

National Airspace System (NAS) Plan Delays

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Statement of  
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Subcommittee on Aviation of the  
Senate Committee on Commerce, Science,  
and Transportation



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Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to appear before you today to discuss the status of the National Airspace System (NAS) plan to modernize, automate, and consolidate the existing air traffic control (ATC) system. As agreed, our statement will focus on the reasons for and the effects of delays in implementing the NAS plan's major systems.

The NAS plan is delayed because FAA assumed that much of the technology it needed would be readily available "off the shelf," but it wasn't. Since FAA didn't anticipate the need to have to develop much new technology, it didn't provide for time to develop and test new systems before buying them, and now FAA is having to do more extensive development work than they expected, in many cases, after it is already committed to a purchase.

The delays are having a variety of effects. For example, FAA expects to provide better air traffic control with fewer people because of NAS plan improvements, but the delays are making it difficult for FAA to provide the level of air traffic control needed in the meantime. Secondly, the NAS plan is supposed to save the airline industry considerable expense by reducing delays and permitting more efficient routing, but these benefits are now being pushed further and further into the future. And a third effect that is a subject of this hearing is that the aviation trust fund, which was set at a level which would have paid for the NAS plan if it had proceeded on

schedule, now has a huge unused balance. The existence of this balance has generated a variety of demands for spending programs.

#### IMPORTANCE OF THE NAS PLAN

Even before deregulation of domestic airlines in 1978, FAA knew that air traffic would continue to rise through the turn of the century, placing unprecedented demands on the ATC system. It also knew that to meet this demand safely and efficiently would require improved and expanded services, additional facilities and equipment, improved work force productivity, and the orderly replacement of aging equipment. So in December 1981, FAA published the comprehensive NAS plan.

FAA plans to spend over \$16 billion on the NAS plan by the year 2000, making the plan one of the largest civil procurements in the history of the federal government. To successfully accomplish this technologically complex overhaul of the existing system, FAA must effectively manage over 150 individual projects involving hundreds of contracts.

The Department of Transportation, which has the final acquisition authority for the plan, has designated 11 of the 150 projects as major systems because they either exceed \$150 million or are critical components of the plan.<sup>1</sup> Together, these 11 systems will cost about \$8 billion, or one-half the plan's total cost.

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<sup>1</sup>A twelfth major system acquisition--the terminal Doppler weather radar--has recently been added, but its benefits and costs have not been included in the NAS plan estimates.

## REASONS FOR NAS PLAN DELAYS

Over the past 5 years, all 11 major systems have experienced schedule delays ranging from 1 to 8 years.<sup>2</sup> (See att. I.) As the attached FAA analysis shows (see att. II), FAA underestimated the complexity of these systems, the time needed to develop software, and the interdependency among the systems. Some technologies thought to be "off the shelf" required further development and testing to meet existing ATC operational requirements. For others, FAA had not defined its operational requirements well enough to permit development of adequate system specifications. In addition, we have found a few situations where FAA decided to develop its own systems rather than using commercial alternatives that were adequate to meet well-defined operational requirements.

To expedite the benefits it estimated would come from the NAS plan, FAA used a fast-track, concurrent development and acquisition strategy that did not include adequately demonstrating the systems' performance before committing to full-scale production. GAO has often shown that this type of approach leads to increased technical, operational, and economic risks. For example, we recently testified that the high degree of concurrency between development and production of the Air Force's B-1B bomber was a major contributor to the program's

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<sup>2</sup>Aviation Acquisition: Improved Process Needs to be Followed  
(GAO/RCED-87-8, March 26, 1987).

problems, and that where concurrency cannot be avoided it must be carefully managed. We concluded that technically challenging development programs that advance the state-of-the-art argue that testing and development should be reasonably complete before production is started.

FAA has recently undertaken measures to correct deficiencies in its acquisition process. In addition to issuing its first standard operating procedures to be followed in acquiring major systems, the agency has established test and evaluation policies and procedures. FAA is also rethinking its approach to acquiring individual systems.

These improvements are too late to benefit most of the 11 major NAS plan systems, but a few of the systems, including the critical Advanced Automation System (AAS) could still benefit. The same should be true for any other systems, such as the terminal Doppler weather radar, that FAA decides are major systems subject to the new policies and procedures.

The challenges that lie ahead for FAA are such that even with substantial management efforts, further delays may be unavoidable. Hardware and software will soon begin to be delivered to the field, and the NAS plan is approaching a critical phase where the challenge will be not only to install the systems but to integrate the more than 1,000 interfaces between and among the various projects. FAA must ensure that the radars, data processors, and data links come together at the same time to accomplish the NAS plan's stated goals and objectives.

Installation and integration is complicated by the large number of principal players. While FAA retains decision making authority, it shares accountability with Martin Marietta, the NAS plan's system engineering and integration contractor (SEIC). And, although FAA proposes to consolidate implementation engineering under the SEIC, hands-on hardware installation will be provided under a separate national technical support services contract (TSSC). FAA plans for the TSSC contractor to operate under the direction of FAA's nine regional offices. The regions will also be responsible for contracting competitively for individual construction efforts. We have work underway to evaluate the adequacy of FAA's installation and integration plans and will report to the Congress on this issue later this year.

EFFECTS OF NAS PLAN DELAYS ON ATC  
SYSTEM SAFETY AND EFFICIENCY

Our work over the last 3 years has identified several effects NAS plan delays can have on ATC system safety and efficiency.

For example, it will be several more years before FAA has as many experienced controllers as it says it needs to handle air traffic that has now reached record levels and is expected to continue to grow. FAA could do more with fewer controllers if their productivity were increased, which is a main goal of the NAS plan's AAS. But the AAS has experienced schedule delays

totalling 8 years and the system's first major labor-saving features are not now expected until the late 1990s, resulting in a corresponding delay in productivity gains. In addition, delays encountered in other NAS plan projects intended to increase FAA's airway facility technician productivity together with staffing shortages are making it difficult for FAA to maintain an adequate level of equipment and facility maintenance.

NAS plan delays have also postponed almost \$38 billion in anticipated aviation user benefits. These include \$24 billion in reduced airline schedule delays and almost \$14 billion in fuel efficiencies that are expected to result from allowing users to operate with a minimum of artificial constraints along preferred routes.

The airlines and the traveling public are becoming increasingly dissatisfied with mounting schedule delays that were up 24 percent in 1986 compared to 1985, and the airlines are pressing FAA to reduce certain aircraft separation standards now. Advanced technologies in the NAS plan will permit FAA to better track aircraft, so it can reduce separation standards without compromising safety. Even though the technologies have been delayed, FAA has proposed to reduce the in-trail separation standard (the distance one aircraft follows another at the same altitude) to its pre-controller strike distance.

Our work has shown that FAA is proposing to reduce its separation standards where its shortage of experienced controllers is most acute--the en route centers which control

flights between airports. We recently testified before the Subcommittee on Government Activities and Transportation, House Committee on Government Operations, that because of air traffic controller inexperience and staffing shortages, controller capacity must be given weight along with airport capacity in determining appropriate levels of air traffic.<sup>3</sup>

IMPACT OF NAS PLAN DELAYS ON  
CONGRESSIONAL DELIBERATIONS

Our work to date has also identified how NAS plan delays are affecting key aviation issues now before the Congress. One of particular interest to this Subcommittee is the current unused balance in the NAS plan's funding source--the airport and airway trust fund.

FAA estimates that the trust fund balance will reach \$5.6 billion by the end of fiscal year 1987. We reported in May 1986 that the unused balance in the trust fund could increase to \$12.4 billion by the end of fiscal year 1990 if (1) the trust fund and aviation taxes are reauthorized without change and (2) revenues and expenditures materialize as projected.<sup>4</sup> Unless reauthorized by the Congress, the trust fund expires at the end of 1987.

The trust fund has an unused balance primarily because fiscal year appropriations for the NAS plan have lagged almost

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<sup>3</sup>Aviation Safety in Airspace Controlled By Two Major FAA Facilities in the Chicago Area (GAO/T-RCED-87-2, Feb. 27, 1987).

<sup>4</sup>Aviation Funding: Options Available for Reducing the Aviation Trust Fund Balance (GAO/RCED-86-124BR, May 21, 1986).



\$2 billion behind the amount authorized in the Airport and Airway Improvement Act of 1982 (Title V of Public Law 97-284). Moreover, because of a penalty provision in the 1982 authorization act, the shortfall between NAS plan and airport improvement program authorizations and appropriations through fiscal year 1987 will cause the share of FAA operations and maintenance appropriations financed from the trust fund to be \$3.3 billion lower than authorized.<sup>5</sup>

FAA, the Department of Transportation, and others have pointed to the appropriation shortfall as a reason for NAS plan delays. Our work, however, shows that none of the NAS plan major systems has experienced a shortage of funding to date. FAA simply has not been able to accomplish as much as originally anticipated in the 1981 NAS plan on which the fiscal year 1982 through 1987 authorizations were based.

The Congress has an interesting dilemma as it deliberates reauthorizing the trust fund this year. FAA's own analysis of its 1983 NAS plan update, which it says is the appropriate

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<sup>5</sup>Currently, the maximum allowable amount of trust funds that can be used to pay FAA's operations and maintenance costs is determined through the use of a formula specified in the 1982 Act. The formula was set up to provide an incentive to fully fund the authorized amounts for the airport and airway development programs. The closer the appropriations for these programs match the amount authorized, the greater the amount that can be used for operations and maintenance. As the difference between the amounts authorized and appropriated for airport and airway development programs increases, the application for the formula results in a lesser amount that can be used for operations and maintenance.

baseline on which to measure progress, shows that the plan's major systems have slipped from 6 months to 4 years since the 1983 update was published. Therefore, appropriations may continue to lag behind authorizations. Until such time as the baseline for authorizations reflects realistic implementation schedules, we expect the Congress will face a continued growth in the trust fund's already substantial unused balance unless changes are made to the authorizing legislation.

FAA's inability to deliver promised aviation user benefits on schedule along with the current and projected size of the trust fund balance has also resulted in pressure from aviation users for FAA to spend more. In addition, the fund balance has resulted in proposals to remove the trust fund from the unified federal budget and exempt it from the requirements of the Balanced Budget and Emergency Deficit Control Act of 1985.

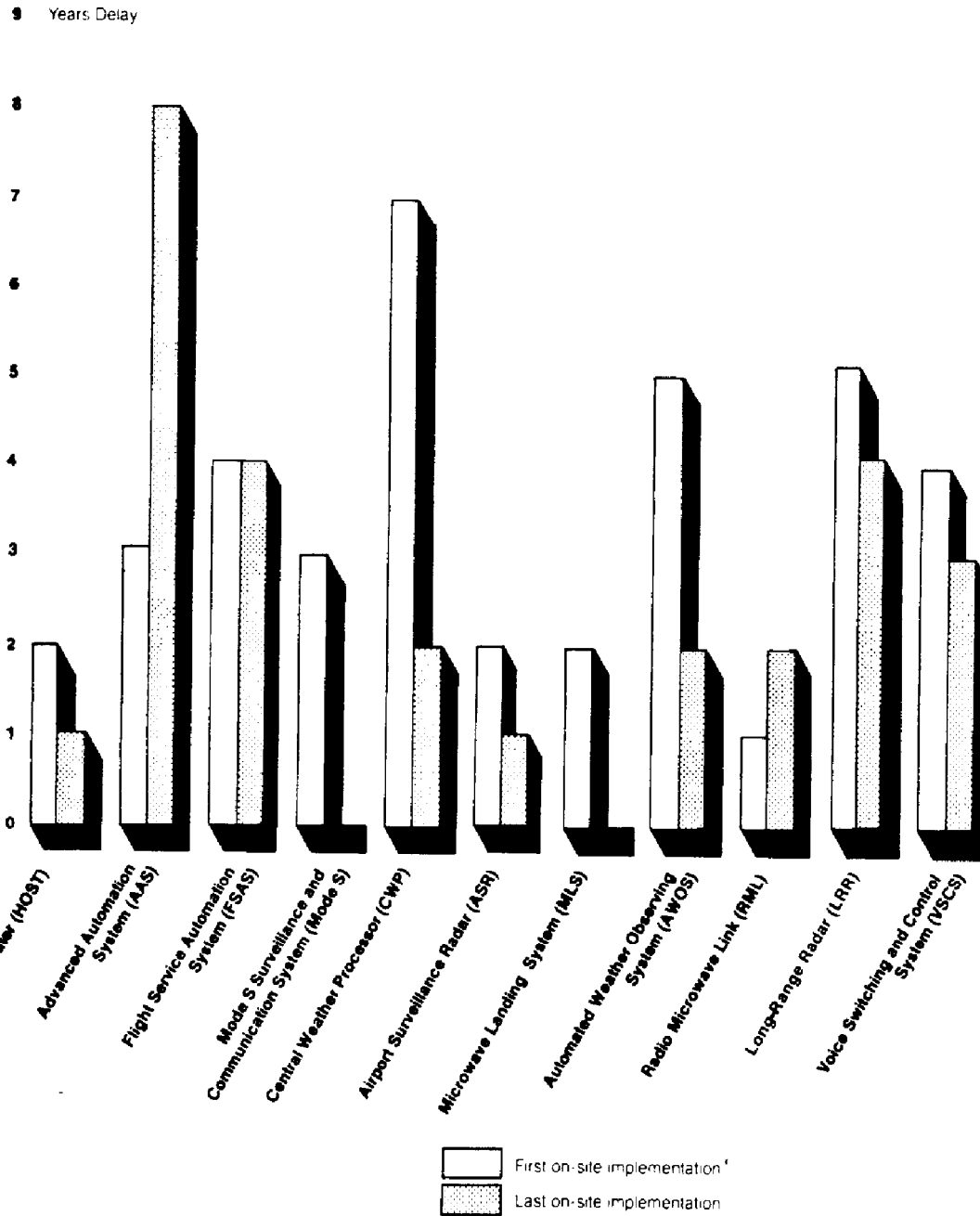
The Air Transport Association (ATA) estimates that scheduling delays, which the NAS plan is intended to reduce, are costing the airlines and their customers about \$2 billion annually. These delays are one of the reasons for ATA's proposal to set up a federal corporation to oversee FAA's operational functions. The Reason Foundation has called for a private, nonprofit, user-oriented corporation responsible for ATC facilities, personnel, and equipment. And, the Aircraft Owners and Pilots Association has also recommended that FAA be removed from the oversight of the Department of Transportation and its functions be restored as an independent agency. All of these proposals would require changes to existing law.

### WHAT SHOULD BE DONE

We have previously suggested remedies to the current situation. First, we suggested that the Congress require FAA to assure that systems work before appropriating further monies for their production. Second, we suggested that FAA should produce a revised NAS plan which includes realistic schedules of project implementation and integration that can be used as a basis for multi-year authorizations and annual appropriations and which FAA can be held accountable for achieving. Third, we suggested that FAA should more fully consider the increased demand for air traffic services on its controller work force in the absence of advanced NAS plan technologies before it reduces existing separation and spacing standards.

This concludes my testimony, Mr. Chairman. I will be happy to answer any questions you or other Subcommittee Members may have at this time.

**Figure 1.1: Number of Years of Estimated Delays in Major NAS Plan Projects**



Source: Comparison of December 1981 NAS plan and May 1986 NAS Program Master Schedule Baseline.

Status of Major NAS Plan Projects

<u>MSA Project</u>	<u>Amount of Slippage in Initial Implementation Comparison 1983 NAS Plan with Draft 1987 Plan</u>	<u>Reason for Slip</u>
HOST	6 Months	Contractor delays in software coding and documentation.
AAS	2 Years	Additional requirements added (color/AERA) and provision for pre-production testing.
VSCS	1 Year	Additional requirements (number of operational positions, redundancy) and testing to reduce risk.
FSAS	2 Years	Software development problems.
AWOS	2 Years	Contractor difficulty complying with Critical Design Review requirements and failure to perform required quality assurance procedures.
CWP	3 Years	Addition of prototype phase, redefinition of statement of work with contractor (NASA/JPL), less than optimum contractor staffing.
Long Range Radar (ARSR-4/FARR)	4 Years	Delay in consummating FAA/USAF agreement on number of systems required and funding.
MODE-S	4 Years	Prototype added, clarification of specifications, revised test plan, contractor late meeting critical design review.

Source: March 5, 1987. Statement by FAA's Acting Député Associate Administrator for NAS Programs before the Subcommittee on Aviation, House Committee on Public Works and Transportation.

Status of Major NAS Plan Projects (Cont.)

<u>MSA Project</u>	<u>Amount of Slippage in Initial Implementation Comparison 1983 NAS Plan with Draft 1987 Plan</u>	<u>Reason for Slip</u>
ASR-9	3 Years	Delay in completion of critical design review, problems in system integration testing, FAA rejection of inadequate test procedures, contractor problem obtaining critical parts.
MLS	2 Years	Delay in contractor software coding; changes of deployment location/runway; delay in receipt of valid frequency assignments.
RNL	1 Year	Implementation started in 1986.
TDWR (New project in 1986 plan)	1 Year	Revision of draft project specification; evaluation of impact of various siting options