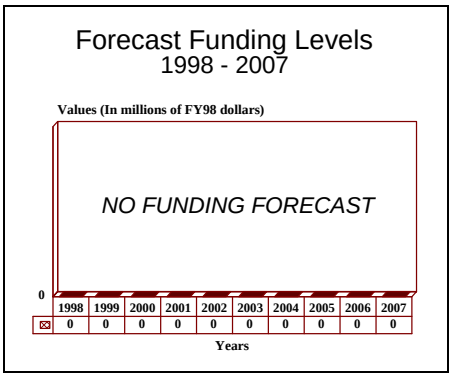
Flight Service Station Modernization - Archived 12/99

Outlook

- All AFSS hardware has been installed as of 1995
- FAA plans to lease program hardware from 1999+
- A limited upgrade and system maintenance potential exists
- **THIS REPORT WILL BE ARCHIVED IN 1999, BARRING AN INCREASE IN PROGRAM ACTIVITY**



Orientation

Description. The Flight Service Station (FSS) Modernization Program is one element of the Federal Aviation Administration (FAA) initiative to upgrade the US air traffic management system.

Sponsor

Department of Transportation (DOT)
Federal Aviation Administration (FAA)
Washington, DC
USA
(Program Manager)

Contractors

Raytheon E-Systems
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(AFSS Computer Systems)

Status. The Model 1 Full Capacity (M1FC) system became fully operational at the end of 1995.

Total Produced. The first M1FC system was installed in October 1989. FSAS (Flight Service Automation System) deliveries total 400 computers and 3,000 display terminals for 18,000 airports. All 61 AFSSs (Automated Flight Service Stations) were commissioned by the end of 1995.

Application. This effort maximizes automation of the dissemination of aeronautical and meteorological information by the FSS network, in order to provide the increasing volume of services required by US general aviation in the most cost-efficient manner. The work includes voice and data communication facilities, computer hardware and software, and input and display interfaces.

Price Range. Indeterminate, as this is largely an upgrade program.

Technical Data

Design Features. The present FSS Modernization program that has evolved is a composite, bearing slight resemblance to the 1978 master plan. The present undertaking is the third generation version of the originally planned system.

Under the original National Airspace Systems Plan (NASP), 13 projects were grouped under the category designated Flight Service and Weather Systems. In the latest version of the revised and renamed Aviation System Capital Investment Plan (December 1993), there are seven projects grouped under Flight Service and Weather. These projects are: Flight Service Automation System (FSAS), Central Weather Processor (CWP), Weather Message Switching Center (WMSC) Replacement, Aeronautical Data-link, Automated Weather Observing System (AWOS), Low-Level Wind Shear Alert system (LLWAS), and Integrated Communications Switching System (ICSS).

The principle project is the FSAS. This project initially supported the implementation of the Model 1 System, which includes 39 Flight Service Stations (FSSs) and 13 flight service data processing systems located at the air route traffic control centers (ARTCCSs). The Model 1 Full Capacity (M1FC) system was scheduled to achieve full operational status in 1995 using the technology/equipment base provided by the Model 1 System. M1FC provides additional hardware, including two Aviation Weather Processors installed at National Airspace Data Interchange Network (NADIN) switching centers, and will raise the number of operational flight service data processing systems to 21 and the number of Automated Flight Service Stations (AFFS) to 61. It also includes the software necessary to complete FSS consolidation. All Model 1 systems are being converted to the M1FC standard. M1FC has roughly the same capacity as the Model 2 design which was originally proposed for the program. Model 2, with four Central Processing Units (CPUs), would have supported up to 180 terminals and 11 AFSSs. M1FC, with four CPUs, supports up to 150 terminals and eight AFSSs. M1FC includes a total of 61 consolidated, automated flight service stations (39 Model 1 upgrades and 22 new installations), the two Aviation Weather Processors (AWPs), and 21 operational flight service data processing systems.

Variants/Upgrades

This entire program is an upgrade designed to improve user access to weather information and Notices to Airmen (NOTAM), simplify flight plan filing, and supply a flight service station automation system to meet projected increases in demand for flight services without increasing staff size. The upgrade provides expanded services and makes extensive use of satellite technology and color displays for windowing weather graphics and textual data.

FSAS Power Conditioning Systems (PCS). The FSAS Power Conditioning Systems (PCS) project provides power conditioning and battery backup systems in AFSSs that are subject to frequent power fluctuations resulting from weather disturbances or commercial power outages. The specific problem to be alleviated is the disposition of certain systems in the AFSSs that are particularly vulnerable, resulting in the temporary loss of service to the public. The completely automatic systems will continue to function even when power outages last several minutes. Minimal maintenance will be required. The requirement is for 61 PCSs.

FSAS Computer Replacement Project. This project develops the requirements and procurement methodology for replacement of current flight service automation system equipment. Among the requirements are the identification and evaluation of alternatives to automated weather processors, flight service data processing systems, and AFSS consoles. This project currently is in the advanced planning and engineering phase in which alternatives are being considered and requirements are being established, reviewed and validated. As currently understood, new hardware and software requirements call for 23 Flight Service Data Processing Systems (FSDPSs), two AWPs, and 61 AFSS consoles.

Program Review

Background. The roots of the FSS network go back to the beginnings of aviation. Four sites established in 1920 grew into a network of approximately 340 stations in the 50 states. Flight Service Stations perform a remarkably broad range of services, primarily for general aviation – for example, opening and closing flight plans, conducting preflight weather briefings, maintaining en-route communications with Visual Flight Rules (VFR) flights, assisting pilots in distress, monitoring radio navigational aids, taking weather observations, disseminating weather information, originating NOTAMs, working with search-and-rescue teams to locate missing aircraft, issuing en-route and airport advisories, relaying communications, advising

customs and immigration officials of transborder flights, and sometimes administering FAA written examinations.

The most important services are clearly those related to weather, though the sound of a friendly voice from someone who knows the territory has brought welcome relief to many distressed pilots. For example, in 1985, FAA air traffic controllers and FSS specialists provided 1,181 assists to aircraft in trouble, and were credited with possibly saving 2,093 lives.

Nevertheless, the concerns of Congress, the FAA, the pilots who use the FSS system, and the specialists who operate it have been focused on the problems and costs of the system since the early 1960s. In FY78, the FAA estimated its FSS network provided 65.8 million services to pilots at an annual cost of about US$150 million, 80 percent of which was personnel cost. They estimated that demand would reach a level of 134.5 million services by 1990. Critics described the FSS system as labor-intensive, error prone, inefficient and expensive.

Automation, consolidation, and collocation were seen as the answers to all these criticisms. Automation would reduce the labor content of the services provided, increase the capacity of the system to provide them, facilitate direct user access to many services without intermediation by specialists, and free specialists from many time-consuming clerical tasks. Consolidation and collocation would compound the cost savings, shorten many lines of communication, and facilitate development of more useful, comprehensive, and error-free central data resources. In January 1978, a master plan was approved to automate the 43 busiest stations quickly, and later to consolidate the 290 stations (including the 43 automated) in the contiguous 48 states into 20 hub facilities collocated with 20 Air Route Traffic Control Centers. An alternate plan to extend automation from 43 to a maximum of 150 stations was developed, should consolidation and collocation not prove acceptable.

The originally approved 1978 plan spelled out a phased implementation plan for automating the 43 stations. First a Model 1 System of limited capability would be fielded, providing 565 briefing positions and 16 data processing systems. The system would allow specialists to enter flight plans and to retrieve and display weather and aeronautical data on a CRT screen for pilots. Next, a Model 2 System would replace Model 1 and automate all the specialist functions, providing the capacity to handle the workload of 290 flight service stations. The system configuration was conditional on a future decision to consolidate and collocate. The system would incorporate an AWP to edit incoming data, plus provide the capability to display weather graphics on the viewing screen. Finally, a Model 3 System would provide a pilot self-briefing capability and add other enhancements to Models 1 and 2, the nature of the enhancements depending on the nature of the self-briefing access device.

The Government Accounting Office (GAO) immediately presented a contrary view on the FAA's plan. Although agreeing on the need for automation and the concept of pilot self-briefing, the GAO told the secretary of transportation that the FAA needed to give more consideration to other station improvement programs, to take more advantage of competition in the early development phase of acquisition, and to design ways to ensure maximum use of the automated system. The GAO made the following suggestions: 1) the DOT should require the FAA to delete Model 1, because improvements already under way made it superfluous; 2) more software development should be included in the design verification phase, both to take advantage of competition in a high-risk area and to comply with Office of Management and Budget Circular A-109 acquisition rules; and 3) without compromising flight safety, a mechanism should be developed to control the insatiable demand of pilots for preflight services provided by specialists, discourage excessive recourse to specialists, and assure effective implementation of the pilot self-briefing concept.

The FAA rounded up the usual arguments to defend its evolutionary approach to acquisition: deploying a limited system quickly; gradually developing user acceptance; and systematically expanding, building on successes, isolating technical risks, and minimizing waste. While agreeing that pilot acceptance was the key to success for the self-briefing concept, the FAA strongly defended its preference for encouraging compliance with education and useful products, as opposed to forcing compliance with negative persuasive mechanisms.

The FAA had a number of pre-automation activities under way in the early 1970s aimed at facilitating the FSS specialist's tasks and introducing alternate means for pilots to obtain information and file flight plans. These were the improvements which the GAO felt precluded the Model 1 AFSS system. They included high-speed printers to hasten weather data acquisition, dedicated request/reply circuits to replace crowded party lines, closed-circuit television to display weather data, the Pilot Automatic Telephone Weather Answering Service (PATWAS) to provide recorded weather and aeronautical information synopses, Transcribed Weather Broadcast (TWEB) to provide the same information over navigational radio voice channels, and a fast-file system to allow pilots to dictate

flight plans into a recording system and avoid bottlenecks.

Early experiments in FSS automation were conducted in 1975. The Aviation Weather and NOTAM System (AWANS), a prototype built by E-Systems and installed in the Atlanta FSS, drew favorable comments from both specialists and users. AWANS employed a computer to process and store weather and aeronautical information, accessible by FSS specialists with keyboard and CRT display consoles for relay to pilots. In 1977 another AWANS was installed in the Indianapolis FSS, which was in the process of being collocated with the Indianapolis ARTCC. Another system, the Meteorological and Aeronautical Presentation System (MAPS), was in service at the Washington ARTCC near Leesburg, Virginia. During the early 1980s, the FAA reported work on the Utterance Recognition Device (URD) in an effort to develop a machine which could listen and respond to pilots, and allow them to file flight plans directly into computer memory. Another effort, the Voice Response System (VRS), was intended to enable pilots to receive an automated, limited weather briefing via direct push-button telephone-to-computer connections. Demonstration/tests of VRS were conducted in the Washington, DC, and Columbus, Ohio, areas. Pilot Self-Briefing Terminals (PSBTs) were also being explored for the additional benefits of visual displays and printouts.

In 1980, the FAA awarded three contracts totaling US$12.8 million for the competitive design of a new automated FSS network. The FAA also announced selection of 14 locations for its future Continental United States (CONUS) network of 61 FSSs, and tentative identification of the other 47 sites. Consolidation of the 318 existing CONUS FSSs into 61 – to take place only after the automated facilities had demonstrated the capability to provide equal or better service – was projected to save US$1.5 billion by 1995, based on automating 61 FSS by FY89 at a cost of US$495 million. In October 1981, E-Systems was awarded two contracts totaling more than US$78.3 million to produce the computer systems for FSAS.

When the NAS plan was published in FY82, FSS modernization became a major structural element of the plan. FSAS was one of 11 major system projects out of 150 projects comprising the plan, and one of 13 flight service and weather system projects. In September 1982, the FAA announced a ground-breaking ceremony at the Terre Haute Regional Airport, in Indiana, for the first leased AFSS. Construction of the facility was financed by the regional airport authority, and the facility leased to the federal government for 20 years at US$1 per year, with an option to purchase.

The FAA said the facility would provide improved services for pilots in the area while taxpayers from around the country would be spared the costs of constructing a facility that will benefit primarily the local community. Benefits to the community were projected to total US$60 million or more over the 20-year lease period, based on an average annual payroll of US$1.25 million and a multiplier effect.

In October 1985, the FAA announced a contract with Input Output Computer Services of Waltham, Massachusetts, to provide an Interim Voice Response System (IVRS). In this system, central computers store weather data from the FAA Weather Message Switching Center (WMSC) in Kansas City, Missouri, and transmit the data to 16 satellite computers serving general aviation pilots in 24 cities. Pilots in the 24 cities could dial a local IVRS number, punch in a three-letter airport identifier, and receive a pre-recorded, digitized voice message supplying area weather information. Acknowledging that these messages might not constitute adequate weather briefings, the FAA recommended pilots contact their local FSS before take-off and expressed the hope that IVRS would substantially reduce the time required for FSS weather briefings. The system was described as a precursor to one planned as part of the final AFSS program.

Twelve Model 1 Systems were commissioned in 1986. However, during hearings before the House Aviation Subcommittee in May of that year, the FAA was roundly criticized by members of Congress and aviation user groups. The Aircraft Owners and Pilots Association (AOPA) said the FSS modernization program had been grossly mismanaged, running four years behind schedule, with Model 2 automation so mired in difficulties that further development was suspended in 1984.

In a survey of AOPA members, 25 percent did not receive a briefing prior to flight and 60 percent who contacted an AFSS experienced briefing delays of up to 30 minutes. According to the Professional Airways Systems Specialists (PASS), approximately seven years ago there were more than 11,000 specialists maintaining 19,000 facilities. Today there are 6,000 at 22,000 facilities.

Subcommittee Chairman Norman Mineta said the FAA is presenting reality through rose-colored glasses. “We are not getting a true picture here. You (the FAA representative) are acting as an agent of DOT and are presenting a filtered and censored view of the facts. We are continually not seeing a plan carried out. . . FAA’s and Congress’s credibility is on the line here, and I am going to continually come down hard on the FAA.”

GAO Brings It Out to the House. In March 1987, the GAO issued a broad, critical report to the Chairman of the Subcommittee on Transportation, House Committee on Appropriations. The report, titled *Aviation Acquisition: Improved Process Needs to be Followed*, itemized delays and cost increases, imputed to the FAA's failure to follow OMB A-109 acquisition principles, but passed lightly over FSAS. In May testimony to the subcommittee, GAO Associate Director Herbert R. McLure said the FSS consolidation program deserved the Subcommittee's support. Start-up problems had been solved, pilot complaints about lost flight plans were corrected, and delayed access to weather briefers was due primarily to staffing constraints at the automated stations rather than to Model 1 System deficiencies. McLure also cited an alternative developed by the MITRE Corporation for the FAA, which would expedite consolidation. The contract modification with E-Systems initiating development of the Model 1 Full Capacity system was made in July.

In FY88, the FAA proceeded with Model 1 Full Capacity systems in lieu of the Model 2 System. According to the FAA, the Model 1 Full Capacity system expands the Model 1 system to 61 AFSSs, 21 FSDPSs (originally 23 but reduced under the Capital Investment Plan) and two AWPs. The M1FC program included adding a fourth computer processor system to the Model 1 and expanding the capacity for each FSDP, allowing for full consolidation.

The US$21.4 million FY89 FAA budget request for FSS modernization included US$9.4 million to provide FSS automation, and US$12 million to consolidate/ relocate FSS. Congress appropriated a total of US$19 million for the program.

By the end of FY91, deployment had been approved for the first three FSDPSs. Model 1 hardware was removed from the three sites, as well as from 10 AFSS sites and the facilities prepared for conversion to the M1FC configuration. Deployment of the remaining FSDPSs had been placed on hold, pending resolution of the FAATC concern that M1FC could not be logistically supported beyond 1995. These concerns were resolved and FSDPS deployment continued. The capability for direct user access terminals (DUATs) to improve user access to weather information and flight-plan filing was originally to be leased or purchased from commercial vendors to meet a schedule compatible with systems installations; however, this entire concept was withdrawn in 1991.

FSAS Program and Problems. By the end of December 1993, the FAA had commissioned 13 of the 21 Model 1 Full Capacity Flight Service Data Processing Systems (FSDSPS). In addition, 59 of the 61 AFSSs were declared operational and 40 of the 61 had been commissioned with Model 1 Full Capacity equipment. According to the FSAS program manager, last-site implementation had been slated to occur in Minneapolis in February 1994, rather than in Miami in December 1993, because Hurricane Andrew destroyed the equipment that had been commissioned in Miami in 1992. However, the Capital Investment Plan's last site-implementation date was set for June 1994. In addition, the FAA consolidated and relocated staff for 207 FSSs. FAA plans remained intact to complete consolidation of 318 FSSs in 1995, as originally scheduled in the Capital Investment Plan.

Full M1FC implementation capability was scheduled to be completed by the end of 1994. However, little information has been made available on the FSS modernization program since 1993, and it is not clear how much the past software problems may have truly delayed the program. Additionally, the government budget cuts are sure to have an effect on this program.

It was reported that the FAA had a plan to address problems in supporting AFSS. Specifically, the FAA planned to purchase spare parts to maintain the AFSS equipment through 1995 and, in 1995, to replace some AFSS hardware and upgrade the FSDSPS software to maintain the system until 1998. Additionally, the FAA planned to replace hardware at the FSDPSs and the AWPs at that time.

However, rather than purchase new equipment and software in 1998, the FAA now intends to lease all equipment, software and data streams necessary for flight service operations. According to the FSAS program and business managers, the FAA decided to lease flight service operations in November 1992 because leasing would make state-of-the-art equipment more readily available for the agency than purchasing. The FAA is currently developing the strategy needed to make this change in the program. Until a strategy is developed, time frames, the impact on current FSAS projects, and costs cannot be determined. On the other hand, FAA program officials continue to believe that over time, leasing will be more cost-efficient than purchasing.

Related Activity. The following related programs are included in the Aviation System Capital Investment Plan (ASCIP): Integrated Communications Switching System (ICSS), Advanced Automation System (AAS), Direction Finder (DF) Modernization, Weather Message Switching Center Replacement (WMSCR), Traffic Management System (TMS) and Consolidated NOTAM System (CNS). These are all projects which support enhanced flight services.

In its operation, FSAS equipment is supported by several systems and services, including the Geostationary Operational Environmental Satellite (GOES), which provides satellite weather information for pilot briefings. FSAS also requires communications support from the NAS Interfacility Communications System (NICS), including Data Multiplexing, and from the National Airspace Data Interchange Network (NADIN). FSAS also interfaces with the Remote Maintenance Monitoring System (RMMS).

Funding

Operational, software upgrading and maintenance funding only.

Recent Contracts

No known recent contracts.

Timetable

Month	Year	Major Development
	FY78	Master Plan approved
	FY78	RFP issued
	FY80	Three design verification contracts awarded
	FY81	FSAS Model 1 production contract awarded to E-Systems
	FY82	FSS Modernization continued in NAS Plan as FSAS
	FY86	First Model 1 System commissioned
	FY87	Model 1 Full Capacity (M1FC) development initiated
	FY87	FSS Communication Graphics RFP
	FY87	Direct User Access Terminal System (DUATS) RFP
	FY88	Communication Graphics contract awarded
	FY88	DUAT contract award
Sep	1987	Last Model 1 System commissioned
	FY89	Communication Graphics implementation begun
	FY90	First M1FC delivery to FAA Technical Center
	1991	M1FC implementation begun
	1991	DUAT project canceled
	1992	FSAS power conditioning systems contract award
	FY92	Communication Graphics implementation completed
	1994	M1FC installation completed. 59 AFSSs operational. Determination of requirements for the FSAS Computer Replacement completed. 1995 M1FC fully operational
	1995	FSAS system operational with all 61 installations completed
	1996	FSAS power conditioning systems implementation scheduled for completion

Worldwide Distribution

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Forecast Rationale

Since the installation of the final Flight Service Station (FSS) in 1995, little, if any, information regarding the FSS program has been released. No additional funding and/or procurement contracts have been identified, although some type of maintenance and upgrade program is probably taking place. It is believed that

such a program will cost no more than US$1.0-2.0 million per year.

It is known that after 1998, the FAA will not purchase new equipment and/or software. Instead, all equipment, software and data streams necessary for flight operations will be leased. FAA projections indicate that leasing will serve a two-fold purpose: 1) it will be more cost-efficient in the long run, and 2) it will allow state-of-the-art equipment to come on-line more rapidly. The implementation date for the lease program is FY99.

Due to the lack of contract or other funding data combined with the FAA statement that all FSS stations have been procured and installed, the 10-year forecast has been omitted.

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