

GAO

Report to the Honorable
John Paul Hammerschmidt, House of
Representatives

September 1988

AIRLINE SCHEDULING

Airline Practices in Establishing and Maintaining Connecting Times



**Resources, Community, and
Economic Development Division**

B-228633

September 30, 1988

The Honorable John Paul Hammerschmidt
House of Representatives

Dear Mr. Hammerschmidt:

In response to your March 30, 1988, request and subsequent agreements with your office, this report examines how airlines decide how much time to allow for passengers and their baggage to transfer to connecting flights. In preparing this report we also reviewed the steps that airlines take to minimize the likelihood of missed connections. As you requested, we focused our examination on connecting times at Lambert-St. Louis International, Memphis-Shelby County, and Washington National airports. For illustrative purposes, we examined scheduled connecting times between Arkansas points and Washington, D.C., through St. Louis, Missouri, and Memphis, Tennessee.

The specific objectives of our review were to determine

- how airlines establish, publicize, and enforce connecting times between flights;
- whether current scheduled connecting times are too short and, therefore, responsible for growing consumer complaints about missed connections;
- if there are carrier policies regarding (1) holding outgoing flights when incoming connecting flights are late and (2) keeping spare aircraft in reserve to replace those that develop mechanical problems; and
- if there are any unusual circumstances that would increase the likelihood of missing connections at the three airports we reviewed.

Results in Brief

Airlines establish minimum connecting times for each airport. The procedures for setting a minimum time for connecting flights at an airport depend on whether the connections are between flights of the same carrier (on-line connections) or between flights of different carriers (inter-line connections). For on-line connections, a carrier can set whatever time between the flights it believes is a reasonable minimum for the airport.

For connections between the flights of different carriers, the airlines serving the airport agree to a standard minimum time between arrivals and departures for flights connecting at that airport. Although there are

no formal mechanisms for ensuring that airlines do not schedule connections allowing for less than the minimum airport connecting time, the airlines will not accept responsibility for transferring passengers and their luggage from other carriers for connections that allow for less time than the agreed upon minimum. Also, in the absence of a bilateral agreement between carriers setting a minimum time different from the airport minimum, the publishers of airline schedules (the primary means of publicizing connecting times) will not list a connection that does not adhere to the established airport minimum.

The airlines attempt to set minimum connecting times that reflect the situation at each airport, and they have procedures in place to adjust minimum times that are too short to consistently transfer passengers and their baggage to connecting flights. The minimum connecting times are based on the time required to transfer passengers and baggage between the most distant gates. According to airline representatives, it is in the carriers' interest to see that travelers make their connections. The schedules we reviewed showed that the airlines usually allow more time to make connections than the minimum connecting time established for either on-line or interline connections at the airport. The airlines will hold flights in some cases, and some carriers maintain backup aircraft to compensate for delays and reduce the possibility of missed connections. Five of the seven carriers we contacted told us they keep some aircraft in reserve specifically to back up airplanes that develop mechanical problems.

While complaints about missed connections have grown, the increase has been in roughly the same proportion to the overall increase in passenger complaints about all flight problems. Finally, we found that there are problems at the Memphis and St. Louis airports that increase the likelihood of delays and, therefore, missed connections. These include delays caused by the physical layout of the airports, such as runways that are too close together for simultaneous operations during bad weather. Also, workforce problems, such as those experienced by Northwest Airlines and its affiliate, Northwest AirlinK, have resulted in some delays at Memphis-Shelby County airport.

How Minimum Connecting Times Are Established, Publicized, and Enforced

During the past few years, airlines changed their route systems in ways that place greater importance on scheduling and connections. The carriers have often replaced direct point-to-point service with a hub-and-spoke operation. The hub-and-spoke system brings passengers from a variety of origins (spokes) to a common point (the hub) where it transfers them to other flights to take them to their final destinations. In most hubbing operations the airline brings in a large number of flights within a relatively short period of time, interchanges the passengers, and sends them out again. An airline might have several such peak periods of activity at its hub each day. Hub-and-spoke systems afford both the carriers and the flying public numerous advantages, but they also require more connections. Overly tight schedules or frequent flight delays will result in missed connections and traveler inconvenience.

Establishing Minimum Airport Connecting Times for On-Line Connections

For on-line connections a carrier can schedule as much or as little time as it believes is necessary to transfer passengers and their baggage between its flights. If the airline's gates at the airport are all close together, the airline might set a time as short as 20 minutes as the minimum amount of time for connections. Flights departing at least 20 minutes after the arrival of another flight could be considered connecting and reported as such in its schedules.

Airlines have an incentive to minimize scheduled connecting time in order to reduce the total elapsed time for their flights and thereby make their flights more attractive to potential customers. However, according to airline representatives, they try to schedule sufficient time to minimize the number of people who might miss their connections due to late-arriving flights. The Department of Transportation (DOT) policy, set in September 1987, of publicizing the on-time performance records of the carriers and their scheduled flights has given an added incentive to setting realistic schedules. Some carriers have recently added time to their schedules to deal with the problem of chronically late flights.

Establishing Airport Minimum Connecting Times for Interline Flights

When the connection is between flights of different airlines, the minimum amount of time that must be allowed to transfer passengers and their baggage generally must adhere to the minimum time set for the airport. Minimum connecting times for interline connections are set at each airport for the purpose of constructing air travel schedules between cities when no one carrier conveniently serves both the origin and destination city. For example, an airline may provide morning service between Washington, D.C., and St. Louis, but not to Des Moines. If

another carrier flies between St. Louis and Des Moines, a traveler can purchase a ticket between Washington and Des Moines with a change of airplane and carrier in St. Louis.

All scheduled airlines will accept connecting reservations that allow at least the established airport minimum time to transfer passengers and their baggage. The airport minimum connecting time is specific to each airport and is set by agreement among the carriers.

Airport minimum times for interline connections are established at each airport by the carriers serving that airport and belonging to the Air Traffic Conference.¹ The Air Traffic Conference requires unanimous consent of its members at the affected airport to set or change airport minimum connecting times.

The principal consideration in setting a minimum time for interline connections at an airport is the same as for on-line connections, that is, how much time is required to transfer baggage and passengers. Because baggage movements take longer, the airport minimum connecting time will usually be based on the amount of time necessary to transfer baggage between planes parked at the two gates farthest apart.

Airlines that belong to the Conference have cooperated in establishing standard minimum connecting times for the nation's airports under a grant of antitrust immunity. This immunity may expire at the end of 1988. Without such immunity, airlines that collectively set the minimum connecting time at the airport could be in violation of antitrust laws. According to an official of the Air Traffic Conference, the loss of immunity will not affect the ability of the airlines to collectively agree on standard minimum connecting times because the Conference plans to expand participation in the decision process to all carriers serving the airports, not just to Conference members.

This official also said that airport minimum connecting times are rarely changed. He estimated there have been only about 10 actions affecting airport minimum interline connecting times since 1970. This includes minimums established for new airports as well as changes at existing airports.

¹The Air Traffic Conference is a division of the Air Transport Association and is comprised of representatives from most scheduled airlines. The airline representatives are generally the carriers' chief marketing executives.

Carriers do not always have to adhere to the airport minimum. Two airlines can enter into a bilateral agreement to establish minimum connecting times for their operations at the airport that are higher or lower than the standard. At St. Louis International Airport, the standard is 40 minutes, but Eastern Airlines and Continental Airlines have agreed to a 30-minute minimum for interline connections. Carriers will generally enter into such agreements when their gates are relatively close together. Figures II.1, II.2, and II.3 in appendix II provide details on the standard, on-line, and bilateral agreement minimum connecting times at Memphis, St. Louis, and Washington National airports.

Publicizing Connecting Times

The airport minimum connecting times are built into the airlines' computerized reservations systems and published in the Official Airline Guide.² When a traveler requests information from a travel agency on air service from one city to another, the points of departure and destination are entered into the computerized reservation system. If there is no direct or nonstop service, alternative connecting services will appear on the display screen for which the time between the connecting flights is at least the established minimum connecting time.

Enforcing Airport Minimum Connecting Times

Minimum airport connecting times are only enforced to the extent that the Official Airline Guide generally will not publish interline connections that are less than the airline or airport minimum times. However, two airlines may have a written bilateral agreement that establishes a minimum interline connecting time that differs from the standard. Likewise, the computerized reservations systems that travel agents use to book flights will only display connections that meet the minimums.

Scheduled Connecting Times at St. Louis and Memphis Airports Generally Exceed the Minimums

For the airports we examined, the amount of time that carriers schedule for their on-line and interline connections is generally greater than the minimum airport connecting times established by the individual airlines. For example, officials of Trans World Airlines (TWA), the dominant carrier in St. Louis, told us their average scheduled on-line connecting time is 62 minutes in St. Louis. TWA's minimum on-line connecting time is 35 minutes (30 minutes for commuter flights). Officials of Northwest Airlines, the dominant carrier in Memphis, estimated their average scheduled connecting time to be about 40 minutes. Northwest Airline's minimum on-line connecting time is 30 minutes.

²The Official Airline Guide is the principal compendium of air travel routes between cities.

Our examination of selected flights between Arkansas cities and Washington, D.C., through Memphis and St. Louis found that flights between Fort Smith, Arkansas, and Washington, D.C., allow an average of 67 minutes with a range of 50 to 96 minutes to change planes in Memphis. The minimum connecting time for the Memphis airport is 30 minutes. Flights from Fayetteville, Arkansas, allowed 61 minutes, on average, with a range of 40 to 78 minutes for the change to the Washington-bound plane in Memphis.

Flights from Fayetteville and Harrison, Arkansas, through St. Louis allowed, on average, 39 and 92 minutes, respectively. The range for these flights was 30 minutes to 2 hours and 20 minutes. Average connecting times for flights from Washington, D.C., to selected Arkansas points ranged from about 1 hour for Fayetteville flights that connect in Memphis to more than 2 hours for Harrison flights that connect in St. Louis.

Length of Delay When Connections Are Missed

If travelers miss their connecting flights, the amount of time they must wait for another flight depends on a number of factors such as their destination, the airport where the connection is to be made, and the amount of time by which the original connection was missed. For example, passengers from Fort Smith arriving in Memphis to connect with a flight to Washington, D.C., may have to wait 3 to 4 hours for the next flight if they miss their original connection. Passengers from Fayetteville to Washington, D.C., who miss their connecting flight in St. Louis could be rebooked on another flight leaving in less than 30 minutes or, depending on the time of day, could have to wait more than 3 hours for the next flight.

Carrier Policies Attempt to Minimize the Problem of Missed Connections

According to representatives of seven airlines contacted during this study, they occasionally hold flights to allow for late connections, but such decisions are made on a case-by-case basis. They consider such factors as (1) the number of passengers on the delayed flight, (2) whether they have other connections to make elsewhere, (3) whether the time can be made up in flight, (4) whether passengers on the outgoing flight have connections to make elsewhere, and (5) whether incoming passengers can be rebooked onto another flight. The carriers said that DOT's requirement to report on-time performance (see later discussion) has not affected their decisions to hold flights for late connections.

Five of the seven carriers we contacted told us they keep some aircraft in reserve specifically to back up airplanes that develop mechanical problems. For example, Delta Airlines and United Airlines have four airplanes in reserve, Northwest AirlinK has three, and TWA reserves vary depending on their fleet maintenance schedule. Piedmont Airlines personnel could not provide a specific number, but said that reserve aircraft are available at their maintenance facility to serve as backups. Officials of Northwest and USAir said they do not keep a set number of aircraft in reserve for use as backups; however, depending on maintenance and flight schedules, an aircraft may be available at any given time to replace one that has developed mechanical problems. Some of the carriers assign their reserve aircraft to their hub airports. Delta, for example, keeps two planes at its western hub in Salt Lake City, Utah, and two at its eastern hub in Atlanta. Other carriers divide their reserve aircraft between their hubs and other parts of their systems.

Airport Layouts and Other Problems Can Affect Passenger Connections

The physical configuration of an airport can also affect the probability of delays and missed connections. According to representatives of the Memphis-Shelby County Airport Authority and Northwest Airline's station director in Memphis, connecting passengers who must go from one concourse to another must again pass through security. If the X-ray machine is not working, a physical search is required, and this can and has delayed passengers in getting to their connecting flights.

A similar situation exists at the St. Louis airport, according to TWA's station director. He and Northwest's station director in Memphis said that plans exist at both airports to build corridors between the concourses to alleviate this problem. Finally, the president of the Airport Authority in Memphis and TWA's station director said that both Memphis and St. Louis airports have parallel runways that are closer together than Federal Aviation Administration regulations permit for operations under instrument flight rules. Consequently, during inclement weather, incoming flights must be staggered, thereby delaying some flights.

Other circumstances at Memphis-Shelby County Airport, unrelated to airport layout, might have caused more travelers to miss their connections during the past year. Northwest Airlines and its affiliated commuter, Northwest AirlinK, fly approximately 85 percent of the flights into and out of Memphis. Representatives of both airlines told us that they experienced labor problems during 1987 that resulted in delays and

cancellations. For example, according to the president of Northwest AirlinK, during a 90-day period in 1987, a major airline hired away 25 percent of his pilots. As a result, he had to cancel about 1,000 flights. However, departures and arrivals at Fort Smith and Fayetteville were largely unaffected. Only three Fort Smith and three Fayetteville flights were cancelled because crews were not available. Northwest AirlinK operated eight flights daily out of these cities at the time of the pilot shortage. The president also said that Fayetteville and Fort Smith are important markets for Northwest AirlinK.

On-Time Performance at Memphis, St. Louis, and Washington National Airports

Since September 1987 DOT has required that the 14 largest carriers (those with at least 1 percent of domestic revenues) report the on-time performance of their scheduled nonstop flights between the nation's 27 largest airports (those with at least 1 percent of total domestic passenger boardings). The 14 airlines have voluntarily supplied data for all their operations.

Flights are considered on time if they arrive and depart within 15 minutes of the time shown in the carrier's computerized reservations system. The on-time performance record for the three airports we examined appears in appendix III. Each of these airports is among the 27 for which data are required. The on-time data for these three airports do not indicate that they are experiencing excessive numbers of delayed flights. Memphis and St. Louis each have had a better on-time performance than the national average for arriving flights during 5 of the 8 months for which data were available. Carriers serving Washington National reported on-time performance above the national average in 4 months and below it for 4 months. None of the deviations from the national average was large. (See app. III.)

Consumer Complaints About Missed Connections

There are no data available on the number of passengers who miss their connections. To gain some perspective on this issue, we reviewed the data on consumer complaints to DOT to determine whether missed connections were becoming an increasingly common consumer complaint. Consumer complaints to DOT about air travel problems increased dramatically in 1987. DOT received 12,741 complaints about airline services in 1986, but by 1987 complaints had grown to 44,845. Complaints about missed connections rose from 405 in 1986 to 2,055 in 1987. The increase in complaints about missed connections, however, was roughly proportional to the overall increase in complaints about air service. (See app. IV.)

DOT attributes the increase in passenger complaints about air service largely to greater consumer awareness and use of its consumer complaint hotline. According to DOT's Director of Consumer Affairs, the Department's 1986 year-end report, publicizing its complaint resolution services, received considerable exposure. A number of newspapers, television stations, and national magazines published the telephone number for filing complaints about unsatisfactory air travel experiences. DOT officials attribute the higher level of complaints involving cancellations and delays to weather problems in the East and Midwest during the first 2 months of 1987. DOT officials also noted that there were many airline mergers in 1986 and 1987, and some of the carriers had difficulties in combining their workforces. This, too, produced some delays and missed connections. Finally, consumer complaints to DOT have abated during the past year. There were 36 percent fewer complaints overall in May 1988 compared with May 1987, and complaints about flight problems were down 34 percent.

We discussed the contents of this report with DOT officials and incorporated their comments where appropriate. Because of the informational nature of this report and the fact that it discusses a matter for which no agency is directly responsible, we did not obtain official agency comments on this report. Unless you publicly announce its contents earlier, we plan no further release of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of Transportation; the Administrator, Federal Aviation Administration; and other interested parties. We will make copies available to others upon request.

The objectives, scope, and methodology of this report are presented in appendix I. Major contributors to this report are listed in appendix V.

Sincerely yours,



Kenneth M. Mead
Associate Director

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Abbreviations

DOT	Department of Transportation
GAO	General Accounting Office
TWA	Trans World Airlines

Objectives, Scope, and Methodology

Our objectives were to discover how minimum connecting times are set for different airports, what procedures are followed to adjust minimum connecting times, whether existing minimum and actual connecting times are allowing travelers sufficient time to change planes or whether their growing complaints are over missed connections, what practices the airlines engage in to minimize the likelihood of missed connections, and whether there are special conditions at airports that increase the likelihood of delays and missed connecting flights.

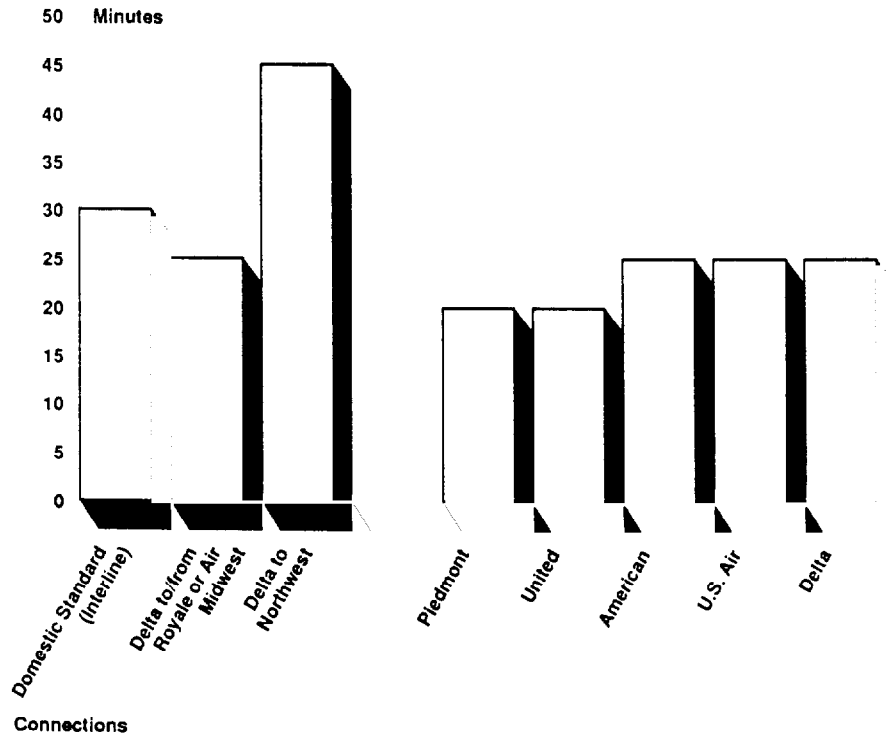
We obtained information on airline connecting times through discussions with representatives of seven airlines—Delta Airlines, Trans World Airlines, United Airlines, Piedmont Airlines, USAir, and Northwest Airlines and its affiliated commuter airline, Northwest AirlinK. We also obtained information from the Official Airline Guide, Air Transport Association, Scheduled Airline Ticket Office, and DOT. Finally, we visited and collected information at Memphis-Shelby County, Washington National, and Lambert-St. Louis International airports.

We analyzed data on minimum connecting times and airline schedules contained in the Official Airline Guide and data obtained from DOT on flight delays, cancellations, and consumer complaints. We initially wanted to analyze data pertaining to the total number of passengers who missed connections and the amount of time by which connecting flights were missed. We were unable to do this, however, because the necessary data were not available.

We conducted our work during the period March through May 1988.

Minimum Connecting Times at Selected Airports

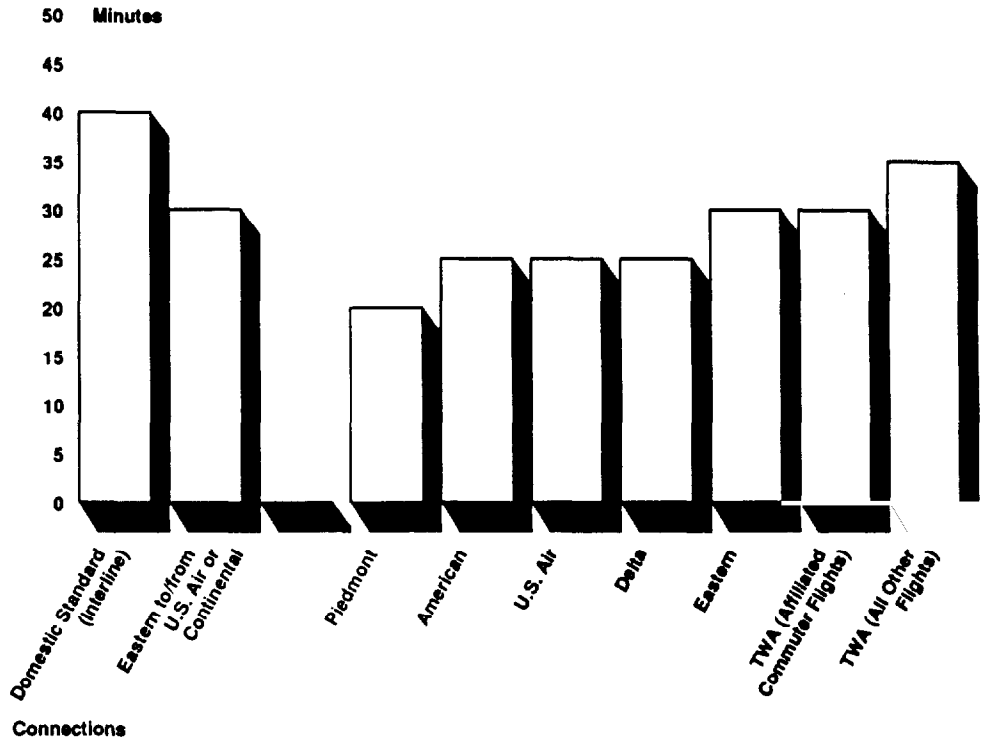
Figure II.1: Minimum Connecting Times at Memphis-Shelby County Airport



Source: Official Airline Guide, North American Edition, February 1988

Appendix II
Minimum Connecting Times at
Selected Airports

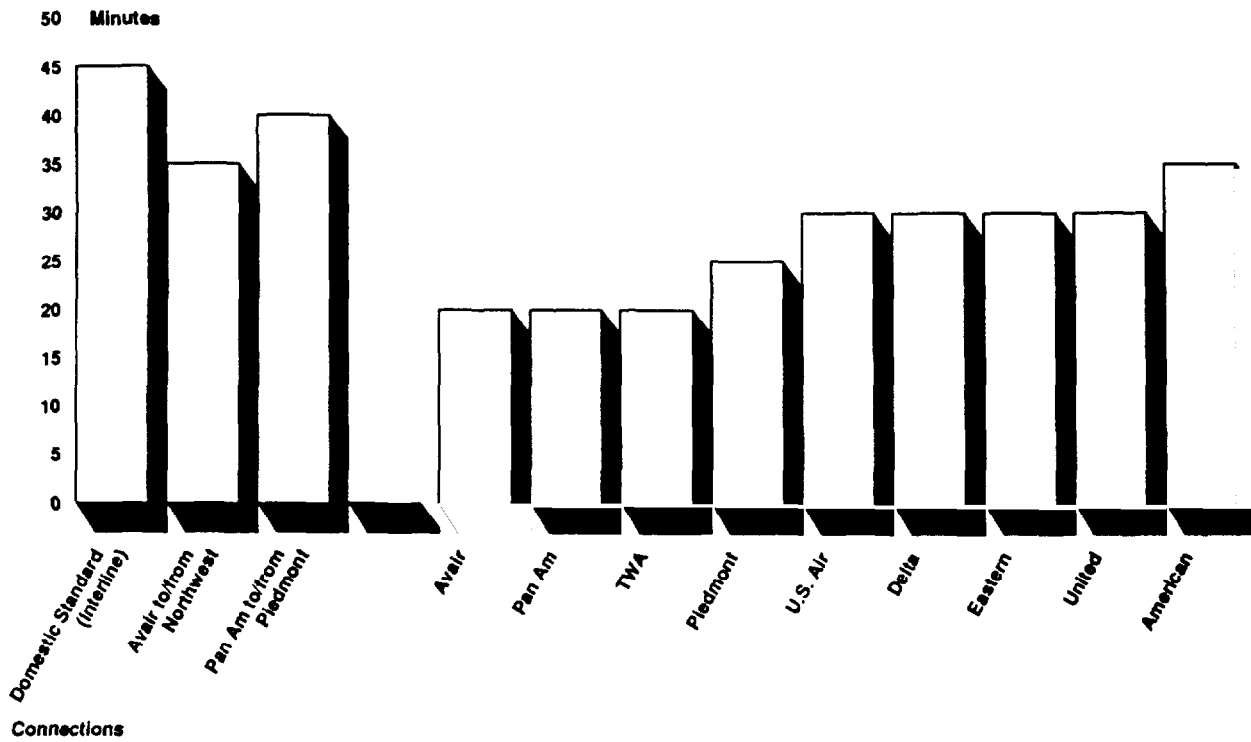
Figure II.2: Minimum Connecting Times
at Lambert-St. Louis International Airport



Source: Official Airline Guide, North American Edition, February 1988

Appendix II
Minimum Connecting Times at
Selected Airports

Figure II.3: Minimum Connecting Times at National Airport, Washington, D.C.



Source: Official Airline Guide, North American Edition, February 1988

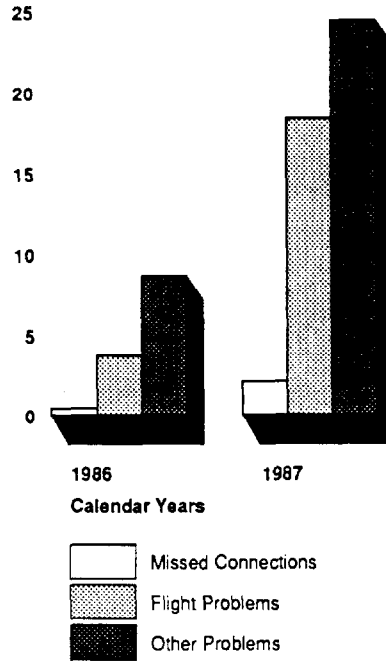
Percentages of On-Time Arrivals Reported by Major Carriers Serving Memphis, St. Louis, and Washington National Airports From September 1987 to April 1988

Month	Memphis	St. Louis	Washington National	National average
September 1987	78.4	82.0	74.1	76.4
October	82.8	82.0	80.8	79.3
November	77.9	78.5	72.5	75.1
December	68.2	64.8	73.7	65.0
January 1988	66.4	67.7	71.5	67.5
February	66.8	69.1	75.7	73.1
March	76.9	76.8	76.7	77.6
April	86.7	85.0	78.3	81.3

Source: U.S. Department of Transportation

DOT Consumer Complaints

30 Number of Complaints (Thousands)



• Source: Department of Transportation, Office of Consumer Affairs

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