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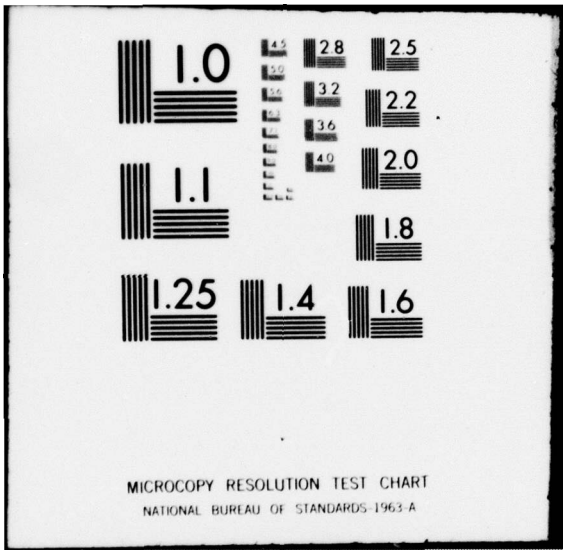
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Third Annual FAA Forecast Conference Proceedings

June 1978

U.S. Department of Transportation
Federal Aviation Administration,
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Washington, D.C. 20591

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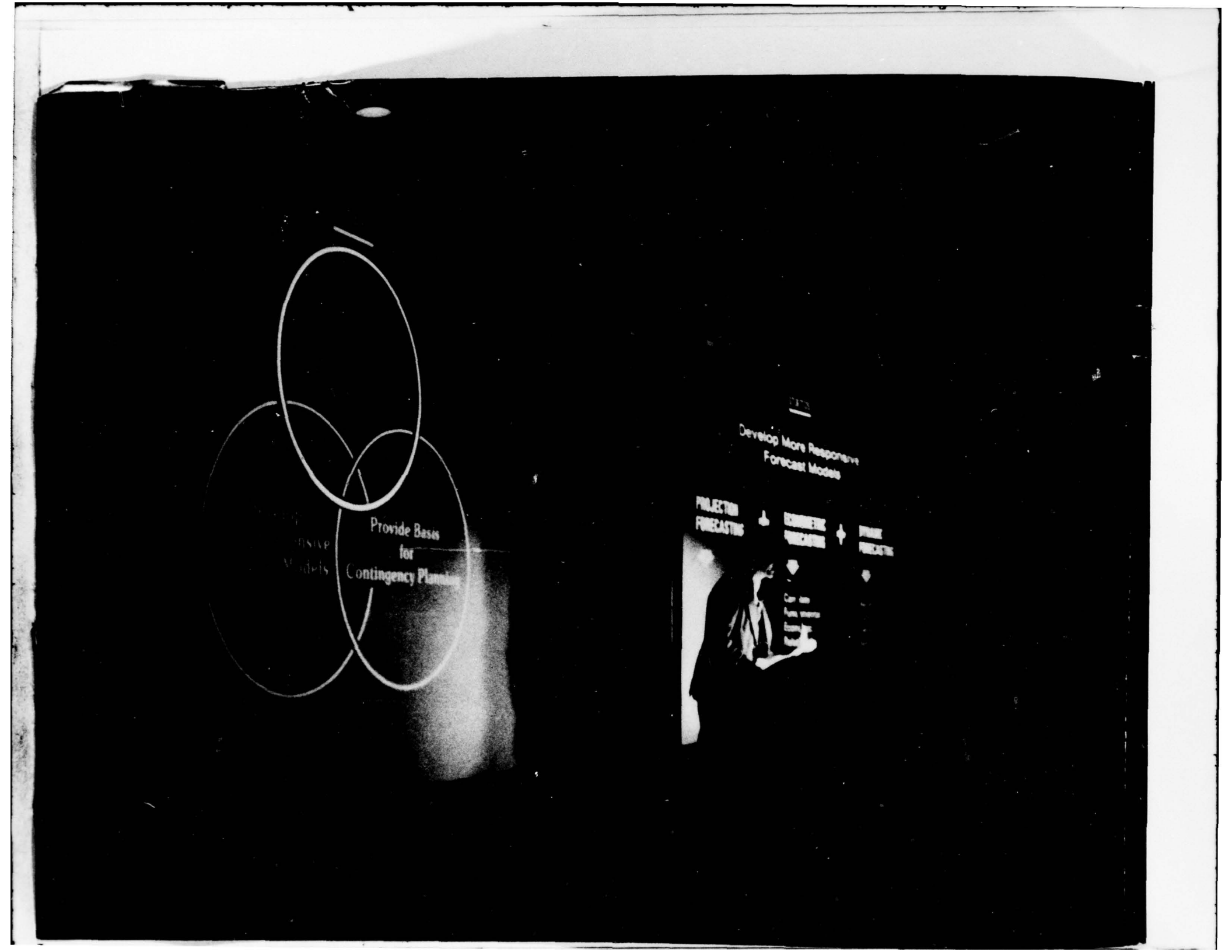
Provide Basis
for
Contingency Plan
Develop More Responsive
Forecast Models
PROJECTION
FORECASTING

LEVEL I

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16. Abstract

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The document is organized into two parts. Part I, Forecasting Initiative Overview, discusses commentary from the aviation community, followed by the FAA response. Part II, Proceedings, presents remarks by conference participants. In total, this document updates the dialog between the FAA and members of the aviation community and general public in the joint effort to define the most useful and appropriate aviation forecasting system.

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Third Annual FAA Forecast Conference Proceedings

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Foreword

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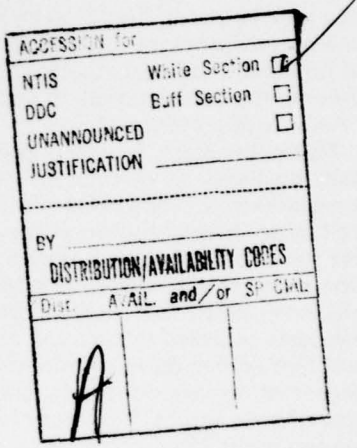

Introductory Remarks

Dr. Scott Sutton
Deputy Director
Office of Aviation Policy, FAA

Ladies and Gentlemen, panelists, my name is Scott Sutton. I am Deputy Director of the Office of Aviation Policy, and it is a real pleasure to welcome you to the Third Annual Aviation Forecast Conference. I am going to make my opening comments rather brief, but there is one theme I want to leave with you this morning: that being, to establish a mood and an environment in which you, the users of forecasts, can participate with us in improving the decisionmaking utility of the FAA's aviation forecasts.

To say the least, forecasting is a rather risky business, an eclectic art, not a science. It requires your knowledge of the industry as well as an understanding of the people who use the system and what they want out of it. One enters it with the knowledge that one will never be perfect, and we are mindful of the costs inherent in such imperfection. The problem comes down to minimizing the degree of our imperfections, and thereby the cost of such errors. With your help, I think we can make great progress in doing that.

The theme of our conference, consequently, is the use of aviation forecasts in decisionmaking. Our past conferences have been rather technical, concentrating on methodology. One of my former associates use to say methodology is when theory turns around and chases its own tail, and he had very little patience with it. He wanted to get to the matter of this conference today—how you apply your theory pragmatically to solve real problems. And I want you to be our critic in helping to achieve that objective. I was going to say something like we are here to create an interface between the Government and the public, but there are some professional wordwatchers who point out that "interface" has been stricken from the bureaucrat's lexicon. So I thought I would draw as a text for my closing comment a line from a popular TV program—from Kojack—who said, "Let it all hang out, baby." Thank you very much.

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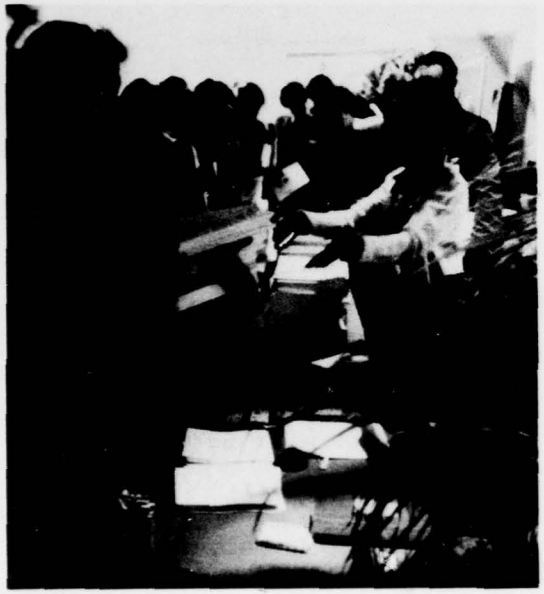
Part I
Forecasting Initiative Overview

The Evolution in FAA Forecasting

The early requirement for aviation forecasting by the FAA was to provide the indicators of future activity upon which FAA planning could be based. These indicators were derived generally by straightforward extrapolation of historical trends, plus some measure of intuitive reasoning. They formed the basis for the FAA budget, staffing requirements, and expansions to the National Aviation System.

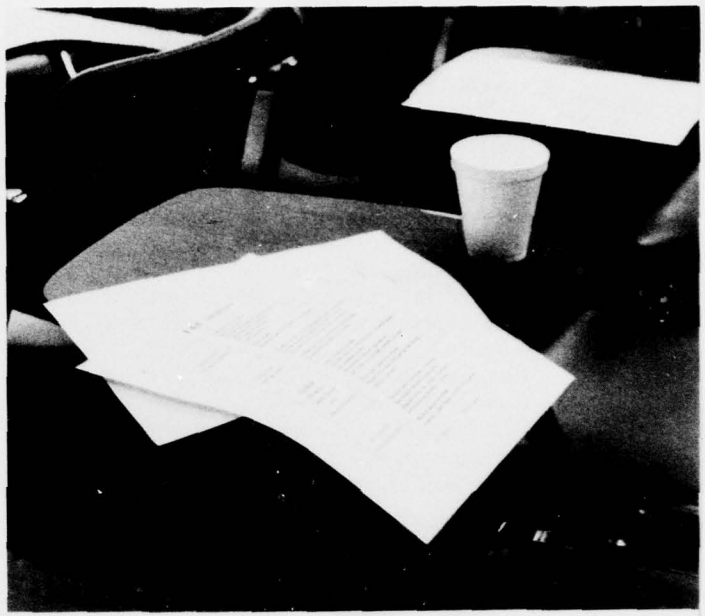
As the aviation industry became larger and more complex, it was recognized that the planning and activity by all members of the community controlled the indicators upon which the FAA depended. The FAA's central planning functions now had to be coordinated closely with local, state, and regional planners, who owned and operated major facilities of the aviation system, with the air carriers, commuters, and general aviation sectors whose decisions determined traffic volume and composition, and with the airframe manufacturers whose design and production commitments defined the aircraft fleet.



As the interdependencies between the FAA and its aviation colleagues grew and as forecasting techniques became more powerful and reliable, exchanges between planners and forecasters throughout the industry became commonplace and the FAA role in forecasting grew extensively. The situation by 1976 was that the FAA operated a complex of forecasts that had great influence not only on planning and decisionmaking by FAA management, but on the entire aviation community as well.

While this rapid growth in capability helped to fill FAA's need for more accurate and refined forecasts, it was not always consistent with planning in the aviation community. For example, the FAA's aviation forecasts are structured basically to measure the overall national activity parameters upon which the FAA can base its budget and staffing levels and plan for future requirements of the National Aviation System. The forecasts do not provide the detailed geographic information required by local, state, and regional authorities who plan for growth at specific airport sites within the total aviataion system.

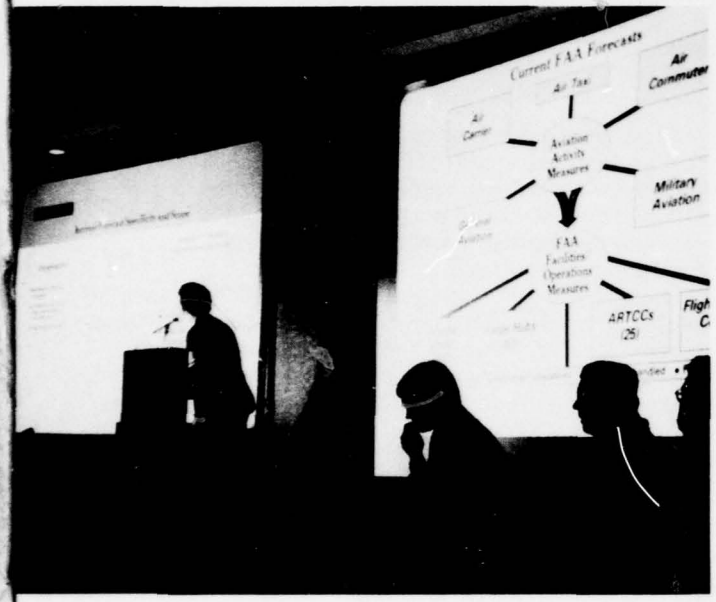
Additionally, certain aspects of the FAA role in aviation forecasting were not appropriately defined. To what degree should FAA headquarters engage in forecasting future activity at specific air terminals? Should the FAA act only in a review capacity for forecasts generated by other segments of the aviation community? Should the agency become a consulting partner for local, state, and regional planning authorities? Should it expand the number, type, and scope of its forecasting activities?



Clearly, the forecasting effort at the FAA is evolving rapidly, and in today's uncertain, complex world, in which mistakes are so costly, this evolution must be well directed and properly focused. This objective can be achieved only through close consultation with the entire aviation community, including aircraft manufacturers, airport operators, local planning authorities, air carriers, and individual owners of general aviation aircraft. FAA data must account for the data on which

these segments of the industry base their decisions. Assumptions must appear reasonable in light of what the FAA knows to be true. FAA models must describe the aviation system as it actually works. And to be fully useful for all parties, FAA outputs must address the questions of real importance to aviation planning at all levels, not just those that are important to FAA budget submissions.

In short, a mutual understanding of requirements must be worked out between the aviation community and the FAA. Toward this end, the agency has specified its perceptions and it has received excellent commentary from the industry. This commentary should continue so that our common effort will result in the most productive approach to aviation forecasting, as well as an efficient working procedure for interaction between the FAA and its aviation and general public constituency.



The FAA Forecasting Initiative

The FAA initiative is designed to strengthen the utility of its aviation forecasts for managers and planners throughout the aviation industry. The initiative began last year with a series of seminars and other professional consultations. Each was highly focused to illuminate specific areas of planning and forecasting interaction. For example, the June 1977 seminar in Denver concentrated on growth trends and forecasting needs of the commuter industry. At these meetings, the agency took great care to achieve participation from all segments of the aviation community, including regional, state, and local transportation authorities, aircraft operators and equipment manufacturers, as well as people with strong collateral interest, such as academic and investment specialists.

The output from this series of seminars, consultations, and meetings was evaluated intensively, and a first-cut analysis was developed during the summer and fall. These results were summarized and the FAA's forecasting initiative was announced at the FAA Aviation Forecasting Conference held in December. Both the Fiscal Year 1977 Aviation Forecast Report, which was issued at that time, and the conference were structured to review the entire scope of the FAA's forecasting effort and to present plans to improve it. A group of aviation planners, representing both state and local authorities and industry, commented critically, both in individual speeches and in panel discussions. Excellent commentary was also received during an open discussion with the more than 300 members of the audience.

This conference marked the end of the first year of the forecasting initiative. The FAA now has what it believes to be a collective statement from its constituency regarding the strengths, weaknesses, uses, and potentials of FAA forecasting. In addition, the agency has developed a plan of attack for achieving the improvements which are feasible and which meet major needs as identified by the aviation community.

For the remainder of this year, the FAA will be working on developmental projects in forecasting methods and reviewing this work with the aviation industry through a series of

seminars and special consultations. The results of this work will be presented at this year's forecasting conference. At that time, the agency hopes to have some new forecasting models running, output from its data-gathering efforts, and a yearly schedule for interaction with the aviation community in the preparation of future forecasts. By early 1980, FAA forecasts should be functioning in support of decisionmaking by all levels and segments of aviation, and a rational working procedure should be in place that will achieve an optimum degree of cooperation and interaction between FAA forecasters and the overall aviation community.

Summary of Commentary

From commentary by the aviation community, it is the FAA's perception that the FAA Forecasting Initiative should address four areas:

User-oriented specificity of selected forecast parameters, including extension into areas treated lightly in previous forecasts

More emphasis on aggregation of locally derived forecast data to build higher-level forecasts, rather than disaggregation of national forecasts.

Careful structuring of the FAA role to utilize the forecasting capability at the regional and local levels, and to achieve interaction between these regional and local aviation decisionmakers and the FAA as forecasts are developed.

More focused support for analyses of impacts from major potential future events or policy options.

Specificity

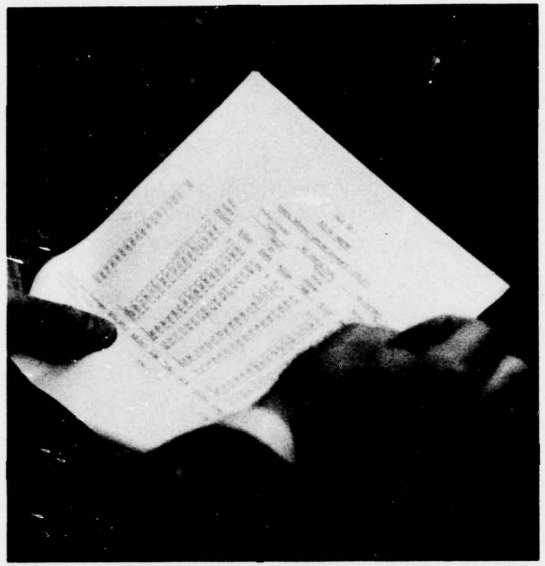
A repeated comment, which varied only as a function of each planner's professional area, was that while the computational processes of the FAA forecasts include factors of vital interest to planners throughout the aviation community, the outputs express only the parameters directly required by FAA. The lack of relevant outputs is particularly vexing because numerous direct management interfaces between the FAA and aviation planners often require decisions based on these very factors. The following are individual examples of the need for greater specificity:

Geographic Disaggregation There was widespread expression of need for specific forecasts of activity by geographic region and airport site. Often, this was coupled with the recommendation for considerable regional and local planning autonomy in the forecasting of regional and local requirements. These two requirements must be met if appropriate state and regional forecasts are to be achieved.

Traffic Identification If individual airport expansion is to be properly timed and optimally designed, more detailed forecasts of traffic by sector and operator purpose are essential. The problem is most severe for general aviation and the rapidly growing commuter industry. Commentators confirmed that the major difficulty in accurate forecasting for each of these sectors is the lack of data, both at towered and nontowered airports. Detailed information is essential for such parameters as user purpose, regional growth patterns, the number and type of pilots, and fleet size and composition. While such data are considerably more complete for trunk carriers, industry representatives point out that expanded forecasts are needed for this sector as well, particularly with regard to fleet mix and aircraft range.

Temporal Disaggregation Airport planners and operators strongly appealed for forecasts of aircraft activity by day-of-the-month and time-of-the-day at major hub airports. Again, the basic problem is lack of data upon which such forecasts can be based, and again the major deficiency is in general and commuter aviation, two sectors that account for approximately 40 percent of peak hour movement at many hub airports. Airport planners point out that airport plans based on projections that include "soft" data on 40 percent of terminal operations are not satisfactory.

Planning Indicator Specificity Data and forecasts are required for parameters pertinent to community decisionmaking. For example, operators of nontowered airports need to have a clear indication as to the number of general aviation aircraft tie-downs that will be required, as well as an indication of requirements for technicians and mechanics.



Aggregation

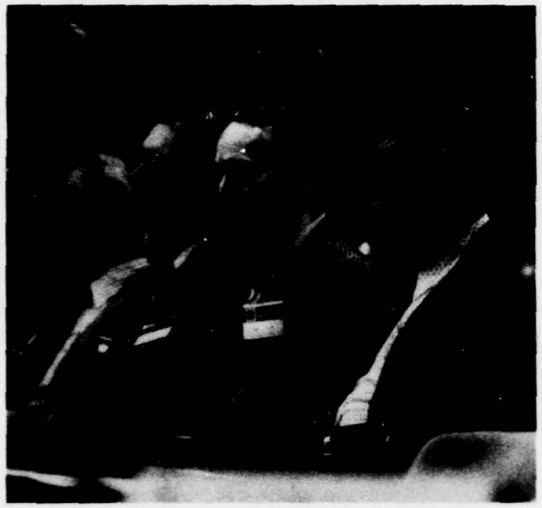
Closely related to the question of local versus national forecasting requirements is the methodolical issue of "top-down" disaggregated forecasting versus "bottom-up" aggregated forecasting. A basic criticism of FAA forecasting is the approach by which local forecasts—such as those for terminal areas, hubs, and flight service stations—are developed by disaggregating national forecast totals. While the resulting forecasts satisfy the FAA need for traffic data and are consistent in the aggregate, each local forecast, taken by itself, cannot be related with any precision to forecasts that could be derived locally. Besides creating difficulties for local planners, these discrepancies also impact important Federal grant expenditures that are tied to local and state planning for aviation system capacity. The FAA has responsibility for reviewing and evaluating this planning, but because local and state projections are built "bottom-up" from data focused at that level, the FAA's disaggregated forecast methodology can be used only with difficulty to cross-check and pinpoint structural variations when the forecasts differ.

The issue of disaggregation is difficult to address, and this is well recognized by those FAA regional offices and state and local planning groups who have raised it. The difficulties have to do with the FAA need to gather volumes of specific local data if it is to generate forecasts at the local level, and with the appropriate interaction between the FAA and the extensive existing regional, industrial, and local data gathering and forecasting efforts. Adoption of forecasting techniques based on an aggregated, "bottom-up " approach, then, is intertwined with the approaches taken to satisfy other areas of the forecast initiative. Indeed, aggregation is at the heart of the basic management problem which motivated the FAA Forecasting Initiative—the need for FAA planners to work in harmony with planning groups throughout the aviation community.

FAA Role

The question of the appropriate role for the FAA in aviation forecasting has naturally arisen as the forecasting processes have

become more sophisticated, as the needed data have become more detailed and specific, and as management functions have become more interrelated. There are two aspects to this issue of FAA role: The first is to define the degree to which FAA headquarters ought to forecast growth for specific local sites; and the second is to understand



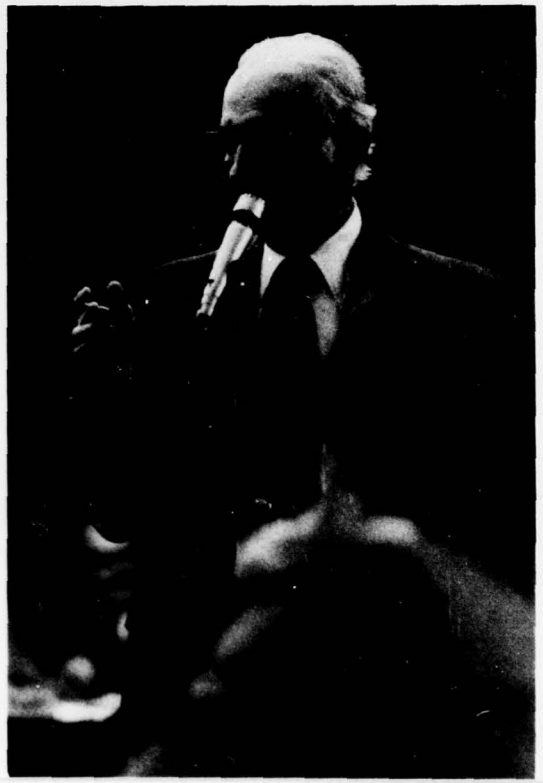
the manner in which aviation planners use FAA forecasts so that the forecast-generating process can be optimally structured.

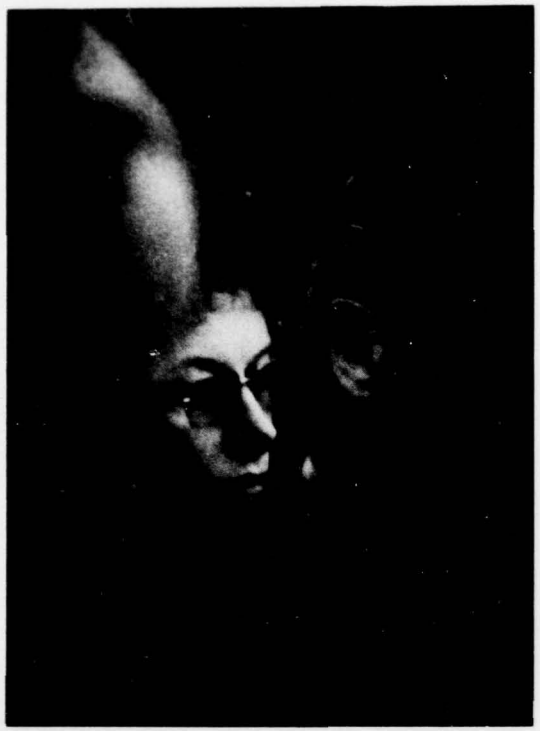
The aviation community expressed general concern that although the FAA is not set up to generate forecasts for all managers in all segments of the aviation community, its forecasts have tended to merge in coverage with those by other segments of the community as the FAA forecasts have been refined to include behaviorial representations of the industry and to consider specific local parameters. A number of participants expressed the opinion that a continuation of this trend is not desirable. FAA forecasting should generally be complementary to the work of others, not a duplication of or a replacement for their efforts. Overlapping forecasts are desirable only in the few cases when the FAA must have an independent source of information. One commentator suggested that the FAA should act as a clearinghouse for forecasts generated by local, state, and regional planners. Another advocated a slightly greater FAA role—as an evaluator of local, state, and regional forecasts in terms of methodology, assumptions, and their reasonableness within an overall national forecasting context. In achieving the proper role for FAA headquarters and other forecasters, the prime requirement is determination, on a case-by-case basis, as to what other groups are doing or have the capability to do.

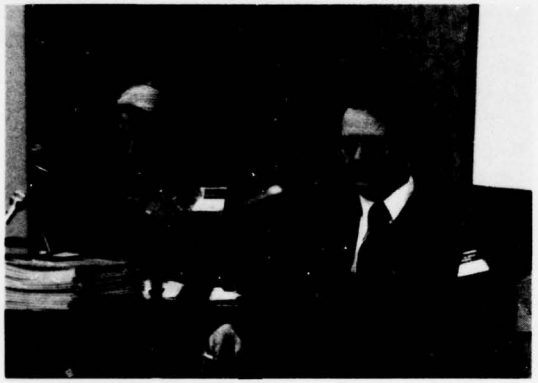
Turning to the second aspect of FAA role—structuring the FAA forecasting process to best meet the needs of aviation planners—various commentators pointed out the FAA must first clearly understand the planning functions, schedules, and processes used by the aviation community. Accordingly, it must then format its forecast output to provide the specific information needed by various elements of the community, and it must time the dissemination of its forecasts relative to the budget and planning cycles of regional and state authorities. Additionally, there must be an exchange of planning data as the forecasting process moves forward each year so that the final product incorporates the knowledge and perception of all concerned parties. Finally, the strong need for comprehensive and reliable short-term (1 to 3 years) forecasts was stressed on many occasions.

Event Impact-Analysis

On numerous occasions, the aviation community expressed concern over the limitations to decisionmaking imposed by forecasts that are based on a single, "most likely" combination of future events. Remembering the industry problems in the early 1970's, caused partially by the generally unanimous and overly optimistic forecasts of the late 1960's, several commentators suggested the development of methods for







assigning probabilities or confidence intervals to predicted parameters. Others indicated the need for forecasts to explore alternative economic growth patterns which would result should a particular major event occur (e.g., an oil embargo), especially over the short term (1 to 3 years). Yet others suggest that forecasts should analyze the probable impact of various potential policy or technical options, such as regulatory change or an increased avionics capability in general aviation aircraft, as well as explore possible evolution in the various setments of aviation.

There are problems here because FAA forecasting is fundamentally chartered to provide a basis for budget, personnel, and resource decisions. Handled improperly, a series of "what if" forecasts could degrade the clarity required for these formal resource management requirements. Second, the possibilities for such analysis are limitless and are often expensive. It is imperative to establish a priority rationale and to quantify potential benefits before committing to them.

By properly recognizing these considerations, the development of such a capability will substantially improve the decisionmaking utility of FAA forecasts. The appropriate FAA response can only be defined through close coordination with the aviation community .

The FAA Forecasting System

Overview

Although the FAA formally instituted its initiative early in 1977, the agency has been aware of the need for better aviation forecasts for several years and, indeed, has been engaged in a continuing effort to improve them. Typically, FAA projects prior to and including the first year of the initiative were structured to expand the scope of the forecasts,— that is, to provide estimates on future growth in additional areas of interest to both the FAA and the aviation community.

The FAA aviation forecasting system is summarized briefly in Tables 1 and 2. Table 1 covers those basic forecasts that form the foundation for current-year FAA operating budget requests and for future-year requirements of the national airspace system. For example, the national forecasts of future aviation activity (air carriers, air taxi, general aviation, military) provide indications as to the overall level of aviation activity, while hub, terminal area, ARTCC, and flight service station forecasts project growth at specific sites requiring some form of FAA operational service. Table 1 provides a short description of each forecast.

Table 2 covers special purpose forecasts and forecast-related research projects sponsored by the FAA to fill gaps in the existing overall forecasting effort or to improve the versatility or accuracy of current forecasting procedures. For example, the general aviation dynamic forecasting model enables planners to examine the implicatons of such policy actions as variable time-of-day landing fees before implementing them; the fixed-base operators study is structured to generate a more accurate data base for

general aviation; and the Atlantic Coast Basin forecast deals with evolving and increasingly busy air carrier routes across the Atlantic.

Table 1. Basic Forecasts

National Forecasts

Official FAA annual forecasts of future domestic aviation activity. In addition, the rationale underlying the forecasting effort is explained; those forces that have an impact on aviation are assessed; the assumptions upon which the forecasting models are based are summarized; and the models themselves are presented.

Terminal Area Forecasts

Annual forecasts of air carrier, air taxi, general aviation and military operations and instrument operations at each of the top 1,000 airports. Forecasts are useful for analyzing airport capacity requirements, forecasting markets, and for planning airport growth.

IFR Aircraft Handled

Annual forecasts of IFR-aircraft departures and overs for the 25 FAA Air Route Traffic Control Centers. Forecasts are used for facility planning and budget appropriations.

Supplemental Air Carrier Forecast

Econometric forecasting model that projects both local and national activity by supplemental air carriers. It is useful to local planners responsible for expansion at specific airports, to the air industry in planning fleet size and composition, and to the FAA in analyzing the impact of supplemental carriers on the National Airspace System.

Annual Instrument Approaches

Econometric model that forecasts annual instrument approaches for individual airports. Driving variables are itinerant operations, instrument operations, and the weather. Forecasts are used in development plans for FAA facility expansions.

Flight Service Station Activity

Annual forecasts of pilot briefs, flight plans filed, and aircraft contacted for individual FAA flight service stations. Forecasts are used for facility planning and budget appropriations.

Hub Forecasts

Detailed forecasts for air carrier, local service, air commuters, air taxi, general aviation, and air cargo growth at 25 major hubs of the National Airspace System. Forecasts are based upon local socioeconomic assumptions and local aviation activity. Forecasts are useful for developing airport master plans and for planning FAA facilities, staffing, and service levels.

Air Taxi and Commuter Forecasts

Annual forecasts of local and national air taxi and commuter activity. This econometric model focuses on the service needs of small communities, and it can evaluate the impact

of such factors as regulatory reform, legislative change, and environment. It is used both for airport capacity analysis and policy evaluation.

Air Freight Demand Forecast

Econometric forecasting model that projects long-term air freight demand at 25 large U.S. hubs. It forecasts freighter operations and freight hauled in holds of passenger aircraft. It can evaluate the implications of policy actions, regulatory reform, and legislative change.

Table 2. Special Purpose Forecasts and Data Bases

General Aviation Dynamic Forecast (GAD)

Dynamic model that forecasts general aviation activity. The model analyses the dynamic interactions of such parameters as the number of pilots, the cost of fuel, and aircraft utilization rates. It can be used to evaluate the impact of a wide variety of policy actions.

General Aviation State Forecasts

Annual forecasts of general aviation fleet size, aircraft utilization rates, and operations by state. Local socioeconomic demographic characteristics are incorporated. Forecasts are structured to aid state-level airport planning and developmental programs.

International Aviation Activity

Econometric model that forecasts worldwide aviation activity by world region, by aircraft type, and by altitude. It uses world regional economic and population data, and fuel prices and aircraft operating costs as exogenous variables. It supports studies on high-altitude pollution and the requirements for satellite communications.

Atlantic Coast Basin Activity Forecast

Forecast that predicts traffic across the North Atlantic by aircraft type, by altitude, and by speed. It covers both standard tracks across the North Atlantic and such new routes as from the Caribbean to Northern Europe and from North America to Africa. It is useful to the air industry, international airport managers, and the FAA for a wide spectrum of planning activities.

General Aviation Activity at Nontowered Airports (1972 and 1974)

Research project that generated an automated data bank on the nontowered airports which handled 91 percent of all general aviation activity. Data covers total and itinerant operations at 2,884 nontowered airports. Data was used in revising the general aviation operations forecasting model.

General Aviation Aircraft, Owner, and Utilization Characteristics

This report presents the results of an extensive analysis into such factors as median and total hours flown, local and itinerant flight hours, cruising speed, avionics, and fleet distribution. Analysis was performed by region, by use category, by type of aircraft, and by type of ownership for calendar year 1975 data.

General Aviation Attrition Study

Research project that established the attrition rate of the general aviation fleet based upon type, age, and use of aircraft. This data constitutes one basis for the FAA's GA fleet forecasting model.

Fixed–Base Operator Study

Project will survey approximately 2,000 randomly selected airports to ascertain the services provided by fixed–base operators. Since the type of services provided are a strong determinant of growth at any particular airport, this study will be useful to local airport planners.

Future Structural Changes In General Aviation Flying

Study will evaluate the impact of such structural changes as new aircraft technology, attitude changes, and regulatory action in general aviation. it will be useful when analyzing the implications of policy actions on the National Airspace System.

Local Census Data Base

Local Census Tract Data Base has been combined with an aviation data base which includes airport location and activity levels, based aircraft, and pilot population. This data is useful to both towered and nontowered airport planners, and has proven invaluable when formulating FAA general aviation forecasts.

Profiles of Air Carriers

Each airport profile shows traffic distribution by hour of the day, type of carrier and equipment, and stage length. It is useful for analyzing airport capacity.

General Aviation Traffic Mix at High–Density Airports

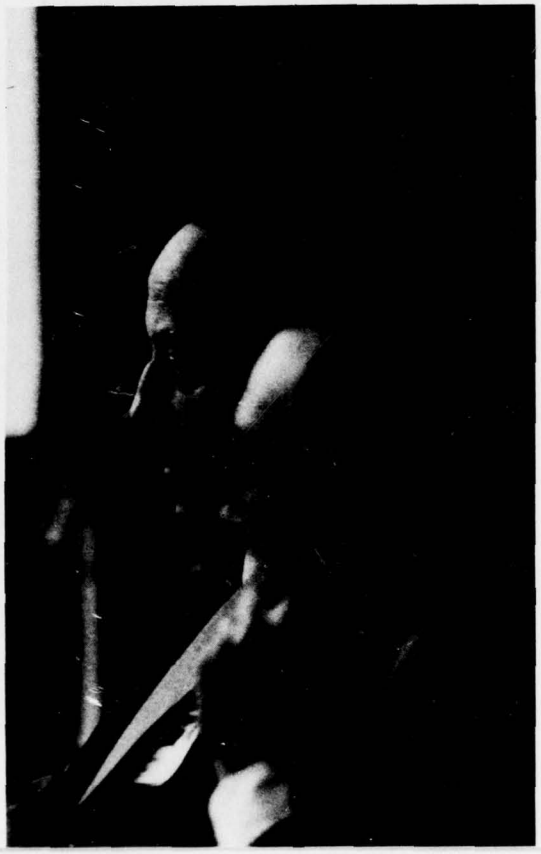
This project is analyzing the changing patterns of general aviation activity versus air carrier operations at major airports. It is useful as an aid in planning future airport capacity and design.

Tower Statistics Quick Response

Daily tower operations by airport and by category of user are on computer tape for 1972 through October 1977. This data base is used by the FAA for short–term forecasting, peaking analysis, and airport planning. Procedures are being developed that will make this data base available to state and local planners.

General Aviation Time–Of–Day Preference

Analysis of the hourly distribution of general aviation traffic by individual airport.



It has application both for planning airport development and for establishing operating procedures that accommodate general aviation traffic during off–peak hours.

Instantaneous Airborne Counts

This project forecasts aviation traffic for individual airports at specific points in time. These "snapshot" forecasts cover IFR versus VFR growth, user category, and altitude traffic distribution. These projections aid in planning facility requirements at specific airports.

Although the scope of FAA aviation forecasting has grown significantly over recent years, the aviation community has identified major areas requiring additional capability. Primary among these are general aviation, whose data base is inadequate, and individual terminal areas (both towered and nontowered) whose forecasts are not sufficiently specific. Yet even though additional forecasts are needed, the trend toward greater and greater forecasting activity by the

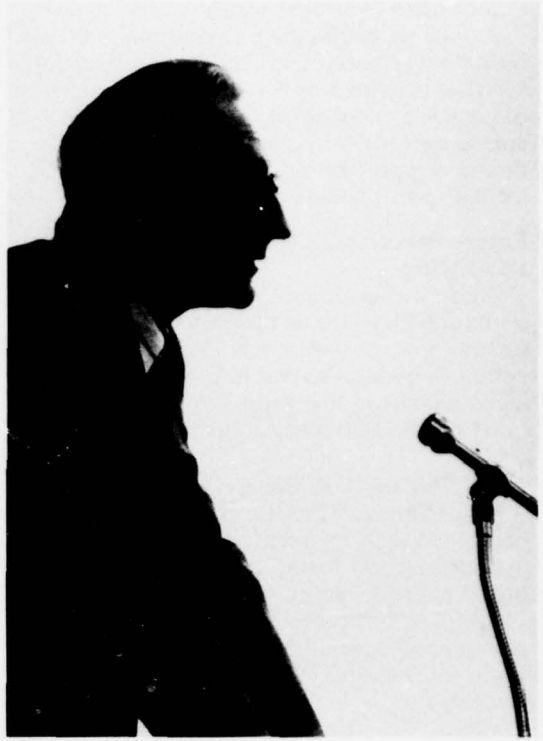
FAA is viewed with concern by some elements of the aviation community who feel the FAA is entering areas in which other authorities have direct responsibility—for example, forecasting activity levels for regions and at specific airports.

In an attempt to bridge this somewhat contradictory situation, the FAA forecasting initiative is proceeding in two directions simultaneously. First, the agency is adjusting the scope of its forecasts to address issues identified by the aviation community as requiring attention. Secondly, and perhaps more fundamentally, the FAA is reshaping the procedures through which it works with the greater forecasting community. The objective is evolution to an interactive process that will most efficiently integrate each forecasting and planning element of the entire aviation community—including the FAA—and through cross flow of information and perceptions, result in a superior total forecasting system.

Recent Expansions in FAA Forecasting

Operations at Towered Airports—Quarterly Forecasts Seasonal variations in air traffic are of critical importance in planning the capacity requirements for individual airports. The FAA is developing forecasting models that will generate short-term (3-year) forecasts for operations at towered airports on a quarterly schedule. The models will forecast operations for air carriers, general aviation, and air taxis.

Tower Statistics—Quick Response Program Daily tower operations at all FAA-towered airports are in computer files for the years 1972 through the present. Included are operations for air carriers, air taxis, general aviation, and military aviation. This data provides a basis for peaking analysis and, as such, is valuable as an aid in short-term forecasting and airport planning. The FAA has scheduled a series of workshops that will instruct regional, state, and local planning authorities in how to access and manipulate these data banks.



Alternative Future Forecasts Future aviation activity is intrinsically dependent upon economic and social conditons whose evolution cannot be known with certainty. Consider, for example, the traumatic impact of the generally unforeseen oil embargo of 1973 on both the American economy and the aviation industry. And yet, the orderly expansion of the enormously capital-intensive air industry must be based in part upon projections of future aviation activity. It is im-

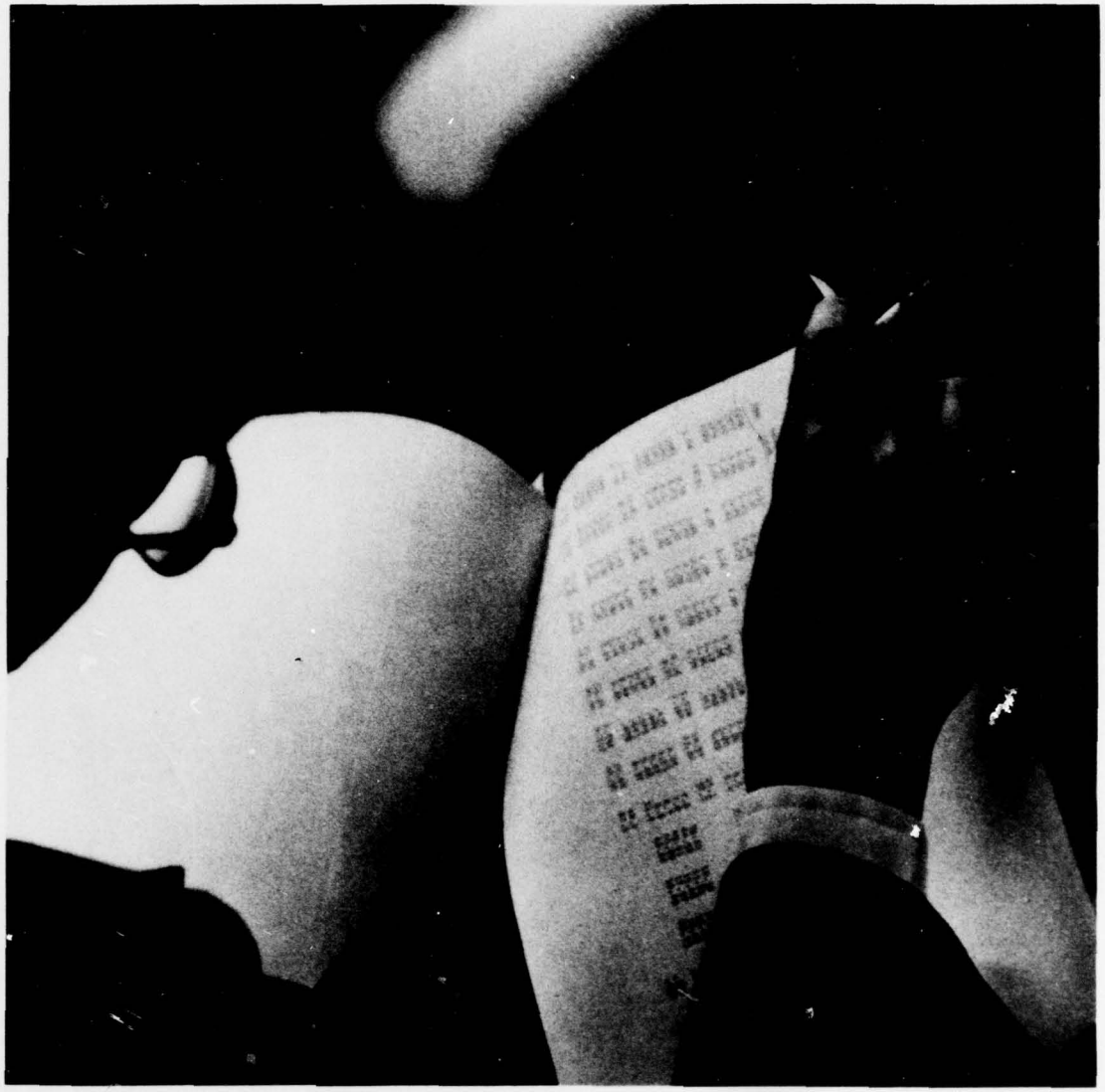
perative, therefore, to consider plausible alternatives to baseline "most likely" assumptions on the evolution of future events.

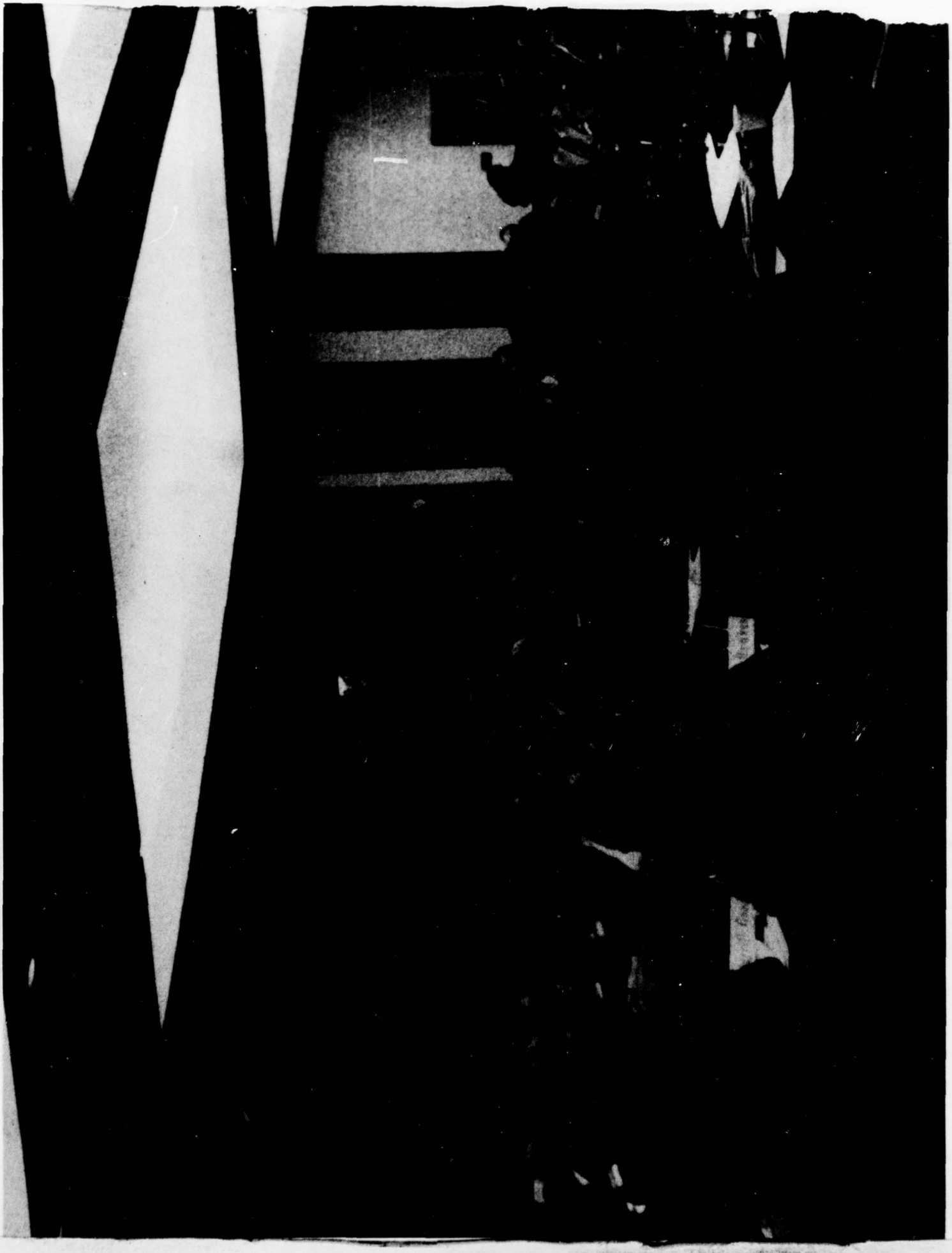
Future FAA forecasts will include alternative projections of aviation activity that would result should social and economic events occur different from baseline assumptions. Besides placing plausible bounds around the baseline forecast, these alternative projections could serve as a policy analysis tool. These alternative forecasts will also serve as sensitivity checks on the baseline forecasts to identify potent social and economic parameters that may require special monitoring.

International Forecasting Model The FAA is expanding its forecasting model for international aviation to respond to specific agency requirements. The expanded model will help evaluate the environmental impact of high-altitude aircraft traffic on the ozone layer, and it will be used to help evaluate the Nation's Aerosat requirements.

Census Track Data The agency is updating the software associated with the Census Tract Data for areas around aviation facilities. Correlations between local demographic data and aviation activity will be identified.

Evaluation Criteria The agency is developing criteria with which it can evaluate the accuracy of its aviation forecasts. The criteria will help to identify whether the cause of forecasting errors is due to structural limitations in the models or to changes in exogenous variables.





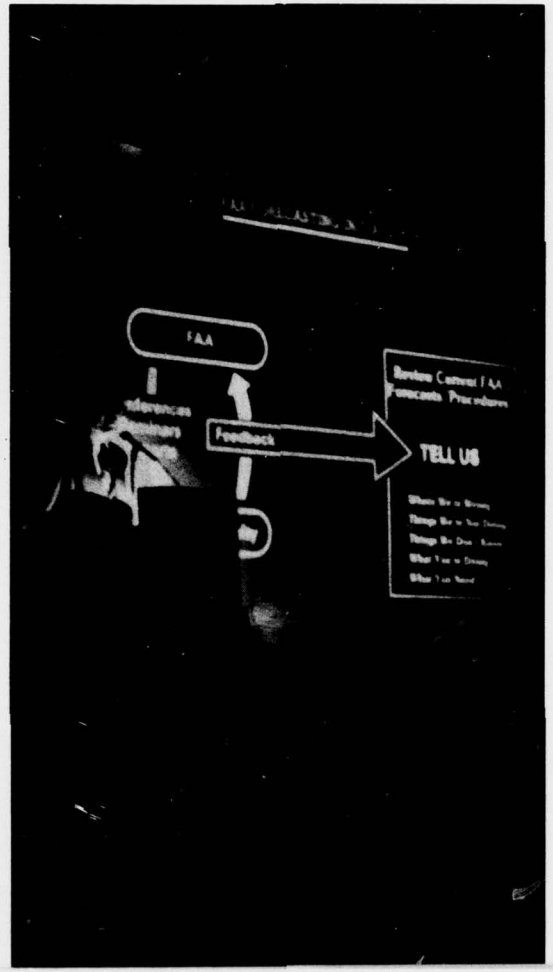
Procedural Changes

The FAA is fully aware of the aviation planning and forecasting capability at the local, state, and regional level. It has no desire to duplicate or pre-empt work by those authorities. The agency does wish, however, to incorporate the knowledge, perception, and insight of state, regional, and local planners into its forecasts, particularly its terminal area and hub forecasts. Conversely, the FAA wishes to assure that national trends and policies are properly accounted for in forecasts generated regionally and locally.

Currently, the agency is evolving the procedures by which it generates aviation forecasts to achieve comprehensive interaction between all concerned aviation planners. The objectives are to include all relevant input data, to achieve widespread agreement on baseline assumptions, to meld the perceptions of state and local forecasters—who have superior insight into such factors as locale-specific growth patterns—with the perception of FAA headquarters forecasters, and to achieve a mututal understanding on forecasts for particular hubs or terminals before those forecasts are formally issued. The following are procedural changes which the FAA is instituting to achieve its goal of improved and coordinated forecasting by national, regional, state, and local forecasters.

Hub Forecast Workshops Working sessions are scheduled for each major hub area. The objective is to obtain widespread participation in the forecast-generating process by regional planners, airport operators, area governments, and the general public. A draft forecast report will be circulated to all concerned parties for final review prior to national publication.

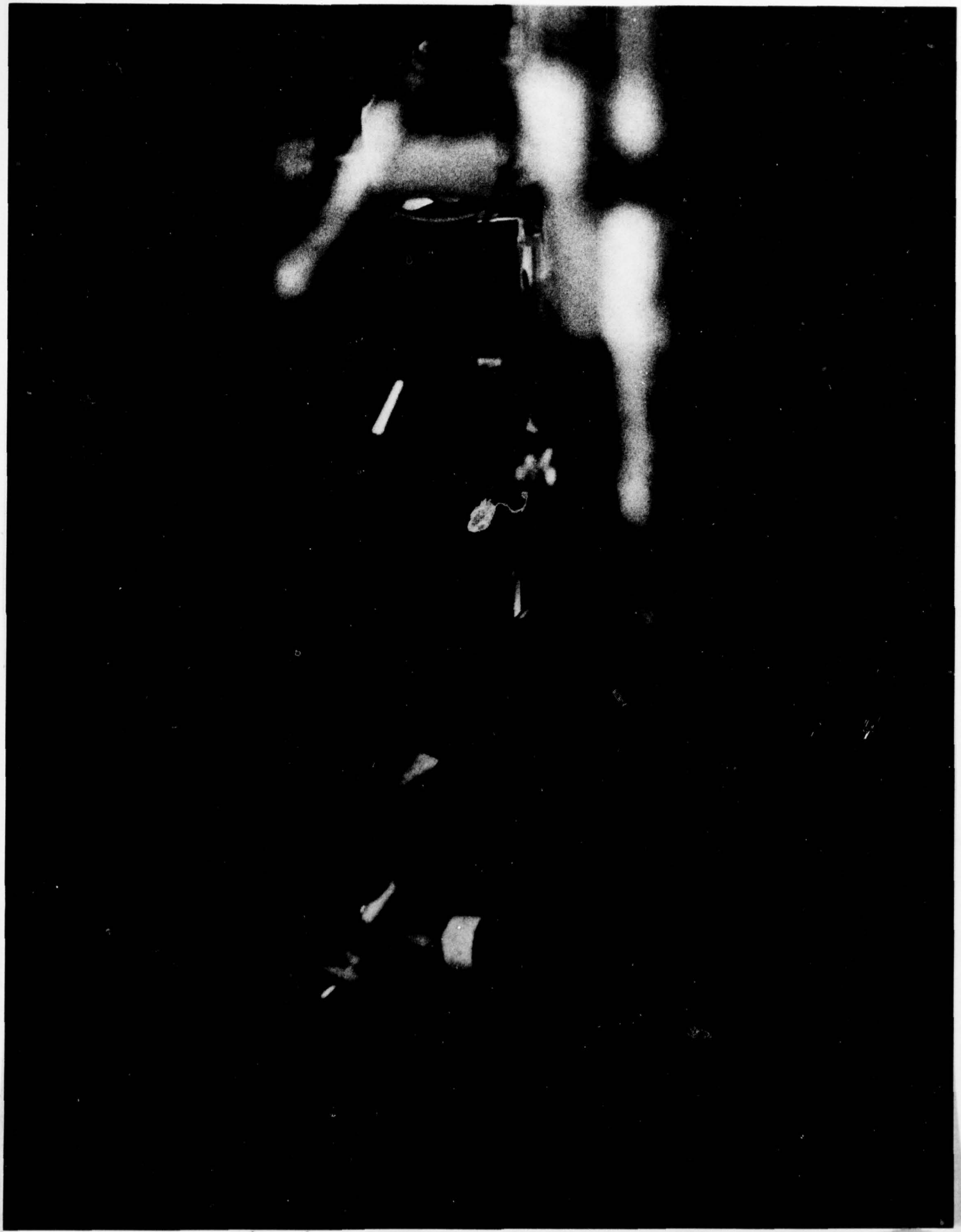
Regional Workshops Over the next 18 months, the FAA has scheduled nine regional workshops (one in each region) and four theme seminars for state and local planning authorities. The objective is to involve all concerned parties actively in the forecasting process. At these workshops, state and local planners will be instructed on how to access and use FAA forecasting models and data bases. The FAA will seek to ascertain the data and forecasting requirements of specific locales. In addition, specific topics of general interest to aviation planners—such as the impact of the President's energy bill—will be featured.



Terminal Area Forecasts (TAF)—Data Access FAA headquarters is standardizing the software for its more than 1,000 terminal area forecasts and is developing a capability through which FAA regional personnel can access and interact with the data base. Once equipped with this software package, regional planners will be able to obtain TAF data for any terminal area; adjust, change, or update the base year data; and then transmit the corrected data back to FAA headquarters. In this way, the FAA hopes to facilitate input by regional and local planners into the base data for specific terminal area forecasts. The Southwest Region has this capability on a test basis.

Feedback

Because the second year's work discussed here is based on output from the first year's dialog, it is important that FAA be assured that its perception of aviation community needs for forecasting is accurate. Therefore, it is requested that as you review this Conference Proceedings Document, feel free to send us your comments. Any format will do, including hand annotation on the pertinent pages of the document.



Part II
Proceedings

Commuter Airlines

Mr. Tom Miles...
President, CAAA

Mr. Miles provides a prospectus on the nature, status, and outlook for commuter airlines—the fastest growing segment of the aviation industry. He then discusses the potential pros and cons of proposed regulatory reform in the commuters and other segments of the air industry.

In my role today, I hope to answer two questions: number 1, the outlook for the fastest growing segment of the aviation industry—the commuter airlines; and number 2, whether current forecast initiatives are providing adequate support to meet the need of decisionmakers.

Let me start by asking, "Where is the air transport industry today?" And the answer: "it is now operating in the climate of regulatory reform." Once the competitive forces of the marketplace are unleashed, it is going to be a new ballgame. A new ballgame for the players, a new ballgame for the fans, and a new ballgame for the forecasters and the decisionmakers.

Now I am from the great State of Colorado, and I would like to tell you a story. There was a rancher going out to hunt, and he was crossing a field when all of a sudden he noticed the most beautiful little bird lying on the ground. He stooped over, picked it up, and he cupped it in the warmth of his hands. All of a sudden he felt the thing quiver. And like the commuter airline industry, he said, "there is life in this bird." But he did not have time to mess around with a little bird. But low and behold, there was a fresh cow dump. He pushed the little bird in the cow dump and squished it around right up to its little neck. He said, "little bird, I hope you survive," and went on his way. Low and behold that little bird felt the warmth of the cow dump, and all of a sudden he started chirping and signing away. Now there was a predator in the area who heard all this commotion. He spotted that pretty little bird and with one gulp it was gone.

Now there are three morals to this story. He who puts you in it is not necessarily your enemy. He who gets you out is not necessarily your friend. And, when you are in it up to here, keep your mouth shut. Now to relate this story to my presentation, I have found that sometimes the best part of any presentation is the question and answer session. But sometimes there just is not enought time, so I am going to ask myself some questions that will give those of you who know little or nothing about the commuter airline industry a very brief updating as to what this industry is all about.

Definition of Commuter Airlines

Now the first question is, "what distinguishes commuter airlines from certificated air carriers?" Number 1, we are exempt from certification. It does not cost commuter airlines $50,000 or $100,000 to get the right to serve the American people, provided the operation is restricted to aircraft seating no more than 30 passengers or having a payload not to exceed 7,500 pounds. We are free to enter or leave any market at any time, and we have no route protection. Another competitor can come around anytime and enter our market. We have no subsidies. If we cannot provide a service the public will support through the farebox, it is a "no-go" decision. The bureaucracy does not have to kill us, again the free enterpirse system of play. And lastly, the fares, rates, and charges of these independent entrepreneurs are not regulated by the bureaucracy. In other words, they are not regulated by people who do not necessarily understand the marketplace or the problem of carriers. And perhaps that is the reason why commuters have been so successful.

CAB Requirements

Now the next question is, "under such a laissez-faire policy, does the CAB impose any requirements on commuter airlines?" Yes, they do. First of all, we must register with the Board. We must carry passenger liability and property insurance prescribed by the Board. We provide the Board with copies of our schedules, fares, and rates. We file periodic reports on a quarterly basis. And we operate our aircraft pursuant to FAA regulations to ensure the safest possible service for the public.

Recent Growth

Now the next question , "how big is the commuter airline industry?" We analyzed the official airline guide, which is the bible of the aircraft support industry, and found there are 970 communities in North America now served by U.S. air carriers. Of those 970 communities, 636 are served by commuter air lines. We are the leading class of air carrier service to communities in North America. And if it were not for commuter air carriers, 314 of those communities would have no air service. For those 970 communities, we operate 2,233 passenger stations or 41.8% of the total stations operated in North America.

In 1976 the commuters carried 7.6 million passengers, 175 million pounds of cargo, and 160 million pounds of mail. Our annual growth rate over the past 5 years has been as follows: passenger—9.5% and you know what the certificated carriers did in that same period; cargo—31.2%, and we are just beginning to move; and mail—17.5%. Now with such a performance, is there any wonder why the proponents of regulatory reform are pointing with pride to the growth and development of the commuter airline industry. They claim that the commuters are the living example of what can be accomplished by air carriers while operating under the true forces of competition rather than regulatory regimentation.

Now I do not want to get into an argument on the pros and cons of regulatory reform as it impacts the major airlines— that is their business. But I will address myself to those provisions of regulatory reform which impact service to small communities and commuter air carriers.

Many of you live in major cities. When you travel, you go to major cities. You have the convenience of 727s, L-10-11s, 747s, DC-10s, you name it. But let me remind you, there are literally millions of American citizens who do not have such conveniences. They have to drive two and three hours to get to an airport where they can board a flight. It is aggravating and it is frustrating. Why should they be required to drive that distance when they may have within their own area a paved and lighted airport? In some cases, there is an airport in their area that has scheduled service, but that service is so ill timed that they may have to wait two and three hours for the return flight. They might as well get in the car and drive all the way. These are the people who are calling for corrective action. They want scheduled air service in response to their needs. And that is exactly what the architects of regulatory reform are planning to give them.

The Canon/Kennedy Bill

Now we do not have time to analyze the Anderson bill, the Canon/Kennedy bill, or the other bills that are surfacing. But I would like to concentrate on one bill—the Canon/Kennedy bill—and just give you an idea of its potential impact. Qualified commuter airlines want to become full participants in the American air transport system so they can better serve travelers and shippers by air. That is exactly what Canon and Kennedy plan to give them—full participation in the system.

A vast majority of commuters have always taken the position that they want no certification. The Canon/Kennedy bill would give them a form of certification, but would enable them to operate under minimum regulations. They would have joint fares, aircraft guaranteed loans, equal representation, the official airline guide, and subsidy if needed. In other words, the bill would make the commuter airlines full competitors in the system. At the same time, the Canon/Kennedy bill would enable the 401 certificated carriers to obtain a new form of certification. They, too, could hold a local air carrier certificate. In other words, the bill would say to local service carriers, "you are already serving given areas of this great land of ours. But there are many small communities in your regions that are not being served, and one of the reasons is the cost of certification. Now we are going to make this certificate available to you. It may motivate you to get back into the crib from which you began. You may find it economically feasible to start operating commuter-type aircraft, and then you, too, will become more competitive."

As of now, it is a one-way street. Only the commuters can compete with the certificated carriers. We are going to make it a two-way street—and let the certificated carriers compete with the commuters. Everybody will be on an equal footing and the competitive market force will be the judge.

Several months ago, you saw the beginning of this when Southern Airways purchased seven 300-mph, 19-passenger, fully pressurized, metro-switched, square-engined airliners. Southern Airways finally took the position if we cannot beat'em, we better join'em. When this new legislation is passed, Southern will be in a position to expand into the other small communities.

Today, Allegheny Airlines would like to serve some small communities that are not certificated to its system. But again, the

bureaucracy is saying no. This is impeding the growth of Allegheny, contrary to public interest. Of course, there are many commuters who are opposed to such expansion. But it will be a different story because they believe in American free enterprise, and they are saying,"once you give me the right to compete on equal footing, I will be willing to accept that proposition."

What Local Service Commuter Carriers Can Achieve

Now the next question is: "Can you give us an example illustrating the motivating force behind the creation of a commuter airline?" Let me tell you just one quick story. It was back in 1965, North Central Airlines was serving Appleton, Wisconsin, and Ashkash, Wisconsin, enroute to Chicago. Appleton is about 35 miles from Ashkash, and they are connected by an interstate highway. It takes about 30 minutes to drive from Appleton to the Ashkash Regional Airport. Northcentral realized it was costing them too much to serve both communities. So, they petitioned the CAB to hyphenate Appleton to Ashkash so they would be able to expand their service. The Civil Aeronautics Board held hearings and found the people in Appleton did not want to be hypenated with Ashkash. They wanted their own local airport. But the CAB said no, it makes no sense. We are going to establish a regional airport in Ashkash. The people in Appleton can drive to Ashkash. A few businessmen in Appleton got together and said, "we want our own airline." So they formed the Fox River Valley Airline: one airplane seating 5 people, 2 flights a day to Chicago. Now when North Central airlines heard that, they laughed. "Ha, they won't be in business 6 months—1 airplane, 5 passengers, 2 flights a day." But these businessmen went to a local artist in Appleton and said, "we have to respond to more central areas." The artist said, "what's your name?" "We are the Fox River Valley Airline." "What's your local?" "We have a flying goose." He said, "come back in a week and I'll have your response." So a week later they came back and there was a beautiful little red fox with a limp goose in his mouth. Now mind you, when North Central Airlines was serving Appleton, it was two flights a day at the wrong time of day. All they could get out of Appleton to Chicago was about 6,200 passengers a year. Today, the Fox River Valley Airline is known as Air Wisconsin. Air Wisconsin serves the states of Nebraska, Minnesota, Wisconsin, Michigan, Indiana, and Illinois. They have 12 round trips a day between Appleton and Chicago in 300-mph, 19 passenger metro airliners, and they are approaching 40,000 passengers a year in that market alone. When the big certificated carriers were having their financial difficulties several years ago, little Air Wisconsin, the little old fox, was boasting profits of $100,000, $200,000, $300,000, and I think for the first six months of 1977, $900,000 in profits.

Now, I could go on and on, telling you about this great little industry, but Gene says I am three minutes from touchdown. If you want the full story of the commuter airline industry, we just published a 144-page yearbook called "Time for Commuters." It will cost you $5.00. Just send us a letter with your check, and we will give you all the information about this exciting industry.

Now I want to get back to the story that I started out with—and the three morals. The first, "he who puts you in it is not necessarily your enemy." Now the Civil Aeronautics Board and its predecessors put the certificated carriers into the system. It also put commuter airlines into the system. And I think we all appreciate the fact that we are a part of the Nation's air transport system. The second moral was: "he who gets you out of it is not necessarily your friend." Everybody knows we have problems today. The trunks have their problems, the regionals have theirs, and we all know the commuters have theirs. And now the legislators and regulators are trying to find ways to get us out of the problem. We hope like hell that when they get us out, they do not gobble us up, because we do not want the same thing to happen to us *that happened to the little bird.* And the third moral is, "when you are into it up to here, keep your mouth shut." Gentlemen, nobody can afford to keep their mouth shut in a climate of regulatory reform. You have to fight for what you believe in, and I assure you, the commuter airlines are going to fight like hell so they can better serve travelers and shippers by air.

The FAA Perception of User Requirements

Mr. Gene Mercer... Chief, Aviation Forecast Branch, FAA

Mr. Mercer outlines the concept and goals of the FAA initiative to improve the decisionmaking utility of its aviation forecasts. He describes the FAA's perception as to the forecasting needs of various governmental and private groups engaged in planning the future of aviation within this country. He identifies currently perceived deficiencies in the FAA's forecasts, and presents the many initiatives now underway to resolve those deficiencies. Mr.Mercer closes by reiterating the need for close cooperative interaction between the FAA and the forecast-using community.

The FAA Forecasting Initiative

Today, aviation is a very complex industry in which the actions taken by one segment dramatically affects other segments. In response, the FAA has undertaken an initiative to maximize the management utility of its aviation forecasts, not only for FAA management, but also for the entire aviation community.

Today, I will discuss on-going work that we have undertaken to upgrade and improve our forecasting effort. We want to relate to you our perceptions as to who the users of forecast are, what management decisions are being made on the basis of these forecasts, what new forecasts are needed, and our initiatives to meet these needs.

The Role of FAA Forecasts

The FAA is responsible for the orderly growth of the National Aviation System. In doing this, we produce national forecasts for all major users of the system, as well as facility forecasts for terminal areas, the large hubs, enroute centers, and our flight-sevice stations.

Our forecasts impact not only the FAA, but other governmental bodies involved in developing transportation policy. This morning, we will discuss how state, local, and regional authorities make decisions on the basis of forecasts, and this afternoon we will be talking with some system users of aviation forecasts. We want this to be a broad-based dialog, and we want to receive feedback so that we can expand and improve the focus of our aviation forecasts. Our goals are to develop more responsive models, provide a basis for contingency planning, and increase the specificity and scope of the forecasting effort. We will be concentrating on this last goal in today's session.

Forecasting Techniques

To meet the management needs of the FAA and the user community, we utilize three basic forecasting techniques. We do projection forecasting for the very short-term (1 to 3 years) by interpolating historical trends. Our longer-term national models utilize econometric forecasting techniques, and recently we have developed dynamic forecasting models for use in policy analysis. These dynamic models enable us to respond when unanticipated events occur such as the oil embargo. For example, when the President announced his energy policy, we were able to analyze the effect of proposed new taxes on the growth of aviation.

The Panelists

Our initiative is structured around our current perception as to the users of aviation forecasts and the functions they perform. And here is where we need feedback from the user community. Let us know what we are doing wrong, what we do not know, and what we should be doing.

The panel this morning focuses on state and local decisionmaking. It consists of the following individuals: George Howard, representing the Regional Planning Authority from the Port of New York; Merrill Goodwyn, representing the State Planning Authority from the Texas Aeronautics Commission; Grady Ridgeway, representing an airport planning authority from the City of Atlanta, the Department of Aviation; T. Wallace Hawkes, from Greiner Environmental Sciences Incorporated; and Tom Sides, who is the OMB examiner for the Department of Transportation. Tom will discuss the use of forecasts by the Federal Government when authorizing our budget levels. This panel will be moderated by a member of my staff, Pamela Kruzic.

This afternoon's panel will consist of John Winant, President of NBAA; Ken Whitehead, from United Airlines; Boone Barker, from the Boeing Company; Ed Greenslet, from Bache, Halsey/Stuart and Shields, Inc; Jack Wiegand, from Rolls-Royce. The afternoon panel will be moderated by Bernard Hannan, and it will focus on the forecasting needs of aviation system users.

For the duration of this presentation, I have instructed the panelists to feel free to interrupt at any point and ask questions about any of the initiatives I am discussing. After my overview presentation, the panelists will each make individual statements. There will then be an open panel discussion with questions from the floor. An hour has been set aside for this afternoon for capturing your comments and input into this conference. Please go to one of the floor mikes when you have a question, state your name, and the company you represent, and then ask your question. The conference is being recorded and will be summarized in a publication to be issued in July.

Forecasting Requirements of State and Regional Planning Authorities

State and regional planning authorities need forecasts in order to develop state system plans and individual airport master plans, along with the associated environmental impact statements. They need national forecasts for all the major users of the system, and they are most interested in terminal area and large hub forecasts. In response, we annually provide 12-year forecasts for approximately 1,000 airports. State and regional planners are also vitally interested in the general aviation forecast, whose data base leaves a lot to be desired. A great number of our initiatives are structured to establish a more reliable data base so that our forecast models will be more responsive.

It is our perception you need state-level rather than national forecasts for state planning. Owing to differing growth rates from state to state, we also realize you need greater geographic disaggregation. In order to do capacity analysis for individual airports, we think you require both time-of-day traffic distribution and the mix of general aviation activity and air carrier activity.

At the beginning of this session, we handed out a list of the initiatives that are either currently underway or planned. Many of these initiatives are of particular interest to state, local, and regional planners, and I will go over a few of these topics. However, we do have slides available for all topics that are listed, and I will be happy to discuss any about which you have a particular interest.

Current FAA Initiatives

The general aviation (GA) state forecast model was developed by the Transportation System Center, and it recognizes unique growth rates by state. It produces a forecast of GA fleet size, aircraft utilization rate, and operations. This forecast model incorporates socioeconomic demographic characteristics, and it is valuable for the state-level airport planning process.

Now I will discuss our hub forecast effort. Historically, the major problem inhibiting orderly development of the national airspace system occurs at the major air carrier hubs. We, therefore, felt it necessary to develop more detailed forecasts for these 24 major hubs which have 97 towered facilities. A series of models have been developed that incorporate local socio-economic assumptions. We will be issuing a series of reports that will give a detailed breakdown as to the growth of trunk air carriers, local service air carriers, air commuters, air taxis, general aviation, and air cargo. They will also provide background on the total transportation picture for each particular community. These forecasts will be valuable aids for developing airport master plans and will be used for planning service facilities and staffing .

Annually, the FAA issues a profile publication on air carrier operations and passengers at the 100 top air carrier airports. Each profile shows traffic distribution by hour of the day, type of carrier, type of equipment, and stage length. This publication is valuable for analyzing airport capacity, forecasting markets, and planning airport growth.

Another initiative is our tower statistics quick-response program. We have daily tower operations by airport and by category of user from 1972 through October 1977 on computer. This data base is used at the FAA for short-term forecasting, for peaking analysis, and for airport planning. This data base will be made available to state and local planning authorities. We are now developing the procedures for explaining the data base, how it can be used, and how to access it.

Forecasting Requirements of the Air Carrier Industry.

Another major user of aviation forecasts is the air carrier industry. The air carrier industry uses forecasts for planning their fleet, marketing, investment, scheduling, and R&D effort. Annually, the FAA issues terminal area and large hub forecasts, as well as

forecasts for air carriers, air taxis, air commuters, general aviation, and the military. We recognize that air carrier forecasts are also made by the air carrier industry and that the FAA forecast is used for comparison purposes. One value of this comparison is to reach some understanding as to future fleet mix, average stage length, fare structure and so on.

Current FAA Initiatives

We perceive that air carrier management requires many types of forecasts and different levels of disaggregation. In response, many of the initiatives lie in the area of air carrier and geographic disaggregation.

We annually produce terminal area forecasts for approximately 1,000 major airports in the United States. This forecast includes all airports served by certificated route air carriers and commuter air carriers. It provides an annual forecast of air carrier passengers, air taxi passengers, and operations at FAA terminals. These forecasts are used for facility planning and for budgetary planning.

We recognize that the commuter industry has been the most rapidly growing segment of the aviation community, and we realize this very rapid growth is going to continue. Last year we developed a computer model to forecast national and local commuter activity. This model can evaluate impacts on the industry as a result of regulatory reform or legislative change. It can also analyze the system to ascertain the impact of commuter growth at some terminals that are already nearing capacity. We have tried to focus on the service needs of small communities with this model. We have identified 74 communities that may lose certificated route air carrier service in favor of commuter service. We have also identified approximately 50 locations we feel are likely candidates to receive commuter air service over the next 10 years.

We have developed an econometric forecasting model for domestic international air freight. We have disaggregated this forecast to 25 large U.S. hubs, and translated it to differentiate between all freighter operations and bellypit movement in combination carriers. This model is useful for policy analysis and ascertaining the impacts of regulatory reform.

The FAA, the MOT of Canada, and the CAA of the United Kingdom are required to develop North Atlantic traffic forecasts. Historically, those forecasts have been 5-year forecasts of traffic across the standard track structure of the North Atlantic. In recent years, there has been a proliferation of new service across the North Atlantic—the Carribean to Northern Europe, North America to Africa—and these flights have been operating on random tracks. In many instances, these random tracks intersect the standard tracks across the North Atlantic and create air traffic control problems. Recognizing this, we are developing a new forecasting technique to predict O&D traffic across the North Atlantic by aircraft type, by altitude, and by speed. In fact, we are attempting to predict instantaneous airborne counts on this vital North Atlantic route.

Forecasting Requirements of General Aviation

Another major user of aviation forecasts is the general aviation community. This community needs forecasts for much the same reasons as the air carrier industry: To plan for future production, investment, scheduling, marketing, and R&D.

Current FAA Initiatives

Obviously, the most important forecast is that for general aviation activity. Our initiative is directed to provide forecasts by state and region, to develop a good data base for activity at specific terminals, and to ascertain the effects of such changing characteristics of the general aviation fleet as increased sophistication and higher numbers of IFR-rated pilots and the necessity to fly into controlled airspace. As I mentioned before, a major problem is the unreliability of the general aviation data base.

The first initiative is the GAD dynamic model. Many of you have probably seen demonstrations of this particular model which was developed for the FAA by Battelle Memorial Institute. In this model, if you change cost data, it will impact the number of pilot and student starts. This in turn will impact the number of new private pilots, which will change the demand for general aviation aircraft. This will impact utilization rates of GA aircraft and the number of operations they perform. In short, the model is dynamically interactive.

Two years ago, the FAA contracted with the Bureau of Census to interview 10,000 owners of aviation aircraft. We had a 96% response rate from this survey, and we were able to gather a great deal of information about the general characteristics of aircraft owners: Who they were; how they utilized their airplanes; and what type of avionic equipment they had on board. This data base

has proven invaluable to many of our general aviation forecast models. This publication is also available if any of you are interested.

The general aviation attrition study was a research effort to establish the attrition rate of the general aviation fleet—that is, to ascertain when aircraft become inactive from the fleet. We looked historically at general aviation by type of aircraft, by use, by utilization rate, and by age, and we were able to develop a distribution of attrition over time. This data was put directly into our fleet forecast model.

Recently, we contracted with the Bureau of Census to conduct a fixed-base operator's study. This initiative resulted from a NATA suggestion that we perform this survey. We are going to survey approximately 2,000 randomly selected airports. We will get the names of all fixed-base operators located at those facilities, and then send a survey form to find out the type of services they offer. We feel the type of services being provided is a strong determinant in the growth at any particular airport facility.

Forecasting Requirements of Aviation-Related Industries

Other aviation-related industries—the financial community, the airport services community, energy suppliers, consumer advocacy groups—also use FAA forecasts. Although primarily interested in specific terminal forecasts, they are concerned with national growth as well.

Current FAA Initiatives

Recently, we developed and put on line, the CACI data base which contains all track data from the 1970 census (updated for 1975 and 1976) together with an aviation data base specifying airport locations and activity levels, the number of based aircraft, and the pilot population. We utilize these data bases to obtain site demographic characteristics and in developing individual airport aviation forecasts.

The Airport Evolution Study is a research effort to evaluate the growth characteristics of various airport categories. We are trying to determine airport size and the number of operations for various-sized cities, as well as to evaluate the impact of investment programs on growth at specific airports, the impact of increasing land values (as land values increase, it may cause the death of a particular airport), and environmental considerations (as people move closer around an airport, what happens to activity levels?). We hope this data will assist us in forecasting and planning for individual airports.

Conclusion

I have talked about many of the initiatives going on within the FAA—trying to give you an idea as to our perception of who needs aviation forecasts and how they use them. I have also related what we are doing. Now we want you to tell us where we are wrong, things we are not doing, things we do not know, what are you doing, and what you need. We feel this type of interchange is extremely valuable to the FAA, and hopefully it will be of value to you.

PANEL SESSION I:
FORECASTS FOR STATE AND LOCAL DECISIONMAKING

George Howard... Port Authority of New York

Mr. Howard first provides clues as to why aviation forecasting has been poor over the past two decades. He then stresses the need for regional and local planners to exercise considerable autonomy in forecasting their own requirements. He feels the proper FAA role is to evaluate the results of regional forecasters in terms of methodology, assumptions, and how they appear within the overall national forecasting context. He also urges the FAA to aid in gathering better and more comprehensive regional data as the basis for forecasts.

The Track Record in Aviation Forecasting

If, according to Malthus, Economics is the "dismal" science, forecasting has been the abysmal science—at least for aviation. I cannot speak for other industries, and I use the past tense in the hope and expectation that aviation forecasting will get better.

How bad has it been? The FAA, the CAB, the ATA, the aircraft manufacturers and my own agency, The Port Authority of New York and New Jersey, have all made past forecasts of air travel which have fallen wide of the mark—generally on the low side for forecasts made in the 1950s and on the high side for forecasts made in the late 1960s. Individual forecasts have missed the target year by 100% or more, and according to one analysis, a group of major forecasters in the 1965 time period showed a high to low variation of almost 80 percent for the year 1980—a difference between a forecast of 500 billion RPMs and 275 billion.

Why has the track record been so poor? I don't think it would be an over simplification to say there has been a chronic tendency to project recent growth trends into the future. The relatively low growth rates in the 1950s were extrapolated into the 1960s. Special effects—jets and a declining yield in constant dollars—led to very high growth rates in the sixties, which were extrapolated into the 1970s and 1980s. We know the unfortunate results—too much equipment, too many empty seats, and a poor profit picture for the airlines. This is not to say the forecasters were solely responsible for the bottom-line results, but they, and I mean we, must accept our share of the blame.

Can we learn by our past mistakes? We certainly have to if we are to survive as a profession. There is no escaping the need to forecast. The airlines and the Port Authority, as only one example, have almost $2 billion invested in airport facilities in the New York/New Jersey hub. Millions more will be needed to accommodate the expected demand of the 1980s. Plans have to be made now to provide the right amount of terminal capacity, gate positions, curb space, parking space, terminal highways, and so forth. We believe we can handle a projected doubling of traffic with our three airports over the next 20 years, but commitments have to be made in the near term, even with staged development, if capacity is to be balanced with demand. We cannot afford to be too wrong in setting our sights. And this is as fundamentally true for the airports as it is for the manufacturers, the airlines, and the Federal Government.

But the obvious mandate to forecast with reasonable accuracy does not answer the question—"Can we do it?" It is my personal conviction we can. Forecasting methodology has become increasingly sophisticated. We have dispensed with naive extrapolations and are certainly more aware of the fundamental and institutional changes that can affect the future. We are spelling out our assumptions and, perhaps more importantly, we are discussing mutual problems together. We are delighted the FAA is taking a leadership role in sponsoring this conference and coming forward with such a detailed and documented forecast for fiscal years, 1978–1989. Following, independently, very similar econometric methodology, we note the FAA's forecast for 324 million domestic passengers in 1985 is within one percent of our own forecast for that year. We hope the coincidence is more than happenstance and that we both have improved the rational basis for selecting our independent variables and our basic assumptions. At the Port Authority, we take added comfort from the accuracy of our national forecasts over the last three years.

Regional Versus National Trends

Unfortunately, we in New York have learned the hard way that a good forecast of national travel does not necessarily produce

a good forecast for a region or particular hub. For many years, until about 1969, the N.Y./N.J. hub commanded 10 to 11 percent share of national enplanements. After the two recessions of 1970/71 and 1974/75, which hit hard at the New York/New Jersey region, the share of national activity has dropped to 7.5%. It had been assumed in the sixties that this region would lose out to some degree due to more rapid growth in other areas, particularly the Sunbelt. But the decline after 1969 was precipitous rather than gradual. Three reasons have been identified: New York's share of national income has dropped more than had originally been expected, New York/New Jersey air fares rose by more than the national average due in some part to increases in "air shuttle" fares, and the image of New York as a place to visit suffered.

Regional trends, therefore, are extremely significant in determining how the future for a particular hub may vary from the national outlook. Regional income, population, household formation, and air fares are economic series for which data are generally available or can be developed, and regional economic models can be designed to provide a more rational basis for regional forecasting than simply applying historic ratios or shares of national activity. We understand the FAA is working with regional models, and we would urge the FAA and its consultants to work closely with regional economists and local airport managements so that a full exchange of ideas and information can take place.

At this point in time, we are somewhat skeptical the FAA, or any single agency, can actually provide the many hub forecasts that are required. The FAA may be able to live with a significantly greater margin of error at the regional level than it can at the national level for understandable reasons. But local agencies, authorities, and others who are responsible for aviation planning and operations cannot tolerate significant error and must take into account very specific regional detail and trends.

We would, therefore, take exception to a statement contained in the FAA's 1978-89 report: "State, regional and local authorities also base their Airport Master Plans and State Systen Plans on FAA forecasts or locally generated forecasts which are consistent with the FAA forecasts" (page 16 of the report). This is not exactly the way things work or the way they should work. The local planning and operating agencies and authorities should exercise considerable autonomy in forecasting their requirements. Ultimately they are responsible for the financing and operation of the facilities. If forecasts developed at the regional level are consistent with FAA forecasts, so much the better, but they are not consistent by definition or procedure. Generally speaking, we recommend that the FAA look to the hubs for their own forecasts and continue to provide funds, as is now being done, for regional planners to develop regional aviation forecasts. The FAA should certainly evaluate these forecasts in terms of soundness of methodology and assumptions. It would not be cost ineffective, however, for the FAA to attempt to duplicate regional efforts, and it would certainly be cumbersome, considering the knowledge of regional trends and data which would have to be acquired. A modus operandi might be for the FAA to promote the development of regional forecasts by regional planning agencies and confine itself to national forecasting to the extent possible.

Better Required Data is Required

It is generally recognized that the tools of the forecasting trade have become increasingly sophisticated. The combined techniques of econometrics and computer technology have greatly expanded the science of forecasting. However, the development of relevant, accurate data has not kept pace. Regional economic data are sparce. There is no current, on-going data on the characteristics of air travelers and their trips. A national periodic inflight survey should be instituted to provide such needed data as trip purpose, reasons for choosing air travel, type of ticket used, group size, and ground access modes, including the use of parking lots, rental cars, and public transportation. Sample sizes should be sufficiently large so as to provide hubs with information vital for planning and forecasting. The Port Authority will be collecting this type of information under FAA-sponsored master planning grants in 1978, and we would strongly urge the FAA to support similar efforts on a nationwide and periodic basis.

In summary, we strongly endorse the FAA's present effort to provide a mechanism for forecast review and discussion. We suggest that communication take place on hub forecasts before they are formulated by the FAA, and that new support be mustered for improving regional data, particularly on the characteristics of air travelers and their trips. Forecasting may become even more difficult in the years ahead if we are, indeed, about to enter a new era of less regulation. The problems can only be resolved by more study, better data, and open discussion among all those who are responsible for looking into the "crystal ball."

Merrill Goodwyn
Texas Aeronautics Commission

Mr. Goodwyn expresses a desire for a national clearinghouse at the FAA for aviation forecasts that are generated by local, state, and regional planners. He cites the need for greater geographic and sector specificity, especially in the areas of low-fare commuter and intrastate service. He appeals strongly for multi-year programming in aviation similar in concept to the Interstate Highway System—with its specified goals and measurable indicators of progress.

It appears all of us today run the risk of parroting each other and agreeing or disagreeing on about the same points. I am very impressed with the forecasting initiative that the FAA has outlined today. Those of us in aviation planning at the state level have for years had to shift from industry to the FAA to our own resources when identifying national trends and the impact they have on our own state aviation activity. I am not suggesting or even hoping the FAA will become the sole source of all national aviation forecasting. I do look forward, however, to the possibility of a central clearinghouse on aviation forecasting information. And through conferences such as this one, I hope we can enhance the state-of-the-art of aviation forecasting.

The states, and especially we in Texas, need a better grasp as to how national trends and regulatory changes will affect facility needs and service patterns. We do not have the resources to develop the econometric forecasting procedures you are now using. We do, however, have the resources to adopt them into the unique set of circumstances occurring at the state level. Using these procedures, we want to develop more reliable data on which to base the short and intermediate range programming decisions that are characteristic of typical state airport development programs.

Emphasis on Short-Term Forecasting

If the more specific forecasts you have alluded to are to be useful at the state and local levels, they must be able to identify short-range or cyclical variations in long-range national trends. These variations often occur at different times and to different degrees in different parts of the country. State legislators and locally elected officials, however, do not like to be told to wait until the national program catches up with them. They want action on their funding requests when it is needed. I invite you to continue your initiative and, if possible, to increase the dialog you have initiated with state aviation planning groups.

State and Location-Specific Forecasts

Useful state or location-specific forecasts will require up-to-date state and location-specific input data. You are aware of the disagreement we in the sunbelt states have with the share of market-type forecasts coming out of the Census Bureau. By the time they are corrected to reflect actual conditions, they are no longer useful as a forecasting tool. It would be desirable to coordinate this dialog through the FAA regional and district offices. These offices play an important part in the allocation of available funds to specific airports. Consequently, their actions have a profound effect on state development programs. All levels of the FAA must understand and accept a forecasting program before that program can be useful as a planning tool and as a tool for programming airport development funds.

Recent Surprise Aviation Growth in Texas

I would be remiss if I passed this opportunity to discuss some Texas statistics in the process of identifying deficiencies in our own forecasting effort. Reform of the current regulatory process could create situations similar to ours in other parts of the country. The first example might be the introduction of low-fare, high-frequency service in the Dallas-Houston market by Southwest Airlines in 1971. By the third quarter of 1976, total O&Ds by Southwest and the two CAB carriers serving that market had increased 135%. Population growth in Dallas and Houston during that same period was only around 20–25%. In January 1975, Southwest Airlines introduced similar service to the city of Fort Worth, the central most of the three largest cities in the lower Rio Grande valley of Texas.

All three of these cities are located along a 70-mile stretch of the Texas-Mexico border,

and they are also served to some extent by two CAB carriers. As of October 1977, total daily enplanements for the three cities increased 142%. The population increase in the valley during that period was negligible, perhaps 5%. In January 1975, Rio Airways introduced high-frequency commuter service in the Waco-Dallas/Fort Worth (DFW) market. Today, total Waco enplanements in that market have increased approximately 84%. Waco's population, however, has remained stable since the late 1960s. Five commuters currently operate under the DFW Airport. Since January 1974, when DFW was opened, air taxi operations, a majority of which are commuters, have grown from 10 to 15½% of total DFW operations. As a sideline, commuter enplanements this year are expected to reach 190,000 at DFW, which is a 42% increase since 1974. DFW is now proposing to build a utility runway to separate air taxi traffic from the large jets both for safety and capacity purposes.

The Planning Implications of Unanticipated Growth

Each of these situations I have described led to hurried airport programs or unexpected changes in airport operating procedures. None were identified in our statewide or FAA forecasts. As a result, local, state, and federal resources have been diverted from other planned uses. Had we in Texas paid closer attention to similar developments that proceeded us in California, we would not have been taken by surprise. The California and Texas experiences have identified a trend that may spread to other parts of the country. The data we collected on commuter and intrastate operations can give us all a better indication as to the impact this trend could have on facilities and airport operating procedures. May I suggest then, that you place a high priority on upgrading your forecasting processes and increasing forecast specificity, particularly in the area of commuter and intrastate or low-fare type of service.

Our best forecasting efforts are of little value unless they can be used to influence the short and long-range allocation of funds for specific airport improvements. While it would be desirable to obtain additional funds for our efforts, it is mandatory that we optimize the use of available funds. Until Congress and state legislators are convinced they are getting the most for their airport dollar, it appears useless to ask for more.

Multi-Year Funding Programs

We learned many years ago in the highway program that multi-year funding programs are an essential element of systems development. Specific goals were established by Congress and by the states, and funds were appropriated toward attainment of those goals. Multi-year funding programs were established, and today we have achieved measurable success. Whenever funding was renewed or new funding appropriated, Congress and state legislatures knew how much closer they were getting toward those goals. A cornerstone for that successful program was the ability to forecast available resources and then establish an optimal program for expenditure of those resources. The 1976 amendments to the Airport and Airway Development Act introduced that concept for the first time into airport system development. Unfortunately, no specific national goals were identified, and general aviation airport sponsors still must rely on one or, at best, 2-year funding cycles.

The identification of an airport in the national plan, therefore, has become a meaningless gesture when sponsors have no idea where their projects stand on a list of national projects or national priorities. Our forecasting initiative must lead to a better use of available resources. We must determine in what manner we are going to program our resources over a period of time, and our forecasts must become specific enough to allow us to develop better programs during that period.

Grady H. Ridgeway, Jr.
Commissioner of Aviation
City of Atlanta Dept. of Aviation

Mr. Ridgeway relates that the FAA has consistently underestimated growth at Atlanta's Hartsfield and that this could hamper rationale planning and timely expansion at the airport. He attributes this to unique regional growth patterns in the Atlanta area that cannot be efficiently integrated with the broad-brushed theoretical forecasting

models used by the FAA. He recommends a localized, imperial approach to forecasting for fast-growing airports.

The Experience in Atlanta

Traffic forecasters inherently take a lot of ribbing as being crystal ball gazers. A few of you may recall when forecasting was limited to straight-line extrapolation of historical growth trends. As a result, airport facility planning was significantly handicapped, especially regarding the timing of capital improvement programs. Now with the more sophisticated methodologies, such as econometrics, regression analysis, system dynamics, and trend approaches, we can forecast aviation activity with sufficient assurance to make projections on airport facility requirements.

Despite recessionary periods in the growth of air traffic passengers, such as that experienced by most air carrier airports during 1975, we tend to inherently underestimate the growth in enplaning passengers, especially for Hartsfield in Atlanta. The forecasts have been low partly due to our seemingly unpredictable growth, and partly to the numbers of interchange passengers which increased from 69% to 72.75% in 1976. Our terminal facilities in Atlanta represent a typical case of obsolescence caused by growth far exceeding forecasts. In 1961, we first occupied our existing terminal building on the north side of the air field. This facility was designed originally to accommodate 12 million annual passengers or approximately 6 million enplaned passengers. As early as 1965, it could be readily observed that the new terminal would soon become outmoded owing to the soaring increase in passenger traffic. In 1976, approximately 13.7 million passengers were enplaned from this enlarged, but still overcrowded passenger facility, with a total of 27.3 million passengers accommodated. Despite the 1.3% decrease in air passenger traffic during the recession year, 1975, enplanements for 1976 were up 8% over 1975, and enplaned passengers from January through September 1977 were up 8.18% over the like period in 1976. This increase will probably accelerate during the year-end holiday season, and it is estimated that aggregate enplanements in 1977 will be no less than 9% over 1976.

To accommodate such seemingly unpredictable increases in passenger growth, the city of Atlanta developed plans in 1968 for a new passenger terminal complex to be located at the center of the airport between the east-west parallel runways. This complex, now under construction and scheduled for completion in late 1980, will accommodate an estimated 26 million enplanements. The addition of a fifth concourse, currently being built, will permit 29 million enplanements to be accommodated by 1987. By 2000, that number is forecast to be 50 million. Naturally, no single air carrier airport can provide for that magnitude of traffic. So hopefully, well in advance of the year 2000, Atlanta's second airport will have been developed and operating.

Atlanta's Approach to Forecasting

With that brief background, let me now turn to Atlanta's approach to forecasting aviation activities for the purpose of suggesting improvements compared with current FAA methodology. Preliminary forecasting for all activity at Hartsfield, Atlanta, is accomplished by the 9 carriers serving our airport. These preliminary forecasts are then reviewed and published by the Air Transport Association. Atlanta's consultants compare the forecast with those of FAA, the Atlanta Regional Commission, and other agencies making aviation activity forecasts. They are then submitted to the City of Atlanta, Department of Aviation, for final review and approval. The methodology employed by the airlines is known as the top-down approach. Data base control is obtained from a subjective survey of Atlanta's domestic industries.

This methodology has yielded reasonably satisfactory results for Atlanta, while FAA terminal area forecasts have been inherently low. For example, the FAA terminal forecasts for 1976 indicate that in 1987 Atlanta will enplane under 25 million per annum, while our own forecasts indicate approximately 29 million. FAA growth trends indicate a saturation point being reached in 1977 which continues through the end of 1982. The growth trend then takes an upswing through the end of 1987. While we recognize that Atlanta's growth in air passenger enplanements cannot continue to increase indefinitely, we see demand reaching at least 29 million by 1987.

It should be noted that we are talking about only domestic enplanements. Although our current percentage of international enplanements is insignificant when compared with overall anticipated volumes, there is every reason to believe that international traffic will grow rapidly as other markets are opened in Atlanta.

Conclusion

In summary, I believe that forecasting for Hartsfield, Atlanta, cannot be accomplished

through the application of a broad-brushed modeling technique. This conclusion is borne out by observing the history of our growth patterns. While we recognize it is very costly to approach each large hub on an individual basis, it can be even more costly if some generally accepted forecasting methodology is applied without exercising judgment based on experience. In other words, an imperical approach may be more appropriate in such cases as Hartsfield, Atlanta, than a purely theoretical determination.

Time does not permit me to discuss other criteria of aviation activity, such as the number of operations and air cargo. Let me note, however, that our own forecast for aircraft operations is consistently lower than the FAA's. This is an interesting phenomenon since the FAA enplanement forecast is lower than ours.

Tom Sides... Office of Management and Budget

Mr. Sides describes how OMB works with Government agencies when developing their yearly operating budgets. He emphasizes the central role of aviation forecasts in setting manpower appropriations for the FAA in the short term and in structuring R&D and system expansion programs for the longer term.

The Role of OMB

Let me share with you a story I heard recently about the 2 biggest liars in Washington. The first one is the OMB examiner who goes into the agency and says, "I've come to help you;" and the second one is the agency budget officer who says, "I'm glad you're here." In all candor, I am glad to have this opportunity to provide you with a brief perspective on the role OMB plays with respect to aviation forecasts and how these forecasts impact the Presidential budget. OMB serves as staff to the President, primarily in the areas of budgetary review, interagency legislative coordination, and presidential management initiatives.

The Budget and FAA Forecasting

As Dr. Sutton pointed out earlier this morning, the FAA is mindful of the costs resulting from forecasting errors. OMB is also mindful of such costs in that projected budgets are based in large part on projected levels of work load. In late January, this Administration will submit to Congress the FY 1979 budget which will be implemented beginning October 1, 1978. The FAA, with its almost 60,000 employees and over 2½ billion dollar budget, is an integral part of this budget. Air traffic controllers make up the largest segment of FAA employment—almost 29,000 people, and the staffing for this group is based in large part on the forecasts developed by the FAA, primarily the forecasts of aircraft operations. Forecasts also provide insight into projected staffing requirements for such areas as flight standards, systems maintenance, and research and development programs. In addition, they provide a basis for projecting expected receipts for the Airport and Airway Development Trust Fund.

For the longer term, OMB is working with the FAA on major system acquisitions such as the proposed automation, modernization, and consolidation effort for flight service stations. In the area of legislation, OMB has been working with the FAA and the Office of the Secretary of Transportation on certain provisions of regulatory reform legislation such as aircraft loan guarantees. With regard to aircraft noise legislation, OMB depends heavily upon FAA forecasts to evaluate the ability of the trust fund to finance certain provisions of that piece of legislation.

In closing, I hope the subjects I have touched on briefly this morning will lead to further questions and mutually beneficial discussions.

T. Wallace Hawkes
Greiner Environmental Sciences, Inc.

Mr. Hawkes points out the central role of aviation forecasts in fulfilling the requirements of the National Environmental Policy Act. He recounts that a court order requiring the preparation of an environmental impact statement for the most recent update of the National Airport Systems Plan has resulted in a much more intensive critique of the plan and, therefore, of the underlying forecasts of aviation activity. He stresses that environmental restrictions may well inhibit the future growth of aviation and that such factors must be incorporated into the aviation forecasting process.

Aviation Forecasts and Decisionmaking

Aviation forecasts are used in the decisionmaking process by all levels of Government in their aviation-related planning. Airport master plans, which are developed at the local level, are based on needs as determined by aviation forecasts. Air-side and land-side improvements are based solely on forecasts. In addition, there are a myriad of federal, state, and local environmental regulations which are applicable to almost every aviation improvement taken today, from new or improved airports on down to certification of aircraft. In the case of airport improvements, construction which utilizes federal financial assistance through the ADAP program or others, must go through the formal environmental impact statement process. This is required by NEPA, the National Environmental Policy Act.

Aviation Forecasts and Environmental Impact Statements

Aviation forecasts prepared by the FAA and at the local level form the sole basis for determining the environmental impacts of an aviation development action. For example, an air quality analysis would be based on the predicted number of aircraft operations and the magnitude of surface transportation activity resulting from forecast enplanements. Even more critical, as it relates to aviation forecasts, are the acoustic noise studies. These studies not only require accurate forecasts of aircraft operations, but also an accurate forecast as to fleet mix and time-of-day operation. Although forecasts of fleet mix may become somewhat less important in noise studies when FAR Part 36 requirements are met, they will still be of use because some aircraft will be quieter than others. The percentage of aircraft operations by time-of-day is particularly important because aircraft noise descriptors, such as the noise exposure forecasts (NEF) procedure or the integrated noise model, are heavily weighted for night operation since the level of annoyance goes up as the sun goes down.

The impact of surface transportation on acoustic noise is usually predicted through an established correlation between surface transportation trips and forecast enplanements. In addition, induced activity and support services, such as concessions, car rentals, caterers, and so forth, are directly related and usually correlated to forecast enplanements. Even the scale of a new runway is directly related to aviation forecast data because the length of the runway is a function of stage length. Aviation forecasts, then, are central to the decisionmaking process in regard to environmental consequences. If the aviation forecasts are wrong, the computed environmental impacts are wrong—right down the line.

Environmental Impact Statements for the NASP

Aviation forecasts are utilized from the bottom up and from the top down in the aviation industry. Consider the national airport systems plan—the NASP. The NASP is prepared by the FAA in response to the Airport and Airway Development Act, and the latest update was issued in January 1978. The NASP identifies requirements for a national system of airports for a ten-year period. Forecasts of aviation activity prepared by the FAA, Gene Mercer's office, formed the sole basis for the study that developed the 1978 NASP. As a result of a court order this past summer, Judge Sirica ordered the FAA to prepare an environmental impact statement (EIS) on the entire national airport systems plan, more than 3,000 airports in the 50 states and the various territories. This court-order has resulted in circulation of the NASP and associated EIS

through the NEPA environmental circulation process. As a result, the 1978 NASP has come under much greater scrutiny than was the case with the original NASP. This NASP EIS was circulated to more than 300 agencies throughout the federal bureaucracy, the 50 states, and the territories.

This intensive critique has resulted in great attention being placed on the forecasts of aviation activity which were used in developing the NASP and the NASP EIS. Many comments questioned whether the cause/effect relationship betwen airport development and aviation activity has been adequately determined. Let me quote one comment we received on the NASP; "we expect towards zero population growth to result in the NASP underlying demand projections being somewhat high, particularly in latter years." Other comments were almost insulting; for example, "the NASP could be a sound basis for noise control planning if confidence wasn't undermined by excessive demand forecast." As you might expect, these comments always come in without any factual data to support them, but this puts the FAA in the position of having to resupport what it has already done.

Environmental Restrictions on Aviation Growth

Let me tell you about another situation where forecasting aviation activity is presenting some unique problems. That situation is right here in the Washington metropolitan area. The increased aviation activity and associated increase in noise levels around Washington National Airport have resulted in another civil lawsuit being brought against FAA by residents in the noise influence areas. The courts ruled against FAA in this litigation, and ordered the FAA to prepare an environmental statement on existing operations at both National and Dulles airports.

This is a precedent-setting court order. The FAA has realized for some time that future activity at Washington National Airport could not be accommodated. In an attempt to deal with the problem, the FAA is studying a series of policy options. Currently, 32 different options are being evaluated. The operational controls being considered include hourly quotas, nightly curfews, and equipment restrictions. The implications of these policy options have significant impact on the aviation activity at 2 other airports in the area, Dulles International and Baltimore-Washington International. The environmental consequences of diverting air traffic to Dulles and Baltimore-Washington as a result of quotas and curfews at National are being examined in detail. When decisions are made here or at similar locations that forecast aviation activity cannot be accommodated, the whole process of aviation forecasting becomes a new ballgame, one in which the effects of capacity restraints must be reanalyzed. In cases such as this, the decisionmaking process becomes more one of biting the bullet.

Comments and Questions by Audience Participants

....Gil Quimby—NARCO Avionics....

How do you define an air taxi operation? and how to you back fit this distinction into the collective data of prior years where you called everything an air taxi?

Response—Gene Mercer, FAA

FAA air traffic controllers record an air taxi operation as any commuter operator or nonscheduled air taxi operator who utilizes a TANGO code. We recognize not all air taxi operators utilize the TANGO code, and therefore, the count in the historical time series is not accurate. That is why we have utilized commuter operations as reported on form 298 to the CAB as the basic input data to our forecast model.

....Duane Freer—FAA....

I would like your assessment as to the impact of the new rail facility in the northeast. How has it affected traffic in New York? Secondly, referring to the matter of applying national forecasts to the regional or local level and the fact that it is not tracking well in New York, please tell us how we might bridge the gap between national forecasts and your forecasts as opposed to Merrill's suggestion that the national role ought to be limited to a clearing house of some sort. How would you differentiate between the two as applied to New York?

Response—George Howard, PONYA

I do not think the two ideas are that inconsistent. I suggest the FAA should look critically at the forecasts which are developed for the regional systems plans. There is considerable expertise in local planning, not just at the airports themselves, but in the designated planning authorities such as Tri-State in New York. The FAA should borrow on that expertise as a major input for its hub forecasts. The FAA expertise is most valuable in

appraising critically those forecasts that are made regionally, looking at them in terms of the national forecasts. I do not think these concepts are contradictory, the idea of a clearing house and the notion of regional experts making local forecasts.

On the question about the northeast corridor rail, the federal rail people have estimated approximately a 3% diversion from air travel for the 150-mph rail system. Our own Tri-State regional planning commission sees a 2–10 percent diversion to rail for the 1985 period. There has been some apparent diversion to rail, but these are hard figures to look at. Total rail travel in the corridor has been increasing, but it is not necessarily the metroliner rail—it seems to be the total flow. Of course, we have had sharp increases in air shuttle fares which may have something to do with it. But if the federal rail people are only looking for a 3 percent diversion, we do not feel very concerned.

Response—T. Wallace Hawkes, Greiner Corporation

George, I have those exact figures. The Federal Rail Administration in their northeast corridor studies and the FAA in the NAFS studies have determined that when the full thrust of the $1.6 billion northeast rail improvements are completed, trip-ins by air in the northeast corridor will be reduced by 17%. When you convert this to total enplanements at the northeast corridor airports, it results in a reduction of 1.4% in Boston, 1.1% in New York, and 1.6% in Washington. That is the total effect.

....Don Goldman—System Development Corporation....

From the FAA initiative, it seems there is a great deal of emphasis on disaggregation. What these gentlemen seem to suggest this morning is a more localized approach. Are they suggesting then a better approach to forecasting activity would be through an aggregation technique rather than a disaggregation technique?

Response—Merrill Goodwyn, Texas Aeronautics Commission

I have a little trouble with the notion that all forecasting technologies and methodologies must agree, yet I realize we cannot go with 2 different sets of forecasts, one to lower the environmental impact and another, say, to acquire ADAP funds more quickly. But at the same time, we cannot afford to be too pessimistic, particularly in a growth state like ours. At some point in time, we have to agree to disagree and that seems to be our position in Texas. We want to work with you. We want to develop better forecasting techniques at our level and integrate them into national forecasts. But you must accept that we cannot always accept some share of the national pie you are able to hand us, based on the information you have at the national level.

Response—Grover Jones, Florida

I mentioned that Tampa is one of the seven or eight grandfather cities that have nonstop service to Washington National and are farther out than 650 miles. Some of the policy options now being considered at Washington National would eliminate these grandfather cities. If that happens, Mr. Ridgeway, 73% would easily go to 80% because all these trips would then come through Atlanta. That shows you the effect of national implications at the local level which might not necessarily be picked up at the local level without a review from a national perspective.

Response—Dave Bluestone, TRB

Originally, we tried building aggregate forecasts from local estimates. The problem was that the sum of individual carrier forecasts was equal to about 140% of the aggregate; that is, when you add them all together, they are just too big. On the other hand, the problem with top-down forecasts is you do not get all the individual variations. I am not saying you can not get there from here, but it is very complicated.

....Frank Spencer—Northwestern University....

Mr Sides, tell me the position of the Office of Management and Budget concerning the Aircraft and Airport Noise Abatement Bill and possible cross subsidy from the Airway Trust Fund. Are we talking about putting some money in and then dividing it out? What are the budget implications? And what methodology do you use to ascertain how much would be generated in that fund?

Response—Tom Sides, OMB

The primary impact on the budget is title III of the bill which sets aside a 2% environmental surcharge for carriers that choose to re-engine, retrofit, or replace their aircraft. This will take anywhere from $300 to $325

million per year from the receipt side of the trust fund. In addition, title I would initiate a land acquisition program costing approximately $400 million during the first 2 years. This program would acquire noise-impacted land in airport areas. Title II would raise substantially funding levels for the airport grants program and the R&D program. At this point in time, the Administration supports only title III of the bill as it now stands.

As to how we compute how much the environmental surcharge will generate: OMB relies on the calculations and computations of the FAA and the Office of the Secretary. Current projections show that a 1% ticket tax produces in the neighborhood of $150 million dollars annually.

....Grover Jones—Florida....

Mr. Sides, would you elaborate on the overall legislative responsibilities of your office.

Response—Tom Sides, OMB

I presume you are concerned primarily with transportation legislation. The spokesmen for the Administration in the area of aviation are the Secretary of Transportation and the Federal Aviation Administrator. The responsibilities of OMB are to coordinate interagency development of transportation legislation. There are very few bills that do not impact agencies of the Government other than the Department of Transportation in some direct or indirect way. For example, great interest is expressed by the State Department in the Buy-America clauses in the Aircraft Noise Bill. There is also interest from the Department of Labor and the Environmental Protection Agency in many provisions of this legislative proposal. Our involvement is that of an honest broker, if you will, trying to make sure the views of agencies are given adequate attention in the Administration position on a given piece of legislation.

....Tom Messier, FAA....

Given that there may be differences in the forecasts by the FAA and those found in state and local master or system plans, what processes do we use when making funding allocation decisions? What processes do we use to resolve those differences and arrive at a mutually agreeable position?

Response—Merrill Goodwyn, Texas Aeronautics Commission

I do not know that you should necessarily base funding solely on forecasts. Forecasts should be one tool used to determine funding levels. Unfortunately, you do not have an overall direction to start with. We do not know exactly what the national air transportation goal is—that is an issue discussed very often. Once you have established that goal, you can establish a mechanism for making appropriations. The forecast would simply identify where you are in time toward achieving your goal or where you might be if you fund at a certain level. You must have an overall process—goals, appropriations, allocations for the aviation system. You also need to develop a multi-year program. We cannot work at our level on a single-year programming approach. Grover Jones has done a great deal of work in that area. Well, my point is that forecasts are simply not the only tool for making appropriations.

....Charlotte Chamberlin, Transportation Systems Center....

The presentation on what is being done in forecasting, and especially in regional disaggregation, is very impressive. I would like to ask the entire panel what needs it sees in terms of O&D forecasting? What needs do you see in terms of forecasting aviation in a general, multi-modal context? The presentation today seems to look at aviation by itself, not in context of what other modes are doing. The question about the northeast corridor is particularly relevant here.

Response—George Howard, PONYA

The system planning work we have just completed looked at the possibility of improved rail service. Although there are alternate assumptions with regard to the 3% figure for diversion from the airports, it is not a figure we can necessarily argue with. We have looked at the methodology, and it looks ok. But in terms of intercity travel, most is by air or the automobile. And most econometric forecasting models explicitly or implicitly take into account the cost of automobile travel.

As far as O&D is concerned, this is much more important to the air carriers, the city-by-city analyses, and the system users. However, in the New York area, we do attempt to forecast overseas and domestic separately owing to the different service and facility needs. When it comes down to individual O&Ds, the hubs do not have much of a requirement. We did find that average fares out of a particular hub can make a difference in the forecasts of total travel. We also found this true for the air shuttle market. As those fares began to go up, we believe stagnation

followed. But generally, I think the systems users are much more interested in specific O&Ds that we are.

Response—Grady Ridgeway, City of Atlanta, Dept. of Aviation

In Atlanta, we went through an extensive session with our consultants before we embarked on our present expansion program. We conducted surveys for all the cities that feed into or from Atlanta. Much to our chagrin, we determined that even the air carriers, much less our own planners, did not have a good feeling for what was occurring in the Sunbelt area. This caused us to back up and take another look at our Southern Region. They helped us reach some decisions that we think are sound. Because location and cost do have an impact on any major hub, it is very important we look closely at all the possible modes of transportation that could affect not only our present location, but some of the properties we have acquired at two other locations should we need a second or third airport for our region.

Response—T.Wallace Hawkes, Greiner Environmental Sciences, Inc.

Ms. Chamberlin seemed concerned that multi-modal distribution is not adequately considered in aviation forecasting. In our studies on the NASP, we created hypothetical alternatives for which we did not necessarily have good forecast data in order to satisfy the NEPA requirements for looking at alternatives. We found that even with a $1.6 billion investment in the northeast corridor rail program, the effect on enplanements at major airports in the northeast corridor ranged from 1 to 1½%. This is a reduction that could be anticipated. Even Gene Mercer would not claim his forecasts are accurate to 1%. So in essence, we found the effects to be negligible.

Further, the recent 55-mph speed limit for the bus and auto put both at an additional speed disadvantage when compared with air transportation. Moreover, the cost of fuel is a higher percentage of the total operating cost for a passenger car than for an airplane. So the cost of fuel goes up, the mile-cost for cars will go at a far more rapid rate than the seat-mile cost for an aircraft. The latest figures we have (1974) show the energy cost for each rail passenger was 3,931 btu's per passenger mile. It was 7,623 btu's per passenger mile for the airlines, almost double. But that was with a 57% load factor. If we look into the future a little bit, we foresee narrow-body jets on a flight of under 500 miles and at capacity consuming 4,500 btu's per passenger mile. In addition, we foresee 2,700 btu's per passenger mile for wide-bodied jets traveling over 1,000 miles, actually bettering the energy cost of rail transportation, and this excludes the far greater cost of building energy-intensive rail systems. The FAA projects that new aircraft engines will have 20–25% improvement in fuel economy in the early 1980s. The A-300 airbus already employs this technology for fuel economy. So the indications are that surface fixed-rail transportation will barely be competitive with air transportation in energy consumption by the mid-1980s.

Response—B. Hannan, FAA

A basic assumption made in the FAA's recent forecast was that the number of passengers would rise less than total passenger miles because the distance traveled would increase over time. But all those increases that Merrill talked about down in Texas were basically in short-haul markets, and virtually all of it was out of the automobile sector. If you talk to Lemar Muse of Southwest Airlines, you find his opinion of elasticity in the short-haul market relative to price is on the order of 20 to 1, as opposed to the 0.7 that the CAB tends to use. So, I am not sure the real impact of price in the short-haul market is really reflected here, particularly when proposed regulatory reform would encourage price competition.

....Ed Margle, National Transportation Policy Study Commission....

Mr Mercer, you mentioned that you had plans to better incorporate multi-modal operations in your forecasting. There is a requirement to look at the effect on demand from the northeast corridor, in terms of physical requirements, up to 1990 and beyond. In addition, energy is becoming a tremendous driving force. What are your plans for multi-modal splits?

Response—Gene Mercer, FAA

We do place the impact of other transportation modes into our aviation forecasts, but we have not zeroed in on the potential impact of new rail service or the development of other transportation modes in short-haul markets. We are trying to zero in on such issues as the potential diversion out of the automobile and into air transportation, particularly into short-haul [illegible]tation as the commuter industry grows. We a[illegible] only interested in multi-modal splits, but also in the split between the air carrier industry, the commuter industry, and general aviation.

Luncheon Address

Mr. Langhorne Bond...
Administrator of the FAA

Mr. Bond points out the critical need for great precision in aviation forecasting owing to the tremendous investment required to keep pace with the demand for new aircraft and facilities. He appeals for continued close Government/industry cooperation in this effort to improve the decisionmaking utility of FAA forecasts. He stresses that special emphasis will be placed on forecasting for general aviation and commuter services, two areas that will dominate national aviation investment over the coming years.

The Need for Accurate Forecasts

Years ago, aviation was run intuitively. A lot of those guesses were right, and I expect helpful in a business that was growing like a weed. But there is obviously a need today for greater precision and scientific forecasting in our business. We have come a long way from the barn-storming pilot tradition and the by-guess and by-God notion of going forward. Of course, intuition does remain a valuable business asset, but when research and development costs run into billion of dollars, and when the competition comes from both private and Government investment funds. the importance of being right is very critical. Those of you who are beholden to stockholders and investment houses have a certain feeling of hot breath on your neck as you try to make those investments. That is the equivalent to you as the President is to me. Better to be right as much of the time as you can.

So we are trying to put together our aviation forecasts, not as academic exercises or simply for the purpose of data gathering data and mastacating, but rather as a decisionmaking tool—a tool that can tell us what to do in the years ahead. For us, it is an investment decision to see what is going to happen. Forecasts guide the FAA in capital investment and resource allocations, and equally important, they guide other Federal agencies that are in this business as well.

I said on the Hill not long ago for Congressman John Burton, that it is no longer possible for us in aviation, given the interdependency of our system, to do just one thing. That phrase was used in the economic planning and the fiscal management context, but it is true both in nature and economics—you can never do just one thing. The work we do in this conference and the data we generate is quite useful in many corners of the American economy, not only to us in the aviation business.

Long-range forecasting has become an essential ingredient in the management of technology-intensive industries. As all of you realize, the development of technology in the aviation business requires very long lead times, astonishingly so. Ten to 15 years from conception to on-line status is a typical figure, not an exception.

Industry/Government

So, I am personally very happy to see all of you because I know you will take home what we decide here and put it to work, or you will disagree with it. But in any case, the frontiers of knowledge will surely have been expanded. If our projections are to be meaningful, we have to share the work with you. That is the purpose of this conference. We must be sure we both understand what the true data points are. For in the final analysis, your concerns, most of you being from the private sector, are our concerns. If we are going to succeed in this business, and I am confident we will, we must do it together—from a common base. So, we need your help. And I know that your presence here endorses that thesis.

Duane Freer tells me the sessions so far have been very vigorous and forthright. It seems to be that is typical whenever the FAA is involved with members of this independent and strong-minded aviation community. So, I am heartened, especially when it is Duane, not me out there on the firing line.

I know that bureaucracies do not always work in real time and with the real world. We

are trying to close the gap with this FAA effort, and I am glad our own bureaucracy is trying to cooperate and share understandings with you.

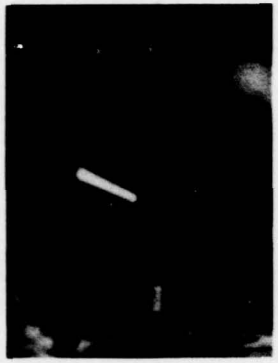
I trust that your comment on FAA forecasting scenarios will continue this afternoon with the same vigor and candor, while I scuddle back to my tenth floor office. Especially important are your comments as to the significance of what we produce, as it plugs into real-world decisionmaking at which you are far more expert than we. It is one thing to produce data and forecasts and information, but it is not always relevant. What we need to do is throw out what is of no consequence and produce what is really significant. I hope you will tell us what that is.

Emphasis on General Aviation and Commuters

I am especially interested in what we produce for planning the growth and diversification of general aviation and commuter services. They are significant, and they are the fastest growing corner of our business today. They present special concerns in the provision of rational and equitable service away from the major airports. We are convinced that growth in these areas will dominate much of the national investment in aviation over the coming years. Everything I have seen, and all my travels confirm that it is essential for us to put our bucks in the right place. So, Ladies and Gentlemen, your comments on our forecasting and data gathering techniques are very important to us all. I hope you will continue to be as candid and helpful as you have. When we are through here, write and tell us how we can improve.

The expansion of the frontiers of knowledge is a process without an end; it is evolutionary and dynamic; and it is only through meetings of this kind that we can go forward together.

PANEL SESSION II:
Forecasts for System Users Decision-Making



John Winant... President of the National Business Aircraft Association

While reiterating the general aviation industry's need for accurate forecasts of future aviation activity, Mr. Winant expresses a warning that without proper supervision forecasting tools might be used to rationalize or structure Government manipulation of the industry. He questions whether increased fuel costs will cause a significant decline in the growth rate of general aviation beginning in the middle 1980s, as predicted by the FAA. He suggests more intensive research into future manpower requirements to include not only pilot requirements, but also mechanics, technicians and backup personnel.

I hope to address aviation on a broader base than simply as a representative of business aviation. There are indeed many mansions in that very diverse community we call general aviation. There are many fragilities which we witness from time to time in response to varying kinds of stimuli, both good and bad, and there are many strengths which reflect the economic system of this country as a whole.

General Aviation and Forecasting

The primary thing that general aviation has difficulty in coming to grips with is uncertainty. We seem able to react in a forthright and positive manner to virtually everything else. On the subject of forecasting, what we have in our community can pretty accurately be described as a love/hate relationship. On the one hand, we most certainly endorse the efforts FAA has undertaken. We are totally supportive of the FAA attempt to construct a more accurate basis for looking at the future.

Large segments of the general aviation community depend on the FAA forecast document as a means for planning the development and marketing of equipment which users—business aviation, recreational aviation, aircraft owners, personal aircraft owners—will buy in future years. In my particular segment of the community, long lead-time is needed for making a sound purchase decision on the next aircraft or additional aircraft best suited to the required mission. So, on the one hand, we do need a re sonably accurate forecast document that gives us the great big road map we need, and has on it the theoretical interstate systems we may be traveling. We feel the FAA forecasts provide the interstate systems on this road map of the future. The secondary roads, the ones we really travel to get where we are going, are not on that particular map and perhaps never can be there.

A Fear of Manipulation

On the other hand, even as much as we require forecasting, we fear it. Very candidly, large segments of our community believe that if forecasting tools become too sophisticated, they could well be used for manipulative purposes. At some point in the future, if the worst-case situation arose, Government policy-makers could use these very forecasting tools as a means for dampening, constraining, perhaps even deeply curtailing general aviation activity. The question could be asked, "what would it take to dampen general aviation activity "x" percent, which we the policy-makers feel would be a healthy thing in terms of socioeconomic conditions?" So, we love you, we hate you, FAA forecasts, and both at the same time.

Some comments on the current forecast document, which is most readable. I would like to make clear note of that: it is the most readable thing I have yet seen coming out in the forecast area. It is very well put together. You can get to the meat very quickly, and you can extract the sense of what it is trying to tell you.

The General Aviation Growth Prediction—A Caveat

It would appear that general aviation will continue to grow at a healthy rate throughout the forecast period. A rate tempered from that of the recent past, but still at about a 5.6% average per year from now until 1989. We should note that in the later years, however, the growth rate is projected to decrease, from the 5.6% average for 10 years to something nearer a 4.2% per year growth in the later years. That may be a very accurate forecast. I have no grounds for contesting it, but I am going to raise some questions concerning it.

The principle reason I can derive from the

forecast document, as to why the growth rate is predicted to diminish through 1989, seems to involve estimates that as we go through the next decade, the ever-rising cost of fuel will have a dampening effect on the growth rate that exists now. I am not sure this is a correct assumption. The predication is based on a 7% compounded increase in the price of fuel per year. I am not sure this would prove to be a negative deterrent, and I think certain other considerations should be counter-weighed against the 7% fuel cost assumption.

First, if there is to be an equivalent rate of inflation in the entire economy, then the dampening effect on fuel costs alone would not be of great significance. If, however, there is a 7% increase in fuel costs per year for general aviation, and the overall inflation number turns out much lower than the figure used in the forecast, then indeed, there could be a significant dampening effect.

We should anticipate improvements in engine design with respect to fuel efficiency, design improvements that will come into maximum play early in the 1980s. The use of super-critical design factors, better fuel management, and better avionics are just a few factors that would tend to countervail any significant deterrent caused by a 7% per year increase in fuel cost.

Additionally, forecasters must take into full account regional patterns of general aviation development. The rate of growth in three vast regions of the United States—the entire sunbelt from ocean to ocean, the midwest west of the Mississippi, and the mountain states—will have a much higher growth rate than other areas. The national average will not be applicable to these areas. I predicate these comments on weather, on distance between communities, and on the prospective continuation of the 55-mph limitation on auto travel.

I also think there are detrimental factors requiring close examination. The principle one involves the environment. If existing DOT airport/aircraft noise abatement policies are carried out, and if in fact, 5 years from now the Federal Government will still be handing over to localities untrammeled authority to enact restrictions deterring aviation activity, then there could be severe dampening which may or may not have been factored into the model at this point.

Another factor having potential to heavily impact general aviation growth involves federal tax policies. There may be changes in the tax code, in the name of tax reform, which could impose user fees, licensing and examination fees, and medical fees on individual airmen in the very near future.

Manpower Forecasts

There is need for qualitative forecasting by the FAA on future levels of manpower in terms not only of the number of certificated pilots, which is part of the current forecast, but also the number of mechanics, technicians, and other back-up persons that will be needed in the 1980s. Right now, my organization is looking at the whole future manpower situation. On an initial basis, we come up with rather dicouraging conclusions. There will indeed be major retirements of air carrier pilots into the 1980s, with the obvious consequent need for replacement, particularly among persons then in their late 20s. Secondly, the cost of instruction is escalating rapidly, not only for pilots, but for mechanics and technicians. As these costs escalate and since other fees may be imposed on top of them, there may well be a constraint on the number of persons entering instruction and on the number graduating from it.

I think the impending study of aviation service organizations will help in this kind of manpower assessment. I strongly recommend that the FAA carefully monitor manpower adequacy for the period through 1990.

Changes in General Aviation Equipment

Another element is the forecast for a fairly significant change in the equipment to be found in the general aviation fleet, with a growing percentage becoming twin-piston, turbo-prop and turbo-jet. This change in mix will have a substantial impact on elements of the national aviation system. I would assume these impacts would come with some force from 1982 on.

Final Remarks

Finally, a hard look at the airport facilities question is needed. Reliever airports, joint-use airports, heliports, and airport facilities require closer examination, particularly those airports commonly referred to as high-density. A very searching look is needed into the impact of regulatory reform on the growth rate for general aviation.

Ken Whitehead... United Airlines, Director of Facilities and Airport Planning

Mr. Whitehead discusses the experience of his department in airport planning at the major hubs over the last 10 years. He stresses the need for forecasts of daily and peak hour activity 20 years in the future. He points out that such data is lacking for general aviation and commuter aviation, two sectors that account for 35% to 55% of annual movements at 13 of the 25 busiest air carrier airports. As a result, some airport master plans tend to be overly vague and generalized. He recommends improved reporting of general aviation operations at large hubs, at least for some representative days during the peak month.

Airport Master Planning

Today I will not present airline industry views on the wide range of forecasts used in airline decisionmaking, on aircraft purchases, airborne equipment needs, scheduling strategies, or new markets. Most airlines prepare their own forecasts for these purposes, although FAA forecasts are used to check system activity trends. Instead, my remarks relate to forecasts for master planning airports at the 24 large hubs, and the need for better information on aircraft movements of commuter airlines and general aviation at those hubs. The lack of such information frustrates efforts by many airport operators, consultants, and airline planners whose objectives include cost-effective and convenient solutions for accommodating future aviation growth.

My comments reflect our department's experience with studies at many of the 91 airports served by United, and with the industry forecasts which airlines have developed for master planning in the past few years. One reminder . . . most aviation forecasts are prepared for specific purposes and should not be used for others. As an example, the FAA Terminal Area Forecasts are not designed for master planning, even though they can be used as checks for annual passengers and movements on which the more detailed forecasts are based.

Data Requirements

Different levels of detail are required for three types of airport planning. In system planning for state or regional studies, annual passengers and movements appear to satisfy the consultants and agencies involved. Airport master planning requires annual volumes plus detail on daily and peak hour activity out 20 years into the future. Such detail is available for scheduled air carrier operations in special forecasts for airport planning prepared under the auspices of the Air Transport Association (ATA). Daily and peak hour data are developed using the average day of peak month as a baseline to correlate local and system trends in future aircraft size, boarding load factors, additional flight frequencies, and some peak spreading. These parameters provide a system rationale for hypothesizing activity for future years, a rationale which is lacking in other forecasting approaches which use the 37th busiest day or some other local guideline. Project planning, especially for terminals, requires even more detail and user input on short-term needs (3–10 years).

Master Planning Airports

But today's discussion focuses on the most critical aspect of master planning airports that serve large hubs; that is, assessing the potential for future traffic growth, particularly in terms of aircraft movements and airfield/runway capabilities. Comparing forecasts in a recent master planning study, one city's consultant concluded that airfield/runway capacity could not accommodate growth beyond 1990–95. Air carrier passenger enplanements forecasted by the consultant for 1992 were comparable to the ATA forecast for 1995 . . . a difference of only 3 years. However, the real indicator of airfield activity is peak hour movements. This shows a 10-year difference between the two forecasts in the 1990–95 period, extending the airport's potential for normal growth beyond the year 2000. Obviously, annual passengers are a poor measurement of growth potential.

A typical ATA forecast of peak hour activity includes peak hour movements for each aircraft seating group, including actual data for a base year and forecasts out 20 years. It reflects airline industry projections of fleet mix changes. Such forecasts also show available seats and average seats/move-

ment which correlate aircraft size and load factor with passenger volumes. This peak hour data permits better analysis of traffic growth potential than do those depending entirely upon annual movements.

In recent analyses for one large airport, the peak hour movements forecasted for 1995–2000 implied high levels of delay, averaging more than 6 to 8 minutes per arrival. This was based on air carrier peak hour movements as forecasted by ATA, and the assumption that peak hour movements of commuter airlines and general aviation represented about 40% of total activity (based on annual operations). This assumption was made since insufficient hourly data existed and no hourly forecasts were available. Lacking specifics on the types of activity covered by the 40% approximation for nonairline activity, some persons interpreted the end result as requiring a new air carrier airport to replace or supplement the existing facility. Others recognized that the need for additional capacity might be satisfied by certain other types of airport/facilities, at lower cost and offering better convenience to users. However, any conclusions or recommendations remained vague in the absence of specifics on 40% of the peak hour movements. Similar uncertainties exist at 13 of the top 25 airports, where commuters and general aviation together represent 35% to 55% of annual aircraft movements. The 40% "general aviation and other," which includes commuter airlines, could have future peak hour movements approximated on the basis of the FAA "Profiles of Air Carrier Operations and Passengers" (issued annually) and the "Forecasts of Commuter Airline Activity--July 1977." However, those same documents could be used by the FAA to help develop forecasts with detail comparable to those issued by ATA.

At many large hubs, general aviation is the largest part of the 40% nonairline activity, and includes 5 or 6 categories with different needs. However, existing records do not provide the time of day needed to plan a convenient and cost-effective system of airports. Not all users want or need to operate from air carrier airports. In one city, I was told that one convenient general aviation airport lacked the runway instrumentation needed for high performance business jets.

Conclusion

The lack of hourly movement profile data on these nonairline categories often results in generalizations and vague proposals. Since forecasting general aviation seems to involve more variables than scheduled operations, the minimum step forward would be to improve reporting and recording operations at large hubs for some representative days during the peak month. Such reporting may require some changes in communication between pilot and tower, to help identify major categories of aircraft and users.

I believe all user needs would get better consideration and the money spent on master planning for large hubs would be more productive, if the FAA would (1) assist the development of commuter forecasts for all airports serving large hubs, with aircraft movement detail comparable to the ATA forecasts, and (2) if the FAA would upgrade the data base on general aviation movements at air carrier airports serving large hubs by recording time-of-day profiles of operations for some representative days during the peak month, as part of the FAA Study, "GA Traffic Mix at High Density Airports".

Boone Barker...
Director
of Marketing for
the Boeing Company

Mr. Barker first outlines the nature of forecasts required by aircraft manufacturers. He points out the inability to accurately quantify fleet mix, aircraft retirements, and needed aircraft range are soft points that inhibit the accuracy of current forecasts. He expresses a fear of the relative unanimity of current forecasts and makes a plea for greater research into plausible alternative economic growth patterns. Mr. Barker then presents the Boeing forecast for industry-wide equipment requirements.

Forecasting Needs of Aircraft Manufacturers

From the manufacturer's standpoint, decision-makers need and use forecasts to answer specific questions: what products, what models and what airplanes are best going to suit the market? How many airplanes, products, and models are forecast to be built?

The test of such forecasts is two fold. First of all, are the forecasts reasonable? Secondly,

and probably more important, how could we be surprised when things do not turn out as the baseline forecasts say? Today, as I talk about how we do our product forecasting, I would like to look at some results, not necessarily to explain the results, but to illustrate some problem areas that might be interesting. I want to point out the weaknesses in this kind of forecasting, the things we have trouble with. That is a way of explaining our needs for better forecasting methods, the theme of this conference.

Approach

Generally, we start with an economic forecast, translate it into a revenue passenger mile forecast, put together an airplane market forecast for various market studies, and then go through a feedback loop to check airline ability to buy. We currently use an economic forecast which we generate ourselves and compare for reasonableness with those by other people. This year, our forecast is about like everyone else's with one exception, and that is Chase.

Our revenue passenger mile forecast is broken down by various types of carriers in various parts of the world. Again, our total traffic forecast for those segments is in close agreement with everybody else's, including the FAA's. This is comforting in a sense. People like to stand up and say, "well, our forecasts are about like everybody else's." But this is dangerous because 10 years ago we were all wrong. The question that arises is: "Are we wrong again?"

Our detailed methodology contains a load factor forecast and an ASM forecast just like the microforecasting of the FAA. We use an airplane mile—RAM stands for revenue airplane mile—forecast to get to the frequency issue and the average airplane size issue. Probably a main weakness in our forecasts is the inability to accurately forecast frequencies. There is not a lot of data, and it takes detailed studies. It impacts the mix of movements at airports as substantially as it impacts the kind of new airplane purchases we forecast. And it has not been well studied. You can call it frequency; you can call it average seat size; you can call it airplane miles.

Similarly, range capability criteria is used to forecast the range categories which these specific airlines will require. Again, it sounds simple, but airlines have always operated airplanes at their maximum range capability for a small percentage of the time. For example, DC-10s are transcontinental range aircraft, but the great majority are operated at less than transcontinental range. So, the required range for equipment is a weak point in the forecasts.

Basically, we use some descriptions of what airlines have, what they are projected to retire, and what work rates, seating densities, and utilization will be available. We put this information together with available seat miles, airplane mile requirements, and range capability to develop a forecast of requirements. From that come airplane delivery forecasts and fleet mixes.

Retirements is another difficult area. Jet transport retirements do not give us a solid historical basis upon which to forecast future retirements. Jet transports probably do not have an age at which they simply cannot be flown safely. They do not run out of air worthiness. They do run out of economic life, but a fully depreciated airplane is a pretty good deal in some cases. So, our retirement philosophy is also a soft point in this forecast, and we would surely welcome better insight into that.

We forecast a world traffic level of 925 billion passengers by 1987. We have assumed retirement at roughly book life (16 to 18 years) with an average world load factor, including charters, that approaches 64%.

Assumptions

There are some other important but often unstated assumptions. We assume that airport and aerospace capacity will be available. We assume fuel will be available. We assume there will be no revolutionary changes in air transportation. We assume airlines earnings will be reasonable, and that is a tough assumption to stand up to. We assume that our specific frequency and range forecasts are correct.

On traffic level, I emphasize again, we are pretty much in agreement with everybody, and we ought to worry about that agreement. We need some alternates that are not just plus or minus five percent. We need alternates that would create major changes, and we need some insight into the probability of those alternates.

There is an FAA document that projects alternative aviation futures to the year 2000. It defines pretty well some possible scenarios. The document authors are careful to state that they have not assigned any probabilities to the scenarios. The scenarios go fairly far out, and they are rather broad. That is a pretty good start, but we also need to look at possible surprises in the short term and medium term. It is those fluctuations that are going to give us trouble.

Current Boeing Forecast

That which goes into an open lift forecast

looks like this. Available seat miles come from RPMs at the assumed load factor. You subtract lift from airplanes now in the fleet or on order. You knock off retirements, add on the growth market, and that is the forecast. The total market comes to $71 billion for domestic passenger airplanes, in constant 1977 dollars. And you can add on about $3 billion for freighters.

The bottom line for our management is how many of each of our current and possible future products should we expect to sell? That product forecast is an important part of the program decision process.

The short range airplane market amounts to about a third of our forecast, mostly for airlines outside the United States. The medium-range airplane market is a larger proportion, mostly with airlines inside the United States. The long-range airplane market is also a fairly large dollar number, mostly to national airlines outside the United States. These forecasts are based on specific assumptions about products in each market area.

There is a big peak in annual dollar deliveries in 1985 that results from several things. The most important is the retirement assumption which takes out of the active air carrier fleets a lot of airplanes bought in the 1960s. I think the retirement assumption is reasonable, if for no other reason than the economic and environmental obsolence of those earlier airplanes.

But, can the manufacturer handle that peak? And more important, can the airlines handle that volume of new equipment?

I note the non-U.S. airlines are assuming a large proportion of the world's market, at least in our view. Part of that is due to maturity. There is a slowing down of domestic growth in general because the U.S. system tends to be a little more mature.

The test of such a forecast, as I said, is its reasonableness. Are those results reasonable, and how might we be surprised? For example, the up and down fluctuations between 1978 and 1982 are probably within the forecasting uncertainty noise level. Our chart drawn a year ago looked quite different in that area. We were surprised by the strength of the airplane market in 1977. My forecast made a year ago for orders in 1977 was off a lot, so our ability to forecast short term variations, frankly, is not very good. We need to work on that.

I think the same thing is true for other kinds of forecastings. One perspective on the airline earnings situation and ability to buy looks like this. The percentage of operating revenue which will be going to equipment in the mid-1980s is a lot less than it was in the late 1960s. The early 1970s were troublesome years. Airline management made some commitments that I believe were proper, considering all the projections of good growth and good earnings. Nobody had forecast the worst recession since the 1930s. Before the oil embargo quadrupled fuel prices, somebody smart could have said: "this might happen and are we willing to live with the consequences?" Under those circumstances, perhaps airline decisions might have been a little different. So it is important for all of us to look at possible alternatives and at the uncertainties of forecasts.

The paradox is that forecasters must sound positive. Or as my bosses would say, "I don't want to know what you think might happen, I want to know what will happen." That is a problem for which I do not have a solution.

However, the decision-makers are in fact able to make decisions on the basis of risks. This is a risk-taking business, and it is something they are used to. So quantifying what might happen in terms of risk is an approach that can work. There is one thing for sure about a forecast that goes into enough detail to be useful: that forecast is going to be wrong. In some way or another and in some details, it is just going to be wrong. It is important that we spell out alternates, not just plus or minus five percent. The surprise is the unknown unknowns, particularly in the short and medium term, not just the very long term, not the year 2000. Frankly, what happens in the year 2000 is of virtually academic interest at this stage. We really need some new method to handle what is going to happen next year and in the next five years. We also need some techniques to handle the areas in which we have been surprised—frequency growth, frequency proliferation, earnings, and fuel prices.

Ed Greenslet... Bache, Halsey, Stuart and Shields, Inc.

Mr. Greenslet describes the process used by his firm to estimate an airline's ability to invest prudently. He uses this methodology to show that the airline industry over-invested considerably between 1966 and 1974 in the aggregate, and this, in turn, contributed to their severe financial problems of the 1970s. He forecasts that between now and 1990, the industry will be able to invest prudently on the order of $82 billion. This will be basically in line with their requirements although some firms may have to alter their corporate strategy.

Hearing all I have today about forecasting, I feel a necessity to relate the words of wisdom one grizzled old forecaster gave to the young guy just coming our of business school: "Forecast frequently, but never about the future."

The main interest of the financial community in forecasting is very simple—to make money. Whether it be Fred Bradley at Citibank, William McCurdie at Equitable, myself, or anyone dealing in the financial area, in the final analysis, we are interested in making money. How well we succeed is measured pretty much by the success of our forecasts. There is not much we can do to bob and weave and get away from it after the fact. If we are wrong, we are wrong, and it is going to hang out there for all to see. So, maybe that makes us a little cynical, and a little quick on the trigger to be critical of forecasts. But nevertheless, we do try to use them. We try to cooperate with others who make them. And certainly we need them. Forecasts such as we are talking about today are all part of the grist for our decision-making.

Short Term Focus

Most of the forecasting done by anybody in the financial community is by necessity very short term and very specific. A lendor lending money on an airplane looks at the credit rating of that company, its ability to generate revenue out of that airplane, and the cash flow from that airplane to repay the loan. I look at a company's earnings, everything it does to run its business, and the results that are going to be produced in the next quarter, the next year, and the next two years. My customers are little interested in what is going to happen in 1989. They are very interested in what the company is going to earn over the next three months.

However, there is a necessity to go deeper, and we do attempt long term forecasting. There was one study in which I was involved that did take a long term look at the airlines from a purely financial standpoint. Other studies have looked at the number of needed airplanes based on traffic growth, replacement, and all those other inputs we have talked about already. However, they did very little direct work on what the airlines can afford to buy.

Most of that work involved assuming certain levels of CAB rates of return for trunk airlines and saying: "If airlines made a certain return, they would have enough money. If they made another amount of return, they would not." But that gave us no real insight into the probabilities of one or the other being achieved. So we went into the past and looked at these companies as money-generating machines: to see what they had done in the past, how well they had been able to match investment rates with their earning power, how well they invested their money, what kinds of return they had gotten on it, and what that might tell us about the future.

Let me just leap from that to the conclusion, and then we will come back and walk through the methodology. Basically, our conclusions say that Northwest, for example, could generate investment capacity of $10.5 billion between 1976 and 1990. If they just plan to hold their share of the airline market, they would probably need to invest something under $5 billion,a better than two-to-one ratio between their ability and their need. Eastern Airlines might have the capacity to invest something under $5 billion, but might need over $8 billion to maintain its market-share. That translates to a major shortfall.

Approach to Financial Forecasting

That is our summary conclusion. Now let me quickly walk through how we got there, and some of the things we thought about. First, we looked at the past to see what these companies had been able to earn, what their

return on assets had been. But measuring investment ability is really more than measuring earnings, because earnings are only one piece of the pie. There are many other sources of money as we all know. Depreciation and earnings are two, but in the process of running a business, you set up a series of prior claims. Those claims show up partly as interest in debts incurred to finance investment and partly as lease payments on aircraft. In effect, these are monies which would be available today as part of your current cash flow if you had not made those decisions in the past. They would either show up in depreciation, had you bought rather than leased the airplanes, or they might show up in pre-tax earnings, if in fact you had restrained yourself and invested less. We tried to determine the relationship between internal funds generated over time and total assets. By doing this, we set up some parameters, and the easy parameter to analyze was 200%.

Two hundred percent investment of internal funds means that, in effect, you spend two dollars for every dollar you generate. In theory, this would lead to about a 50–50 debt/equity ratio. Obviously it does not because you have to repay that debt. So at 200% or more you are in effect over investing since most people that lend in this business talk about one-to-one as a reasonable ratio for financial strength. So the 200 number becomes a threshold. Above that number you could say the company is over investing, and below it you could say they are within their capability.

A Look Back

From this, we can see that, on the aggregate, the industry was over-investing from about 1966 through about 1970. Much of this over-investment was a result of high traffic forecasts made during those years. But I feel management bears the responsibility of having followed policies that called for investments which were in excess of their current ability to pay.

Not all companies bought just because the forecasts said they were going to need "X" amount of new equipment. There were several in the airline business who did not over-invest during those years. They held the investment, whether by accident or by plan, to a level they could sustain. And if a few could do it, I submit that others could have done it.

We in the financial business tend to make pretty harsh judgments from time to time, and this is one of them—that the over-investment was not justified, that the earnings level during those years was clearly signaled and there should have been some adjustment to investment to bring it more in line with the ability to earn.

Using a computer simulation model, we plugged in assumptions that would allow the industry to invest only in proportion to its earning power. Over the critical years, 1967 to 1975, we find that the actual net income was $1.3 billion. The assimulated earning power was $3.4 billion. So the investment policy followed by the industry cost them $2 billion dollars on the bottom line, or between $200 to 300 million a year on average. For example in 1967, when the investment was $2.2 billion, it should have been about $1.6 billion. Interesting enough, the total investment the industry could have made between 1967 and 1975 was not greatly different, simulation or real. They would have wound up spending just about as much money, but they would have spent more of it in the early 1970s and less in the late 1960s. The consequence would have maintained, in our view, better earning power for them during that period.

A Look Ahead

In making our forecast for the industry over the next decade, we applied the following basic inputs: what return on assets, what rate of depreciation, what rate of interest on debt. I might add the industry forecast was not built by itself. It is an aggregate of all individual trunkline forecasts which were made separately and then added together to produce the industry number.

If each individual company in the industry is able to earn a return on assets commensurate with what it has shown in the past, the *total investment capability of the industry* between now and 1990 will be on the order of $82 billion. We suggest that, in the aggregate over a period of time, the industry will be able to generate the amount of funds necessary to buy the equipment that all these demand charts call for. But of course, there are several companies that will fall short, and for those we see some very serious implications. They simply will not be able to keep up with the industry. That might be particularly true in a more competitive environment where regulatory reform would allow companies to expand more rapidly. Frankly, we suggested that companies like Eastern and TWA would have to adopt a different corporate policy.

Implications

Now, what has a forecast like this achieved in terms of practical effect in the real world? To begin with, it sets some standards against

which year-to-year, shorter term forecasting can be compared so that we can test where the company is on a short term basis against a longer term view. It also highlights something that is not as well appreciated in the financial community as perhaps it should be, and that is the power of the airlines as cash machines. What other industry do we know in which the entire gross plant is essentially depreciated over 15 years or less? Very few.

TWA is one of the companies, for example, for which we suggested a different corporate strategy as a result of this study. We are now seeing the beginning of that new strategy, I think, in the ideas TWA is implementing in Chicago and Los Angeles, and is now proposing for New York–Denver and other markets. They are changing their whole corporate strategy: Do not go for market share, cut back frequencies, play a different game. One of the reasons they are adopting such strategies is to help resolve the problem of generating enough investment funds to maintain the position in the market that they have had.

Conclusions

This is one approach to forecasting from a financial standpoint. A lot more needs to be done on it. I have outlined just one effort, and it is certainly not a definitive effort. Much can be done to refine this process, to make it more "real world" and to make it more responsive to the changes that are going on. But unless we do it, current facility planning will be done in somewhat of a vacuum. In the final analysis, all the money is going to come through the companies, and the financial side has to be integrated deeply into any demand equation or any facilities plan.

Jack Wiegand...
Rolls-Royce, Inc.

Mr. Wiegand applauds the FAA initiative to improve the management utility of its aviation forecasts, and he expresses an appreciation of the difficulty and importance of this effort. He suggests the FAA could improve its forecasts by increasing the scope of both the air carrier and general aviation sectors. He would like to see air carrier forecasts extended to a worldwide basis, and he would like general aviation forecasts to include user trends so that future markets could be predicted for different aircraft sizes and ranges.

Long before we acquired the computer techniques that can develop forecasts for decisionmaking. Lord Mansfield gave us some words of wisdom, he said, "decide promptly, but never give any reasons." He followed by saying, "Your decisions may be right, but your reasons are sure to be wrong." By the response of the aviation community in attending this FAA symposium, we have a positive indication that there is a great interest in looking at and discussing the reasons behind forecasting and decisionmaking. In so doing, we turn our backs on the advice given by Lord Mansfield. We are not only publishing our reasons, but are discussing them in open forum.

Scope of the FAA initiative

The FAA intent to improve their forecasts for decisionmakers both in Government and private industry is most ambitious. We know all too well the difficulty encountered when we assemble company forecasts and are continually told we have failed to meet the requirements of management. Imagine Mr. Gene Mercer and his FAA staff trying to satisfy the objectives of hundreds of managements. Commonly, we hear what a man does not know does not hurt him. But in business, what management does not know does hurt them.

For this reason, we all must produce better forecasts each year. To do this, we must know management's objectives. The objectives of last year may not necessarily be the objectives of this year. There must be constant communication between management and planners if we are to produce useable forecasts. It is too late to learn of this year's objectives after the forecast is typed.

If you have not grasped the great magnitude of the FAA objective, let me just mention a few of those areas not usually thought of as being part of our industry: Car rental agencies, hotel and motel chains, caterers, advertisers, highway planners, and the list goes on.

We cannot take this task lightly. Many of the companies heavily involved in aviation do not have a staff of planners. They rely on the

studies and forecasts prepared by others. It is through meetings like this that these companies can make their requirements known to the FAA and become better informed as to what is available. We are all in it together. As Sir Kenneth Keith commented shortly after becoming Chairman of Rolls Royce, "this ain't a business, it's a way of life."

It always seems as if other sectors of the business other than our own have little difficulty obtaining their answers from the FAA data. It is easy for an engine manufacturer to say that the FAA has little trouble establishing annual budget and staffing requirements for, say, pilot briefings at 326 service centers, but we as engine manufacturers, say it is not all that easy. In our particular case as an engine manufacturer, we have some different problems.

Using FAA Aviation Forecasts

Before determining how an outside forecast source is used, we must first consider why it is used. Some planners use them as a drunk man uses a lamp post, for support rather than illumination. Yet, outside forecasts can be used to support or fortify our own forecasts when challenged, or to provide illumination when we have little or no knowledge of a particular market. In the markets where we are better established and better informed, we would use the FAA forecasts much less than in those areas that are new to us.

For example, when we show our management charts on world RPM distribution for 1976 through 1991, including ASMs required, we get few, if any, comments. They usually go uncontested. With similar attention, we can proceed through the ASMs by range and jet aircraft deliveries by year. When one compares our charts with those prepared by our competitors, or airframe manufacturers, we find little difference. As Mr. Tom Craig of Boeing has often stated, "these are the echo forecast charts." However, when we get the charts that are proprietary in nature, such as our overall market share or what future aircraft will be powered by our engines, management becomes more interested. As planners, we agree this is the most important part and also the most difficult part of the forecast.

Also this is the part of the forecast that we cannot expect to get from outside sources. But an outside source can help us by providing illumination. Many sources are available concerning U.S. carriers. Mr. Ed Greenslet, who is on our panel today, analyzes the airline industry, as do others in the financial community. In addition, there are several other notable groups who prepare valuable aviation forecasts.

Suggestions to Improve the FAA Forecasts

Before leaving this subject of air carriers, we have suggestions that could increase the usefulness of the FAA forecasts. We suggest that the FAA not limit itself to just the U.S. portion of activity, but increase its scope to a worldwide basis, not just for the benefit of Rolls Royce, but for the entire aviation community. Rolls Royce shows the world distribution of RPMs in their planning documents, not because we are an overseas company, but owing to the oneness of aviation. Over half of the world's RPMs are by non-U.S. air carriers. Looking at it from this side of the Atlantic over the last 5 years, U.S. manufacturers of civil transports have exported over 60% of their production. As you can see, Rolls Royce is not the only international marketeer. We also suggest that the categories used in tables 8, 9, and 10 of the FAA forecast be revised. Two, three, and four-engine aircraft do not impart the same picture of fleet composition as they did 10 years ago. A more relevant designation might be capacity and range.

Moving to another sector of aviation, we find many in our industry are not well informed about general aviation. In this area, we must rely on outside information for our decision-making. Table 11 of the FAA forecast shows the expected general aviation fleet size in 1989 to be 291,000 aircraft. It is made up of various aircraft types using a variety of propulsion systems. During the forecast period, the Rolls Royce product line will include turbo-prop, turbo-shaft, and turbo-fan engines. On an initial pass it would appear the only data of interest to Rolls Royce would be in those categories. However, this is not sufficient. If, for example, a gas turbine manufacturer makes a technological breakthrough such that an engine could sell at a fraction of its present cost, some of the piston-powered aircraft could become part of the gas-turbine manufacturers market.

As can be seen, general aviation is a large inter-connected market and no segment can remain outside the decisionmaking process. The FAA categories used in describing general aviation fleets are not sufficient. The aircraft in each category are used for a variety of purposes. We desire to know the trends among users so we in industry can better understand the requirements for future aircraft. Our questions pertain to size and range trends in order to establish growth rates for each aircraft. Without this information,

market potential for an engine cannot be determined nor can an engine be sized for development.

What we seek today is a transfer of knowledge between the FAA and industry. Knowledge, as defined by Dr. Samuel Johnson, is of two kinds—we know the subject ourselves, or we know where we can find information on it. We are now concerned with the knowledge of where. Because this is an FAA symposium, we do not necessarily expect the FAA to always become the "where". The Aviation Forecast Branch has been given a particular charter. If industry needs fall within that charter, all is well and good. If not, industry can make suggestions to alter the scope. The FAA is asking us for ideas. However, we must accept the fact that all inquiries labeled aviation are not the responsibility of the FAA.

Comments and Questions by Audience Participants

....Don Garvat, The MITRE Corporation....

The forecasts today implicitly assume enough fuel, enough ATC capacity, and factors of similar nature. We all know that it is rather difficult to model, but how do you people, who have to lay the bucks on the line, account for such factors that we often find absent?

Response—Boone Barker, The Boeing Company

We do not model such factors, at least not in our company. There is a place where models work, and a place where models do not work. Currently, there are a number of analytical efforts aimed at projecting measures of capacity, measures of demand at airports, for example. But all that requires a conclusion and a judgment, a judgment which is applied to the forecast as far as we are concerned.

....David Bluestone, TRB....

This brings up the whole problem of constraints. Many constraints are self-fulfilling. For example, if the FAA forecasts that it will not have enough money for something, they do not build it. Then the forecast comes out right. You go up to the capacity, and that is it. And Mr. Greenslet bothered me on the same thing. If, say, PAN AM, TWA, or Eastern, limited by their estimated ability to finance, bought fewer new aircraft, and their competitors bought more, then their market share would go down. They would be outscheduled and their traffic would go down, probably more than in proportion to their underscheduling, and they would go broke faster. This whole problem of constraints is very puzzling. I do not have the answer, but I sure know the problems.

Response—Ed Greenslet, Bache, Halsey, Stuart, and Shields, Inc.

That is absolutely right. There are a lot of paths that could be taken. For example, if you cannot and do not make the investment, you might wind up losing more than if you ran hard and tried to keep up. That is one of the unpleasant choices facing companies in that position. What we need to do is at least establish a set of criteria by which the choices available to a company could be evaluated, or at least provide better insight into the reasons for such choices.

But I would say this, the rules of the game are changing, opened up by regulatory reform. We do not know how the TWA approach to life will work. They are not just cutting back, they are doing something different, and maybe it does work. Maybe they do not have any choice but to try and see if it works. Maybe the risk is high, but at least they are willing to try a different path. For that I think you have to say, alright give'em credit and we will see how it works out.

....Paul Starnfells, The MITRE Corporation....

A question for Boone Barker. I would like him to forecast when Boeing is going to announce their new airplane and tell us whether it is going to be a 7N7, 7X7, or both?

Response—Boone Barker, The Boeing Company

We are working hard toward a new airplane program at this time. We have stopped giving names like 7X7, or 7N7. We flatly call it "new airplane program." We are exploring programs with various versions as well as possible derivatives. I would not want to speculate about when the market would be right for the new airplane.

....Gil Quimby, NARCO....

First John Winant, did your big pie of world RPMs include the non-ICAO countries?

Response—John Winant, NBAA

No.

....Gil Quimby, NARCO....

Boone, I understand your inability to come down hard in defining your jet aircraft retirement schedule. Could you tell us something about what happens when a jet aircraft is retired?

Response—Boone Barker, The Boeing Company

We have to account for two kinds of retirement, inter-airline transfers and airplanes which go out of service from the operations that constitute our market. There are obviously other people, such as aircraft brokers, who have a different market area of interest. Our market does not, for example, include air travel clubs, and airlines in certain countries which just do not buy new airplanes. When airplanes are retired, they sometimes go into such service, which feature low utilization, unscheduled or nonscheduled service, or very small airlines. Some have gone to individuals. The Los Angeles Dodgers have an airplane, for example. There are some airplanes that end up as scrap aluminum. There are a number of airplanes stored down in Arizona, some of which are still owned by the airlines. And we count them as retired even though they may still be owned by the airlines. Many airplanes get sold by airlines like Pan AM or TWA to other airlines, for whom such an investment is a good deal. British West Indies is an example. They have done well with 707s bought from U.S. trunk airlines. Local service airlines, and Allegheny is an example, are buying equipment from trunks such as United Airlines.

The airplanes that actually go out of service tend to be the turbo-jets which have relatively poor fuel economy. But that does not hurt their use in the kinds of lower utilization service we are talking about.

You can look at the piston-engine aircraft retirement and try to draw some conclusions, but that was under an entirely different set of circumstances than exists today for jet transports. There is no flat hour limit on the types of airplanes we are talking about. They do tend to cost more in maintenance and do tend to require some changes, but they are sure carried on the books at low prices. This is a difficult issue, and one each airline has to assess it on the basis of its needs.

Response—Ken Whitehead, United Airlines

From everything I have done with the trunk airlines, the retirement of aircraft correlates far higher with financial strength than with anything else. Wealthy airlines do not have old airplanes. Poor airlines have old airplanes.

If you look at Ed's list of airlines, Northeast, Delta, and Braniff all have young fleets which are retired—resold really—in a relatively few years. The airlines down at the bottom tend to have old airplanes. However, we call that a chicken and egg question—it is not clear whether they are profitable because their airplanes are relatively new, or whether their fleet is relatively new because they are profitable.

....Tom Comick, Postal Service....

Ed, is it possible that the simulated cumulative investment in the early 1970s may have been due to the Government loan program that kept manufacturers in the business that should have dropped out?

Response—Ed Greenslet, Bache, Halsey, Stuart, and Shields, Inc.

Well, I will venture an opinion whether it is a good one or not. No, I do not think so. I do not think that was an overriding factor.

Response—Boone Barker, The Boeing Company

I would like to comment on Ed's statement. I think he has done an admirable job in trying to analyze a very difficult problem. However, 20–20 hindsight is a lot easier than 20–20 foresight. Airlines have to make investment commitments on the basis of long order times, and they have to live with those decisions. Most airplanes delivered after 1970 were ordered before 1970. There were many cancellations. Many airlines shifted their equipment to different kinds of operation. They sold them. They converted them to freighters. They cut the utilization. They left the seating densities low. They tried to handle the situation.

Also, Ed's study has a very critical assumption: that the airlines will be permitted by the regulatory agencies to make a reasonable return on investment. And that is a heroic assumption in view of what has been happening to trunk airlines over the last few years. I am not so sure this will occur unless some action is taken.

....Tom Comick, Postal Service....

I think Boone answered most of the question, but to press further. Ed, should those airlines that made the mistake have cancelled more than they did, or could the mechanisms you suggested have been employed in view of this long lead time problem?

Response—Ed Greenslet, Bache, Halsey, Stuart, and Shields, Inc.

I would say "yes." There should have been more phone calls to Seattle. I do not recall anyone taking drastic action when clearly the numbers said drastic action was called for. Now granted that would move the problem back only one step, and it might have made Boeing's and Douglas' problem greater, but it is a business decision and you have got to do what seems right in the light of the times. I can not fault the original orders at all. What I can fault was continuing that investment level when all the signs were saying that the assumption on which those orders were placed was falling apart. Nobody was willing to step in and make radical changes. The only example that comes to mind of a trunk airline which made the needed phone call was National, and they dealt with options, not orders. They just chopped off some of their DC-10s. I think more of that should have happened.

....Ira Briskoff, Onyx Corporation....

I have another question for Ed Greenslet. The airlines have not had a new stock issue for some years. I was wondering under what circumstances could they raise the money they need by selling new equity?

Response—Ed Greenslet, Bache, Halsey, Stuart, and Shields, Inc.

When you say they have not had a new stock issue, that is technically correct. But just this year, there have been several equity offerings. There have been several issues of preferred stock, some convertible, some with common attached to it. There have been some convertible bonds sold. However, the prices of that financing were very high, and there is no way you could finance an entire company at such rates.

Our study was built around the assumption there would be no equity financing. We assumed that if a company runs its business well and keeps its debt/equity ratios in balance, it would be able to roll over its debt. But we did not make provisions for equity offerings. The equity you see in the table is internal funds minus dividends. Clearly, there is a chicken/egg here. Delta Airlines, for example, could raise equity if they wished to, but they do not need to. Someone who needs it, can not get it. But we assumed there would be no equity financing during the period of the forecast.

....George Howard, PONYA....

This is a fascinating study you people have come up with. It indicates the industry has very substantial investment capability, if the companies react collectively in accordance with their capacity to invest and do not over invest on the average. This does not jive at all with what we constantly hear from the ATA: that there are no possibilities for investment, that they must look to the Federal Government for help, and that they really do not know where their next aircraft is going to come from. How does your study reconcile with what the ATA is telling us?

Response—Ed Greenslet, Bache, Halsey, Stuart, and Shields, Inc.

Well, as George Jones knows, I respectively do not agree or disagree with some of his conclusions. The record of the better part of the last decade would lead to some very gloomy conclusions. We believe there were significant abnormalities over the last ten years that were being worked out of the system. You had a situation of substantial excess capacity; you had excessive investment in the business; and the capital costs, the rent to run that investment, was a significant burden on your earning power.

That is changing. In fact, the more probable scenario over the next 5 years would be a capacity short industry—chronic shortage of seats. Whatever else that implies, it suggests to me that the earning power on those assets is considerably better than it was in years past.

....Bill Tucker, Canadian Government Aviation Stats and Forecast Group....

My question is for Mr. Winant, but others in the panel may also contribute. We made the same assumption on the availability of fuel at an increased real price in our forecasts, and it is probably the single thing on which we get most argument. Please give me your opinion on the validity of the assumption that fuel will be available for the remainder of this century. Alternatively, what are the possibilities of different means for aircraft propulsion?

Response—John Winant, NBAA

I do not think different means of aircraft propulsion have been included in the forecast. They are being worked on. We assume fuel will be available through the forecast period, but at an increasing cost.

Response—Boone Barker, The Boeing Company

We have looked at a variety of alternate methods for powering aircraft besides petroleum. Even at very high fuel prices, it will take a while before those will pay out. Work really needs to be done now. We need technology development. Even though our forecasts say we will not have any such alternate fuel powered aircraft by the year 2000, it does not mean we should not be working very hard on such technology and perhaps spending a fair amount of money on it. But there does not appear to be in the relatively near future, that is 10 to 25 years, a better fuel for aircraft than petroleum.

There have to be policy decisions on the best use of petroleum. There are other fuels that could be used by other energy-consuming sectors. However, an aircraft just does not work that way. We think petroleum ought to be allocated for aircraft operations. The fuel economy of air carrier operations per passenger mile is going to get much better as more new high by-pass-ratio powered aircraft come into the fleets. Fuel use will probably stay relatively constant.

Engines have been run with hydrogen fuel for a good number of years. It is not something that became popular since the energy crisis.

....Bob Monroe, Aircraft Owners and Pilots Association...Tennis Shoe Air Force....

I have been impressed by the number and diversity of people who have commented on the lack of detailed information about general aviation for decisionmaking and forecasting purposes. How valuable is this information to each of you? How badly do you want it? How much are you willing to pay for it?

Response—John Winant, NBAA

I do agree with the statements on the lack of specific detailed information. General aviation is a hugely diverse world in terms of equipment, piloting credentials, and aircraft usage, ranging all the way from purely recreational flying to extreme professionalism in sophisticated turbo-jet equipment. It seems to beg for better descriptors.

However, detailed information is obviously going to cost a great deal of money because the statistical data bases are so obtruse and inaccessible. It is going to be very difficult and extremely expensive to exercise it. I think it is worth it.

Response—Gene Mercer, FAA

I came from the air carrier industry into the FAA. Since I have been with the FAA, we have spent 80% of our aviation forecasting effort working on the critical general aviation problem.

Response--Herb Crawford, HNT&B

I strongly support what Ken Whitehead said with regard to the need for information on general aviation activities, specifically during peak hour conditions. With the increase in the number of seats and the load factor per aircraft for the air carrier fleets, air carrier operations are not increasing nearly as rapidly as enplaned passengers. Therefore, looking at peak hour demands on a major air carrier airport, most existing airports can last a long time with reasonable improvements and expansions. However, as you approach 190 seats for the average aircraft, there will be a lot of communities which today have air service that just are not going to be served by 190-seat aircraft. It just is not economical to land at the smaller places. Undoubtedly, that is one reason why the commuter aircraft industry has shown the growth it has. It is filling in such places with smaller aircraft. From an airport planner's and operator's standpoint, it does not make any difference how passengers are getting to and fro. For purposes of this discussion, I would like to eliminate local flights which bring people to a city because they want to conduct business there, say in a business airplane. I am talking about the flights that connect with scheduled airline service: the business aircraft that connect people to an airline going overseas or the air taxi flights. These flights must continue to use the major hub airports. They can not use some other general aviation field. They do not carry nearly as many passengers, but they still constitute an operation. And that operation takes just as much time in utilization of the runway as if it were a 190-seater. In the absence of detailed information on these kinds of operations, which, in addition to the certificated air carriers are going to occupy the runways of major hub airports, there will be a gap in airway planning. With all due respect to the major airlines and to ATA, this absence of informa-

tion is being treated to a considerable degree as if it did not exist. But it does exist now, and is going to exist a whole lot more in the future. If we do not know what it is and can not forecast properly, we can not plan for it. Then a number of busy major hub airports are going to come to grief because they will not have adequate capacity. My plea to the FAA is to sponsor improvement in the kind of information that will enable a realistic assessment as to the future needs of major hub airports, not just for certificated air carriers, but for all aircraft operations that are related to certificated aircraft operations.

Response—Gene Mercer, FAA

We have a planned initiative to look at the growth of general aviation and to define what has been commonly referred to as "hard-core" general aviation at the major air carrier airports. Our objective is to define what hard-core general aviation consists of, why they are there, and the minimum level general aviation that will not divert to reliever type airports. This is a planned project for the coming year.

Response—John Winant, NBAA

I totally endorse the remarks just made. I do not like the term "hard-core" because I do not know what you are talking about. For the year 1975, NBAA conducted a massive study, and it came up with results that are reasonably accurate. One of the most significant things that popped out was the very high incidence of business aircraft flights which serve no purpose except to interconnect with certificated air carriers. That number is 31% of all business flights. When you consider the millions of business aircraft flights conducted each year, that is a whale of a number. And such flights do not involve just the 23 major hub airports, they involved flights to any airport served by a certificated carrier, not including, however, interconnections with commuter airlines. Should such business flights increase for some reason, e.g., say deregulation or partial deregulation leads to a decrease in service to many smaller cities (and in fact there is a falling behind in commuter service which is timely, scheduled, and reasonably convenient). We are going to find ourselves back in the late 1960s with massive congestion and a hard-nose ruckus involving the air carriers and operators of airports. So, I am all for better definition of the dimensions of this sector which represents 40% of aviation activity.

Response—Gil Quimby, NARCO

Boeing has done some excellent work on how you can increase the capacity of an airport. United has studied the problem of delay and congestion backup at major hub airports. There have been studies on how to provide separate but equal approach guidance to major hub airports so that the inter-air modal connection can better serve people that are trying to use both general aviation and air carriers. I think the FAA has least studied this kind of solution. For years we have heard about STOL runways of a mere 3 or 4,000 feet at a place where the traffic pattern does not intersect with heavy jet traffic. But the attempts to put such runways into service are very rare and not very wise.

I have two ways to get from near Philadelphia to JFK: One is to drive and the other is to fly a small airplane. I use them both. I have been impeded more by traffic backed up on the beltway from the JFK parking lot than I have by instrument approach and delays going into JFK.

....Harry Shepards, Evaluation Technologies....

I would like to say a few words on congestion. In the world of air traffic control and airspace management, we kid ourselves about capacity and saturations. We speak of just a few sections of the day. Man, we all know, is a diurnal animal, yet we speak primarily of peak hour traffic. All our solutions are directed to that. However, the day is 24 hours long. It reminds me of a man that takes an aspirin for a headache when the pain is really at the other end. I wonder what effort has been exerted to spread traffic through the remainder of the day. There are other modes of transportation directly involved with air transport that are more available. Traffic congestion between the airport and final passenger destination seems to have eased quite a bit by utilization of other periods of the day. Is anything going on now about shifting people to travel during off-peak hours?

Response—Gene Mercer, FAA

Yes. Peak load pricing has been studied, both from the viewpoint of higher fees for air carriers landing at peak periods and lower off-peak fares to encourage night flying. I do not know how conclusive these studies have been. Scott Sutton might want to comment on this.

Response—Scott Sutton, FAA

Our work has shown that pricing tech-

niques can be used to distribute traffic more evenly throughout the day. The problems we have run into are institutional; for example, long term contracts with airports when you get to talking about landing fees. These are institutional, perhaps legal questions that have to be addressed.

Response—Darius Gaskins, CAB

We are already beginning to see some proposals from carriers which correspond to peak load pricing. Most of them, so far, have focused on peak day traffic. Over the next year or so, you should see a heavy influence of peak load pricing in the cost of tickets. We do not have hard information about what will happen, but I am quite confident it will be beneficial in the sense that there will be movement of traffic away from the peaks. There will also occur better utilization of equipment, but we have not done specific studies to predict the consequences.

Response—Ken Whitehead, United Airlines

The question involves subjects outside my specialties, but I think there is more "peak spreading" going on than people realize. It is not something that happens just for the fun of it. It occurs in the presence of worse alternatives. One problem is that when you look across three or four time zones, the spreading of peak traffic in one location can have significant impacts at other airports. Analyses of curfews show similar problems. If some cities—say Honolulu, Los Angeles and JFK—all had 10:00 PM to 7:00 AM curfews, it would be difficult to schedule through flights from Honolulu to JFK. The "windows" get very narrow.

Peak hour pricing of landing fees also has implications for smaller cities. It could cause an airline to say, "we cannot give you a flight to Hub X between 3:00 PM and 7:00 PM because the traffic volume we haul from your city does not allow us to 'bid' enough for slots at that time of the day."

Time zone changes and the implication for smaller cities make it difficult to "peak spread" as much as some proposals suggest. But airlines are aware of these problems and, within limits, are adjusting to the realities of what some airports can and cannot do now.

Response—Merrill Goodwyn, Texas Aeronautical Commission

I think the problems in long haul are obvious. If we are going to spread this at all, it has got to be in the shorter haul movements. Again I would go back to the experience in Texas and Southwest Airlines. The pricing mechanism which they now use has moved their passenger peak to 7:00 P.M. at night.

Let me also point out that the demand you are going to pull by off-peak pricing in a short haul market will be pulled primarily from automobile transport. You are not working with the same perception of time as when a person travels on a scheduled flight between two major cities. Someone pulled out of an automobile would have spent several hours in a car in making that trip. Therefore, putting him on a 7:30 or even an 8:00 flight is not really going to change his arrival time at his ultimate destination by a significant extent. Now, whether everybody is willing to make that adjustment, I do not know. But certainly, the pricing mechanism has been successful in moving business away from the 5 to 6 o'clock peak time period.

Response—George Howard, PONYA

Probably the airport that has done the most experimentation with peak hour pricing, as applied to landing fees, is the British Airport Authority (BAA). For several years, the BAA increased their landing fees during peak hours. We have looked at it very carefully, and I am sure the FAA and the CAB have what information is available. Very frankly, there has not been much shifting. The imposition of higher fees took place at a time when movements were declining, and it was very hard to see cause and effect relationships. In New York, back in 1969 when we were faced with heavy congestion at the airports, we imposed a $25.00 minimum flight fee during peak hours. We had a 30% reduction in general aviation peak hour activity which we felt greatly increased the efficiency of airport operation.

Many airlines run connecting patterns at specific airports—Delta at Atlanta is a classic example. There are many reasons for this. A great many passengers fly by connecting flights and want reasonable connections. They do not want to sit around an airport for 2 to 3 hours. The airlines find it a good marketing technique to provide good connecting flights within their own system. The commuter air carriers are trying to make the same kinds of flights. The result is a more efficient air transportation system. We should not lose sight of that.

....Bob Frye, Department of Transportation....

Grady, you said that you planned a second airport in the Atlanta area sometime in the 1980s, and Gene, you said that something has to be done to disperse the traffic from

Washington National to Dulles and Baltimore. This seems to indicate that fast and convenient ground transportation is needed between airports. Grady, I would like to know if you have been thinking about such operations between airports.

Response—Grady Ridgeway, Atlanta Department of Aviation

We are looking at a hard-rail direct connection between the 2 airports so that it would not make much difference which airport you might come into or go from. This is a means by which we can overcome the terrific number of transferees that would occur should we continue to hold this posture.

....Mike Ferris, Donnelly Corporation....

Inasmuch as Donnelly provides machine-readable schedule information to such users as the FAA, the CAB, Port of New York, Boeing Airlines, and number of others, I would appreciate comments as to the usefulness of schedule data, specifically to the forecasting process, and what improvements you see as necessary to make that data more useful.

Response—Gene Mercer, FAA

We use the computer base OEG data a lot. We find it extremely useful for specific analyses into what has happened, and we put it into forecasts to some extent. One problem with using such computer-based data is the number of data bases—the O&D data, the 10% sample data, for example. They do not use the same format; they do not use the same city codes; and they do not use the same airport codes. We have to put together a data dictionary and that has turned out to be a very difficult and expensive task. If there is a way to simplify that problem, it would help all the people who use such data bases.

Response—Don Garvat, The MITRE Corporation

We have used the Donnelly tapes in our forecasting models, and one of the major problems was attempting to link traffic flow data, for example, with the airline guide data. We also had a few problems with coding. Occasionally, we find intra-Japanese traffic in the middle of the Pacific and things like that. But basically, the fundamental problem is "linkage," as the Boeing gentleman pointed out. However, we had to use this data to drive our models because it is the only consistent body of data we had to work with.

Response—Gene Mercer, FAA

We do use OAG. We have the OAG on line for our own time-share computers and we have it on line at our NAFEC computers. So we use it extensively in all our forecasting models. One other comment, when you maintain the historical series of OAG tapes, it is very frustrating when the format changes at any particular point in time.

Response—Bill Simpson, ORI, Inc.

Recently, as part of an air pollution study, we began looking at traffic in and out of the 25 major commercial airports and at 10 to 13 of the general aviation airports. I looked at the FAA data on operations at Washington National and then had some aides count the actual air taxi operations into Washington National. I came up identifying just about ½ of the air taxi operations that show in the publications of the FAA. So my guess is that only about ½ the air taxi flights into Washington National are scheduled; the rest of them seem to be unscheduled.

Response—Gene Mercer, FAA

That is quite surprising.

Regulatory Reform

Dr. Darius Gaskins... Director of the Office of Economic Planning, CAB

Dr. Gaskins relates his perception as to the direction in which CAB policy is evolving. He begins by recounting recent Board decisions that authorize low-fare proposals put forth by the major airlines, noting that many of the fares have a "fill-up" feature, others are basically "no-frill" fares, while the remaining are structured around off-peak pricing. He points out that many of these fares have an explicit cancellation fee, and that most are occurring in the discretionary travel market. Mr. Gaskins then turns to current CAB entry policy which is geared toward freer entry into airline service, pointing out that over the long run, entry policy is more important to competition than fare policy. He discusses four major concerns of the CAB: (1) Predatory pricing, (2) the maintenance of regular service, (3) the protection of consumers, and (4) the financial condition of the carriers. He closes by questioning the fixed retail prices under which the air industry operates.

I get the impression that economic regulation of the aviation industry is a significant question for everybody in this room, and I will do what I can to shed light on what is going on. I must offer a couple of caveats at the outset: First, I do not speak for the Civil Aeronautics Board. Second, I am really not very knowledgeable about the airline industry. I am a professional economist, and I have been working on airline regulation for a while, but I do not know all I should. Third, it is pretty hard to predict what is going to happen over the next year, but I will give it a try.

Recent CAB Fare Decisions

Let me review briefly what we have seen in the last six months with respect to fare proposals, reservation systems, and evolving CAB policy. Since the first of the year, we have had a dramatic series of low fare proposals put forth by the major carriers and some upstarts. The first big episode that got the most publicity was Freddie Laker's proposal to fly people across the Atlantic for $236 round trip. That proposal involved a new kind of service: No guarantee or reservation; you have to stand in line; you have to pay for your lunch. In response to Laker's skytrain proposal, the major carriers came forward with a package of three proposals, all of which had low fares and significant new characteristics. There was a stand-by fare which involved flying only if space was available. This was $256 round trip. There was a budget fare in which you paid your money, again $256, and told them what week you wanted to go. After a while, they would tell you the day of the week and the flight, but it is not an official reserved coach seat by normal standards. Finally, there was a dramatic reduction in the APEX fare, called super-APEX.

A second major development was the super-saver fares that went in last April. These fares, available almost all across the country, are apparently geared to tourist travel; that is, discretionary travel. There was a 7-day stay requirement, and you had to purchase your ticket 30 days in advance. That is significant because it turns out somewhat like a "no-show" penalty, and this is a significant departure from traditional ticketing associated with standard coach fares.

Third, we have such innovations as TWA's super-coach, a low-fare associated with high-density seating between Chicago and Los Angeles. It is a super-economy coach in which you do not get your lunch, but again with very low fare. Delta recently proposed aerobus fare between New York and Miami for $55.00, a dramatic reduction from the coach fare. In response to that, Eastern, National, and the other carriers in that market offered a comparable fare in 727s and L-1011s, but they did not copy Delta's dense seating. In response to that, Delta withdrew the aerobus and replaced it with a super no-frills fare, which again was $55.00, in a conventionally configured airplane that had been operating in that market. TWA has a proposal that offers low fares into Las Vegas from major cities throughout the country, particularly the Northeast, New York and Chicago. This particular fare is limited to certain trips that originate on one day and come back on another day. It obviously has important peak load features to it. If you go on days that correspond to peak load traffic into Las Vegas, you pay a higher fare than if you

schedule your trip on a day which corresponds to the off-peak. It was a significant departure from standard coach fares. And finally, Allegheny and Ozark, two local service carriers, have put in place fares that go under the name of "simple saver." These carriers are somewhat handicapped in that they do not have major nonstop authority between cities. But they do have multi-stop authority between certain primary cities, and they offer a low-fare for passengers who fly on multi-stop flights between major cities.

For the most part, these fares were approved by the CAB. There are more proposals than these, and we anticipate this is not a passing fad. We will continue to see multiple low-fare offerings with special characteristics of the reservation system.

Characteristics of the New Low Fares

Now, let me go over some of the characteristics we see when we look at the new fare services, and then talk a little bit about what is causing this. Forming our own judgment about why these low fares have occurred is important to figuring out whether they are likely to continue. I also think it is important for you to form your own perspective as to what is going on. I will offer you mine, and you can judge for yourself.

Fill-up Feature

Well, many of these fares have a fill-up feature; that is, the fare is available to passengers only when there is space available in the airplane. This is particularly true of the standby fare offered across the Atlantic. If you go to the airport and it turns out the airplane is fully reserved for coach and first class travel, you do not get on. If there is an available seat, you get on. From an economic standpoint, this fare makes all kinds of sense. The airplane is flying; the seat is vacant; and the incremental cost of putting somebody in that seat is extremely low. A system that allows you to fill up those empty seats is a very cost effective way of providing air transportation.

Notice that the service is not the same. The individual who goes to get a standby ticket does not have a right to fly on the airplane. He can not make firm plans. He can not make business appointments at the other end. But he can get very inexpensive transportation.

A second kind of fill-up fare is associated with the budget fare. A passenger indicates what week he wants to fly, and one of the scheduled carriers across the Atlantic will tell him the particular flight, a week ahead. This feature enables the carrier to wait until it has a good handle on actual reservations for a given week, and then to fill up empty seats with budget passengers. So it turns out to be a fill-up fare, but it gives passengers a little more assurance they will go when they want, not on a particular day, but at least within the desired week. Again, the important feature of this fare is the "fillup" capability.

Last week, Texas International had a fare approved by the CAB which turns out to be two different fares for the same seat on the same flight. It looks like raw price discrimination at first blush, but it enables people really wanting to go to buy their way on a relatively full airplane. Texas International is offering this dual-price service on those airplanes they anticipate will be relatively full. They do not necessarily offer it on off-peak times, and that means an individual who is willing to pay more to fly on a peak flight is able to manifest his desires in the marketplace by buying one of these expensive seats. This particular kind of dual pricing is an experiment. It may not work very well, but it is interesting in that is was proposed by an airline and the CAB was willing to experiment with that kind of alternative.

No Frill Fares

We see all kinds of no frill fares coming in. Their basic feature is that you do not necessarily pay for your lunch if you do not want it. These fares are basically the price of transportation if you choose not to pay for the complimentary meal. This breaks the connection between air transportation and the purchase of food, and it is basically a new service. Again, it has an economic function. Not everybody that gets on an airplane is willing to pay a price equivalent to the cost of a meal, and this allows passengers to make that choice.

Cancellation Fees

Another significant feature we see in many of these fares in one form or another is a cancellation fee. In the case of fares across the Atlantic, both super-APEX and budget fares have cancellation fees. If you make a reservation with one of those systems, and you fail to take advantage of that reservation, you forfeit an advance payment. I believe it is $50.00. From an economic standpoint, it makes a lot of sense. It says: if you make a reservation on an airplane and you do not use it, you are imposing a cost on the system. You are requiring them to keep that seat available for you. Therefore, an individual who makes 10 reservations and only uses 1 is much more costly to the system

than an individual who always meets his reservations. The individual who imposes such costs on the system should pay for it, and that is the function of a no-show penalty.

Now, as with everything else, there are problems. If you are going to introduce a no-show penalty of some sort, you introduce an inconvenience. Travelers have to put money down ahead of time, otherwise the airlines cannot enforce the no-show cancellation penalty. But the concept has potential as a means to rationalize air travel.

Peak Load Pricing

One final thing—peak load pricing. I mentioned the TWA super jackpot as an example of peak load pricing. We anticipate more peak load pricing for the system, and the Board is interested in approving such fares when they are shown to be economically viable and nonpredatory.

Reasons for Low-Fare Pricing

The Increase in Discretionary Travel

Now let me share with you my thoughts about what is going on. There will always be economically efficient peaking which is associated particularly with business travel. But when you talk about discretionary travel, you no longer have the obvious necessity for peaking. People who are going on vacation and students who are traveling, for example, do not necessarily have to meet the same kind of schedule as a business man. As discretionary travel increases, there is less reason for the extreme peaking that is associated with pure business travel.

The increase in discretionary travel also has other consequences. If you go down on the list of new fare proposals that are coming in, you will discover several significant features. Probably the most significant is that these low-fare proposals usually occur in basically tourist markets. There are low-fare proposals to Las Vegas; there are low-fare proposals across the Atlantic; there are low-fare proposals between New York and Miami; and there are low-fare proposals to Hawaii. The low-fare proposals are occurring in those markets in which there is a large proportion of discretionary travel.

Now, some people, who have the devil theory of the airline industry, say "ah-ha, we see low-fare proposals in these markets because that is where the charters are strong, and these low-fare proposals are just a means of driving the charters into the sea." Well that is possible, and I know the Board is very concerned about that. But there is another obvious explanation: These low-fare proposals occur in those markets because that is precisely where the demand for air travel is relatively elastic. If you lower your fare, you can attract a lot of people to fly with you.

When you think about discretionary travel, it is important to bear in mind that the nature of competition changes. A traveler thinking about going someplace may have not made up his mind as to where he wants to go, and the air fare may make a difference. If he can go to Las Vegas for $50.00 versus $250.00 to London, he may well go to Las Vegas. Alternatively, if he can get to London for $100.00, and Las Vegas costs almost the same thing, he may choose to go to London. Suddenly, you are not talking about competition between 2 or 3 carriers flying between the same city pair, you are talking about a competition among all the carriers that offer vacation travel. So the system becomes much more competitive.

I look at the low-fare proposals that are occurring; I look at where they are occurring; and I think a basic motivating factor is the growth of discretionary travel and the growing awareness by the airlines that this is becoming a more important segment of the market.

A Different Explanation

Now, I do not want to short-change you. Let me give you the other side of the story. We have seen these low-fare proposals come and go whenever the carriers feel threatened politically or otherwise. We have the example of TWA. They look into the crystal ball and see they may not be able to generate internally the funds needed to maintain their share. They become desperate and offer a low-fare dense-seating proposal. A different corporate strategy. I think that is an accurate description of TWA's situation, and it may be the primary motivation for their participation in various low-fare proposals.

Strategic Response to Regulatory Reform

Another version, a more cynical version is "ah ha, this is just an attempt to cut-off the regulatory reform movement." The carriers are going to prove there is ample competition in the system. You guys just leave regulation alone; Congress does not need to enact new legislation; the old legislation is just fine. And we have all these low fares that are just popping up everywhere. This is possible, but it would involve a conspiracy encompassing a large number of players. I do not think people act that way, but maybe I am wrong.

New Competitive Fares

Ok, so I come back to my explanation. I

think there is a growing realization as to the significance of discretionary vacation travel, and that changes the basic economics and how you price your service. There is something else that follows. If the system is becoming more and more dependent upon discretionary travel, and is therefore becoming more competitive by the very nature of options which travelers have, it implies different things in terms of the viability of low fares. Some people say, "We have seen these kinds of discount fares before. They are here today. But you wait, a year from now it will be all over, and the fares will be back up at the relatively high levels." Maybe that did happen in the past. But if the market is characterized by significantly more discretionary travel, it is going to be much harder for any particular carrier in any one market to raise his fare. Consider Eastern Airlines flying between New York and Miami and competing with New York/Las Vegas or New York/London for tourist travel. They have a fare of $55.00. They have 2 competitors who are also matching that fare on the same route. But more significantly, if they decide to go back to the old fare of around $100.00, surely they must realize that large numbers of those travelers will go to Las Vegas or to London or the Bahamas. Because they are facing much more real competition in terms of traveler options, they cannot stifle competition by tacitly colluding with direct competitors. They would have to arrange for everybody that is competing for that same travel to raise their rates uniformly, or else they are going to lose their shirt.

Evolving CAB Policy

Now let me talk a little bit about the evolving CAB policy. Again I am reading the tea leaves. I have seen what the Board has done in the past 4 months, and I am just guessing as to future directions.

Approval of Low Fare Proposals

In general, the Board has accepted low fare proposals. That does not mean they have accepted them all; and it does not mean there is no significant concern about low fares that are not viable in the long run or low fares that are predatory, that is, aimed at driving out competitors to gain long-run advantage. They will not look favorably on low fares that are unduly discriminatory, that are available to one passenger and not to another, unless there is a basic economic justification. With all these caveats, the best predictor is: if the fare is a low fare proposal, the Board will probably approve it.

An Awareness of Higher Costs

Simultaneously, the Board is showing a willingness to think about higher fares. They have already started to forecast future costs in the industry. They have allowed fare rates to go in which are forecasts of costs projected three months ahead. Eventually it will be six months ahead. They are aware that costs do go up, and that the basic DPFI fare is going to have to go up. They want to provide the carriers with realistic regulation in the face of inflation, so they have offered this six-month period for fares.

Peak versus Off-peak Fares

In discussions about peak and off-peak fares, the Civil Aeronautics Board is not interested in off-peak fares just because they are low. They are interested because the on-peak fares should be high enough to pay for the capacity that is demanded by the peak user. There is no basic attitude on the Board that only low fares are good. The Board is interested in rational fares. There is a growing recognition that peak and off-peak pricing is rational; that is, higher fares for peak users make sense.

Now how do we get from here to there? A lot depends on what fares the carriers offer. If the Board allows some pricing discretion under a revised DPFI, and if the carriers do not elect to push for high fares at certain peak times, then we probably will not get it under the existing statute. But, it is not a low fare Board in the sense that only low fares are good fares. It is a Board that is interested in rational fares.

CAB Entry Policy

So far, I have talked only about fare policy. In the long run, entry policy is more important. Within the last year, the Board has observed several proposals for new route certification by carriers which are based on the offering of low fares. The Midway case, which the Board has set down for hearing, has a low fare proposal by a brand new airline. Two carriers have offered low fares in the Las Vegas/Dallas market. I believe the Board will seriously consider whether or not that is a basis for granting a route award to one or both of those carriers. Two days ago Texas International applied for a certificate to fly between Washington and Houston, based on an extremely low fare. I anticipate the Board will carefully consider that route application. The Board is very interested in applications for new route authority that are based on low fares which the Board can reasonably expect to be fulfilled. Of course in the route area, everything takes a lot longer. There is a lot

more at stake, and the existing statute gives incumbent carriers considerable legal ammunition. Nothing dramatic is going to happen until some of these cases are settled by the Board, and ultimately litigated before the courts. But I think the basic policy thrust is there. The Board believes that freer entry into airline service makes sense and, in the long run, will be more responsible for a competitive system than any particular fare policy the Board adopts. However, the process of getting there is somewhat slower.

In some route cases, the Board may authorize more carriers to serve a market than would be allowed by traditional standards. The rationale is that we are faced with great uncertainty. We do not know how many carriers can profitably serve a market or which carriers are the most appropriate. We anticipate that even if only one carrier does operate, nonoperative carriers in the wings will provide a substantial competitive spur in the long run.

Easing Restrictions on Carriers?

One other significant feature of the Board's current policy is its attitude towards restrictions on carriers. Over the last 40 years, the CAB has acted as the handicapper general. The handicapper general is a character in a story by Kurt Vonnegut. The story describes our society 100 years from now when everybody's equal. To have everybody equal, you have to handicap them because some people run faster than others, some people are taller than others, and things like that. So if you are really going to get equality after the fact, you have got to put a lot of handicaps on people. And my interpretation of Board policy for 40 years is they have attempted to keep carriers equal by putting weights on the fast runners.

That basic handicapping process is under question. Let me give you an example: when the IATA carriers in the North Atlantic offered low transatlantic fares in response to Freddie Laker, the Board anticipated that the particular low fares might not be aimed so much at Freddie Laker's skytrain service, but aimed more at growing charter service by supplemental carriers in that market. The Board was very concerned that particular low fares would decimate the supplemental carries in the North Atlantic. They did several things in response, and I must add they got a little prodding from the President. They instituted an early warning system to monitor what happens to supplementals; but more significantly, they embarked on a very aggressive campaign to liberalize restriction on charters. So rather than block the low fares, rather than prevent people from competing vigorously against the charters, they let the low fares go in and simultaneously tried to take the blinders, weights, and hindrances off the charter operators so they would have a fair chance.

I think that is a basic approach this Board will take in the future. When it is concerned about the viability of one particular competitor or one segment of the market, its tendency, other things being equal, will be to free up some of the restrictions that made it difficult for that particular segment or competitor to participate effectively in the market. I think this is a very significant aspect of prospective CAB policy.

Problems Faced by the CAB

So far, I have indicated what I think is happening in the aviation industry, and also the direction in which I think the Board is moving. Let me mention at least four concerns that the Civil Aeronautics Board does face.

Predation

One major concern is possible predation in the relationship between scheduled traffic and supplemental carriers in the Atlantic. We saw the possibility again with TWA's low fares into Las Vegas. Both of these markets had significant charter traffic and some supplemental traffic, and the concern was that the proposed fares were low enough so the charters would be driven from the market. Now, this raises some very significant problems. If you are concerned about predation, what do you do about it? Unfortunately, a predatory price looks for all intents and purposes just like a competitive price. It is very difficult for the CAB to say, "ah, for years we have been trying to get these fares down and now you are lowering them, but they are too low." It is hard to grapple with that issue, but it is an issue that the Board is concerned about. With respect to charters, there is an even more significant long-run problem. If somehow, owing to their status under the statute, charters have a competitive disadvantage with respect to scheduled carriers, are you going to protect them or are you going to keep them in the market just because they act as a competitive spur—that is a very difficult question. The Board has not faced the question squarely, but they may have to.

Protecting Regular Service

A second policy concern that the Board has not resolved to its satisfaction is the problem of "protecting" regular service in the presence of discount fares. We have seen over the last six months a host of low fares, primarily aimed at discretionary travel. But what about the business man who still pays

the coach fare. Well, on the one hand you might be callous and say, his fares have not been going up noticeably. They just go up with costs because of the clever way we have devised fare calculations. There is no obvious change in coach fares as the amount of discounting increases. However, the terms and conditions of service for regular passengers have changed. Load factors on these airplanes are going up dramatically. The airplanes are more crowded, so that means the business man trying to get a reservation is facing different conditions than he faced 5 years ago. The Board is quite concerned about deterioration in service because, after all, they are establishing a ceiling price that is supposed to prevent the passenger from being exploited, and that ceiling price is based on a 55% load factor.

Now I have a partial answer for this. Most of these fares we have seen are based on capacity controls. The carriers will not deliberately sell a seat to a discount passenger when they could sell it to a business passenger. So the apparent increase in load factor that you see on an airplane does not harm the business passenger proportionately. The business passenger is really facing roughly the same opportunity for a reservation he always had because he is a preferred passenger. If he calls up within a reasonable period of time, the airline will serve him because they would rather have his full fare than somebody else's discount fare.

However, that particular answer does not work when you are talking about fares that are not capacity controlled. Therefore, this question of degraded service for the coach passenger is one that the Board is concerned about.

Protection of Consumers

A third thing the Board is concerned with is the protection of consumers. We monitor, on a regular basis, what is happening to consumers. It turns out that as various kinds of exotic services are offered, there are problems. Consumers get stranded on chartered flights; there are complaints about consumers not knowing about low fares and paying higher fares than they should; there are complaints about baggage lost, and so forth and so on. The Board is quite concerned that consumers may not know what they are buying. We see this concern when we consider policy towards charters and tour group operators. On the one hand, the Board wants to liberalize rules that give supplemental carriers a chance to compete fairly against scheduled carriers; but on the other hand, they are worried about people who fly on chartered airplanes and lose their baggage or have their charters cancelled. So simultaneously, the Board is trying to liberalize the conditions for charters and crack down on the people who fly charters—to make sure they do not abuse consumers. There is a basic conflict between these two goals, and the Board has to face it.

Financial Condition of the Carriers

One final policy concern is the financial condition of the carriers. It is a significant question. How can you have fares going down across the board and still have a viable airline industry? Well, I am quite optimistic about that because I do not interpret the Board's actions as being interested in low prices for the sake of low prices. They are interested in a rational, efficient airline service, and it turns out that these low fares so far make sense. It means we will be able to fly some individuals at lower fares by filling up airplanes, without destroying the economic viability of the carriers. I anticipate that load factors are going to go up. They are already up substantially. Our bureau of accounts and statistics is predicting that by year end the average load factor will exceed 55%, which is the DPFI standard for domestic operations. If we have peak/off-peak pricing systems, we can push load factors up into the 65-70% level domestically. That means you have got a lot more satisfied consumers; and you are doing it without a proportional increase in the fleet.

I predict, based on my perception of this market, we are going to continue having an increase in load factors. The carriers are now aware there are different service options that will fill up their airplanes. The Board is willing to accept those options on that basis. Therefore, I think we are going to see a steady increase in load factors. In that sense, low fares are not incompatible with financial viability. They will not destroy the carrier's ability to pay for new aircraft.

Closing Remarks

Now, let me mention a couple things that might otherwise drop through the cracks. In looking over the airline deregulation literature, no one seems to have addressed the fact that the retail price of air travel in this country is fixed by the statue we operate under. We have seen fixed retail prices in many industries, and the universal opinion is that they are a bad thing. They lead to excess capacity at the retail level, and they may lead to lack of choices for consumers. In fact, economists have been so successful in their attack on fair trade, or retail price mainte-

nance, that Congress has chosen to repeal the fair trade laws. Unfortunately, there is no movement to repeal fair trade with respect to airline tickets. And, if fair trade does not work well, if it leads to excess capacity and the wrong kind of service in other segments of the economy, it would seem that it probably does not work terribly well with respect to air travel. I have not done a study on this, but I am struck by the fact while we talk about more competition in the airline sector, we are stuck with a law that says the retail ticket price has to be the same no matter where you sell it or what the terms and conditions are.

A second thing I feel compelled to mention is this business about congestion and landing rights. Some airports seem fairly crowded, and some carriers having grandfather rights seem to have inherent advantages over other carries. That looks like the sign of a natural monopoly, and it gives regulators some concern, particularly regulators that are trying to increase competition in the system. There is a natural solution for that problem. If you have something scarce, you auction it off to the highest bidder. So if you have only a few slots at National Airport, you sell them to the highest bidder. I do not know what the Tennis Shoe Air Force will have to say about that proposal, but it is what economist naturally think about whenever there is scarcity. An economist does not think about getting the Government to build more airports, he thinks well why not auction off the scarce resource. I guess it all depends on your perspective, on how you think about these problems.

Closing Remarks...

Duane V. Freer
Director of Aviation Policy, FAA

It has been a long and productive day, so I will keep my closing remarks brief. Forecasting is a tough job. It is not a pure science; a lot of art is involved, as well as a lot of luck. When I first came to the agency back in 1932 or something like that, the only thing we had in the office that eventually became Policy and Planning was forecasting. We did straightline projections into the future based on history. We ultimately found that this "system" of forecasting was less and less reflective of the real world. We now have a very complex and sophisticated system of forecasting. Unfortunately, our new econometric and dynamic forecasting models are increasingly hard to explain. But the quality of our forecast is improving and that is what is important.

One big problem we have is deciding what we should forecast. Also, should we forecast "raw demand" or should we forecast real world? At our annual planning review conference held in Washington a couple of years ago, the then Associate Administrator dared to utter the word "constraints" publically. We got a flood of correspondence from people who were outraged that anyone in an aviation policy-making role should either admit to or accept constraints to the growth of aviation—primarily general aviation. So, it is a real problem, not only for us but for the industry, what to forecast—a constrained growth or raw demand for an ideal world.

The matter of constraints will be coming up for discussion soon. We are having a conference in Washington that is to be an engineering development and policy review conference. We hope that both our Administrator and the Chairman of the CAB will appear to kick it off. We expect that forecasting of both real and unconstrained demand will be dealt with head on.

One of the panel speakers made the point that he was not so disturbed by what the forecast said about 2 or 3 years downstream, but rather 20 years downstream. We, too, are concerned about that. We are thinking of separating our current forecast and making two—a short term and a long term prognostication. One technique is to use several scenarios for the longer term forecasts. We recently published an aviation futures document which draws five scenarios for the long range future. We hope that we have encompassed in that document all of the reasonable scenarios for the future. But we know full well there can be "wild card" entries in any scenario events that no one can foresee. They can warp everything out of shape. Such was the case with the OPEC oil embargo in 1973. Many things can happen, and there is no one in my office or Gene Mercer's shop who would relish the thought of standing here 20 years from today and having to account for

each and every missed projection.

Finally, let me express my appreciation for your participation in this conference. I think it has be a very good conference. It certainly has been helpful to us, and I hope it has been helpful to you. Frequent communication between forecasters, planners, and the air community is absolutely essential if we are to maintain a strong, vibrant, and well-functioning industry. Let us maintain and expand upon this dialog in the months ahead—both for the improvement of aviation forecasting and for the good of aviation.

Thank you very much.