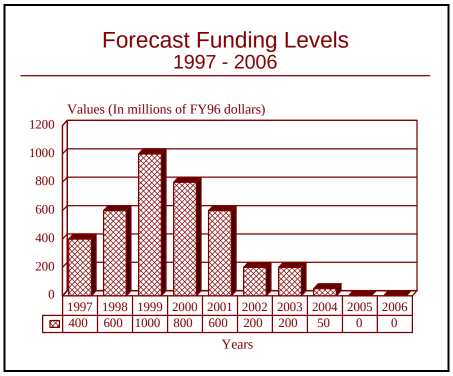
# Advanced Automation System (AAS) - Archived 1/98

## Outlook

- Restructured in 1994 to recoup schedule and cost
- Interim program established as stopgap for aging computers
- Remains key element of FAA ATC modernization program




## Orientation

**Description.** The AAS is a widescale upgrade program for replacing aging US Air Traffic Control (ATC) computer systems with new hardware, software, and controller workstations.

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

FAA Technical Center
Atlantic City, New Jersey (NJ)
USA
(Simulation and testing support)

**Contractors**
Loral Corp Federal Systems Co
6600 Rockledge Drive
Bethesda, Maryland (MD) 20817
USA
Tel: +1 301 493 8100
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(Prime contractor)

Computer Sciences Corp
Network Integration Division
3190 Fairview Park Drive
Falls Church, Virginia (VA) 22042
USA
Tel: +1 703 876 3511
Fax: +1 703 641 8312
(Principal software subcontractor)

Raytheon Co
Equipment Division
Air Traffic Control Directorate
1001 Boston Post Road
Marlborough, Massachusetts (MA) 01752
USA
Tel: +1 508 490 1000
(En route/terminal/tower displays, common consoles, technical support services; prime for STARS)

Status. Advanced development.

Total Produced. A small number of PAMRIs (Stage 1) have been produced, with the first site implementation achieved by the October 1, 1991, deadline. In April 1995 the program was downsized in both cost and scope in an attempt to bring the program under control and on-line by the year 2000. Current requirements are for the current contractor, Lockheed Martin (then Loral), to provide 3,235 Display System Replacement (DSR) automated workstations to upgrade 20 air route traffic control centers (ARTCCs), and to develop and test one Tower Control Computer Complex (TCCC) for airport air traffic controller use. A production contract for an additional 69 TCCCs to be installed at the 70 busiest US airports will determined by the performance of the prototype.

Application. The object of the AAS program is to provide a total automation system to handle the projected US air traffic load into the 21st century.

Price Range. Due to extensive overruns and lack of specific definition of the recently redefined/renamed DSR workstations, it is impossible to determine an accurate DSR unit-cost estimate at this time. An equal distribution of the current contract value would suggest a total unit value of approximately US$277 million. This figure, however, includes the apportioned cost of development, manufacture and installation of the console, along with contractor training, and maintenance and supply support through 2001. Loral has been given a US$500,000 per-site incentive to bring the program in under cost and ahead of schedule.

# Technical Data

Design Features. The design features and equipment descriptions presented herein represent information provided by the original contractor, IBM Federal Systems, prior to its purchase by Loral and the recent program restructure. It is, therefore, subject to significant future change.

AAS is a general upgrade for the US ATC system. According to the original plan, commencing in the early 1990s, all Area Control Facilities (ACFs) would receive AAS computers, Sector Suites, and other associated hardware. The AAS computer language was, and remains, Ada, the now widely adopted standard DoD computer language.

In its program formulation, the FAA described its approach to AAS development as "a top down, evolutionary, total system approach", with the intent being for each segment to build on its predecessor. The R&D phase was a design competition for a limited, prototype system, which concluded with the issue of an RFP for the full AAS. Implementation was slated to take place in three steps.

The first step consisted of two phases. The first phase involved the implementation of the Peripheral Adapter Module Replacement Item (PAMRI), which would replace original peripheral adapter modules, data receiver groups and radar multiplexers in use at the 20 Air Route Traffic Control Centers (ARTCC) across the US. IBM was the PAMRI contractor and the initial production versions were delivered in late 1990 for installation at the FAA Academy at Oklahoma City and at the Seattle ARTCC in early 1991. The PAMRI equipment was designed to provide an interface with additional ATC radars (a single PAMRI should be able to handle 25 radars), as well as supplying higher data transmission rates for radar site interfaces. PAMRI was also to provide sufficient redundancy to support the next phase, especially Initial Sector Suite System (ISSS) transition, as well as simultaneously supporting full ATC operations. The PAMRI is intended to collect information from remote air traffic subsystems and distribute it to Host Computers at en route centers. PAMRI last-site implementation was scheduled for July 1, 1993. The FAA decided, however, to increase system redundancy through additional radar display equipment. This affected PAMRI procurement. PAMRI site #15 was the first affected by this change, with the initial 14 sites retrofitted starting in February 1993.

The second phase of the upgrade process focused on the Initial Sector Suite System (ISSS), which is also the largest portion of the AAS program. The ISSS as originally defined by the FAA/IBM would consist of new intelligent controller workstations, called common consoles, with color displays and electronic presentation of flight data. ISSSs would be initially installed in en route facilities served by Host Computers. Approximately one million lines of Ada code were to be designed for ISSS. The work would result in the supply of new controller workstations at en route centers to replace existing controller displays, and the automation of some related processes that are currently being performed manually. Links to the existing Host Computers were to be provided, as well as radio, telecommunications and radar equipment. Upon transition to the ISSS, the old ARTCC control rooms would be refurbished to accommodate the additional sector suites that are required in the terminal consolidation effort. ISSS implementation was scheduled to be completed in 1998. At least a three-year delay, due to a combination of factors including continuing specification changes and software shortfalls, was identified before Loral took over the program, and the program was restructured to replace the ISSS with the as yet to be fully defined DSR.

The final step of the improvement program as envisioned by the FAA consists of two phases; it will provide additional automation support in airport towers, and will allow for the consolidation of the remaining large terminal control facilities at en route centers. The first phase consists of the installation of Tower Control Computer Complexes (TCCC) in selected airport air traffic control towers. The original plan called for first-site implementation in January 1997, with remaining TCCCs to be installed over the period of 1998 through 2002. This schedule is subject to revision following the 1995 restructure.

The final phase involves the addition of software to allow the performance of en route functions in the Area Control Facilities, as well as the installation of additional hardware that will convert ARTCCs into Area Control Facilities. The final product of this phase will be called Area Control Computer Complex (ACCC). Due to delays engendered by funding cuts in FY92, the FAA took advantage of the added time to schedule slippage in software design and systems engineering tasks for the ACCC, as well as to redefine the present ACCC and related Automated En Route ATC (AERA) products into four packages representing the same capabilities. These four packages have the following first-site implementation schedules: February 1998, Host Computer replacement; February 1999, initial Aera service; February 2000, AERA 2; and February 2001, final capabilities. This implementation and associated schedules are subject to change following the program restructure.

Workstations/Displays. The AAS components include the newly defined 3,235 DSR workstations. The workstations will replace existing consoles, computer read-out displays, flight data input/output devices and flight strip printers. The latter is an especially awkward component of the existing system. The new workstations will also supply all functions that are currently provided by the data entry and display subsystems. Since the new workstations are adaptable, they can provide the interface to all current control functions. In the original IBM design, the consoles are based on the IBM RISC/6000 reduced-instruction-set computer workstations. One million lines of Ada code were being written for the workstations prior to IBM’s exit from the program.

Assuming that Lockheed Martin’s technical approach will be similar to IBM's, displays will be supplied in several varieties. In IBM's design, the en route/terminal consoles would use two different color displays. One is a 20x20-inch, 2,048-line flat color monitor (manufactured by Sony America Corp), and 19-inch diagonal, 1,024-line auxiliary display. The tower displays would use two 10x10-inch, 1,024-line monochrome displays. Monochrome, rather than color, displays were chosen by IBM due to their better performance in bright light, such as encountered in ATC towers (ranging from almost total darkness to 2,000 foot-candles). The tower displays are of a size to allow easy fitting into sometimes restricted quarters, and optional mounting configurations include single or double display pedestal, ceiling, or in-line console. Raytheon's display controller, as selected by IBM, simultaneously drives the main and auxiliary displays, or four of the monochrome tower displays, and is based on a 68020 microprocessor.

Three main screen displays were being developed. One type was to provide radar fixes (including weather systems), another would display flight strips, and the third would provide general information for reference (maps, charts, etc.). The tower consoles are designed to provide greater detail because they will be handling planes approaching or taking off near large airports.

Host Computer. IBM proposed to initially retain the already installed IBM 3083 BXI computers (Host Computer), and to upgrade them as newer models become available. The NAS Host Computer project was a transitional step to AAS, conducted in parallel during the AAS design phase, to quickly provide needed computer hardware capacity and reliability improvements for the en route system. IBM 9020 computers were replaced with IBM 3083 processor complexes. One HCS consists of two 3083 processors in a primary and support configuration, peripherals, system control and maintenance support, and direct access storage. The HCS employs existing operations software slightly modified or converted to operate with Host hardware, a virtual machine control program, and commercial programs for support and maintenance. HCS main computers have a 16-megabyte storage capacity, expandable to 32 megabytes (four to five times the capacity of the present 9020s). Compact peripheral cartridge tapes provide an additional 180 megabytes of storage (more than eight times the capacity of bulky 10.5-inch reel-to-reel tapes used in the current system). The 9020s are operating at 80 percent of capacity. Largely because of their tenfold greater speed, the 3083s will initially operate at about 20 percent of capacity. HCS also provides improved man-machine interface, new support capabilities, and two principal software enhancements: Conflict Resolution Advisory (a resolution aid for IFR aircraft on a predicted conflict course) and Conflict Alert IFR/VFR Mode C Intruder (a capability when one aircraft is IFR and the other VFR). The first HCS was installed in the Seattle ARTCC in late 1986; implementation was completed in 1989. One HCS has been provided to each of the AAS prime contractors for development engineering.

STARS. One of the segments of the AAS program initiated after the extensive restructuring effort in 1994, the

Standard Terminal Automation Replacement System project supersedes the originally planned Terminal Advanced Automation System. STARS will replace the current automated radar terminal system, which features 15- to 25-year-old controller workstation and computer technology and is used at 180 Terminal Radar Approach Control (TRACON) facilities nationwide. The current system has a high failure rate and is unable to accept the modifications that would improve its safety and efficiency. The acquisition of STARS will allow more extensive ATC automation, as well as a partial consolidation of TRACON facilities. Weather displays will also be improved.

The current STARS implementation plan calls for initial operational capability at the first facility – in Boston, Massachusetts – by December 1998. After software tests, fully functional STARS systems will be ready for installation beginning in the year 2000. The last scheduled site (Columbus, Ga.) will be operational by early 2005. A total of 171 FAA and 199 Department of Defense facilities will be equipped with the system, which will utilize commercial off-the-shelf technology.

# Variants/Upgrades

AAS in itself is an upgrade program for the US ATC system. For details of the systems involved, refer to the Design Features section of this report.

# Program Review

Background. In December 1981 the FAA chartered a comprehensive NAS (National Airspace System) plan for modernizing and improving ATC (Air Traffic Control) and airway facilities through the year 2000 at an FAA cost estimate of approximately US$12.2 billion for the first 10 years (1982-1992) and an estimated cost through completion of US$15.8 billion. The three principal objectives of the plan have, for the most part, remained constant – consolidate major ATC facilities from more than 200 to less than 30; introduce common modular hardware, software, and controller workstations to increase productivity and capacity; and introduce higher levels of automation to improve safety, fuel efficiency, and controller productivity.

By 1980 the airspace system had evolved piecemeal into a mix of equipment from different technological generations, predominantly the 1960s. It was expensive to maintain and operate, offered little capacity for expansion, and was difficult to adapt to changing user requirements. If implemented properly, the process and structure of the NAS plan would provide an orderly framework for solving immediate problems while also providing the mechanism to evolve future systems. The immediate tasks faced were: to provide users with assured safe operations, to accommodate the increasing demands of competing users with minimum regulatory constraint and maximum fuel efficiency, and to increase the capacity of the system at congested major hub airports. The US ATC system is the busiest and most complex in the world. The driving force behind the overall system upgrade is to be able to handle expected increases efficiently and safely.

The major components of the ATC system are en route ATC, terminal ATC, and Flight Service Stations (FSS). ARTCCs (Air Route Traffic Control Centers) control all en route aircraft which are under IFR (Instrument Flight Rules) and not under the control of military or other facilities; there are 22 US ARTCCs. Terminal ATC facilities include ATCTs (Airport Traffic Control Towers) and a variety of Radar Approach Controls (RAPCON) – Terminal Radar Approach Controls (TRACON), Terminal Radar Approach Controls in the Tower Cab (TRACABS), and Combined Center Radar Approach Controls (CERAP). There are approximately 300 ATCTs and 190 RAPCONs today. Flight Service Stations provide a wide range of services to the large general aviation fleet. The NAS plan includes a Flight Service Automation System (FSAS) project with the goal of providing 61 highly automated FSSs by 1994.

Under the NAS Area Control Facility (ACF) project, since renamed the Aviation System Capital Investment Plan, the FAA intends to reduce 212 facilities (22 ARTCCs and 190 RAPCONs) to 23 ACFs - located at the 20 continental US ARTCCs, Honolulu ARTCC, Anchorage ARTCC, and New York TRACON. Some locations will not be consolidated into ACFs due to their complexity and importance to the original NASP. These locations include Chicago, Dallas/Ft. Worth and Los Angeles. Additional ACFs could be established if the FAA determines they are necessary to handle the specialized requirements of busy terminals like Los Angeles or Dallas/Ft. Worth. In FY93 budget hearings, an FAA official testified that the agency was considering having 53 or 54 consolidated facilities based on FAA studies indicating that, in cases where one of the 23 consolidated facilities failed, adjacent facilities could not manage the airspace in an adequate manner. The original AAS contract contained options for acquiring equipment for up to 18 additional locations. This project will provide higher levels of automation, improved productivity, and greater capacity, and is critical to the overall consolidation effort. The ACFs will provide radar guidance for all airport approaches and departures, as well as handle aircraft flying under Instrument Flight Rules (IFR) between airport terminal areas.

AAS. RFPs were issued for the Host Computers in 1982; competitive design contracts were awarded to IBM and Sperry in the fall of 1983. RFPs for the AAS were issued in 1983 and in August 1984 IBM and Hughes were awarded competitive design contracts; IBM's for US$130.4 million and Hughes' for US$116.3 million. Also in August 1984, RCA received an US$18.7 million addition to a US$13.5 million 1983 contract to provide system engineering support for the Host Computers.

The AAS Preliminary Design Review was completed early in 1987 and RFPs for the full system were issued. The program to expand or modify existing ARTCC facilities to accommodate installation of the Host Computers and ISSSs began in 1984 and was completed in FY87.

In February of 1987, the Defense Department established a liaison office at the Federal Aviation Administration to improve communications between the two agencies on civil/military projects included in the National Airspace plan. The FAA requested a study on Ada, the DoD standard computer language, in connection with AAS.

In a March 1987 report to the Chairman of the House Subcommittee on Transportation, Committee on Appropriations (GAO/RCED-87-8, "AVIATION ACQUISITION: Improved Process Needs To Be Followed"), the GAO criticized the FAA for "consistently moving projects into the last two stages of the acquisition process although they fell short of satisfying the approval criteria set forth in (OMB) Circular A-109," resulting in extensive cost and scheduling delays. The GAO recommended closer adherence to A-109 principles, particularly including operational testing prior to making production decisions.

The AAS acquisition contract and Technical Support Services Contract (TSSC) were awarded in August 1988. The Hughes Advanced Systems Company lodged a protest of the US$3.6 billion Advanced Automation System contract award to IBM. Hughes was IBM's only competitor. IBM's work on the AAS was temporarily halted during the 45-day GSA resolution period. The GSA Board of Contract Appeals (GSBCA) denied the protest of Hughes in an opinion issued October 28, 1988.

Raytheon Service Company (Burlington, MA) was awarded the $344 million Technical Support Services Contract (TSSC). It was a five-year contract with two two-year options to provide project management, engineering, construction management, and equipment installation services in support of the Advanced Automation System program. Raytheon personnel were also contracted to plan and implement FAA-approved modifications to the National Airspace System.

The next prominent milestone was to be delivery of the first ISSS in 1992. However, due to problems with software design, unresolved ISSS requirements issues and the identification of new requirements by the FAA, the FAA anticipated at that time that ISSS would be delayed by a total of 19 months. According to the Aviation System Capital Investment Plan issued in December 1990, the ISSS first upgrade delivery was scheduled for mid-1994. All of the other programs appeared to have been cascaded, with approximately a two-year delay.

From 1992 to 1993, schedule delays and cost growth worsened. IBM informed the FAA that the company could not meet its commitment to demonstrate the operational soundness of the new consoles by the November 1993 deadline (already extended from a February 1990 deadline). Then IBM announced it wouldn't even have the consoles ready until early 1994, much less an operational system. This was apparently the straw that broke the camel's back, for in November 1992, the FAA issued a "cure letter" (the first legal step) beginning the process to terminate IBM's contract. The FAA and IBM subsequently negotiated an agreement that involved a major management shakeup.

In March 1993, the FAA and IBM both acknowledged an additional 14-month delay to the second AAS segment known as the Initial Sector Suite System (ISSS). The ISSS had been the major thrust of the FAA's and IBM's work to date and had a history of development problems. That delay placed ISSS approximately three years behind the schedule established in the original 1988 contract. The Tower Control Computer Complex (TCCC) and Area Control Computer Complex (ACCC) remained in the early stages of development at that time. A date for their completion had not been set. (Note: the ACCC was subsequently canceled).

The FAA announced, in June 1993, that AAS was back on track after a stringent agreement was reached with contractor IBM. Despite problems with software development and a slipping schedule, the FAA appeared confident that an operational system would be installed in Seattle by October 1996. Both the FAA and IBM admitted that major mistakes had been made in the past and these accounted for all the delays. This optimism subsequently proved to be highly unfounded.

On March 1, 1994, IBM sold the company unit that was developing AAS (IBM Federal Systems) to Loral Corporation. The FAA, however, continued working with

IBM because the parties had not yet entered into a novation agreement.

In April 1994, the GAO released a report slamming the FAA and its handling of the AAS program. In summary, the GAO found that despite several FAA management initiatives, problems continued with the AAS program, and in all likelihood, would worsen if corrective measures were not immediately taken. Citing examples, the GAO said in 1993 the FAA announced a US$1.2 billion cost increase that raised the total cost of the AAS project to US$5.9 billion, compared with the 1988 estimate of US$4.3 billion. The FAA also estimated that it might need an additional US$1.0 billion (i.e. approximate US$7 billion program total) to complete system development and implementation. According to the GAO, it was probable that ISSS, which had already been delayed three years, would experience additional delays. The chance of meeting the October 1996 date for first implementation of ISSS at a site was considered remote.

Amid a growing swell for privatization of the organization, the sorry state of the program (beset by overruns estimated in the billions and delayed to the point of paralysis by constantly changing specifications) finally saturated the FAA's apparent high tolerance for mismanagement and overruns. In June 1994, FAA administrator David Hinson announced that the FAA was canceling and modifying various parts of the AAS in order to bring costs under control and save hundreds of millions of dollars. Specifically, Hinson canceled the Area Control Computer Complex (ACCC), which was to integrate en route, terminal and flight operations through a US$1 billion computer program; and the US$600 million Terminal Advanced Automation System (TAAS), which would have coordinated radar, communications and computer processing operations in areas of very heavy air traffic. Hinson then ordered a further review of remaining elements by experts from MIT's Lincoln Laboratories and Carnegie-Mellon's Software Engineering Institute. He also brought in Robert Valone from the National Oceanic and Atmospheric Institute to use his expertise in managing multibillion-dollar radar and satellite programs to bring things back in line.

Cancellation and rebid of the Loral AAS contract was considered in the process. However, after a management reorganization at Loral, and after monitoring the progress of the organization in turning the program around, it was determined in April 1995 that the FAA would continue with Loral as the AAS prime contractor.

The decision was also likely influenced by the fact that in its software audit, the Lincoln Lab/Carnegie-Mellon team found that the ISSS software architecture was basically sound and that ISSS met 78 percent of system requirements. Loral received excellent marks for software cleanup and documentation improvements after taking over the program.

The decision to stick with Loral was announced in the form of a fixed price plus incentive contract valued at US$898 million. The contract calls for delivery of 3,235 DSR consoles to upgrade 20 ARTCCs and to be used at three other locations. The first delivery is to go to the Seattle WA center in 1997 and the last to Boston in 2000. In addition to the development, manufacture and installation of the DSR consoles, the contract provides for contractor training, and maintenance and supply support through 2001. FAA analysis indicates that this reduced-scope decision will save US$1.6 billion over the previous approach. It is estimated that an additional US$50 million of maintenance-cost savings will be realized in the first five years of DSR operation.

In a separately negotiated fixed-price incentive award, Loral received an additional US$57 million to develop the software and workstations for the Tower Control Computer Complex (TCCC). The TCCCs will replace a number of completely different terminals with flat panel displays that will allow controllers to operate and monitor a large number of airport, lighting and instrument landing systems. A single system was to be delivered to the FAA Technical Center near Atlantic City for test and evaluation in September 1996. The Unit is slated for final installation at the designated first operational site in El Paso, TX. A future production contract will be structured to provide 69 additional locations for installation at the 70 busiest US airports. This is down from the originally requested 150 installations.

In a related June 1995 award, the FAA awarded the Computer Sciences Corp (CSC) a US$207 million contract to produce, install and support operational software for the new FAA ATC automation Systems. The three-year En Route Software Development and Support (ERSDS) contract includes two additional one-year options and expands on the original ERSDS contract to Loral. Working cooperatively, Loral is developing the prototype software and CSC will develop the operational versions. The software to be provided by CSC includes:

- DSR Software – An operational readiness demonstration is planned for Seattle in October 1998.
- TCCC Software – Planned introduction date was December 1996.
- A tracking and planning system for departures called Departure Sequencing Prototype (DSP) – currently in test.
- An equivalent system for arrivals called Center-TRACON Automation System (CTAS) – introduced during the Spring of 1996.

- Automated En Route Automation (AERA) software that predicts midair collisions and advises controllers how to avoid them – scheduled to go on-line in Indianapolis next year.
- Ongoing enhancements to the Traffic Management System (ETMS) which adjusts traffic flow at airports to compensate for local delays.

In 1995, the teams to compete for the potentially $1 billion STARS program took shape: Raytheon Electronic Systems (Transportation Systems Division) with Hughes Aircraft; Lockheed Martin (formerly Loral) with Concurrent Computer Corp (formerly Harris Computer Systems Corp); and Boeing with BDM and Oracle. After a six-month product verification and demonstration phase, the award ultimately went to the Raytheon consortium in September 1996. The contract included pre-production development and three multiyear option periods.

Raytheon reached two milestones in the STARS project ahead of schedule in December 1996: it successfully passed the System Design review phase and completed the integration and testing of of two contract configuration STARS systems.

Subcontractors in the STARS project include Hughes Informations Systems, Hughes Defense Communications, Sun Microsystems Federal Inc, and UFA, Inc.

## Funding

The FY92 funding request for AAS was US$716.9 million, which was whittled down to US$451.3. Requested FY93 funding for AAS and the Voice Switching and Control System (VSCS) combined was US$805 million. Costs for the program escalated significantly from the original estimate of US$3.5 billion. Due to modifications to the original contract (totaling 63 by December 21, 1990), by early 1991 the total cost had risen by about US$242 million, to about US$3.8 billion. Of this amount, US$1.8 billion was for basic items and US$2.0 billion was for options. As of December 1990, the FAA had spent approximately US$336 million for the AAS.

A GAO report on the status of the FAA's modernization program issued in April 1992 showed further cost escalation. The total cost was then estimated at US$4,672.9 million, an increase of US$219.2 million from the previous year's estimate. The increase was attributed to the need to improve man-machine interfaces for the TCCC portion (US$149.6 million), changes in ISSS software needed to meet additional FAA requirements (US$30 million), and a study of alternative plans for smaller terminal facilities if the FAA were to revise its original consolidation plans (US$13.5 million), with the rest attributable to various project changes.

For FY94, the FAA requested approximately US$456 million in funding for AAS. This request included money needed for technical support contractors, field implementation support, building modernization linked to the ASS project, and training. The bulk of the request, some US$350 million, was to fund the AAS prime contract with IBM. Unfortunately, based on the then-current completion cost estimate of US$5.1 billion, the AAS program was already US$1.5 billion over the original 1988 estimate of US$3.1 billion, and the total cost was still climbing.

Prior to the 1994 AAS program restructure and scope reduction, the estimate to completion had reached almost US$7 billion. Following the restructure, the estimate was reduced to US$5.4 billion, with approximately US$1.4 billion lost in unsalvageable work already performed on other segments of the AAS that have been dropped.

Despite its many problems, Congress has granted most of the requested funding for AAS. As of late 1994, the FAA had requested over US$2.9 billion for AAS and has received about US$2.6 billion in appropriations. Like other Facilities and Equipment projects, AAS did not receive full funding because of development problems, schedule slippage, and unresolved requirements. For example, the committees on Appropriates denied funding for limited production of ISSS consoles prior to their recent redefinition because of the problems with ISSS software development. The Congress also reduced some funding for other components because of problems affecting the system and because the FAA's consolidation plan had not been issued.

## Recent Contracts

| Contractor | Award ($ millions) | Date/Description |
|---|---|---|
| Loral | 898.0 | Apr 1995 – FFP plus incentive contract to deliver and install 3,235 Display System |

| Contractor | Award ($ millions) | Date/Description |
|---|---|---|
| | | Replacement Consoles, and provide contractor training and maintenance and supply support through 2001. First delivery September 1997; final delivery 2000 |
| Loral | 57.0 | Apr 1995 – FFP plus incentive contract to develop the software for one Tower Control Computer Complex. |
| CSC | 207.1 | Jun 1995 – Contract to produce, install and support operational software for new FAA ATC automation systems |
| Raytheon | | Sep 1996 – Contract worth up to US$1 billion for the team led by Raytheon for the development, production, and installation of the Standard Terminal Automation Replacement System (STARS). |

## Timetable

| | | |
|---|---|---|
| | 1982 | NAS Plan chartered by FAA. Host Computer RFP issued |
| | 1983 | AAS dual contract RFP issued; Host Computer design contracts issued |
| | 1984 | AAS dual contract award – design competition phase |
| | 1985 | Host Computer production contract |
| | 1986 | Host Computer delivery |
| | 1987 | AAS production RFP; Host Computer implementation began |
| | 1988 | AAS production contract awarded; Host Computer implementation completed |
| | 1991 | PAMRI first delivery and first-site implementation |
| Nov | 1992 | First ISSS delivery to FAA for testing |
| Jul | 1993 | Completion of PAMRI implementation |
| | 1994 | AAS program restructured |
| Jul | 1995 | Contract awards to Loral and CDC restructured |
| Dec | 1995 | AERA installation |
| Sep | 1996 | First TCCC delivery to FAA |
| Dec | 1996 | DSR delivery to Seattle, Wash., ARTCC site (first of 21 scheduled sites) |
| Oct | 1997 | DSR delivery to Salt Lake City, Utah |
| | 1998 | Seattle DSR to become operational after training period |
| Dec | 1998 | STARS to become operational at Boston, Mass., TRACON site |
| May | 2000 | Final DSR delivery to Boston, Mass., site |
| | 2005 | Final STARS system installed |

## Worldwide Distribution

While the potential for export of applicable ATC modernization technologies exists, the AAS is a **US**-only program.

# Forecast Rationale

While the AAS program may well become a classic business-school case study in how not to manage a program, the fact remains that the urgent need for improvement of the US ATC system exists and the pertinent initiatives will be supported at virtually any cost. This was dramatically emphasized in the summer of 1995 when, in a span of four months, 20 Display Channel Complex failures were experienced at five FAA Air Route Traffic Control Centers, including the Chicago-area center. In a stop-gap measure, the FAA will spend US$65 million to provide an interim upgrade of outdated computers at five sites until the new DSPs begin to become available. The five ARTCCs are: Chicago, Dallas-Fort Worth, Washington, Cleveland and New York. Even so, the first replacement (Chicago) will not be available before the beginning of 1997. If all goes well, the sites will be operational for only 16 months before the first DSR is scheduled to become operational (September 1998).

It can only be hoped that the 1994 restructure will really put the program on track this time. Based on past

FAA/contractor performance, however, a wait-and-see attitude must be adopted. The US ATC system will ultimately, of necessity, be improved; the questions are when and at what expense. Extended further delays could have significant passenger safety and US economic growth impact. The program will thus continue to be supported in one form or another.

While the FAA has scaled back, cut, and outright canceled some components of the program, it has stopped short of terminating AAS, as been recommended by some. The forecast is based on the current estimated completion cost of US$5.4 billion with a nominal US$175 million allowance (3 percent) for further minor delays and overruns.

## Ten-Year Outlook

ESTIMATED CALENDAR YEAR FUNDING ($ in millions)

| | | | High Confidence Level | | | Good Confidence Level | | | | Speculative | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Designation | Application | thru 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | Total 97-06 |
| AAS | ATC (FAA) | 1675.00 | 400.00 | 600.00 | 1000.00 | 800.00 | 600.00 | 200.00 | 200.00 | 50.00 | 0.00 | 0.00 | 3850.00 |