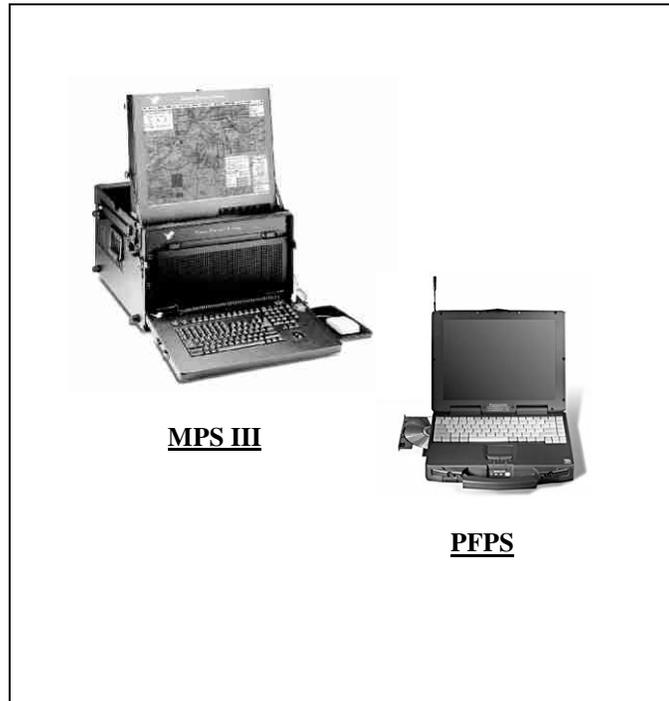


AIR FORCE MISSION SUPPORT SYSTEM (AFMSS)



Air Force ACAT IAC Program

Total Number of Systems:	2,900
Total Program Cost (TY\$):	\$652M
Average Unit Cost (TY\$):	N/A
Full-rate production	
Blocks C2.0, C2.1:	Incremental, Beginning FY97
Block C2.2:	Incremental, Beginning FY99
PFPS 3.01, 3.1:	Incremental, Beginning FY98

Prime Contractor

AFMSS/UNIX-based systems:
Sanders, a Lockheed Martin
Company
AFMSS/PFPS systems: Tybrin
Corp.

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Air Force Mission Support System (AFMSS) program is developing a family of hardware and software products providing automated mission planning support for Air Force aircraft and precision-guided munitions. AFMSS contributes to all operational concepts of *Joint Vision 2020*. AFMSS has become a significant command and control enhancement, providing *information superiority* to the *dominant maneuver* force.

The acquisition of AFMSS is evolutionary. Software for Mission Planning Systems (MPS) is UNIX-based, runs on UNIX workstations, and is being released in “Blocks.” Portable Flight Planning Software (PFPS) versions are Microsoft Windows-based and run on IBM-compatible PCs. AFMSS uses several hardware configurations comprising Commercial Off-The-Shelf hardware to meet system requirements.

AFMSS software is loaded on a specific hardware configuration with Aircraft/Weapon/Electronics modules and other Installable Software Modules to provide a mission planning environment (MPE) for each aircraft type. Aircraft with electronic data transfer capability employ aircraft-unique hardware peripherals to prepare data transfer devices (DTDs) for uploading mission information into aircraft computers. The outputs of AFMSS-based MPEs are combat mission folders (consisting of maps, images, and flight information) and DTDs.

Eventually, all Air Force AFMSS users and Navy platforms using legacy mission planners will migrate to the Joint Mission Planning System (JMPS) architecture.

BACKGROUND INFORMATION

The AFMSS program began in 1990 with a UNIX-based automated mission planning system. Early versions had limited capabilities and did not fully meet user requirements. Development of **Block C2.0** software began in 1996 and was completed by 2QFY97. Block C2.0 MPEs for several aircraft types underwent operational test and evaluation during 1997 and 1998. Overall, the effectiveness of Block C2.0 was rated as marginally satisfactory for all users except the F-117A and the B-2. User requirements for the B-2 and F-117A MPEs were not met with Block C2.0 versions. Suitability for Block C2.0 was rated as unsatisfactory. Block C2.0 systems have now been upgraded or replaced by later AFMSS versions or by PFPS-based MPEs. **Block C2.1** software completed development in 1998, and development of **Block C2.2** software was completed in late CY98. The first Block C2.2 MPE, the B-2 v1.5, entered operational test and evaluation in December 1998. All MPS users are now employing Block C2.2 versions. **PFPS version 3.01** (for Windows-based PCs) provides basic flight planning capabilities for the following Air Force aircraft: A-10, B-1B, B-52H, C-141B, C-27A, E-3A, E-4B, EF-111, F-117A, F-15 (various), F-16 (various), C-130 (various), KC-10, C-135 (various), H-53, and T-38. Several Navy aircraft are also supported. The first MPE using PFPS 3.01 to enter operational test and evaluation was the F-16 Software Capabilities Upgrade (SCU) 3 Plus in May 1998. **PFPS 3.1** mission planning software recently completed development and has been certified for use for a few aircraft types. Enhancements in PFPS 3.1 include three new aircraft types (C-17A, C-5, and H-60), expanded weapon delivery functions, air refueling track editing, multiple routes, terrain masking, improved threat overlays, and other tools for airdrops and helicopter operations.

TEST & EVALUATION ACTIVITY

An operational test and evaluation, ranging in length from a few days to several months, is conducted for each aircraft's MPE. Qualified operations test personnel and experienced operational aircrews plan missions under operationally representative conditions and time constraints to determine if the MPEs are able to meet requirements to generate mission plans in a timely manner. For aircraft with data transfer devices, planners transfer missions to cartridges and the accuracy of data loaded into the aircraft is checked. Suitability data are also collected for some MPE types.

Table 1 shows aircraft MPE versions that have completed operational testing during FY00.

Table 1. Summary of FY00 AFMSS OT&E Activity

Operational Test Organization	AFMSS Block C2.2 Versions	PFPS 3.01 Versions	PFPS 3.1 Versions
AFOTEC Det 2, Eglin AFB, FL		C-17 sp3	
28 th Test Squadron, Air Warfare Center (AWFC), Eglin AFB, FL	J-2 Ver 3.2 and Ver 4.0 F-16 PO4B 50T5 Ver 4.32 and Ver 4.32 with WCMD Ver 4.01.1 B-1B Ver 1.2	A-10 F-16 50T5 CSS	Basic PFPS 3.1 ** PFPS for Windows NT F-16 SCU3PM
72 nd Test and Evaluation Squadron of AWFC, Whiteman AFB, MO	B-2 Ver 2.0		
33 rd Flight Test Squadron of Air Mobility Warfare Center (AMWC), Ft. Dix, NJ		KC-135E KC-135R C-141	
Det 1, 53 rd Test and Evaluation Group, Holloman AFB, NM	F-117A Ver 3.1.2* and Ver 4.0.1*		

* Test reports on these systems have not yet been made available to DOT&E.

** This test also evaluated flight performance modules for C-130 and MH-53 aircraft types.

Block C2.2 MPEs: Five Block C2.2 MPEs have undergone operational test and evaluation in FY 2000: those for U-2, F-16 PO4B 50T5, B-1B, B-2, and the F-117A. All Block C2.2 systems were Y2K compliant and were replacements for earlier MPE versions. Operational test and evaluation of U-2 MPE version 3.2 was completed in January 2000. The system was rated “satisfactory” for basic flight planning needs and was recommended for release. However, some important test issues were not resolved favorably, and 18 deficiencies remained open. The most significant deficiency was incorrect prioritization of Navigational Aids. The system still had many uncorrected deficiencies identified during earlier tests. An additional U-2 MPE release 4.0 completed OT&E in July 2000. The system was rated overall satisfactory. Eighteen deficiencies were reported, the most significant ones being related to display and prioritization of navigation aids. Testing of software for the F-16 PO4B 50T5 version 4.32 was completed in October 1999. However, the release of test results was placed on hold until June 2000 because of deficiencies in the aircraft’s Operational Flight Program (OFP). In the final test report, after OFP problems were corrected, the system was rated as satisfactory for basic flight planning needs. Forty-seven deficiencies were identified during the test. The 28th Test Squadron tested a version of the MPE for the F-16 PO4B 50T5 which included an A/W/E for the **Wind Corrected Munition Dispenser (WCMD)** in August 2000. The system was recommended for release, but with a marginal rating. There were several deficiencies with the WCMD planning tools, which taken together, reduced usability and caused extra work to develop mission plans. There were 21 deficiencies reported against the A/W/E, not counting those against the basic F-16 PO4B MPE. The most recent **B-1B** MPE, version 1.2, was tested in March and April 2000. Whereas the previous B-1B release (version 1.1) had not been recommended for operational use, version 1.2 was rated overall as “satisfactory.” Nevertheless, two test issues

(meeting user needs and suitability) did not receive satisfactory ratings. There are still several significant usability issues that increase planning time and lead to risk of errors. Additionally, there is an open suitability concern because the hardware for preparing data transfer cartridges is a single point-of-failure item and units are not provided with spares. Failure of this item would prevent a deployed unit from fulfilling their wartime mission. Thirteen new deficiencies were identified during test of version 1.2. These are in addition to 32 uncorrected deficiencies from earlier releases. Version 2.0 of the **B-2** MPE was tested in early FY00 in conjunction with operational testing of a new release of aircraft software (version P1.1). This MPE also included version 3.2.1 of CLOAR. For the first time, the B-2 MPE was rated overall satisfactory. The current version 2.0 enables planners to achieve the required 8-hour planning timeline for a wartime mission and the latest CLOAR version 3.2.1 contains improvements that make it a usable tool for the first time. While CLOAR can provide acceptable routes, care must be taken to constrain potential route choices and to choose proper optimization settings. Improvements are still needed in a number of areas (e.g., printed products). Briefings and correspondence indicate that **F-117A** MPE version 3.1.2 was tested and released for operational use in April 2000. However, a test report on this system was never completed. The latest F-117A MPE, version 4.0.1, completed testing in August 2000 and was released for operational use. A test report on version 4.0.1 will be available in October 2000. Discussion with test team personnel indicates that both version 3.1.2 and version 4.0.1 were rated as marginally satisfactory for effectiveness because the planning times slightly exceeded requirements.

FPS 3.01 MPEs: The basic software for PFPS version 3.01 was tested during FY98. The software was recommended for release, with the exception of the threat depiction tool. The threat depiction tool was found to present incorrect information on terrain masking results. Although the PFPS software has embedded flight performance modules for many aircraft types, MPEs for each aircraft type are still individually tested and certified before operational use.

Fiscal Year 2000 PFPS 3.01 tests included OT&E of the PFPS-based Cartridge Support Software (CSS) for the **F-16 50T5**. The 28th Test Squadron completed this test in October 1999. Effectiveness and suitability were both resolved as satisfactory. Twelve deficiencies were identified during testing but none were high priority. The 33rd Flight Test Squadron tested a mission planning system for the **KC-135E** using PFPS 3.01 in December 1999. Because testing showed that a data transfer device could not be prepared using this system, the planning system was certified for basic flight planning only. A report for this testing has not been distributed. The 28th Test Squadron completed testing of the **A-10** mission planning capability in December 1999. All test issues were resolved as satisfactory, including the ability to upload data to the aircraft via a data transfer cartridge. Forty-one deficiencies identified during the test remain open. The 33rd Flight Test Squadron completed OT&E of the **C-141** mission planning system based on PFPS 3.01 in January 2000. All critical operational issues were rated as satisfactory. However, there were eight deficiencies. The most significant deficiency reports were on the inadequacy of training for the system. The 33rd Flight Test Squadron tested a **KC-135R** planning system, version 1.9.2, in January and February 2000. The system was found satisfactory overall, but several test measures were rated as unsatisfactory or inadequate. Problems were encountered loading data for transfer to the aircraft. Loss of power was experienced when shutting down the system on battery power. Training was also rated as inadequate. Twelve deficiencies were reported against the system. Detachment 2 of AFOTEC conducted OT&E of the planning system for the **C-17A**, Spiral 3 in May and June 2000. The system was rated overall as effective and suitable, with 12 minor deficiencies. Technical orders were rated as unacceptable, and some problems were encountered loading software and data into the laptop computer.

PFPS 3.1 MPEs: The basic PFPS 3.1 software underwent OT&E from December 1999-March 2000. The system was rated as effective and suitable, but 74 deficiencies that did not significantly interfere with effective mission planning remained open at the conclusion of the test. Among the

principal shortcomings discovered during testing were lack of capability to import threat data bases and lack of training. A version of PFPS 3.1 for Windows NT was tested in April 2000. No significant problems (beyond those in Basic PFPS 3.1) were noted. A Mission Planning Environment for the **F-16 SCU 3PM** based on PFPS 3.1 underwent OT&E in March and April 2000. The system was found satisfactory in effectiveness and suitability. Sixteen new deficiencies were reported.

TEST & EVALUATION ASSESSMENT

OT&E tests performed on AFMSS mission planning environments during FY00 indicate that there have been improvements in effectiveness and suitability of more recent releases and versions.

Available test reports for UNIX-based systems with Block C2.2 core all reported overall satisfactory except for the B-1B, the WCMD A/W/E used on the F-16 PO4B 50T5, and the F-117A. While there were factors preventing a fully satisfactory rating of the B-1B planning system, it was a major improvement over the previous version, particularly for functions related to Joint Direct Attack Munition planning. The WCMD A/W/E used on the F-16 PO4B 50T5 had a number of shortcomings but was recommended for release provided users were informed of workarounds. The F-117A MPE is still exceeding the 8-hour planning time requirement by 1-2 hours. UNIX-based AFMSS users still record significant usability complaints. Nevertheless, user dissatisfaction is decreasing and mission planning times are improving as the system matures and earlier deficiencies are corrected in new releases. Faster hardware is also leading to planning time reductions. AFMSS users with complex missions (e.g., B-1B, B-2, and F-117A) are likely to continue experiencing a significant number of usability problems.

All PFPS 3.01 and 3.1 systems tested in FY00, and for which test reports are available, received ratings of satisfactory for effectiveness and suitability. These users have fewer major usability complaints, and the newer 3.1 version has a number of enhancements over earlier configurations. Although there remain a significant number of open deficiencies for PFPS systems, user feedback on version 3.1 has been mostly favorable.

DOT&E recommends that the Air Force continue to focus attention and funding on fixing deficiencies and improving AFMSS products. It is certain that these systems will be in service for several more years before capabilities can be migrated to systems based on JMPS.

