batteries and separate calibration flights;
- a common operational context for engineering-level analysis.

Questions / concerns regarding this and all other CRS products should be directed to Eric Byrd, CRS Manager, at JSSEO by phone, 703-602-3868 x230, or email, [Eric.Byrd@Siap.Pentagon.mil](mailto:Eric.Byrd@Siap.Pentagon.mil).

## 6. (U) Bibliography / Source Documents

More detailed, descriptive information is included in the SECRET//NOFORN scenario overview document, entitled *Version.pdf* (look in CRS\_NEA III\_2003\USERINFO\), that accompanies the excursion. The CRS team obtained the information necessary to develop this scenario from a variety of sources (classified and unclassified), which are listed in the bibliography (Appendix C) included with *North East Asia (NEA) III 2003 Scenario Vignette, Version 2.0*.