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REPORT BY THE

# Comptroller General

OF THE UNITED STATES

~~9417~~

## Selected Budget Issues In The Federal Aviation Administration

In this report GAO concludes that:

- The Federal Aviation Administration's automation of flight service stations should be fully funded in fiscal year 1980. Flight service stations provide assistance to pilots.
- An extension from 3 years to 5 years in the obligational availability of the facilities and equipment appropriation, as FAA requested, will not necessarily slow down obligation rates.
- The private sector does not have a flight inspection training simulator of the type desired by FAA available for lease. FAA needs to further consider an alternative proposal from the private sector which could provide needed training.

This report was requested by the Chairman, Subcommittee on Transportation, House Committee on Appropriations.



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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

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The Honorable Robert B. Duncan  
Chairman, Subcommittee on  
Transportation  
Committee on Appropriations  
House of Representatives

Dear Mr. Chairman:

Your predecessor requested that we review a number of issues which were raised during the committee's review of the Federal Aviation Administration's (FAA's) fiscal year 1979 budget. These issues are expected to be raised again in subsequent FAA budgets. Specifically, we were asked to:

- Review the projected savings FAA believes will result from fully funding its flight service station 1/ automation program and determine how the full funding concept relates to the way other transportation projects are financed.
- Determine whether the availability of the facilities and equipment appropriation should be extended from 3 years to 5 years, as FAA requested for the past 2 years.
- Determine, by comparing costs, whether FAA should purchase a flight inspection simulator for training, considering the availability of such equipment in the private sector.

The results of our review are discussed in detail in appendix I and are summarized briefly below.

FULL FUNDING FLIGHT SERVICE  
STATION AUTOMATION PROGRAM

We believe a program or project is fully funded when the budget authority requested and made available (funds appropriated) is for the total cost of the program or project to be initiated in the budget year. We have issued

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1/Flight service stations brief pilots on weather conditions and file a pilot's flight plan.

several reports addressing full funding, copies of which have been given to the committee staff. As discussed in those reports, we believe full funding strengthens the congressional decisionmaking process; increases the Congress initial control and oversight over total spending and outlays; and improves many aspects of management, including providing cost savings in conjunction with multiyear contracting.

In one of the reports (FGMSD-78-18, Feb. 23, 1978), we pointed out that the programs or projects financed by the Coast Guard's acquisition, construction and improvements appropriation appeared to be fully funded in that the budget authority (funds appropriated) represents the full amount for construction of projects begun in the year of the recorded budget authority.

Like the Coast Guard's acquisition, construction and improvements appropriation, the programs and projects financed by FAA's facilities and equipment appropriation also appear to be fully funded in that the budget authority provides all the funds needed to complete the programs or projects begun in the year of the budget authority.

In its fiscal year 1979 facilities and equipment budget, FAA requested but did not receive \$146.6 million, which together with \$27.9 million appropriated in fiscal year 1977 would allow FAA to fully fund automation of its 43 busiest flight service stations. FAA had estimated that full funding would save \$37.5 million, including \$26.3 million which FAA expected to realize from discounts on production of the automated system.

We believe FAA was premature in asking for full funding during fiscal year 1979 as an automated system had not been designed (this was to be accomplished during fiscal year 1979); thus, the cost estimates and requested funding levels based thereon were subject to change. More important, FAA had not planned to award a production contract until fiscal year 1980. Thus, this additional time would have enabled FAA to obtain better cost data, such as the budgeted cost data on production that it obtained from contractors being considered for the design/development phase. This budgeted cost data indicated that \$1 million to \$15 million could be saved if the production phase of flight service station automation were fully funded.

Because FAA plans to award a production contract late in fiscal year 1980 and has budgeted cost data on which to

make a more reliable cost estimate and funding request, we believe the flight service station automation program should be fully funded during fiscal year 1980.

AVAILABILITY OF THE FACILITIES AND  
EQUIPMENT APPROPRIATION FOR OBLIGATION

Beginning in fiscal year 1974, the Congress limited to 3 years the obligational availability of the facilities and equipment appropriation. Before that time appropriated funds were available for obligation for an indefinite period of time (no-year appropriation). This change from a no-year appropriation to a 3-year appropriation was made because of concerns expressed by the Appropriations Committees over unobligated balances. However, total fiscal yearend unobligated balances did not decrease with this change, thus suggesting that other factors besides the obligational availability of funds also affect unobligated balances.

Yearend unobligated balances in this appropriation are dependent on the interrelationship between new budget authority, the unobligated balance carried forward and annual obligations. For example, yearend unobligated balances increased in fiscal year 1974 and 1978-79 because new budget authority exceeded obligations. FAA rate of obligation is dependent on such factors as the nature, size, and type of programs and projects undertaken; the procurement leadtime required to obtain equipment/facilities; the level, utilization, and productivity of personnel; management practices regarding priorities and scheduling; and FAA's overall effectiveness.

In support of its fiscal year 1979 budget request for a 5-year appropriation, FAA analyzed 22 major programs to determine why appropriated funds could not be fully obligated within 3 years. FAA's analysis attributed lapsing funds to the long equipment delivery time required for complex electronic equipment--13 programs had equipment being delivered 3 years after funds for the program were appropriated--and the fact that FAA regional offices could not fully obligate project funds for equipment installation until this equipment was available.

Project funds allocated to the regions include construction cost for site preparation and salary and administrative expenses of installation, construction, and flight checking of equipment and facilities. Without equipment, regional project funds cannot be obligated. In the

22 programs FAA analyzed, 42 percent of the project funds allocated to the regions was still unobligated after 3 years; thus, these funds lapsed.

Our review of fiscal year 1976 facilities and equipment appropriated funds that lapsed at the end of fiscal year 1978 showed that the unavailability of equipment was the biggest reason for lapsing funds in the two regions reviewed. Other reasons for lapsing funds included such things as incompleting planning and land acquisition and site problems.

FAA has considered several possible solutions and concluded that a 5-year instead of a 3-year appropriation would be more compatible with its experience in obligating funds. Other solutions considered included a change in FAA's method of budgeting, which is still under consideration, and continuing with a 3-year appropriation.

FAA officials believed that no major or insurmountable problems were created by a 3-year appropriation. However, FAA officials said its workload was increased and difficulties were encountered in estimating lapsing funds when funds to complete the projects for which funds lapsed were requested and made available as new budget authority.

A 5-year appropriation would be more compatible with FAA's experience in obligating funds. As such, a 5-year appropriation should not in itself slow down FAA's rate of obligation, unless other factors affecting obligations are also changed. In addition, a 5-year appropriation should virtually eliminate lapsing funds; thus, eliminating the problems FAA encounters when new budget authority is made available to complete projects for which funds lapsed. In contrast, a 3-year appropriation gives the Congress an opportunity to review FAA's progress in obligating funds, especially when appropriated funds are expected to lapse.

With a 5-year appropriation, yearend unobligated balances could still increase if the total funds available annually for obligation, especially new budget authority, increases at a faster rate than FAA's annual obligations. However, yearend unobligated balances could be reduced (to possibly \$100 million) if FAA changed its method of budgeting. Salary and administrative expenses for facilities and equipment activities are currently budgeted on a project basis. Because equipment delivery and installation generally takes 2 to 3 years, salary and administrative expenses for equipment installation remain unobligated at the end of the budget year. If FAA budgeted for such expenses on an

annual rather than project basis, funds for salary and administrative expenses would be obligated for the most part at the end of the budget year.

This proposed method of budgeting is similar to the way the Coast Guard budgets for salary and administrative expenses in its acquisition, construction and improvements appropriation.

AVAILABILITY AND NEED  
FOR A SIMULATOR

FAA has modernized its aircraft fleet with jets and turboprop aircraft and equipped them with complex automated systems to enable fast and accurate flight inspections to determine the performance reliability of air navigation aids. To perform flight inspections with this modernized equipment, pilots and technicians must be trained. FAA believes this training could be expanded, enhanced, and performed at a lower cost by purchasing a combined cockpit/flight inspection simulator (see app. VII for diagram), but its requests for funds to purchase such a simulator have been denied repeatedly by the Appropriations Committees.

FAA's combined cockpit/flight inspection simulator was to consist of two distinct training stations, one for pilots and one for flight inspection technicians, physically and electronically integrated into one combined simulator. The pilot training station (see parts A and B in app. VII) was to be a replica of the cockpit of FAA's Sabreliner 80 flight inspection aircraft, and the technicians training station (see part E in app. VII) was to be a replica of the flight inspection equipment located in the rear of the Sabreliner 80. Both stations were to be mounted on one platform so that pilots and technicians could be trained as a team, and the platform was to be provided with motion to simulate the motion of an aircraft in flight.

In response to its March 1975 request for information, FAA received two responses: one to sell FAA a combined simulator meeting FAA specifications and an alternate proposal from Flight Safety International.

Flight Safety International proposed to lease FAA time on its Sabreliner 80 cockpit simulator and to provide on a lease basis a separate flight inspection station integrated electronically but not physically with the cockpit simulator. The price quoted by Flight Safety was only a rough estimate.

In addition, uncertainty existed as to whether Flight Safety planned to buy all the equipment necessary to build a flight inspection station or whether Government-furnished equipment was to be provided.

FAA recognizes that Flight Safety International's proposal could result in some savings to the Government, but it believes training would be adversely affected over the quality of training available from a combined cockpit/flight inspection simulator like the one it wanted to buy. FAA officials said this combined simulator would allow FAA to train pilots and technicians better in crew coordination, in that the action can be stopped in the simulator and mistakes identified to the benefit of both the pilot and technician. FAA also said that the combined simulator would provide an ample work area (see parts C and D in app. VII and app. VIII) for instructors and observers. Further, they said both the pilot and technician would be provided with motion, which Flight Safety believes is unnecessary for the technician station.

Because it considered Flight Safety International's proposal inferior, FAA did not consider it in its 1977 cost analysis. FAA did estimate what it believed would be the cost to lease a combined simulator, although it did not receive any contractor proposals for this. However, its estimates were based on numerous assumptions which may or may not prove true.

In estimating the cost to buy a combined simulator in its 1977 cost analysis, FAA used the \$2.9 million figure quoted by Atkins and Merrill, Inc. in response to FAA's 1975 request for information, adjusting this price for the cost of inflation and spare parts to arrive at an estimated purchase price of \$4.5 million. FAA, however, now has no assurance that Atkins and Merrill or even another contractor can deliver at this price. Price quotations were only provided by one contractor, and that price, despite FAA's adjustments, has been eroded by time. More important, Atkins and Merrill is now a subsidiary of Flight Safety International; thus, it is difficult to predict how either would respond today.

Private industry does not now have a combined cockpit/flight inspection simulator of the type FAA wants, nor has anyone offered to lease one to FAA. The alternative training method proposed by Flight Safety International--two separate simulators--could provide the necessary training, but the quality of training would be less than what FAA had



hoped to provide with a combined simulator. However, differences in the quality of training between the two options are difficult, if not impossible, to measure.

FAA should obtain current cost data on the purchase of a simulator and specific cost data on Flight Safety International's proposal. A cost comparison should then be made considering all cost to the Government including indirect cost; Federal, State, and local taxes lost if the Government purchased rather than leased a simulator; and the residual value of any Government assets.

When the cost difference between the two options is known, FAA should be given an ample opportunity to justify to the Appropriations Committees the additional cost (or savings) expected from purchase of a combined simulator compared to the intangible, nonquantifiable benefits that are expected. In this way the Appropriations Committees will be able to judge which option would be in the best interest of the Government considering cost as well as the quality of training.

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At your request, we did not take the time to obtain written agency comments, but we discussed the matters covered in the report with agency officials. Their comments are included in the report where appropriate.

As arranged with your office, we are sending copies of this report to the Chairman, Senate Appropriations Committee; the Director, Office of Management and Budget; the Secretary of Transportation; and others who have expressed an interest in this report. Copies will also be available to other interested parties who request them.

Sincerely yours,



DEPUTY Comptroller General  
of the United States



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ABBREVIATIONS

FAA	Federal Aviation Administration
F&E	facilities and equipment
FSS	flight service station
FY	fiscal year
GAO	General Accounting Office
OMB	Office of Management and Budget

FINDINGS AND CONCLUSIONS ON SELECTEDFEDERAL AVIATION ADMINISTRATION BUDGET ISSUESTHE FULL FUNDING BUDGET CONCEPT: WHAT IS IT?

In our February 1978 report to the Chairman, House Budget Process Task Force, on the application of full funding to Federal programs and activities (FGMSD-78-18, Feb. 23, 1978), we pointed out that the full funding concept originated in the early 1950s to cope with budgeting problems in the Navy's shipbuilding program. Construction of a Navy ship usually took 3 to 7 years. Before the full funding concept was used, the Navy shipbuilding program operated under contract authorizations with funds appropriated in annual increments as estimated to be required for contract expenditures during the budget year. Under the full funding concept, funds were provided at the outset for the total estimated cost of a given item. In 1961, the budget for the shipbuilding program expanded the concept to include what was called "end cost" budgeting, whereby the amount budgeted includes such growth factors as design and minor characteristic changes and changes in labor and material rates which would affect costs during the construction period.

We stated that the full funding concept used by the Department of Defense did not provide funding for an entire program; instead, it provided funding for the full cost of the number of items for which procurement will be started that year. For instance, if a total program provided for procuring 1,000 missiles to be purchased in increments of 100, full funding under the Department of Defense's definition would occur if procurement funds were provided in a given year to complete 100 missiles. We stated that some people would deem this as incremental funding in that the full cost for the 1,000 missiles was not funded at one time.

We stated that Office of Management and Budget (OMB) Circular No. A-11 issued in July 1962 provided for full funding of all major procurement and construction programs. We reported that the 1977 version of Circular A-11 stated that "Requests for major procurement and construction programs will provide for full financing of the entire cost." We also reported that the President, in submitting the 1979 budget to the Congress, had continued to support the full funding concept and had directed that all "new starts" be included under the full funding concept.

More important, we pointed out how the full funding concept improves many aspects of management; it can minimize construction delays, facilitate better budget estimates, and provide cost savings in conjunction with multiyear contracting. We also presented several concerns about full funding which included diminished control by the Congress over outlays, fluctuations in budget estimates, and increases in obligated balances. These concerns were more fully addressed in a subsequent report to the Chairman in September 1978. 1/

In enclosure II to our February 1978 report, we presented a schedule of appropriation accounts that appeared to be fully funded. One was the Coast Guard's acquisition, construction, and improvements appropriation. We believe the programs and projects financed from this appropriation appeared to be fully funded, in that the budget authority represents the full amount for construction of projects commenced in the year of the recorded budget authority.

In our September 1978 report, we reported that there was a generally accepted definition of full funding in use by civil agencies; that is:

"A program (or project) is considered to be fully funded if the budget authority requested and (made) available is for the total cost of that program to be initiated in the budget year."

We stated that we preferred this definition to the one used by the Department of Defense; however, that did not mean that the full funding concept as followed by the Department of Defense was inappropriate for its programs.

In our September report, we stated that full funding would strengthen the congressional decisionmaking process and increase the Congress' initial control and oversight over total spending and outlays consistent with the objectives of the Budget Control Act of 1974. Under full funding, the full dimensions and costs of any item are known by the Congress and the public when it is first presented for funding. We stated our belief that this knowledge facilitates congressional decisionmaking concerning funding priorities within the budget year spending ceiling. This is

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1/GAO report to the Chairman, House Budget Process Task Force, entitled "Further Implementation of Full Funding In The Federal Government" (PAD-78-80, Sept. 7, 1978).

because programs compete on a more equitable basis since the full funding concept emphasizes the full Federal investment involved in each new start. In contrast, full funding would require a higher budget authority ceiling than if programs were incrementally funded; thus, the political realities of implementing the full funding concept Government-wide may be difficult to accept.

Also, we pointed out that the impact of full funding on the budget and the economy was dependent on the timespan of outlays. For example, the future implications of a \$300 million program on the budget and the economy could be significant if the outlays were made over a 3-year period, whereas the impacts would be much smaller if outlays were spread over 30 years.

Although full funding could reduce the Congress ability to exercise shortrun control over outlays, we stated that if full funding were further implemented, the shortrun control over outlays could be changed through congressional policies governing this control. This issue was addressed in another GAO report "Analysis of Department of Defense Unobligated Budget Authority" (PAD-78-34, Jan. 13, 1978) in which we recommended that the Congress consider establishing some oversight procedures directed at the balance of total obligational authority.

Concerning budget estimates, we stated that agency officials told us that there would be problems in developing long-range estimates for full funding the total cost of multiyear projects. They cited uncertainty of estimates extending beyond 1 year and inflation as problems in making long-range estimates. Many agency officials expected that supplemental appropriations would be needed after multiyear estimates proved to be wrong. In contrast, some officials believed that full funding was an incentive to produce better estimates and to work within them.

Our September report identified a number of incrementally funded multiyear programs which had potential for conversion to full funding. To be considered a candidate for full funding, we believed a program (or project) should

- be a discrete, multiyear program with a planned completion date;
- be subject to total cost estimating;

- not be subject to changes in design that would affect funding levels significantly;
- be a commitment to the extent that there is clear evidence that the Government intends to fund the program to completion.

Although our February 1978 report stated that the programs and projects financed by the Coast Guard's acquisition, construction and improvements appropriation appeared to be fully funded, we would consider these programs and projects to be fully funded only to the extent they met the above program and project criteria. However, we did not attempt to determine to what extent the Coast Guard's programs and projects met this criteria.

#### THE FACILITIES AND EQUIPMENT APPROPRIATION

The Federal Aviation Administration's (FAA's) facilities and equipment (F&E) appropriation was established to finance the purchase/construction and installation of various facilities and equipment, including flight service stations (FSSs), to aid aircraft to safely navigate our Nation's airspace. The funds appropriated for facilities and equipment come from various taxes levied against the users of the Nation's airspace and are deposited into the Airport and Airway Trust Fund.

Like the Coast Guard's acquisition, construction and improvements appropriation, the programs and projects financed by the F&E appropriation also appear to be fully funded, in that the budget authority represents the full amount to complete the programs and projects commenced in the year of the recorded budget authority.

FAA contends that the programs and projects financed from this appropriation are fully funded. FAA officials told us that the funds appropriated each year include all the funds needed to design, purchase, install, and flight check facilities and equipment and to pay for any construction cost, FAA salary, and administrative expenses relating to each of these activities.

#### FLIGHT SERVICE STATION AUTOMATION AND FULL FUNDING

In March 1976, FAA requested and received \$27.9 million as part of its fiscal year (FY) 1977 F&E appropriation to initiate a \$237 million program to automate and consolidate



its flight service stations. In June 1976, FAA issued its master plan for automating/consolidating FSSs.

Under this plan, FAA had planned to develop 20 automated FSSs at its air traffic control centers 1/ and to consolidate therein 174 FSSs by 1984 at an estimated cost of \$285 million. FAA's long term goal was to consolidate all 292 FSSs into the 20 centers, but the remaining 118 FSSs were to be consolidated later.

With an automated FSS system, users were to have direct access to weather and aeronautical data and could directly file flight plans with no assistance from FSS specialists, thus enabling FAA to meet increasing and projected workloads without proportionate increases in staffing. FAA estimated that savings from automation/consolidation would begin to accrue in fiscal year 1984 and that cumulative savings of \$672 million could be realized by fiscal year 1990.

In January 1978, FAA issued a revised master plan that provided for automating its 43 busiest FSSs by linking them to flight service data processing systems at 14 of the 20 air traffic control centers. FAA estimated that this would cost \$174.5 million if the program were fully funded. This cost estimate was based on inflation through 1985.

FAA's cost estimate included funds to provide flight service data processing systems at the 6 remaining air traffic control centers, but these systems were not essential for automating the 43 busiest FSSs. However, the additional six systems are necessary to automate and/or consolidate additional FSSs as envisioned in the 1976 plan. A decision to automate/consolidate additional FSSs was to be made later but before 1983.

According to FAA's April 1978 cost analysis of alternative FSS system configurations, automation of the 43 busiest FSSs would reduce FY 1985 operating cost by about \$200 million whereas consolidation would reduce operating cost only an additional \$31 million.

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1/Air traffic control centers control an aircraft's flight between airports.

In March 1978 at OMB's request, FAA requested but did not receive \$146.6 million in its FY 1979 F&E budget, which together with the \$27.9 million appropriated for FSS automation in fiscal year 1977 would have allowed FAA to fully fund automation of the 43 busiest FSSs. According to FAA and OMB officials, full funding would enable the contractor to (1) spread fixed costs over several years and a larger number of units, resulting in lower unit prices, and (2) take advantage of quantity discounts from suppliers which could, if competition warranted, be passed on to the Government. They also believed that full funding would help standardize system equipment and operations by eliminating or minimizing systems changes and the multiple logistics, training, and software documentation programs necessary to accompany such changes.

FAA estimated that full funding could save \$37.5 million over the cost to incrementally fund FSS automation through a number of 1-year or multiyear contracts. FAA had estimated the cost to incrementally fund FSS automation at \$212 million (inflated dollars).

Of the \$37.5 million in savings, FAA expected to save \$26.3 million based on discounts on hardware cost. According to an FAA official, a discount of 22.5 percent was possible based on its experience and discussions with industry. An FAA official told us, for example, that one large contractor reportedly discounts its bids 10 percent for a 2-year contract and 5 percent for each additional year up to a maximum of 25 percent.

An additional \$7.3 million in savings was attributed to design to cost cuts in software development and 2 years less work by the contractor on the software development under full funding. According to an FAA official, FAA will have to perform under its operations appropriation some of the software work that the contractor was expected to perform if FSS automation was incrementally funded, thus negating some of this potential savings. The remaining \$3.9 million in savings represented a reduction in documentation, testing, and training based on reductions (savings) in hardware and software cost. Documentation, testing, and training is estimated based on a percentage of hardware and software costs.

According to an FAA official, the estimation of \$37.5 million in savings attributable to full funding was hastily prepared. This official said that when the decision was made to request full funding, FAA had only a short time

before budget submission to convert its cost estimates from incremental funding to full funding.

At the time FAA requested full funding for FSS automation, it planned to select up to three contractors to design and develop an automated system for FSSs. FAA planned on starting this phase during FY 1979. This phase was to be followed by award of a production contract to one of the contractors sometime in FY 1980.

In June 1978, FAA requested proposals for the development/production of an automated FSS system. Since its request for full funding for FY 1979 had been rejected by the House Appropriations Committee, FAA planned on using some of the funds appropriated for FSS automation in FY 1977 to award the necessary contracts for the design/development phase.

In requesting proposals from potential contractors, FAA requested the contractors to provide budgeted cost data for production of the automated system on both an incremental and full funded basis. According to an FAA official, the budgeted cost data FAA received from interested contractors indicates a savings of \$1 million to \$15 million is possible in the purchase of hardware if the production phase is fully funded.

FAA now plans to award a contract for the design/development phase by July 1979. An FAA official said that the contractors selected for this design/development phase will be required to provide firm cost data for the production phase on an incremental and fully funded basis. This official also said that if savings were possible from full funding, FAA would be asked to request full funding for the production phase in its FY 1981 budget. Although a production contract is expected to be awarded late in FY 1980 (August 1980), another FAA official told us that if FAA requested full funding for FY 1981, it would have to ask the Appropriations Committees for either an advance on its FY 1981 budget authority or permission to use its existing budget authority if a contract is ready for award in August 1980 as planned.

### CONCLUSIONS

FAA's automation of 43 FSSs was not a good candidate for full funding during FY 1979. An automated system had not been designed, and so the cost estimates and requested funding levels based thereon could be subject to change.

Further, FAA did not plan to enter into a production contract until FY 1980 after the design/development phase was completed. With the additional time provided by the development phase, FAA could have obtained better cost data, such as the budgeted cost data for production that FAA requested and received from potential design/development contractors.

Because FAA plans to award a production contract in FY 1980 (August 1980) and has budgeted cost data for the production phase on which to make a more reliable cost estimate, FSS automation should be considered for full funding in the FY 1980 budget. Besides the other advantages that full funding can provide (see p. 1), some potential savings also appear possible by fully funding the production phase of FSS automation.

With award of the production contract scheduled late in FY 1980 and the possibility that contract award could slip, full funding of FSS automation could be deferred until the FY 1981 budget, thus allowing FAA an opportunity to adjust its funding request based on the expected availability of firm production cost data. However, some alternative action, such as a supplemental appropriation or an advance on FAA's FY 1981 budget authority, would have to be taken to avoid delay of contract award should FAA be prepared to award a production contract on schedule.

#### AVAILABILITY OF THE FACILITIES AND EQUIPMENT APPROPRIATION FOR OBLIGATION

Until 1974, F&E appropriated funds were available for obligation for an indefinite period of time (no-year appropriation). Beginning with the FY 1974 appropriation, the Congress limited to 3 years the obligational availability of the F&E appropriation. This change to a 3-year appropriation occurred as a result of concerns expressed by the House and Senate Appropriations Committees over unobligated balances in the F&E appropriation.

Total fiscal yearend unobligated balances, however, did not decrease with this change from a no-year appropriation to a 3-year appropriation. In fact, yearend unobligated balances have increased in total dollars and fluctuated as a percentage of the total funds available for obligations, as shown in following table, thus suggesting that other factors besides the obligational availability of funds also affect unobligated balances.

<u>Fiscal year</u>	Total funds available for <u>obligation</u>	<u>Yearend unobligated balances (note a)</u>	
		<u>Amount</u>	<u>As percent of total funds available</u>
(000,000 omitted)			
1971	\$404	\$157	39
1972	553	199	36
1973	502	292	58
1974	542	334	62
1975	561	326	58
<u>b/1976</u>	571	<u>c/287</u>	50
1977	487	<u>c/285</u>	58
1978	485	<u>c/317</u>	65
1979	598	(est.) <u>c/305</u>	51

a/Includes balances from no-year appropriations and any outstanding 3-year appropriations.

b/End of transitional quarter.

c/Includes unobligated funds that ceased to be available for obligation at the end of the fiscal year (in other words, the funds lapsed).

Yearend unobligated balances for the F&E appropriation are also dependent on the interrelationship that exist between new budget authority, unobligated balances carried forward, and annual obligations. As shown in the following table, yearend unobligated balances increased in FYs 1974, and 1978-79 because the new budget authority in those years exceeded obligations and decreased in the other fiscal years as obligations were greater than the new budget authority.

	Fiscal year					
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
	----- (000,000 omitted) -----					
Unobligated balances available beginning of year	\$292	\$334	\$326	\$287	\$276	\$261
New budget authority	<u>250</u>	<u>227</u>	<u>245</u>	<u>200</u>	<u>209</u>	<u>337</u>
Actual obligations (note a)	<u>208</u>	<u>235</u>	<u>284</u>	<u>202</u>	<u>b/168</u>	<u>c/293</u>
Increase/(decrease) in unobligated balances	<u>42</u>	<u>( 8)</u>	<u>( 39)</u>	<u>( 2)</u>	<u>41</u>	<u>c/44</u>
Yearend unobligated balance (note d)	<u>\$334</u>	<u>\$326</u>	<u>d/\$287</u>	<u>d/\$285</u>	<u>d/\$317</u>	<u>c/d/\$305</u>

a/Includes obligations made under budget authority approved in prior fiscal years.

b/FAA officials said an additional \$40 million would have been obligated had FAA not missed awarding a contract for VORTAC replacement.

c/Current estimate.

d/Includes unobligated funds that lapsed.

FAA's annual obligations are dependent on such factors as the nature, size, and type of programs and projects undertaken; the procurement leadtime (cycle) required to obtain equipment/facilities; the level, utilization, and productivity of personnel; management practices regarding priorities and scheduling; and FAA's overall effectiveness. However, some of these factors, such as priorities, could change as a result of changes in the length of time funds are available for obligation; thus, possibly affecting obligation rates at least for specific appropriations.

FAA EXPERIENCE WITH  
3-YEAR APPROPRIATIONS

With a 3-year appropriation, FAA has not been able to obligate all F&E appropriated funds within the 3-year period of availability; thus, funds have ceased to be available for obligation--that is, they lapsed. Details on lapsing funds follow.

<u>Fiscal year appropriation made</u>	<u>Amount appropriated</u>  (millions)	<u>Last fiscal year funds available</u>	<u>Amount lapsing at end of 3 years</u>  (millions)	<u>Percent of appropriated funds that lapsed</u>
1974	\$250	a/1976	a/\$ .4	b/.0
1975	227	1977	9.7	4.2
1976	245	1978	55.3	22.6
1977	200	1979	c/42.0	21.0

a/End of transitional quarter.

b/Less than 1 percent.

c/Estimate as of September 30, 1978.

In support of its FY 1979 budget request for a 5-year F&E appropriation, FAA analyzed 22 major programs totaling \$320 million to determine why appropriated funds could not be fully obligated within 3 years. FAA's analysis attributed lapsing funds to the long equipment delivery time required for complex electronic equipment and the fact that FAA regional offices could not fully obligate project funds for equipment installation until this equipment was available. Project funds allocated to the regions include construction costs for site preparation and salary and administrative expenses relating to installation, construction and flight checking of equipment and facilities. In the 22 programs analyzed, 42 percent of the funds allocated to the regions was unobligated at the end of 3 years. Appendix II shows the rates of obligation by FAA organizational components for the 22 programs analyzed.

Of the 22 programs FAA analyzed (see app. III), 13 had equipment being delivered 3 years after funds for the program were appropriated. (Because of slippages in delivery, 15 programs are now expected to have equipment delivered 3 years after funds were appropriated.) Lapsing funds for the 13 programs totaled about \$22 million. Three of the 13 programs (now 4 of 15 programs) had the first equipment being delivered 3 years after funds were appropriated. A selected list of contracts with equipment being delivered more than 3 years after the year funds were appropriated follows.

<u>Item</u>	Months until last delivery ( <u>note a</u> )
Mark IE ILS	50
ARTS II (note b)	<u>c</u> /70
ARTS IIIa	45
RBPM (Beacon performance monitors)	54
DARC	61
ARSR-3 (note b)	<u>d</u> /53
Beacon test set/interogator (ATCBI) (note b)	60

a/Months elapsed from beginning of fiscal year in which funds were appropriated until month of last delivery.

b/First delivery was more than 3 years after the fiscal year in which funds were appropriated.

c/Now 78 months.

d/Now 66 months.

The average procurement cycle for the 22 programs analyzed was as follows.

Start procurement	Contract award	First delivery	Funds lapse	Last delivery
<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>
0	10	26	36	41
MONTHS				

FAA claims that it has acted to improve management of its procurement process to reduce the procurement cycle time by

--budgeting only for items which can be procured the same year as funds are appropriated,



- starting procurement planning 6 months before receipt of its appropriation, and
- awarding more multiyear/option and turnkey contracts.

Despite this action, delays are still inevitable. For example, FAA may only receive one bid thus necessitating readvertising the contract, sometimes by combining it with equipment to be purchased from another appropriation to make the contract more appealing or negotiating with the bidder--actions that delay award of the contract and equipment delivery. Further, once a contract is awarded, the contractor may not be able to meet scheduled delivery dates. Although the contractor may be delinquent in his deliveries, contract cancellation is generally not prudent according to FAA officials as it invites further delays when the process to procure the equipment starts anew.

#### TYPES OF PROJECTS AND REASONS FOR LAPSING FUNDS

At the end of FY 1978, the last year funds for the FY 1976 F&E appropriation were available for obligation, about \$55.3 million of the \$245 million appropriated in FY 1976, or about 23 percent, lapsed. (See p. 9.) Of the \$55.3 million lapsing, FAA's southern and southwest regions lapsed almost \$14.8 million, or about 27 percent, on 767 projects. Appendix IV contains a listing of selected projects and the amounts lapsed for the two regions. FAA's Airway Facility Service lapsed about \$12.2 million, or about 22 percent.

The reasons funds lapsed in the two regions varied from project to project, but equipment availability was cited by FAA regional officials as the biggest factor. In the two regions, 427 of the 767 projects, about 57 percent, could not be completed because equipment was not available. Lapsing funds on these 427 projects totaled about \$7 million, or 48 percent, of the \$14.8 million lapsed by the two regions.

Other reasons given for lapsing funds included (1) planning had not been started, finalized, or completed, (2) new projects financed by the FY 1976 appropriation were established late in FY 1978 (late assignments), and (3) scheduling, contracting (necessity to rebid), technical, environmental, land acquisition, and site problems. In addition, a number of projects for which funds lapsed had been completed, but the surplus funds from these projects were needed to cover deficits on other projects for which

funds were to lapse. FAA regional officials told us that had these problems not existed, equipment for some of these projects would not have been available.

Appendix V shows for each of the two regions visited the reasons for lapsing funds during FY 1978 and the number and dollar amount of lapsing funds for each reason listed.

According to FAA officials, the \$12.2 million lapsed by FAA's Airway Facility Service, which is responsible for procuring equipment, consisted of about \$4.2 million for contingencies, such as contract modification, and provisioning (purchase of parts) and about \$8 million for installation, the funds for which had not been allocated to the regions because equipment was not expected to be available. According to FAA officials, a small part of the lapsing funds was for contracts not yet awarded.

On September 30, 1978, FAA estimated that about \$42 million of its FY 1977 appropriation would lapse at the end of FY 1979. (FAA now estimates that \$44.5 million will lapse.) Of the \$42 million expected to lapse, FAA's southwest region estimated that it would lapse about \$2.2 million, or 5.2 percent, and FAA's Airway Facilities Service estimated that it would lapse about \$21 million, or about 52 percent. The \$21 million includes about \$10 million for FSS automation.

At a minimum, FAA's southwest region believed it would lapse \$1 million on 91 projects compared to its September 1978 estimate of \$2.2 million. Equipment availability was cited as the reason on 84 percent of the projects. Appendix VI contains a listing of some of the projects which are expected to lapse funds at the end of FY 1979.

According to FAA officials, FAA has considerable flexibility in scheduling projects. For example, equipment initially slated for one project can be diverted to another project either within or between regions. Equipment purchased with one year's appropriation can even be used on approved projects being funded from another year's appropriation. When this occurs, the equipment from the new project when it becomes available is used to complete the old project. Projects can be canceled and new ones added. Surplus funds from completed projects can be reprogrammed for new projects or to cover deficits on other projects. According to FAA officials, this flexibility is needed to meet changing conditions and priorities to assure that equipment is promptly

installed, if not at the site for which it was initially scheduled because of problems there or higher priorities elsewhere, then at another eligible location.

FAA regional officials also told us that a high priority was not given to an appropriation's expiration in scheduling projects. They stated that other factors, such as safety, congressional/community interest, regional priorities, equipment and staff availability, and length of job, also needed to be considered. One regional official said that the regions also had to conform their work schedules to (1) provide supervision and support for contractor installation work scheduled under turnkey contracts awarded by FAA headquarters, (2) promptly utilize buildings made available by other entities, or (3) conform to actions taken by others, such as the Weather Service, in projects of mutual interest.

### POSSIBLE SOLUTIONS

In analyzing its F&E appropriation, FAA recognized three possible solutions:

- Continue as is with a 3-year limitation.
- Extend the 3-year limitation to 4, 5 or 6 years, preferably 5 years.
- Continue the 3-year limitation for equipment procurement but finance installation-related costs annually.

According to FAA officials, no major or insurmountable problems are created by a 3-year F&E appropriation other than the uncertainty that exists as to whether lapsing funds will be made available to complete the projects. According to FAA officials, the biggest problems are encountered when lapsing funds are made available as new budget authority to complete the projects for which funds lapsed. Specifically, they said that difficulties were encountered in estimating lapsing funds and the administrative workload was increased unnecessarily.

FAA officials told us that they have to estimate the amount of lapsing funds at least 9 months before they lapse so that appropriate provisions can be made in FAA's budget request to obtain funds to complete the projects for which funds would lapse. FAA officials said that if FAA underestimates lapsing funds and if the Congress makes lapsing funds available as new budget authority on the basis of this

estimate, any shortage in funds to complete the projects would have to be made up from funds appropriated for new projects, an action that could delay or even necessitate canceling new projects.

FAA underestimated the funds that actually lapsed on both its FYs 1974 and 1976 appropriation; funds for these appropriations lapsed at the end of FY 1976 transitional quarter and FY 1978, respectively. Although the actual funds lapsing on the FY 1974 appropriation were only a few hundred thousand dollars more than FAA's estimate, lapsing funds on its FY 1976 appropriation were almost \$1 million more than its estimate of \$54.4 million. Because the new budget authority for FY 1979 only included \$54.4 million based on FAA's estimate to complete the projects for which funds lapsed, rather than the \$55.3 million that actually lapsed, FAA officials said this shortage would have to be made up from funds provided for other new projects.

FAA also claims that additional administrative work is created when lapsing funds are made available as new budget authority. FAA officials said that a project authorization has to be issued to each office to withdraw lapsing funds and when lapsing funds are made available as new budget authority, FAA has to turn around and issue new project authorizations. In addition to maintaining the old project cost account, FAA officials said a new project cost account has to be established. FAA officials explained that the old account was needed to handle any claims arising from work charged to that account; the new account was needed to keep track of obligations; and both accounts were necessary to account for total project cost so that the Federal investment in the completed project could be capitalized (recorded as an asset).

FAA has repeatedly requested that the F&E appropriation be extended from a 3-year to a 5-year appropriation. FAA officials said this change was warranted based on FAA's obligation experience on the 22 major programs it analyzed. (See p. 8 and app. II.) FAA's analysis showed that appropriated funds for the most part could be totally obligated within 5 years--only 4 percent of the funds allocated to the regions remained unobligated after 5 years. (See app. I.) Further, FAA officials said a 5-year appropriation would eliminate the problems experienced when funds from a 3-year appropriation were expected to lapse.

FAA also considered, and still is, changing its method of budgeting to request for each budgeted activity or

project only those funds needed to purchase equipment and award construction contracts for site preparation. Funds needed for salary and administrative expenses would be requested separately, rather than on a project basis, but only in amounts necessary to cover obligations during the budgeted year. Under this method of budgeting, FAA officials believed fiscal yearend unobligated balances could be reduced to \$100 million assuming annual appropriations of \$250 million.

This proposed method of budgeting is similar to the Coast Guard's method for its acquisition, construction and improvements appropriation.

FAA officials expressed some concerns with this method of budgeting. First, no assurance exists that annual installation funds would be made available; thus, project completion could be delayed. FAA officials also believed that the Appropriations Committees would want FAA to address their annual request for salary and administrative expenses, resulting in a review of each project twice: once when the funds to purchase the equipment were requested and again when salary and administrative expenses were requested to cover installation. In addition, FAA officials believed that under this method of budgeting, the F&E appropriation would no longer be fully funded.

FAA officials agreed that a 5-year appropriation would not eliminate unobligated balances. Further, they said the unobligated balances achievable from a change in the method of budgeting, although satisfactory to one Congress, could be found objectionable later by another Congress. More important, FAA officials said that any change in the budgeting or bookkeeping procedures would not result in quicker equipment installation, which they believed was the bottom line.

### CONCLUSIONS

A 5-year F&E appropriation would be more compatible with FAA's existing experience in obligating funds. As such, a 5-year appropriation should not in itself slow down FAA's rate of obligation, unless other factors affecting obligation rates, such as priorities and project scheduling, are also changed. A 5-year appropriation should virtually eliminate lapsing funds, thus eliminating the problems FAA encounters when lapsing funds are made available as new budget authority to complete the projects for which funds lapsed. In contrast, a 3-year appropriation gives the

Congress an opportunity to review FAA's progress in obligating funds, especially when funds are expected to lapse.

Although a 5-year appropriation may not affect FAA's rate of obligation, yearend unobligated balances could still increase if the total funds available annually for obligation, especially new budget authority, increases at a faster rate than FAA's annual obligations. However, yearend unobligated balances could be reduced (to possibly \$100 million) if FAA budgeted for salary and administrative expenses on an annual rather than project basis. With this change in budgeting, the funds requested for a budgeted activity or project should include only the amount needed to purchase equipment and pay construction cost for site preparation. Because 3 years or longer is sometimes required to obligate funds for construction cost, lapsing funds with this change in budgeting would be less with a 3-year appropriation but they would be virtually eliminated with a 5-year appropriation.

Although this proposed method of budgeting is a deviation from full funding as FAA knows it, we believe in the case of the F&E appropriation that salary and administrative expenses and other recurring expenses are proper for funding on an annual rather than project basis. A certain level of funding is required annually for salaries and administrative expenses no matter what projects are being carried out; thus the funds for this do not necessarily need to be fully funded on a program or project basis. Also programs or projects that meet our criteria for full funding (see p. 3) would still be fully funded if salaries and administrative expenses were budgeted for annually, so long as the funds appropriated for them were sufficient to purchase equipment and facilities and pay contractors for any related construction.

This change in FAA's method of budgeting should be initiated by returning to the Treasury (the Airport and Airway Trust Fund) any funds for salary and administrative expenses or other recurring expenses contained in the yearend unobligated balances.

This change in FAA's method of budgeting and the return of salaries and administrative expenses to the Trust Fund would not affect the number of projects FAA has underway.

FLIGHT INSPECTION TRAINING

To better perform its flight inspection mission, FAA modernized its aircraft fleet with jets and turboprop aircraft and equipped them with complex electronic systems to enable fast and accurate automated performance quality evaluations of air navigation aids. To realize the benefits of this modernization program, pilots and technicians must be trained in the equipment, methods, and procedures to be used.

The training of pilots and technicians is currently accomplished at FAA's training academy in Oklahoma City, Oklahoma, FAA flight inspection field offices, and contractor facilities.

Flight inspection training starts at the FAA academy with 4 weeks of instruction in airspace system inspection which is designed to provide exposure to some of the basic flight inspection equipment, procedures, and techniques used in flight inspecting air navigation aids. This training initially included inflight training to further familiarize pilots and technicians with the basic equipment and techniques of flight inspection. During FY 1978, eight pilots and nine technicians received training in basic airspace system inspection but no inflight training was given in this course. FAA believed this training was inadequate without inflight training and in November 1978, the academy was instructed to reinstitute use of the DC-3s for basic airspace systems inspection training.

In FY 1978, FAA instituted a computer managed self-study program to instruct pilots and technicians in flight inspection procedures and techniques. This training program, which is administered in FAA's flight inspection field offices, uses programmed learning to permit students to progress at their own pace and a terminal keyboard, computer, and a touch sensitive, television-type screen to simulate automated flight inspection equipment. Through this program, students are taught the basic procedures and data inputs needed to operate automated flight inspection equipment. The program was tried as a 6-month test which ended in December 1978, and the benefits of this program are still being evaluated.

Before the computer managed instruction program was started, up to 2 weeks of training (1 week for pilots and

2 weeks for technicians) in basic flight inspection procedures and techniques were given at FAA's training academy, including inflight training.

Following this training program, pilots and technicians return to the FAA academy for 4 weeks of additional training in automated flight inspection procedures and techniques. In this program, pilots and technicians learn to use area/inertial navigation equipment in flight inspection data gathering and receive experience with automated flight inspection equipment by using laboratory equipment and inflight training. Inflight training takes place aboard FAA's Sabreliner 80s and aero commanders where pilots and technicians are trained together with each receiving 7-1/2 hours of actual experience. During FY 1978, 84 pilots and 56 technicians received this training.

Before pilots can train in the Sabreliner 80 or aero commander, they must be qualified for the particular aircraft. Initial qualification training for the Sabreliner involves 15 hours of training in a cockpit simulator at a contractor's facility, 10 hours of inflight training, and numerous hours of classroom instruction. Initial qualification training for the aero commander consists of 25 hours of inflight training and classroom instruction at the FAA academy. FAA plans to convert 15 hours of aero commander inflight training to a cockpit simulator obtained by contract.

After qualifying, Sabreliner 80 and aero commander pilots must take yearly refresher training, which consists of 6 hours of cockpit simulator training and classroom instruction at contractor facilities.

#### NEED FOR COCKPIT/FLIGHT INSPECTION SIMULATOR

FAA believes a combined cockpit/flight inspection simulator is needed to improve the training of its flight inspection pilots and technicians. This combined simulator was to consist of two distinct training stations--one for pilots and one for flight inspection technicians--physically and electronically integrated into one combined simulator. The pilot training station (see parts A and B in app. VII) was to be a replica of the cockpit of FAA's Sabreliner 80, and the technicians training station (see part E in app. VII) was to be a replica of the flight inspection equipment located in the rear of the Sabreliner 80. Both stations were to be mounted on one platform so that the pilot and



technician could be trained as a team, and the platform was to be provided with six different types of motion to simulate the motion of an aircraft in flight.

FAA believed the quality of training would be enhanced because this simulator would (1) allow training to be stopped and the training problem analyzed and played back, (2) provide problem solving situations regarding failures and deviations in components of the airway system, and (3) provide practice relating to equipment malfunctions, aircraft emergencies, and abnormal conditions--actions which are difficult, impossible, or too risky to perform during in-flight training. In addition, simulator training would not be affected by adverse weather, and the simulator would permit FAA to develop, test, and train personnel in new procedures before implementing them in actual flight inspection.

FAA also believed a simulator would provide needed flexibility in that pilots, including foreign and military pilots which are also trained by FAA in flight inspection procedures, would not be required to meet all the requirements--medical, physiological, initial qualification, and refresher qualification requirements--for operating specific types of aircraft. FAA believed a simulator would provide needed training capacity, thus eliminating the need for additional flight inspection aircraft and facilitating phaseout of the DC-3s. FAA also stated that with a simulator, it would be able to centralize training at the academy. In addition, FAA stated that a simulator would reduce training cost and fuel consumption.

In its FY 1975 budget submission, FAA requested funds to buy a combination cockpit/flight inspection simulator, but funds were denied by the House Appropriations Committee until a determination could be made that FAA could not lease the equipment or obtain necessary training from the private sector. The committee, however, did agree to entertain a later proposal to purchase the simulator provided adequate justification was presented and if satisfactory arrangements could not be made with industry.

Following this action, FAA issued specifications for a simulator, and in March 1975 it distributed a request for information to industry to obtain price quotations on three basic alternatives for a combined cockpit/flight inspection simulator and to solicit alternative proposals. The three alternatives included:

- Purchase a simulator for installation at FAA's training academy in Oklahoma City.
- Lease a simulator with an option to purchase.
- Purchase simulator time (at contractor's site). This option included various arrangements for contractor and/or FAA instructors and classroom facilities.

Of the 46 companies that received the request, 2 responded. One company (Atkins and Merrill, Inc.) proposed to sell FAA a simulator built to specifications for about \$2.9 million without spare components. Flight Safety International, which currently leases cockpit simulator time to FAA, submitted an alternative proposal for providing the required training by incorporating its existing cockpit simulator with construction of a physically separate flight inspection station.

FAA claimed that each respondent's proposal was fully examined and that the results of its analysis clearly indicated that it would be advantageous to buy the combination cockpit/flight inspection simulator and requested funds for this in its FY 1978 budget. Again FAA's request was denied on the basis that training equipment was available in the private sector.

In response to this denial, FAA revised its cost analysis and again concluded that purchasing a simulator would be more advantageous than contracting with outside sources. Again FAA requested funds in its FY 1979 budget to purchase a simulator and again its request was rejected.

#### FLIGHT SAFETY INTERNATIONAL'S PROPOSAL

Flight Safety formally proposed in May 1975 to lease FAA time on its Sabreliner 80 cockpit simulator and to provide on a lease basis a separate flight inspection station which would be integrated, electronically but not physically, with Flight Safety's cockpit simulator. Flight Safety believed its proposal would provide needed flexibility in that the cockpit simulator could be used separately for pilot training for FAA and other Flight Safety customers and yet meet FAA needs for flight inspection training in that the cockpit and flight inspection station could be operated together when joint pilot and technician training was needed. The Flight Safety proposal indicated that the flight inspection station would have motion similar to the cockpit simulator and that the motion of the two simulators

would be synchronized. As in the case of a Government-purchased simulator, the Government was to provide the instructors. Flight Safety believed that this alternative method of training would sharply reduce cost and that "training effectiveness would not be adversely affected."

A number of uncertainties exist with this proposal. For example, it was not clear whether Flight Safety planned to buy all the equipment necessary to build an operational flight inspection station or whether Government-furnished equipment was to be provided. In addition, Flight Safety proposed to lease 3,500 hours of time to FAA at \$175 per hour but acknowledged that this was a rough estimate. Flight Safety lacked information about how long this type of contract would run, thus making amortization of cost difficult to determine.

Subsequent discussions to resolve these issues have not proved fruitful and, if anything, additional issues have been raised. A Flight Safety official told us that Flight Safety had offered to provide the two separate but integrated simulators at the FAA academy but that this was rejected by FAA on the grounds that it could not lease space to a contractor. This official also said that FAA wanted exclusive use of the simulator; something Flight Safety was not willing to provide. FAA also maintained that it wanted the cockpit simulator and flight inspection station physically combined and provided with motion to provide the quality training it desires. Flight Safety now questions whether any motion at all is needed in the flight inspection station and sees no real reason for having a physically combined system, features it believes will unnecessarily increase the Government's cost.

#### FAA'S ANALYSIS OF FLIGHT SAFETY INTERNATIONAL'S PROPOSAL

In analyzing Flight Safety's proposal, FAA recognized that this alternative method of training could result in some savings to the Government in that the engineering and integration costs of combining a separate flight inspection simulator with an existing cockpit simulator would be less than those incurred in building a combined simulator of the type FAA desired. However, FAA believed training effectiveness would be adversely affected under this alternative training method.

An FAA official told us that with a combined simulator FAA could train pilots and technicians in crew coordination better than with two separate simulators. In turn, this official believed the flight inspection mission could be accomplished more smoothly and with less coordination, thus providing an environment on board the aircraft that was more conducive to safety.

In an actual flight inspection mission, the pilot and technician must coordinate their actions. Although this coordination takes place by radio, an FAA official told us this coordination could be reduced or minimized if the pilot and technician had a greater understanding of the interrelationships that exist between each other's duties and actions. This official said that with a combined simulator, the pilot and technician would be trained more as a team where the action of either can be stopped and mistakes identified for the benefit of both the pilot and technician. This official said that under Flight Safety's proposal this would be difficult, if not impossible, to do.

FAA officials stated that the combined simulator that they would like to purchase would also provide an ample work area (see parts C and D in app. VII and app. VIII) for instructors and student observers, thus providing in effect a miniclassroom; something that would not be available if two separate simulators were provided, as proposed by Flight Safety.

Besides the enhanced crew training and ample work area, FAA officials said that the flight inspection training station, as a result of being physically combined with the cockpit training station, would be provided with the same simulated motion as provided to the pilot and as experienced in actual flight. Further, an FAA official told us that, from the standpoint of training pilots, the combined simulator, if provided with six types of motion and a visual system, would have the potential to enable FAA pilots to practice takeoffs and landings to such an extent that it would be possible for pilots to receive most of their initial qualification training in the simulator with only a minimum amount of inflight training. This official said that Flight Safety's simulator, although good, was not sophisticated enough to accomplish this.

This FAA official, however, did say that if Flight Safety was willing to physically combine a flight inspection station with its Sabreliner 80 cockpit simulator, FAA would

consider seriously a proposal to lease it. Although FAA did not receive any contractor proposals for leasing a combined simulator in response to its 1975 request for information, it did estimate in its 1977 cost analysis what a combined simulator would cost to lease.

FAA's estimates, however, were based on numerous assumptions which may or may not prove valid. For example, FAA estimated that it would cost the leasor at least \$2,250,000 to buy a flight inspection simulator and to engineer and modify an existing cockpit simulator to provide a combined simulator and that the contractor would amortize this cost over 5 years. In addition, the Government's cost to lease excluded the cost to permanently relocate FAA instructors, since Government training was to be provided at the contractor's facility.

#### COST OF A GOVERNMENT-PURCHASED SIMULATOR

In estimating what it would cost the Government to purchase a simulator, FAA used the \$2.9 million <sup>1/</sup> quoted by Atkins and Merrill in the spring of 1975 and adjusted the price to account for the cost of inflation and spare components to arrive at an estimated purchase price of \$4.5 million. FAA, however, now has no assurance that Atkins and Merrill or even another contractor can deliver at this price. Price quotations were provided by only one contractor and that price, despite the adjustments made by FAA, has been eroded by time. Further, Atkins and Merrill is now a subsidiary of Flight Safety; thus, it is difficult to predict how either company would respond today.

#### CONCLUSIONS

Private industry does not now have a combined cockpit/flight inspection simulator of the type desired by FAA, nor has anyone offered to lease one to FAA. However, FAA no longer has assurance that it can purchase a combined simulator at the price used in its cost analysis.

The alternative training method proposed by Flight Safety could provide the necessary training but the quality of training would be less than what FAA had hoped to provide

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<sup>1/</sup>Includes the cost of providing a visual presentation device (see part A of app. VII) and six different types of motion.

with a combined simulator. However, the additional quality in training that is expected to be provided by a combined cockpit/flight inspection simulator is difficult, if not impossible, to quantify.

FAA should obtain new cost data on the purchase of a simulator and specific cost data on Flight Safety's proposal. A cost comparison of the two should then be made. This comparison should include all cost factors, such as indirect cost; Federal, State, and local taxes foregone; and the residual value of any Government assets. Costs should be converted to their present value.

When the differences in cost are known, the Appropriations Committees should give FAA ample opportunity to justify the additional cost (or savings) expected from the purchase of a combined simulator in relationship to the intangible, nonquantifiable benefits that are expected. Once this has been done, the Appropriations Committees will be able to judge whether the additional cost (or savings) of purchasing a simulator is justifiable with respect to the intangible benefits that are expected to be realized.

#### SCOPE OF REVIEW

We reviewed congressional hearings on the three budget issues; Flight Safety International's alternative proposal for flight inspection training; and various FAA records, reports, studies, and instructions, including its master plans for automating/consolidating FSSs and related cost estimates expected from full funding. We reviewed the results of its analysis of 22 major F&E projects, but we did not attempt to verify this data. We also examined past, existing, and projected flight inspection training requirements and FAA's revised cost analysis on alternatives for providing flight inspection training. We interviewed FAA officials, an OMB official, and a Flight Safety International official. Our review was made at FAA headquarters in Washington, D.C.; FAA's southern and southwest regions; FAA's training academy in Oklahoma City, Oklahoma; and FAA flight inspection national field offices in Oklahoma City and Atlanta, Georgia.

RATES OF OBLIGATIONS FOR 22MAJOR PROGRAMS ANALYZED BY FAA

<u>FAA organizations</u>	Percent obligated in year					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Regions/centers	-	6	52	31	7	4
Washington office:						
Airway Facility Service	43	47	10	-	-	-
Other	80	20	-	-	-	-

RESULTS OF FAA ANALYSIS OF 22 MAJOR  
PROGRAMS FINANCED BY F&E APPROPRIATIONS

APPENDIX III

Item (note a)	Program funds (millions)	Number of unit	Months			Total to last delivery	Units under-livered after 3 years	Lapsing funds (millions)
			To award	From award to First delivery	Last delivery			
Mark IE ILS	\$ 19.4	122	11	18	39	50	64	\$ 3.4
DME	5.0	90	7	18	29	36	10	0.5
VOR XMTRS	2.6	151	6	16	28	34	-	-
ILS Modulator	2.6	255	8	18	31	39	60	0.3
CAT III ILS	4.3	9	11	12	15	26	-	-
CCMS	4.6	11	5	16	22	27	-	-
BUEC Transceivers	5.5	220	11	8	19	30	-	-
COMM. SVC. Monitor	4.4	1,079	7	6	39	46	-	-
DTE	7.8	325	10	12	34	44	150	1.2
Trans/R'cvrs	8.9	1,700	4	7	29	33	-	-
60 KW Eng. Gen.	1.4	24	10	13	19	29	-	-
175 KW Eng. Gen.	3.8	32	3	12	19	22	-	-
ASR-8	70.7	40	13	10	24	37	6	1.2
ARTS IIIa	46.0	55	14	15	31	45	20	1.6
ARTS II	20.9	73	13	32	57	70	73	5.1
BRITES	4.9	93	12	13	18	30	-	-
ATCBI-5 Test Set	7.1	97	8	33	52	60	97	1.0
RBPM	11.2	200	8	16	46	54	144	0.4
DARC	21.8	22	12	18	49	61	13	0.3
TML	6.3	28	15	14	23	38	10	0.4
ASR Imp.	7.0	38	9	17	30	39	3	0.1
ARSR-3	<u>54.2</u>	22	14	24	39	53	22	<u>6.6</u>
Total	<u>\$320.4</u>		<u>b/10</u>	<u>b/16</u>	<u>b/31</u>	<u>b/41</u>		<u>\$22.1</u>

a/Items selected for analysis were not financed with any one particular fiscal year's appropriation.

b/Average number of months.

APPENDIX III



LISTING OF SELECTED PROJECTS IN FAA'S  
SOUTHERN AND SOUTHWEST REGIONS FOR  
WHICH FUNDS LAPSED AT THE END OF FY 1978

	Description of work	FAA region			
		Southwestern		Southern	
		Number of projects	Amount lapsed	Number of projects	Amount lapsed
Various navigation aids (VOR, VORTAC, VOR/DME and transmitters)	Establish, relocate, replace, or convert	9	\$ 99,900	5	\$ 662,700
Remote center air ground communications	Establish, relocate, or improve	46	1,099,000	7	366,100
Air traffic control radar systems (ATCRBS, ARSR-3, DARC, RML and BPM)	Establish and improve	46	821,300	63	1,510,500
Instrument landing systems	Establish, relocate, or improve	43	699,400	41	681,900
Various lighting systems (REIL, VASI, MALS, and RAIL)	Establish or improve	86	771,500	46	1,471,000
Automated radar tracking system (ARTS II)	Establish or improve	9	191,100	13	532,900
Airport surveillance radar (ASR) and beacon performance monitors and antennas	Establish, improve, replace, or provide	38	383,800	37	484,200
Facilities at flight service stations (IWEB, TTY and MWICS)	Establish, replace, or rehabilitate	50	400,000	71	454,300

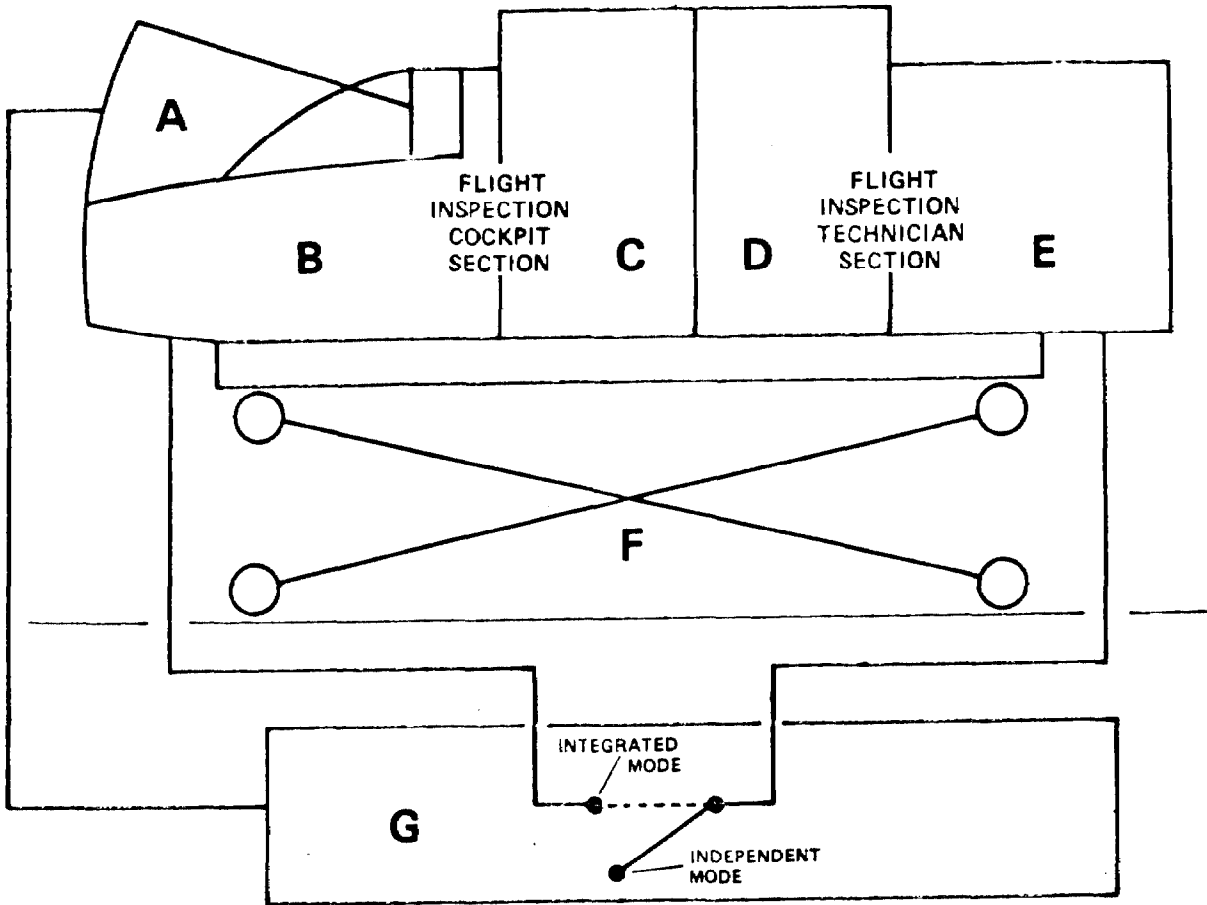
REASONS FY 1976 F&E APPROPRIATED FUNDS  
LAPSED AT THE END OF FY 1978 IN FAA'S SOUTHERN  
AND SOUTHWEST REGIONS

	<u>Southern region</u>		<u>Southwest region</u>	
	<u>No. of projects</u>	<u>Amount lapsed</u>	<u>No. of projects</u>	<u>Amount lapsed</u>
Equipment not available	248	\$4,542,000	179	\$2,433,000
Late assignment of project	21	730,000	10	174,000
Surplus--available for reprogramming	16	65,000	33	244,000
Sponsor related problems	18	428,000	31	347,000
Rebid was necessary	5	787,000	-	-
Scheduling--priority	9	121,000	6	166,000
Technical matters	4	68,000	7	75,000
Environmental matters	2	292,000	2	192,000
Land/site acquisition matters	22	1,030,000	17	815,000
Planning--Region and headquarters	20	401,000	54	1,185,000
Other	<u>37</u>	<u>636,000</u>	<u>26</u>	<u>118,000</u>
Total	<u>402</u>	<u>\$9,100,000</u>	<u>365</u>	<u>\$5,749,000</u>

LISTING OF SELECTED PROJECTS IN  
FAA'S SOUTHWEST REGION EXPECTED TO  
LAPSE FUNDS AT THE END OF FY 1979

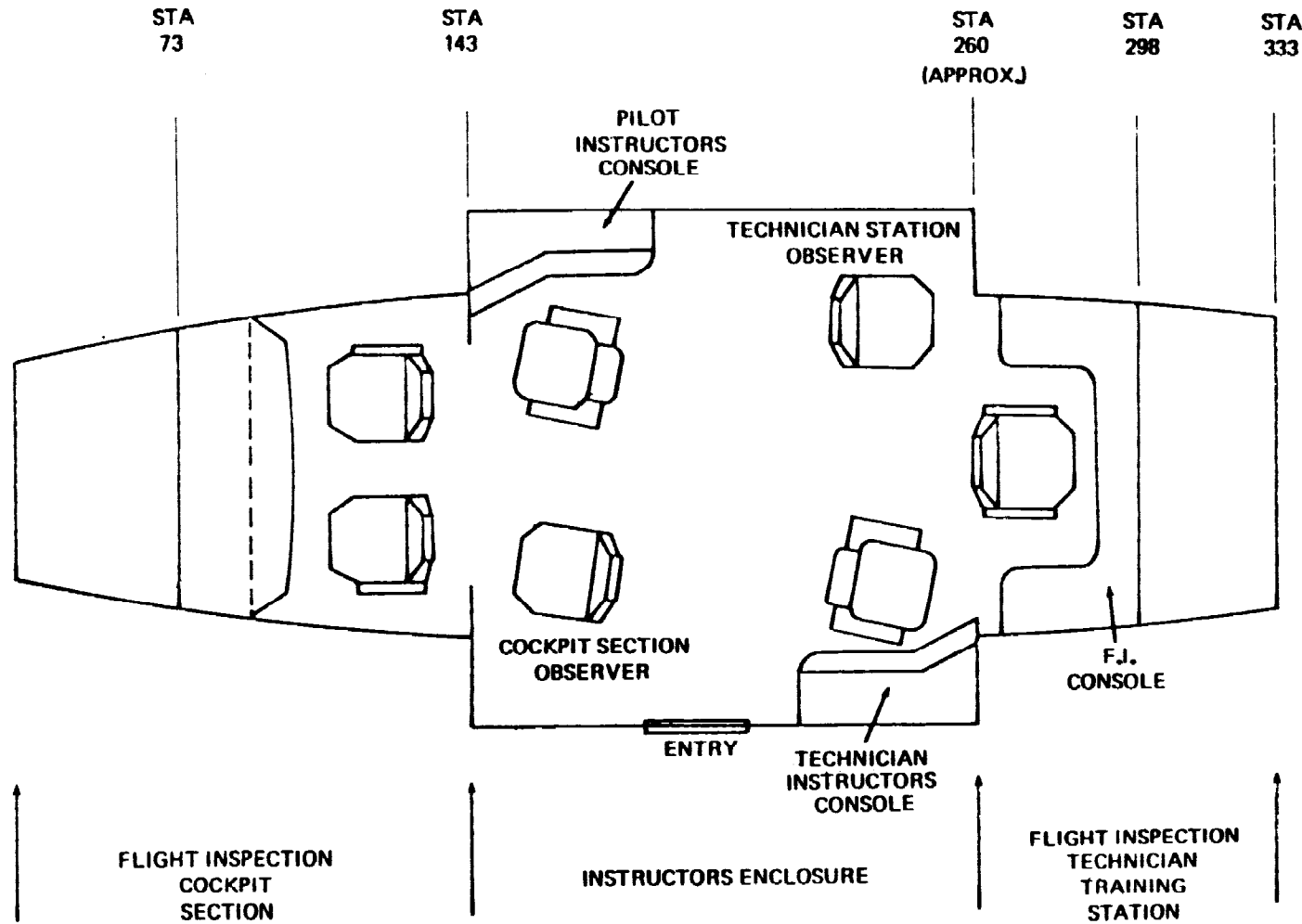
	<u>Number of projects</u>	<u>Amount estimated to lapse</u>
Relocate VORTAC	1	\$ 82,700
Replace Locator Outer Market	8	31,000
Improve ARTCC (NADIN)	3	75,000
Various DME projects	23	271,700
BUEC	10	46,500
MALS	1	42,000
CHI	6	88,500
BPM	15	39,500
Beacon Amt. for ASR	2	12,000
Various FSS Improvements	10	66,500
FSS Relocation	<u>1</u>	<u>147,300</u>
Total	<u>80</u>	<u>\$902,700</u>

FLIGHT INSPECTION TRAINER, PROFILE VIEW



- A. Visual Presentation Device (if applicable) OPTION
- B. Pilot's Training Station
- C. Pilot Instructor's Station
- D. Technician Instructor's Station
- E. Flight Inspection Technician's Training Station
- F. Motion System (six degrees of freedom)
- G. Computer System – a digital system capable of activating and/or controlling displays and functions of the visual system, and pilot and technician training stations in both integrated and independent models of operation.

### PROPOSED LAY-OUT OF FLIGHT INSPECTION TRAINER



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**House of Representatives**  
**Committee on Appropriations**  
**Washington, D.C. 20515**

July 13, 1978

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Honorable Elmer B. Staats  
 Comptroller General of the United States  
 U.S. General Accounting Office  
 Washington, D.C. 20549

Dear Mr. Staats:

Our Committee's review of the fiscal year 1979 budget of the Federal Aviation Administration (FAA) raised a number of issues which we believe should be analyzed by your office. For the past two years FAA has requested that the availability of the appropriation for facilities and equipment be extended from three years to five years. We are concerned about the slow rate at which facilities and equipment appropriations are obligated and question whether an extension of the availability of these appropriations would further delay their obligation. We believe that an analysis of this appropriation should be made to determine if the extended availability proposed by FAA is required to permit a timely and effective use of funds.

A second issue which concerned our Committee was FAA's proposal to fully fund its flight service station automation program. Although the Congress did not approve FAA's fiscal year 1979 request for this program, our Committee did indicate that a further review of this concept is warranted. We would appreciate, therefore, a review by your office of the projected savings FAA believes will result from full funding as well as how this concept relates to the manner in which other transportation projects, such as Coast Guard aircraft and vessel procurements and mass transit construction, are financed.

The third issue involves FAA's request to purchase a new flight simulator for pilot training. This year, as well as in past years, the Congress has not approved FAA's requests for this equipment because of the availability of such equipment in the private sector. We believe a comparison should be made of the relative costs of obtaining this training.

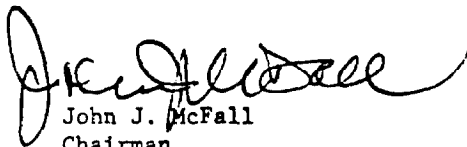
APPENDIX IX

APPENDIX IX

Honorable Elmer B. Staats  
July 13, 1978  
Page two

We would appreciate meeting with you at your earliest convenience to discuss these three issues. Our Committee utilizes the work of your office on a continuing basis. Of particular significance, has been the recent work performed in the areas of coordinating search and rescue efforts (LCD-76-456), navigation systems planning (LCD-77-109), second career training for air traffic controllers (CED-78-131), Amtrak's subsidy needs (CED-78-86) and Amtrak's and Conrail's five year plans (PAD-78-51 and 52).

Sincerely,



John J. McFall  
Chairman  
Subcommittee on Transportation  
Appropriations

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