

NASA RANGE SAFETY PROGRAM 2005 ANNUAL REPORT

Eastern Range Range Safety Instrumentation Update

The United States Air Force's 45th Space Wing supports NASA activities at KSC and Cape Canaveral Air Force Station (CCAFS). The Eastern Range provides the activities and resources for flight safety (including public safety), range instrumentation, infrastructure, and scheduling required to support and assure space and ballistic launches and other operations. Eastern Range range safety instrumentation is comprised of legacy and newly acquired state-of-the-art technologies to support the launch mission of the 45th Space Wing.

Eastern Range instrumentation equipment is located on Cape Canaveral Air Force Station, Patrick Air Force Base, Malabar Annex, Jonathan Dickinson Missile Tracking Annex, and KSC, in addition to Antigua, Argentina, and Ascension stations. The Eastern Range also uses instrumentation from other Department of Defense and NASA agencies to accomplish its mission. Some of the major instrumentation systems that support Range Safety have recently been updated.

Flight Operations Version One

Flight Operations Version One (FOV1) consists of two independent systems that are located in the Range Operations Control Center on Cape Canaveral Air Force Station. The FOV1 systems provide the capability for Range Safety to monitor launch vehicle performance. The systems acquire and process instrumentation data from Cape Canaveral Air Force Station and off-range sites through redundant network paths. Using the instrumentation data, these systems generate flight path and predicted impact point displays.



Using these displays, the Mission Flight Control Officer determines the risk based on pre-defined mission rules and, if required, terminates any vehicle that

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violates established flight destruct criteria. The system resides in the FOV1 Controls and Display room.



FOV1 was initially accepted into the Eastern Range inventory 18 September 2003. It went through an upgrade and development effort called fix-it-first that was completed in December 2005. The fix-it-second development effort will follow and will be completed in early 2007.

Post Detect Telemetry System

The latest telemetry system acquired by the Eastern Range is the Post Detect Telemetry System (PDTs). This system was accepted into the Eastern Range inventory 27 October 2005 and enhanced many of the Eastern Range range safety critical systems. PDTs provides transport of digital post-detect telemetry data from Eastern Range telemetry sites via the Network Core System Wide Area Network Interface Units and the microwave and commercial circuits from Jonathan Dickinson Missile Tracking Annex.

PDTs sites include Tel-4 on KSC (shown below), Jonathan Dickson, Antigua, and Ascension. Timing and sequencing system components provide the synchronization signals required for the PDTs and the Network Core System equipment operation. The post-detect telemetry data is transported to the launch customer facilities and the Range Operations Control Center (ROCC) for range safety purposes.



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INTELSAT SATCOM System

The INTELSAT SATCOM System (side B) was modified as part of the PDTS project to support new bandwidth, polarization, and modulation format requirements. This new digital service is configured as the Eastern Range primary telemetry transmission carrier from downrange stations at Antigua and Ascension to the Range Operations Control Center.



Core Data Wide Area Network Interface Units

Core Data Wide Area Network Interface Units System is the major transport mechanism to Range Safety and telemetry data end users. The Core—shown in the diagram below--provides the communication backbone at Cape Canaveral Air Force Station. The Core consists of four rings, two OC-48 (red 2488 megabits per second) and two OC-12 (green 622 megabits per second). The communication link to NASA is through the Launch Operation Control Center. The primary nodes shown in the diagram are listed below:

- ROCC (Range Operations Control Center)
- XY Facility
- VIB (Vertical Integration Building)
- STB (Southwest Terminal Building)
- ETB (East Terminal Building)

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