

For Release  
on Delivery  
Expected at  
2:00 p.m. EDT  
Wednesday  
April 12, 1989

FAA Research, Engineering and Development Issues

Statement of  
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Before the  
Subcommittee on Transportation, Aviation and Materials  
Committee on Science, Space, and Technology  
House of Representatives



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Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to summarize for the Subcommittee our on-going work on the Federal Aviation Administration's (FAA) Research, Engineering and Development (RE&D) program. Our statement today will provide preliminary observations in two areas: (1) FAA's compliance with the Aviation Safety Research Act of 1988 and (2) the controls FAA uses to manage its RE&D program. We base our observations on work we are currently doing for Committee Chairman Roe to assist the Committee as it reviews FAA's \$165 million fiscal year 1990 RE&D budget. Our work involves developing and analyzing information on FAA's funding, staffing, and scheduling of RE&D subprograms. Although we have not completed our work in these areas, we have prepared a fact sheet entitled, Aviation Research: Information on FAA's Research, Engineering, and Engineering Program (GAO/RCED-89-122FS), that presents some of our initial results. We have brought a limited number of copies of that fact sheet with us today.

In summary, while FAA still can take steps to make its recently restructured RE&D program more responsive to the Aviation Safety Research Act, many positive changes have occurred. To its credit, FAA has issued a new RE&D Plan, revamped its organizational structure for managing RE&D, embarked on research in key mandated areas, and solicited advice from the aviation community. On the other hand, some requirements of the Act remain unfulfilled to the degree that the Congress cannot be assured that resources are being used most effectively and that FAA's RE&D Plan

is being carried out as intended. For example, FAA issued the latest Plan without the requisite project cost and staffing information. And, while the agency's program contains at least the mandated 15 percent in long-term research, specific research projects of a long-term nature were not identified as required in FAA's fiscal year 1990 budget. In addition, while we did not conduct an exhaustive review of RE&D management controls, we did find weaknesses in FAA's internal controls and procedures for ensuring consistent resource use and in the availability of reliable data.

#### FAA'S RESPONSIVENESS TO THE ACT

As you know, the Aviation Safety Research Act of 1988 requires FAA to

- submit an annual plan with detailed annual cost, schedule, and manpower data for each project, as well as a report of accomplishments for the preceding year;
- allocate not less than 15 percent of its fiscal year 1990 budget to long-term research;
- undertake research on aircraft structures, fire safety, human factors, aeromedical research, and computer simulation models; and
- establish a research advisory committee.

As I will now discuss, we found that, with a few exceptions, FAA was generally responsive to these four requirements.

### Resource Estimates Not Included in RE&D Plan

As required, FAA recently issued its new RE&D Plan. However, the January 1989 Plan does not comply with all of the requirements of the Aviation Safety Research Act. While it contains general schedule information on each project, FAA has not included detailed annual estimates of the cost and staffing levels for each project for the first 2 years of the Plan. FAA officials told us that resource needs for research are subject to change at the project level or, as in the case of new programs such as aging aircraft, estimates for these needs will not exist until the projects are under contract. Therefore, officials do not believe that attempting to quantify such unknowns and then represent these numbers as detailed estimates in the budget submission or the plan would be useful. We believe, however, that long-range planning for RE&D resource needs is important and that the results of that planning should be included in budget justification and planning documents at the lowest level possible. Depending on the maturity of the research program, this level could vary from among the project, subprogram, and program budget estimates.

FAA did not submit a report of accomplishments with this plan because of the many recent changes to the program. Officials say, however, that such a report will accompany future plan updates.

### Percentage of Long-term Research Is Not Highlighted

The Congress set 15 percent as the minimum proportion that FAA

should devote to long-term research<sup>1</sup> because it believed the agency did not look far enough into the future and focused only on short-term, clearly achievable goals. Our analysis of subprograms<sup>2</sup> carrying over into fiscal year 1990 shows that FAA's overall program adheres to this criteria and, indeed \$58.3 million, or 35.3 percent, of this year's request is intended for projects with exclusive long-term benefits. FAA officials said that the budget review was too far along when the Act was passed to do include long-term information. They plan to include it in next year's submission.

#### RE&D Budget Generally Includes

#### Research Areas Named in the Act

FAA's fiscal year 1990 budget contains funding to varying degrees for each area of research mandated by the act. For example, FAA requests funding for an aging aircraft subprogram for the first time and has requested increased amounts for research on human factors, aeromedicine, fire safety, and computer simulation modeling. The table in attachment I highlights trends in those programs and subprograms responsive to the act for fiscal years 1987 through 1990. Overall, approximately 21 percent of FAA's fiscal year 1990 request is allocated to these research areas, as shown in attachment II.

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<sup>1</sup>According to the Act, a long-term research project is one that is unlikely to result in a final rule making within 5 years, or in initial installation of operational equipment within 10 years after the project begins.

<sup>2</sup>A subprogram is a discrete project or group of projects; it is the lowest level for which FAA maintains funding information.

### Research Advisory Committee Has Been Established

FAA has complied with the requirement to appoint a Research Advisory Committee. This requirement was established to ensure that the agency had expert advice available to it in planning its research program. FAA issued a charter for the committee on February 10, 1989, and named its members, including representatives from user groups, universities, corporations, and other government agencies. However, the committee has not yet held its first meeting. FAA did solicit advice from the aviation community on its new RE&D Plan at a conference last December, but the agency did not receive these views in sufficient time to alter the plan or the fiscal year 1990 budget. FAA officials say that they will incorporate these views in the next plan update and budget cycle.

### OBSERVATIONS ON MANAGEMENT CONTROL

The Federal Managers' Financial Integrity Act of 1982 requires executive agencies to establish and maintain systems of internal controls in accordance with standards developed by the Comptroller General. One of these standards requires that an agency establish internal control systems that provide reasonable assurance that its program objectives will be accomplished. In FAA's case, for example, internal controls would help the agency to adhere more closely to the Aviation Safety Research Act and to ensure that research program goals are met.

While we did not conduct an exhaustive review of RE&D management controls, we did find weaknesses in FAA's internal

controls for ensuring consistent resource use and in the availability of reliable data. Specifically, FAA does not have a consistent or systematic means of setting relative priorities among projects or for transferring funds among subprograms. This means that established research programs--though less glamorous or farther from completion--could be pushed aside to satisfy immediate needs, thus sacrificing longstanding program goals. While this could be a satisfactory though ad hoc way of setting priorities, if it occurs with great frequency, the disruptive effects on achieving overall program goals could outweigh the positive effects of responding to current needs. Further, FAA does not maintain and therefore cannot report adequate project staffing and scheduling data, thus making it difficult for FAA managers or the Congress to oversee the agency's deployment of its RE&D resources. However, FAA has initiated steps toward improving some of these areas.

#### Priorities Are Not Established

FAA has not established priorities for its fiscal year 1990 RE&D budget or its new RE&D Plan. This means that projects are not distinguished in terms of which are more important and, therefore, more deserving of scarce resources. Last year, we pointed out the need for FAA to set priorities among projects in its multi-billion dollar air traffic control modernization program--the National Airspace System Plan (NAS Plan)--so that objective trade-offs could be made based on project benefits, costs, and

schedules.<sup>3</sup> We believe that setting priorities is just as important in the RE&D program where, like the NAS Plan, numerous discrete subprograms exist that address areas ranging from aeromedical research to airborne collision avoidance systems. Additionally, RE&D projects are managed throughout the organization, including the Technical Center and the Civil Aeromedical Institute. Thus, because of the many and diverse competing sponsors of research, central guidance for establishing a hierarchy among research requirements needs to be established.

FAA acknowledges the need to set priorities and will begin to address this problem during the coming year by implementing a new management control process. FAA plans for the new process to be a top-down approach built around the four major mission areas highlighted in the new RE&D Plan: capacity, safety, security, and efficiency. These mission areas will form the framework for analyzing and setting priorities for requirements, setting goals and objectives, and measuring improvements. Currently, the process is in draft format; and plans call for working groups, with participants from throughout the organization, to establish and set priorities for requirements and evaluate future budgets against those requirements.

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<sup>3</sup>AIR TRAFFIC CONTROL: Continued Improvements Needed in FAA's Management of the NAS Plan (GAO/RCED-89-7, Nov. 10, 1989).



## Criteria on Which to Base Reprogramming

### Actions Does Not Exist

FAA has not established criteria for approving transfers of funds among RE&D subprograms. As a result, FAA has no means to ensure that it will spend funds in accordance with the priorities it plans to develop. We believe such criteria are needed if the agency is to maintain control over the program during budget execution.

During our review of RE&D subprogram funding for fiscal years 1987 to 1989, we noted that such transfers--called reprogrammings--were numerous. For example, during fiscal year 1988, reprogramming actions changed funding in 70 of the 99 subprograms FAA designated in its congressional submission. Eighteen of these increased or decreased by more than \$500,000 with several between \$3 million and \$9 million. According to FAA's program analyst responsible for reviewing reprogramming actions, changes come about in many ways and from different places. For example, congressional interest is at least one important source and was responsible for funds being added to the crashworthiness program. A reprogramming also can be initiated based on direction from various levels within FAA in response to compelling research findings from programs in other agencies, including the National Aeronautics and Space Administration, the National Science Foundation, and the Department of Defense. Others are initiated for administrative reasons, including the need to distribute funds carried over from previous years. In addition, in response to recommendations made at an FAA-

hosted international conference, FAA established an aging-aircraft subprogram in fiscal year 1989 with funds transferred from other RE&D projects.

Currently, RE&D reprogrammings are approved by the FAA organization within which the project resides without involving the FAA's Associate Administrator for Advanced Design and Management Control (ADM)--the FAA official whose organization has overall RE&D responsibility. A program analyst in ADM's Management Control Service sees all reprogramming actions, but she brings an action to ADM top management attention only if she feels it warrants their interest. However, no criteria exist for management to approve these actions, or for ADM's analyst to decide when to request higher management involvement. This is a result of the situation described earlier wherein no means or policy exists with which to set priorities among projects. Thus, according to FAA officials, immediate needs--such as funding NAS Plan projects--can sometimes be viewed as the most pressing and result in siphoning funds from established projects in other areas.

Because of the extent of reprogrammings we identified in the past 2 years and FAA's not having criteria on which to base such reprogrammings, we are concerned about the agency's ability to meet the goals and objectives it plans to establish as part of its new control process. We believe that FAA should be free to transfer funds when necessary but only within established parameters approved by appropriate levels of the organization. Major changes

in programs or subprograms should require the review and approval of top management.

Information Describing FAA's Program Is Not Readily Available

In the process of performing our work for Chairman Roe, we noted that FAA does not have readily available historical information on RE&D subprograms, such as the number of FAA staff on the projects, project milestones, and the names of contractors or even the project manager. To meet our data needs, FAA undertook a special effort to obtain this information.

Indeed, maintaining and reporting such data are important to achieving the RE&D program's goals because with this information program managers could better evaluate program progress and plan future program direction. Moreover, those charged with overseeing the program also would have the historical information they need. For example, FAA needs this information to demonstrate to the Congress that the agency has an adequate vision of what is needed in aviation research. Last fall, FAA submitted a \$212 million budget to the Secretary of Transportation, a request which subsequently has been reduced to the \$165 million request your Subcommittee is evaluating. The acting service director of FAA's new RE&D control organization told us of his difficulty in defending the RE&D budget without good historical data.

To address its need for RE&D data, FAA has contracted to develop a management information system on RE&D subprograms. The system is being developed so that FAA can monitor variances in RE&D activities and projects from established goals and objectives.

FAA plans a phased implementation of the system with the first phase focused on the RE&D budget subsystem and scheduled for completion this July. Remaining phases are planned for implementation during fiscal 1990.

Positive Changes in the RE&D Program

FAA has taken some steps toward improving its RE&D program, such as reorganizing to establish central control; appointing Interservice working groups to develop RE&D requirements and formulate RE&D budgets; and initiating periodic program reviews to keep management informed of projects' status against plans, major accomplishments, and important milestones. We believe the initiation of these efforts is a step in the right direction. For example, central control will establish an appropriate organizational framework within which reprogramming criteria can be established. However, it is premature to assess their effectiveness, given the recent nature of these actions.

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To summarize, in issuing a new RE&D Plan, reorganizing itself to better manage research, and responding with plans for research in each of the areas named in the act, FAA has demonstrated a tangible desire to improve its program and to respond to congressional direction. Some additional steps still need to be taken, however, such as including cost and staffing data in the budget and highlighting the portion of the program that is devoted to long-term research.

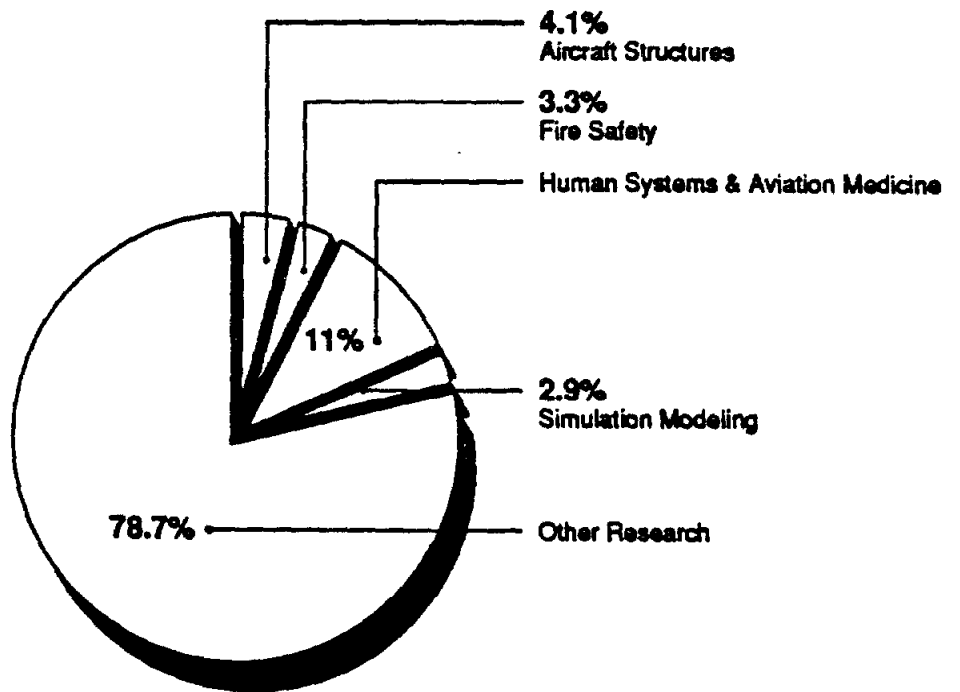
While it is premature to assess the effectiveness of FAA's new RE&D program, our work for Chairman Roe suggests that specific weaknesses in FAA's policies and procedures need to be addressed, including setting relative priorities among projects, establishing criteria for transferring funds among subprograms, and maintaining staffing and scheduling data. In our opinion, application of these management controls over the RE&D program will enhance FAA's responsiveness to congressional directives such as the Aviation Safety Research Act and ensure that FAA's research program focuses on the most pressing aviation needs.

TRENDS IN RESEARCH AREAS NAMED  
IN THE AVIATION SAFETY RESEARCH ACT  
FISCAL YEARS 1987 TO 1990  
(Dollars in thousands)

<u>Area of Research:</u> <u>Program/subprogram</u>	<u>FY 87</u>	<u>Obligations</u> <u>FY 88</u>	<u>FY 89<sup>a</sup></u>	<u>Proposed</u> <u>budget,</u> <u>FY 90</u>
<b>1. Human Systems and Aviation Medicine:</b>				
Human Systems and Operations	\$178	\$2,420	\$5,157	\$10,592
Aviation Medicine	4,502	3,766	7,082	6,513
FAA/NASA Cooperation	<u>714</u>	<u>812</u>	<u>938</u>	<u>961</u>
Subtotal	<u>5,394</u>	<u>6,998</u>	<u>13,177</u>	<u>18,066</u>
<b>2. Simulation Modeling:</b>				
National Airspace System Performance Analysis Capability	0	0	0	2,500
Airspace Systems Models	0	0	0	773
Simulation Models	<u>0</u>	<u>764</u>	<u>1,568</u>	<u>1,465</u>
Subtotal	<u>0</u>	<u>764</u>	<u>1,568</u>	<u>4,738</u>
<b>3. Aircraft Structures:</b>				
Aging-Aircraft	0	0	3,858	4,054
Crashworthiness/Airworthiness	<u>1,979</u>	<u>1,680</u>	<u>2,432</u>	<u>2,733</u>
Subtotal	<u>1,979</u>	<u>1,688</u>	<u>6,290</u>	<u>6,787</u>
<b>4. Fire Safety:</b>				
Aircraft Systems Fire Safety	<u>3,892</u>	<u>3,544</u>	<u>4,321</u>	<u>5,547</u>
<b>Grand Total</b>	<u>\$11,265</u>	<u>\$12,986</u>	<u>\$25,356</u>	<u>\$35,138</u>

<sup>a</sup>Fiscal year 1989 obligations are estimated as of January 31, 1989

**PERCENTAGE OF FY 90 R,E&D  
BUDGET REQUEST DEVOTED TO  
SPECIFIC ACTIVITIES LISTED IN THE  
AVIATION SAFETY RESEARCH ACT  
OF 1988**



FY 90 R,E&D Budget Request is \$165 million.

Aviation Medicine program includes work on human factors associated with Aging-aircraft.

Other Research category includes all R,E&D subprograms not specifically identified in the Aviation Safety Research Act of 1988.