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*Office of Inspector General*  
*Audit Report*

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**Passenger Origin-Destination Data  
Submitted by Air Carriers**

**Bureau of Transportation Statistics**

**Report Number AV-1998-086  
Date Issued: February 24, 1998**





**U.S. Department of  
Transportation**

Office of the Secretary  
of Transportation

Office of Inspector General

# Memorandum

Subject: ACTION: Report on Audit of Passenger  
Origination-Destination Data Submitted by Air  
Carriers, Bureau of Transportation Statistics  
Report Number AV-1998-086

Date: February 24, 1998

From:   
Lawrence H. Weinrob  
Assistant Inspector General for Auditing

Reply to JA-1  
Attn of:

To: Assistant Secretary for Aviation and  
International Affairs  
Acting Director, Bureau of Transportation  
Statistics

This is our report on the Audit of Passenger Origination-Destination Data Submitted by Air Carriers to the Bureau of Transportation Statistics. We are providing this report for your information and use. An Executive Summary of our report follows this memorandum.

We discussed the audit results with the Deputy Assistant Secretary for Aviation and International Affairs, other Office of the Secretary (OST) officials, and Bureau of Transportation Statistics management. On February 12, 1998, we provided them a draft of this report for their review and comment. These officials generally agreed with our results and informed us that OST is developing a notice of proposed rulemaking to solicit comments from air carriers and aviation data users on improving aviation data reporting and processing systems.

Please provide your written comments on the recommendations within 30 days. We appreciate the cooperation provided during the audit. If you have questions or need further information, please contact me at x61992, or Alexis M. Stefani, Deputy Assistant Inspector General for Aviation, at x60500.

Attachment

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# EXECUTIVE SUMMARY

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## *Passenger Origin-Destination Data Submitted by Air Carriers*

*Report No. AV-1998-086*

*February 24, 1998*

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### *Objectives and Scope*

The Department of Transportation Assistant Secretary for Aviation and International Affairs; the Assistant Secretary for Budget and Programs; and the Director, Bureau of Transportation Statistics (BTS), requested the Office of Inspector General to audit the passenger origin-destination (O&D) data submitted by air carriers. The audit objectives were to: (1) evaluate the accuracy and completeness of air carrier passenger O&D data submitted, (2) determine if there were alternative procedures that could be used to provide the data more accurately or efficiently, and (3) evaluate the processes used within the Department to collect and disseminate the data. Department officials indicated their need for O&D data to be at least 95 percent accurate.

We conducted the audit at the BTS Office of Airline Information, four air carriers, and three industry consulting firms. The audit covered O&D data reports submitted for the First Quarter of Calendar Year 1997.

### *Background*

Federal regulations require all United States (U.S.) air carriers conducting scheduled passenger operations with one or more aircraft seating 60 or more passengers to submit quarterly O&D data to the Department covering all domestic and international air passenger traffic. U.S. air carriers report passenger traffic data between airports. Today, the O&D data system is used to report on a deregulated, highly competitive aviation market moving approximately 540 million enplaned passengers annually.

O&D data provide the point of origin, air carrier of each flight segment, fare-basis code<sup>1</sup>, stopover points, destination, number of passengers, and airfare. The source documents for O&D data are passenger tickets with a serial number ending in zero lifted at the airport gate from passengers as they board aircraft. This data-gathering process provides an approximate 10-percent sample of flown passenger tickets. For the First Quarter of Calendar Year 1997, 40 air carriers were required to report O&D data.

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<sup>1</sup> The code appearing in the fare-basis box on a flight ticket that describes the applicable service and discount to which the passenger is entitled (e.g. F - first class, Y - coach, and YD - discount coach).

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The BTS Office of Airline Information collects and analyzes O&D data for the Department. Once compiled by the Office of Airline Information, the O&D aviation database provides a profile of air travel in the United States, including such information as the air routes passengers take to travel from point of origin to destination, air carriers that provide flight service between city-pairs (the origin and destination cities form a city-pair such as New York to Chicago), passenger activity levels in each city-pair, and airfares paid.

In the Department, the Office of the Secretary and the Federal Aviation Administration (FAA) are primary users of O&D data. The Office of the Secretary uses O&D data to negotiate international aviation agreements, analyze airline competition, select air carriers for international routes, monitor airfares, review international airline alliances and mergers, and set aviation policy. FAA uses O&D data to allocate airport improvement grant funds, determine air traffic control operational needs, and develop regulatory changes. Other Government users of the O&D data include the Department of Labor for its Consumer Price Index computations and Congress for its aviation policy determinations.

## *Results*

The Department relies heavily on accurate and complete O&D data to make sound policy and economic decisions that affect the aviation industry and consumers. Three critical uses for O&D data are international negotiations and air route awards, airfare analysis, and FAA's future funding structure.

- International air travel is an emerging, significant economic force that affects the U.S. economy. Without timely, accurate, and complete O&D data to analyze domestic carriers' passenger traffic, travel patterns, and air fares, the Department is at a disadvantage in reviewing and negotiating international air route awards to ensure U.S. carriers retain competitive parity with foreign air carriers.
- In response to consumer inquiries about domestic airline prices, the Department, using O&D data, first reported (in June 1997) on the average fares of the 1,000 largest domestic city-pairs in the "Domestic Airline Fares Consumer Report." Accurate and complete O&D data must be submitted by air carriers for the Department to report fairly average airfares to consumers.
- The National Civil Aviation Review Commission recommended, in part, that FAA's air traffic control services be placed in a performance based organization with the goal that these services be managed and priced based on

## EXECUTIVE SUMMARY

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their costs and value to system users. Accurate O&D information on passenger demand for and use of the air transportation system will be essential for the FAA to attain this goal.

Although O&D data are used by Department analysts to provide quantitative support for key policy and funding decisions, we found that O&D data are unreliable for use in making these important decisions. Overall, the passenger counts from 69 percent of the reported 8,894 city-pairs we reviewed did not meet the 95-percent accuracy criteria desired by Department officials. For example, we found 643 city-pairs where the O&D passenger counts were misreported by 31 to 40 percent. The percentage of city-pairs with identified reporting problems was high for the air carriers. However, the percentage of passengers misreported in the aggregate was relatively small for each air carrier.

To compensate for the unreliable O&D data submitted by air carriers, Department aviation analysts either request air carriers to provide supplemental data or use adjustment factors based on prior experience with each air carrier's data. To provide accurate and complete O&D data needed by Department analysts and policymakers, the Department should change its O&D data collection system.

Today, the computer systems used by air carriers for reservations and sales form a viable alternative to the paper-based O&D system. All the information on an air traveler currently reported in the O&D system is available in the air carrier's Computer Reservation System (CRS). Using a CRS process instead of the O&D ticket collection system will be more timely, reduce airline paperwork burden, and provide more accurate and complete data. In addition, CRSs are easier to update as fewer systems are involved, and they can provide information on small commuter and foreign air carriers. The Department needs to design a system based on CRSs to replace the outdated and unreliable O&D data collection system.

Until a new system is implemented, specific actions are needed by BTS to improve the accuracy and completeness of O&D data submitted by the air carriers. To ensure compliance from the air carriers, BTS should: (1) caution air carrier management of their legal responsibility to provide accurate and complete O&D data and provide air carriers with training on effective O&D data collection system, (2) take enforcement action against air carriers that repeatedly fail to file correct data, and (3) strengthen BTS's monitoring of air carrier reporting.

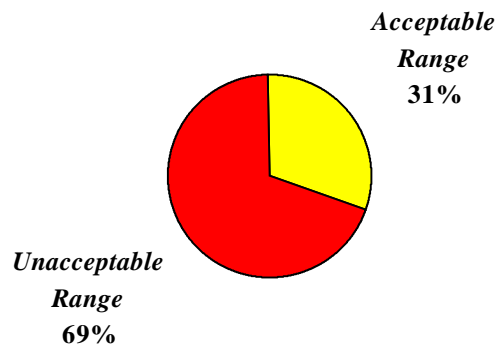
# EXECUTIVE SUMMARY

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## *Analysis and Recommendations*

We found air carriers' O&D data submissions did not meet the 95-percent accuracy desired by Department officials. For the quarter ended March 31, 1997, 39<sup>1</sup> air carriers reported serving 8,894 city-pairs. We found the number of passengers reported for 6,166 city-pairs (69 percent) did not meet the 95-percent accuracy criteria desired by Department officials. We considered a city-pair to be within the acceptable range if the passenger count on the O&D Survey report was within plus or minus 5 percent of the benchmark.<sup>2</sup>

### **Percentage of City-Pairs Within the Desired 95-Percent Accuracy**



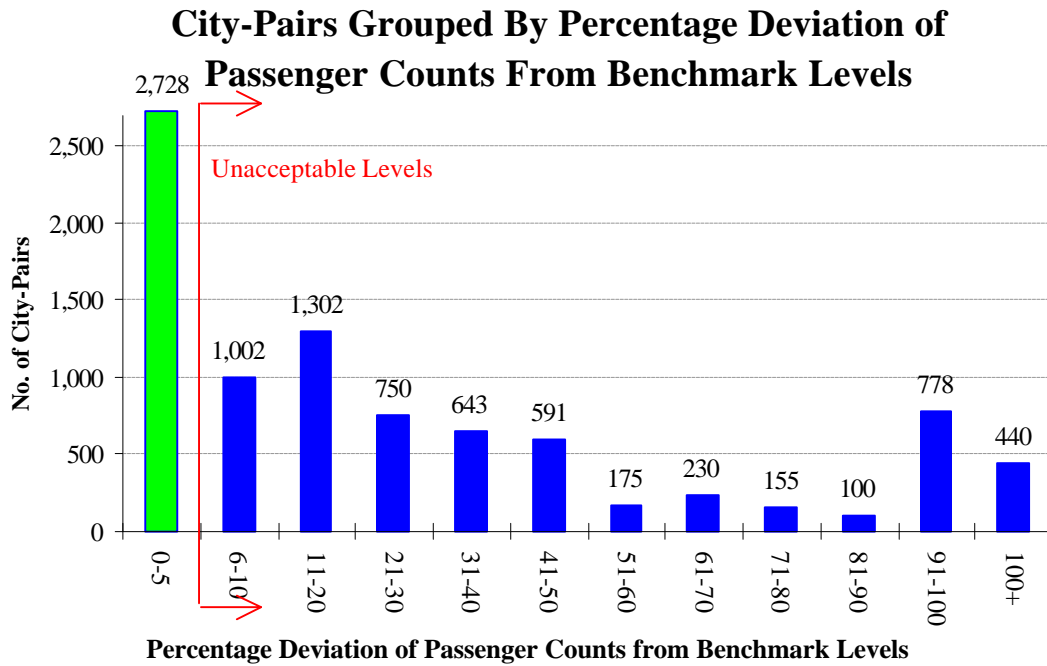
The following graph illustrates the degree to which reported O&D data are inaccurate. For example, there were 643 city-pairs where the O&D passenger counts were misreported by 31 to 40 percent. The following graph groups city-pairs by the percentage deviation of their passenger counts from the counts established by the benchmark. The percentage of city-pairs with identified reporting problems was high for the air carriers. However, the percentage of passengers misreported in the aggregate was relatively small for each air carrier. For example, on an overall passenger basis, one air carrier's data submission met the 95 percent reporting goal, however, this goal was only met in 62 percent of its city-pair markets.

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<sup>1</sup> Although 40 air carriers reported O&D data for the period audited, only 39 air carriers provided the comparable passenger traffic data from aircraft dispatch reports, which we used to evaluate O&D data submissions.

<sup>2</sup> We used an Office of Airline Information passenger count benchmark of the number of passengers submitted by air carriers to the Department from dispatch reports that track the number of passengers enplaned. Because this other passenger count report is also used for aircraft operation purposes, we accepted it as a reliable benchmark.

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We found that inaccurate and incomplete reporting of O&D data occurred because: (1) the basic reporting requirements of the O&D system established almost 50 years ago have not kept pace with the changes in the aviation industry, (2) air carriers' controls over their O&D data collection and reporting were not effective, and (3) BTS did not adequately monitor air carrier reporting.

### ***Reporting Requirements Have Not Kept Pace With Changing Industry Practices***

The basic reporting requirements of the O&D Survey have not changed since 1947. The original idea of sampling every tenth ticket was satisfactory when the airline industry was regulated, was not automated, and issued comparatively fewer tickets. Several factors have caused the O&D collection and processing systems to become outdated and provide inaccurate and incomplete O&D data. Two main factors are code-sharing arrangements and the expansion of international gateways with additional domestic and foreign air carriers.

Code-sharing is a marketing agreement between two air carriers whereby one air carrier agrees to allow the other to use its airline designator code on its flights while each air carrier operates independently in all other aspects. We found code-sharing arrangements are not being properly tracked in the O&D Survey because these relationships are only known by the code-share partners themselves, and not necessarily by the reporting air carriers. The reporting air carrier is the first on a ticket itinerary that meets O&D reporting requirements. From information on the face of a ticket, the reporting air carrier cannot accurately

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identify the actual air carrier that flew subsequent flight segments. Additionally, U.S. air carriers are entering into code-share alliances with foreign air carriers.

Since the advent of deregulation, all major U.S. air carriers, except Southwest Airlines, have expanded their routes to international markets. Internationally, if any portion of a passenger's itinerary is operated by an O&D reporting U.S. air carrier, the entire itinerary will be reported by that air carrier. For example, if a passenger departs London-Heathrow Airport for Rome, Italy, on British Airways, and then connects on Delta Air Lines to Atlanta, Georgia, the full itinerary would be reported by Delta Air Lines. However, foreign air carriers without U.S. code-share partners and anti-trust immunity<sup>4</sup> are not required to report O&D data when they fly into and out of U.S. airports. For example, Aeromexico operates air routes from Cancun, Mexico, to Atlanta, Georgia, and enplanes both U.S.-originating passengers and connecting passengers from foreign air carriers without reporting O&D data for this market.

### *Air Carrier Data Quality Controls Were Not Effective*

Air carrier management had not implemented effective data quality controls to ensure accurate and complete O&D Survey data were gathered and submitted. The root causes for data inaccuracies were the lack of data review prior to submission, errors in programming, and noncompliance with Federal regulations. For example:

- Air carriers submitted itineraries for airport codes that did not exist and for airports not served by the reporting air carrier,
- Air carriers truncated long itineraries, and
- Air carriers incorrectly submitted airfares net of taxes.

### *BTS Office of Airline Information Data Quality Controls Were Not Effective*

Ineffective monitoring by the BTS Office of Airline Information contributed to the inaccurate and incomplete O&D data submitted by air carriers. Although the BTS Office of Airline Information increased its monitoring in the last year, it did not ensure that air carriers had the necessary O&D systems to ensure the submission of accurate and complete data. Department personnel had neither conducted on-site data system reviews nor provided formal training to air carriers since 1985.

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<sup>4</sup> The Department has the discretion to exempt alliances between air carriers from the anti-trust laws to the extent necessary to allow the air carriers to form the planned alliance, so long as there is no adverse affect to the public interest.



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## *Alternatives to the Current O&D System*

We concluded a new system is needed for collecting O&D data due to the prevalence of inaccurate and incomplete data. A less expensive, more accurate alternative to the present system is to use information in the air carriers' CRSs. All the information on a traveler necessary for O&D reporting is electronically stored in air carrier's CRS and is exchanged daily with other air carriers through a clearinghouse for revenue accounting purposes. Using the CRSs instead of the ticket collection system will be more timely, less costly to the airlines, and provide more accurate and complete data. Furthermore, with the emerging trend in the use of electronic ticketing, the traditional ticket will not be available as a data source. In addition, CRSs are easier to update because fewer systems are involved and they can provide information on small commuter and foreign air carriers.

CRSs do have some downside factors that are being addressed by air carriers. CRSs record flight reservations and ticket sales, not actual travel as ultimately flown because passengers may double book flights or not actually use the itinerary as originally reserved. Because double bookings cost air carriers lost revenue, air carriers frequently update their procedures to discourage double booking which should reduce the impact of this factor on O&D data. However, the use of unadjusted CRS data would still include itineraries that are subsequently changed by travelers after the data have been submitted to the Department. The Department should study how to better adjust CRS data to account for double booking and changed itineraries. In addition, six air carriers do not have CRS data. These air carriers would have to submit O&D data through a different medium or in the same manner they do now. These six air carriers transported about one percent of the domestic passengers during the First Quarter of Calendar Year 1997.

## *Interim Actions Are Needed*

Until the use of a CRS process is implemented, BTS must take actions to improve the accuracy and completeness of O&D data submitted by air carriers to the Department. To ensure compliance with O&D regulations by the air carriers, BTS should: (1) caution air carrier executive management of their legal responsibility to provide complete and accurate O&D data, and when necessary take enforcement actions against air carriers that fail to comply; and (2) take a proactive role in reviewing the submitted O&D data and providing prompt feedback to the air carriers on errors found. Additionally, the Office of Inspector General remains committed to the development of accurate and complete aviation databases and will audit specific air carrier O&D collection systems and data as necessary.

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## *Organizational Placement Options*

Prior to 1985, the Office of Airline Information was a functional unit within the Civil Aeronautics Board tasked with accumulating specified data from air carriers and maintaining aviation databases. After the sunset of the Civil Aeronautics Board, the Office of Airline Information was transferred to the Research and Special Program Administration. In June 1995, the Department repositioned the Office of Airline Information within the newly formed BTS.

Two studies have suggested the repositioning of the Office of Airline Information within the Department. A 1997 study by the National Research Council recommended the Office of Airline Information be removed from BTS and realigned within the Department. The study concluded that the BTS was a statistical agency and not an administrative, regulatory, or enforcement agency. It explained that as a statistical agency BTS carries an inherent mission to protect the confidentiality of data, a mission at odds with the release of aviation data to the public. A second study by a Department consultant based its recommendation to reposition the Office of Airline Information on BTS's failure to provide proper funding and place importance on the value of the aviation data products produced by the Office of Airline Information.

The Department should determine the best location for the Office of Airline Information. Repositioning this office in the Office of the Secretary could improve oversight of the program because the Office of the Secretary relies on timely, accurate, and complete O&D data and other aviation products compiled by the Office of Airline Information. For instance, the Office of the Secretary frequently needs immediate answers to questions that arise during negotiations for U.S. and foreign alliances. Repositioning within FAA would also be another alternative because FAA also is a principal user of Office of Airline Information database products and currently maintains a substantial investment in computer systems staffed with personnel familiar with aviation and database skills. Keeping the Office of Airline Information in BTS also has merits. The Office of Airline Information maintains several important aviation databases and could logically be a part of the Department's primary statistical office. However, if the Department chooses to leave the Office of Airline Information in BTS, then BTS should increase its managerial oversight of the Office of Airline Information to ensure the Department has quality aviation data products to support decisionmaking effecting aviation issues.

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## *Better Business Practices Should be Implemented*

To promote better business practices, a consultant study recommended the Department outsource noncore business processes (such as maintaining the reference library) being done by the aviation data staff in BTS. We agree with this recommendation. We recommended the BTS, as required by the Government Performance and Results Act of 1993, establish specific program performance measures for data accuracy of all aviation data products, including O&D.

We also tested the process used to account for O&D data product sales. The BTS Product Distribution Center (Distribution Center) sells Office of Airline Information aviation database products, including O&D data. We found an overall lack of management and accounting controls in the Distribution Center for the sale of aviation database products. Sales from March 1996 to September 1997 were recorded as \$349,727. The receipts recorded for this time period were \$278,507. The Distribution Center should collect the unpaid balance of \$71,220 for the sale of aviation data products.

## *Recommendations*

We recommend the Assistant Secretary for Aviation and International Affairs and the Acting Director of BTS:

- design and implement a system to replace the outdated and unreliable O&D data collection system with a CRS-based method;
- determine the best organizational placement of the Office of Airline Information;
- outsource noncore business processes of the Office of Airline Information;
- implement interim corrective actions until a new O&D system is implemented to improve the data accuracy and completeness including training air carrier staff on correct O&D data processes, providing prompt feedback on data errors, using enforcement actions when necessary, and improving Office of Airline Information processes for monitoring air carrier compliance;
- establish specific program performance measures for data accuracy to meet the requirements of the Government Performance and Results Act; and
- collect the funds owed the Department and establish appropriate accounting controls.

## *Agency Comments*

In response to a February 12, 1998 discussion draft of this report, the Deputy Assistant Secretary for Aviation and International Affairs, other Office of the

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Secretary officials, and BTS management officials verbally concurred with our findings and recommendations. Office of the Secretary officials stated that as primary users of aviation data, they were increasingly concerned about the quality of the Department's aviation data, and the obsolete data reporting and processing systems. In recognition of the problems the Office of the Secretary has experienced, and confirmed by our report, the Office of the Secretary plans to initiate an industry and user outreach program to review aviation data collected by the Office of Airline Information and measures that may be taken to modernize and improve aviation data reporting and processing systems. The Office of the Secretary has prepared a draft advanced notice of proposed rulemaking to solicit public comments from reporting air carriers and aviation data users on the nature, scope, source, and means for collecting, processing, and distributing airline traffic, fare, and financial data.

### *Office of Inspector General Comments*

We are requesting written comments to our specific recommendations including actions planned and target dates for completion of the recommendations.

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## PART I

### BACKGROUND

The Federal Government has collected and analyzed commercial aviation data since the 1938 Civil Aeronautics Act. The Civil Aeronautics Board Sunset Act of 1984 requires the Department of Transportation (Department) to collect and disseminate information on civil aeronautics. Currently, the Bureau of Transportation Statistics (BTS), Office of Airline Information compiles aviation databases using passenger traffic data submitted by United States (U.S.) air carriers. These are U.S. airline companies approved by the Federal Aviation Administration (FAA) to operate scheduled passenger service. One of the key aviation databases used to identify and analyze air travel patterns and airfares is the passenger origin-destination (O&D) data submitted to BTS by air carriers in the quarterly O&D Survey.

#### What is the O&D Survey?

Title 14, Code of Federal Regulations (CFR), Part 241 requires U.S. air carriers conducting scheduled passenger operations with one or more aircraft seating 60 or more passengers to submit to the Department a quarterly O&D Survey report. The source documents for the O&D Survey are passenger tickets lifted at the airport gate from enplaned passengers. Only tickets with serial numbers ending in zero are included in the O&D Survey. This process results in an approximate 10-percent sample of air passenger traffic. Air carriers compile O&D data elements from these tickets for the O&D Survey report. Required O&D data elements are point of origin, air carrier for each flight segment, fare-basis code, stopover points, destination, number of passengers, and ticket dollar value. For the First Quarter of Calendar Year (CY) 1997, 40 U.S. air carriers were required to report O&D data. O&D data cover both domestic and international air passenger traffic flown by reporting U.S. air carriers.

Foreign air carriers do not file comparable O&D data for travel to and from the United States. However, the Department does require foreign air carriers to file limited O&D data if the foreign air carrier has a U.S. code-share partner<sup>1</sup> and has been granted anti-trust immunity.<sup>2</sup> Under such agreements, foreign air carriers are required to file O&D data for passengers with U.S. connection points. During the

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<sup>1</sup> Code-sharing is a marketing agreement between two air carriers whereby each air carrier agrees to allow the other to use their respective airline designator code to give the appearance to passengers that each airline is providing the full itinerary for travel.

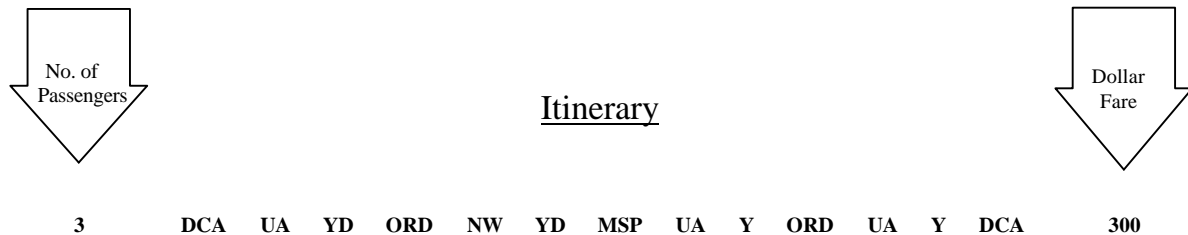
<sup>2</sup> The Department has the discretion to exempt alliances between air carriers from the anti-trust laws to the extent necessary to allow the air carriers to form the planned alliance, so long as there is no adverse affect to the public interest.

First Quarter of CY 1997, the following seven foreign air carriers met the limited filing requirement:

- Austrian Airlines
- Canadian Airlines International
- Lufthansa German Airlines
- KLM Royal Dutch Airlines
- Sabena Belgian World Airlines
- Scandinavian Airlines Systems
- Swissair, Swiss Air Transport

Foreign air carriers without U.S. code-share partners and anti-trust immunity fly into and out of U.S. airports without reporting O&D data. For example, Aeromexico operates air routes from Cancun, Mexico to Atlanta, Georgia and enplanes both U.S. originating passengers and connecting passengers from foreign air carriers without reporting O&D data for this market.

Reporting air carriers compile the O&D data and submit it in a prescribed format that compresses duplicate travel itineraries. For illustration, a compressed line item in an O&D Survey would read:



This itinerary shows that three passengers flew from Washington, D.C. National Airport (DCA), on United Airlines (UA) at a discounted coach fare (YD) to Chicago, Illinois O’Hare Airport (ORD), then on to their destination of Minneapolis-St. Paul, Minnesota (MSP), on Northwest Airlines (NW) also at a discounted coach fare. The passengers returned on United Airlines at a full coach fare (Y) to Chicago, Illinois, and then to Washington, D.C., on United Airlines at the full coach fare. The total airfare for this itinerary was \$300 per passenger.

The BTS compiles and disseminates O&D data submitted by air carriers. O&D database products are provided free to Government agencies, unless special data processing is requested, and are sold to the public. The O&D aviation database is intended to provide a profile of air travel in the U.S., including information on the air routes passengers take to travel from point of origin to destination, air carriers that provide flight service between two aviation markets (*e.g.*, city-pairs such as Los Angeles, California to Washington, D.C.), passenger activity levels between each city-pair, and airfares paid.

## Who Uses the O&D Survey Data?

The Office of the Secretary and FAA are primary users of O&D data. The Office of the Secretary uses O&D data to analyze airline competition, negotiate international agreements and route awards, monitor airfares, and set aviation policy. FAA uses O&D data to allocate airport improvement grants, forecast air traffic control operations, and develop regulatory changes. Other users and uses of the data include:

- Congress -- policymaking;
- Department of Commerce -- Gross National Product;
- Department of Labor -- Consumer Price Index;
- Department of Justice -- antitrust cases;
- Department of State -- international bilateral aviation negotiations;
- Airport authorities, state and local government agencies -- capacity planning;
- Air carriers -- forecasting and marketing;
- Aviation manufacturers -- aircraft market analyses;
- Wall Street investment firms -- investment analyses;
- Rental car, resort, and amusement park corporate marketing departments -- market forecasting and advertising; and
- Data vendors and consulting firms -- data resale and repackaging.

## OBJECTIVES, SCOPE AND METHODOLOGY

The Assistant Secretary for Aviation and International Affairs, the Assistant Secretary for Budget and Programs, and the Director of BTS, requested the Office of Inspector General (OIG) audit the passenger O&D data submitted by air carriers. These senior Department officials indicated their need for O&D data to be no less than 95 percent accurate. Our audit objectives were to:

- Evaluate the accuracy and completeness of air carrier passenger O&D data submitted to the BTS,
- Determine if there are alternative procedures that could be used to provide the data more accurately or efficiently, and
- Evaluate the processes used within the Department to collect and disseminate data.

We performed the audit in accordance with Government Auditing Standards prescribed by the Comptroller General of the United States, and included such tests of procedures, records, and other data as circumstances warranted. Because air carriers delete ticket numbers when they compile O&D data for submission to



the Department, we could not verify either the accuracy or completeness of individual itineraries and fare data included in O&D submissions.

To estimate the accuracy and completeness of overall O&D data submissions, we used an alternate evaluation methodology. We used an Office of Airline Information passenger count benchmark of the number of passengers submitted by air carriers to the Department from a dispatch report that tracks the number of passengers enplaned. Because this other passenger count report is also used for aircraft operation purposes, we accepted it as a reliable benchmark. Using this comparative data, we then computed the number of city-pairs that were outside the 95-percent accuracy desired by Department officials.

We performed our audit work between July 1997 and February 1998. The audit covered air carrier reports submitted for the First Quarter of CY 1997. For the First Quarter of CY 1997, 40 air carriers were required to report O&D data. However, only 39 air carriers provided O&D data and the comparative passenger traffic data from aircraft dispatch reports we used to evaluate O&D data submissions. See exhibit A for a list of the entities and air carriers visited during the audit.

To conduct our audit, we:

- Reviewed the Office of Airline Information's policies, procedures, and regulations for compiling the O&D Survey;
- Interviewed key Department personnel concerning their use of and reliance on the data;
- Analyzed four air carriers' O&D data collection and reporting processes;
- Interviewed a major O&D data reseller for its perspective on the quality of O&D data;
- Reviewed an August 9, 1996 consultant's report on alternative O&D collection methods;
- Reviewed a July 8, 1997 consultant's study on the Office of Airline Information's organization and business structure; and
- Evaluated the Department's processes for dissemination of aviation data and audited the BTS Product Distribution Center sales records.

We also reviewed the Office of Airline Information's Government Performance and Results Act performance measures and initiatives. One of the performance measures was data accuracy. The initiatives were: (1) to provide policymakers with information and analysis to enable reasoned decisionmaking using timely and relevant data, (2) to provide cost-effective data collected from U.S. air carriers, and (3) to edit and validate the aviation databases to maintain a high degree of

accuracy while remaining timely. Our concerns with the performance measures and initiatives are discussed in Part II of this report.

### Prior Audit Coverage

The OIG's Inspections and Evaluations report "Airline Data Collection and Reporting Program - Research and Special Programs Administration," (Report No. E1-RS-5-001 dated March 22, 1995), found: (1) data were inaccurate and inconsistent because reporting requirements were not clearly defined and were outdated, were inconsistently interpreted by the airlines, and were not monitored to ensure accurate and consistent submissions; (2) criteria did not exist for withholding sensitive financial data from public disclosure; and (3) the Office of Airline Information lacked internal procedures and could not perform all of its duties because it did not control its budget and data requirements.

OIG made four recommendations.<sup>3</sup> First, OIG recommended that a task force determine the need for the data, the most efficient way to obtain and present the data, and standards for enforcement actions and validation of the data. Second, OIG recommended the Research and Special Programs Administration (RSPA) implement a long-range plan for reviewing and validating the air carrier data submissions. RSPA concurred with these two recommendations.

Third, OIG recommended RSPA establish, publish, and implement clear policy and criteria for withholding financial information from public disclosure. RSPA officials did not concur with this recommendation, stating BTS was handling requests for confidential treatment in accordance with existing Department regulations and was exercising care not to release data prematurely. OIG determined this recommendation was no longer applicable and closed the recommendation.

Finally, OIG recommended RSPA develop internal management controls and standard operating procedures to clearly define organizational responsibilities. Subsequent to the OIG report, the office was transferred from RSPA to BTS. In addition, an independent consultant was hired to perform an in-depth study of the operations of the Office of Airline Information. OIG closed this recommendation because these actions met the intent of the recommendation.

We found data accuracy problems continue to exist. Our results and recommendations follow.

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<sup>3</sup> OIG made recommendations to RSPA because the Office of Airline Information was organizationally aligned under this Operating Administration at the time of the audit.

## PART II

### RESULTS AND RECOMMENDATIONS

*Finding: Air carriers O&D data submissions did not meet the 95-percent accuracy desired by the Department.*

The O&D city-pair data are crucial to Department decisionmaking including international air route awards, airfare analysis, and FAA's future funding structure. However, air carrier O&D data reviewed were neither accurate nor complete. For the quarter ended March 31, 1997, 39 air carriers reported serving 8,894 city-pairs. We found the number of passengers reported in O&D data for 6,166 city-pairs (69 percent) were outside the 95-percent accuracy level desired by Department officials. Inaccurate and incomplete reporting of O&D data occurred because: (1) the basic reporting requirements of the O&D system established almost 50 years ago have not kept pace with changes in the aviation industry, (2) air carriers' controls over their O&D data collection and reporting were not effective, and (3) BTS did not adequately review air carriers' O&D data collection and reporting processes. Therefore, the governmental and private users of O&D data cannot rely on the data to accurately report passenger travel itineraries and airfares between city-pairs.

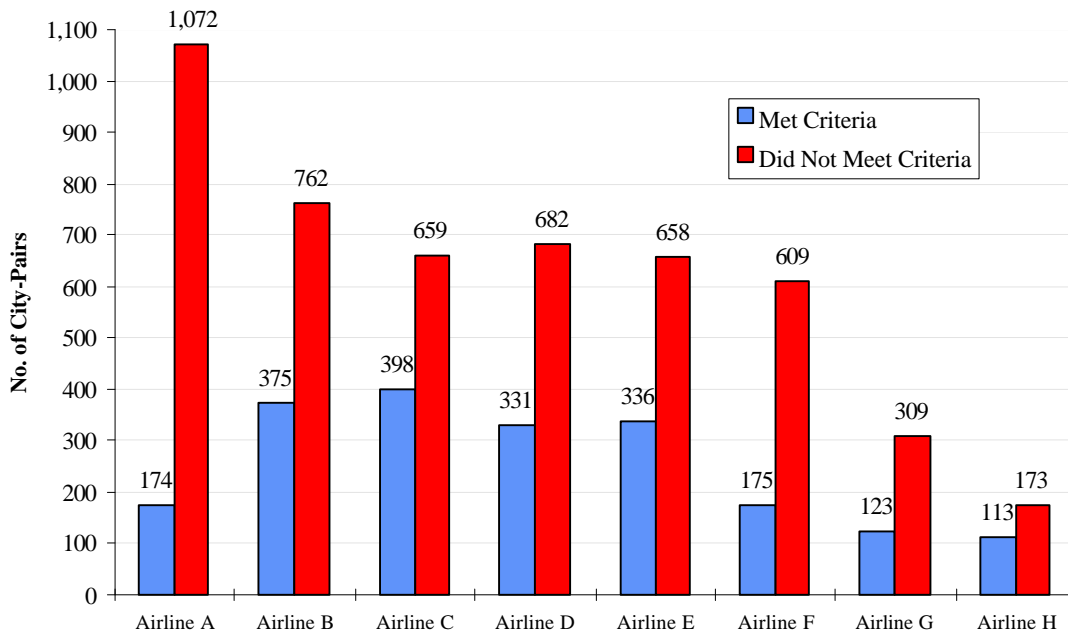
#### O&D CITY-PAIR DATA ARE NEITHER ACCURATE NOR COMPLETE

U.S. certificated air carriers are required by Department regulation to report monthly actual passenger counts on Form 41, Schedule T-100 (T-100). The T-100 includes counts of the number of passengers enplaned and is used by air carrier operations personnel to compute aircraft weights and balances before an aircraft is cleared for departure. Because of the safety implications of inaccurate reporting, T-100 is a reliable benchmark for assessing the number of passengers on each flight segment. The T-100, however, is not a substitute for O&D Survey data because the T-100 does not include all data elements included in the O&D Survey; primarily passenger origin to destination itineraries and airfares.

Using T-100 passenger data as a benchmark, we concluded the air carrier O&D submissions for the period reviewed were neither accurate nor complete. For the First Quarter of CY 1997, 39 air carriers reported serving 8,894 city-pairs. We found passenger counts for 6,166 city-pairs (69 percent) did not meet the 95-percent desired accuracy criterion requested by Department officials, while passenger counts for 2,728 city-pairs (31 percent) did meet the accuracy level. We considered a city-pair to be in the acceptable range if the passenger count on the O&D Survey report was within plus or minus 5 percent of the benchmark.

The following chart shows for the eight largest U.S. air carriers<sup>4</sup>, the number of city-pair passenger counts that met the Department’s criterion and those that did not. For example, Airline A served 1,246 city-pairs. We found the passenger counts for 1,072 city-pairs (86 percent) did not meet the desired 95-percent accuracy rate. The passenger counts for only 174 city-pairs (14 percent) were within the acceptable range. As illustrated, the air carriers were reporting a significant number of city-pairs that did not meet the desired 95-percent accuracy level.

*Chart 1*



**Eight Large U.S. Air Carriers**

Under-reporting of O&D data results in missing information while over-reporting results in double-counting of data. Both types of misreporting distort the O&D data. To better understand the impact of the currently inaccurate and incomplete O&D data on decisions made by the Department, we examined both overall and city-pair specific misreporting of passenger counts for the eight large air carriers. Shown below are the percentage of misreported city-pairs and the percentage of misreported passenger counts for these carriers.

<sup>4</sup> These eight air carriers accounted for 79 percent of passenger volume for the First Quarter of CY 1997. We did not include Southwest Airlines (Southwest) in this analysis because, in 1980, DOT granted Southwest a special waiver allowing the reporting of limited O&D data. Because of the then unique intrastate service area of Southwest, DOT permitted Southwest to limit its O&D reporting to directional (not round-trip) routes, average airfares, and a simple 10-percent sample of all tickets.

<u>Air Carriers</u>	<u>Percentage of City-Pairs Misreported</u>	<u>Percentage of Passengers Misreported</u>
Airline A	86	14
Airline F	78	6
Airline G	72	11
Airline D	67	13
Airline E	66	8
Airline B	67	6
Airline C	62	5
Airline H	60	6

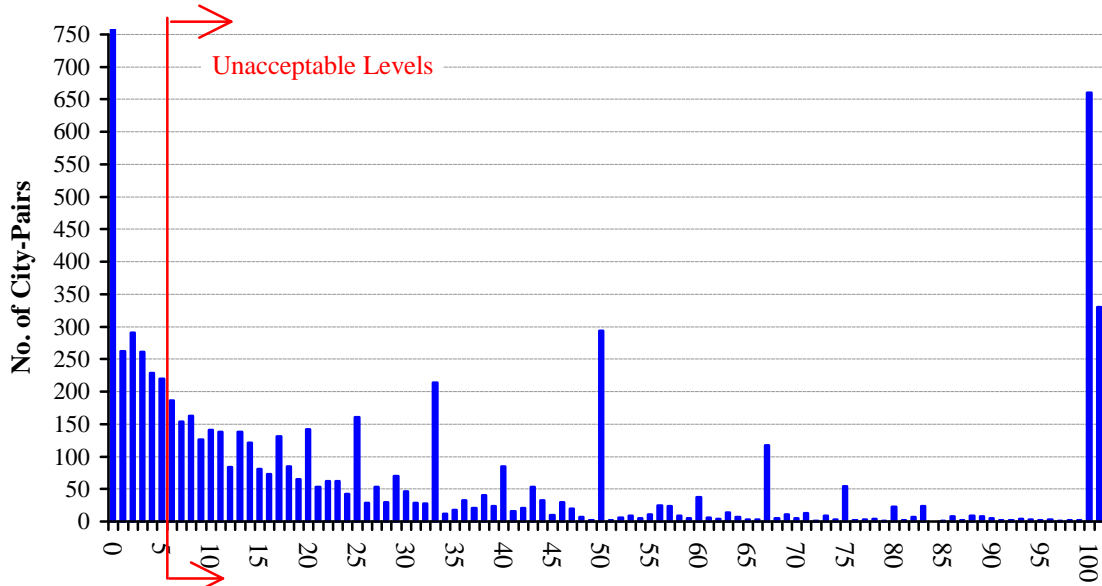
Although the percentage of city-pairs with identified reporting problems was high for the air carriers, the percentage of passengers misreported in the aggregate was relatively small for each air carrier. For example, on an overall passenger basis, Airline C’s data submission met the 95 percent reporting accuracy goal. However, this goal is not met in 62 percent of its city-pair markets.

Charts 2 and 3 further illustrate this point for the eight large air carriers. Chart 2 groups all of the city-pairs served by these carriers according to the deviation of their passenger counts from the T-100 benchmark data. Chart 3 shows the number of passengers traveling in each of the groups of city-pairs from Chart 2. In Chart 2, the majority of the city-pairs (71 percent) lie to the right of the 5 percent acceptable deviation point for passenger counts. The percentage of passengers traveling in the city-pairs whose accuracy is outside the acceptable range, however, is much lower, only 38 percent as shown in Chart 3.

This is particularly true for the high number of city-pairs that are 100 percent or more inaccurate. About 990 city-pairs, 14 percent of total city-pairs for these eight air carriers, make up these categories, but only about 213,000 passengers, 2 percent of total passengers, flew in those markets.

Chart 2

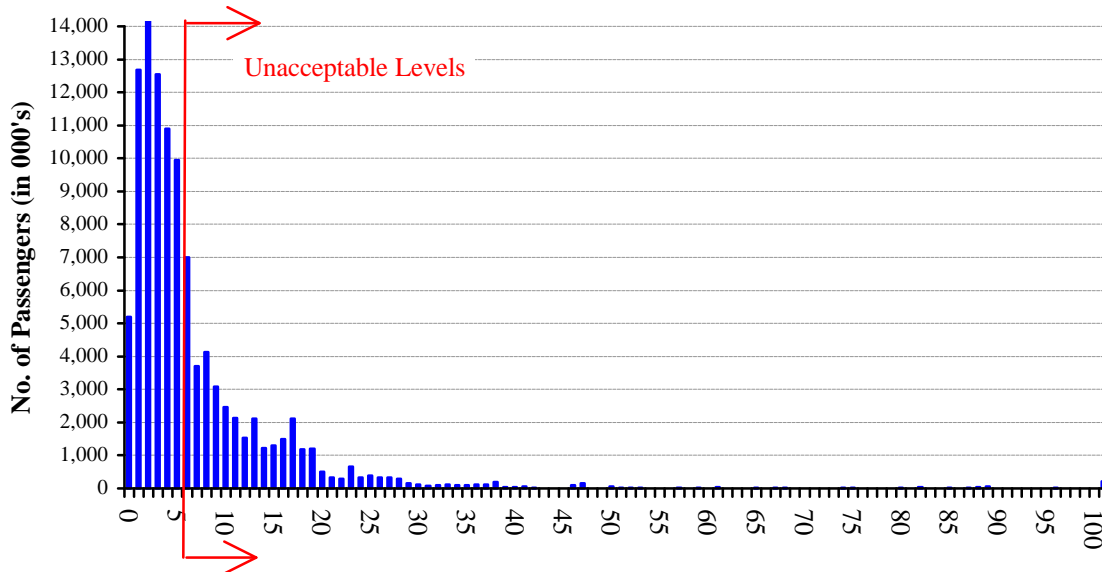
### City-Pairs Grouped by Percentage Deviation of Passenger Counts From Benchmark for 8 Air Carriers



Percentage Deviation of Passenger Counts From Benchmark Levels

Chart 3

### Passengers in City-Pairs Grouped by Percentage Deviation From Benchmark for 8 Air Carriers

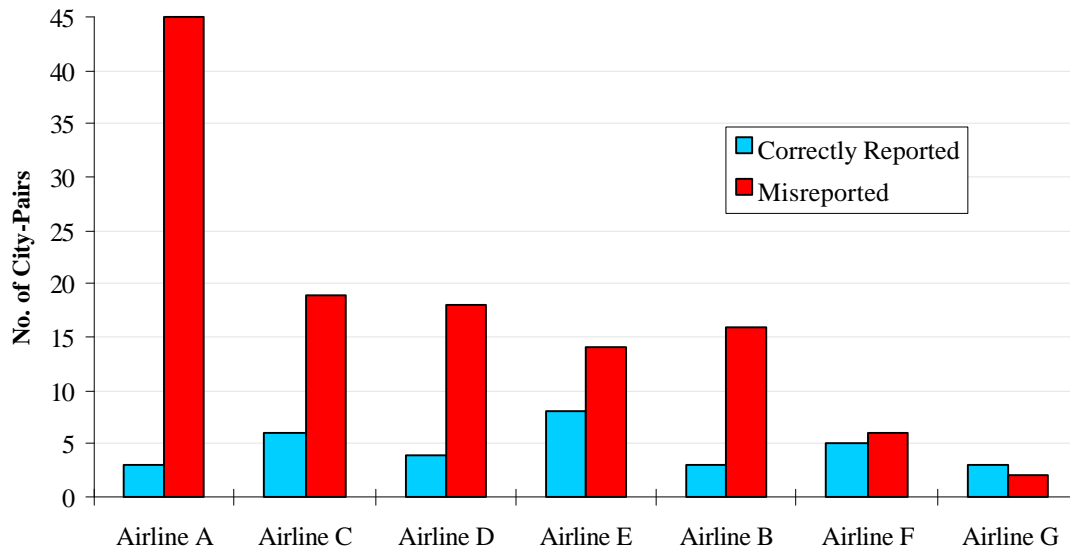


Percentage Deviation of Passenger Count From Benchmark Levels

We also analyzed the data for the Washington, D.C. market. Chart 4 shows, for the major air carriers at Washington-Dulles International Airport, the number of city-pairs that met and did not meet the 95-percent criterion. All but one of the air carriers out of Washington-Dulles misreported more city-pairs than they correctly reported.

Chart 4

### Accuracy of the City-Pairs Reported by the Major Carriers for Washington-Dulles International Airport



### Major Air Carriers Serving Washington-Dulles International Airport

The results lead to several conclusions. Chart 1 shows O&D data by city-pairs for eight major air carriers do not meet the 95-percent accuracy level for a majority of each air carrier's city-pairs. These city-pair data do not provide a true representation of actual passenger traffic. As shown in Charts 2 and 3, reliance on O&D data for all but the highest passenger volume city-pairs, is likely to provide misleading results. Similarly, Chart 4 shows that any decisions based on the O&D data for traffic through a particular airport such as Dulles International are likely to be flawed.

### **THREE REASONS WHY THE DATA ARE INACCURATE AND INCOMPLETE**

Inaccurate and incomplete reporting of O&D data occurred because: (1) the basic reporting requirements of the O&D system established almost 50 years ago have not kept pace with the changes in the aviation industry, (2) air carriers' controls over their O&D data collection and reporting were not effective, and (3) BTS did not adequately monitor air carrier reporting.

#### *REPORTING REQUIREMENTS HAVE NOT KEPT PACE WITH CHANGING INDUSTRY PRACTICES*

The basic reporting requirements of the O&D Survey have not changed since 1947. The original idea of sampling every tenth ticket was satisfactory when the airline industry was regulated, was not automated, and issued comparatively fewer tickets. Today, the O&D data system is used to report on a deregulated, highly competitive aviation market moving approximately 540 million enplaned passengers annually. Currently, an estimated 25 percent of domestic air travel is ticketless travel in which a passenger is not given a paper ticket but is allowed to board the aircraft after showing identification that matches the reservation data.

In this new environment, several factors in particular have caused the O&D collection and processing systems to become outdated and provide inaccurate and incomplete O&D data. Two main factors are code-sharing arrangements and the expansion of international gateways with additional domestic and foreign air carriers.

**Code-sharing Arrangements.** Code-sharing is a marketing agreement between two air carriers whereby one air carrier agrees to allow the other to use its airline designator code on its flights while each air carrier operates independently in all other aspects.<sup>5</sup> Internationally, code-sharing is a growing trend in the airline industry with 6 U.S. air carriers having 40 international code-share arrangements. Domestically, 27 U.S. air carriers had 83 domestic code-share arrangements.

With the advent of international code-sharing arrangements, accurate itinerary and air carrier information for each ticket are not always available to the reporting O&D air carrier. The following example shows how incorrect data are reported in the O&D Survey because of code-sharing arrangements.

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<sup>5</sup> Effective January 1, 1998, new regulations are required to report both the ticketing and operating air carriers for each flight, but only for their own code-share partners. For segments of the trip where the code-share arrangement is unknown because it is on another air carrier's code-share partner, this new requirement will not apply.



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**PASSENGER TICKET AND BAGGAGE CHECK**  
 SUBJECT TO CONDITIONS OF CONTRACT  
 NOT TRANSFERABLE

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 FLIGHT COUPON  
**ARC** TOUR CODE 1361558770

ISSUED BY **UNITED AIRLINES** of 7  
 NAME OF ISSUING AGENT **CARLSON WAGONLIT**  
 NAME OF PASSENGER **FORT BRAG**

PNV/CARRIER CODE **RIVIDA/AA YCA** FARE BASIS/TIC **US05MAR97**  
 X/O FROM **FAYETTEVILLE** NCDL 7122 Y 08MAR400P  
 X/O TO **ATLANTA**

AGENT CODE **A34543051**  
 DATE OF ISSUE **05MAR97**  
 FCI **6 0011**  
 NOT VALID BEFORE NOT VALID AFTER

ISSUING AGENT ID **X/ XC82\*47**  
**C70-71**

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**X/ERA445.00YCA UA ALA1820.48Y UA X/FRA1820.48Y US**  
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USD 4599.00					
TAX YC 6.50					
TAX KY 6.00					
TOTAL USD 4622.55					

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Because the last number in the ticket serial number was a "zero," the itinerary and fare data were included in the O&D Survey.

Based on information from the above used airline ticket, Atlantic Southeast Airlines reported this O&D data as follows:

One passenger originated from Fayetteville, North Carolina to Atlanta, Georgia on Atlantic Southeast Airlines (Delta Air Lines code-share), then to Frankfurt, Germany on Delta Air Lines, then to the destination of Almaty, Kazakhstan (ALA on ticket) on United Airlines. The return trip left Almaty on United to Frankfurt, Germany then to Pittsburgh, Pennsylvania, then to Charlotte and Fayetteville, North Carolina, all on US Airways. Atlantic Southeast Airlines only has access to its own code-share information, which means it did not know that the segment between Frankfurt, Germany and Almaty, Kazakhstan was being operated by United's code-share partner, Lufthansa Airlines. Therefore, the foreign code-share arrangement was not reported correctly in this example.

Another example of the adverse effect code-sharing has on the O&D Survey follows.

- Airline E submitted O&D data for its code-share partner, Airline I, with its own passenger data. Because Airline I did not fly aircraft that met reporting requirements, it was not required to submit O&D data. Thus, Airline E's O&D data were over-reported on code-share routes with Airline I.

A 1997 consultant's study concluded that O&D data currently collected do not satisfy the changed needs of the Department users (*e.g.*, code-sharing data are not reported accurately). It found that a significant number of data validation problems arise in the data collection process due to airline reporting procedures that: (a) combine manual and electronic filings, (b) lead to communication difficulties with foreign carriers, and (c) require a special submission process for foreign carrier filings.

**International Gateways.** Since the advent of deregulation, all major U.S. air carriers, except Southwest Airlines, have expanded their routes to international markets. In many emerging international markets, flight frequency is often less than one per day (*e.g.*, three flights per week.) In these "thin" markets, the number of passengers, and therefore sample tickets, is relatively small. As a result, errors from a 10-percent sample are likely to be significant so that the sampling results are unreliable. Other examples of how the expansion into international markets plays a role in the inaccuracy of the O&D Survey follow.

- Airline A and Airline E did not report their foreign tickets in the O&D Survey until they received payments from the foreign travel agents, which could take 45 to 60 days. Both air carriers excluded foreign ticket itineraries from the proper O&D Survey quarter if payment had not been received. O&D data for such foreign sales were either deleted or erroneously included in the subsequent quarter.
- Airline A and Airline E noted that in Europe and Japan, U.S. carriers cannot publish airfares lower than the foreign-owned air carrier; however, they can actually charge a lower fare. Airline A and Airline E included the higher, published fares in the O&D Survey though passengers did not actually pay those amounts. Air carriers call this practice net ticketing.

#### *AIR CARRIER DATA QUALITY CONTROLS WERE NOT EFFECTIVE*

Air carrier management had not implemented effective data quality controls to ensure accurate and complete O&D Survey data were gathered and submitted. The root causes for data inaccuracies were the lack of data review prior to submission, errors in programming, and noncompliance with Federal regulations.

## Lack of Review Prior to Submission to the Department

Title 14 CFR Part 241 places the responsibility for the submission of accurate and complete data on the air carriers. Part 241 requires air carriers to review O&D data before submission. Careful review of their O&D data should have detected the following types of errors.

**Invalid or Incorrect Airport Codes.** Air carriers submitted data in which the airport code was erroneous or the airport code was for an airport that the air carrier did not serve. For example, Airline E's edits failed to detect that "NEW" was not a valid airport code. We also found two air carriers where the itineraries were deleted from each air carriers' O&D Survey rather than corrected whenever computer edits identified invalid or incorrect airport codes.

**Bulk Airfare Incorrectly Reported.** Bulk fares are group discount packages purchased from travel agents that combine the airfare with other package benefits, commonly found with cruise lines or ski resorts. Whenever an air carrier cannot determine the actual airfare for O&D reporting, Office of Airline Information guidelines require the use of a five-digit filler code of 99999 to represent this unknown amount. However, one of the four air carriers we reviewed incorrectly reported bulk fares as 999. The Office of Airline Information's O&D processing system read this as a \$999 airfare.

## Errors in Programming

Because the preponderance of air carriers use computers to compile and edit their O&D Survey, programming errors for O&D sample selection affect all of the O&D data. For example:

**Fare Caps.** Airline E had a programming control that excluded from O&D reporting any tickets with a value greater than \$2,500. This fare cap was initially implemented 15 years ago as a data entry edit check. However, the fare cap was not adjusted to keep pace with inflation or recognize the growth of Airline E's international service that resulted in higher value tickets. As a result, tickets with fares that exceeded \$2,500 (principally international and first class airfares), were excluded from the air carrier's submission.

**Foreign Airfares Reported as Zero.** For First Quarter CY 1997 ticket sales by 15 foreign air carriers, Airline A incorrectly reported airfares as

zero dollars for itineraries where the passengers originated on foreign air carriers, but flew later segments on Airline A.

### Noncompliance with O&D Regulations

Title 14 CFR Part 241 prescribes the regulations for submission, form, and content of the O&D Survey. An instruction manual is contained in Appendix A to 14 CFR Part 241, entitled “Instructions to Air Carriers for Collecting and Reporting Passenger Origin-Destination Survey Statistics.” Air carriers are also directed to follow “Passenger Origin-Destination Directives” issued by BTS. Yet, we found the following examples of noncompliance with reporting requirements.

- Air carrier O&D procedures are to be updated and sent to BTS whenever a major system change takes place. Of the 40 air carriers required to submit O&D data, 7 had not revised their procedures since 1987, even though BTS issued reporting format changes including how to handle bulk fares and ticketless travel. Eighteen air carriers had not submitted procedures to BTS. The remaining 15 air carriers had O&D procedures documentation on file that appeared to be current.
- Airline A and Airline J did not retain copies of O&D Survey submissions and supporting documentation for the 3 years required by regulation. Data retention is necessary for correction of data after submission. For example, BTS found programming errors in Airline A’s O&D system and requested that Airline A correct its submissions since 1995. However, Airline A was unable to comply with the request for corrected data because it did not retain copies of the raw, uncompiled data.

### *BTS OFFICE OF AIRLINE INFORMATION DATA QUALITY CONTROLS WERE NOT EFFECTIVE*

Ineffective monitoring by BTS’s Office of Airline Information contributed to the inaccurate and incomplete O&D data submitted by air carriers. Although the Office of Airline Information increased its monitoring in the last year, it did not ensure that air carriers had the necessary O&D systems to assure the submission of accurate and complete data. The Office of Airline Information personnel had neither conducted on-site data system reviews nor provided formal training to air carriers since 1985.

The Office of Airline Information did not maintain current documentation of air carriers’ O&D data-gathering and editing procedures. Appendix A to 14 CFR Part 241, Section VIII, requires air carriers to submit in a timely manner major changes in O&D Survey procedures to the Department. As previously discussed, only

15 of the 40 O&D reporting air carriers had current O&D procedures on file with the Office of Airline Information.

In the fall of 1996, the Office of Airline Information retained contractors to improve O&D data quality. Since July 1997, the contractors and the Office of Airline Information senior staff worked intensively with Airline A to correct its O&D submissions. They also worked intensively with Airline E for 6 months to correct the air carrier's O&D submissions from 1994 through 1997.

## **WHAT IS THE IMPACT OF INACCURATE AND INCOMPLETE DATA?**

The Department relies on accurate and complete O&D data to make sound policy and economic decisions that affect the aviation industry and consumers. The Department relies on O&D data to: monitor competition in U.S. air transportation, forecast where airport infrastructure improvements are needed, approve international air service routes and frequency of service, approve access to U.S. markets by foreign air carriers, and negotiate access to foreign markets for U.S. air carriers. Corporations rely on O&D data to accurately forecast the needs of air travelers for lodging, restaurant, and ground transportation services, and to make marketing analyses of the air carrier industry.

Four examples of how critical O&D data are to Department analysts and policymakers are international air route awards, consumer and Department airfare analyses, and FAA's future funding structure.

- International air travel is an emerging, significant economic force that affects the U.S. economy. Without timely, accurate, and complete O&D data to analyze domestic air carriers' passenger traffic, air fares, and air passenger travel patterns, the Department is at a disadvantage in reviewing and negotiating international air route awards to ensure U.S. carriers retain competitive parity with foreign air carriers. An example of this was the US Airways-British Airways code-sharing agreement. According to Department officials, British Airways earned substantially more revenue from the agreement than did US Airways, in part, because British Airways had better market and traffic data when it negotiated the terms of the agreement.
- In response to consumer inquiries about domestic airline prices, in June 1997, the Department first reported on the average fares of the 1,000 largest domestic city-pairs in the "Domestic Airline Fares Consumer Report" based on O&D data. Because of inaccurate and incomplete O&D data submitted by air carriers, consumers cannot rely on this report to provide accurate average airfare information to make informed discretionary spending decisions, such as selecting a place to vacation or choosing an air carrier because of low airfares.

- The categories of airfares (first class, coach, etc.) and ticket dollar amount data are also employed in estimating revenues likely to accrue to various carrier route applicants. Such assessments are at the heart of the air carrier selection process, indicating to Department decision-makers whether the carrier applicant's proposed fare and service levels are reasonable in view of market conditions. Absent reliable O&D data, the Department's ability to select the carrier applicant that will best serve the U.S. aviation interests would be undercut.
- The National Civil Aviation Review Commission recommended, in part, that FAA's air traffic control services be placed in a performance based organization with the goal that these services be managed and priced based on their costs and value to system users. Accurate O&D information on passenger demand for and use of the air transportation system will be essential for the FAA to attain this goal.

Although O&D data are used by the Department to provide quantitative support for key policy and funding decisions, we found that O&D data are unreliable for use in making these important decisions. Aware that the O&D data submitted had problems, Department aviation analysts routinely either requested air carriers to provide supplemental data or used adjustment factors based on prior experience with each air carrier's data for decisionmaking purposes.

### **AN ALTERNATIVE TO THE CURRENT O&D PROCESS IS NEEDED**

To provide accurate and complete O&D data needed by Department analysts and policymakers, the Department should change its O&D data collection system. Continued reliance by Department decisionmakers on the paper ticket-based O&D Survey is not acceptable. The data are inaccurate for making decisions on specific city-pair markets or airports.

Since the O&D Survey began in 1947, numerous advances in computer technology have occurred and the aviation industry has changed greatly. Originally, the O&D Survey statistically sampled passenger tickets lifted at the airport gate from enplaned passengers. These sample tickets were then compiled manually. Today, 32 of the 40 air carriers required to submit O&D could electronically submit the data, and these air carriers account for 99 percent of the approximately 540 million enplaned passengers flown each year. The computer systems used by these 32 air carriers for reservations and sales form a viable alternative to the paper-based O&D system.

## What is a Computer Reservations System (CRS)?

A CRS is an electronic database used by air carriers to capture and track data on reservations made by air travelers. CRS data are also used for air carriers' revenue accounting and to exchange ticket revenue between air carriers. CRSs are accessible by airlines and travel agents on dedicated terminals. The major CRSs are: Sabre, Galileo International, Worldspan, and System One/Amadeus.

All the reservation information on a traveler necessary for O&D reporting are electronically stored in air carriers' CRSs under a transaction control number (TCN) file created for each reservation. The TCN has been adopted in an industry standardized format. Most air carriers presently exchange CRS data daily, through a clearinghouse, for revenue accounting purposes with other air carriers. The Department could access the TCN data through the clearinghouse and extract only the required O&D data elements. This sales-based O&D data gathering methodology would capture data on all ticket sales for the 32 air carriers that could use CRSs.

The Office of Airline Information contracted with TravelScan Corporation to identify and evaluate the technical feasibility of new methods for collecting O&D data. According to its report, "Technical Feasibility of New Methods for Collecting Airline Passenger O&D Data," dated August 9, 1996, there are a number of electronic sources from which O&D information could be more accurately and completely compiled. This study concluded that the most viable alternative described was the use of CRS data.

## Most Air Carriers Support the CRS Alternative

One air carrier is drafting a petition to the Department requesting a rulemaking proceeding to amend 14 CFR Part 241 to replace the current O&D Survey with a system based solely on CRS data. This petition is supported by the Air Transport Association and by several major air carriers. The draft petition states:

In short, the present reporting system is broken and it will be expensive and counter-productive to fix it. Even after it is fixed, it will be expensive to maintain and will continue to produce a result that is of lower quality than data which could be more efficiently collected using sales based information generated directly from CRS's.

The petition also contains the following additional justification for using CRS sales-based systems:

A TCN record is produced for every automated CRS ticket that is printed. It contains every item of information that appears on the face of the ticket. This includes all data elements now collected by the Department in the O&D Survey. Unlike the ten percent sample of the ticket lift that is conducted separately by every reporting carrier, the TCN records could more easily be used to report 100 percent of the data needed, thus eliminating sampling errors. Moreover, the consistency of TCN records among carriers and CRS systems if subjected to only one point of programmatic data manipulation at DOT, would eliminate the problems caused by judgmental factors inherent in the preparation of O&D Survey reports by dozens of separate programmers at individual carriers. It certainly also would allow rapid response to new analytical needs because the programming would be done at the DOT.

Because the airlines already produce the TCN reports on a consistent basis for their own internal use, the cost of furnishing these reports to the Department would be minimal. Substitution of the TCN records for the O&D Survey ticket lift sample would also save the reporting carriers from the considerable expense and burden that maintenance of that reporting system imposes on them.

#### Advantages to using CRS Data

Access to an accurate source of data for nearly the entire population of O&D travelers is the most significant advantage of the Department adopting a CRS-based system. Because 99 percent of all passengers who fly in the U.S. fly on airlines that could use CRSs, this type of system will provide completely accurate data for nearly every passenger who actually flies. As a result, a CRS-based system would eliminate sampling errors which is an important consideration for the large number of low passenger-volume markets.

There are other important reasons for changing to a CRS process for O&D data collection as follows.

- CRSs are less costly (reduced paperwork) and more timely for most air carriers because electronic sales data are already transmitted to the clearinghouse daily.



- CRSs are easier to update because programming changes are made to each CRS instead of each air carrier's system.
- CRSs are more accurate because there would be less manual data entry that could cause errors.
- CRSs would provide easier access to foreign traffic information because foreign air carriers may also participate in CRS programs.
- CRSs would facilitate the collection of ticketless travel information because the data are already in electronic form.

### Disadvantages to Using CRS Data

There are disadvantages to using a CRS-based O&D data collection system. Foremost, a CRS-based system is likely to overcount some passengers, at least initially. Air carriers and industry experts agree that approximately 15 percent of CRS-based travel reservations reported to the Department would subsequently not be used. This results because passengers change routings, cancel reservations and request refunds, or fail to show up for scheduled flights but retain tickets for later use.

A majority of the 15 percent is attributed to double bookings. Passengers double book to ensure seating when travel times have not been finalized. Double bookings have traditionally been a problem for air carriers and can result in lost revenue. Thus, air carriers have implemented more restrictive flight reservation procedures to reduce the impact of double booking.

A new security control should have a measurable effect on reducing double bookings. Air carriers and the Office of Airline Information expect new FAA security regulations requiring picture identification with ticket name matching will reduce the impact of double bookings. To assess the impact of passenger changes to O&D travel itineraries reported to the Department, the Department should study how to better account for itinerary changes made by passengers, and ensure that air carriers are informed that O&D data are required to be submitted accurately regardless of the medium used.

Another disadvantage is that six air carriers do not use CRS sales-based data. These air carriers would have to submit O&D data through a different medium or in the same manner they do now. These six air carriers only transported 1 percent of the passengers during the First Quarter of CY 1997. Overall, the disadvantages of converting to CRS-based system are outweighed by the dramatic increase in the accuracy and reliability of the data.

## Department is Using a CRS Sales-Based O&D System for Congressional Study

To address a Congressional request, the Department has a consultant performing a study of rural airfares that relies on CRS generated data. In July 1997, the Department issued Docket OST-97-2767, "Data Requirements for Rural Air Fare Study," which requires air carriers to submit CRS data for a Department study of smaller U.S. cities' airfares in circumstances where the O&D Survey does not provide sufficient detail. This rural airfare study will cover a 12-month period to facilitate the Department's preparation of a report to Congress. In our opinion, this rural airfare study should serve as a good test of the sufficiency of CRS data as the source for O&D data.

A better O&D system is available for the Department. To improve the accuracy and completeness of the O&D Survey, we concluded the Department should design a system to use the CRS sales-based methodology and amend 14 CFR Part 241 to replace the current O&D Survey process with this methodology. Further, by switching to CRS, the Department can reduce the paperwork burden on the airline industry and decrease air carrier costs for providing O&D data while obtaining more accurate and complete data for governmental analyses.

### **INTERIM ACTIONS NEEDED TO IMPROVE O&D DATA**

It is the air carriers' responsibility to ensure that O&D data derived from the manual ticket-lift system and submitted to the Department are accurate and complete. Until a CRS sales-based system is implemented, specific corrective actions are needed to ensure air carriers provide the Department more accurate and complete O&D data. Therefore, BTS should:

1. Meet with air carriers' executive management to explain that accurate and complete O&D data are required by regulation and are needed by the Department to make sound policy decisions that affect the aviation industry.
2. Train air carriers' O&D data collection staff on air carrier responsibility for providing accurate and complete data and for establishing an effective process to edit and review O&D data prior to submission.
3. Take a proactive role in reviewing the submitted O&D data and provide prompt feedback to the air carriers listing the types of errors that have occurred in their O&D systems.
4. Take enforcement action including fines against air carriers that repeatedly fail to provide timely, accurate, and complete O&D data.

OIG is committed to the development of accurate and complete O&D data to facilitate the Department's policymaking. Therefore, to assure air carriers provide accurate and complete O&D data, OIG will perform audits of air carriers' O&D data collection systems and submissions as necessary.

### The Office of Airline Information's Operations Can be Improved

To its credit, the Office of the Secretary hired a consultant, Infrastructure Management Group, Inc. (IMG) to conduct a performance improvement analysis of the aviation data needs of the Department. The results of this study were presented in a July 8, 1997 report entitled "Aviation Data Program Performance Improvement Analysis." IMG found that the Office of Airline Information has not been integrated into BTS operations. IMG reported on the minimal interaction between BTS and the Office of Airline Information on planning and operations of the aviation data program. One example of this lack of coordination was the Fiscal Year 1997 budget. Congress authorized BTS \$3.1 million for aviation data programs and BTS reduced the Office of Airline Information's budget to \$2.9 million without consultation.

The key recommendations of the IMG report provided to the Assistant Secretary for Aviation and International Affairs were:

- add more resources (staff and technology) and make the investment on a consistent basis,
- selectively outsource noncore business processes of the aviation data program, and
- reengineer and reorganize to improve program performance.

Outsourcing would shift certain functions of the Office of Airline Information to the private sector. The Office of Airline Information could contract with either an outside vendor or another Department entity to manage the computer operations, software application development, reference library, and report publication. By outsourcing these functions, the Office of Airline Information should be better able to focus on its core activities of validating and analyzing data, and enforcing regulations.

### Organizational Placement Options

Prior to 1985, the Office of Airline Information was a functional unit within the Civil Aeronautics Board tasked with accumulating specified data from air carriers

and maintaining aviation databases. After the sunset of the Civil Aeronautics Board, the Office of Airline Information was transferred to RSPA. In June 1995, the Department repositioned the Office of Airline Information within the newly formed BTS.

Two studies suggested the repositioning of the Office of Airline Information within the Department. A 1997 study by the National Research Council recommended the Office of Airline Information be removed from BTS because BTS is a statistical agency, and not an administrative, regulatory, or enforcement agency. It explained that as a statistical agency, BTS carries an inherent mission to protect the confidentiality of data provided, a mission at odds with the release of aviation data to the public. "Aviation Data Program Performance Improvement Analysis," a 1997 report by IMG, based its recommendation to reposition the Office of Airline Information on the failure of BTS to provide proper funding and place importance on the value of the aviation data products produced.

The Department should determine the best location for the Office of Airline Information. In addition to leaving the Office of Airline Information in BTS, the Office of the Secretary or FAA could take over this function. The Office of the Secretary and FAA are primary users of Office of Airline Information aviation data products. Repositioning the Office of Airline Information in the Office of the Secretary could improve oversight of the program because the Office of the Secretary relies on timely, accurate, and complete O&D data and other aviation products compiled by the Office of Airline Information. For instance, the Office of the Secretary frequently needs immediate answers to questions that arise during negotiations for U.S. and foreign code-share alliances. Repositioning within FAA would also be another alternative because FAA is a heavy user of Office of Airline Information database products and currently maintains a substantial investment in computer systems staffed with personnel familiar with aviation and database skills. Keeping the Office of Airline Information in BTS also has merits. The Office of Airline Information maintains several important aviation databases and could logically be a part of the Department's primary statistical office.

However, if the Department elects to keep the Office of Airline Information in BTS, then BTS should increase its managerial oversight of the Office of Airline Information to ensure the Department has quality aviation data products to support decisionmaking effecting aviation issues. Also, concerns have been raised about the funding levels for this office. Currently, BTS is funded under the Intermodal Surface Transportation Efficiency Act. The Highway Trust Fund finances BTS operations, including the Office of Airline Information. A proposal in the Fiscal Year 1999 budget is to finance the Office of Airline Information from the Aviation Trust Fund for the next 10 years.

## Government Performance and Results Act Measures

The Office of Airline Information had established performance measures required by the Government Performance and Results Act of 1993. The Office of Airline Information's mission statement is:

*To provide U.S. Government agencies and other non-government users uniform and comprehensive financial and market/traffic statistical economic data on individual air carrier operations and the air transportation industry.*

One of the performance measures was for data accuracy. The initial target goal was for comparable data sets to be within 15 percent of each other. However, the goal is vague, does not provide sufficient specific criteria to measure performance, and is inconsistent with the data accuracy goal of 95 percent desired by Department senior management.

## RECOMMENDATIONS

We recommend the Assistant Secretary for Aviation and International Affairs and the Acting Director of BTS:

1. Design a system to use CRS data to meet the Department's O&D data needs.
2. After the new system is designed, issue a rulemaking amending 14 CFR Part 241 to replace the current O&D Survey.
3. Determine the best organizational placement of the Office of Airline Information. If the decision is made to retain the Office of Airline Information in BTS, then BTS should provide sufficient funding and increase its managerial oversight of the Office of Airline Information to ensure the Department has quality aviation data products to support decisionmaking effecting aviation issues.
4. Selectively outsource noncore business processes in the Office of Airline Information including computer operations, software application development, reference library operations, and report publication.
5. Initiate the following interim corrective actions until a CRS-based process is implemented to ensure the submission of accurate and complete O&D data:

- a) Meet with air carriers' executive management to explain that accurate and complete O&D data are required by regulation and needed by the Department to make sound policy decisions that affect the aviation industry.
- b) Train air carriers' O&D data collection staff on air carrier responsibility for providing accurate and complete data and for establishing effective processes to edit and review O&D data prior to submission.
- c) Take a proactive role in reviewing the submitted O&D data and provide prompt feedback to the air carriers listing the types of errors that have occurred in their O&D systems and the actions needed to improve data accuracy and completeness.
- d) Take enforcement action including fines against air carriers that repeatedly fail to provide timely, accurate, and complete O&D data.
- e) Obtain and maintain copies of all air carriers' current O&D procedures manuals.
- f) Maintain a tracking system of air carriers' O&D procedures to ensure information on file remains current.
- g) Under the Government Performance and Results Act, better define the data accuracy goal and develop specific performance measurements.

### PART III

#### OTHER MATTERS

We reviewed the processes used by the BTS Product Distribution Center to sell aviation database products, to the public, generally by subscription. We found the BTS Product Distribution Center lacked fundamental accounting controls resulting in uncollected revenue from 75 customers of \$71,220 as follows.

*BTS Reported Sales (March - December 1996)*

Sales:	\$176,607
Receipts:	<u>112,127</u>
Uncollected	<u>\$ 64,480</u>

*BTS Reported Sales (January - September 1997):*

Sales:	\$173,120
Receipts:	<u>166,380</u>
Uncollected	<u>\$ 6,740</u>

BTS should collect the funds owed the Department and establish the following accounting controls:

Separation of Duties -- One employee was responsible for receiving customer orders, preparing request forms for O&D database tapes to be produced, picking up the finished product, shipping the product to the customer, recording payments received in the receipts register, and delivering the check payments to accounting for deposit. We recommend BTS divide the above described duties between two or more employees.

Invoicing Customers for Products -- The Product Distribution Center shipped an entire year's worth of aviation data products to a customer valued at \$11,650, but did not send the customer an invoice for payment. We recommend BTS implement management controls to ensure customers are invoiced for products at the time of shipment.

Accrual Basis of Accounting -- The BTS Product Distribution Center does not use the accrual basis of accounting for the sales of aviation database products. Generally accepted accounting principles, which apply to BTS, specify the use of an accrual basis of accounting to accurately track revenue. This requires revenue to be recognized in the accounting period (fiscal year) earned, without regard to the time of payment. We recommend BTS establish accounts and management controls to ensure revenue is recorded and accounted for in accordance with generally accepted accounting principles as follows.

An *Accounts Receivable* should be established at the time of sale if the product has not been paid in full at the time of purchase. Accounts receivable should be “aged” to ensure timely payment and properly track delinquent accounts.

An *Unearned Revenue* account should be established to identify a liability on BTS’s financial statements for prepaid subscriptions whenever BTS has not provided all data products subscribed to at year end.

Inventory Tracking System -- Extra copies of O&D tapes and publications are maintained at BTS. This excess inventory needs to be tracked to ensure proper accountability of BTS data products. We recommend that an inventory tracking system be created and maintained.



## Entities and Air Carriers Visited During the Audit

### **Department Offices Visited:**

Office of Assistant Secretary for Aviation and International Affairs  
BTS/Office of Airline Information  
BTS/Product Distribution Center

### **Air Carriers Visited:**

American Airlines began operations in 1934. American Airlines currently serves 97 domestic and 69 international destinations, operating 642 aircraft. The headquarters is located in Dallas, Texas, and the company has a total of 81,000 employees.

United Airlines began operations in 1926. United Airlines serves 98 domestic and 38 international destinations, with an operating fleet of 574 aircraft. The headquarters is located in Chicago, Illinois, and the company has a total of 89,000 employees.

Southwest Airlines was incorporated in 1971 and initially provided service to three Texas cities. Southwest Airlines provides service to 52 domestic cities and operates 243 jet aircraft. The headquarters is located in Dallas, Texas, and the company has a total of 23,000 employees.

Atlantic Southeast Airlines began operations in 1979 and operates as a regional commuter airline providing connections to Delta Air Lines. Atlantic Southeast Airlines provides service to 53 domestic cities and operates 80 aircraft. The headquarters is located in Atlanta, Georgia, and the company has a total of 3,000 employees.

### **Contractors or Consultants Visited:**

Data Base Products, Inc. is a Dallas, Texas consulting firm that buys aviation database products from the Office of Airline Information and then repackages and resells the information to customers. Customers are air carriers, local airport authorities, and corporations.

The Airline Tariff Publishing Co. of Washington, D.C., collects and disseminates rule and fare information on behalf of participating domestic and international air carriers. This company provides data that support CRS itinerary pricing.

TravelScan Corporation is a Bethesda, Maryland, consulting firm specializing in designing proprietary computer databases for the aviation industry. TravelScan Corporation also provides consulting services to airlines and travel distributors. TravelScan Corporation performed the alternative O&D collection method feasibility study and is conducting the rural airfare study currently underway.

Major Contributors to This Report

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