Joint Helmet Mounted Cueing System (JHMCS)

The Joint Helmet Mounted Cueing System (JHMCS) is a modified HGU-55/P helmet that incorporates a visor-projected heads-up display to cue weapons and sensors to the target. This new cueing system is intended to improve effectiveness in both air-to-air and air-to-ground missions. In close combat, a pilot must currently align the aircraft to shoot at a target. JHMCS allows the pilot to simply look at a target in order to designate it to one of the aircraft's weapons systems. This system projects visual targeting and aircraft performance information on the back of the helmet's visor, enabling the pilot to monitor this information without interrupting his field-of-view through the cockpit canopy. The system uses a magnetic transmitter unit fixed to the aircraft canopy rail and a magnetic receiver unit mounted on the helmet to define helmet pointing positioning. A Helmet Vehicle Interface interacts with the aircraft system bus to provide signal generation for the helmet display. This system demonstrates a significant improvement to a close combat targeting and engagement capability.

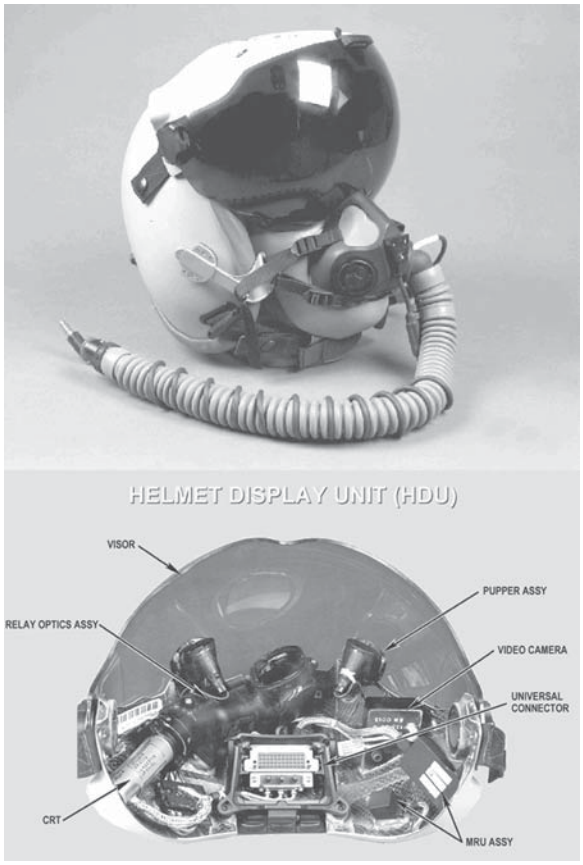
The JHMCS system will be employed in the FA-18C/D/E/F, F-15C/D, and F-16 Block 40/50 with a design that is 95 percent common to all three platforms. The Air Force has eliminated funding for JHMCS in the F/A-22. When used in conjunction with an AIM-9X missile, JHMCS allows a pilot to effectively designate and kill targets in a cone more than 80 degrees to either side of the nose of the aircraft, or high-off-boresight.

TEST & EVALUATION ACTIVITY

DOT&E approved the JHMCS Test and Evaluation Master Plan and the Air Force and Navy IOT&E plans for the system. Multi-Service operational test and evaluation (MOT&E) of JHMCS began in June 2001 for the Air Force and October 2001 for the Navy, and ended in June 2002. The final report on the MOT&E recommended fix-and-verification of eight deficient areas prior to a full-rate production decision. From January through March 2003, the Air Force Operational Test and Evaluation Center (AFOTEC) and the Navy's Operational Test and Evaluation Force (OPTEVFOR) performed Fix Verification on the eight deficient areas. While they found that several of the deficient areas were fixed or improved, the combined teams did not recommend the Air Force fielding or Navy fleet introduction until the Upper Helmet Vehicle Interface demonstrated to be more robust and yield a higher mean time between critical failure (MTBCF). On July 18, 2003, the Air Force headquarters (based on informal field reports of increased reliability) requested that AFOTEC reassess the JHMCS. The reassessment did not have OPTEVFOR participation. The Navy has equipped two squadrons with the JHMCS as an early operational capability and has used it for approximately ten months, flying over 4,700 JHMCS hours, including combat in Iraq.

TEST & EVALUATION ASSESSMENT

Initial tests for both the F/A-18C/D and F-15C revealed significant reliability deficiencies. The device that connects the helmet to the aircraft (helmet vehicle interface) was particularly unreliable. An operational assessment of the systems for the F/A-18C/D and



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F-15C found the JHMCS potentially effective, but potentially not suitable due to numerous breaks in the helmet vehicle interface. Initial F-15C flight tests revealed that the legacy computer was slow in providing necessary data to JHMCS. This slow data input to the helmet, coupled with normal aircraft buffet during air combat maneuvering, made it difficult for the pilot to designate the target.

Since these initial tests, several corrections have been introduced, but have not improved reliability to an acceptable level. Based on MOT&E data collected from June 2001 to June 2002, DOT&E and the commanders of AFOTEC and OPTEVFOR determined that JHMCS was operationally effective, but not operationally suitable. Both the Navy and Air Force recommended delaying full-rate production until deficient areas are fixed and verified. DOT&E delayed its assessment to allow the Services time to fix the deficiencies.

The Air Force reassessment analyzed reliability data from Elmendorf Air Force Base, Alaska, and Nellis Air Force Base, Nevada, from April through July 2003. The MTBCF was 44.1 hours, just less than half the 93.7 hour requirement. The MTBCF achieved during MOT&E was one-third the required value (25.5 hours versus 74.3 hours). The requirement difference is based on different average sortie durations that are more fully described in the MOT&E final report. Preliminary data from the two still-deployed Navy squadrons indicate 81-91 flight hours between critical failures. While at first glance the Navy numbers suggest significantly better reliability, without the average sortie duration to calculate MTBCF on the same basis, no definitive conclusions should be made regarding reliability.

Based on MOT&E data and test observations, DOT&E determined that JHMCS was operationally effective, but not operationally suitable due to significant deficiencies in reliability and maintainability. DOT&E also concurs with the recommendation by both Services to delay full-rate production until deficient areas are fixed and verified. JHMCS brings a significant increase in combat capability by allowing aviators to look and designate air and ground targets in a matter of seconds without maneuvering their aircraft. If the Navy preliminary data noted above is confirmed through analysis, then DOT&E will consider revising its determination of operational suitability.

Both Air Force and Navy pilots who have flown the system concur that it adds substantial capabilities and remains a highly effective system. This capability, however, has two significant limitations: limited night utility and a Navy funding mismatch between the helmet and the high-off-boresite-angle missile, AIM-9X. The current system design should be enhanced to provide compatibility with night vision goggles. This could further expand the system's capability to include operations at night. The Navy's funding mismatch between the helmet and AIM-9X procurement resulted in the first F/A-18E/F squadrons deploying with only part (JHMCS) of their high-off-boresight combat envelope. The Navy will not realize the full air-to-air combat potential of the F/A-18E/F until it conducts follow-on operational test and evaluation of the F/A-18E/F with JHMCS and the AIM-9X missile, currently scheduled for spring of 2004.