

## Executive Summary

### F-15E Multi-Purpose Display Processor (MPDP) Upgrade

#### PNUM 33

**Background:** The F-15E Open Systems Demonstration Project directly supports the application of commercial hardware and software technology to upgrade the F-15E Multi-Purpose Display Processor (MPDP). Specifically, the products of the Open Systems Project are inputs to the DARPA funded Commercial Operational and Support Savings Initiative (COSSI)--“Commercially Based Processing for F-15E”. The USAF has shown their support of Open Systems by signing a Cooperative Research and Development Agreement (CRADA) on 13 April 1997 to provide the Boeing Company with an F-15 E. Aircraft number E-1 will be used to demonstrate an Open Systems Approach in a real military environment. This focused commitment will fulfill OUSD A&T direction to “take a major program and use it to prove the case for open system practices and procedures.”

**Requirement:** With sustainability as a priority, the F-15 Program Office rated the upgrade of the F-15E MPDP as a “must do.” The upgrade is a high priority because the MPDP has high levels of economic obsolescence, low reliability, and severe computer resource limitations. As part of COSSI, the Boeing Company will lead an industry team to evolve a commercial multipurpose display processor, familiarly known as the Advanced Display Core Processor (ADCP). This effort will demonstrate the ADCP’s ability to replace the MPDP and Very High Speed Integrated Circuit (VHSIC) Central Computer (VCC) while providing significant Operations and Support savings. The ADCP will enable critical operational capabilities and provide for efficient future growth. Program plans also include the investigation into the implications of applying an Open Systems Approach to the Programmable Communications, Navigation, and Instrumentation (PCNI) electronics package.

**F-15 Open System Demo Project Products and Results:** The Open Systems Demo Project results indicate that the current F-15 aircraft environment will support the insertion of commercially based hardware technology. Products of the Demo Project are being incorporated and implemented in the COSSI program and leveraged by other on-going F-15 and F-18 upgrade activities.

The following are some of the areas that are currently being addressed in the report:

- **Integrated Product Team:** Members of the F-15 Project Team have participated across multiple Boeing open system/acquisition reform activities, (i.e. AV-8 OSCAR, F-15 and F-18 COSSI, and Boeing’s Common Commercial Object Oriented Software Team). Lessons learned and data have been shared across these programs. The Project Team has also met with multiple key avionic suppliers to obtain supplier perspectives and to jointly produce specifications and validation/verification procedures for the ADCP. Active USAF participation has included drafting of operational requirements, system requirements documentation, the above mentioned F-15E-1 CRADA, and the COSSI 845 Agreement.
- **Performance Specifications and Improved Environmental Descriptions:** The F-15 aircraft environment analysis and description is still in progress. Analyses and surveys on aircraft cold and hot operations testing have provided a better definition of the current F-15E environment. The detailed data is in the process of being documented and will be made available to the supplier community. This information will better determine the viability of commercially based products. Changes to selected operating procedures, to support commercial insertion, have been identified and provided to the F-15 user community. The change recommendations are currently in review. The performance specification inputs, BIT philosophy, and user approved procedure changes will be incorporated in the USAF’s System Requirements Document.
- **Software/Hardware Metrics and Built-In Test (BIT) Philosophy:** These areas have been established for use during the ADCP evaluation and upgrade. In addition, software and hardware metrics have evolved for the AV-8 OSCAR program and Boeing’s Common OFP program. A detailed BIT philosophy, applicable to all aircraft programs, has been established in close coordination with suppliers and USAF logistics personnel.
- **Management and System Requirements Data List, Warranty, and 845 Agreement Documents:** Requirements and documents have been drafted for use by the F-15 COSSI. These documents have been streamlined to reflect new management relationships, BIT philosophy, and lessons learned from other Boeing open system initiatives. These documents will evolve during COSSI. The 845 agreement for F-15 COSSI, a more streamlined and commercially oriented agreement, was accomplished in only two months by USAF and

Boeing Project Team personnel. This experience with 845 Agreements has provided a model for future programs.