BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of Transportation

FAA Could Improve Overall Aviation Safety And Reduce Costs Associated With Airport Instrument Landing Systems

The Federal Aviation Administration (FAA) operates and maintains over 700 instrument landing systems at airports throughout the United States. GAO found that FAA could save about $31 million between now and the year 2000 if it replaced some of its older instrument landing systems with newer systems, which are less costly to operate.

GAO also found that FAA could improve overall aviation safety and reduce cost by ensuring that existing systems are located where they are needed most. This would include a $792,000 savings in equipment purchases if 11 existing systems that do not appear to meet FAA's safety and operational efficiency criteria at their present locations are relocated instead of acquiring 11 new systems as the Secretary of Transportation proposes.

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-215115

The Honorable Elizabeth H. Dole
The Secretary of Transportation

Dear Madam Secretary:

This report discusses how the Federal Aviation Administration (FAA) could improve overall aviation safety and reduce costs associated with airport instrument landing systems. We undertook this review to determine (1) whether instrument landing systems operated by FAA are justified and (2) whether opportunities exist for FAA to reduce the cost of operating and maintaining these systems.

This report contains recommendations to you on pages 10 and 23. As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to your Administrator, FAA, and Inspector General and to the Director, Office of Management and Budget. We are also sending copies to the Senate and House Committees on Appropriations; the Senate Committee on Commerce, Science, and Transportation; and the House Committees on Government Operations, Public Works and Transportation, and Science and Technology.

Sincerely yours,

J. Dexter Peach
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF TRANSPORTATION

FAA COULD IMPROVE OVERALL AVIATION SAFETY AND REDUCE COSTS ASSOCIATED WITH AIRPORT INSTRUMENT LANDING SYSTEMS

D I G E S T

The Department of Transportation's Federal Aviation Administration (FAA) is responsible for developing and managing the nation's airways. Accordingly, FAA has established a system of airways and a related network of air traffic control and navigation aids for use by both military and civil aircraft.

Instrument landing systems are an integral part of FAA's air traffic control and navigation network. They increase the reliability of air passenger service by enabling pilots of aircraft having the required electronic equipment to land their aircraft safely in adverse weather. As of March 1984, FAA owned and operated 718 instrument landing systems located at 503 airports throughout the United States.

Existing tube-type and solid-state instrument landing systems will eventually be replaced by more advanced systems known as microwave landing systems. FAA plans to install these newer systems over an 11- to 16-year period beginning in 1986. For airports with existing instrument landing systems, FAA plans to operate and maintain colocated instrument and microwave landing systems until around the year 2000 while owners equip their aircraft with the new electronic equipment needed to use the microwave systems. (See p. 2.)

According to FAA, limited resources make it impossible to place instrument landing systems at each of the nation's 3,159 airports. Therefore, FAA has published criteria for installing and removing (decommissioning) landing systems to help ensure that they are located at the airports where they will benefit the most users at the lowest cost consistent with overall aviation safety and operational efficiency.

FAA's published criteria state that instrument landing systems are installed on the basis of (1) the availability of scheduled air carrier turbojet (as opposed to turboprop) service,

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(2) the number of instrument approaches made by aircraft to a runway, or (3) special conditions or needs such as providing relief to congested major commercial airports, providing safer and more reliable service at commuter airports, or meeting training needs. According to FAA's criteria, a system is considered for decommissioning if (1) air carrier turbojet service has been discontinued and is not expected to resume, (2) the number of instrument approaches falls below a prescribed level for 3 consecutive years, or (3) the special conditions or needs used to justify the system cease to exist or change significantly.

FAA policy requires that a decision to decommission an instrument landing system under the first two criteria be supported by a detailed benefit-cost analysis as a final check to ensure that the system is not economically justified. Values for increased safety and improved efficiency are included as benefits in the analysis, which is made by a computer program. An instrument landing system is not economically justified when the estimated costs of owning, operating, and maintaining it exceed the quantified economic value of the benefits. (See pp. 3 to 5.)

FAA, however, does not have any specific criteria for judging when, if ever, instrument landing systems installed to meet special conditions or needs should be decommissioned. However, many of these systems were expected to increase usage at the airports where they were installed, especially for training flights.

GAO undertook this review to determine (1) whether the instrument landing systems operated by FAA are used enough to be justified and (2) whether opportunities exist for FAA to reduce the cost of operating and maintaining these systems. GAO's audit work was conducted from April 1983 to March 1984. (See pp. 5 to 7.)

FAA WILL REALIZE SAVINGS BY REPLACING OLDER INSTRUMENT LANDING SYSTEMS

FAA at one time planned to replace all of its tube-type systems with solid-state systems, which are less costly to operate and maintain. In 1982, however, FAA decided to retain 81 tube-type systems until they are ultimately

replaced by microwave landing systems. FAA believed that the 81 systems would not be in use long enough to recover the installation cost by the time they were replaced with microwave landing systems.

At GAO's request, FAA prepared a life-cycle cost study in July 1983 to evaluate whether it was cost-beneficial to replace the remaining 81 tube-type instrument landing systems with solid-state instrument landing systems. The study showed that if FAA replaced the tube-type systems with new solid-state systems, it could realize savings of $31 million by the year 2000, after recovering $16.4 million in capital costs. FAA calculated the present value of the net savings (discounted at 10 percent annually) to be $8.1 million.

These savings are possible because FAA intends to use instrument landing systems for several years longer than originally planned. The systems are to be colocated with the microwave landing systems while owners equip their aircraft with the electronic equipment needed to use the newer system. Thus, according to FAA, the 81 instrument landing systems, in all probability, will not be decommissioned until after the year 2000. In contrast, FAA estimates that the cost of replacing a tube-type system with a solid-state system would be recovered in 8 years. (See p. 9.)

Therefore, in the draft of this report sent to Transportation for comment, GAO proposed that FAA replace all tube-type instrument landing systems with solid-state systems at the earliest possible time. FAA now plans to replace all but three of the tube-type instrument landing systems with solid-state systems. They do not intend to replace the remaining three tube-type systems with solid-state systems because they are located at airports which are scheduled to receive microwave landing systems by 1990. (See p. 33.)

GAO believes, however, that it might still be cost-effective to replace the three remaining tube-type systems with solid-state systems even though microwave systems may be installed at these airports before 1990. According to FAA, the instrument landing systems will probably be operated and maintained--along with the microwave systems--for longer than 8 years.

FAA COULD IMPROVE OVERALL AVIATION SAFETY AND REDUCE COST BY ENSURING THAT EXISTING INSTRUMENT LANDING SYSTEMS ARE LOCATED WHERE THEY ARE NEEDED MOST

According to FAA's policy, instrument landing systems should be decommissioned if FAA's computer-generated benefit-cost analysis shows that they are not economically justified. However, FAA officials in eight of FAA's nine regional offices and at FAA headquarters told GAO that, because of anticipated pressure from airport users and owners, no action has been taken towards decommissioning instrument landing systems. (See p. 15.)

Using FAA's published criteria, GAO identified 22 instrument landing systems which do not appear justified at their present locations. The systems do not meet FAA's number of instrument approaches or scheduled commercial turbojet service criteria and were not installed to meet special conditions or needs.

GAO did not use FAA's benefit-cost computer program to reach a more definite conclusion. At the time of its review, FAA had revised the criteria and formula, but had not validated the program. However, an FAA headquarters Aviation Policy and Plans official told GAO that the number of instrument approaches is usually the determining factor in most of FAA's benefit-cost analyses.

On the basis of this information, GAO believes that FAA should perform the required detailed benefit-cost analysis on the 22 instrument landing systems and decommission those that are no longer justified.

Instrument landing systems installed to meet special conditions or needs

GAO also reviewed 40 other instrument landing systems which were installed to meet special conditions or needs, and for which FAA does not have any specific criteria for judging when, if ever, they should be decommissioned. (See pp. 17 to 20.)

Moreover, GAO found that FAA does not collect the data needed to determine whether many of these instrument landing systems are meeting the special conditions or needs for which they were installed. For instance, FAA does not

collect the data needed to determine whether systems installed at satellite airports to reduce the use of major airports by non-commercial aircraft are accomplishing their objective. Similarly, FAA does not collect the data needed to determine whether systems installed to meet training needs are actually being used for training flights. (See pp. 18 to 19.)

Because of the lack of criteria and specific data on need, GAO looked at the number of instrument approaches as a measure of the systems' effectiveness. GAO's analysis showed that 29 of the 40 instrument landing systems would not meet FAA's number of instrument approaches criterion.

GAO believes that FAA should develop specific criteria for judging when instrument landing systems installed to meet special conditions or needs should be decommissioned. These criteria should clearly identify when the special condition(s) or need(s) cease to exist or change significantly. This would require collecting the data to determine whether (1) instrument landing systems installed at satellite airports are diverting noncommercial traffic from major airports as intended and (2) systems installed to meet training needs are used enough to be justified. If FAA determines that an instrument landing system is not accomplishing its objective(s), it should perform a benefit-cost analysis and decommission those that are not justified.

FAA could save money by relocating existing instrument landing systems

According to FAA, as of May 1984, 60 instrument landing systems were needed and justified on runways at 51 airports. (See p. 22.)

In December 1984, the Secretary of Transportation requested that $15.3 million in fiscal year 1985 funds be reprogrammed to acquire and install 11 new instrument landing systems. Using FAA estimates, $792,000 in future costs could be saved if FAA's benefit-cost analysis finds that 11 systems are not justified at their present locations and are relocated instead of acquiring 11 new systems as the Secretary requests. (See p. 22.)

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

GAO recommends that the Secretary of Transportation, before acquiring any new instrument landing systems, direct the Administrator, FAA, to:

--Perform the required computer-generated detailed benefit-cost analysis for the 22 instrument landing systems which were not installed to meet special conditions or needs and which appear to meet FAA's decommissioning criteria. Those that are found not to be justified should be decommissioned and relocated at airports meeting FAA's safety and operational efficiency criteria.

--Collect the data to determine whether instrument landing systems installed to meet special conditions or needs, including those installed at satellite airports or specifically to meet training needs, are accomplishing their objectives.

--Establish criteria for decommissioning instrument landing systems which are installed to meet special conditions or needs that clearly identify when the conditions or needs which justify the systems cease to exist or change significantly. Those that are not accomplishing their objectives and which are not justified on the basis of benefit-cost criteria developed by FAA should be decommissioned and relocated at airports meeting FAA's safety and operational efficiency criteria.

AGENCY COMMENTS AND GAO's EVALUATION

In its February 7, 1985, comments on GAO's draft report, Transportation stated that it did not believe it appropriate to decommission any instrument landing systems at that time, but agreed to examine 12 systems promptly to determine whether they should be retained. Transportation stated that the remaining systems are needed to meet the Congress' and FAA's commitment to providing a safe environment for the flying public. (See app. I.)

Transportation's conclusion is based on unpublished criteria that it uses in addition to its published criteria. Transportation states that these criteria (1) qualify airports for instrument landing systems (see pp. 15 to 17, 20 to 21, and 26) or (2) should be considered before deciding to decommission an existing system. (See pp. 20 to 21 and 26.)

While GAO believes that these criteria are not illegal or contrary to any regulation, they may result in FAA's retaining instrument landing systems at airports where they are not justified on the basis of their published criteria. FAA's published criteria specifically state that they are designed to help ensure that systems are located at airports where they will benefit the most users at the lowest cost consistent with overall aviation safety and operational efficiency. GAO believes that as a general rule, the published criteria should be followed by FAA in making decisions to install or decommission systems. If necessary, the criteria should be revised to consider other factors which are consistent with the goals of cost-effectiveness, safety, and efficiency.

Transportation's comments and GAO's evaluation are discussed in detail throughout the report, where appropriate.

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Contents

ILLUSTRATIONS

ABBREVIATIONS

FAA	Federal Aviation Administration
DOT	Department of Transportation
GAO	General Accounting Office
ILS	instrument landing system
MLS	microwave landing system
NAS	National Airspace System

CHAPTER 1

INTRODUCTION

The Department of Transportation's (DOT's) Federal Aviation Administration (FAA) is responsible for operating a national airspace system to move air traffic safely and expeditiously. In 1983, FAA spent about $1.8 billion and employed about 32,000 people to operate and maintain this national airspace system. The system includes the following major components:

--air traffic control centers and airport control towers, with their associated radar and communication facilities, to direct pilots into, out of, and between airports;

--air navigation aids, such as very high frequency, omni-directional ranges, to assist pilots in determining their location and flight course; and

--landing aids, such as instrument landing systems (ILSs) and approach lighting systems, to guide pilots onto an airport runway.

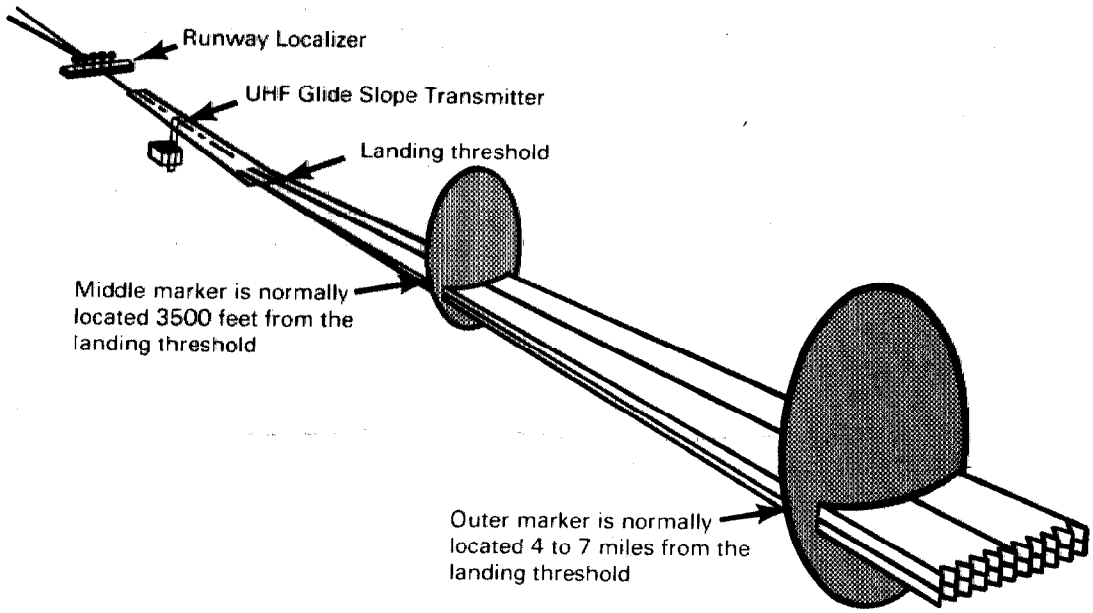
This report discusses FAA's management of ILSs.

INSTRUMENT LANDING SYSTEMS

ILSs are an important part of FAA's airspace system. They increase the reliability of air passenger service by enabling pilots to land their aircraft safely in adverse weather.

An ILS provides horizontal, vertical, and distance parameters to assist a pilot in landing an aircraft. An ILS consists of (1) a localizer, which generates a signal indicating a course down the runway centerline, (2) a glide slope, which generates a signal indicating the optimum angle of descent to the runway, and (3) two or three marker beacons, each of which generates a signal that indicates the aircraft's distance from the point where it should touch down on the runway. When approaching an airport, the pilot turns on the ILS receiver and follows the indicated course and angle of descent down to a point where the runway becomes visible. These are illustrated in the following diagram.

ILS
Instrument Landing System



Source: Federal Aviation Administration

As of March 31, 1984, FAA had installed 718 ILSs at 503 airports and had 32 additional installations planned. When these planned installations are completed, FAA will have 750 ILSs at 531 airports. Cost data on operating and maintaining ILSs are not readily available. However, on the basis of the 54 ILSs that we had cost data for, we estimate that FAA spent about $61 million to operate and maintain the 718 ILSs during fiscal year 1983.

Most of the 750 ILSs are solid-state equipment; however, FAA officials told us that about 185 (about 25 percent) are older, tube-type equipment. The first tube-type ILSs were installed about 40 years ago. Then in the early 1970's, FAA began installing solid-state ILS equipment. By the late 1970's, FAA was replacing some of the earlier tube-type ILSs with solid-state ILSs, which are more economical to operate and maintain.

In 1986, the FAA will start to replace ILSs with a more advanced approach aid--microwave landing systems (MLSs). MLSs are part of FAA's National Airspace System (NAS) plan, a comprehensive $11.9 billion endeavor to consolidate, modernize, and automate air traffic control facilities and services in the United States.

Among its advantages, the MLS will allow a pilot to make a short final approach from several directions and at various curved angles. MLS is only minimally affected by surrounding terrain, ground structures, or weather. System designers expect that more planes will be able to get to the ground faster and with fewer delays.

FAA plans to install from 1,200 to 1,400 MLSs over an 11- to 16-year period. From 450 to 650 MLSs are to be installed at airports now without an ILS. For airports with an existing ILS, FAA plans to operate and maintain colocated ILSs and MLSs until about the year 2000, while owners equip their aircraft with the electronic equipment (avionics) needed to use the MLSs. FAA estimates the total cost of the MLS program to be $2 billion. This figure includes $1.1 billion for the ground systems to be funded by FAA and $.9 billion for aircraft avionics equipment to be paid for by aviation users.

FAA CRITERIA FOR INSTALLING AND DECOMMISSIONING ILSs AND MLSs

According to FAA, limited resources made it impossible to place ILSs or MLSs at each of the nation's 3,159 airports. Therefore, FAA published installation and decommissioning criteria to ensure that ILSs and MLSs are located where they will benefit the most users at the lowest cost, consistent with overall aviation safety and operational efficiency. These criteria, contained in FAA's Airway Planning Standard Number One (Terminal Air Navigation Facilities and Air Traffic Control Services),[1] are based primarily on air traffic demand as a tangible indicator of need. The standard states that these criteria do not cover all situations and should not be used as the sole reason for denying an ILS where there is an operational or air traffic control need. It continues that

> "Other factors wherein a fixed requirement cannot be established which must also be considered are the general terrain features in the vicinity of the terminal, the nature of the operation, and the frequent and predictable occurrence of severe climatological phenomena such as heavy snow, ice, fog, or other local conditions that can adversely affect aircraft operations or the safety of the flying public."

FAA revised its Airway Planning Standard Number One effective September 1983. The revised standard includes installation criteria for MLSs and decommissioning criteria for both MLSs and ILSs. Installation criteria for ILSs were not included in the revised standard because FAA is replacing them with MLSs as its standard precision approach landing aid. ILS installation criteria in the superseded standard were to be used for installing additional ILSs.

Installation criteria

Under the superseded planning standard, an ILS could be justified on the basis of (1) the availability of scheduled air carrier turbojet (as opposed to turboprop) service on a sustained

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[1]Established eligibility for air navigation facilities and air traffic control services and is applied throughout this report to measure the effectiveness of existing ILSs.

basis,[2] (2) the number of instrument approaches made by aircraft, or (3) special conditions or needs.

An airport where scheduled air carrier turbojet aircraft operate on a sustained basis qualifies for an ILS. FAA established this criterion because it believed the size, speed, and relatively slow response times of turbojet aircraft made proper alignment on an approach particularly critical and because of the high cost of air carrier accidents.

The number of instrument approaches to the runway is another criterion for justifying an ILS. FAA categorizes instrument approaches by type of user for ease of application by the FAA regional offices. An instrument approach by an air carrier aircraft is given more weight than an approach by a general aviation aircraft. For example, at a small hub airport,[3] 175 instrument approaches by an air carrier aircraft could be equivalent to 1,500 approaches by general aviation aircraft. Similarly, air carrier instrument approaches to large hub airports such as Boston's Logan, Seattle-Tacoma, and Dallas-Fort Worth, are given more weight than air carrier instrument approaches to smaller hub or nonhub airports. For example, 350 air carrier instrument approaches to a nonhub airport would qualify the airport for an ILS, whereas only 100 approaches would qualify a large hub airport.[4]

Since the number of instrument approaches is not a precise indicator of the benefits derived from an ILS, FAA policy requires a detailed benefit-cost analysis as a final check to ensure that a proposed ILS is justified. This analysis ensures that the benefits derived from an ILS will equal or exceed the cost of owning, operating, and maintaining it. According to FAA, the primary quantifiable benefits of an ILS are safety and efficiency. Several factors are considered, such as the cost of injuries, deaths, and aircraft destroyed or damaged in accidents that might be prevented by an ILS, as well as the value of passenger time wasted and air carrier operating costs due to flight disruptions that might have been avoided by an ILS. If, in the resulting benefit-cost ratio, the benefits are equal to or exceed the costs, an ILS is normally considered to be justified.

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[2]An FAA headquarters official told us that scheduled turbojet service at least 3 times a week, together with a long-term commitment to provide turbojet service to the airport, was required to justify an ILS under this provision.

[3]FAA segregates airports into four general types--large hub, medium hub, small hub, and nonhub--depending on the amount of commercial air traffic.

[4]This relationship varies considerably, depending on the size of the airport and the extent to which the ILS will reduce the minimum visibility levels required to land the aircraft. This example is based on reducing this requirement from 500 feet above the ground and 1 mile distance to 200 feet and 1/2 mile.

The requirement for a benefit-cost analysis to install an ILS applies only to ILSs justified on the basis of instrument approaches. However, several years may pass between the ILS request and the availability of equipment for installation. Therefore, FAA requires that the justification for an ILS be revalidated just before its installation to ensure that it is still justified.

An ILS also can be justified because of (1) special conditions, such as predictable adverse weather or different terrain near the airport or (2) special needs, such as providing relief to congested major commercial airports, safer and more reliable service at commuter airports, or for instrument training flights.

Decommissioning criteria

Airway Planning Standard Number One provides that an ILS should be considered for decommissioning if (1) air carrier turbojet service has been discontinued and is not expected to resume, (2) the number of instrument approaches falls below a prescribed level for 3 consecutive years, or (3) special conditions or needs (such as training) used to justify the ILS cease to exist or change significantly.

FAA policy requires that a decision to decommission an ILS under the first two criteria be supported by a benefit-cost analysis as a final check to ensure that the ILS is not justified. The analysis is similar to the one done prior to installing an ILS under the number of instrument approaches criterion (see p. 4) and includes safety and efficiency as the primary quantifiable benefits. Conversely, FAA does not have specific criteria for judging when, if ever, ILSs installed to meet special conditions or needs should be decommissioned.

The standard requires a history of 3 consecutive years of instrument approaches before an ILS can be decommissioned, but does not specify when this 3-year history should begin. An FAA Aviation Policy and Plans official told us that the 3-year history should start the year following the last year the ILS met the instrument approach activity criterion. Thus, if the ILS had not met the approach criterion for 3 or more years before the loss of turbojet service, the ILS should have been considered for decommissioning when the turbojet service was discontinued.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to determine whether (1) the ILSs operated by FAA are justified and (2) opportunities exist for FAA to reduce the cost of operating and maintaining these systems.

Our review was performed at FAA headquarters in Washington, D.C., and at each of FAA's nine regional offices. We interviewed officials from the FAA headquarters Program Engineering and

Maintenance Service, Systems Engineering Service, and Office of Aviation Policy and Plans, and from the Flight Standards and Airways Facilities Divisions in all FAA regions. We also interviewed FAA Aviation Standards National Field Office officials. We reviewed pertinent legislation; congressional hearings and reports; and FAA policies, criteria, and procedures for information concerning the installation, decommissioning, and replacement of ILSs.

To accomplish our first objective, we ascertained FAA's policies, procedures, and practices for (1) justifying new ILS installations and (2) identifying ILSs that are candidates for decommissioning. We then reviewed air traffic activity at all 274 airports with ILSs but without sustained turbojet service[5] to identify ILSs whose recorded use did not appear to justify continued operation and maintenance. We applied FAA's other decommissioning criteria in Airway Planning Standard Number One to all ILSs installed at airports without regular turbojet service at the end of March 1984. We based our calculations on the instrument approaches recorded by FAA for fiscal years 1980-82--the latest available data at the time of our review. For those ILSs that appeared to be unjustified, we interviewed FAA officials to determine whether FAA had other reasons for keeping them in service and reviewed air traffic activity to determine whether their installation was justified by air traffic volume. Although FAA plans to install only 32 additional ILSs, we considered the justification process important in view of FAA's recently implemented $1.1 billion program to install up to 1,400 MLSs to replace the ILS as its standard precision approach aid.

FAA policy requires a detailed benefit-cost analysis, which is done by computer, before an ILS is decommissioned after air carrier turbojet service has been discontinued and is not expected to resume and/or the number of instrument approaches falls below a prescribed level for 3 consecutive years. We could not use FAA's computer program to perform such an analysis because FAA revised its criteria and formula for the analysis in 1983 but had not validated the computer program at the time of our review. However, an FAA headquarters Aviation Policy and Plans official told us that, since the number of instrument approaches is the primary indicator that continued operation of an ILS is not justified, a detailed benefit-cost analysis using the computer program rarely results in a different conclusion.

Similarly, although FAA does not have any specific criteria for judging when an ILS installed to meet a special condition or need should be decommissioned, many were expected to increase usage at the airports where they were installed. Therefore, we used the number of instrument approaches to determine whether the ILSs operated by FAA appeared to be justified.

Using FAA's installation criteria, we also ascertained whether the ILSs that do not now appear to be justified had been

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[5]FAA criteria provide that airports with sustained air carrier turbojet service qualify as candidates for an ILS.

so when they were installed. The availability of data limited this aspect of our review to ILSs installed since 1978. For those systems that appear to be unjustified, we interviewed FAA officials to determine whether the actual FAA justification for installing them was linked to factors other than use.

Most of the air traffic statistics we used in analyzing the justification for installing and operating ILSs were computer-generated. We did not verify the computer-generated data because the source documents for air traffic statistics are not retained by FAA headquarters. FAA officials stated that the data we used were the best available at FAA headquarters. However, where our review of FAA air traffic statistics showed questionable or missing data, we contacted responsible FAA regional officials and obtained air traffic statistics from them. As a result, we believe the instrument approach data we used are adequate for our analysis.

To accomplish our second objective, we reviewed the development of FAA plans to replace tube-type ILSs with solid-state ILSs to determine why FAA was considering the replacement of tube-type ILSs with solid-state ILSs. We asked FAA for a life-cycle cost analysis to determine whether replacing the remaining tube-type ILSs with solid-state equipment would still be cost-effective, given the eventual decommissioning of ILSs after MLSs come into full use. We evaluated FAA assumptions for the analysis, but we did not validate the cost estimates.

Except for not (1) being able to use FAA's computer program to make a detailed benefit-cost analysis, (2) verifying the computer-generated air traffic statistics, or (3) validating the cost estimates used in FAA's life-cycle cost analysis, our review was performed in accordance with generally accepted government auditing standards. Audit work on the review began in April 1983 and was completed in March 1984. We obtained information for fiscal years 1976 through 1982, the latest information available at the time of our review.

CHAPTER 2

FAA WILL REALIZE SAVINGS BY REPLACING OLDER ILSs

In April 1982, FAA stated that it planned to continue operating 81 tube-type ILSs until they are replaced by MLSs around the turn of the century. However, a 1983 cost study prepared for GAO by FAA's Program Engineering and Maintenance Service showed that prompt action to replace these tube-type ILSs with solid-state ILSs would result in net savings of about $31 million by the time FAA replaces ILSs with MLSs. According to FAA, these savings, which would be realized over a number of years, have a present value[1] of about $8.1 million.

FAA RECOGNIZED THE BENEFITS OF REPLACING TUBE-TYPE ILSs WITH SOLID-STATE ILSs

Tube-type ILSs were first installed about 40 years ago. FAA began installing solid-state ILSs about 15 years ago. Thus, its inventory of 750 ILSs, according to FAA officials, was a mixture of 185 tube-type and 565 solid-state ILSs at the time of our review.

FAA estimates that the annual cost to operate and maintain a tube-type ILS is generally about three times as much as a solid-state ILS. According to FAA data, one reason why solid-state ILSs are more economical to operate and maintain is that the tube-type ILSs use about six times more electricity. Further, wiring in the old tube-type ILSs is becoming brittle and breaks often. FAA estimates that the time required to maintain a tube-type ILS is generally about twice that required to maintain a solid-state ILS. Finally, vacuum tubes and other components for tube-type ILSs are no longer manufactured. Therefore, they will become increasingly difficult and costly to obtain.

FAA recognized the problem of maintaining tube-type ILSs and by 1978 was considering replacing all tube-type ILSs with solid-state ILSs. A 1980 FAA cost analysis showed that the total life-cycle costs[2] of replacing all tube-type ILSs with solid-state ILSs would be 21 percent less than the cost of continuing to operate and maintain the old ILSs. According to its life-cycle cost

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[1]Present value is the value today of a future payment or receipt, or a stream of payments or receipts, discounted at the appropriate discount rate.

[2]Life-cycle costing is a method of evaluating the acquisitions of new equipment that compares all of the projected costs associated with continuing to operate and maintain existing equipment against all of the costs associated with purchasing and installing new equipment, plus the cost of operating and maintaining the new equipment over its useful life.

study, FAA would have had to spend $78 million, beginning in fiscal year 1981, to replace the tube-type ILSs with solid-state ILSs, but it would have saved this much in operation and maintenance costs by the end of 1992. The study showed cumulative net operation and maintenance cost savings of nearly $188 million through the year 2005. FAA's study showed that the discounted value of these savings (discounted at 10 percent annually) would have been $34 million at the time of the study in 1980.

In March 1981 hearings before the House Committee on Appropriations' Subcommittee on Transportation, FAA was asked what consideration it had given to replacing tube-type ILSs with solid-state ILSs. FAA responded that it had made a cost-benefit study and planned to replace the remaining 256 tube-type ILSs. FAA said that it planned to request initial funding for the replacement program in its fiscal year 1983 budget.

However, in April 1982 hearings before the same Subcommittee, FAA stated that it was no longer planning to replace all 256 tube-type ILSs. FAA decided to replace a tube-type ILS only when it would pay for itself through reduced maintenance costs before it was to be replaced with an MLS. Under this criterion, FAA stated it would not replace 81 tube-type ILSs.

However, in July 1983, FAA officials told us that they believed that ILSs will remain in use several years longer than originally planned. Further, FAA plans to operate and maintain colocated ILSs and MLSs for several years while operators equip their aircraft with MLS avionics. Also, FAA plans to decommission the ILSs only after two-thirds of the aircraft routinely using runways with ILSs and MLSs have been equipped with MLS avionics. FAA Program Engineering and Maintenance Service officials do not expect aircraft operators to acquire MLS avionics until FAA has installed MLSs at a substantial number of airports. FAA Program Engineering and Maintenance Service officials projected that FAA will operate essentially all ILSs until the years 1998 to 2003 and will not decommission most colocated ILSs until after the year 2000.

FAA COULD REALIZE SAVINGS BY REPLACING REMAINING TUBE-TYPE ILSs

In July 1983, at our request, the FAA Program Engineering and Maintenance Service prepared another life-cycle cost study to evaluate whether replacing the remaining 81 tube-type ILSs was still cost-beneficial. The new life-cycle cost study projected that the total cost to replace the 81 tube-type ILSs in fiscal year 1984 would be $16.4 million. It projected that FAA would recover this cost in 8 years through savings in operation and maintenance costs. The study also projected that FAA could realize cumulative net savings of about $31 million by the year 2000 if it replaced the 81 tube-type ILSs with new solid-state ILSs in 1984. FAA's study showed that the discounted value of these savings (discounted at 10 percent annually) would be about $8.1 million.

The 1983 life-cycle cost study used an average cost of $203,000 to replace a tube-type ILS, which was $105,000 less than the $308,000 used in the 1980 life-cycle cost study. FAA's lead engineer for the ILS program told us the $105,000 decrease occurred primarily because the 1980 study was based on replacing all equipment shelters and all glide slope and localizer antennas, while the 1983 study provided for refurbishing existing shelters rather than replacing them and for replacing glide slope and localizer antennas only when necessary.

Although FAA's 1983 study showed that replacing all tube-type systems would be cost-beneficial, FAA's plans were not revised and the 81 tube-type systems were not scheduled to be replaced.

RECOMMENDATION TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation direct the Administrator, FAA, to replace all tube-type ILSs with solid-state ILSs at the earliest possible time.

AGENCY COMMENTS AND GAO's EVALUATION

In its February 7, 1985, comments on our draft report, DOT agreed that substantial savings could result from replacing the 81 older tube-type ILSs with solid-state systems. According to FAA, funds had already been reprogrammed to replace 3 of the 81 tube-type ILSs. Further, on the basis of the proposed recommendation in our draft report, DOT requested in December 1984 that $16.5 million in fiscal year 1985 funds be reprogrammed to replace 75 of the remaining 78 tube-type ILSs with solid-state systems.

According to DOT, they do not intend to replace the other three tube-type ILSs located at three airports in Alaska with solid-state systems because these airports are scheduled to receive MLSs prior to 1990. However, FAA plans to operate and maintain colocated ILSs and MLSs while operators equip their aircraft with MLS avionics. Thus, according to FAA Program Engineering and Maintenance Service officials, these ILSs, in all probability, will not be decommissioned until after the year 2000.

According to FAA's 1983 cost study, FAA would recover the cost of replacing a tube-type ILS with a solid-state system in 8 years. Therefore, we believe that it might still be cost-effective to replace the three remaining tube-type ILSs with solid-state systems now, even though MLSs may be installed at these airports before 1990, since the ILSs will probably be operated and maintained for longer than 8 years.

CHAPTER 3

FAA COULD IMPROVE OVERALL AVIATION SAFETY AND REDUCE COST BY ENSURING THAT EXISTING ILSs ARE LOCATED WHERE THEY ARE NEEDED MOST

FAA is operating some ILSs that do not appear to be justified and others whose continued operation is questionable at their present locations. As of March 1984, 22 ILSs did not appear to be justified according to FAA's criteria. These ILSs were originally justified on the basis of the number of instrument approaches or because of scheduled commercial turbojet service. However, due to changes in the amount or type of air traffic, we believe they may no longer be justified.

FAA is also operating 40 ILSs that were installed to meet special conditions or needs and for which FAA does not have any specific criteria for judging whether they should continue to be operated and maintained. Since many of these ILSs were expected to increase usage at the airports where they were installed, we applied FAA's number of instrument approaches criterion as a measure of their effectiveness. We found that, as of March 1984, 29 of these ILSs were being used so infrequently that their continued operation seemed questionable. In addition, FAA was planning to install four more ILSs that appear questionable on the basis of the number of instrument approaches.

Conversely, airports that qualify for ILSs do not now have them. According to FAA, as of May 1984, another 60 ILSs were justified on runways at 51 airports.

In December 1984, the Secretary of Transportation requested that $15.3 million in fiscal year 1985 funds be reprogrammed to acquire and install 11 new ILSs. Using FAA estimates, $792,000 in future costs could be saved if 11 of the existing ILSs that do not appear to be justified at their present locations are relocated instead of acquiring 11 new systems as the Secretary proposed.

FAA OPERATES ILSs THAT DO NOT APPEAR TO BE JUSTIFIED UNDER EXISTING FAA CRITERIA

Using FAA's criteria, we identified 22 ILSs operated by FAA as of March 1984 that do not appear to be justified. These ILSs were installed on the basis of FAA's number of instrument approaches or turbojet service criteria. Special conditions or needs were not used as justification. Therefore, according to FAA policy, they should have been decommissioned when (1) turbojet service was terminated and/or the number of instrument approaches fell below a prescribed level for 3 consecutive years and (2) FAA's benefit-cost analysis showed that they had ceased to be economically justified.

Since we were unable to use FAA's computer program to perform the required benefit-cost analysis (see p. 6), we applied FAA's number of instrument approaches criterion to airports without turbojet service. We found that two of the ILSs did not appear to be justified when installed or since installation. Six others did not appear to have been justified since 1976. Due to the lack of information,[1] we were unable to ascertain whether these six were initially justified. The remaining 14 ILSs were justified at some time after 1975 but subsequently experienced the termination of turbojet service to the airport and/or a decline in the number of instrument approaches.

The following table shows the last year that each of these ILSs met FAA's number of instrument approaches criterion and the extent to which usage during fiscal years 1980, 1981, and 1982--the latest available data at the time of our review--met the criterion.

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[1]The FAA historical data file has air traffic information only since 1976; therefore, we could not verify the justification of an ILS where it was based on the number of instrument landings prior to 1976.

ILSs That Are Not Justified on the Basis of FAA's Number of Instrument Approaches Criterion as of March 1984

Airport name	Location City	Location State	Percent of required approaches FY80	FY81	FY82	Last year operation appeared justified
1. Wheeling-Ohio County	Wheeling	WV	93	58	64	1979
2. Shenandoah Valley	Staunton-Waynesboro-Harrisonburg	VA	62	64	90	1981
3. Lea County (Hobbs)	Hobbs	NM	82	86	34	1978
4. Santa Fe County Municipal	Santa Fe	NM	37	27	32	1982
5. Ottumwa Industrial	Ottumwa	IA	75	30	26	1982
6. Liberal Municipal	Liberal	KS	32	48	30	1978
7. Fort Dodge Municipal	Fort Dodge	IA	77	0	68	1982
8. Civic Memorial	Alton	IL	76	83	50	1979
9. Coles County Memorial	Mattoon-Charleston	IL	13	16	15	1978
10. Mt. Vernon-Outland	Mt. Vernon	IL	25	34	30	1977
11. Quincy Municipal Baldwin Field	Quincy	IL	41	45	78	1982
12. Whiteside County Airport-Joseph H. Bittorf Field	Sterling Rockfalls	IL	57	25	12	1976
13. Kokomo Municipal	Kokomo	IN	13	24	0	a
14. McKellar Field	Jackson	TN	74	32	49	1980
15. Rocky Mount-Wilson	Rocky Mount	NC	5	0	1	1979
16. Marion Municipal	Marion	IN	7	17	0	b
17. Huron Regional	Huron	SD	55	37	63	Unknown[c]
18. Titusville-Cocoa	Titusville	FL	32	32	65	Unknown[c]
19. Crossville Memorial	Crossville	TN	17	17	18	Unknown[c]
20. New River Valley	Dublin	VA	18	29	30	Unknown[c]
21. Ingalls Field	Hot Springs	VA	37	40	74	Unknown[c]
22. Rosecrans Memorial	St. Joseph	MO	54	42	67	Unknown[c]

[a]Not since installation in 1980.

[b]Not since installation in 1979.

[c]Use of these ILSs since 1976 appears insufficient to justify continued operation. Due to lack of historical data, we were unable to determine whether they were initially justified.

Ten of the 22 ILSs appeared to be no longer justified after the loss of turbojet service. FAA's planning standard requires that, prior to decommissioning an ILS at an airport that has lost turbojet service, FAA should assess whether the airport qualifies for an ILS on the basis of instrument approach activity or other needs. FAA air traffic data show that none of these 10 airports had sufficient instrument approach activity to justify retaining the ILS. Further, FAA regional Flight Standards officials advised us that none of these 10 airports has a special aeronautical need that would justify an ILS.

For example, FAA officials told us that an ILS was installed at Coles County Memorial Airport, Mattoon-Charleston, Illinois, in 1975 because of planned commercial turbojet service. Turbojet service was discontinued in 1978 and had not been resumed as of March 1984. The number of instrument approaches has been insufficient to satisfy FAA's instrument approaches criterion since at least 1976. Recorded instrument approaches to the airport for 1980, 1981, and 1982 were less than 17 percent of the approaches required to justify continued operation of the ILS. On the basis of FAA's criterion, an additional 240 air carrier, or 240 air taxi, or 1,141 general aviation aircraft instrument approaches in 1982 would have been required to justify continued operation of the ILS. This ILS had not met FAA's criteria for continued operation since 1978. Therefore, according to FAA policy, it should have been decommissioned when the turbojet service was discontinued if FAA's benefit-cost analysis showed that it had ceased to be economically justified.

Because of a general decline in use since 1976, another 4 of the 22 ILSs apparently became unjustified. FAA regional Flight Standards officials said that these four ILSs also do not meet a special aeronautical need. For example, FAA installed an ILS at Whiteside County Airport-Joseph H. Bittorf Field, Sterling Rockfalls, Illinois, in 1973. Our analysis of FAA air traffic statistics showed that the ILS last met FAA's criterion for continued operation in 1976. Instrument approaches in 1977 were 61 percent of the total required to justify continued operation. They increased to 79 percent in 1979 and then declined to 12 percent in 1982. According to FAA policy, since there was no turbojet service, this ILS should have been decommissioned in 1980 after a benefit-cost analysis as a final check.

Two of the 22 ILSs did not appear to be justified when they were installed. We believe this happened because the region that installed them did not comply with FAA's policy of revalidating justification for an ILS just prior to installation.

One ILS was installed at Marion Municipal Airport, Marion, Indiana, in May 1979. Regional Flight Standards and Airways Facilities officials told us that the ILS was originally justified in 1975 on the basis of scheduled turbojet service and the number of instrument approaches. There has been no scheduled commercial turbojet service since 1975. Records of instrument approaches prior to 1976 are not in FAA's historical data file; however, the number of instrument approaches from 1976 through 1982 was never sufficient to justify the ILS.

The other ILS was installed at the Kokomo Municipal Airport, Kokomo, Indiana, in December 1980. Regional Flight Standards and Airways Facilities officials told us that the ILS was originally justified in 1975 on the basis of the number of instrument approaches. The number of instrument approaches in 1976 was sufficient to justify the ILS; however, the number of instrument approaches since then has been insufficient to justify the ILS. The number of instrument approaches in 1977 was about 90 percent of the total required to justify the ILS; in 1978, approaches

dropped to 28 percent of the total required. By 1980, when the ILS was installed, the number of instrument approaches was 5 percent of the total required to justify installing the ILS.

Several years may pass between the time an ILS is requested and the equipment becomes available for installation. Therefore, FAA requires revalidation of the justification for an ILS just before its installation to ensure that it is still justified. However, FAA Flight Standards officials in five regions told us that they do not generally revalidate the justification for an ILS just prior to installation.

Six of the ILSs were not justified at any time during fiscal years 1976 through 1982. Because data were not available, we were unable to determine whether the six ILSs were justified when they were installed or at any time prior to fiscal year 1976. These ILSs are at the last six airports listed in the table on page 13.

FAA does not identify ILSs that should be decommissioned

In its February 7, 1985, comments on our draft report, DOT stated that during the budgetary formulation process, FAA's regions are asked to make recommendations for installing or decommissioning ILSs. According to DOT, those identified as potential candidates for decommissioning are then reviewed as part of the budget process.

FAA accumulates and publishes the statistics needed to evaluate whether an ILS is justified. However, Flight Standards and Airways Facilities officials in eight of FAA's nine regions told us that they do not use the data to identify ILSs that should be decommissioned. They said that the effort would probably be nonproductive because the anticipated pressure that would be brought by airport users and owners would make it extremely difficult to decommission an ILS even if it was not justified. These officials explained that the potential loss of jobs in a community was one of the reasons for the expected resistance to decommissioning an ILS.

Officials in the Office of Aviation Policy and Plans, the Office of Aviation Standards, and the Program Engineering and Maintenance Service at FAA headquarters concurred that FAA generally does not attempt to identify ILSs that should be decommissioned. They, like the regional officials, stated that the effort would probably be nonproductive because of expected pressure to continue to operate an unjustified ILS. However, FAA officials were unable to provide evidence of such pressure. Further, FAA criteria appropriately do not recognize such pressure as a reason for continuing to operate unjustified ILSs.

Agency comments and GAO's evaluation

In its February 1985 comments on our draft report, DOT stated that 13 of the 22 airports, including one at Sterling Rockfalls,

Illinois, qualify for an ILS on the basis of being a commercial service airport or a reliever airport under the Airport and Airway Improvement Act of 1982 (Title V of Public Law 97-248, Sept. 3, 1982) and one airport is justified on the basis of FAA's criteria. According to DOT, the remaining eight are potential candidates for decommissioning; however, DOT believes that after closer examination, most of these ILSs will be found to meet FAA's criteria, which include serving a definite aeronautical need.

Title V does not entitle any airport to an ILS. Instead, it states that

> ". . . this title should be administered in a manner consistent with a comprehensive airspace system plan to maximize the use of safety facilities, with highest priority for commercial service airports, including but not limited to, the goal of installing, operating, and maintaining, to the extent possible under available funds and given other safety needs, a precision approach system and a full approach light system for each primary runway . . . and a nonprecision instrument approach for all secondary runways . . . ." (Emphasis added.)

The act defines a commercial service airport as a public airport that is determined by the Secretary of Transportation to enplane[2] annually 2,500 or more passengers and that receives scheduled passenger service of aircraft.

The act also provides that ". . . reliever airports make an important contribution to the efficient operation of the airport and airway system, and special emphasis should be given to their development." A reliever airport is a specially designed airport that provides relief to a congested major commercial airport.

Thus, title V gives priority to commercial service airports. Congressional policy does not, however, require that ILSs be installed only at commercial airports. Further, title V states only that "special emphasis" be given to developing reliever airports, not that these airports have ILSs. We also observe that, even though title V was enacted on September 3, 1982, and FAA revised its Airway Planning Standard Number One in September 1983, the revised standard does not qualify its application on the basis of whether the airport in question is a commercial service or a reliever airport.

FAA's criteria help ensure that ILSs are located at airports where they will benefit the most users at the lowest cost consistent with overall aviation safety and operational efficiency. (See p. 3.) By not following these published criteria, FAA may be

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[2]Enplanements are the total number of passengers boarding aircraft, including originating, stopover, and transferring passengers. Stopovers of less than 4 hours on domestic flights are not counted as enplanements.

retaining ILSs at airports where they are not justified at the expense of other airports that meet FAA's overall aviation safety and operational efficiency criteria.

DOT stated that it found that the ILS at the Crossville Memorial Airport, Crossville, Tennessee, is justified, but provided no further information. (See pp. 32 and 36.) Using fiscal year 1983 data, we again applied FAA's number of instrument approaches criterion and found that this ILS still does not appear to be justified.

CONTINUED OPERATION OF SOME ILSs IS QUESTIONABLE BECAUSE OF LOW USAGE

As of March 1984, FAA was operating another 40 ILSs installed under special programs authorized by the Administrator, FAA. ILSs installed under these special programs are not required to be justified on the basis of the number of instrument approaches or scheduled commercial turbojet service and no benefit-cost analysis is done. Further, FAA does not have any specific criteria for judging when, if ever, these special ILSs should be decommissioned.

Since many of these ILSs were expected to increase usage at the airports where they were installed, we applied FAA's number of instrument approaches criterion as a measure of their effectiveness. Our analysis showed that 29 of the 40 special installations did not meet this criterion.

The following table shows the degree to which actual use of these 29 ILSs fell short of the amount required for justification under FAA's instrument approaches criterion. For example, there was no recorded use of four systems in fiscal year 1982, and another 20 systems received less than 50 percent of the use required to meet FAA's criterion for continued operation.

ILSs Installed Under Special Programs That Would Not be Justified On the Basis of FAA's Number of Instrument Approaches Criterion as of March 1984

Airport name	Location		Percent of required approaches		
	City	State	FY80	FY81	FY82
1. Frederick Municipal	Frederick	MD	56	22	28
2. Lawrence Municipal	Lawrence	MA	63	46	26
3. Greater Kankakee	Kankakee	IL	6	4	7
4. Fort Collins-Loveland Municipal	Fort Collins-Loveland	CO	13	6	0
5. Fort Lauderdale Executive	Fort Lauderdale	FL	45	64	46
6. Grider Field	Pine Bluff	AR	41	77	44
7. Tamiami	Miami	FL	7	18	9
8. Hammond Municipal	Hammond	LA	6	4	8
9. Sanford	Sanford	FL	14	27	32
10. Chester County G.O. Carlson	Coatesville	PA	6	15	18
11. McMinnville Municipal	McMinnville	OR	1	0	0
12. Yuba County	Marysville	CA	58	89	52
13. Boire Field	Nashua	NH	41	21	25
14. Provo Municipal	Provo	UT	34	0	21
15. Livermore Municipal	Livermore	CA	0	0	0
16. Coeur d'Alene Air Terminal	Coeur d'Alene	ID	6	39	49
17. Lakeland Municipal	Lakeland	FL	24	23	31
18. Okmulgee Municipal	Okmulgee	OK	23	38	31
19. Newton-City-County	Newton	KS	24	25	12
20. Mount Comfort	Indianapolis	IN	1	0	7
21. Ryan Field	Tucson	AZ	0	0	30
22. Horlick - Racine	Racine	WI	58	61	72
23. Glynco Jetport	Brunswick	GA	32	37	33
24. Renner Field (Goodland Municipal)	Goodland	KS	48	22	56
25. Houma-Terrebonne	Houma	LA	52	38	69
26. Denton Municipal	Denton	TX	1	7	8
27. TSTI-Waco	Waco	TX	49	41	28
28. Redbird	Dallas	TX	32	51	52
29. Dade-Collier	Miami	FL	18	12	0

ILSs installed and planned under a satellite airport program

In 1979, the Administrator, FAA, authorized a satellite airport program intended to accelerate the development of general

aviation and reliever airports in metropolitan areas. As of March 1984, 29 ILSs had been installed under the program and 6 more were planned. To be eligible for an ILS under this program, an airport had to be in the vicinity of a major airport that had at least 0.5 percent of the total national passenger enplanements, or more than 20,000 annual air carrier operations. The program focuses on reducing the use of hub airports by diverting general aviation aircraft, especially instrument training flights, to the satellite airports. However, Regional Flight Standards officials and headquarters Aviation Policy and Plans and Aviation Standards officials said that FAA does not collect the data to determine whether instrument approaches to the satellite airports are for training. Therefore, FAA is unable to determine whether these ILSs are diverting general aviation training flights from hub airports as was intended. Further, FAA does not have criteria for determining when to decommission ILSs installed under the satellite program.

Since the program is intended to divert general aviation aircraft to satellite airports thus increasing their use, we applied FAA's number of instrument approaches criterion as a measure for their effectiveness. We found that 22 of the 29 ILSs installed under the satellite program would not be justified on the basis of this criterion. For example, reported use of 16 of these ILSs during 1980, 1981, and 1982 was less than half of that required. We also found that four of the six planned installations did not meet this criterion.

ILSs installed for training needs

Similarly, the last four ILSs in the table on page 18 were installed under a program to meet pilot training needs, but officials in the Office of Aviation Standards told us that data on ILS use for training flights is not collected. Therefore, FAA does not have the data needed to determine whether training ILSs are actually used for training flights.

Since FAA's number of instrument approaches criterion provides a measurement of an ILS' effectiveness, we applied it to see whether usage of these ILSs appeared justified. We found that recorded use in 1980, 1981, and 1982 was insufficient to justify these four ILSs on the basis of FAA's number of instrument approaches criterion.

ILSs installed and planned under a commuter airport program

In January 1981, the FAA Administrator authorized a commuter airport program, which was intended to help commuter air carriers provide safer and more reliable service by installing ILSs at commuter airports. As of March 1984, FAA had installed seven under this program and six more were planned. FAA established a minimum of 2,500 annual commercial passenger enplanements (except for Alaska airports) to qualify for an ILS under this program. However, FAA does not have criteria for determining when to decommission them.

Since FAA does not have any specific criteria for judging whether ILSs installed under the commuter airport program should continue to be operated and maintained and since installing ILSs at these airports should increase use by providing safer and more reliable service, we applied FAA's number of instrument approaches criterion. We found that three of the seven ILSs installed under the commuter airport program did not meet this criterion.

For example, FAA installed an ILS at Renner Field, Goodland, Kansas, in 1983 under the commuter program. In 1979, Goodland had about 2,950 passenger enplanements and therefore exceeded the 2,500 passenger enplanements needed to qualify for an ILS under the program. However, in 1982, before the ILS was installed, passenger enplanements dropped to 1,450, or 58 percent of the 2,500 required to qualify for an ILS under the program. Moreover, the number of instrument approaches in 1980, 1981, and 1982 was less than 20 percent of the number required to justify installing an ILS under FAA's number of instrument approaches criterion.

Agency comments and GAO's evaluation

Our draft report identified 32 ILSs installed to meet special conditions or needs that were being used so infrequently that their continued operation seemed questionable. On the basis of DOT comments, we concluded that 3 of the 32 ILSs installed to meet special conditions or needs should remain at their present locations.

Of the remaining 29 ILSs, DOT stated that 26 serve an aeronautical safety need: 16 of these airports are reliever airports, 2 qualify as commercial service airports, and 8 are satellite airports near large metropolitan airports. Of the remaining three airports, DOT stated that one is currently served by a regional airline and two are used for training and possibly may no longer be needed for that purpose.

Reliever airports are included under the satellite airport program authorized in 1979. Further, the Airport and Airway Improvement Act of 1982 (Title V of Public Law 97-248) directed that special emphasis be given to their development. However, title V does not entitle these airports to an ILS and does not preclude ILSs at these airports from being decommissioned if they do not meet FAA's safety and operational efficiency criteria.

Similarly, commercial service airports are not automatically entitled to an ILS under title V, and title V does not require that ILSs be retained at these airports when they are not justified.

DOT stated that the safety and economic benefits at large hub airports would justify retaining the satellite airport program even if usage at these airports, which according to DOT has been substantial, was limited. We agree that FAA may need to retain ILSs at satellite airports even though they cannot be justified on the basis of existing FAA criteria. We do, however, believe that

FAA should have (1) the data needed to determine whether these ILSs are accomplishing their purposes and (2) criteria to determine whether the ILSs have been located at airports where the greatest benefits will be derived from their cost.

DOT stated that one airport is currently being served by a regional airline. Service by a regional airline does not, by itself, entitle an airport to an ILS. The regional airline would have to provide scheduled turbojet service on a sustained basis or the number of instrument approaches to a runway criterion would have to be met. Neither of these criteria is being met at the airport identified by DOT.

DOT stated that while the ILS at Renner Field, Goodland, Kansas, may not qualify under the commuter airport program for which it was installed, it was served by a regional airline, had an increasing number of instrument approaches in fiscal year 1983, and was expected to reach commercial service airport status in 5 years. They believe that these types of factors should be carefully considered before deciding to decommission an ILS. However, these factors are not included in FAA's published criteria for determining whether the continued operation and maintenance of an ILS is warranted.

As stated above, neither regional airline service nor reaching commercial service airport status automatically entitles an airport for an ILS. Further, an airport's expected growth is not included in FAA's installation or decommissioning criteria (see pp. 3 to 5) and the airport had only 56 percent of the required number of instrument approaches in fiscal year 1982. (See p. 18.) Since Renner Field also doesn't qualify for an ILS under the commuter program, an ILS does not appear justified.

As stated throughout this chapter, our purpose for using FAA's number of instrument approaches criterion was to show that some ILSs installed to meet special conditions or needs were receiving limited use. We do not conclude that these ILSs should be decommissioned; rather, that there are no criteria to determine whether their continued operation is justified.

We do not intend to imply, as DOT stated, that the benefits derived from operating ILSs installed to meet special conditions or needs should necessarily be the same as those for other ILSs. For example, FAA's benefit-cost analysis for ILSs not installed to meet special conditions or needs includes a "remoteness-compensated benefit/cost ratio" when ILSs at remote locations are evaluated. Similarly, we believe that FAA could assign greater benefits to an ILS at a satellite airport than to one at a general aviation airport that is not in the vicinity of a major metropolitan airport.

FAA INTENDS TO ACQUIRE NEW ILSs INSTEAD OF RELOCATING EXISTING ONES

According to FAA, as of May 1984, 60 ILSs were justified on runways at 51 airports. Fifty-five of these ILSs were justified on the basis of annual instrument approaches, two on existing turbojet service, and the remaining three on aeronautical needs, including training.

In a December 20, 1984, letter to the Chairmen of the Senate and House Appropriations Subcommittees on Transportation, the Secretary of Transportation requested that $15.3 million in fiscal year 1985 funds be reprogrammed to acquire and install 11 new ILSs. These ILSs are to be installed at airports that (1) qualify for precision landing systems but do not now have them or (2) have an immediate critical aeronautical need for an ILS and can economically justify installation.

As stated in the Secretary's letter, funds for the 11 new ILSs are to be provided by reducing fiscal year 1985 funding for certain items relating to the NAS plan. Funding for the items is, however, only deferred and all will be resubmitted in a subsequent FAA budget.

Acquiring 11 new ILSs is one of several modifications to FAA's current policy on precision landing aids. Another modification is to accelerate the procurement and delivery of MLSs which will replace the ILSs. (See p. 2.)

In the 1983 cost study prepared at our request, FAA's Program Engineering and Maintenance Service estimated an average cost of $84,000 to purchase an ILS and related spare parts, and about $12,000 to remove an ILS from its existing location and restore the site to its pre-ILS condition. DOT could save $792,000 in future costs (FAA estimate) by relocating 11 of the existing ILSs that do not appear to be justified at their present locations to the airports identified in the Secretary's letter instead of acquiring 11 new systems. This alternative appears appropriate because (1) 12 of the existing ILSs had less than 10 percent of the required number of instrument approaches in fiscal year 1982, including 6 that were not used at all and (2) procurement and delivery of MLSs, which will replace the 11 new systems, has accelerated.

CONCLUSIONS

FAA's criteria for installing and decommissioning ILSs help ensure that they are located at the airports where they will benefit the most users at the lowest cost consistent with overall aviation safety and operational efficiency. In our opinion, compliance with these criteria would justify relocating an ILS from an airport where it is not justified to one where it is.

Therefore, if FAA's benefit-cost analysis supports our finding that these ILSs do not appear to be justified, we believe

that the 22 ILSs that do not meet either FAA's number of instrument approaches or scheduled commercial turbojet service criteria, and which were not installed to meet special conditions or needs, should be decommissioned and relocated at airports that do meet FAA's installation criteria. Safety factors, including the cost of injuries and deaths that might be prevented by an ILS, and efficiency factors, such as the value of passenger time wasted and air carrier operating costs due to flight disruptions that might have been avoided by an ILS, are included in FAA's benefit-cost analysis.

We also believe that FAA should develop specific criteria for judging when instrument landing systems installed to meet special conditions or needs should be decommissioned. These criteria should clearly identify when the special condition(s) or need(s) used to justify a system cease to exist or change significantly. This would require collecting data to determine whether (1) ILSs installed under a satellite airport program are diverting general aviation traffic, including instrument training flights, from major airports and (2) ILSs installed specifically to meet training needs are used enough to be justified. ILSs found not to be accomplishing their purposes should be subjected to benefit-cost-based decommissioning criteria developed by FAA, which should include both safety and efficiency factors. Those found not justified should be relocated at airports meeting FAA's installation criteria.

Finally, we believe that operational efficiency would be better served if no new ILSs are acquired until ILSs at airports where they are not justified are relocated at airports that meet FAA's safety and operational efficiency criteria.

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation, before acquiring any new ILSs, direct the Administrator, FAA, to:

--Perform the required computer-generated detailed benefit-cost analysis for the 22 ILSs not installed to meet special conditions or needs and which appear to meet FAA's decommissioning criteria. Those that are found not to be justified should be decommissioned and relocated at airports meeting FAA's safety and operational efficiency criteria.

--Collect the data to determine whether ILSs installed to meet special conditions or needs, including those installed under a satellite airport program or specifically to meet training needs, are accomplishing their objectives.

--Establish criteria for decommissioning ILSs installed to meet special conditions or needs that clearly identify when conditions or needs which justify the systems cease to exist or change significantly. Those that are not accomplishing their objectives and that are not justified

on the basis of benefit-cost criteria developed by FAA should be decommissioned and relocated at airports meeting FAA's safety and operational efficiency criteria.

AGENCY COMMENTS AND GAO's EVALUATION

In its February 7, 1985, comments, DOT stated that it does not believe it is appropriate now to decommission any of the ILSs cited in our draft report. Their examination led them to conclude that all but 12 of the ILSs are needed to meet the Congress' and FAA's commitment to providing a safe environment for the flying public. They agreed to examine the remaining 12 ILSs promptly to determine whether they should be retained or decommissioned.

We agree with DOT that 3 of the 32 ILSs identified in our draft report as being installed to meet special conditions or needs should remain at their present locations. DOT's comments did not, however, result in any other revisions to our conclusions concerning the other ILSs in our draft report. DOT's comments and our evaluation are discussed in detail in the following sections.

Impact of air traffic controllers' strike and deregulation

DOT stated that the impacts of deregulation in 1978 and the air traffic controllers' strike in August 1981 resulted in GAO's using benefit-cost criteria during an atypical time period of low aviation activity. We do not agree. Concerning deregulation, total instrument approaches for fiscal year 1980 through 1982 averaged almost 2 million a year compared to 1.8 million in fiscal year 1977.

With respect to the air traffic controllers' strike, DOT provided several reasons for not using fiscal years 1981 and 1982 statistical data. According to DOT, (1) airlines were encouraged to use visual approach procedures and general aviation aircraft were generally limited in their access to the instrument flight rules system, (2) flow control limitations on scheduled air carriers resulted in reduced flight schedules and frequent cancellations, and (3) some airport traffic control towers, including five identified in our report, were temporarily closed or were operating at reduced levels. DOT stated that general aviation activity during this period was also reduced by high fuel costs and a slowed economy.

We found that, of the 22 ILSs which appeared not to be justified, none had met the required number of annual instrument approaches criterion in fiscal year 1980, the year before the controllers' strike, and 15 had not met the criterion since 1979. However, aware of FAA's concerns, we had previously discussed the potential impact of the above conditions with appropriate officials in each of FAA's nine regional offices. Of the 22 airports, they identified one--McKellar Field, Jackson, Tennessee--that might have been adversely affected by the controllers' strike.

The airport had qualified for an ILS on the basis of turbojet service, which had previously been discontinued and was not expected to resume, and had not met the number of annual instrument approaches in fiscal year 1980, the year before the strike. Further, the percent of required approaches at McKeller Field had increased in fiscal year 1982, the first full year after the strike. However, the airport still did not meet FAA's number of instrument approaches criterion. (See p. 13.) For these reasons, we included the airport in our review. According to FAA regional officials, the remaining 21 airports were not adversely affected.

Officials in FAA's regional offices also identified 4 of the 29 airports where ILSs were installed to meet special conditions or needs that might have been adversely affected by the controllers' strike. However, none of these four airports--Lawrence Municipal, Lawrence, Massachusetts; Tamiami and Dade-Collier, Miami, Florida; and Yuba County, Marysville, California--had met the number of annual instrument approaches in fiscal year 1980, the year before the strike.

FAA regional officials stated that the strike actually may have been responsible for an increased use of some ILSs identified in our review because air traffic may have been diverted from larger, more congested airports to smaller airports. The information collected during our review seemed to support this contention. Activity at 10 of the 22 ILSs identified as apparently unjustified increased between fiscal years 1980 and 1982. Similarly, activity increased during this period at 18 of the 29 ILSs installed to meet special conditions or needs. However, none met FAA's number of instrument approaches criterion.

ILSs are landing aids which help guide pilots onto airport runways and are installed at airports with or without control towers. When approaching an airport, the pilot turns on the ILS receiver and follows the indicated course and angle of descent down to a point where the runway becomes visible. (See p. 1.) Thus, there is no direct correlation between ILS use and the temporary closing of a tower or its operation at a reduced level. Further, the towers at the five airports identified by DOT are ones that, in 1981, GAO recommended and DOT generally concurred should be closed because they are not economically justified.[3]

Safety is a primary concern

DOT stated that they consider ILSs to be an extremely important safety measure and that most of the ILSs cited in our report are needed to meet the Congress' and the agency's commitment to safety. Further, according to DOT, decommissioning ILSs installed to meet special conditions or needs could seriously compromise safety.

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[3]FAA Misses Opportunities To Discontinue Or Reduce Operating Hours Of Some Airport Traffic Control Towers (CED-81-100, June 1, 1981).

We agree that ILSs are an important safety measure. This is why we applied FAA published criteria, which help ensure that ILSs are located at airports where they will benefit the most users at the lowest cost consistent with overall aviation safety and operational efficiency. Further, the detailed benefit-cost analysis required by FAA policy as a final check to ensure that an ILS is justified on the basis of air carrier turbojet service or the number of instrument approaches includes safety as one of two primary quantifiable benefits. (See p. 5.) By not following these criteria, FAA is retaining ILSs at airports where they do not appear to be justified on the basis of FAA's safety and operational efficiency criteria. This is also why we believe that FAA should develop benefit-cost-based decommissioning criteria for ILSs installed to meet special conditions or needs, which include safety and efficiency factors.

In our draft report we stated that FAA could save about $3.9 million a year if the ILSs we identified as apparently not being justified were decommissioned. After further consideration, we believe that overall aviation safety may be better served by relocating unjustified ILSs at airports that meet FAA's installation criteria and have revised our recommendations accordingly.

Factors other than benefit-cost criteria were considered

DOT stated that our draft report stresses benefit-costs to the exclusion of other equally or more important criteria and that the draft report considers and uses only historical data to determine benefit-costs for decommissioning ILSs. According to DOT, FAA uses these data, but also reviews and considers forecasted aviation activity, aviation growth trends, an airport's forecasted growth and planned expansion, operational requirements at an airport and for the surrounding area, and user needs and concerns before making a decision.

FAA's Airway Planning Standard Number One, which establishes the criteria for installing and decommissioning ILSs, states that the criteria are primarily based on air traffic demand since volume of traffic is a tangible and measurable indication of need. The standard also identifies other factors that must be considered. (See p. 3.) These factors primarily address conditions that can adversely affect aircraft operations or the safety of the flying public and do not include the factors identified by DOT. For ILSs that did not appear to be justified, we did, however, question appropriate regional officials to determine whether other factors should be considered. Their responses are included in our report where appropriate.

DOT did not agree with three of GAO's recommendations

DOT did not agree with any of our three recommendations. For the 22 ILSs that were not installed to meet any special condition or need and that did not appear to be justified on the basis of

FAA's criteria, DOT stated that special conditions peculiar to each site, including commercial service and reliever airport status, should be carefully evaluated to ensure that decommissioning is indeed justified.

As discussed previously, commercial service and reliever airports are not automatically entitled to an ILS. Further, FAA's Airway Planning Standard Number One includes other factors identified by FAA that can adversely affect aircraft operations or the safety of the flying public. (See p. 3.) We believe that, if FAA intends to use other factors such as title V and activity forecasts, Airway Planning Standard Number One should be revised accordingly.

DOT did not agree that data are needed to determine whether ILSs installed to meet special conditions or needs are accomplishing their purposes. They stated that collecting the required data is not feasible; it would be costly and the results would be questionable. They question, as an example, how one could determine the reasons for a pilot choosing to fly into a reliever or satellite airport instead of a major airport.

As DOT pointed out in its comments, the satellite airport program resulted from a collision between a general aviation airplane making practice instrument approaches at San Diego, California, and a major air carrier, causing the loss of 137 lives. Reliever airports, included in the satellite airport program, are specially designed to provide relief to congested major commercial airports. However, FAA has not established procedures to collect data on training instrument approaches to determine whether the ILSs are accomplishing their purposes.

These procedures need not be elaborate, costly, or time-consuming, and could be as simple as requiring pilots making practice instrument approaches to inform the appropriate FAA personnel who would, in turn, record the landings. For example, an Air Route Traffic Control Center in FAA's Northwest Mountain Region has requested pilots to notify the Center of all practice instrument approaches at four airports in the Region. A Center official told us that these approaches are collected and tabulated along with all other Center-controlled aircraft operations.

Concerning our third recommendation, DOT stated that the reasons for installing ILSs to meet special conditions and needs vary from site to site. Therefore, they did not consider it useful to try to develop generalized criteria for decommissioning these ILSs.

The 29 ILSs identified in our report were installed under one of three programs--a satellite airport program, a commuter airport program, or a program to meet pilot training needs. Within these programs, the reasons for installing ILSs do not vary and we believe that specific decommissioning criteria could be established as we recommend.

APPENDIX I

U.S. Department of Transportation

Assistant Secretary
for Administration

400 Seventh St., S.W.
Washington, D.C. 20590

FEB 7 1985

Mr. J. Dexter Peach
Director, Resources, Community
and Economic Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

We have enclosed two copies of the Department of Transportation's (DOT) reply to the General Accounting Office (GAO) draft report, "Operation and Maintenance Costs of Airport Instrument Landing Systems Can Be Reduced," GAO/RCED-85-24.

GAO recommends that the Federal Aviation Administration (FAA):

- Perform the required computer generated detailed benefit-cost analysis for Instrument Landing Systems (ILS's) not installed to meet special conditions or needs and which meet FAA's decommissioning criteria. Those that are found to be not economically justified should be decommissioned;

- Record the data needed to determine whether ILS's installed to meet special conditions or needs, including those installed under the satellite airport program or to meet training needs, are accomplishing their intended purposes;

- Establish specific criteria for decommissioning ILS's installed to meet special conditions or needs which clearly identify when the conditions or needs used to justify the systems cease to exist or change significantly. Those that are not accomplishing their intended purposes and which are not economically justified based on FAA's other decommissioning criteria should be removed; and,

- Replace all tube-type instrument landing systems with new or relocated solid-state instrument landing systems at the earliest possible time.

The Department does not believe that it is appropriate at this time to decommission any of the ILS's cited in the GAO report. Our examination leads us to conclude that 42 of the 54 ILS's (78 percent) cited in the GAO report are needed to meet the Congress' and the agency's commitment of providing a safe environment for the flying public. The impacts of the air traffic controllers' strike and deregulation have resulted in changing statistical data that is not representative. At this time, the Department cannot agree with the findings, conclusions, and recommendations relating

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to the decommissioning of the 54 ILS's discussed in the report. However, we will further examine the ILS's at the twelve locations still in question in a timely fashion in order to determine the need for retaining or decommissioning these ILS's. Regarding the need to replace 81 older tube-type ILS's with solid-state systems, the Department agrees that substantial savings could occur. Accordingly, the Department is in the process of reprogramming funds to speed this effort.

If we can be of further assistance, please let us know.

Sincerely,

Jon H. Seymour

Jon H. Seymour
Acting

Enclosures

APPENDIX I

DEPARTMENT OF TRANSPORTATION REPLY TO GAO DRAFT REPORT OF OCTOBER 31, 1984, ENTITLED OPERATION AND MAINTENANCE COSTS OF AIRPORT INSTRUMENT LANDING SYSTEMS CAN BE REDUCED

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

The General Accounting Office (GAO) report states that the Federal Aviation Administration (FAA) spends about $61 million a year to operate and maintain 718 instrument landing systems (ILS's) at the Nation's commercial and general aviation airports. According to GAO, ILS's were installed based on: (1) the availability of scheduled air carrier turbojet service; (2) the number of instrument approaches made by aircraft to a runway; or (3) special conditions or needs, such as providing relief to congested major commercial airports, providing safer and more reliable service at commuter airports, or meeting training needs. GAO also states that a system is to be considered for decommissioning if: (1) air carrier turbojet service has been discontinued and is not forecast to resume; (2) the number of instrument approaches falls below a prescribed level for three consecutive years; or (3) the special conditions or needs used to justify the system cease to exist or change significantly.

GAO found that for the first two categories of decommissioning criteria cited above, FAA policy requires that a decision to decommission an ILS must be supported by a detailed benefit-cost analysis which includes values for increased safety and improved efficiency as benefits. In the third category, special conditions or aeronautical needs, GAO found that these systems are not required to be economically justified and that FAA does not have any specific criteria for judging when, if ever, they should be decommissioned.

GAO believes that FAA could save $3.9 million a year by: (1) removing from service 22 systems ($1.7 million) that were initially installed under benefit-cost criteria but are not economically justified according to that criteria; and (2) removing an additional 32 systems ($2.2 million) whose continued operation is questionable because, according to GAO, these systems do not meet benefit-cost criteria and FAA lacks adequate criteria for determining when they should be removed from service.

In addition, GAO notes that FAA plans to replace all ILS's over the next 20 years with newer, more sophisticated microwave landing systems (MLS's). GAO found that this replacement will occur as a gradual phase in that will require the operation of both systems for a period of years. GAO states that FAA plans to operate 81 older tube-type systems until they are phased out with MLS's. GAO believes that FAA could save about $31 million between 1984 and the year 2000 if it replaced the 81 older tube-type ILS's with new solid-state ILS's which are less costly to operate.

GAO recommends that the Secretary of Transportation direct the FAA Administrator to: (1) perform the required computer-generated detailed benefit-cost analyses of ILS's, which were not installed to meet special conditions or needs, and decommission those found not to be economically justifiable; (2) record the data needed to determine whether ILS's installed to meet special conditions or needs (including those installed under the satellite airport program or to meet training needs) are accomplishing their intended purpose; and (3) establish specific criteria for decommissioning ILS's initially installed to meet special

conditions or needs (these should clearly identify when the conditions no longer exist or change significantly so as to no longer justify retention); and (4) replace all tube-type ILS's with new or relocated solid-state ILS's at the earliest possible time.

SUMMARY OF DEPARTMENT OF TRANSPORTATION POSITION

The Department does not believe that it is appropriate at this time to decommission any of the ILS's cited in the GAO report. Our examination leads us to conclude that 42 of the 54 ILS's (78 percent) cited in the GAO report are needed to meet the Congress' and the agency's commitment of providing a safe environment for the flying public. The impacts of the air traffic controllers' strike and deregulation have resulted in changing statistical data that is not representative. At this time, the Department cannot agree with the findings, conclusions, and recommendations relating to the decommissioning of the 54 ILS's discussed in the report. However, we will further examine the ILS's at the 12 locations still in question in a timely fashion in order to determine the need for retaining or decommissioning these ILS's. Regarding the need to replace 81 older tube-type ILS's with solid-state systems, the Department agrees that substantial savings could occur. Accordingly, the Department is in the process of reprogramming funds to speed this effort.

POSITION STATEMENT

The Department and FAA consider ILS's to be an extremely important safety measure. In this regard, the Congress has continued to place a high priority on the safe operation of aircraft and improvement to the Nation's airway systems to meet safe operations. In the Airport and Airway Improvement Act of 1982 (Act), Congress declared that the Act "should be administered in a manner consistent with a comprehensive airspace system plan to maximize the use of safety facilities, with highest priority for commercial service airports, including but not limited to, the goal of installing, operating, and maintaining * * * a precision approach system and a full approach light system for each primary * * * [and] a nonprecision instrument approach for all secondary runways * * *." (Underscoring added.) A commercial service airport, as the GAO correctly notes, is defined as a public airport that enplanes 2,500 or more passengers annually and receives scheduled passenger service of aircraft. The Act also provides that "reliever airports make an important contribution to the efficient operation of the airport and airway system, and special emphasis should be given to their development."

FAA currently uses detailed benefit-cost analyses contained in Airway Planning Standard Number One, Terminal Air Navigation Facilities and Air Traffic Control Services, for determining candidate airports for the establishment/discontinuance of ILS's. These criteria are generally applied during the budget formulation process. Airway Planning Standard Number One, however, also recognizes that there are factors other than benefit-cost criteria in determining whether to establish or decommission a facility. We believe that the GAO report over stresses benefit-costs to the exclusion of other equally or more important criteria. The report considers and uses only historical data in determining benefit-costs for decommissioning locations. The FAA uses these data but also reviews and considers forecasted aviation activity, aviation growth trends, an airport's forecasted growth and planned expansion, operational requirements at an airport and for the surrounding area, and user needs and concerns. All these factors must be evaluated before a decision is made.

GAO also reaches its conclusions based on the use of benefit-cost criteria during an atypical time period. Nowhere in the report is a mention made of the air traffic controllers' strike that began in August 1981. GAO was advised not to use fiscal year (FY) 1981 and 1982 data because during that period actual instrument approaches were extensively curtailed due to the inability of the system to meet demands. In this regard, FAA regions were also advised not to use these FY data to determine the eligibility of navigational aids for decommissioning.

There are many reasons for not using statistical data for these years. During the strike-affected period, airlines were encouraged to use visual approach procedures and general aviation aircraft were generally limited in their access to the instrument flight rules system. General aviation activity during this period was also reduced by high fuel costs and a slowed economy. Extensive flow control limitations on scheduled air carriers resulted in reduced flight schedules and frequent cancellations. Additionally, the airport traffic control towers at some locations identified by GAO, such as Wheeling, West Virginia; Hobbs and Santa Fe, New Mexico; Alton, Illinois; and St. Joseph, Missouri, were closed temporarily or operating at reduced levels. We believe these airports may currently meet benefit-cost criteria or other criteria. In this latter regard, some airports already qualify for ILS's on the basis of these other criteria as discussed further on.

Our analysis of the 54 airports cited in the GAO report as not qualifying for an ILS is shown in Exhibit I. The results of this analysis are presented below.

ILS's Installed Under Benefit-Cost Criteria.

We reviewed the 22 locations identified by GAO as not meeting benefit-cost criteria to determine if these locations met other criteria as shown in Exhibit II. We found that 13 of the 22 airports would qualify for an ILS on the basis of being a commercial airport or a reliever airport under Title V of the Act, and 1 airport was found to meet current benefit-cost criteria. The remaining eight have been identified as potential candidates for decommissioning; however, we believe that after a closer examination, most of these ILS's will be found to either meet benefit-cost criteria or serve a definite aeronautical need.

GAO cites Sterling-Rockfalls, Illinois, as an example of an airport not meeting requirements for an ILS. The Official Airline Guide (OAG) (November 1984), which lists scheduled service to all U.S. communities, shows that this airport is served by a regional airline on a daily basis with up to eight flights per day. The airport is currently listed in the National Plan of Integrated Airport Systems (NPIAS) (a catalogue of airports, development needs, and use required by the Act) as a commercial airport with over 2,500 enplanements per year. This airport qualifies for an ILS based on enplanements and is a good example of the type of airport that is entitled to have ILS service which GAO has not properly considered.

ILS's Installed Under the Satellite Airport Program and Other Special Programs.

GAO cites 32 airports having ILS's as not economically justified for retention based on usage (Exhibit III). GAO states that by using FAA's instrument approach criteria they found that 22 ILS's installed under the satellite

airport program would not be economically justified and that 10 other ILS's installed under special programs (commuter, Congressionally mandated, and training) cannot be economically justified. GAO believes that FAA should determine whether the satellite airport and special program ILS's are meeting FAA's objectives and, if not, the ILS's should be removed.

GAO seems to imply that the objectives of the satellite airport program and other special programs are not being met because the ILS's cannot be economically justified on the basis of usage. We disagree with this assessment. The satellite airport program, for example, was established to meet a definite aeronautical need. It came into being as the result of a collision between a general aviation airplane making practice instrument approaches at San Diego, California, and a major air carrier that resulted in the loss of 137 lives.

The objective of the satellite airport program is to reduce the mix of air carrier and general aviation aircraft at major hub airports by making alternate airports attractive for general aviation use. The primary purpose is to increase safety by providing the types of instrument service available at the larger hub airports so as to attract slower-moving small aircraft away from the flight path of faster and larger air carrier aircraft. These locations also provide alternate airports for pilots to conduct required, but generally uncounted, instrument proficiency training operations. The safety and economic benefits at large hub airports would justify the retention of this program even if usage at satellite airports, which has been substantial, was limited.

We reviewed the 32 locations (Exhibit III) cited in the GAO report and found that 28 of these airports serve an aeronautical safety need: 16 of the airports are reliever airports; 3 airports qualify as commercial service airports; and 9 are satellite airports near large metropolitan airports. Of the remaining four airports, two are currently being served by regional airlines but are not enplaning more than 2,500 passengers annually, and two airports are used for training and possibly may no longer be needed for that purpose.

GAO cites Renner Field at Goodland, Kansas, as an airport that does not qualify for an ILS because annual enplanements have fallen to 58 percent of the required 2,500 enplanements per year. While this may be true, the OAG shows that Goodland is served daily on a regularly scheduled basis (up to six flights per day) by a regional airline. Also, during FY 1983, there were 673 instrument approaches made to Goodland. Further, Goodland is expected to reach commercial airport status in 5 years as shown by the NPIAS. It is our belief that these types of factors need to be carefully considered before deciding to decommission an ILS.

In summary, we believe that most of the ILS's GAO has questioned can be shown to serve a definite aeronautical safety need and should be retained.

Tube-Type ILS's.

With respect to converting tube-type equipment to solid-state, the FAA is in agreement with GAO that substantial savings are possible. Accordingly, FAA, with Department concurrence, has made a decision to replace all tube-type ILS components with solid-state component equipment except three locations in Alaska which will receive an MLS prior to 1990.

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Recommendations.

We do not agree with the first recommendation to decommission ILS's that do not meet benefit-cost criteria. While the initial establishment of an ILS may have been based on benefit-cost criteria, it does not necessarily follow that decommissioning many years later should also be based on the same criteria. Special considerations peculiar to each site should be carefully evaluated to ensure that decommissioning is indeed justified. We note that the majority of the 22 airports cited in the GAO report as not meeting benefit-cost criteria are either commercial or reliever airports and eligible, as discussed previously, for retention under Title V of the Act.

During the budgetary formulation process, our regions are asked to make recommendations for establishment or decommissioning of facilities. Those facilities identified as being potential candidates for decommissioning will be reviewed as a part of that process.

We do not agree with the second recommendation regarding the recording of data to determine whether ILS's installed under special conditions are accomplishing their intended purpose. Recording the required data is not feasible; it would be costly and the results would be questionable. For example, how does one determine the reasons for a pilot choosing to fly into a reliever or satellite airport instead of a major airport.

Regarding the third recommendation, we do not agree with the GAO on the establishment of specific criteria for decommissioning ILS's installed to meet special conditions or needs. The reasons for establishing the ILS's vary from site to site. It is, therefore, not considered useful to try to develop generalized criteria for decommissioning ILS's established under special criteria. The FAA, however, through the budgetary process periodically assesses ILS's installed under special criteria to determine whether there is a continuing need for the system. Further, many of the special situations are ongoing and not subject to reversal in the short run. For example, the need to divert general aviation traffic from major airports is a permanent characteristic of our airport system. The decommissioning of ILS's established under special programs could seriously compromise safety. The removal of ILS's from satellite or reliever airports would increase activity at major airports, would result in congestion and time delays, and would reduce the overall level of safety. Of particular concern would be the presence of inexperienced pilots on training flights at major airports who are now able to train at satellite and reliever airports.

The Department agrees with GAO's fourth recommendation on replacement of tube-type equipment with solid-state components. In this regard, funds are being reprogrammed for the procurement of 75 solid-state component sets to replace tube-type units.

Exhibit I

Summary of FAA's Analysis of 54 ILS's at Airports which GAO Cites as not Economically Justified for Retention Based on Usage for Fiscal Years 1980 through 1982

FAA's Analysis of 22 ILS's that GAO has Identified as not Economically Justified Based on Usage - (See Exhibit II):

Currently Meets Criteria for an ILS per FAA Analysis

Commercial Service Airport Enplaning Over 2,500 Passengers Annually	11
Reliever Airport to a Major Airport	2
Meets Benefit-Cost Criteria Based on Usage	1
Subtotal	14

Does Not Meet Criteria for an ILS

Currently Served By Regional Airline on Regularly Scheduled Basis but Does Not Enplane 2,500 Passengers Annually	4
May Warrant an ILS on the Basis of Serving an Aeronautical Safety Need	4
Subtotal	8
Total	22

FAA's Analysis of 32 ILS's Installed Under Special Programs that GAO has Identified as not Economically Justified Based on Usage - (See Exhibit III):

Currently Meets Criteria for an ILS Per FAA Analysis

Reliever Airport to a Major Airport	16
Satellite Airport Serving an Aeronautical Need of Attracting Small Aircraft Away From a Large Airport	9
Commercial Airport Enplaning 2,500 Passengers Annually	3
Subtotal	28

Does Not Meet Criteria for an ILS

Currently Served by Regional Airline on Regularly Scheduled Basis but Does Not Enplane 2,500 Passengers	2
Training Airport That May No Longer Be Needed	2
Subtotal	4
Total	32

Exhibit II

ILS's That Are Not Economically Justified Based on Usage According to GAO as of March 1984 *

FAA Analysis of GAO's Cited Locations and Current Justification for Retention of ILS

	Airport Name	Location City	Location State	Initial Justification	Based Aircraft	Calendar Year 1982 Oprns.	Commercial Airport?(6)	1983 Enplanements	Reliever Airport For	Meets ILS Criteria	Note
1.	Wheeling-Ohio County	Wheeling	WV	B/C	52	36,000				No	4
2.	Shenandoah Valley	Staunton-Waynesboro-Harrisonburg	VA	B/C	23	18,000	Yes	13,000		Yes	1
3.	Lea County (Hobbs)	Hobbs	NM	B/C, N/F	103	38,000	Yes	5,000		Yes	1
4.	Santa Fe County Municipal	Santa Fe	NM	B/C	135	70,000	Yes	5,000		Yes	1
5.	Ottumwa Industrial	Ottumwa	IA	B/C	40	34,000	No	2,000		No	3
6.	Liberal Municipal	Liberal	KS	B/C	95	66,000	Yes	7,000		Yes	1
7.	Fort Dodge Municipal	Fort Dodge	IA	B/C	30	36,000	Yes	7,000		Yes	1
8.	Civic Memorial	Alton	IL	B/C, N/F	101	81,000			St. Louis, MO	Yes	2
9.	Coles County Memorial	Mattoon-Charleston	IL	B/C, N/F	68	49,000	Yes	4,000		Yes	1
10.	Mt. Vernon-Outland	Mt. Vernon	IL	B/C	53	62,000	No	2,000		No	3
11.	Quincy Municipal Baldwin Field	Quincy	IL	B/C	35	48,000	Yes	19,000		Yes	1
12.	Whiteside County Airport-Joseph H. Bittorf Field	Sterling Rockfalls	IL	B/C	57	37,000	Yes	4,000		Yes	1
13.	Kokomo Municipal	Kokomo	IN	B/C, N/F	74	45,000	No	2,000		No	3
14.	McKellar Field	Jackson	TN	B/C	61	39,000	Yes	8,000		Yes	1
15.	Rocky Mount-Wilson	Rocky Mount	NC	B/C	57	35,000	No	2,000		No	3
16.	Marion Municipal	Marion	IN	B/C	56	30,000				No	4
17.	Huron Regional	Huron	SD	B/C	32	37,000	Yes	3,000		Yes	1
18.	Titusville-Cocoa	Titusville	FL	B/C	107	118,000			Melbourne, FL	Yes	2
19.	Crossville Memorial	Crossville	TN	B/C	21	24,000				Yes	5
20.	New River Valley	Dublin	VA	B/C	19	10,000				No	4
21.	Ingallis Field	Hot Springs	VA	B/C	1	8,000	Yes	3,000		Yes	1
22.	Rosecrans Memorial	St. Joseph	MO	B/C	48	46,000				No	4

Notes: (1) Currently meets Title V, Airport and Airway Improvement Act of 1982 (Public Law 97-248, September 3, 1982) which provides for establishment of ILS's at commercial service airports enplaning 2,500 or more passengers.
(2) Designated a reliever airport and qualifies for an ILS on that basis under Title V.
(3) May have qualified in the near past as a commercial airport or may qualify in the near future. Currently served by a regional airline on a regularly scheduled basis. Retention of ILS may be warranted on basis of special conditions, such as weather, terrain, or other considerations. A review needs to be performed to determine if retention is justified.
(4) Does not meet benefit-cost criteria or Title V criteria but may be warranted on the basis of special conditions, such as weather, terrain, or satellite airport to attract general aviation aircraft away from a major airport. A review needs to be performed to determine if special conditions warrant retention.
(5) Serves a small community but found to meet benefit-cost criteria.
(6) No stands for an airport that enplanes passengers on a regularly scheduled regional airline; a blank stands for no enplanements or the number of enplanements are inconsequential.

B/C = Benefit Cost.
N/F = Nonfederal establishment taken over by FAA when it met B/C criteria for Federal operation.
* Based on Fiscal Year 1980, 1981, and 1982 data.
FAA Source: National Plan of Integrated Airport Systems.

APPENDIX I

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ILS's Installed Under Special Programs That Would Not Be Economically Justified Based on FAA's Number of Instrument Approaches Criterion According to GAO as of March 1984 *

FAA Analysis of GAO's Cited Locations and Current Justification for Retention of ILS

	Airport Name	Location City	Location State	Initial Justification	Based Aircraft	Calendar Year 1982 Oprns.	Commercial Airport?(6)	1983 Enplanements	Reliever Airport For Major Airport	Meets ILS Criteria	Note	Major Airports Within 50 Miles
1.	Frederick	Frederick	MD	Satellite	218	125,000			Balt/Friendship	Yes	1	
2.	Lawrence Municipal	Lawrence	MA	"	154	194,000			Boston Logan	Yes	1	
3.	Greater Kankakee	Kankakee	IL	"	101	70,000				Yes	2	Chicago, IL
4.	Fort Collins-Loveland Municipal	Fort Collins-Loveland	CO	"	132	130,000				Yes	2	Denver, CO
5.	Fort Lauderdale Executive	Fort Lauderdale	FL	"	486	164,000			Ft. Laud. Intl.	Yes	1	
6.	Grider Field	Pine Bluff	AR	"	133	58,000				Yes	2	Little Rock, AR
7.	Tamiami	Miami	FL	"	615	311,000			Miami Intl.	Yes	1	
8.	Hammond Municipal	Hammond	LA	"	115	33,000				Yes	2	New Orleans, LA
9.	Sanford	Sanford	FL	"	116	121,000			Orlando Intl.	Yes	1	
10.	Chester Cty (G. O. Carlson)	Coatsville	PA	"	125	107,000			Philad. Intl.	Yes	1	
11.	McMinnville Municipal	McMinnville	OR	"	84	68,000				Yes	2	Portland, OR
12.	Yuba County	Marysville	CA	"	90	59,000				Yes	2	Sacramento, CA
13.	Boire Field	Nashua	NH	"	165	72,000			Boston Logan	Yes	1	
14.	Provo Municipal	Provo	UT	"	150	92,000				Yes	2	Salt Lk. Cty, UT
15.	Livermore Municipal	Livermore	CA	"	387	163,000			Oakland Intl.	Yes	1	
16.	Coeur d'Alene Air Terminal	Coeur D'Alene	ID	"	102	54,000				Yes	2	Spokane, WA
17.	Lakeland Municipal	Lakeland	FL	"	116	121,000			Tampa Intl.	Yes	1	
18.	Okmulgee Municipal	Okmulgee	OK	"	22	78,000			Tulsa Intl.	Yes	1	
19.	Newton-City-County	Newton	KS	"	71	75,000			Wichita Mid-Cont.	Yes	1	
20.	Mount Comfort	Indianapolis	IN	"	57	11,000			Indian. Intl.	Yes	1	
21.	Ryan Field	Tucson	AZ	"	149	477,000			Tucson Intl.	Yes	1	
22.	Horlick-Racine	Racine	WI	"	62	27,000			Gen. Mitchell (Milwaukee)	Yes	1	
23.	Glynco Jetport	Brunswick	GA	Commuter	57	26,000	Yes	12,000		Yes	3	
24.	Renner Field (Goodland Municipal)	Goodland	KS	"	23	18,000	No	2,000		No	4	
25.	Houma-Terrebonne	Houma	LA	"	192	243,000	Yes	96,000		Yes	3	New Orleans, LA
26.	Thief River Falls Regional	Thief River Falls	MN	Congress	38	11,000	Yes	5,000		Yes	3	
27.	Greenwood-Leflore	Greenwood	MS	"	122	33,000				Yes	2	Jackson, MS
28.	Chan Gurney Municipal	Yankton	SD	"	23	31,000	No	2,000		No	4	
29.	Denton Municipal	Denton	TX	Training	132	115,000			Dall/Ft. Worth	Yes	1	
30.	TSTI-Waco	Waco	TX	"	32	67,000				No	5	(Train. ILS for Dall/Ft. Worth)
31.	Redbird	Dallas	TX	"	223	158,000			Dall/Ft. Worth	Yes	1	
32.	Dade-Collier	Miami	FL	"	0	9,000				No	5	(Train. ILS for Miami area)

NOTE: (1) Title V, Airport and Airway Improvement Act of 1982 (Public Law 97-248, September 3, 1982), encourages development of reliever airports in major metropolitan areas.
(2) Satellite airport deemed to serve an aeronautical need primarily for the purpose of attracting slower-moving, general aviation aircraft away from the flight paths of larger airports.
(3) Enplanes over 2,500 passengers annually and qualifies under Title V as a commercial airport.
(4) May have qualified in the near past as a commercial airport or may qualify in the near future. Currently served by a regional airline on a regularly scheduled basis. Retention of ILS may be warranted on basis of special conditions, such as weather, terrain, or other considerations. A review needs to be performed to determine if retention is justified.
(5) Initially established as a training facility for large air carriers. Use may no longer justify retention. Will be evaluated for possible decommissioning.
(6) No stands for an airport that enplanes passengers on a regularly scheduled regional airline but does not meet the 2,500 annual enplanement criteria for an ILS; a blank stands for no enplanements or the number of enplanements are inconsequential.

* Based on Fiscal Year 1980, 1981, and 1982 data.
FAA Source: National Plan of Integrated Airport Systems.

APPENDIX I

30975

AN EQUAL OPPORTUNITY EMPLOYER

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