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AIR TRAFFIC CONTROL

FAA's Advanced Automation System Acquisition Strategy Is Risky

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Information Management and
Technology Division

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July 8, 1986

The Honorable Elizabeth H. Dole
Secretary of Transportation

Dear Madame Secretary:

This letter and the enclosed copy of our April 16, 1986, congressional testimony (appendix I) provide the results of our latest review of the Federal Aviation Administration's (FAA) acquisition of the Advanced Automation System and our conclusions and recommendations. The Chairman and the Ranking Minority member of the Subcommittee on Transportation, House Committee on Appropriations, requested that we evaluate whether the Advanced Automation System is a technically and economically sound investment (see appendix II).

Essentially, our evaluation shows that FAA's current acquisition strategy for the Advanced Automation System does not adequately mitigate technical risks and does not provide for suitable operational simulation of the advanced automation features before the Department of Transportation commits to the multi-billion-dollar contract for full production. In addition, our evaluation shows that the Advanced Automation System, as currently planned, may not be economically justified. FAA's congressionally mandated benefit/cost analysis, recently initiated and scheduled for completion late next year, should provide more information on this issue.

FAA's acquisition strategy is accelerated—it combines development, test, and production into one phase. Full production of the costliest element—the controller workstation—occurs concurrently with development of the most complex software and hardware elements. Typically, major acquisitions have a separate development and testing phase that precedes the commitment to full production. Production decisions are usually based on operational tests of actual performance. In contrast, FAA intends to make the production decision based on contractors' paper designs, computer-model simulations of system performance, and design trade-off analyses. No operational testing will be conducted prior to the production decision. We believe FAA's strategy has unacceptably high risks and may result in significant cost increases, schedule delays, and performance deficiencies.

A significant contributor to the Advanced Automation System's ability to provide benefits to users and FAA is the implementation of Aera. Aera

is a series of sophisticated air traffic control automation programs intended to automate some controller tasks. Aera will be implemented in discrete phases called Aera 1 and Aera 2. Aera 1 will predict the future location of aircraft and check for potential conflicts. Aera 2 will provide several alternative resolutions to such conflicts and will improve coordination among controllers. Significant questions about the technical feasibility and operational suitability of Aera 1 and Aera 2 functions remain unanswered. Much could be answered by simulating the Aera functions before the Advanced Automation System production decision is made. To date, FAA has not approved a plan for conducting these simulations.

FAA also recently stated that its acquisition strategy is sound because (1) a fixed-price type contract for controller workstation hardware will indicate that the contractor believes risks are acceptable, and (2) a non-competitive environment, enabling close FAA-contractor interaction, is more conducive to effective software and system development. We disagree. Regarding the first point, we believe that a fixed price for untested hardware may result in higher costs because the contractor's risk may be reflected in higher fixed prices to compensate for the system's unproven producibility. Additionally, requirement changes to correct performance problems can lead to significant additional costs even in a fixed-price contract. Finally, software—which constitutes a major portion of the Advanced Automation System's development and cost risk—will be developed using a cost-plus type contract. Regarding the second point, having only one contractor during the concurrent development, test, and production phase limits risk-reduction opportunities typically achieved through cost and technical competition. Further, by becoming an active partner in directing changes, FAA could become more responsible—thus the contractor less responsible—for system performance shortfalls if FAA-directed changes do not solve problems.

We also found that Advanced Automation System benefits may not exceed costs. We evaluated the information contained in the MITRE Corporation's 1985 draft benefit/cost study for the Host Computer System and the Advanced Automation System. We adjusted the estimates in the MITRE document to reflect the changed situation and the analysis contained in supporting studies. Specifically, we

- deducted benefits and costs attributable to the Host computer and its related enhancements;
- reduced Aera benefits to conform to the assumptions in the study referenced in the MITRE document;

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- reduced benefits and costs to reflect program schedule slippages and cost increases; and
 - reduced benefits to reflect lower long-term oil price forecasts.

Further, we deducted the large portion of benefits attributed to passenger time savings. We believe the estimated time potentially saved by passengers—3 minutes or less on most flights and 6 minutes on a 5-hour, cross-country flight—is immaterial to individual passengers and should not be used to justify the investment. The Office of Management and Budget supports this view. When all of these adjustments are made and the value of money over time is accounted for, the quantifiable benefits amount to \$2 billion and no longer exceed costs of \$2.2 billion. (See Column 7 on page 26.)

Finally, significant uncertainty exists about the Advanced Automation System's cost growth. The program has already encountered significant cost growth (at least 50 percent in the design competition phase) and, as we have pointed out, FAA's acquisition strategy increases the risk of further cost growth.

We believe FAA needs to change its acquisition strategy to include a development and testing phase before proceeding to full production. Doing so would minimize acquisition risks and ensure that the Advanced Automation System effectively meets the future safety and efficiency needs of the nation's air transportation system. Based on our analysis, the low benefit-to-cost ratio also clearly does not justify an accelerated acquisition strategy. Therefore, we recommend that you direct FAA to take the following actions:

- (1) Revise its acquisition strategy to incorporate a contract phase to develop and operationally test prototype models of critical components under realistic conditions before the decision and contract are made for full production quantities. At a minimum, critical components should include the controller workstations, en route hardware and software, and the local communications network.
- (2) Reexamine Advanced Automation System features and requirements to identify the most inexpensive and cost-effective alternatives and to revalidate requirements before proceeding to the development and testing phase.

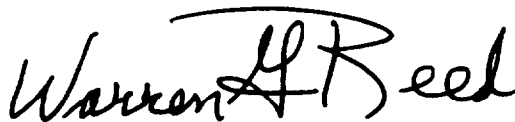
(3) Verify the benefit estimates and the operational suitability of Aera 1 and Aera 2 functional enhancements by operational simulation as soon as is practicable and before proceeding with full-scale production.

The ongoing congressionally directed benefit/cost analysis may identify a more cost-effective alternative to the currently defined system. However, the acquisition strategy needs to be revised even if an alternative design with a higher benefit-to-cost ratio is selected.

We conducted our work primarily at the headquarters of both the Department of Transportation and FAA in Washington, D.C., and at FAA's Technical Center in Pomona, New Jersey. We also interviewed FAA's support contractors. In evaluating the Advanced Automation System's economic soundness we analyzed the most current benefit/cost information available. However, we did not attempt to validate FAA's cost estimates. We performed our work in accordance with generally accepted government auditing standards. Additional details on the overall objectives and scope of our work are provided on pages 35 and 36.

As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Sincerely yours,



Warren G. Reed
Director

