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Fact Sheet for Congressional Requesters

April 1991

AIR TRAFFIC CONTROL

Status of FAA's Modernization Effort

GAO/RCED-91-132FS

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Resources, Community, and
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The Honorable Frank R. Lautenberg
Chairman, Subcommittee on Transportation
and Related Agencies
Committee on Appropriations
United States Senate

The Honorable William Lehman
Chairman, Subcommittee on Transportation
and Related Agencies
Committee on Appropriations
House of Representatives

This fact sheet responds to your February 21, 1991, request that we provide information on the status of the Federal Aviation Administration's (FAA) air traffic control (ATC) modernization program. FAA's modernization program, characterized from its inception in 1981 until December 1990 as the National Airspace System (NAS) Plan, is now known as the Capital Investment Plan (CIP). Both plans include various improvements, such as upgrading computers, increasing automation, and consolidating facilities. However, the CIP responds to a GAO recommendation that FAA provide a more comprehensive modernization plan that identifies all needed projects.[1] As agreed with both of your offices, this fact sheet provides information on the status of both the overall modernization effort and selected individual major systems.

In summary, we found that:

-- FAA now estimates that modernization will require about $31 billion in Facilities and Equipment (F&E) appropriations through the year 2000--a $4 billion

[1]Air Traffic Control: Continued Improvements Needed in FAA's Management of the NAS Plan (GAO/RCED-89-7, Nov. 10, 1988).

increase over FAA's estimate in our April 1990 report.[2] The Congress has appropriated about $11 billion of the $31 billion through fiscal year 1991. FAA is requesting that another $2.7 billion be appropriated for modernization in fiscal year 1992.

-- FAA has completed 30 modernization projects and has 203 active and planned projects in its CIP. However, the completed projects account for only 2 percent of the $31 billion, and the most complex and expensive projects are still unfinished. During 1990 FAA completed only one project, which it characterizes as its least sophisticated terminal automation project.

-- Major systems have experienced continued cost increases and schedule delays since we reported in April 1990. The 12 systems we reviewed in detail account for 33 percent of the modernization cost through the year 2000, 43 percent of the F&E funds appropriated through fiscal year 1991, and 39 percent of FAA's fiscal year 1992 F&E request. Eight of these systems have experienced cost increases in the last year ranging from $0.2 million to $504 million. Eight have experienced schedule slips ranging from 8 to 32 months. This includes such important projects as the Airport Surface Detection Equipment (ASDE-3) Radar, which could help prevent serious runway collisions. (The 12 systems are listed in table 2.1, p. 14.)

We focus on the changes that have occurred during 1990, but also provide information on changes in status since FAA's 1983 Plan.[3] Section 1 discusses the overall modernization effort and highlights the increased cost of modernization. Section 2 provides detailed cost and schedule changes since last year for 12 major systems. These systems include 11 we reported on last year plus the ASDE-3 radar, which has received considerable congressional attention because of runway collisions that recently occurred at the Los Angeles, Detroit, and Atlanta airports.

We obtained the information in this report by analyzing data from various sources. Information on the overall cost

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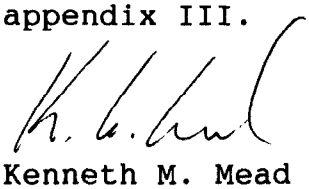
[2]Air Traffic Control: Status of FAA's Effort to Modernize the System (GAO/RCED-90-146FS, Apr. 17, 1990).

[3]We have generally used the 1983 NAS Plan as our baseline in prior reports.

of ATC modernization, as well as appropriations and obligations, was obtained from documents provided by FAA officials. Cost information on individual systems was obtained from FAA's Systems Engineering and Integration Contractor (SEIC) reports and FAA program officials. Schedule information on individual systems was prepared for the FAA by its SEIC and obtained from interviews with FAA program managers. FAA's SEIC provided the number of projects, of those it was under contract to monitor, that were completed during 1990. Other status information, characterized in section 2 as progress and problems, was obtained from interviews with FAA program officials; SEIC officials; and, in some cases, contractor officials. Our work was performed between November 1990 and March 1991. We discussed the facts in this report with FAA and SEIC officials, who generally agreed with the facts as presented. We incorporated their sugggested changes, as appropriate.

This report supplements our statement on FAA's fiscal year 1992 appropriations request to be separately delivered in testimony before both Subcommittees this spring. It updates a similar fact sheet that we provided in the spring of 1990. Unless you publicly announce its contents earlier, we plan no further distribution of this fact sheet until 30 days from the date of this letter. At that time, we will provide copies of this fact sheet to the Secretary of Transportation; the Administrator of FAA; and other interested parties. If you have questions about this fact sheet, please contact me at (202) 275-1000.

Major contributors to this fact sheet are listed in appendix III.



Kenneth M. Mead
Director, Transportation Issues

CONTENTS

ABBREVIATIONS

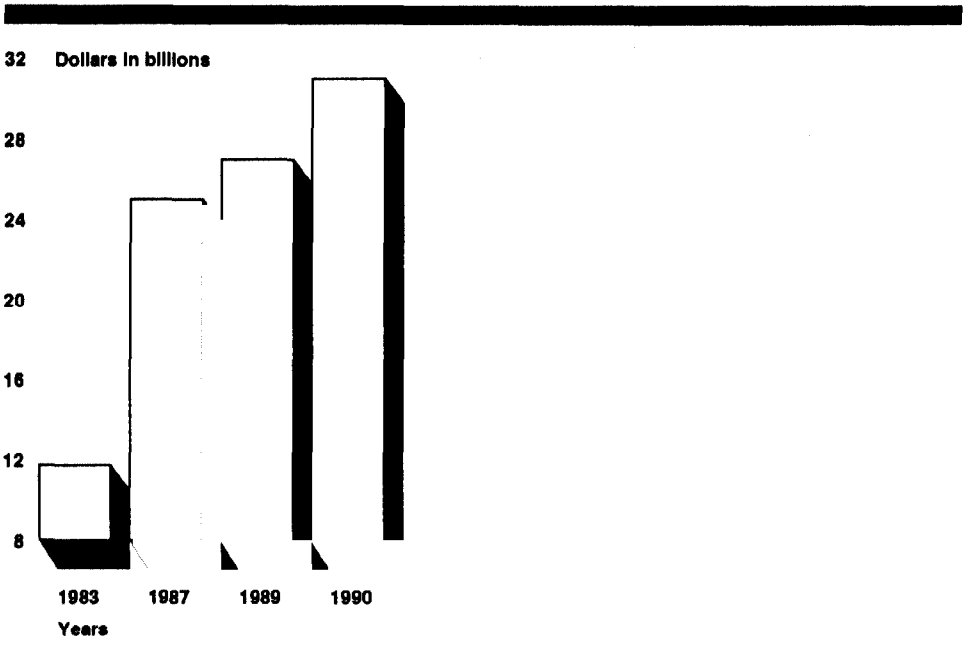
AAS	Advanced Automation System
ARSR-4	Air Route Surveillance Radar-4
ASDE-3	Airport Surface Detection Equipment-3 Radar
ASOS	Automated Surface Observing System
ASR-9	Airport Surveillance Radar-9
ATC	Air Traffic Control
AWOS	Automated Weather Observing System
CIP	Capital Investment Plan
CWP	Central Weather Processor
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FSAS	Flight Service Automation System
MLS	Microwave Landing System
MWP	Meteorologist Weather Processor
NAS	National Airspace System
NWS	National Weather Service
OMB	Office of Management and Budget
RCL	Radio Communications Link
RWP	Real Time Weather Processor
SEIC	Systems Engineering and Integration Contractor
TDWR	Terminal Doppler Weather Radar
VSCS	Voice Switching and Control System

SECTION 1

INFORMATION ON THE OVERALL STATUS OF MODERNIZATION

The Federal Aviation Administration (FAA) is still experiencing increases in the overall cost of the modernization effort and delays in its modernization projects. The estimated total Facilities and Equipment (F&E) funding needed for the modernization effort had more than doubled since 1981 to reach $27 billion last year. FAA currently estimates that the total F&E funding needed for fiscal years 1982 through 2000 is approximately $31 billion, or $4 billion more than we reported last year. Of the total $31 billion FAA says it will need, the Congress has already appropriated about $11 billion. Figure 1.1 shows the estimated cost growth since 1983.

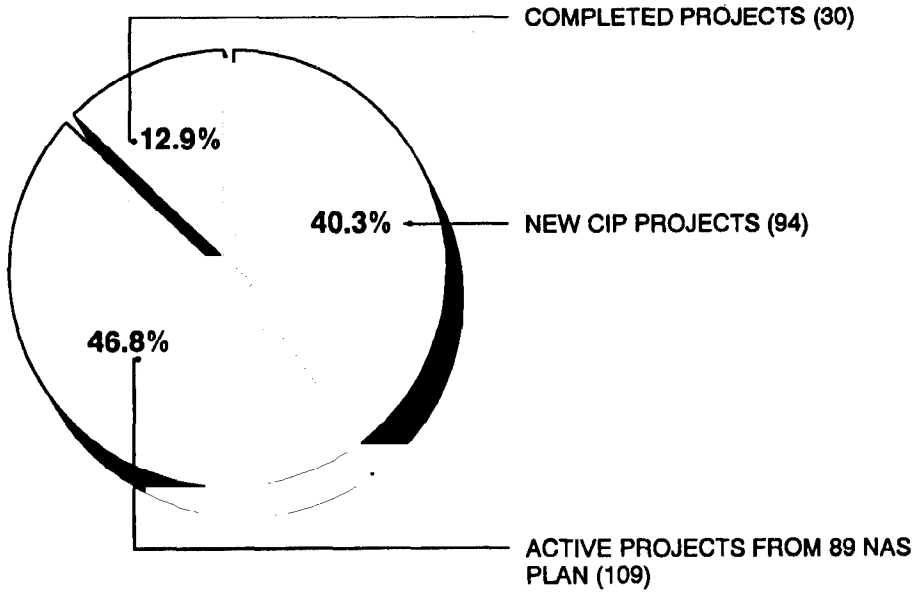
Figure 1.1: Changes in FAA's Estimates of the Total Cost of the Modernization Effort



The increases in funding estimates are primarily due to the addition of modernization projects since 1983, and most recently by the introduction of the Capital Investment Plan (CIP) in 1990. FAA's total modernization effort now involves 233 projects. As figure 1.2 shows, these include 30 completed projects, 109 active projects from FAA's 1989 National Airspace System (NAS) Plan, and 94 new projects identified for the first time in the CIP. FAA estimates that the 94 projects included in the CIP that were not

included in the last NAS Plan will need total funding of $6.5 billion through the year 2000.[1] These projects are primarily due to delays in the NAS Plan. Appendix I lists these 94 projects.

Figure 1.2: The Number of Modernization Projects



Completed modernization projects account for only 2 percent of the total $31 billion needed. The most complex and expensive projects are still active, including the Advanced Automation System, which is estimated to cost $4.4 billion, and the Voice Switching and Control System, which is estimated to cost $1.4 billion.

We had previously recommended[2] that FAA devise a comprehensive plan, including all modernization projects, and the CIP

[1]FAA's estimate of the total cost of modernization through the year 2000 increased $4 billion over the last year, from $27 billion to $31 billion. However, the estimated total cost of the 94 projects included in the CIP that were not included in the 1989 NAS Plan is $6.5 billion. This discrepancy is due to the fact that FAA included some new projects in last year's funding estimates that it had not included in the NAS Plan.

[2]Air Traffic Control: Continued Improvements Needed in FAA's Management of the NAS Plan (GAO/RCED-89-7, Nov. 10, 1988).

accomplishes this. However, the CIP does not include the projects' benefits and costs although the data are available, nor does it prioritize the projects as we recommended. Furthermore, the total number of modernization projects and the total cost of modernization through the year 2000 will likely increase beyond this year's estimates. This is because the CIP reflects FAA's view that modernization is a continual process that does not result in a final end-state system. FAA expects to continually add new modernization projects as needs arise, while subtracting projects it completes.

The CIP organizes projects into five chapters with the active, original modernization projects in chapter 2 and the newer projects, including the 94 added during the last year, in four other chapters. The newer projects are grouped in chapters according to the reason they were added. These reasons--and chapter titles--are Growth, Infrastructure Replenishment, Supportability, and New Capabilities:

-- Growth projects are to expand existing capabilities in response to changing demand. An example is the $500 million procurement of additional Airport Surveillance Radars for newly qualifying airports. This chapter includes 32 projects at an estimated total cost of $3.5 billion through the year 2000.

-- Infrastructure Replenishment projects are supposed to refurbish structures, replace obsolete equipment, or relocate facilities. The goal is the continued operation of the existing air traffic control system. One such project is the $445 million Interim Support Plan which FAA had to undertake because of delays in modernization projects. This chapter includes 59 projects with an estimated total cost of $5.8 billion through the year 2000.

-- Supportability projects are to provide the facilities and equipment needed to support logistics, provide spares, train personnel, and manage FAA's human resources. Aircraft Fleet Modernization, which involves acquiring modern replacement aircraft for FAA at an estimated total cost of $487 million, is such a project. This chapter includes 29 projects with an estimated total cost of $2.3 billion through the year 2000.

-- New Capabilities projects are intended to enhance current and planned investments and take advantage of new technologies. An example is the $32 million Air Traffic Control Applications of Automatic Dependent Surveillance, which implements satellite-based surveillance and communications for aircraft flying over oceans. This chapter includes 24 projects with an estimated total cost of $1.8 billion through the year 2000.

In addition to cost increases, FAA's modernization projects are still experiencing delays.[3] Data have been compiled by FAA's Systems Engineering and Integration Contractor (SEIC) on 89 of these projects.[4] Of these 89 projects, 42 now show less progress than had been scheduled when the NAS Plan was issued in September 1989. The average amount of schedule slippage in these projects since the last NAS Plan is 267 days.

Overall Progress Since Last Year

One measure of FAA's progress in modernization since last year is the number of projects completed. FAA completed one project in 1990. This was the TPX 42 beacon decoder replacement, a $40 million project that FAA characterizes as the least sophisticated of the terminal automation systems. FAA did not complete five other projects that it had scheduled to have completed by the end of 1990. Only one of these five projects is a major acquisition. Because their estimated funding needs totaled only $167.9 million, these five projects would not have contributed greatly to the dollar percentage of completed projects. Progress on 12 major system acquisitions is discussed in more detail in section 2.

ATC modernization progress can also be measured in terms of the amount of F&E funding that the Congress has appropriated and FAA has obligated. Obligations involve awarding contracts, placing orders, and receiving services during a given period that will require payments during the same or a future period. Figure 1.3 shows that FAA has experienced an upward trend in unobligated F&E balances.

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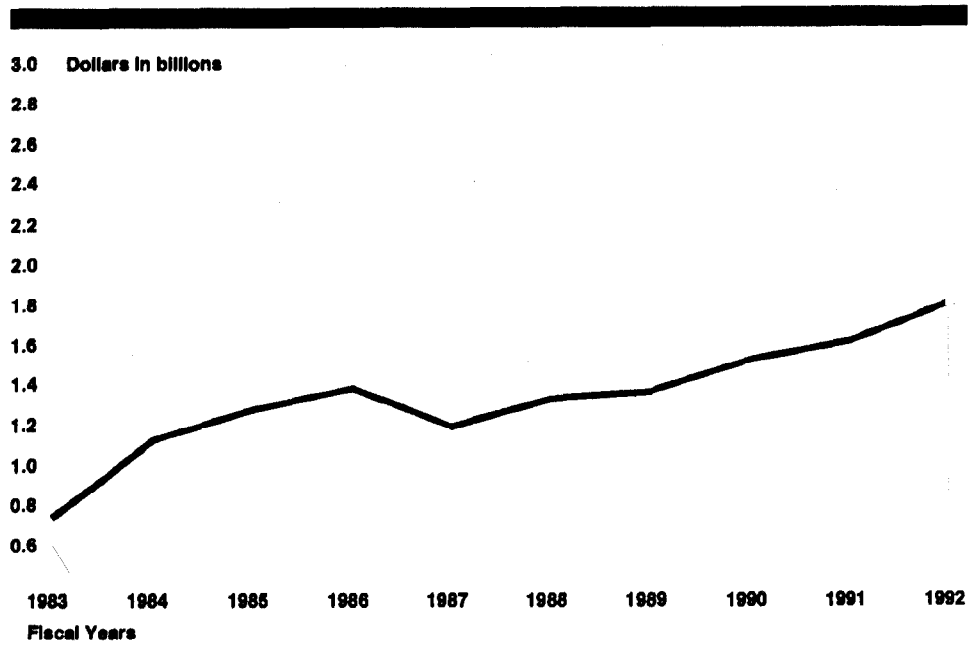
[3]Air Traffic Control: Continued Improvements Needed in FAA's Management of the NAS Plan (GAO/RCED-89-7, Nov. 10, 1988). This report gives an overview of delays in NAS Plan projects since 1983. Delays were reported to average 1.4 years for first-site implementation and 3.2 years for last-site implementation.

[4]Until FAA modified its contract with the SEIC in August 1990, the SEIC was responsible only for tracking the original NAS Plan projects and not any of the projects added since then.

Figure 1.3: FAA Unobligated F&E Appropriations for Fiscal Years 1983 Through 1992



Note: Data for fiscal years 1991 and 1992 are estimated.

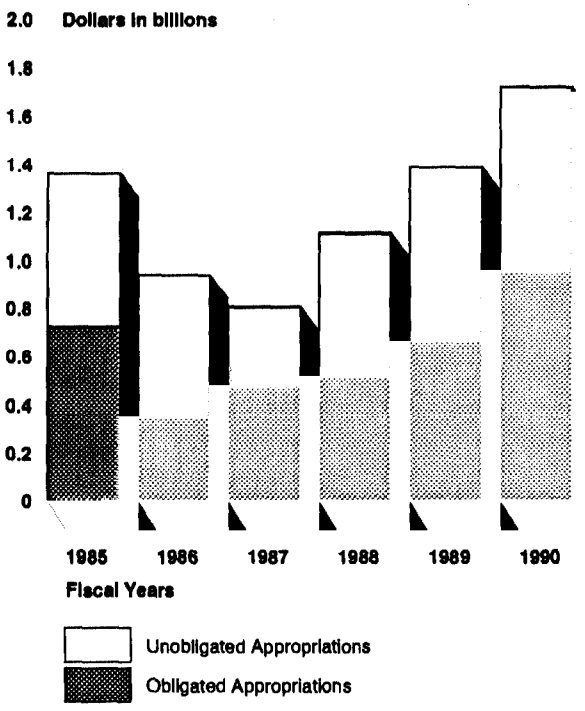
These unobligated balances have occurred for two reasons. First, they result from multiple-year budget authority in which appropriations are available for more than one fiscal year. FAA's F&E funds are available for up to 5 years. Second, unobligated balances result from funds being obligated later than planned.

The Congress considers the growth in FAA's unobligated balances to signal problems. Although it provided no specific criteria on an appropriate obligation level, the Senate Committee on Appropriations reported that FAA's growing level of unobligated F&E funds indicated "weaknesses in financial and program management." The Committee also reported that one cause of unobligated balances is delays in planned acquisition schedules. In response to this concern, FAA is attempting to stop the growth in unobligated F&E funds by increasing first-year obligation rates.

FAA did not achieve its original fiscal year 1990 obligation goal, although it did increase its obligation rate over previous years. FAA originally set a goal of obligating 78 percent of its fiscal year 1990 budget in the first year of the appropriation, which is much higher than it achieved in any of the previous 5 years. First-year obligations had ranged from 37.1 to 59.6 percent for fiscal years 1985 through 1989. FAA later revised its fiscal year 1990 goal to obligating 65 percent of its appropriation.

However, FAA actually obligated about 56 percent of its appropriation, or about $1 billion, in fiscal year 1990 (see fig. 1.4). FAA now plans to increase its first-year obligation rate in fiscal year 1991 to 61 percent.

Figure 1.4: First-Year Obligations to Appropriations



SECTION 2

INFORMATION ON THE STATUS OF 12 MAJOR SYSTEMS

This section summarizes information on changes in 12 of FAA's major systems--11 of which we included in our April 1990 status report.[1] The summary information provided for the major systems includes changes in implementation dates (listed in table 2.1) and changes in the estimated project costs between last year and this year (listed in table 2.2). Other information provided for each system includes a description of the system, the program funding history, and a discussion of the progress of and problems with the system since our 1990 report.

As noted in table 2.1, 11 of the 12 major acquisitions that we report on have experienced a major schedule slip since 1983.[2] Table 2.1 focuses on two milestones that estimate when the first and last systems will become operational in the field. The average delay from the 1983 NAS Plan to the 1990 CIP for first-site implementation is about 5 years, with slips ranging from 1 to 12 years. The average delay in last-site implementation for the same period is about 4 years with slips ranging from 1 to 7 years. Most of these projects have also experienced delays in the short term. Between January 1990 and March 1991, 8 of the 12 projects have had at least one project milestone slip. These slips have ranged from 8 to 32 months.

As noted in table 2.2, 7 of the 12 major systems have experienced cost growth since the earliest year that cost data could be obtained. Two other systems experienced cost decreases because of a decrease in the number of units to be procured. Since our last report, 8 of the 12 major systems have experienced cost increases ranging from $0.2 million to $503.9 million. One project experienced a cost decrease.

Changes in Data From Our April 1990 Report

This fact sheet reports on the same 11 major acquisitions as last year's fact sheet. However, last year we also reported on the Air Route Traffic Control Center Modernization project because of its significance and high cost, although it was not a major

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[1]Air Traffic Control: Status of FAA's Effort to Modernize the System (GAO/RCED-90-146FS, Apr. 17, 1990).

[2]According to the Manager of the NAS Program Management Staff in 1988, the milestones in the 1981 NAS Plan were determined without an adequate understanding of the difficulties that the NAS effort entailed. FAA believes the milestones in the 1983 Plan are better defined and represent a more reasonable baseline from which to measure progress.

acquisition. This year we instead include the Airport Surface Detection Equipment (ASDE-3) Radar. The ASDE-3 radar has received considerable congressional attention because of its potential to prevent the kind of runway collisions that recently occurred at the Los Angeles, Detroit, and Atlanta airports. Furthermore, under FAA's expanded definition, ASDE-3 radar is a major acquisition whereas Air Route Traffic Control Center Modernization is not.

FAA recently redefined its major acquisitions as one of several acquisition reforms. FAA had previously considered a major acquisition as any procurement of $150 million or more. In February 1991 FAA issued an acquisition order that generally applies to programs of $50 million or more. This had the effect of increasing the number of major acquisitions from the 11 major acquisitions that we reported on last year to 44 this year. We focus on only a portion of these major acquisitions in order to present information comparable to the information in last year's fact sheet. FAA's 44 major acquisitions are listed in appendix II.

This year, due to another reform, we also report on the status of projects in accordance with the Office of Management and Budget's (OMB) Circular A-109. OMB Circular A-109 is the policy that all executive agencies are to follow in managing their acquisitions of major systems. FAA has resolved to more closely adhere to this policy. In accordance with OMB Circular A-109, agency heads are to reevaluate major projects at four critical points in the acquisition process in terms of cost, schedule, and performance and decide whether the projects are ready to move to the next phase of the acquisition process. The four key decision points separate five acquisition phases: (1) determination of mission needs, (2) identification and exploration of alternative design concepts, (3) demonstration of alternative design concepts, (4) full-scale development and limited production, and (5) full production. To determine the status of projects in accordance with OMB Circular A-109, we interviewed program managers.

Another change that alters this fact sheet from last year's is the redefinition of the project baseline milestones we used to describe progress. Before the change, the baseline milestones we used included some amount of reserve. According to an SEIC official, the amount of reserve varied significantly from one project to another, so that there was no standardization of project schedules. Now the baseline milestones have been defined as the contract dates, or proposed contract dates. The change gives visibility to contract schedules and standardizes schedules across program areas. However, because of the change, the baseline milestones are not comparable to those we reported on in April 1990. To determine the actual status of each project's schedule, on a comparable basis, we reviewed program documents and interviewed program officials.

Table 2.1: Implementation Milestones for Major System Acquisitions

System	Year of first-site implementation		Year of last-site implementation	
	83 NAS	90 CIP	83 NAS	90 CIP
Advanced Automation System (AAS)	1990	1992	1994	2001
Air Route Surveillance Radar (ARSR-4)	1985	1993	1995	1996
Airport Surface Detection Equipment (ASDE-3) Radar	1987	1991	1990	1994
Airport Surveillance Radar (ASR-9)	1985	1989	1992	1992
Automated Weather Observing System (AWOS)	1986	1989	1990	1994
Central Weather Processor (CWP)	1990	1991	1991	1996
Flight Service Automation System (FSAS)	1984	1991	1989	1994
Microwave Landing System (MLS)	1985	1997	1999	2004
Mode S	1986	1992	1993	1996
Radio Communications Link (RCL)	1985	1986	1989	1993
Terminal Doppler Weather Radar (TDWR)	[a]	1993	[a]	1996
Voice Switching and Control System (VSCS)	1989	1994	1992	1996

Note: These implementation dates may differ from the March 1991 baseline dates used in the project descriptions that follow.

[a]TDWR was not in the 1983 NAS Plan.

Source: Implementation dates for 1983 are from the 1983 FAA NAS Plan. Implementation dates for 1990 are from the 1990 FAA CIP.

Table 2.2: Cost Change in Major System Acquisitions

Dollars in millions

System	Total F&E cost estimate as of (Year noted)	April 90	April 91	Percent increase (decrease) 90-91
Advanced Automation System (AAS)	$2,620 (1983)	$4,430.9	$4,453.7	0.51
Air Route Surveillance Radar (ARSR-4)	600 (1984)	349.4	383.7	9.82
Airport Surface Detection Equipment (ASDE-3) Radar	107 (1986)	130.5	130.5	0.00
Airport Surveillance Radar (ASR-9)	154[a] (1979)	700.8	701.8	0.14
Automated Weather Observing System (AWOS)	146 (1985)	189.5	189.5	0.00
Central Weather Processor (CWP)	152 (1985)	134.9	136.5	1.19
Flight Service Automation System (FSAS)	334 (1981)	365.6	539.8	[b]
Microwave Landing System (MLS)	1,237[a] (1981)	1,112.8	1,112.8	0.00
Mode S	486 (1983)	495.3	424.8	(14.23)
Radio Communication Links (RCL)	264 (1984)	281.3	284.3	1.07
Terminal Doppler Weather Radar (TDWR)	562 (1987)	348.6	348.8	0.06
Voice Switching and Control System (VSCS)	258 (1982)	892.4	1,396.3	56.47

[a]ASR-9 1979 estimate is in constant 1978 dollars and MLS 1981 estimate is in constant 1981 dollars.

[b]FAA changed the way it accounts for FSAS during the last year. See footnote to table 2.9, p. 28, for a more detailed explanation.

ADVANCED AUTOMATION SYSTEM

Vendor: International Business Machines (IBM), Rockville, MD

Program Description

The Advanced Automation System (AAS), the centerpiece of FAA's plans to modernize the air traffic control system, is intended to replace aging air traffic control computer systems with new hardware, software, and controller workstations. FAA believes that implementing the AAS will increase controller productivity, reduce operating costs, save fuel and passenger time, and allow controllers to handle anticipated traffic increases more safely and efficiently.

FAA will implement the AAS program in five separate phases. The first phase is the installation of the Peripheral Adapter Module Replacement Item, which will permit more radars to be connected. The Initial Sector Suite System, which constitutes the largest portion of AAS, will replace controller workstations at en route air traffic control facilities and automate some processes that are now done manually. The Terminal Advanced Automation System, by providing additional hardware and software to support terminal capabilities, is to consolidate smaller terminal facilities into en route centers. The Area Control Computer Complexes will provide software to perform en route functions in area control facilities. Finally, Tower Control Computer Complexes will revamp hardware and software at selected airport traffic control towers.

Table 2.3: Two-Year Funding History for the Advanced Automation System

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$4,430.9	$4,453.7
Cumulative F&E funds appropriated through	939.2	1,449.2
Cumulative F&E funds obligated through	907.7	-

AAS Progress and Problems

FAA is now in the third year of its contract with IBM to design and produce the AAS. A recent contract modification incorporated a 19-month delay for most of the major deliverables under AAS and added $207 million for new requirements to the contract cost. However, the total estimated F&E costs for AAS increased by a much lesser amount during 1990 because FAA had

anticipated the need for the modification and included a portion of the cost in earlier total estimates.

The 19-month delay occurred primarily because FAA and IBM underestimated how long it would take to develop and test software. In addition, not all requirements issues were resolved when the IBM contract was awarded. For example, FAA placed some new requirements on IBM that added yet more time to the schedule.[3] FAA identified a requirement for sector-by-sector transition that would allow the Initial Sector Suite System to be deployed at a center one sector at a time. The initial requirement called for a total one-time change from the old control room to the new control room.

Most of IBM's efforts to date have been directed toward developing the Peripheral Adapter Module Replacement Item and the Initial Sector Suite System; relatively little contract effort has been expended on developing the remaining phases. IBM recently delivered the Peripheral Adapter Module Replacement Item to the FAA Technical Center for testing. IBM is continuing to develop the Initial Sector Suite System; therefore, complete testing of this component will not occur until 1994.

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[3]Air Traffic Control: Continuing Delays Anticipated for the Advanced Automation System (GAO/IMTEC-90-63, July 18, 1990).

AIR ROUTE SURVEILLANCE RADAR

Vendor: Westinghouse Electric Co., Baltimore, MD

Program Description

The Air Route Surveillance Radar (ARSR-4) is a long-range search radar. FAA is purchasing 39 ARSR-4s in a program jointly funded with the Department of Defense. These radars provide air traffic controllers with their primary source of data for monitoring en route aircraft. In addition to their air traffic mission, the ARSR-4s are also designed to meet air defense and drug interdiction missions.

Table 2.4: Two-Year Funding History for Air Route Surveillance Radar

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$349.4	$383.7
Cumulative F&E funds appropriated through	131.6	176.6
Cumulative F&E funds obligated through	120.9	-

ARSR-4 Progress and Problems

Total program costs for the ARSR-4 have increased by $34.3 million. This is the net result of an increase and a decrease in program costs. First, the total cost has increased by $47.6 million since the inception of the project because 8 of the 39 operational sites were relocated. FAA approved a change in these sites to improve radar coverage, in compliance with air traffic requirements. The need to relocate some radars has been known for some time but never formally approved until this past year. Because the eight sites are all new, the regions will have to perform extensive site preparation. FAA is requesting $4.3 million in FY 1992 to relocate these eight sites; the remainder will be requested in subsequent fiscal years. Second, the program's cost was reduced by $13.3 million because some ARSR-4 funds were reprogrammed to other F&E projects. Although this reprogramming was accomplished in 1989, the ARSR-4 program estimate was not formally reduced until this year.

The ARSR-4 program has not experienced any schedule changes during the past year. FAA awarded a contract for full production on July 22, 1988, in accordance with its schedule, and the contractor is now testing the system. According to an ARSR-4 program official, it is too early to judge the test results because

only 1 or 2 percent of testing is complete. FAA expects the first radar to be delivered to the test and evaluation site (also the first operational site) in November of this year and plans to have that radar commissioned in January 1993.

Because of legal and environmental concerns, FAA has transferred the test and evaluation site from Mill Valley, California, to Rainbow Ridge, California. Although the ARSR-4 program manager is somewhat concerned about the field office's ability to prepare the new site in time, regional office staff responsible for implementing ARSR-4 are confident that site preparation will be complete in time for delivery of the radar later this year.

According to the program manager, ARSR-4 has been in full production since 1988. He stated that the contract included full-scale development work. Additionally, the contractor has just begun testing the ARSR-4.

AIRPORT SURFACE DETECTION EQUIPMENT-3 RADAR

Vendor: Norden Systems, Inc., Long Island, NY

Project Description

Airport Surface Detection Equipment (ASDE-3) is an airport surface radar designed to provide surveillance of aircraft and surface vehicles at high activity airports under all weather conditions. This capability is especially important during periods of low visibility such as rain, fog, and night operations. ASDE-3 offers controllers the flexibility to scan the entire airport facility and focus on particular areas. This system was developed to replace aging and less reliable ASDE-1 and ASDE-2 equipment with state-of-the-art technology. FAA plans to furnish 29 airports with ASDE-3 systems; these include replacing 13 existing ground systems and establishing 16 new operational systems. FAA has decided to procure an additional seven systems for newly qualifying airports, which are not included in the cost estimates below.

Table 2.5: Two-Year Funding History for Airport Surface Detection Equipment-3 Radar

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$130.5	$130.5
Cumulative F&E funds appropriated through	124.5	130.5
Cumulative F&E funds obligated through	112.9	-

ASDE-3 Progress and Problems

FAA awarded a fixed-price contract for development and full production to Norden Systems in 1985. The program has experienced schedule slips in the last year. Since last year, FAA's plans to implement the first ASDE-3 radar have slipped 20 months--from July 1990 to March 1992. Likewise, the last-site implementation date was May 1993 but is now November 1993. These schedule slips were caused by two major problems revealed by operational testing conducted at the Pittsburgh airport.

The first major problem revealed by the operational testing is delamination of the antenna. The reflectors, which capture the returning radar energy, are composed of layers of fiberglass and honeycombed aluminum. Due to stress and other forces, the reflectors are blistering and deteriorating at a rapid rate. FAA and Norden have worked together to develop an approach to solve this problem, and FAA has modified the contract. According to the

FAA program manager, there will be no additional contract costs to the federal government.

The second major problem involves display of the radar data. Unlike previous ground radars, ASDE-3 offers the controller the capability to view the entire airport as well as focus on specific areas. However, operational tests have shown that when an area is focused on, a large aircraft splits into multiple targets. Currently, Norden and FAA have yet to devise a solution to the target problems. To explore potential solutions, FAA has formed a task force to review test data and recommend corrective actions.

The FAA program manager told us that, despite the fact that operational testing has not been completed and some problems have been encountered, ASDE-3 is moving toward the final key decision point--full production.

AIRPORT SURVEILLANCE RADAR

Vendor: Westinghouse Electric Co., Linthicum, MD

Program Description

The new Airport Surveillance Radar (ASR-9) is a short-range, highly accurate system for monitoring aircraft movement and position within a radius of 60 miles from the airport terminal. Air traffic controllers use the ASR-9 position data to keep aircraft safely separated and control their movements into and out of the airport. Additionally, the ASR-9 is capable of better precipitation detection than previous-generation radars. FAA is purchasing 105 ASR-9s for operational sites. The program costs listed below in table 2.6 include funds needed to relocate the existing ASR-7 and ASR-8 radars in order to replace older vacuum tube radars (ASR-4, -5, and -6).

Table 2.6: Two-Year Funding History for Airport Surveillance Radar

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$700.8	$701.8
Cumulative F&E funds appropriated through	629.1	674.1
Cumulative F&E funds obligated through	540.0	-

ASR-9 Progress and Problems

The ASR-9 passed major milestones such as contract award, system delivery to first operational site, and first-site implementation before 1990. Last-site implementation is scheduled for September 10, 1992. Since our 1990 status report, the ASR-9 has experienced no major total cost changes or changes in formal program milestones. In terms of OMB Circular A-109, the ASR-9 radar is in full production. The contractor is delivering the radars at a rate of about three per month. However, FAA has fallen behind its schedule for commissioning ASR-9s. Although 52 radars have been delivered, only 17 are operational. Six of the 20 radars delivered in 1989 had not been commissioned by the end of calendar year 1990. FAA had planned that 3 months would be required from delivery to operational status at each site, but it has taken an average of 8 months for those commissioned so far.

The ASR-9 radars commissioned have also not performed as reliably as expected. FAA measures reliability and maintainability in terms of a system's operational availability. For commissioned sites, the ASR-9 has been operationally available for an average

98.2 percent of the time. Thus, availability has been less than the contract specification of 99.9 percent, as well as less than that of previous-generation airport radars.

FAA headquarters and field officials have attributed these commissioning and performance problems to the radar transmitter. Outages occurred frequently while field technicians were testing the radars, depleting initial spare parts. As a result, FAA has executed a no-cost modification to the contract for redesign of the transmitter. It has also begun procuring spare parts in short supply and issued specific testing guidance to field technicians to help avoid outages. FAA program officials believe these actions will help put commissioning back on schedule and improve availability. They also noted that although availability is below contract specifications, it is improving.

AUTOMATED WEATHER OBSERVING SYSTEM

Vendors: Qualimetrics Inc., Sacramento, CA (AWOS) and AAI Corporation, Hunt Valley, MD (ASOS)

Program Description

The Automated Weather Observing System (AWOS) obtains weather data through automated sensors. It processes the data and allows dissemination to pilots by a computer-synthesized voice. The weather elements AWOS measures are wind velocity, temperature, dew point, altimeter setting, cloud height, and visibility. The equipment is commercially available off the shelf, and the contract was competitively bid. AWOS is being installed at 160 locations, primarily airports without towers or human weather observers, and an option to procure an additional 40 units was recently exercised. AWOS was procured to fill an immediate need during the development of the more sophisticated Automated Surface Observing System (ASOS).

Under the AWOS program, FAA also contributes funds to a consolidated program run by the National Weather Service (NWS) to procure ASOS for FAA, NWS, and the Department of Defense. The purposes of ASOS are to improve air safety at small, non-towered airports by installing automated systems at those places, and to eliminate or reduce the human element in the observing process at larger airports. In addition to the weather measurements that AWOS provides, ASOS identifies types of precipitation and amounts of precipitation and will have more displays for use in towered airports. ASOS will be installed at 537 FAA facilities, including non-towered and towered airports. FAA also has a potential requirement for an additional 204 systems.

Table 2.7: Two-Year Funding History for Automated Weather Observing System

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$189.5	$189.5
Cumulative F&E funds appropriated through	80.6	117.2
Cumulative F&E funds obligated through	70.3	-

AWOS Progress and Problems

The AWOS program did not experience an increase in total cost between fiscal years 1990 and 1991. However, both the AWOS and

ASOS programs funded under the AWOS umbrella experienced schedule slips in the last year.

FAA began commissioning AWOS in 1989. As of January 1991 FAA had 119 of the systems delivered and 73 commissioned. FAA now expects the last-site implementation date for the 160 systems to slip 10 months from February 1991 to December 1991. Implementation dates for the 40 optional systems have not yet been set pending resolution of maintenance problems described below.

The date of the AWOS last-site implementation slipped, in part, because of problems with maintaining the systems that have already been installed. The vendor is responsible for providing maintenance as well as producing and installing new systems. According to program managers, the systems are experiencing more outages than expected, causing the vendor to use its resources for maintenance rather than installation. Program officials also said that the slippage is the result of unforeseen installation problems at relatively few sites. They indicated that the bulk of the installations and commissionings are only about 45 days behind schedule. The last-site implementation is being slipped 10 months to accommodate three locations with particular, site-specific problems.

The ASOS contract was awarded on February 19, 1991, a schedule slip of 6 months for contract award. This will extend the first-site implementation date by about 8 months, to September 1991, and the last-site implementation date by about 32 months, to October 1996. According to NWS officials, ASOS was developed by two competing contractors, in accordance with OMB Circular A-109. NWS awarded a contract for full production to the contractor that successfully completed the development phase. The other contractor was terminated because it did not produce a system.

In terms of OMB Circular A-109, according to program officials, both the AWOS and the ASOS programs are in the final phase--full production.

CENTRAL WEATHER PROCESSOR

Vendor: Harris Corp., Melbourne, FL

Program Description

The Central Weather Processor (CWP) is designed to collect, synthesize, and disseminate weather data from various sources and produce data that are tailored to users' specific needs. This program is comprised of two components: the Meteorologist Weather Processor (MWP), and the Real Time Weather Processor (RWP). The MWP is an off-the-shelf commercial service, while the RWP will be developed to provide additional capabilities, such as mosaic data from National Weather Service radars. FAA will lease 23 MWP units and will acquire 25 RWPs. The systems will be installed at en route centers.

Table 2.8: Two-Year Funding History for Central Weather Processor

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$134.9	$136.5
Cumulative F&E funds appropriated through	61.2	68.7
Cumulative F&E funds obligated through	53.9	-

CWP Progress and Problems

The CWP has experienced both schedule delays and a minor cost increase since our 1990 status report. Both the total F&E cost estimate increase and the schedule delays are attributable to MWP.

According to program officials, the total estimated project costs for CWP have increased by $1.6 million because activities previously planned to be funded in the Research, Engineering, and Development Appropriation were moved to the F&E appropriation.

The MWP contract was awarded on September 29, 1989. The first system was delivered on October 15, 1990, 4 months behind the original schedule. FAA has not met its milestone of September 28, 1990, for first-site MWP implementation because of problems revealed during both factory and operational tests conducted this past year. The problems fall into three categories: (1) lack of system software reliability, (2) inadequate training of meteorologists and traffic management staff used to test the system, and (3) inadequate documentation for system users. FAA is developing an action plan to address these issues. The first-site implementation milestone was revised to May 1991, or 8 months

beyond the previous estimate. According to the program manager, the RWP portion of the project has not experienced any schedule changes. Contract award is scheduled for June 22, 1992.

The CWP program manager believes that the MWP does not fit into the OMB Circular A-109 acquisition model because the services were leased. FAA originally planned to have RWP enter full production when the contract is awarded in 1992. However, FAA's System Acquisition Office has required that the project have a limited production phase for two systems before committing to full production. Currently the RWP is undergoing prototype testing.

FLIGHT SERVICE AUTOMATION SYSTEM

Vendor: E-Systems Inc., Garland, TX

Program Description

The Flight Service Automation System (FSAS) project will allow pilots to receive automated weather data before takeoff and will simplify flight plan filing. It will also improve access to the FAA system that notifies pilots of very recent information concerning changes to any aspect of the national airspace system. The first phase of the project, completed in the late 1980s, installed Model I computers in flight service stations. The second phase, known as Model I Full Capacity, increases the processing capacity of those computers so that consolidation of the flight service stations can be completed. Model I Full Capacity will provide two aviation weather processors, 21 operational flight service data processing systems, and 61 automated flight service stations.

Table 2.9: Two-Year Funding History for Flight Service Automation System

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$365.6	$539.8[a]
Cumulative F&E funds appropriated through	310.9	356.6[a]
Cumulative F&E funds obligated through	288.3	-

[a]FAA changed the way it accounts for FSAS during the last year. It no longer includes pre-NAS funding for the project but does incorporate other activities under the FSAS account. Furthermore, GAO did not include the Graphic Weather Display System portion of the FSAS in last year's estimate. To make the total estimated costs more comparable while reflecting FAA's current accounting for the project, we (1) subtract the pre-NAS funding from the fiscal year 1990 total estimated costs, (2) add Graphic Weather Display System to the fiscal year 1990 estimate, and (3) add the Power Conditioning Systems for FSAS, FSAS Computer Replacement, and Automated Flight Service Station Support Space projects to the fiscal year 1991 estimate.

FSAS Progress and Problems

Although table 2.9 shows a large increase, only a portion of this is due to a requirements change. This change results in a $14.5 million increase in the FSAS. In fiscal year 1990 FAA

believed that Power Conditioning Systems would be needed for only a few of the FSASs. However, in fiscal year 1991 requirements were expanded to include Power Conditioning Systems for all the FSASs. The rest of the increase in cost for FSAS from last year to this year is due to accounting changes in the project, such as including other activities under the FSAS budget line item.

FSAS's schedule will slip as a result of problems experienced during operational testing in the last year. A program official believes the first-site implementation date will have to be extended about 14 months to July 1991. Testing at the first implementation site, Kansas City, revealed several problems. The program manager said that the basic problem is slow response time because of the system software. Slow response time was also a problem in earlier tests conducted at the FAA Technical Center, but the issue was not resolved at that time. FAA plans to conduct more stringent tests to verify the results found in the Kansas City tests. This additional testing will delay the program.

Regarding OMB Circular A-109, FSAS program managers told us that FSAS is in the full production phase. However, they acknowledged that FAA is still testing the equipment and fixing problems.

MICROWAVE LANDING SYSTEM

Vendor: Wilcox Electronics, Inc., Kansas City, KS (for use in the demonstration program)

Program Description

The Microwave Landing System (MLS) is designed to guide aircraft to safe landings in conditions of reduced visibility. The MLS' ability to guide approaching aircraft from a wider angle than permitted by the Instrument Landing System currently in use may allow aircraft to follow a variety of approach paths, including curved approaches. FAA contends that this added flexibility could help increase an airport's capacity to accept landing aircraft and help to alleviate undesirable noise effects of approaching aircraft.

Table 2.10: Two-Year Funding History for Microwave Landing System

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$1,112.8	$1,112.8
Cumulative F&E funds appropriated through	171.2	193.2
Cumulative F&E funds obligated through	139.2	-

MLS Progress and Problems

FAA plans to buy a total of 1,250 MLSs. FAA awarded a contract to Hazeltine Corporation in 1984 for the first 172 systems. The contract was terminated in 1989, 5 years after it was signed, because of a substantial delay and delivery of only two systems. As recommended by GAO, FAA developed a nine-project demonstration program to evaluate the economic and operational benefits of MLS.

According to FAA's draft interim report on the demonstration program, the benefits of MLS are being proven and are leading to a decision to proceed with the agency's original plan to replace Instrument Landing Systems with MLS nationwide. For example, simulations of curved approaches using MLS show that the number of flights into the New York area could be increased. Another demonstration project shows that a limited number of Instrument Landing Systems frequencies will be available in the future. MLS, in contrast, would not be subject to frequency limitations. FAA has not yet quantified the results of the demonstration program in a benefit-cost analysis but plans to have that analysis done before issuing its final report.

The Air Transport Association, a trade association representing major U.S. airlines, has sponsored an industry task force that is evaluating the key MLS issues and will issue a joint report with FAA later this year. According to the Executive Secretary of the task force, that report is likely to be less optimistic about the usefulness of MLS than FAA's report on the results of its demonstration program. A key issue to be resolved is when and how a satellite-based system will be ready for Category I landings. The use of satellites for some precision approaches might free up some additional frequencies for Category II and III Instrument Landing Systems.[4] Another issue to be resolved is the utility of an approach and landing technique demonstrated in flight tests the airlines recently sponsored. The tests involved flying curved approaches using the Instrument Landing System in conjunction with area navigation computers aboard aircraft, as an alternative to MLS. FAA and the airlines are undertaking follow-on tests.

Despite the fact that the number of MLSs planned has stayed constant since the original NAS Plan, the total current cost estimate of $1.1 billion does not include all 1,250 systems. The $1.1 billion will allow FAA to procure only 464 of the total MLSs planned. Funds for an additional 786 systems are included in other parts of the CIP.

In terms of OMB Circular A-109, FAA is about to enter full-scale development and limited production of Category II/III MLSs. FAA issued a request for proposals in November 1990 after receiving approval from the Office of the Secretary of Transportation. It plans to award two development contracts in fiscal year 1991 and full production contracts for MLS in 1995. During the past year, FAA also purchased two Category I MLSs from Wilcox Electric Company for use in the demonstration program. The agency plans to buy up to 26 more Category I systems; contract award is scheduled to occur in May 1991.

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[4]Precision landing systems are categorized by the distance and elevation that an aircraft can safely descend without visual reference to the runway. Category I approaches are the most restrictive. Category II and III approaches are respectively less and less restrictive.

MODE S

Vendors: UNISYS, Paoli, PA, and Westinghouse Electric Corp., Linthicum, MD

Program Description

Mode Select or Mode S is a surveillance radar system. Mode S is to address individual aircraft separately so that signal interference is reduced and a clear message channel is established between aircraft and ground installations. This will (1) provide more accurate aircraft locations and (2) allow controllers and pilots to exchange data. For example, aircraft equipped with new Mode S avionics will be able to directly obtain weather information now available only through controllers. In 1984 FAA awarded a contract to procure a total of 137 Mode S systems. FAA officials are reevaluating their plans to procure an additional 259 systems as a result of our report last year which concluded that the agency had not properly analyzed requirements, alternatives, and costs and benefits.[5]

Table 2.11: Two-Year Funding History for Mode S

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E funds	$495.3	$424.8
Cumulative F&E funds appropriated through	328.5	349.8
Cumulative F&E funds obligated through	287.3	-

Mode S Progress and Problems

In 1984 FAA awarded a contract for a joint venture between Westinghouse and UNISYS to develop, test, and produce 137 Mode S systems. However, since our 1990 status report, plans for first-site implementation have slipped from November 1991 to December 1992. Likewise, plans for last-site implementation have slipped from February 1995 to December 1995.

These slips are primarily due to software development difficulties encountered by the joint venture contractors. As a result of these problems, FAA and the contractors agreed in April 1990 to allow the delivery of less capable interim systems prior to implementing the fully capable systems. These less capable systems

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[5]Air Traffic Control: Ineffective Management Plagues $1.7 Billion Radar Program (GAO/IMTEC-90-37, May 31, 1990).

are to be delivered to operational sites beginning in March 1992 and commissioned beginning in December 1992.

Because of problems in producing a workable Mode S system in the summer of 1990, FAA assembled a team of technical specialists, independent of the Mode S program, to review the contractor's design for the interim systems. The team concluded that (1) the proposed design could meet FAA's requirements and (2) UNISYS' quality assurance program for its segment of the system needed to be improved. FAA is currently working with UNISYS to improve the quality assurance program.

The decrease in the estimated total cost of the Mode S program is due to FAA's reevaluating its plans to procure additional systems. FAA had included funding for 60 of these units in previous total funding estimates, but has now removed this funding from its total cost estimates.

According to the program office, Mode S is in the full production phase of OMB Circular A-109. However, FAA has not received an operational system at any site despite having signed the full production contract 7 years ago.

RADIO COMMUNICATIONS LINK

Vendor: American Telephone & Telegraph (AT&T) Technologies, Inc.
Greensboro, NC

Program Description

The Radio Communications Link (RCL), the largest of three projects within FAA's Radar Microwave Link Replacement and Expansion Program, is to replace and expand the existing Radio Microwave Link system and form the backbone of FAA's communications network. RCL is an integrated voice and radar data transmission system that FAA believes will provide cost-effective and reliable service while significantly reducing its need for leasing communications lines. The system will be installed at 818 total sites. It is intended to handle current data traffic as well as meet the needs of consolidated ATC facilities in the future.

Table 2.12: Two-Year Funding History for Radio Communications Link

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$281.3	$284.3
Cumulative F&E funds appropriated through	257.8	257.8
Cumulative F&E funds obligated through	232.4	-

RCL Progress and Problems

In May 1985 FAA awarded a contract to AT&T to design, test, and develop the RCL. The first-site implementation occurred in May 1986. Currently, of the 818 sites, 632 have undergone initial or final acceptance. The remaining sites are either in the installation phase or awaiting shipment of equipment. FAA anticipates that the analog backbone of the system, 180-voice channel capability, will be complete by December 1991.

FAA issued a letter to AT&T in April 1990 requesting that AT&T find alternative methods to provide the capabilities for the RCL. In November 1990 FAA and AT&T agreed on an alternative that permitted RCL production to resume. In addition, two other contractors defaulted, including (1) Transmission Structures Limited for construction of towers and (2) Tricon of America, Inc., for construction of shelters for RCL equipment.

According to the program manager, the RCL program is in the full production phase of OMB Circular A-109.

TERMINAL DOPPLER WEATHER RADAR

Vendor: Raytheon Co., Sudbury, MA

Program Description

The Terminal Doppler Weather Radar (TDWR) is designed to detect wind shear and microbursts around airports. In addition to wind shear, TDWR will also detect gust fronts, wind shifts, and precipitation. TDWR will be used to provide alerts of hazardous weather conditions in terminal areas and advanced notice of changing wind conditions to permit timely change of active runways. FAA is procuring 47 TDWRs. The TDWR contract contains options for up to 55 additional radars, but FAA has not yet chosen to exercise this option.

Table 2.13: Two-Year Funding History for Terminal Doppler Weather Radar

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$348.6	$348.8
Cumulative F&E funds appropriated through	212.9	296.6
Cumulative F&E funds obligated through	193.4	-

TDWR Progress and Problems

TDWR has not experienced any schedule or major cost changes during the past year. The production contract was awarded November 2, 1988, and FAA met its schedule for critical design review the next year. The next major milestone is delivery to the test and evaluation site on December 2, 1991. According to the TDWR program manager, the contractor is ahead of schedule and will be able to deliver on October 2. TDWR first-site implementation is scheduled for March 1993; last-site implementation is scheduled for October 1994.

An item which could affect the TDWR schedule, according to the program manager, is the unavailability of engine generators. The government is to supply engine generators to Raytheon as back-up power. However, FAA is experiencing difficulties putting together the request for proposals because it is the first time the agency has purchased natural gas generators. The first generator is scheduled for delivery in the summer of 1992. According to the program manager, first-site implementation will not be jeopardized because Raytheon can use a modified off-the-shelf generator for testing.

In terms of the OMB Circular A-109 process, TDWR is in the full production phase, according to its program manager. Although the system is being built and software is being written, it still needs to be delivered, tested, and installed.

VOICE SWITCHING AND CONTROL SYSTEM

Vendors: American Telephone & Telegraph (AT&T) Technologies, Inc., Greensboro, NC, and Harris Corp., Melbourne, FL

Program Description

The Voice Switching and Control System (VSCS) is designed to improve voice communications at air traffic control facilities, replacing the existing communication system with an expandable and reliable computer-controlled voice system for both ground-to-ground and air-to-ground communications. It is scheduled to be deployed at 24 air traffic control facilities, and each facility will have the capability of growing up to 430 positions.

VSCS is an integral part of FAA's plans for modernizing the air traffic control system because it will provide communications capabilities for the new controller workstations that are being developed for the Advanced Automation System. The improved capabilities expected from the Advanced Automation System workstations cannot be achieved without VSCS.

Table 2.14: Two-Year Funding History for Voice Switching and Control System

Dollars in millions

	FY 1990	FY 1991
Total estimated F&E costs	$892.4	$1,396.3
Total F&E funds appropriated through	235.7	310.7
Total F&E funds obligated through	132.9	-

VSCS Progress and Problems

In October 1986 FAA awarded VSCS prototype development contracts to Harris Corporation and AT&T to design, develop, and install separate prototype systems. FAA planned to award a production contract in November 1989 to the contractor providing the best prototype system. However, testing of both contractors' systems revealed that additional design and development were needed before either prototype meets FAA's requirements. FAA decided to restructure the project and extend the prototype development phase until December 1991, at which time it plans to award a production contract to the vendor with the best system. FAA's restructuring also includes

-- moving some requirements originally planned to be developed in the production phase back into the prototype development phase and

-- pursuing the development of an interim voice communication system that could replace the current aging system and be able to work with the Advanced Automation System, thereby mitigating the risk of delaying the installation of new controller workstations due to VSCS unavailability.

As a result of the delay in awarding the production contract, the first-site implementation date has now slipped from May 1992 to June 1994. The last-site implementation date has slipped from March 1994 to August 1996.

The total estimated F&E costs for VSCS increased $503.9 million this last year. The increase is due primarily to expanding the prototype development phase. The VSCS program office requested approval to enter the full production phase, but FAA's acquisition office denied it. The acquisition office determined that allowing the VSCS project to enter full production would conflict with the guidance in OMB Circular A-109 because design and testing were not complete. A VSCS program official confirmed that VSCS is currently undergoing prototype development. Prototype development is an activity associated with the "demonstration of alternative design concepts" phase specified in OMB Circular A-109.

PROJECTS INCLUDED IN THE CAPITAL INVESTMENT PLAN THAT WERE NOT INCLUDED IN THE NATIONAL AIRSPACE SYSTEM PLAN

Aeronautical Center Training and Support Facilities
Aeronautical Telecommunications Network
Aircraft Fleet Modernization
Aircraft Flight Simulators
Airmen and Aircraft Registry Modernization
Airport Movement Area Safety System
Airport Surface Traffic Automation
Airport Surveillance Radar Modification for Low-Altitude Wind Shear Detection
Airport Traffic Control Tower Safety Upgrades
Airport Traffic Control Tower System Intra-Connectivity
Air/Ground Radio Replacement
Air Traffic Control Radar Beacon System Relocation
AN/FPS-117 Beacon Improvement
Approach Lighting System Improvement Program Continuation
ARTS IIIA Peripheral Adapter Module Modernization
Automated Flight Service Station Support Space
Aviation Safety Analysis System
Aviation Weather Products Generator
Base Buildings for Airport Traffic Control Towers
Capital Investment Plan System Engineering and Program Management Support
Central Weather Processor Interfaces
Conversion of NADIN IA Message Network Users to the NADIN II Packet Switched Network
Communications Facilities Expansion
Computer Aided Engineering Graphics Enhancement
Development of an Enhanced Radar Analysis Tool
Digital Altimeter Setting Indicator Replacement
Direct User Access Terminal Service Geographic Expansion
DOD/FAA Air Traffic Control Facility Transfer/Modernization
Dynamic Ocean Track System
En Route Software Development Support
Environmental Cleanup
Establish Additional Radar Positions
Establish Alaskan NAS Interfacility Communications System Satellite Network
Establish/Expand Digital Bright Radar Indicator Tower Equipment
Establish Locator Outer Markers
Establish New Chicago Terminal Radar Approach Control Facility
FAA National Simulation Laboratory
FAA Technical Center Building and Plant Support
Flight Service Automation System Computer Replacement
Frequency Interference Support/Resolution
Global Positioning System Monitors
Hazardous In-Flight Weather Advisory Service Expansion

ILS and Visual Navaids Engineering and Sparing
Improve Capacity of Closely Spaced Parallel Runways
Independent Operational Test and Evaluation Oversight
Instrument Approach Procedures Automation
Integrated Communications Switching System Logistics Support
Integrated Terminal Weather System
Interim Backup Emergency Communications Improvement
Local Flow Management Enhancements
Logistics Support Systems and Facilities
Long Range Radar Improvements
Long Range Radar Radome Replacement
LORAN-C Monitors
LORAN Offshore Flight Following
Low-Level Wind Shear Alert System Enhancements
Maintenance Control Center Enhancement
Microwave Landing System - Production Phase II
NAS In-Plant Contract Support Services
NAS Regional/Center Logistics Support Services
National Airspace Data Interchange Network II Continuation
National Airspace Integrated Logistics Support
National Airspace Management Facility
National Airspace System Recovery Communications
National Airspace System Training
National Implementation of the "Imaging" Aid for Dependent Converging Runway Approaches
Network Management and Control Equipment
New Airport and Other Facility Planning
New Austin Airport
Oceanic Satellite Communications
On-Site Simulation-Based Training Systems
Provide FAA Housing
Provide Flight Service Automation System Power Conditioning Systems
Radar Pedestal Vibration Analysis
Radio Control Equipment Enhancements
Refurbish AN/FPS-20 Radars
Relocate Air Traffic System Command Center
Replace Mark 1A, 1B, and 1C Instrument Landing System
Replacement of Controller Chairs
Replace Regional Interim Weather Graphics with National Graphic Weather Display System
Replace Type FA9964 Direction Finder
Satellite Communication Circuits System
Sustain/Consolidate San Juan Facilities
Sustain Distance Measuring Equipment
Sustain VOR/VORTAC
Terminal ATC Automation
Terminal Intrusion Function
Terminal Software Development
Test Equipment Replacement

Transition Engineering Support
Upgrade Commercial Automated Weather Observing System
Upgrade Low-Level Wind Shear Alert System to Expanded Network Configuration
Weather Enhancements
Wilcox CAT II/III Instrument Landing System Replacement

FAA MAJOR ACQUISITIONS

Level I Major Acquisitions:[1]

Advanced Automation System
Airport Surface Traffic Automation
Airport Surveillance Radar-9
Airport Surveillance Radar-10
Air Route Surveillance Radar
Central Weather Processor
Improve Capability of Closely Spaced Converging Runways
Microwave Landing System
Mode S
Terminal ATC Automation
Terminal Doppler Weather Radar
Tower Communication System
Voice Switching and Control System

Level II Major Acquisitions:[2]

Aeronautical Data Link
Aircraft Modernization
Automated Weather Observing System
Computer Resources Nucleus
Field Maintenance Support
Flight Service Automation System
National Airspace Management Facility/Traffic Management System
Radio Communications Link Program
Radio Control Equipment
System Engineering and Integration
Systems Engineering and Technical Assistance
Technical Support Services Contract

Level III Major Acquisitions:[3]

Airport Surface Detection Equipment
Aviation Safety Analysis System
Aviation Weather Products Generator
Data Multiplexing Network Phase III
Direction Finder Modernization
Establish Alaskan Satellite NAS Interface Communication System
Instrument Landing System
Integrated Terminal Weather System
Maintenance Automation Program
National Airspace System Recovery Communication
New York Terminal Radar Approach Control
Next Generation Weather Radar
Office Automation Technology and Services
Parallel Runway Monitors

Level III Major Acquisitions:[3] (continued)

Terminal Software Development Program
Terminal System Programs
Traffic Alert and Collision Avoidance System
Transceiver Replacement
VHF Omnidirectional Range/Tactical Air Navigation

[1]Level I major acquisitions are programs exceeding $150 million in total cost or $50 million in total research and development funds over a 3-year period; programs upgraded from Level II or III; or programs otherwise designated as Level I by the DOT Acquisition Executive.

[2]Level II major acquisitions are programs exceeding $150 million in total cost but do not lend themselves to all the procedures contained in OMB Circular A-109; programs downgraded from Level I or upgraded from Level III; or programs otherwise designated as Level II by the DOT Acquisition Executive.

[3]Level III major acquisitions are programs between $50 million and $150 million in total cost; programs downgraded from a Level I or II; or programs otherwise designated as Level III by the DOT Acquisition Executive.

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