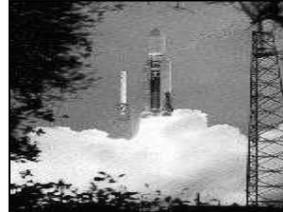


RANGE STANDARDIZATION AND AUTOMATION (RSA)



Air Force ACAT II Program

Total Number of Systems:	Infrastructure upgrades
Total Program Cost (TY\$):	\$1.9B
Average Unit Cost (TY\$):	N/A
MS II/III:	N/A
IOC	Not defined

Prime Contractor

Lockheed Martin

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

Range Standardization and Automation (RSA), which is referred to as Spacelift Range System (SLRS) programs by the System Program Office, addresses range equipment upgrades and standardization through a grouping of three contracts that will modernize and improve capabilities at the Eastern and Western Ranges, while attempting to reduce Operations and Maintenance (O&M) costs by 20 percent from the FY95 baseline. The overall program objective is to improve the SLRS while reducing total cost of ownership by: (1) centralizing command and control and data processing; (2) normalizing logistics support; (3) accelerating response to increasing launch processing and operational requirements; and (4) providing parallel launch operations support capability. RSA consists of products delivered in three distinct acquisition phases: RSA Phase I (at the Eastern Range only), RSA Phase IIA, and the SLRS Contract. The RSA Phase I and Phase IIA contracts will provide a system architecture and associated upgrades to the control/display and communications segments. The SLRS contract will continue modernization by developing and procuring an integrated suite of automated instrumentation, and will engineer and execute a proactive recapitalization process to replace hardware no longer sustainable.

The SLRS combines resources of two independently operated ranges: the Eastern Range managed at Patrick AFB, FL and the Western Range managed at Vandenberg AFB, CA. The SLRS consists of assets that enable the safe and effective launch, testing, and tracking of DoD civil, commercial, and international spacelift vehicles. Missions supported by SLRS systems include space shuttle landings, space surveillance, and ballistic missile, guided weapon, and aeronautical test and evaluation. The SLRS architecture consists of three segments at both the Eastern and Western Ranges: instrumentation, network, and control/display. The instrumentation segment consists of telemetry, command, metric, weather, area surveillance, and imaging sub-systems. The network segment consists of transmission, timing, and radio frequency monitoring sub-systems, and provides both inter- and intra-segment connectivity. The control/display segment consists of instrumentation control, network control, data processing, mission control, planning and scheduling, and meteorological control sub-systems. RSA implements standardized hardware, software, and procedures for both ranges. The standardized SLRS will improve operational efficiency through increased responsiveness, reliability and supportability and reduce O&M costs.

Standardization will be applied to the design of hardware and software and to procedures at the ER and WR. This standardization fosters *interoperability* and *focused logistics* by improving operational efficiency through increased responsiveness, improved reliability and supportability, and reduced O&M costs.

BACKGROUND INFORMATION

RSA addresses virtually every aspect of the range infrastructures at the Eastern and Western Ranges. Numerous shortcomings of the current range systems are described in the RSA Operational Requirements Document (ORD), which documents that range systems are becoming unsupportable. For example, 25 percent of the components required for the major range systems are obsolete and have no source of spares, requiring the ranges to rebuild/refurbish or reverse-engineer and manufacture parts. Poor reliability is causing more frequent system failures, which drives a need for more redundancy at increasing cost. This has forced ranges to become dependent upon their technical services contractors for unique depot maintenance and sustaining engineering support. Furthermore, the ranges lack responsiveness and are unable to support simultaneous operations. This is primarily due to manpower-intensive systems that take days to reconfigure and data processing systems and sensors only capable of single string operations. These factors limit the ranges' ability to meet future demands for government and commercial support.

Correction of these deficiencies began in FY96 with Improvement and Modernization (I&M) projects and RSA improvement contracts. I&M projects made improvements to the control/display, network, and instrumentation sub-systems, and RSA Phase I made improvements to satellite communications (SATCOM), telemetry [Centralized Telemetry Processing System (CTPS)], and the Cape Fiber Optic Network at the Eastern Range only. RSA Phase IIA is making upgrades to all three segments (instrumentation, network, and control/display) at both ranges, including weather, planning/scheduling, data infrastructure, communications, range safety, and control center operations consoles. RSA Phase IIA began in FY99 and will extend through FY05. The SLRS Contract, which was scheduled to begin in FY00 and extend through FY06, will make improvements to optics, surveillance, instrumentation, sustainment, and recapitalization.

RSA was one of the first programs to have requirements developed after implementation of acquisition reform. As a result, requirements were written at a high system level, and requirements allocations to sub-systems, and to acquisition phases, still need to be developed between the operating and developing commands. Numerous technical challenges for the developing command are having significant impacts on schedules, funding, and transition from legacy systems to RSA-delivered systems. This may require some of the current systems to run in parallel with the new RSA systems for an extended period at increased cost to the program office, the operating commands, and the operational units.

The RSA OT&E concept emphasizes combined developmental/operational test and evaluation and is structured to determine operational effectiveness and suitability in an operational environment. There are no dedicated OT&E test articles for RSA. AFOTEC will conduct dedicated operational testing on the incrementally delivered and full SLRS while operating in parallel with the existing SLRS at the Eastern and Western Ranges. Except for equipment installed to facilitate transition, testing will take place in the operational environment and under operational conditions to the maximum extent possible.

The OT&E concept includes three Operational Utility Evaluations (OUE) to coincide with the three contract actions (RSA Phase I, RSA Phase IIA, and SLRS Contract), prior to a final system-level IOT&E, which is scheduled to begin in FY06. The individual RSA OUEs will support an incremental process for gathering and analyzing relevant data leading to the final IOT&E, and will support fielding decisions by Air Force Space Command for each phase or operational capability delivery.

TEST & EVALUATION ACTIVITY

RSA was placed under DOT&E oversight in January 2000. This required the System Program Office to develop a TEMP, which is currently in progress. The TEMP will define the test concept, formulate Critical Operational Issues and Measures of Effectiveness/Performance, and identify required test assets. DOT&E participated in several TEMP development and issue resolution meetings.

AFOTEC conducted an OUE on portions of RSA Phase I at Cape Canaveral Air Force Station from June 1999-March 2000. RSA Phase I provides a new satellite communications network (SATCOM) with reliable communications on the Eastern Range, a fiber optics network on Cape Canaveral (CFON), and a Centralized Telemetry Processing System (CTPS) to standardize and automate telemetry configuration and processing. AFOTEC tested SATCOM and CFON and determined that the new systems could support operational space vehicle and ballistic missile test launches. In particular, these communications capabilities enhanced range safety by providing range safety critical telemetry through SATCOM terminals and real-time video feeds of launches through the CFON network to assist in launch safety determination. Delays in the creation of operational configuration files prevented testing of CTPS until FY01.

TEST & EVALUATION ASSESSMENT

AFOTEC reported in their OUE Report for RSA Phase I that the SATCOM and CFON systems are ready for operational use. However, RSA Phase I systems fell short of the overall reliability requirement for the entire Spacelift Range System, as specified in the ORD. This was primarily due to only one of two planned SATCOM strings currently being in place. The OUE results predicted that ORD reliability requirements would be met once a planned second SATCOM string is installed. DOT&E concurs with AFOTEC's assessment and supports their recommendation that the new systems be used in parallel with legacy systems until a second SATCOM string is brought on line and reliability and dependability meet requirements. The OUE also identified some shortfalls in the supply of spares, software maintainability, and maintenance training. AFOTEC will provide a final assessment of the operational utility of all RSA Phase I deliveries following testing of the Centralized Telemetry Processing System, scheduled in late FY01. The OUE results demonstrated that Eastern Range communications through SATCOM and CFON are an improvement over the previous legacy system, and that SLRS systems are evolving towards an operationally effective and suitable system.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

In spite of the documented need for range modernization, there is fairly substantial resistance to implementation of RSA at the operational ranges, as well as concerns from external range users. The implementation resistance is due to uncertainty about what capability RSA will deliver compared to current systems operating at the ranges today, as well as changes to legacy routines that will be required by standardization. Standardization will require changes in the way the ranges operate and deliver data

products and services. Uncertainty about the magnitude of the required changes has raised concerns within the range operator and range user communities. Other range operator concerns include how long they will need to continue operating two ranges (one with the legacy systems to meet current range requirements and one for the RSA systems under test) at each range location, and how long it will take to either integrate or replace legacy systems with RSA deliverables. In addition, range operators are concerned about unit funding impacts in support of RSA implementation, personnel training, and testing. External range user concerns focus on interoperability and how the new RSA deliverables will interface with legacy systems to meet all user requirements. For example, NASA and the National Oceanic and Atmospheric Administration have expressed concerns that RSA designs to standardize weather squadron operations will impact their interfaces with the ranges. Most of these issues are now being addressed in appropriate senior-level forums, but final resolution has not yet been attained.

Placing RSA under DOT&E oversight has helped foster additional discipline in the development and coordination of a coherent system-level RSA test strategy. However, there are residual issues involving Reliability, Maintainability, and Availability (RMA) modeling, O&M cost estimation methodology, and availability of CTPS configuration files that impact the test community. RMA modeling is hampered by the non-standardized methodologies employed at each of the ranges to capture and calculate historical RMA data. This has affected AFOTEC's ability to configure their RAPTOR model for RMA analyses and assessments. O&M costs are to be reduced 20 percent from baseline FY95 figures, but the lack of a rigorous methodology to estimate total range O&M costs makes it difficult for AFOTEC to determine whether this key performance parameter in the RSA ORD will or can be achieved. The inability of the operational unit to generate operational configuration files for CTPS has forced AFOTEC to delay CTPS operational testing until 4QFY01. In addition to these issues, the System Program Office needs to accelerate coordination of the TEMP for submission to DOT&E for approval.