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BENEFIT ANALYSIS OF THE AUTOMATED FLOW CONTROL FUNCTION OF THE AIR TRAFFIC CONTROL SYSTEMS COMMAND CENTER

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16. Abstract

This report summarizes the findings of a benefit analysis study of the present and proposed Air Traffic Control Systems Command Center automation systems. The benefits analyzed were those associated with Fuel Advisory Departure and Quota Flow procedures. Actual data on reduced arrival capacity conditions were analyzed. Benefits were then derived based on the supposition that flow control procedures had been utilized. Using future demand predictions, benefits for both the present and proposed advanced systems were estimated through 1990.

The study indicated that the only benefit that could be appropriately quantified was fuel savings due to the implementation of Fuel Advisory Departure Procedures.

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PREFACE

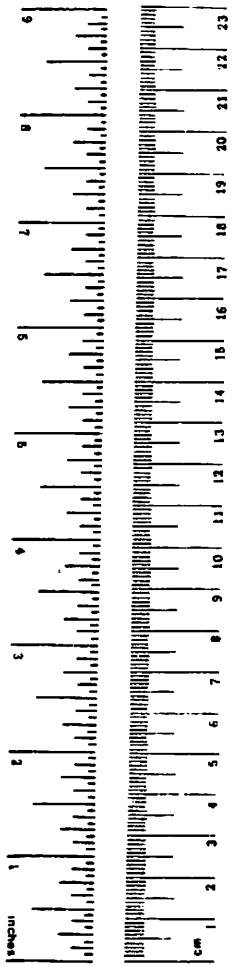
The operational requirements for flow control automation were proposed without quantification of anticipated benefits. The purpose of this report is to assess the benefits of the present flow control automation systems and to ascertain any additional or increased benefits due to a more accurate future system.

Appreciation is expressed to John R. Coonan, Paul M. MacDonald, and Manuel F. Madeiros for their contribution to this study.

METRIC CONVERSION FACTORS

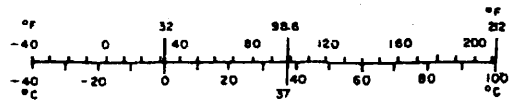
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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EXECUTIVE SUMMARY

This report presents the results of a benefit analysis of the present and planned automated systems supporting Central Flow Control operations in the Air Traffic Control Systems Command Center (ATCSCC) of the FAA.

The present and potential benefits of the systems were analyzed and are described in this report. It was determined that the basic quantifiable benefits of the systems are fuel savings resulting from the implementation of Fuel Advisory Departure (FAD) procedures.

In order to quantify fuel saving benefits the delays experienced by arrival traffic at the major airports in 1975 were examined in detail. The actual data for specific days, which would have been applicable to FAD procedures, were then gathered. The data were for four of the major airports (Atlanta, J.F. Kennedy, LaGuardia, and O'Hare).

The presently operational Airport Information Retrieval System (AIRS I) is a computer program which predicts future demand, landing delays, air hold counts, quota flow assignments, and FAD assignments in selected terminal areas. A version of this program was modified at the Transportation Systems Center and used as a simulation tool to derive estimates of the potential fuel savings that would have accrued if FAD procedures had been used throughout the year.

A Benefit Analysis Simulation (BAS) was then developed to quantify the potential long term benefits of AIRS I and the advanced operational system. Traffic forecast data were used in estimating the FAD procedure benefits through 1990. Because major delays are primarily caused by random unforeseen incidents (e.g., snow on runways, winds, thunderstorms, accidents) it was assumed that the number of delay days per year was constant through 1990.

Fuel saving benefits in both gallons of fuel saved and their dollar value were then derived. The dollar value of the benefits

was derived using standard present value techniques, with a discount rate of 10 percent.

Three different FAD procedure criteria were simulated to derive the benefits:

1. The present AIRS I, which detains aircraft on the ground so their airborne delays will not exceed 48 minutes. This is imposed on all aircraft departing within 2.5 hours of the impacted airport.

2. An advanced system option the same as AIRS I except the airborne delay time is reduced to 30 minutes.

3. An advanced system option with the 30-minute criterion covering all aircraft within the continental United States (CONUS).

The estimated benefits of the above for 1977 through 1990 are shown below.

FADP CRITERIA	PRESENT VALUE OF FUEL SAVING BENEFITS IN DOLLARS	TOTAL GALLONS OF FUEL SAVED
(1) 48 Min, 2.5 Hr	51,358,000	314,950,000
(2) 30 Min, 2.5 Hr	63,536,000	392,777,000
(3) 30 Min, CONUS	70,634,000	439,624,000

1. INTRODUCTION

The National Airspace System (NAS) is a semiautomated system installed in 20 Air Route Traffic Control Centers (ARTCC's). The computation and communication cost of this system are in the millions of dollars. Prior to 1970, each center had a tendency to act in an independent manner during adverse conditions, imposing restrictions on each other which at times had a detrimental effect on the entire system.

In order to alleviate this problem, the FAA established the Air Traffic Control System Command Center (ATCSCC) in 1970 to oversee the flow of aircraft among the centers. Its primary objective is the balancing of national air traffic flow to minimize delays without exceeding controller and airport/airspace capacity.

During the past 5 years, an evolutionary process of increasing flow control automation has occurred at the ATCSCC. In the fall of 1970 automation for data retrieval at 14 airports was initiated. The data retrieved were typical daily arrival scheduled times derived from the Reuben H. Donnelley Corp.-Official Airline Guide tapes. The first operational implementation of the Airport Information Retrieval System (AIRS I) was in January 1972. This system was implemented on a time-shared computer. The system was initially limited to the retrieval of the actual daily arrival scheduled times from the Rueben H. Donnelley Corp.-Official Airline Guide tapes. Evolutionary additions and improvements to AIRS I have continued, the major ones being:

a. Advanced Flow Control Procedures (AFCP), implemented in July 1972

b. Quota Flow, implemented in February 1973

c. Fuel Advisory Delay (FAD) procedures, implemented in February 1974

With the installation and constant improvements to the AIRS I flow control system the ATCSCC personnel have been able to assume more responsibility in managing traffic flow between adjacent

centers and to react more rapidly and efficiently in the solution of flow control problems.

The next major step will be the implementation of an advanced flow control system on a dedicated 9020A computer. This system will provide a real time interface to the ATCSCC and the 20 ARTCC's. The result will be timely, complete dynamic data on key position reports of enroute aircraft, reroute information, and diversions and cancellations of flights. These automation enhancements will result in a more accurate and efficient ATCSCC flow control system and an increased credibility with the users of the ATC system.

The purpose of this study was to define the benefits of the present AIRS I and the advanced flow control system and to quantify these benefits where possible.

It was determined that there were two areas where the benefits of the automated could possibly be quantified:

1. Fuel savings which would occur if FAD procedures were imposed.

2. Savings to the users due to the reduction in the number of flight disruptions (cancellations, diversions, and overflights).

It was decided that only the benefits of fuel savings due to the imposition of FAD would be quantified. The reasons for this were twofold:

1. Although a strong case can be made that flight disruptions would be lessened because of the imposition of either Fuel Advisory Departure of Quota Flow procedures, no credible number could be quantified.

2. The fuel saving benefits due to the imposition of FAD are high enough to justify the expenditures involved in the operation of AIRS I and the development/operation of the advanced system, thereby satisfying the objectives of the study.

In order to quantify the fuel saving benefits the AIRS I program was selected as the simulation tool, since it is the most timely source of delay predictions; it has valid, readily available

data and can predict delays under flow control procedures. The AIRS I program was modified to include an option for the calculation of fuel consumption savings when FAD procedures are imposed. Because of the large number of simulation runs required, a new Benefit Analysis Simulation (BAS) was developed and verified from cases run using AIRS I as the simulation tool.

In order to quantify the fuel saving benefits actual data were collected from the ATCSCC for the most serious arrival delay conditions during the first 11 months of 1975 for specific days and airports. These data were then reviewed, and a total of 68 cases at 4 airports were deemed applicable for the simulation of FAD procedures.

The above data were then utilized for the capacity and demand information inputs to the two simulations. Information from airlines and manufacturers was used to determine the actual fuel consumption rates for various categories of aircraft. These data were entered into the benefit analysis option of the AIRS I and the BAS Programs.

FAA demand predictions were used in order to quantify the FAD benefits through 1990. Simulation runs were made for both systems through 1990. Simulation runs were also made to determine the sensitivity of the results to future demand predictions, diurnal distribution of traffic, and capacity.

2. SYSTEMS DESCRIPTION

A brief description of the present AIRS I operational system and the advanced system is presented below. More detailed information appears in Appendixes C and D.

2.1 AIRS I OPERATIONAL SYSTEM

The AIRS I system is a computer program based upon an airport traffic information data base and designed for use by the FAA's Central Flow Control (CFC) Facility. The program is on a time-shared PDP-10 computer system. The biweekly Official Airline Guide (OAG) data tape from the R.H. Donnelley Corporation constitutes the main data base. This data base is enhanced by operator input from the ATCSCC. This input consists of flight schedule updates, Airport Reservation Office updates, and airport operational data such as landing capacity estimates, departure delays, and general aviation estimates as a percentage of scheduled traffic.

The AIRS I programs utilize this data base to compute the future demand, landing delay, air hold counts, quota flow assignments, and FAD assignments in the selected terminal areas. The FAD threshold used with AIRS I is 48 minutes of airborne holding; that is, for any predicted delay greater than 48 minutes the delay time in excess of 48 minutes is assigned as a ground delay.

2.2 ADVANCED CENTRAL FLOW CONTROL SYSTEM

The computer for the advanced flow control system will be an IBM 9020A computing system located at the Jacksonville (JAX) ARTCC. It will provide data processing support to the ATCSCC located in Federal Office Building 10A in Washington, D.C.

A dedicated communication interface between the input/output devices at the ATCSCC and the JAX CFC computer will provide for rapid exchange of CFC message queries and responses. Data communication channels between the CFC computer and the NAS en route center computers will also be established using a store and forward concept.

The basis CFC reference data base is the same OAG tape as used in AIRS I. An off-line configuration of the CFC computer system (batch processing) will be used for the biweekly update. The NAS en route computing system will augment this OAG-derived data base in real-time with flight-related messages via the store and forward communication system. These messages are simply position and flight progress reports by flight identification. The FAD threshold used with the advanced system will be 30 minutes of airborne holding.

3. BENEFITS OF THE AUTOMATED FLOW CONTROL FUNCTION

3.1 INTRODUCTION

The present AIRS I and the advanced automated systems capabilities have been reviewed and a number of benefits identified. Many of the benefits cannot be directly quantified, but they nevertheless contribute to the enhancement of the National Aviation System. The major enhancements are:

a. Equitable and timely distribution of both air and ground delay times.

b. Predictive tool to alert users of delays and their length

c. Distribution of airborne holding aircraft for more efficient stacking and sequencing and to permit en route aircraft to "fly through."

d. Smoothing of traffic, resulting in a distribution of traffic peaks.

e. Reducing cancellations and diversions due to holding aircraft on the ground and giving the user the option to cancel or divert flights when alerted to the length of the delay.

The benefits of the automated systems are discussed in detail below.

3.2 BENEFITS OF FUEL ADVISORY DEPARTURE (FAD) AND QUOTA FLOW CONTROL (QFLOW) PROCEDURES IN REDUCING AIRCRAFT OPERATING EXPENSES

The most obvious benefits of the automated system are in the implementation of FAD and QFLOW procedures. The procedures presently in use are delineated in "Flow Control Procedures," Federal Aviation Administration Order 7210-7C, Jan. 8, 1976.

The imposition of these procedures is predicated on an actual airport constraint, such as equipment failure, weather phenomena, or other factors, that significantly reduces the airport's acceptance rate with delays predicted for an extended period of time.

Briefly, FAD procedures are designed to reduce aircraft operating expenses by absorbing a portion of the predicted delay on the ground; QFLOW procedures are designed to saturate safely the arrival center and adjacent center airspace to keep a constant demand pressure at the arrival airport. QFLOW procedures can also involve the imposition of ground delays.

This study quantified only the reduction of aircraft operating expenses due to the imposition of FAD procedures, since both FAD and QFLOW procedures are applicable to the same delay conditions, and FAD procedures result in higher benefits.

The Civil Aeronautics Board (CAB) publishes operating costs of aircraft operated by the U.S. certified route carriers for 12-month periods. The operating costs are tabulated by block hours and are divided into the categories of flying operations, maintenance, and depreciation/rentals. Only the first two categories have potential as cost saving, because of the implementation of FAD procedures. In order to determine the potential benefits to be derived from the application of FAD procedures to these pertinent costs, discussions were held with airlines, user organizations, an aircraft manufacturer, and an engine manufacturer. The results are discussed below.

3.2.1 Flying Operations

The dominant costs of flying operations are those of crew and fuel. In 1974 crew and fuel costs constituted more than 98 percent of flying operation costs. By 1975 trade publications indicated this figure had increased to 99 percent.

3.2.1.1 Crew Costs - Telephone discussions were held with representatives of the Air Transport Association, the Airline Pilots Association, and various airlines. The general consensus was that crew costs should be considered the same whether an aircraft is holding in the air or at the originating airport. Therefore, no differentiation was made between crew costs while holding on the ground or in the air in this study.

3.2.1.2 Fuel Costs - Fuel costs obviously are the major cost differential between holding on the ground and in the air. Telephone conversations were held with several airlines in order to obtain typical holding fuel consumption rates. At O'Hare one airline stated that they used 15,000 ft. as their typical holding altitude for fuel consumption estimations. The estimated holding fuel consumption rates for a second airline were slightly higher.

A review was then made of aircraft's holding performance curves and charts. These data indicated that the holding fuel consumption rates obtained from the airlines were approximately at the various aircrafts' gross weight midpoints.

For consistency in this study all fuel consumption rates were extracted from the performance data at a holding altitude of 15,000 ft and at the midpoint gross weights of performance curves or charts. To be conservative the minimum holding fuel consumption rates delineated were used. The selection of the midpoint gross weight for each aircraft type appears to be the logical choice for the following reasons:

a. It agrees with the data obtained from the airlines.

b. The stage lengths of the flights will be of various lengths, resulting in various aircraft gross weights in the terminal area.

c. The aircraft loads (passenger and cargo) will vary, resulting in different gross weights.

d. The aircraft gross weight will vary dependent on whether a scheduled refueling is to be made at the terminal airport.

For the purpose of this study it was assumed that the taxi/idle ground fuel consumptions were equivalent whether the aircraft had an imposed FAD ground delay or takeoff occurred at the original scheduled time. This assumes that the taxiway queue times at the end of the FAD ground delay and the originally scheduled time frames were the same, and the aircraft remained at the gate.

Therefore, the decrease in airborne holding time will result in the FAD fuel saving benefits when multiplied by the holding fuel consumption rates.

3.2.2 Maintenance

A study was made to determine if a difference between maintenance costs while airborne holding vs. holding on the ground could be determined. Several airlines were contacted. The concensus was that there would be no difference between maintenance costs based on whether an aircraft was holding in the air or on the ground.

If any appreciable maintenance cost differential existed between holding in the air or on the ground it would be in engine maintenance costs. As a further check discussions were held with representatives of an engine manufacturer. They stated that the major maintenance costs associated with engines are in the takeoff, climb, and cruise portion of a flight, with the first two phases predominant as far as engine life. They estimated that the descent and holding phases contribute less than 1 percent of engine maintenance costs; idling on the ground contributes less than 0.5 percent. In addition, engines are no longer cycled for maintenance on the basis of airborne hours. A variety of engine parameters are constantly monitored, and these parameters determine when an engine should have major maintenance. Therefore, it was their recommendation that no engine maintenance cost differential be used in this study.

As a result, maintenance costs differentials are not considered as quantifiable benefits of FAD.

3.2.3 Conclusions

The only quantifiable benefit of aircraft operating costs is the reduction of fuel consumption due to holding aircraft on the ground during FAD.

3.3 FLIGHT DISRUPTIONS

In order to determine the effects of flow control on cancellations, diversions, and overflights an attempt was made to develop an algorithm based on such factors as fuel reserves, accumulated flight time, and delay time. In October 1975 the author visited the central operations/dispatching offices of two airlines. The development of such an algorithm was discussed and their representatives did not consider such an algorithm feasible. Flight disruption decisions were made by experienced airline dispatchers. The decisions to order a flight disruption were multilateral in nature. Some of the factors involved included

a. What is the amount of fuel reserve?

b. What is the predicted length of the delay?

c. What is the need of the aircraft on other routes?

d. Is the crew scheduled to take a new flight from the destination airport?

e. Because of the announced delay will the scheduled passengers have switched to a competing airline for the next flight stage?

f. Can other flights be rescheduled for more efficient use?

If present flow control procedures were in common use it is felt that a reduction in the number of flight disruptions would occur. With the implementation of the advanced flow control a further reduction could be expected because of its greater accuracy, and in turn, more credibility to the users. Since no actual data exist on the reduction of flight disruptions due to flow control procedures and considering the factors discussed above, the reduction in flight disruption have not been considered as a quantifiable benefit in this study.

4. QUANTIFICATION OF FAD PROCEDURE BENEFITS

4.1 INTRODUCTION

The first step in quantifying the benefits of FAD procedures was the development of a simulation tool. The present AIRS I system was modified and used for the original simulation runs. Because of the number of runs required and the costs and time involved in utilizing AIRS I as a simulation tool, a Benefit Analysis Simulation (BAS) was developed. Selections of cases to be run and sensitivities of the simulations to input parameters were determined. The BAS was verified and used as the basic simulation tool. Parametric runs were than made as functions of FAD procedure criteria, and finally, sensitivity runs were performed. The results are presented in the following sections.

4.2 SIMULATION DEVELOPMENT

4.2.1 Modification of AIRS I

The presently operational Airport Information Retrieval System (AIRS I) was modified to include an option for the calculation of fuel saving benefits due to the imposition of FAD procedures. Briefly, the initial program retrieves the actual hourly scheduled aircraft and estimates of general aviation traffic, including Airport Reservation Office (ARO) updates, from its data base. Estimated hourly airport arrival capacity and an allowable terminal area delay time are entered. The program then calculates the estimated terminal delays for all aircraft. Based on the estimated time of departures from the originating airports, ground delays for each individual aircraft are calculated so each aircraft will be delayed in the terminal area by the entered hourly terminal delay. The additional option calculates the fuel saving benefits for eight categories of aircraft. The outputs include by aircraft category the number of aircraft delayed, the total delay time, the ground delay during the FAD period, the fuel savings in gallons, the dollar savings, the number of aircraft delayed on the ground

during the FAD period, and the number of aircraft delayed (air and ground) during the FAD period. Aggregations of these figures are also included.

The fuel consumption rates used are listed below:

CATEGORY	GALLONS PER MINUTE
4-Engine Wide Body Jet	50.3
3-Engine Wide Body Jet	29.0
4-Engine Regular Body-Stretched Jet	25.3
4-Engine Regular Body Jet	22.8
3-Engine Regular Body Jet	16.8
2-Engine Regular Body Jet	11.0
Turboprop	3.7
All Others	1.0

For simplicity in running simulations one fuel consumption rate is used for the majority of the general aviation aircraft. The total savings for this category contribute approximately 0.1 percent of the total fuel savings, a figure of essentially no significance. Also, General Aviation two-engine jets have been included with the two-engine airline jet category. In a typical run this entire category contributes about 20 percent of the total fuel saved. The number of small general aviation jets included has very slight significance on the results because of the percent included in the category and the offsetting result of higher-fuel prices vs. lower fuel consumption.

Cost savings for the first seven categories were based on a fuel cost of $0.31 per gallon. The "All Other" category fuel savings was based on a fuel cost of $0.70 per gallon.

4.2.2 Development of the Benefit Analysis Simulation (BAS)

A number of simulation runs were performed using the AIRS I as the simulation tool. The BAS was then developed in order that

a large amount of runs could be simulated in a rapid and efficient manner. A description of the BAS and its verification as a simulation tool are contained in Appendix B.

The BAS was used in generating all the results presented in the following sections.

4.3 SELECTION OF CASES TO BE SIMULATED

One of the major problems in the study was in determining the number of cases that FAD procedures could be applied in future years. It was decided that the most reasonable way would be to review the ATCSCC Daily Résumés and RECAP sheets for problem days during 1975. The first 11 months of 1975 were reviewed. The FAA AAT-12 Performance Summary Profile (PSP) sheets were then collected for all days where the number of 30-minute arrival delays exceeded approximately 50 aircraft. The case studies were limited to ATL, JFK, LGA, and ORD, since PSP data were available for these airports. These four airports account for approximately 80 percent of all IFR delays greater than 30 minutes. There were several days at other airports which could not be simulated because data were not available. In addition, one PSP was missing from ORD, so this day was not simulated.

The advantage of using the PSP data was that the actual hourly arrival capacities during adverse conditions are recorded. The cases simulated and the reasons for capacity reduction are shown in Table 1. A study of the reasons for reduced capacity indicates that the implementation of the UG3RD would have little effect on the cases selected. Therefore, the same cases were deemed applicable for future years.

4.4 SIMULATION RUNS

The simulation runs were made by utilizing the data on the PSP's. Capacity was equated to the PSP actual hourly arrival data. In the cases where these data were not recorded either of two assumptions were made: (1) capacity was assumed to equal the normal capacity of the airports or (2) if the PSP data indicated

TABLE 1. 1975 SIMULATED FADP RUNS WITH CAUSES OF CAPACITY REDUCTION (JANUARY THROUGH NOVEMBER)

AIRPORT	DATE	CAUSES OF CAPACITY REDUCTION
ORD	1-8	Low Ceiling and Visibility
ORD	1-9	Volume, Heavy Jet Mix
ORD	1-10	Thunderstorms, High Shifting Winds
ORD	1-29	Winds
ORD	2-5	Snow
ORD	2-15	Snow, Below Minimums
ORD	2-23	Localizer Failure
ORD	2-25	Winds, Low Ceiling, Snow
ORD	3-24	Decreased Visibility, Snow
ORD	3-27	Winds, Icing, Demand, ILS Loss
ORD	4-2	Snow, Visibilities, Two ILS Failures
ORD	4-3	Snow
ORD	4-18	Thunderstorms, Demand
ORD	4-19	Winds, Runway Closure for "Soil Evaluation"
ORD	5-30	Thunderstorms
ORD	6-12	Winds, Reduced Visibility
ORD	6-17	Thunderstorms
ORD	8-20	Thunderstorms
ORD	8-22	Thunderstorms
ORD	9-11	Winds, Aircraft Emergency
ORD	10-17	Winds
ORD	10-22	Winds, Demand
ORD	10-23	Runway Closed, Winds, Computer Outage
ORD	10-24	Weather
ORD	10-31	Winds
ORD	11-2	Demand
ORD	11-9	Demand
ORD	11-13	Winds
ORD	11-26	Snow, Low Ceiling and Visibility

TABLE 1. 1975 SIMULATED FADP RUNS WITH CAUSES OF CAPACITY REDUCTION (CONTINUED)

AIRPORT	DATE	CAUSES OF CAPACITY REDUCTIONS
JFK	1-11	Below Minimums
JFK	1-18	Winds
JFK	2-5	Winds, Snow Removal
JFK	3-19	Weather, Departures, Volume, Runway Configuration
JFK	4-24	IFR Weather, "Scan" Failure, Weather Below Minimums
JFK	6-12	One Runway for Arrivals Combined with Low Ceiling, Low Visibility and Traffic Volume
JFK	6-15	Low Ceiling, No Visual Approaches
JFK	6-16	Demand Exceeded Capacity for One Landing Runway with IFR Weather
JFK	6-24	Airport Accident
JFK	6-28	Demand, Weather
JFK	7-13	Thunderstorms, Runway Closed for Inspection
JFK	8-4	Weather
JFK	8-24	Thunderstorms, Runway Configuration, Demand
JFK	8-25	Below Minimums
JFK	8-26	Low Ceiling, Low Visibility
JFK	10-25	Alternating Approaches with LGA, Runway Change, Weather
JFK	11-12	Crash, Weather, ILS Failure
JFK	11-13	Winds
JFK	11-14	Disabled Aircrafts Caused Single Runway Operation
JFK	11-21	Thunderstorms, High Winds
JFK	11-30	Strong Winds, Low Visibility
LGA	1-13	Weather, Sanding of Runway
LGA	1-20	IFR Weather, Icy Runway Caused Poor Breaking Action
LGA	1-25	Weather Below Minimum, Glide Slope Out of Service
LGA	3-12	Strong Gusty Winds
LGA	3-14	Weather Below Minimums, Runway Closed for Sanding
LGA	3-19	Weather, Sanding of Runway
LGA	5-4	Weather, One Runway Operation Due to JFK ILS Approaches, Conflicting Flow Between LGA and TEB

TABLE 1. 1975 SIMULATED FADP RUNS WITH CAUSES OF CAPACITY REDUCTION (CONCLUDED)

AIRPORT	DATE	CAUSES OF REDUCED CAPACITY
LGA	8-4	Weather
LGA	9-26	Winds, ILS Failure
LGA	11-21	Winds, Wet Runways
LGA	11-24	Winds
LGA	11-30	Winds, Visibility
ATL	2-1	Weather Below Minimum
ATL	2-19	Low Ceiling, Runway Localizer Inoperative
ATL	2-23	Weather Below Minimum
ATL	3-12	Low Ceiling, Low Visibility, and RVR
ATL	9-7	Low Ceiling, Low Visibility, Airport Below User Minimums
ATL	11-24	Below Minimums, Runway Repairs, Winds

delays had occurred in the missing actual arrival periods, capacity figures were estimated by graphical extrapolation using the hourly demand and the time and magnitude of the delays. In order to determine the benefits of future years, preliminary FAA demand data predictions were used. The ratio of future yearly data to 1975 data is shown below:

YEAR	ATL	JFK	LGA	ORD
1975	1.0	1.0	1.0	1.0
1980	1.175	1.206	1.062	1.079
1985	1.275	1.347	1.121	1.091
1990	1.285	1.458	1.150	1.101

The normal values of arrival capacities used in the simulations were:

AIRPORT	ARRIVAL CAPACITY PER HOUR
ATL	50
JFK	45
LGA	40
ORD	65

The BAS calculated the fuel saving benefits for 1975, 1980, 1985, and 1990. Linear interpolation was then used to calculate the benefits for the years between the four data points. Because the data base only contained 11 months of data these results were multiplied by 12/11 to arrive at the actual yearly benefits.

In the simulation runs a determination had to be made as to how future demand increases would be treated on an hourly basis. At the present time actual hourly demand sometimes exceeds normal capacity during peak demand hours. It was decided to conduct simulation runs at four different future diurnal demand distribution scenarios ranging from future hourly demand increased proportional to the increase in yearly demand to all future hourly

demand greater than hourly capacity redistributed to other hours. (The redistribution algorithm is defined in Appendix B.) Table 2 delineates the four diurnal demand distributions used in the simulations.

Simulation runs were made for the following conditions:

a. 48-minute FAD for all aircraft within 2.5 hours of impacted airport criterion (the present AIRS I).

b. 30-minute FAD for all aircraft within 2.5 hours of impacted airport criterion for one option of the advanced system.

c. 15-minute FAD for all aircraft within 2.5 hours of impacted airport criterion for second option of the advanced system for use in future years in conjunction with UG3RD improvements.

Sensitivity runs were also performed as functions of future demand and capacity. The results of these runs are contained in Appendix A.

Another option of the advanced system is to implement FAD Procedures for all aircraft within CONUS departing for the impacted airport. Since the AIRS I and BAS were only able to simulate the 2.5-hour cases this condition was handled as follows:

The AIRS I system was used to determine both the daily number of aircraft arriving at the four airports that departed within 2.5 hours flight time of the airports and also the daily number of aircraft arriving at the impacted airports that departed from within CONUS. These results are shown in Table 3. The ratios of the number of flights departing within CONUS to the number of flights departing within 2.5 hours flight time of the airports were then calculated.

These ratios were used to adjust the simulation results so that the fuel saving benefits for all aircraft departing within CONUS could be calculated.

4.5 FAD PROCEDURES FUEL SAVING BENEFIT RESULTS

The initial simulations were run for the four future diurnal demand distributions. The results are shown in Table 4. These

TABLE 2. FUTURE DIURNAL DEMAND DISTRIBUTION SCENARIOS FOR FAD BENEFIT ANALYSIS

SCENARIO	STEP 1	STEP 2
A	Future hourly demand increased proportionally to 1975 hourly demand as a function of future yearly demand predictions divided by 1975 demand.	No redistribution
B	Same as Scenario A	All future hourly demand greater than 120 percent of hourly capacity redistributed to other hours.
C	Same as Scenario A	All future hourly demand greater than 110 percent of hourly capacity redistributed to other hours.
D	Same as Scenario A	All future hourly demand greater than hourly capacity redistributed to other hours.

TABLE 3. PERCENT OF ARRIVALS ORIGINATING WITHIN 2.5 HOURS AND WITHIN CONUS

AIRPORT/ITEMS	8/14/76 SAT.	SUN.	MON.	TUE.	WED.	THU.	FRI.
ORD							
24 hr. Total Arrivals	895	821	931	975	980	983	977
Arr Within 2 1/2 hrs.	750	676	790	821	827	829	823
%	84%	82%	85%	84%	84%	84%	84%
Arr Within CONUS	861	790	897	942	948	948	945
%	96%	96%	96%	97%	97%	96%	97%
JFK							
24 hr. Total Arrivals	388	370	357	387	394	403	396
Arr Within 2 1/2 hrs.	209	194	202	218	225	224	223
%	54%	52%	57%	56%	57%	56%	56%
Arr Within CONUS	248	225	235	263	269	270	266
%	64%	61%	66%	68%	68%	67%	67%
LGA							
24 hr. Total Arrivals	311	296	374	375	374	375	375
Arr Within 2 1/2 hrs.	294	279	356	357	356	357	357
%	95%	94%	95%	95%	95%	95%	95%
Arr Within CONUS	300	285	362	363	362	363	363
%	96%	96%	97%	97%	97%	97%	97%
ATL							
24 hr. Total Arrivals	604	580	601	611	612	615	615
Arr Within 2 1/2 hrs.	588	562	583	595	597	598	598
%	97%	97%	97%	97%	98%	97%	97%
Arr Within CONUS	599	573	594	605	606	609	609
%	99%	99%	99%	99%	99%	99%	99%

TABLE 4. FADP FUEL SAVING BENEFITS AS FUNCTIONS OF FUTURE DEMAND DISTRIBUTION SCENARIOS FOR AIRCRAFT WITHIN 2.5 HOURS OF IMPACTED AIRPORT CRITERION

SCENARIO	1980		1985		1990	
	48 Minute FADP	30 Minute FADP	48 Minute FADP	30 Minute FADP	48 Minute FADP	30 Minute FADP
	BENEFITS IN THOUSANDS OF DOLLARS					
A	5941	7818	8251	10,351	9808	12,046
B	5922	7802	8224	10,326	9787	12,029
C	5848	7755	8130	10,262	9641	11,915
D	5393	7210	7480	9506	8807	10,943
	BENEFITS RELATIVE TO SCENARIO A					
A	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	1.00	1.00	1.00	1.00	1.00
C	0.98	0.99	0.98	0.99	0.98	0.99
D	0.91	0.92	0.91	0.92	0.90	0.91

results show that the fuel saving benefits of Scenarios A, B, and C are approximately the same. Therefore, the remaining simulation runs were only run for Scenarios A and D.

FAD procedure fuel saving benefits were then calculated for the time period 1977 through 1990. For the advanced system cases it was assumed that the system would become operational in 1979. Therefore, the 1977 and 1978 benefits for the advanced system are the same as the AIRS I 48-minute, 2.5-hour criterion.

Tables 5 and 6 show the dollar benefits for the 48-minute and 30-minute FAD procedure system applied to all aircraft within 2.5 hours of the impacted airports for Scenarios A and D future demand distributions, respectively. Table 7 shows the dollar benefits for the advanced system for the 30-minute, CONUS FAD criterion. The present value of the benefits were calculated using a 10 percent discount rate.

As stated previously the Scenario A diurnal demand distribution proportionally increases hourly traffic as a function of yearly increases in demand forecasts; the Scenario D diurnal demand distribution redistributes any future hourly traffic exceeding hourly capacity to other hours. It is beyond the scope of this report to determine how future traffic will be regulated. It was decided to use the average values of the benefits of the two scenarios, since some compromise between the two appear reasonable. The results for the average values are shown below.

SYSTEM	PRESENT VALUE OF BENEFITS (IN DOLLARS)	TOTAL FUEL SAVINGS (IN GALLONS)
48-Minute 2.5-Hour	51,358,000	314,950,000
30-Minute 2.5-Hour	63,536,000	392,777,000
30-Minute CONUS	70,634,000	439,624,000

Table 8 shows the dollar benefits for the advanced system if the 30-minute criterion is reduced to 15 minutes in 1985 for Scenario A demand distribution for both aircraft within 2.5 hours and within

TABLE 5. FADP FUEL SAVING BENEFITS FOR AIRCRAFT WITHIN 2.5 HOURS OF IMPACTED AIRPORT FOR SCENARIO A DEMAND DISTRIBUTION

(Benefits in Thousands of Dollars)

YEAR	48 Minute FADP Criterion Yearly Benefits	30 Minute FADP Criterion Yearly Benefits
1977	3967	3967
1978	4625	4625
1979	5283	7018
1980	5941	7818
1981	6403	8325
1982	6865	8831
1983	7327	9338
1984	7789	9844
1985	8251	10351
1986	8562	10690
1987	8874	11029
1988	9185	11368
1989	9497	11707
1990	9808	12046
PRESENT VALUE	53758	66157

TABLE 6. FADP FUEL SAVING BENEFITS FOR AIRCRAFT WITHIN 2.5 HOURS OF IMPACTED AIRPORT FOR SCENARIO D DEMAND DISTRIBUTION

(Benefits in Thousands of Dollars)

YEAR	48 Minute FADP Criterion Yearly Benefits	30 Minute FADP Criterion Yearly Benefits
1977	3748	3748
1978	4296	4296
1979	4845	6532
1980	5393	7210
1981	5810	7669
1982	6228	8128
1983	6645	8588
1984	7063	9047
1985	7480	9506
1986	7746	9793
1987	8011	10081
1988	8277	10368
1989	8542	10656
1990	8808	10943
PRESENT VALUE	48957	67729

TABLE 7. THIRTY-MINUTE FADP FUEL SAVING BENEFITS FOR ALL AIRCRAFT DEPARTING WITHIN THE CONTINENTAL U.S. FOR IMPACTED AIRPORT

(Benefits in Thousands of Dollars)

YEAR	Scenario A Demand Distribution Yearly Benefits	Scenario D Demand Distribution Yearly Benefits
1977	3967	3748
1978	4625	4296
1979	7842	7289
1980	8848	8157
1981	9409	8668
1982	9969	9179
1983	10530	9690
1984	11090	10201
1985	11651	10712
1986	12043	11046
1987	12434	11380
1988	12826	11713
1989	13217	12047
1990	13609	12381
PRESENT VALUE	73538	67729

TABLE 8. FADP FUEL SAVING BENEFITS FOR 15-MINUTE FADP CRITERION INITIATED IN 1985

(Benefits in Thousands of Dollars)

YEAR	Aircraft Departing Within 2.5 Hours for Impacted Airport	Airport Departing Within Conus for Impacted Airport
1977	3967	3967
1978	4625	4625
1979	7018	7842
1980	7818	8848
1981	8325	9409
1982	8831	9969
1983	9338	10530
1984	9844	11090
1985	11586	13025
1986	11938	13431
1987	12290	13837
1988	12643	14244
1989	12995	14650
1990	13347	15056
PRESENT VALUE	68981	76680

CONUS. The increase in benefits from implementing the 15-minute criterion are shown below.

FADP CRITERIA	INCREASE IN PRESENT VALUE OF DOLLAR BENEFITS	INCREASE IN GALLONS OF FUEL SAVED
2.5 Hours	5,445,000	41,304,000
CONUS	6,045,000	45,934,000

4.6 SENSITIVITY ANALYSIS

4.6.1 Sensitivity to Airborne Holding Conditions Simulation Assumptions

The fuel consumption savings were calculated on the basis that the airborne delays would occur at an average holding altitude of 15,000 ft and at the midpoint gross weight as shown on the manufacturers' holding curves and charts. There are an unlimited number of combinations of altitudes and aircraft gross weights. Because of limitations in data and for brevity it was decided that fuel consumption sensitivity would be calculated as follows:

a. Holding altitude fuel consumption rates at 5000 ft and 25,000 ft were compared to the 15,000 ft holding fuel consumption rates with the midpoint gross weights used in all calculations.

b. The minimum and maximum holding gross weight fuel consumption rates were compared to the midpoint gross weights with a 15,000 ft holding altitude used in all calculations.

Fuel consumption rates' sensitivities are shown below for the five major aircraft types.

AIRCRAFT TYPE	PERCENT DIFFERENCE FROM REFERENCE VALUES			
	HOLDING ALTITUDE		GROSS WEIGHT	
	5000 FT	25,000 FT	MINIMUM	MAXIMUM
4-Engine Wide Body	+5.8	-2.9	-24.9	+27.8
3-Engine Wide Body	+5.1	-1.7	-23.1	+34.2
4-Engine Reg. Body-S	+4.8	-3.9	-35.9	+30.1
3-Engine Reg. Body	+6.9	-4.0	-19.7	+12.8
2-Engine Reg. Body	+8.5	-5.4	-13.4	+15.8

The above data were then applied to the ORD simulation run for 2-5-75, which was the run of maximum impact. The above five aircraft categories accounted for over 95 percent of the fuel savings. This results were as follows:

a. The effects of a 10,000 ft difference in holding altitude resulted in less than a 5.2 percent change in overall FAD fuel saving benefits.

b. The effects of excursions in aircraft gross weight from the midpoint to either the minimum or maximum values resulted in less than a 20 percent change in overall FAD fuel saving benefits.

These results indicate that the selection of 15,000 ft as a reference holding altitude had a relatively minimum effect on the FAD simulation results. The minimum and maximum aircraft gross weights have considerably more effect on the results. However, as previously discussed, the midpoint gross weight seems to be the most reasonable figure to use in the simulation. Also, there appears to be a slight probability that many aircraft would be holding at the minimum or maximum holding gross weights delineated by the manufacturers. Therefore, the practical effects of aircraft gross weights would be considerably less than shown in the previous table.

4.6.2 Sensitivity to Ground Holding Conditions Simulation Assumptions

The FAD procedure simulation benefit calculation was made with the assumption that an equivalent amount of fuel will be consumed on the ground during the imposed ground delays as would have been the case if the aircraft had departed as scheduled. This is obviously the most desirable condition, since it results in the maximum fuel saving benefits. However, if this assumption is not true the ground fuel consumption for the imposed ground delays could be higher for the following reasons:

a. Gate congestion requiring that aircraft be moved away from their gates.

b. Imposed ground departure delays having aircraft being scheduled for takeoffs during higher departure demand periods causing higher taxiway queues with resulting higher engine idle time. (By the same token, the opposite effect could occur.)

No actual data were available for analysis. However, the sensitivity of any possible increase in ground fuel consumption due to the imposition of FAD Procedures has been considered in this study. The following typical fuel consumption rates for aircraft while at idle were used:

TYPE	GALLONS PER MINUTE
4-Engine Wide Body	19.6
3-Engine Wide Body	9.4
4-Engine Regular Body Stretched	10.7
4-Engine Regular Body	10.3
3-Engine Regular Body	7.4
2-Engine Regular Body	4.8
Turbo	3.0

The sensitivity of FAD fuel saving benefits to running the aircraft engines during a portion of the FAD-imposed ground delay was determined by applying the above data to the simulation results for 2-5-75. The FAD-imposed ground delays average 125 minutes over a time span of 16 hours. These results indicated that if the aircraft engines were running for 20 percent of the FAD-imposed ground delay the decrease in FAD benefits would have been less than 9 percent. The 20 percent figure says that all aircraft could have had their engines at taxi/idle for 25 minutes during the imposed ground delay.

During this time frame aircraft could have experienced reduced as well as increased takeoff queue times. Therefore, the differences between taxiway waiting times could even possibly have a zero average over the entire period, resulting in no additional taxi/idle fuel consumption on the taxiway. Also, over the entire FAD

period it is not probable that gate demand would require all the aircraft to be moved from their departure gate to a holding area, necessitating additional taxi fuel consumption.

4.6.3 Sensitivity of Fuel Saving Benefits to Future Demand Predictions

In order to determine the sensitivity of fuel saving benefits to demand, simulation runs were made at plus and minus 20 percent of the future demand predictions. The results of these runs are shown in Tables 9 through 13. Table 13 shows the sensitivity of the benefits to future demand.

For future demand Scenario A, the ratios of percent change in benefits to percent change in demand extend from 1.0 to 0.8. For future demand Scenario D these ratios range from 0.8 to 0.65. It would be expected that Scenario D would be less sensitive to demand changes, since all traffic above normal capacity is spread to off peak hours.

4.6.4 Sensitivity of Fuel Saving Benefits to Arrival Capacity During Nonadverse Conditions

Table 14 shows three sets of capacity estimates for the four airports. The capacities shown are (1) the TSC baseline estimates which were constant through 1990 and (2) the ATCSCC IFR 1976 capacity estimates, and (3) UG3RD capacity estimates for 1975, 1980, 1985, and 1990.

Table 15 shows the benefits for Scenario A demand distribution for aircraft within 2.5 hours of impacted airports for the 48- and 30-minute criteria with the ATCSCC IFR capacity estimates.

Comparing these results to the results with the TSC capacities shows the following fuel saving benefits (present value):

	PRESENT VALUE OF FUEL SAVING BENEFITS IN DOLLARS	
	TSC CAPACITIES	ATCSCC CAPACITIES
48-Min FADP	53,758,000	55,051,000
30-Min FADP	66,157,000	67,888,000

TABLE 9. THIRTY-MINUTE FADP FUEL SAVING BENEFITS FOR ALL AIRCRAFT DEPARTING WITHIN THE CONTINENTAL U.S. FOR IMPACTED AIRPORTS WITH FUTURE DEMAND INCREASED BY 20%

(Benefits in Thousands of Dollars)

YEAR	Scenario A Demand Distribution Yearly Benefits	Scenario D Demand Distribution Yearly Benefits
1977	4393	4064
1978	5265	4770
1979	8910	8079
1980	10183	9144
1981	10891	9736
1982	11599	10328
1983	12306	10919
1984	13014	11511
1985	13722	12103
1986	14228	12506
1987	14733	12909
1988	15239	13311
1989	15744	13714
1990	16250	14117
PRESENT VALUE	85638	76131

TABLE 10. THIRTY-MINUTE FADP FUEL SAVING BENEFITS FOR ALL AIRCRAFT DEPARTING WITHIN THE CONTINENTAL U.S. FOR IMPACTED AIRPORT WITH FUTURE DEMAND DECREASED BY 20%

(Benefits in Thousands of Dollars)

YEAR	Scenario A Demand Distribution Yearly Benefits	Scenario D Demand Distribution Yearly Benefits
1977	3575	3436
1978	4037	3829
1979	6814	6462
1980	7563	7123
1981	7986	7520
1982	8408	7918
1983	8831	8315
1984	9253	8712
1985	9676	9110
1986	9961	9360
1987	10246	9609
1988	10531	9859
1989	10817	10109
1990	11102	10358
PRESENT VALUE	62009	58427

TABLE 11. FADP FUEL SAVING BENEFITS FOR AIRCRAFT WITHIN 2.5 HOURS OF IMPACTED AIRPORT FOR FUTURE DEMAND INCREASED BY 20%

(Benefits in Thousands of Dollars)

YEAR	Demand Scenario A Yearly Benefits		Demand Scenario D Yearly Benefits	
	48 Minute FADP	30 Minute FADP	48 Minute FADP	30 Minute FADP
1977	4393	4393	4064	4064
1978	5265	5265	4770	4770
1979	6137	7980	5477	7243
1980	7008	9020	6183	8099
1981	7598	9658	6670	8628
1982	8188	10297	7157	9157
1983	8779	10935	7643	9686
1984	9369	11574	8130	10215
1985	9959	12212	8617	10744
1986	10371	12653	8943	11092
1987	10784	13094	9269	11440
1988	11196	13534	9595	11788
1989	11609	13976	9921	12136
1990	12021	14416	10247	12484
PRESENT VALUE	63860	77136	55936	68500

TABLE 12. FADP FUEL SAVING BENEFITS FOR AIRCRAFT WITHIN 2.5 HOURS OF IMPACTED AIRPORT FOR FUTURE DEMAND DECREASED BY 20%

(Benefits in Thousands of Dollars)

YEAR	Demand Scenario A Yearly Benefits		Demand Scenario D Yearly Benefits	
	48 Minute FADP	30 Minute FADP	48 Minute FADP	30 Minute FADP
1977	3575	3575	3436	3436
1978	4037	4037	3829	3829
1979	4499	6121	4221	5809
1980	4961	6696	4614	6306
1981	5260	7076	4930	6663
1982	5638	7457	5246	7020
1983	5977	7837	5562	7378
1984	6315	8218	5878	7735
1985	6654	8598	6194	8092
1986	6876	8848	6389	8306
1987	7098	9090	6584	8521
1988	7321	9335	6779	8735
1989	7543	9581	6974	8950
1990	7765	9827	7169	9164
PRESENT VALUE	44374	55877	41464	52650

TABLE 13. SENSITIVITY OF FADP FUEL SAVING BENEFITS TO FUTURE DEMAND FOR 1977 THROUGH 1990

(Percent Change From Baseline Prediction in Parenthesis)

DEMAND SCENARIO	FADP CRITERION	FUTURE DEMAND PREDICTION	PRESENT VALUE (Thousands of Dollars)	TOTAL FUEL SAVINGS (Thousands of Gallons)
A	48 Minute 2.5 Hours	Baseline	53758	330248
A	"	120% of Baseline	63860 (+19%)	395732 (+20%)
A	"	80% of Baseline	44374 (-17%)	269416 (-18%)
A	30 Minute 2.5 Hours	Baseline	66157	409539
A	"	120% of Baseline	77136 (+17%)	480668 (+17%)
A	"	80% of Baseline	55877 (-16%)	342890 (-16%)
A	30 Minute CONUS	Baseline	73538	458258
A	"	120% of Baseline	85638 (+16%)	537022 (+17%)
A	"	80% of Baseline	62009 (-16%)	383226 (-16%)
D	48 Minute 2.5 Hours	Baseline	48957	299652
D	"	120% of Baseline	55936 (+14%)	344148 (+15%)
D	"	80% of Baseline	41464 (-15%)	250984 (-16%)

TABLE 13. SENSITIVITY OF FADP FUEL SAVING BENEFITS TO FUTURE DEMAND PREDICTIONS FOR 1977 THROUGH 1990 (CONTINUED)

DEMAND SCENARIO	FADP CRITERION	FUTURE DEMAND PREDICTION	PRESENT VALUE (Thousands of Dollars)	TOTAL FUEL SAVINGS (Thousands of Gallons)
D	30 Minute 2.5 Hours	Baseline	60916	376016
D	"	120% of Baseline	68500 (+12%)	424342 (+13%)
D	"	80% of Baseline	52650 (-14%)	322400 (-14%)
D	30 Minute CONUS	Baseline	67729	420990
D	"	120% of Baseline	76131 (+12%)	474874 (+13%)
D	"	80% of Baseline	58427 (-14%)	360387 (-14%)

TABLE 14. COMPARISON OF AIRPORT ARRIVAL CAPACITY ESTIMATES DURING NONADVERSE CONDITIONS

AIRPORT	YEAR	TSC BASELINE	ATCSCC IFR	UGRRD ESTIMATES*	
				IFR	VFR
ATL	1975 (76)	50	53	54	65
	1980	50		54	65
	1985	50		56	71
	1990	50		56	70
JFK	1975 (76)	45	35	30	37
	1980	45		30	37
	1985	45		30	37
	1990	45		30	37
LGA	1975 (76)	40	32	30	38
	1980	40		29	37
	1985	40		29	36
	1990	40		28	38
ORD	1975 (76)	65	66	59	68
	1980	65		54	68
	1985	65		54	67
	1990	65		53	65

*AVERAGE VALUES

TABLE 15. FADP FUEL SAVING BENEFITS WITHIN 2.5 HOURS OF IMPACTED AIRPORT, SCENARIO A DEMAND DISTRIBUTION, AND ATCSCC IFR CAPACITIES DURING NONADVERSE CONDITIONS

YEAR	48 Minute FADP Criterion Yearly Benefits	30 Minute FADP Criterion Yearly Benefits
1977	3990	3990
1978	4622	4622
1979	5295	7138
1980	5947	7957
1981	6467	8500
1982	6986	9043
1983	7506	9587
1984	8025	10130
1985	8545	10673
1986	8905	11059
1987	9265	11445
1988	9626	11830
1989	9986	12216
1990	10346	12602
PRESENT VALUE	55051	67888

The results show that the differences between the capacity estimates are within 2.6 percent for both cases.

Table 16 illustrates the sensitivity of capacity estimates to the present value of fuel saving benefits for the four airports. Comparing Table 16 with Table 14 shows that the TSC baseline capacities were the highest capacity estimates for JFK and LGA and within 5 percent for ORD. From this it can be concluded that this report's fuel saving benefits are conservative.

What capacity estimates during nonadverse conditions should be used on the simulation runs is open for conjecture. In the case where low visibility was the cause of excessive delays IFR capacity estimates would appear to be the most logical. In the case of winds being the factor for delays VFR capacities should possibly be used.

The reason for the relative insensitivity of the results to the capacities used during "normal" conditions is that the FAD period generally extended through the peak traffic hours. At the end of the FAD period the "normal" capacity is greater than the demand, so the stack of arrival aircraft could land without a direct propagation of delays to the aircraft scheduled to arrive at this time.

4.7 CONCLUSIONS

Since this report only pertains to the benefits of the ATCSCC Automated Flow Control Function and does not include any cost analysis, no conclusions can be made as to the economic justification of the systems analyzed.

However, it should be emphasized that there are considerable benefits to both the present and advanced systems. A continuation of the present system through 1990 will result in an estimated $51 million (present value) of benefits attributed to a total fuel saving of 315 million gallons.

Development of the advanced system would result in an estimated $71 million (present value) of benefits attributed to a total fuel savings of 440 million gallons.

TABLE 16. COMPARISON OF PRESENT VALUE OF BENEFITS FOR INDIVIDUAL AIRPORTS AS A FUNCTION OF NONADVERSE ARRIVAL CAPACITIES FOR 48-MINUTE, 2.5-HOUR FADP CRITERION

(Thousands of Dollars)

AIRPORT	Capacity Values Used in Simulation Runs		Percent Difference in Net Present Values of Benefits
	High	Low	
ATL	70 (40%)	50	24%
JFK	45 (50%)	30	17%
LGA	40 (25%)	32	7.6%
ORD	66 (22%)	54	16%

The above benefits should be considered as conservative estimates, since only benefits which could be directly quantified were included.

ADDENDIX A
SIMULATION RESULTS

This appendix contains the simulation results which were made in order to calculate the fuel saving benefits if Fuel Advisory Delay procedures were utilized. These computer outputs are based on 11 months of 1975 data. All benefits delineated in the body of this report were derived by multiplying these computer output results by 12/11 for calculating full years of benefits.

This appendix contains runs made for different future diurnal demand distribution scenarios. The scenarios are defined as follows:

SCENARIO A: Future hourly demand increased proportionally to 1975 demand as a function of future yearly demand predictions divided by 1975 demand.

SCENARIO B: Same as Scenario A, but with all future hourly demand greater than 120 percent of capacity redistributed to other hours.

SCENARIO C: Same as Scenario A, but with all future hourly demand greater than 100 percent of hourly capacity redistributed to other hours.

SCENARIO D: Same as Scenario A, but with all future hourly demand greater than hourly capacity redistributed to other hours.

The simulations were performed for ATL, JFK, LGA, and ORD.

Tables A-1 through A-16 show the fuel and equivalent cost savings as a function of the future diurnal demand.

Tables A-17 through A-23 show the sensitivity of the fuel savings benefits to future demand predictions.

Tables A-33 through A-39 show the sensitivity of the fuel saving benefits to landing capacities during nonadverse conditions.

Tables A-40 through A-43 show the benefits for an "optimal" system (i.e., 15-minute and 0-minute FADP criteria).

TABLE A-1. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO A

FOR 43 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	15036	4661	163259	52163	459697	142506	511968	158710
ATL 2/19/75	0	0	220540	68367	603634	187176	650164	201550
ATL 2/23/75	179726	55715	534165	165591	927967	287675	964505	298996
ATL 3/12/75	113352	36847	563572	130907	1013195	314090	1043993	325139
ATL 9/17/75	11456	3551	219103	67923	592165	183571	647300	200663
ATL 11/24/75	150363	46614	541326	167811	952333	295223	934555	305212
TOTALS	475443	147388	2266970	702762	4554012	1411741	4807490	1490320

FOR 30 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	36513	11320	292144	90564	616510	191118	674509	209097
ATL 2/19/75	17901	5549	362316	112317	769743	238620	811273	251494
ATL 2/23/75	242737	75248	525313	194003	1054726	326965	1093393	338951
ATL 3/12/75	205503	63706	738237	228853	1164330	367142	1220132	378240
ATL 9/17/75	30073	9322	366612	113649	762592	236403	817717	253492
ATL 11/24/75	234145	72584	693365	216643	1120602	347386	1154256	357819
TOTALS	766877	237729	3038942	936031	5508493	1707631	5771280	1789093

CPU TIME: 0.17 ELAPSED TIME: 26.44

TABLE A-2. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO B

FOR 48 : IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	15036	4661	164689	51053	458265	142062	509320	158044
ATL 2/19/75	0	0	213379	66147	607917	188454	651596	201994
ATL 2/23/75	179726	55715	499079	154714	880729	273025	905074	280572
ATL 3/12/75	113362	36847	582140	180463	975246	302326	997443	309207
ATL 9/17/75	11456	3551	214812	66591	579276	179575	610066	189120
ATL 11/24/75	150368	46614	539894	167367	916531	284124	935864	290117
TOTALS	475448	147388	2213993	686335	4417964	1369566	4609863	1429054

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	36518	11320	289096	89893	615078	190674	672361	208431
ATL 2/19/75	17901	5549	361600	112096	772607	239509	816285	253048
ATL 2/23/75	242737	75248	587152	182017	1002456	310761	1027517	318530
ATL 3/12/75	205503	63705	736805	228409	1146380	355377	1168577	362258
ATL 9/17/75	30073	9322	363748	112761	749693	232404	780483	241949
ATL 11/24/75	234145	72534	697422	216200	1084800	336288	1104133	342281
TOTALS	766377	237728	3036723	941381	5371014	1665012	5569356	1726497

CPU TIME: 0.49 ELAPSED TIME: 26.65
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-3. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO C

FOR 48 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	15036	4661	168269	52163	457549	141840	510536	158266
ATL 2/19/75	0	0	215528	66813	604337	187344	643719	199552
ATL 2/23/75	179726	55715	514832	159597	912234	282792	949469	294335
ATL 3/12/75	113362	36347	530708	180019	1011043	313424	1047566	324745
ATL 9/11/75	11436	3551	217676	67479	590016	182904	645152	199997
ATL 11/24/75	150368	46614	538462	166923	950185	294557	983122	304767
TOTALS	475748	147388	2235475	692994	4525369	1402861	4779564	1481662

FOR 30 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	36818	11320	292144	90564	614362	190452	673077	208653
ATL 2/19/75	17901	5549	359452	111430	768310	238176	807693	250384
ATL 2/23/75	242737	75248	604337	187344	1035393	320971	1074060	332958
ATL 3/12/75	205503	63706	735373	227965	1182182	366476	1218700	377797
ATL 9/11/75	30073	9322	365396	113272	760434	235734	815569	252826
ATL 11/24/75	234145	72584	695990	215757	1118454	346720	1152824	357375
TOTALS	766677	237728	3053192	946486	5479135	1698529	5741923	1779693

CPU TIME: 0.49 ELAPSED TIME: 28.05
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-4. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO D

FOR 45 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	15036	4661	164639	51053	409574	126967	445376	138066
ATL 2/19/75	0	0	214095	66369	552782	171362	586436	181795
ATL 2/23/75	179726	55715	471154	146057	791224	245279	809125	250828
ATL 3/12/75	118362	36847	537746	166701	875000	271250	888605	275467
ATL 9/17/75	11456	3551	133313	58373	486191	150719	487623	151163
ATL 11/24/75	150368	46614	495499	153604	817001	253270	830606	257487
TOTALS	475448		2071501		3931772		4047771	
		147388		642162		1218847		1254306

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	36518	11320	291428	90342	566387	175579	602905	186900
ATL 2/19/75	17901	5549	364464	112983	717472	222416	751125	232848
ATL 2/23/75	242737	75248	557079	172694	911518	282570	929419	288119
ATL 3/12/75	205503	63705	689546	213759	1033258	321859	1054010	326743
ATL 9/17/75	30073	9322	332242	102995	655692	203326	658040	203992
ATL 11/24/75	234145	72584	653028	202433	935271	305434	998875	309651
TOTALS	766377		2887787		4874798		4994374	
		237728		895211		1511134		1548253

CPU TIME: 0.49 ELAPSED TIME: 37.27
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-5. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	228407	70806	366241	113534	494725	153364	614339	190445
JFK	1/18/75	48731	15106	176224	54629	305683	94761	422356	130930
JFK	2/05/75	82694	25635	285017	88355	465669	144357	661104	204942
JFK	3/19/75	159490	49441	324394	100717	469616	145580	609416	188918
JFK	4/24/75	33963	10528	151115	46845	276147	85605	390359	121011
JFK	6/12/75	46269	14343	183112	56764	334244	103615	477000	147870
JFK	6/15/75	3436	1065	112725	34944	236766	73397	376086	116586
JFK	6/16/75	34933	10830	171301	53103	310126	96139	460746	142831
JFK	6/24/75	190792	59207	325374	100865	476010	147563	618271	191664
JFK	6/28/75	2461	762	119118	36926	249568	77366	379043	117503
JFK	7/13/75	76780	23801	218066	67600	356396	110482	499647	154890
JFK	8/04/75	7563	2437	150620	46692	291906	90490	444012	137643
JFK	8/24/75	25588	7932	152601	47306	285513	88509	425808	132000
JFK	8/25/75	33963	10528	140295	43491	244150	75686	344584	106821
JFK	8/26/75	81223	25179	207726	64395	326364	101172	441551	136880
JFK	10/25/75	8854	2744	96471	29906	201828	62566	301256	93389
JFK	11/12/75	247602	76756	493734	153057	699494	216843	880161	272849
JFK	11/13/75	78762	24416	239723	74314	387402	120094	545422	169080
JFK	11/14/75	60046	18614	185574	57527	311596	96594	425808	132000
JFK	11/21/75	69396	21512	199846	61952	329816	102242	444012	137643
JFK	11/30/75	30015	9304	148654	46082	264336	81944	365250	113227
TOTALS		1551473		4448431		7317355		10126231	
			480946		1379004		2268369		3139122

TABLE A-5. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263341	81790	410545	127263	545917	169234	676863	209827
JFK	1/13/75	79137	24718	223484	69280	363780	112771	488316	151377
JFK	2/05/75	130449	40439	344039	106667	538038	166791	743798	230577
JFK	3/19/75	197385	61189	372534	115516	529663	164195	677838	210129
JFK	4/24/75	60046	18614	201332	62412	338176	104834	459771	142529
JFK	5/12/75	72348	22582	229362	71103	397247	123146	548874	170150
JFK	6/15/75	19690	6103	150140	46543	294367	91253	445498	138104
JFK	6/16/75	62012	19223	215605	66837	369677	114599	533115	165265
JFK	6/24/75	219057	67907	367216	113836	525731	162976	677342	209976
JFK	6/28/75	25093	7778	163422	50660	311596	96594	451892	140086
JFK	7/13/75	107302	33418	260899	80875	419399	130013	572001	177320
JFK	8/04/75	32972	10221	197385	61189	350978	108803	519818	161143
JFK	8/24/75	50201	15562	204289	63329	349507	108347	500127	155039
JFK	8/25/75	56610	17549	182617	56611	298794	92626	410545	127268
JFK	8/26/75	106316	32957	247602	76756	380018	117805	503084	155956
JFK	10/25/75	29040	9002	142261	44100	260404	80725	367711	113990
JFK	11/12/75	289940	89881	548379	159997	761027	235918	949078	294214
JFK	11/13/75	112230	34791	285017	88355	446474	138406	614834	190598
JFK	11/14/75	93530	28994	230359	71569	363780	112771	486846	150922
JFK	11/21/75	102534	31739	242579	75230	382975	118722	504570	156416
JFK	11/30/75	60046	18614	191457	59360	320946	99493	429244	133065
TOTALS		2171229		5411332		8543494		11561165	
			673071		1677501		2650022		3583951

TABLE A-6. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO B

FOR 43 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	228407	70806	365745	113380	494725	153364	616800	191208
JFK	1/18/75	48731	15106	176224	54629	305203	94612	422851	131083
JFK	2/05/75	82994	25635	235017	88355	465669	144357	662095	205249
JFK	3/17/75	159490	49441	324398	100563	469616	145580	611877	189681
JFK	4/24/75	33963	10523	146638	45473	278129	86219	394786	122383
JFK	6/12/75	46269	14343	179676	55699	331782	102852	470592	145883
JFK	6/15/75	3436	1065	109768	34028	233825	72485	368702	114297
JFK	6/15/75	34938	10830	168840	52340	303640	95678	449430	139323
JFK	6/24/75	190992	59207	324394	100717	475034	147260	619757	192124
JFK	6/23/75	2461	762	116623	36773	249073	77212	346241	113534
JFK	7/13/75	76730	23801	217571	67447	356396	110482	502109	155653
JFK	8/04/75	7363	2437	146638	45473	288949	89574	445003	137950
JFK	8/24/75	25588	7932	148159	45929	286488	88811	423749	132912
JFK	8/25/75	33963	10523	139779	43337	244150	75686	346055	107277
JFK	8/26/75	81223	25179	207230	64241	326364	101172	443037	137341
JFK	10/25/75	8354	2744	95991	29757	179366	61303	298299	92472
JFK	11/12/75	247602	76756	493239	152904	699494	216843	882623	273613
JFK	11/13/75	73762	24416	239723	74314	366907	117941	543951	168624
JFK	11/14/75	60046	18614	135574	57527	310126	96139	419399	130013
JFK	11/21/75	69396	21512	199366	61803	330792	102545	438594	135964
JFK	11/30/75	30015	9304	148654	46082	264836	81944	368207	114144
TOTALS		1551473		4421367		7305064		10099157	
			430946		1370771		2264559		3130728

TABLE A-6. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO B (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263341	31790	410049	127115	545917	169234	679324	210590
JFK	1/13/75	79737	24718	223414	69260	363284	112618	4[illegible]811	151531
JFK	2/05/75	130449	40439	344039	106667	538038	166791	744789	230884
JFK	3/19/75	197335	61139	372139	115363	529663	164195	680299	210892
JFK	4/24/75	6[illegible]046	16614	196905	61040	340142	105444	464193	143901
JFK	5/12/75	72343	22532	225141	70195	394766	122383	542465	168164
JFK	6/13/75	19590	6103	150140	46543	293972	91130	438114	135815
JFK	6/16/75	62012	19223	213539	66223	369677	114599	521799	161757
JFK	6/24/75	219057	67907	366736	113688	525731	162975	678323	210436
JFK	5/23/75	25093	7779	162927	50507	311596	96594	439090	136117
JFK	7/13/75	107302	33413	250404	80725	419399	130013	574462	173033
JFK	8/04/75	32972	10221	195419	60579	349987	108495	521304	161604
JFK	8/24/75	50201	15562	199846	61952	350482	108649	503084	155956
JFK	8/25/75	56610	17549	182137	56462	298794	92626	413006	128031
JFK	8/26/75	106316	32957	247107	76603	380013	117805	505545	156713
JFK	10/25/75	29040	9002	141765	43947	257943	79962	364755	113074
JFK	11/12/75	289940	89881	547333	169843	761027	235918	951540	294977
JFK	11/13/75	112230	34791	285993	88657	446474	138406	613343	190137
JFK	11/14/75	93530	28994	230363	71562	365745	113380	482898	149698
JFK	11/21/75	102384	31739	242134	75077	384445	119177	502589	155802
JFK	11/30/75	60046	18614	191487	59360	320946	99493	432201	133982
TOTALS		2171229	673071	5391642	1671401	8547966	2649858	11542449	3578149

TABLE A-7. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO C

.RUN BAS

FOR 48 TIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK 1/11/75	228407	70806	366241	113534	494725	153364	614339	190445
JFK 1/18/75	48731	15106	176224	54629	305683	94761	420885	130474
JFK 2/05/75	82694	25635	285017	88355	465669	144357	662095	205249
JFK 3/19/75	159490	49441	324394	100717	469616	145580	609416	188918
JFK 4/24/75	33963	10523	151115	46845	270745	83930	388888	120555
JFK 6/12/75	46269	14343	182617	56611	329816	102242	473548	146799
JFK 6/15/75	3436	1065	110759	34335	236766	73397	376581	116740
JFK 6/16/75	34938	10830	171301	53103	306674	95068	458780	142221
JFK 6/24/75	190792	59207	325374	100865	476010	147563	618271	191664
JFK 6/28/75	2461	762	119118	36926	248593	77063	378052	117196
JFK 7/13/75	76780	23801	218066	67600	356396	110482	499647	154890
JFK 8/04/75	7863	2437	150140	46543	287479	89118	444508	137797
JFK 8/24/75	25588	7932	152601	47306	280095	86829	423826	131386
JFK 8/25/75	33963	10523	140295	43491	244150	75686	344584	106821
JFK 8/26/75	81223	25179	207726	64395	326364	101172	441551	136880
JFK 10/25/75	8854	2744	96471	29906	201628	62566	299290	92779
JFK 11/12/75	247602	76756	493734	153057	699494	216843	880161	272849
JFK 11/13/75	78762	24416	239723	74314	387897	120248	544926	168927
JFK 11/14/75	60046	18614	135574	57527	312092	96749	426783	132302
JFK 11/21/75	69396	21512	199846	61952	329816	102242	445003	137950
JFK 11/30/75	30015	9304	148654	46082	264336	81944	365250	113227
TOTALS	1551473		4445490		7294244		10116384	
		480946		1378093		2261203		3136069

TABLE A-7. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO C (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263641	81790	410545	127263	545917	169234	676863	209827
JFK	1/18/75	79737	24713	223484	69280	363760	112771	486346	150922
JFK	2/05/75	130449	40439	344039	106667	538038	166791	744789	230884
JFK	3/19/75	197385	61189	372634	115516	529663	164195	677838	210129
JFK	4/24/75	60046	18614	201332	62412	332758	103154	458285	142068
JFK	6/12/75	72548	22582	228902	70959	392820	121774	545422	169080
JFK	6/15/75	19690	6103	149645	46389	294863	91407	445973	138253
JFK	6/15/75	62012	19223	215605	66837	367711	113990	531149	164656
JFK	6/24/75	219057	67907	367216	113836	525731	162976	677342	209976
JFK	6/28/75	25093	7778	163422	50660	310606	96287	450901	139779
JFK	7/13/75	107302	33418	260899	80876	419399	130013	572001	177320
JFK	8/04/75	32972	10221	197385	61189	348516	108039	520313	161297
JFK	8/24/75	50201	15562	204239	63329	344069	106667	498161	154429
JFK	8/25/75	56610	17549	182617	56611	298794	92626	410545	127268
JFK	8/26/75	106316	32957	247602	76756	380018	117805	503084	155956
JFK	10/25/75	29040	9002	142261	44100	260404	80725	365745	113380
JFK	11/12/75	289940	89881	546379	169997	761027	235918	949078	294214
JFK	11/13/75	112230	34791	235993	38657	446969	133560	614339	190445
JFK	11/14/75	93530	28994	230668	71569	364275	112925	490282	151987
JFK	11/21/75	102384	31739	242679	75230	382975	118722	506041	156872
JFK	11/30/75	60046	18614	191437	59360	320946	99493	429244	133065
TOTALS		2171229	673071	5411333	1677503	8529299	2644072	11554246	3581807

CPU TIME: 1.33 ELAPSED TIME: 59.90
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-8. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO D

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	228407	70806	365745	113380	494725	153364	621723	192734
JFK	1/13/75	48731	15106	177215	54935	306178	94915	426288	132149
JFK	2/05/75	82694	25635	234522	72701	468130	145120	659138	204332
JFK	3/19/75	159490	49441	324398	100563	470592	145883	616800	191208
JFK	4/24/75	33963	10528	149645	46389	283531	87894	414972	128641
JFK	6/12/75	46269	14343	176719	54782	328330	101782	468626	145274
JFK	6/15/75	3436	1065	107307	33265	226921	70345	358362	111092
JFK	6/16/75	34938	10830	165833	51423	299785	92933	437124	135508
JFK	6/24/75	190992	59207	324894	100717	473543	146799	619757	192124
JFK	6/23/75	2461	762	115682	35861	237261	73550	353934	109719
JFK	7/13/75	76780	23801	217571	67447	356891	110636	507031	157179
JFK	8/04/75	7863	2437	144722	44863	288454	89420	438114	135815
JFK	8/24/75	25588	7932	151611	46999	287479	89118	429244	133065
JFK	8/25/75	33963	10528	139799	43337	244150	75686	350978	108803
JFK	8/26/75	81223	25179	207230	64241	326364	101172	445003	137950
JFK	10/25/75	8854	2744	95000	29450	198376	61496	309135	95831
JFK	11/12/75	247602	76756	493239	152904	700485	217150	887545	275138
JFK	11/13/75	78762	24416	238252	73858	385436	119485	552806	171369
JFK	11/14/75	60046	18614	185574	57527	305203	94612	419895	130167
JFK	11/21/75	69396	21512	200837	62259	323408	100256	436133	135201
JFK	11/30/75	30015	9304	148654	46082	267293	82860	368702	114297
TOTALS		1551473	480945	4414429	1368484	7272540	2254476	10121310	3137596

TABLE A-8. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO D (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK 1/11/75	263341	31790	410049	127115	546892	169536	684246	212116
JFK 1/18/75	79737	24718	224460	69582	364755	113074	492264	152601
JFK 2/05/75	130449	40439	343594	106514	540499	167554	741832	229967
JFK 3/19/75	197385	61189	372139	115363	530654	164502	685222	212418
JFK 4/24/75	60046	18614	200837	62259	345560	107123	484384	150159
JFK 6/12/75	72848	22582	226441	70196	392325	121620	542465	168164
JFK 6/15/75	19690	6103	149645	46389	286983	88964	427774	132609
JFK 6/16/75	62012	19223	213639	66228	361318	112008	509493	157942
JFK 6/24/75	219057	67907	366736	113688	525731	162976	683256	211809
JFK 6/28/75	25093	7773	161951	50204	299785	92933	426783	132302
JFK 7/13/75	107302	33413	260404	80725	420390	130320	579385	179609
JFK 8/04/75	32972	10221	196905	61040	352448	109258	517357	160380
JFK 8/24/75	50201	15562	203298	63022	351473	108956	506041	156872
JFK 8/25/75	56610	17549	182137	56462	299785	92933	417929	129557
JFK 8/26/75	106316	32957	247107	76603	381009	118112	510468	158245
JFK 10/25/75	29040	9002	140775	43640	256952	79655	375591	116433
JFK 11/12/75	289940	89881	547333	169843	762018	236225	956462	296503
JFK 11/13/75	112230	34791	234522	88201	446474	138406	622218	192887
JFK 11/14/75	93530	28994	232339	72025	360823	111855	483393	149851
JFK 11/21/75	102334	31739	243670	75537	380018	117805	500127	155039
JFK 11/30/75	60046	18614	191467	59360	323903	100409	432696	134135
TOTALS	2171229	673071	5400018	1673996	8529795	2644224	11579386	3589593

TABLE A-9. LGA FADP BENEFITS FOR FUTURE DEMAND SCENARIO A

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	65262	20231	109619	33981	216071	66982	282606	87607
LGA	1/20/75	121656	37713	191360	59321	302253	93698	372593	115503
LGA	1/25/75	89336	27694	139407	43216	205307	63645	236990	73466
LGA	3/12/75	3791	1175	17737	5498	68431	21213	111515	34569
LGA	3/14/75	19010	5893	58289	18069	135603	42036	185660	57554
LGA	3/19/75	129246	40072	171714	53231	233185	72287	269933	83679
LGA	5/04/75	0	0	10127	3139	65899	20428	100751	31232
LGA	8/04/75	20905	6480	71579	22195	198333	61483	266142	82504
LGA	9/26/75	79331	24747	148276	45965	261064	80929	311122	96447
LGA	11/21/75	67158	20813	137498	42624	256637	79557	328236	101753
LGA	11/24/75	0	0	9505	2946	89336	27694	148912	46162
LGA	11/30/75	29774	9229	55757	17284	99473	30839	131798	40857
TOTALS		625989	194052	1120888	347469	2131597	660790	2746258	851333

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	107087	33196	155249	48127	274374	85055	344073	106664
LGA	1/20/75	190724	59124	265505	82306	380203	117862	456866	141628
LGA	1/25/75	130525	40462	181219	56177	256000	79360	287684	89182
LGA	3/12/75	22178	6875	41811	12961	107724	33394	165377	51266
LGA	3/14/75	48784	15123	100114	31035	195165	60501	247132	76610
LGA	3/19/75	166013	51464	215448	66783	276906	85840	316199	98021
LGA	5/04/75	6336	1964	40552	12571	110892	34376	152704	47338
LGA	8/04/75	37383	11588	114060	35358	262973	81521	336469	104305
LGA	9/26/75	144471	44786	217344	67376	337741	104699	388435	120414
LGA	11/21/75	126098	39090	200229	62070	332041	102932	405550	125720
LGA	11/24/75	1259	390	37383	11588	150808	46750	217980	67573
LGA	11/30/75	62094	19249	96310	29855	148912	46162	181219	56177
TOTALS		1042952	323311	1665224	516213	2833739	878452	3499693	1084898

TABLE A-10. LGA FADP BENEFITS FOR FUTURE DEMAND SCENARIO B

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	65262	20231	109619	33981	216071	66982	282606	87607
LGA	1/20/75	121656	37713	191360	59321	302253	93698	372593	115503
LGA	1/25/75	89336	27694	139407	43216	205307	63645	236990	73466
LGA	3/12/75	3791	1175	17737	5499	68431	21213	111515	34569
LGA	3/14/75	19010	5893	58289	18069	135603	42036	185660	57554
LGA	3/19/75	129246	40072	171714	53231	233185	72287	269933	83679
LGA	5/04/75	0	0	10127	3139	65899	20428	100751	31232
LGA	8/04/75	20905	6480	71529	22195	198333	61483	266142	82504
LGA	9/26/75	79331	24747	148276	45965	261064	80929	311122	96447
LGA	11/21/75	67158	20818	137498	42624	256637	79557	328236	101753
LGA	11/24/75	0	0	9505	2946	89336	27694	148912	46162
LGA	11/30/75	29774	9229	55757	17284	99473	30838	131799	40857
TOTALS		625939	194052	1120388	347469	2131597	660790	2746253	851333

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	107087	33196	155249	48127	274374	85055	344073	106664
LGA	1/20/75	190724	59124	265505	82306	380203	117862	456866	141628
LGA	1/25/75	130525	40462	181219	56177	256000	79360	287684	89182
LGA	3/12/75	22178	6875	41811	12961	107724	33394	165377	51266
LGA	3/14/75	48784	15123	100114	31035	195165	60501	247132	76610
LGA	3/19/75	166013	51464	215448	66788	276906	85840	316199	98021
LGA	5/04/75	6336	1964	40552	12571	110892	34376	152704	47338
LGA	8/04/75	37383	11588	114060	35359	262973	81521	336469	104305
LGA	9/26/75	144471	44786	217344	67376	337741	104699	388435	120414
LGA	11/21/75	126098	39090	200229	62070	332041	102932	405550	125720
LGA	11/24/75	1259	390	37333	11573	150603	46750	217980	67573
LGA	11/30/75	62094	19249	96310	29856	148912	46162	181219	56177
TOTALS		1042952	323311	1665224	516213	2833739	878452	3499693	1084898

TABLE A-11. LGA FADP BENEFITS FOR FUTURE DEMAND SCENARIO C

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA	1/13/75	65262	20231	109619	33981	216071	66982	282606	87607
LGA	1/20/75	121656	37713	191360	59321	302253	93698	372593	115503
LGA	1/25/75	89336	27694	139407	43216	205307	63645	236990	73466
LGA	3/12/75	3791	1175	17737	5498	69431	21213	111515	34569
LGA	3/14/75	19010	5893	58239	18069	135603	42036	185660	57554
LGA	3/19/75	129266	40072	171714	53231	233185	72287	269933	83679
LGA	5/04/75	0	0	10127	3139	65899	20428	100751	31232
LGA	8/04/75	20905	6480	71529	22195	198333	61483	266142	82504
LGA	9/26/75	79631	24747	146276	45965	261064	80929	311122	96447
LGA	11/21/75	67156	20818	137498	42624	256637	79557	326236	101753
LGA	11/24/75	0	0	9505	2946	89336	27694	148912	46162
LGA	11/30/75	29774	9229	55737	17284	99473	30838	131798	40857
	TOTALS	625939	194052	1120733	347469	2131597	660790	2746258	851339

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA	1/13/75	107087	33196	156249	48127	274374	85055	344075	106664
LGA	1/20/75	190724	59124	286505	88305	380203	117862	456866	141628
LGA	1/25/75	130325	40462	181219	56177	256000	79360	287684	89182
LGA	3/12/75	22176	6875	41811	12961	107724	33394	166377	51266
LGA	3/14/75	48784	15123	100114	31035	195166	60501	247132	76610
LGA	3/19/75	166013	51464	219448	68028	276906	85840	316199	98021
LGA	5/04/75	6336	1964	40552	12571	110692	34314	152704	47338
LGA	8/04/75	37333	11573	114030	35350	262973	81521	336469	104305
LGA	9/26/75	144471	44786	217384	67379	337741	104699	388435	120414
LGA	11/21/75	126098	39090	200229	62071	332041	102932	405660	125720
LGA	11/24/75	1259	390	37533	11635	100303	45750	217960	67573
LGA	11/30/75	62094	19249	96310	29856	143912	46162	191219	56177
	TOTALS	1042952	323311	1665224	516213	2733739	976452	3499693	1084904

CPU TIME: 0.33 ELAPSED TIME: 41.83

TABLE A-12. LGA FADP BENEFITS FOR FUTURE DEMAND SCENARIO D

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	65262	20231	109619	33981	216071	66982	282606	87607
LGA	1/20/75	121556	37713	191360	59321	302253	93698	372593	115503
LGA	1/25/75	89336	27694	139407	43216	205307	63645	239990	73466
LGA	3/12/75	3791	1175	17737	5498	68431	21213	110892	34376
LGA	3/14/75	19010	5893	58239	18060	135603	42036	185660	57554
LGA	3/19/75	129246	40072	171714	53231	233135	72297	269933	83679
LGA	5/04/75	0	0	10127	3139	65699	20425	100114	31035
LGA	8/04/75	20905	6480	71599	22195	197697	61286	266142	82504
LGA	9/26/75	79381	24747	148276	45965	261064	80929	310499	96254
LGA	11/21/75	67158	20818	137498	42624	256637	79557	323236	101753
LGA	11/24/75	0	0	9505	2945	39336	27694	146276	45965
LGA	11/30/75	29774	9229	55757	17284	99478	30838	131799	40857
TOTALS		625939		1120338		2130961		2743739	
			194052		347467		660593		850553

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	107037	33196	155249	48127	274374	85055	344076	106664
LGA	1/20/75	190724	59124	266506	82606	380203	117862	456866	141628
LGA	1/25/75	130525	40462	181219	56177	256000	79360	287684	89182
LGA	3/12/75	22178	6875	41811	12961	107724	33394	164754	51073
LGA	3/14/75	48734	15123	100114	31035	195165	60501	247132	76610
LGA	3/19/75	166013	51464	215443	66788	276906	85840	316199	98021
LGA	5/04/75	6336	1964	40552	12571	110392	34376	152081	47145
LGA	8/04/75	37383	11588	114060	35359	262337	81324	336469	104305
LGA	9/26/75	144471	44786	217344	67375	337741	104699	387799	120217
LGA	11/21/75	126098	39090	200229	62070	332041	102932	405550	125720
LGA	11/24/75	1259	390	37333	11573	150803	46750	217344	67376
LGA	11/30/75	62094	19249	96310	29856	148912	46162	181219	56177
TOTALS		1042952		1665224		2933103		3497175	
			323311		516213		876255		1084113

TABLE A-13. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A

.RUN BAS

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	403686	125142	729082	226015	759958	235586	813831	252287
ORD	1/09/75	76819	23813	274679	85150	291677	90419	323630	100325
ORD	1/10/75	322964	100118	594184	184197	639042	198103	687351	213078
ORD	1/29/75	325906	101030	653856	202695	683802	211978	734832	227797
ORD	2/05/75	1304909	404521	1770242	548775	1810185	561157	1887981	585274
ORD	2/15/75	630803	195548	951397	294933	1007056	312187	1055294	327141
ORD	2/23/75	0	0	19040	5902	32648	10120	48300	14973
ORD	2/25/75	137143	42514	405325	125650	433153	134277	480009	148802
ORD	3/24/75	57268	17753	195988	60756	215314	66747	248443	77017
ORD	3/27/75	0	0	77682	24081	95797	29697	123636	38327
ORD	4/02/75	386181	119716	496093	153790	502123	155658	522446	161958
ORD	4/03/75	379321	117589	453042	140443	464433	143974	469797	145637
ORD	4/18/75	156654	48562	260172	80653	283630	87925	294678	91350
ORD	4/19/75	6205	1923	115247	35726	138705	42998	160786	49843
ORD	5/30/75	16557	5132	106968	33160	119379	37007	147680	45780
ORD	6/12/75	28286	8768	169079	52414	195988	60756	212545	65888
ORD	6/17/75	2030	629	143556	44502	157164	48720	188468	58425
ORD	8/20/75	0	0	69012	21393	89019	27595	103518	32090
ORD	8/22/75	0	0	62110	19254	86265	26742	103518	32090
ORD	9/11/75	70389	21820	191160	59259	211168	65462	239468	74235
ORD	10/17/75	6920	2145	97572	30247	112795	34966	130794	40546
ORD	10/22/75	0	0	39452	12230	52388	16240	72800	22568
ORD	10/23/75	0	0	71442	22147	93884	29104	121786	37753
ORD	10/24/75	395789	122694	575273	178334	600050	186015	649616	201380
ORD	10/31/75	16402	5084	124659	38644	131220	40678	160744	49830
ORD	11/02/75	0	0	35883	11123	51063	15829	75217	23317
ORD	11/09/75	8960	2777	75913	23533	100067	31020	124903	38719
ORD	11/13/75	196684	60972	432006	133921	463757	143764	517590	160452
ORD	11/26/75	255339	79310	541390	167830	572434	177454	622397	192943
TOTALS		5185715		9731509		10394164		11322058	
			1607560		3016757		3222178		3509825

TABLE A-13. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	580381	179918	924459	286582	956783	296602	1010656	313303
ORD	1/09/75	169978	52693	399778	123931	416776	129200	456213	141426
ORD	1/10/75	438226	135850	735659	228054	783967	243029	835045	258863
ORD	1/29/75	487158	151018	831446	257748	864780	268081	921942	285802
ORD	2/05/75	1500429	465132	1979793	613735	2019737	626118	2097519	650230
ORD	2/15/75	793322	245929	1128758	349914	1184417	367169	1233403	382354
ORD	2/23/75	4760	1475	70756	21934	89810	27841	109536	33956
ORD	2/25/75	243050	75345	566232	175531	596099	184790	647020	200576
ORD	3/24/75	115928	35937	296751	91992	320905	99480	362313	112317
ORD	3/27/75	2584	801	176716	54781	194844	60401	225920	70035
ORD	4/02/75	476518	147720	618810	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140028	526102	163091	537492	166622	542857	168285
ORD	4/18/75	235322	72949	338840	105040	366445	113597	381625	118303
ORD	4/19/75	75217	23317	230494	71453	253952	78725	276048	85574
ORD	5/30/75	46235	14332	187014	57974	201512	62468	242223	75089
ORD	6/12/75	82118	25456	260354	80864	298129	92419	320210	99265
ORD	6/17/75	74158	22988	274876	85211	291886	90484	327950	101664
ORD	8/20/75	37260	11550	167637	51982	190464	59043	210486	65250
ORD	8/22/75	22762	7056	134573	41717	164237	50913	182186	56477
ORD	9/11/75	142352	44284	294678	91350	315382	97768	345060	106968
ORD	10/17/75	44984	13945	164016	50844	184778	57281	209684	65002
ORD	10/22/75	10206	3163	99330	30792	114982	35644	144242	44715
ORD	10/23/75	9520	2951	156492	48512	191870	59479	238140	73823
ORD	10/24/75	477490	148021	665009	206152	693147	214875	751409	232936
ORD	10/31/75	81351	25218	220441	68336	229635	71186	264397	81963
ORD	11/02/75	5509	1707	122148	37865	142156	44068	172530	53484
ORD	11/09/75	52440	16256	155277	48135	187014	57974	213937	66320
ORD	11/13/75	302261	93700	565398	175428	599012	185693	654918	203024
ORD	11/26/75	349000	108190	663566	205705	699347	216797	758074	235002
	TOTALS	7312724	2266929	12956453	4016484	13715896	4251911	14788228	4584338

CPU TIME: 1.87 ELAPSED TIME: 1:25.52
NO EXECUTION ERRORS DETECTED

TABLE A-14. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO B

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD 1/03/75	403636	125142	724766	224677	757090	234697	809530	250954
ORD 1/09/75	76319	23813	270594	83884	288963	89578	318874	98850
ORD 1/10/75	322964	100118	597635	185266	645943	200242	690801	214148
ORD 1/29/75	325906	101030	649732	201432	681072	211132	730744	226530
ORD 2/05/75	1304909	404521	1766046	547474	1807388	560290	1883771	583969
ORD 2/15/75	630303	195543	951397	294933	1007056	312187	1055294	327141
ORD 2/23/75	0	0	19040	5902	32648	10120	48300	14973
ORD 2/25/75	137143	42514	401246	124386	430443	133437	475929	147537
ORD 3/24/75	57268	17753	202839	62895	228421	70810	263623	81723
ORD 3/27/75	0	0	73792	22875	93213	28896	120399	37323
ORD 4/02/75	386131	119716	496098	153790	502123	155658	522446	161958
ORD 4/03/75	379321	117589	453042	140443	464433	143974	469797	145637
ORD 4/18/75	156654	48562	253099	80010	280876	87071	291909	90491
ORD 4/19/75	6205	1923	115247	35726	138705	42998	160786	49843
ORD 5/30/75	16557	5132	102322	31874	117320	36369	147680	45780
ORD 6/12/75	28236	8753	160736	49843	188391	58401	203585	63111
ORD 6/17/75	2030	629	139432	43239	155120	48087	182336	56524
ORD 8/20/75	0	0	60037	18611	77972	24171	89019	27595
ORD 8/22/75	0	0	41407	12836	53818	16683	57268	17753
ORD 9/11/75	70389	21820	173907	53911	175284	54338	194611	60329
ORD 10/17/75	6920	2145	60890	18875	68508	21237	87989	27245
ORD 10/22/75	0	0	25844	8011	38094	11809	57148	17715
ORD 10/23/75	0	0	67354	20879	92526	28683	128590	39862
ORD 10/24/75	395739	122694	541738	167954	566564	175634	620141	192243
ORD 10/31/75	16402	5084	124659	38644	133839	41490	156802	48608
ORD 11/02/75	0	0	33310	10481	51759	16045	72462	22463
ORD 11/09/75	8960	2777	62110	19254	82814	25672	101444	31447
ORD 11/13/75	196684	60972	423032	131139	455479	141198	494813	153392
ORD 11/26/75	255339	79310	537334	166573	569740	176619	617674	191478
TOTALS	5165715		9534935		10185602		11053665	
		1607560		2955817		3157526		3426622

TABLE A-14. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO B (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	530381	179918	920143	285244	953901	295709	1006340	311965
ORD	1/09/75	169978	52693	395707	122669	414062	128359	451457	139951
ORD	1/10/75	438226	135850	742560	230193	792246	245596	839177	260144
ORD	1/29/75	487158	151018	827358	256480	862064	267239	917854	284534
ORD	2/05/75	1500429	465132	1975533	612430	2016925	625246	2093322	648929
ORD	2/15/75	793322	245929	1128758	349914	1184417	367169	1233403	382354
ORD	2/23/75	4760	1475	70756	21934	89810	27841	109536	33956
ORD	2/25/75	243050	75345	562152	174267	593389	183950	642955	199316
ORD	3/24/75	115928	35937	306407	94986	336767	104397	380943	118092
ORD	3/27/75	2584	801	172840	53580	192900	59799	223336	69234
ORD	4/02/75	476518	147720	618810	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140023	526102	163091	537492	166622	542857	168285
ORD	4/13/75	235322	72949	337463	104613	364372	112955	379566	117665
ORD	4/19/75	75217	23317	230494	71453	253952	78725	276048	85574
ORD	5/30/75	46235	14332	193915	60113	214618	66531	257403	79794
ORD	6/12/75	82118	25456	266377	82576	307103	95201	328483	101831
ORD	6/17/75	74158	22988	270788	83944	290523	90063	322504	99976
ORD	8/20/75	37260	11550	169761	52625	191160	59259	207717	64392
ORD	8/22/75	22762	7056	113369	35299	130427	40432	133877	41501
ORD	9/11/75	142552	44284	286379	88783	287777	89210	308480	95628
ORD	10/17/75	44934	13945	124571	38617	133556	41402	164016	50844
ORD	10/22/75	10206	3163	93884	29104	114296	35431	146286	45348
ORD	10/23/75	9520	2951	160566	49775	199346	61797	254464	78883
ORD	10/24/75	477490	148021	632198	195981	658997	204235	723946	224423
ORD	10/31/75	81351	25218	221751	68742	233563	72404	262440	81356
ORD	11/02/75	5509	1707	122148	37865	144229	44710	171334	53268
ORD	11/09/75	52440	16256	146302	45353	173039	55192	200815	62252
ORD	11/13/75	302261	93700	558997	173289	594184	184197	634910	196822
ORD	11/26/75	349000	108190	659524	204452	696652	215962	753351	233538
	TOTALS	7312724		12336133		13593100		14620012	
			2266929		3979203		4213847		4532197

CPU TIME: 1.90 ELAPSED TIME: 1:24.47
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-15. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO C

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD 1/03/75	403686	125142	729082	226015	759953	235586	813831	252287
ORD 1/09/75	76319	23313	274679	85150	291677	90419	323630	100325
ORD 1/10/75	322964	100113	594164	184197	639042	198103	686669	212867
ORD 1/27/75	325706	101030	653856	202695	683802	211978	734832	227797
ORD 2/05/75	1304709	404521	1770242	548775	1810135	561157	1887981	585274
ORD 2/15/75	630303	195543	951397	294933	1007056	312187	1055294	327141
ORD 2/23/75	0	0	19040	5902	32648	10120	48300	14973
ORD 2/25/75	137143	42514	405325	125650	433153	134277	480009	148802
ORD 3/24/75	57253	17753	196684	60972	215996	66958	249820	77444
ORD 3/27/75	0	0	77632	24081	95797	29697	123636	38327
ORD 4/02/75	386131	119715	496098	153790	502123	155658	522446	161958
ORD 4/03/75	379321	117589	453042	140443	464433	143974	469797	145637
ORD 4/13/75	156654	48562	260172	80653	283630	87925	294675	91350
ORD 4/17/75	6205	1923	115247	35726	138705	42998	160786	49843
ORD 5/30/75	16657	5132	106272	32944	119697	36796	149753	46423
ORD 6/12/75	23236	9758	165623	51344	192537	59686	211864	65677
ORD 6/17/75	2030	629	143556	44502	157164	48720	188468	58425
ORD 8/20/75	0	0	71071	22032	91093	28233	104895	32517
ORD 8/22/75	0	0	60719	18822	85569	26526	98675	30589
ORD 9/11/75	70389	21820	185636	57547	201512	62468	233945	72522
ORD 10/17/75	6220	2145	92750	28746	108651	33681	128031	39689
ORD 10/22/75	0	0	36050	11175	46942	14552	66668	20667
ORD 10/23/75	0	0	69398	21513	91168	28262	119070	36911
ORD 10/24/75	395739	122694	573241	177710	598038	185391	645593	200133
ORD 10/31/75	16402	5084	124659	38644	131220	40678	160744	49830
ORD 11/02/75	0	0	35863	11123	50367	15613	75217	23317
ORD 11/09/75	8960	2777	75913	23533	99371	30805	124221	38508
ORD 11/13/75	196684	60972	432906	133921	463062	143549	517590	160452
ORD 11/26/75	255839	79310	541390	167830	572434	177454	622397	192943
TOTALS	5185715		9710902		10366030		11298340	
		1607560		3010363		3213456		3502628

TABLE A-15. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO C (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	580361	179918	924459	286582	956733	296602	1010656	313303
ORD	1/09/75	169978	52693	399778	123931	416776	129200	456213	141426
ORD	1/15/75	438226	135850	735659	228054	783967	243029	834349	258648
ORD	1/29/75	487158	151013	831446	257743	864780	268031	921942	285802
ORD	2/05/75	1500429	465132	1979793	613735	2019737	626118	2097518	650230
ORD	2/15/75	793822	245929	1123758	349914	1184417	367169	1233403	382354
ORD	2/23/75	4760	1475	70756	21934	89810	27841	109536	33956
ORD	2/25/75	243050	75345	566232	175531	596099	184790	647020	200576
ORD	3/24/75	115928	35937	297433	92204	321587	99691	363690	112743
ORD	3/27/75	2584	801	176716	54781	194844	60401	225920	70035
ORD	4/02/75	476518	147720	618810	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140028	526102	163091	537492	166622	542857	168285
ORD	4/13/75	235322	72949	338340	105040	366445	113597	381625	118303
ORD	4/19/75	75217	23317	230494	71453	253952	78725	276048	85574
ORD	5/30/75	46235	14332	136332	57762	201512	62468	244296	75731
ORD	6/12/75	82118	25456	257403	79794	295360	91561	319514	99049
ORD	6/17/75	74158	22988	274876	85211	291986	90484	327950	101664
ORD	8/20/75	37260	11550	169761	52625	192537	59686	211168	65462
ORD	8/22/75	22762	7056	134573	41717	164933	51129	178735	55407
ORD	9/11/75	142352	44284	239154	89637	305711	94770	340913	105633
ORD	10/17/75	44934	13945	160556	49772	132699	56636	209684	65002
ORD	10/22/75	10206	3163	97236	30153	110222	34168	142193	44081
ORD	10/23/75	9520	2951	154448	47873	189140	58633	235410	72977
ORD	10/24/75	477490	148021	663010	205533	691135	214251	747385	231689
ORD	10/31/75	81351	25218	220441	68336	229635	71186	264397	81963
ORD	11/02/75	5509	1707	122148	37865	141474	43856	172530	53484
ORD	11/09/75	52440	16256	155277	48135	186332	57762	213937	66320
ORD	11/13/75	302261	93700	565898	175423	593331	185482	654918	203024
ORD	11/26/75	349000	108190	663566	205705	699347	216797	758074	235002
	TOTALS	7312724	2266929	12940905	4011385	13693281	4244899	14774572	4580105

CPU TIME: 1.89 ELAPSED TIME: 1:22.48
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-16. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO D

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	403686	125142	748473	232026	791572	245387	796597	246945
ORD	1/09/75	76819	23813	224371	69555	225723	69975	227771	70609
ORD	1/10/75	322964	100118	412680	127930	415449	128789	427874	132640
ORD	1/29/75	325906	101030	672224	208389	713043	221044	717822	222524
ORD	2/05/75	1304909	404521	1789161	554639	1841030	570719	1927233	597442
ORD	2/15/75	630803	195548	951397	294933	1007056	312187	1053813	326682
ORD	2/23/75	0	0	17682	5481	31290	9699	46256	14339
ORD	2/25/75	137143	42514	414325	128595	452851	140383	457601	141856
ORD	3/24/75	57268	17753	200816	62252	228421	70810	246370	76374
ORD	3/27/75	0	0	43369	13444	44661	13844	46606	14447
ORD	4/02/75	386131	119716	496093	153789	502123	155658	522446	161958
ORD	4/03/75	379321	117589	453042	140443	464433	143974	469797	145637
ORD	4/18/75	156654	48562	232567	72095	253952	78725	270524	83862
ORD	4/19/75	6205	1923	115247	35726	138705	42998	160105	49632
ORD	5/30/75	16557	5132	56537	17541	58660	18184	61415	19038
ORD	6/12/75	28286	8768	32432	10053	35883	11123	36565	11335
ORD	6/17/75	2030	629	94570	29316	94570	29316	94570	29316
ORD	8/20/75	0	0	0	0	0	0	0	0
ORD	8/22/75	0	0	0	0	0	0	0	0
ORD	9/11/75	70339	21820	4828	1496	4828	1496	4828	1496
ORD	10/17/75	6920	2145	0	0	683	211	3460	1072
ORD	10/22/75	0	0	0	0	0	0	0	0
ORD	10/23/75	0	0	27216	8436	53746	16661	91854	28474
ORD	10/24/75	395789	122694	468029	145089	466103	144493	479502	148645
ORD	10/31/75	16402	5084	26892	8336	26892	8336	26892	8336
ORD	11/02/75	0	0	10351	3208	23458	7271	37956	11766
ORD	11/09/75	8960	2777	8278	2566	8278	2566	8278	2566
ORD	11/13/75	196634	60972	333316	103327	336085	104186	345060	106968
ORD	11/26/75	255337	79310	526542	163223	562989	174526	570420	176830
TOTALS		5165715	1607560	8340993	2585693	8782499	2722561	9131615	2830789

TABLE A-16. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO D (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	580381	179918	943850	292593	988382	306398	993408	307956
ORD	1/09/75	169978	52693	358983	111284	360354	111709	362382	112338
ORD	1/10/75	438226	135850	554155	171783	558301	173073	572103	177351
ORD	1/29/75	487158	151018	849814	263442	894726	277365	902202	279682
ORD	2/05/75	1500429	465132	1998712	619600	2050567	635675	2136770	662398
ORD	2/15/75	793322	245929	1128758	349914	1184417	367169	1231922	381895
ORD	2/23/75	4760	1475	70756	21934	89810	27841	109864	33747
ORD	2/25/75	243050	75345	584560	181213	625297	193842	630047	195314
ORD	3/24/75	115928	35937	322283	99907	355411	110177	378174	117233
ORD	3/27/75	2584	801	139180	43145	140472	43546	142417	44149
ORD	4/02/75	476518	147720	613810	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140028	526102	163091	537492	166622	542857	168285
ORD	4/18/75	235322	72949	316759	98195	341609	105898	364372	112955
ORD	4/19/75	75217	23317	230494	71453	253952	78725	275352	85359
ORD	5/30/75	46235	14332	138024	42787	142156	44068	147680	45780
ORD	6/12/75	82118	25456	98675	30589	102126	31659	102822	31874
ORD	6/17/75	74158	22998	234052	72556	235410	72977	238140	73823
ORD	8/20/75	37260	11550	3450	1069	3450	1069	3450	1069
ORD	8/22/75	22762	7056	0	0	0	0	1377	426
ORD	9/11/75	142352	44284	67620	20962	68316	21177	74521	23101
ORD	10/17/75	44984	13945	20064	6219	21445	6647	24222	7508
ORD	10/22/75	10206	3163	26530	8224	26530	8224	26530	8224
ORD	10/23/75	9520	2951	153090	47457	194586	60321	246302	76353
ORD	10/24/75	477490	148021	537103	166501	556519	172520	569913	176673
ORD	10/31/75	81351	25218	105624	32743	105624	32743	106933	33149
ORD	11/02/75	5509	1707	117320	36369	135950	42144	156654	48562
ORD	11/09/75	52440	16256	73144	22674	75217	23317	79363	24602
ORD	11/13/75	302261	93700	473937	148470	481692	149324	490666	152106
ORD	11/26/75	349000	108190	668970	207380	714876	221611	725002	224750
TOTALS		7312724		11365319		11871025		12287131	
			2266929		3523390		3680005		3808994

CPU TIME: 1.92 ELAPSED TIME: 1:24.93
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-17. ATL DEMAND SENSITIVITY: FUTURE DEMAND D DECREASED BY 20%

.RUN BAS

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	15036	4661	105257	32629	294292	91230	294292	91230
ATL 2/19/75	0	0	126023	39067	390957	121196	390957	121196
ATL 2/23/75	179726	55715	402414	124743	610066	189120	610066	189120
ATL 3/12/75	118862	36847	445376	138066	699571	216867	699571	216867
ATL 9/17/75	11456	3551	114566	35515	338686	104992	338686	104992
ATL 11/24/75	150368	46614	416019	128965	648016	200884	648016	200884
TOTALS	475448	147388	1609655	498990	2981588	924289	2981588	924289

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ATL 2/01/75	36518	11320	211231	65481	446808	138510	446808	138510
ATL 2/19/75	17901	5549	253478	78578	544906	168920	544906	168920
ATL 2/23/75	242737	75248	481178	149165	703867	218198	703867	218198
ATL 3/12/75	205503	63705	595029	184453	859964	266588	859964	266588
ATL 9/17/75	30073	9322	248465	77024	498363	154492	498363	154492
ATL 11/24/75	234145	72584	560659	173804	809841	251050	809841	251050
TOTALS	766377	237728	2350040	728510	3863749	1197758	3863749	1197758

CPU TIME: 0.48 ELAPSED TIME: 33.73
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-18. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D DECREASED BY 20%

FOR 48 C.I. FAA BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	223407	70836	324393	100563	426268	132149	511954	158705
JFK	1/13/75	48731	15106	144227	44710	231364	71722	322912	100102
JFK	2/05/75	82694	25635	219537	68056	380513	117959	502109	155653
JFK	3/19/75	159490	49441	273666	84842	388888	120555	485855	150615
JFK	4/24/75	33953	10526	112230	34791	206255	63939	309630	95985
JFK	6/12/75	46269	14343	143159	45929	253515	78589	351473	108956
JFK	6/15/75	3486	1065	77771	24107	172772	53559	252525	78282
JFK	6/16/75	34933	10830	135952	42114	233330	72332	324393	100563
JFK	6/24/75	190992	59207	280570	86982	391349	121318	488811	151531
JFK	6/28/75	2461	762	88112	27314	170310	52796	259413	80418
JFK	7/13/75	76780	23801	169331	52647	281070	87131	377557	117042
JFK	8/04/75	7863	2437	109273	33874	213639	66228	320451	99339
JFK	8/24/75	25523	7932	110759	34335	211178	65465	307169	95222
JFK	8/25/75	33963	10523	104346	32502	184599	57225	253095	78739
JFK	8/26/75	81223	25179	169331	52647	260699	80873	339662	105295
JFK	10/25/75	8854	2744	72568	22582	141765	43947	221518	68670
JFK	11/12/75	247602	76756	413424	129711	583332	180832	721646	223710
JFK	11/13/75	73752	24416	203794	63176	314553	97511	417433	129404
JFK	11/14/75	60046	18614	156439	49134	242184	75077	324894	100717
JFK	11/21/75	69596	21512	171301	53103	263361	81641	342123	106059
JFK	11/30/75	30015	9304	116623	36773	204769	63473	273129	86219
TOTALS		1551473		3612591		5755933		7713657	
			130946		1119894		1784331		2391224

TABLE A-18. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D DECREASED BY 20% (CONTINUED)

FOR 30 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263341	81790	366736	113688	477000	147870	566583	175640
JFK	1/18/75	79737	24718	190001	58900	283531	87894	383965	119029
JFK	2/05/75	130449	40439	278129	86219	445978	138253	574462	178083
JFK	3/19/75	197385	61189	318980	98883	442542	137188	546892	169536
JFK	4/24/75	60046	18614	157524	48832	260899	80878	372139	115363
JFK	6/12/75	72548	22582	191932	59514	308640	95678	416938	129250
JFK	6/15/75	19690	6103	116657	36163	226921	70345	314553	97511
JFK	6/16/75	62012	19223	177624	55085	287479	89118	386907	119941
JFK	6/24/75	219057	67907	315528	97813	434167	134591	541490	167861
JFK	6/28/75	25093	7778	131920	40895	226441	70196	323903	100409
JFK	7/13/75	107302	33413	211178	65465	334739	103769	442046	137034
JFK	8/04/75	32972	10221	152106	47152	271720	84233	386907	119941
JFK	8/24/75	50201	15562	161951	50204	271720	84233	374600	116126
JFK	8/25/75	56610	17549	143236	44403	234305	72634	312092	96748
JFK	8/26/75	106316	32957	205760	63785	307665	95376	395281	122537
JFK	10/25/75	29040	9002	115186	35707	193453	59970	281070	87131
JFK	11/12/75	239940	89881	473053	146646	644865	199908	783179	242785
JFK	11/13/75	112230	34791	243593	77063	368207	114144	479462	148633
JFK	11/14/75	93530	28994	200837	62259	293872	91100	383470	118875
JFK	11/21/75	102384	31739	214134	66381	313562	97204	402170	124672
JFK	11/30/75	60046	18614	157524	48832	253995	78738	335219	103917
TOTALS		2171229		4526709		6881701		9003323	
			673071		1403389		2133320		2791022

TABLE A-19. LGA DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D DECREASED BY 20%

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA 1/13/75	65262	20231	101387	31429	172350	53428	216071	66982
LGA 1/20/75	121656	37713	188192	58339	279438	86625	302253	93698
LGA 1/25/75	89336	27694	111515	34569	168545	52248	205307	63645
LGA 3/12/75	3791	1175	16464	5103	53225	16499	68431	21213
LGA 3/14/75	19010	5893	54484	16890	117229	36340	135603	42036
LGA 3/19/75	129266	40072	161586	50091	211643	65609	233185	72287
LGA 5/04/75	0	0	3791	1175	43084	13356	65899	20428
LGA 8/04/75	20905	6480	51952	16105	133071	41252	197697	61296
LGA 9/26/75	79831	24747	133071	41252	216707	67179	261064	80929
LGA 11/21/75	67158	20818	129266	40072	209734	65017	256637	79557
LGA 11/24/75	0	0	6959	2157	63367	19643	89336	27694
LGA 11/30/75	29774	9229	49421	15320	82377	25536	99478	30838
TOTALS	625939	194052	1008038	312502	1750770	542732	2130961	660593

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA 1/13/75	107087	33196	147003	45570	230653	71502	274374	85055
LGA 1/20/75	190724	59124	261701	81127	356115	110395	390203	117862
LGA 1/25/75	130525	40462	153340	47535	213539	66197	256000	79360
LGA 3/12/75	22178	6875	40852	12571	83714	27501	107724	33394
LGA 3/14/75	48734	15123	96810	29356	176519	54410	195165	60501
LGA 3/19/75	166013	51464	205307	63645	255364	79162	276906	85840
LGA 5/04/75	6336	1964	25959	8050	83000	25730	110892	34376
LGA 8/04/75	37383	11588	84959	26321	185660	57554	262337	81324
LGA 9/26/75	144471	44786	202138	62662	280577	86979	337741	104699
LGA 11/21/75	126098	39090	191497	59519	282606	87607	332041	102932
LGA 11/24/75	1259	390	34215	10606	119124	36928	150903	46750
LGA 11/30/75	62094	19249	89336	27694	130525	40462	148912	46162
TOTALS	1042952	323311	1532777	475156	2410393	747217	2833103	878255

CPU TIME: 0.33 ELAPSED TIME: 42.52
NO EXECUTION ERRORS DETECTED

TABLE A-20. ORD DEMAND SENSITIVITY: DEMAND SCENARIO D DECREASED BY 20%

FOR 48 TH. FAOP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	403636	125142	655093	203073	694600	215326	748473	232026
ORD	1/09/75	76319	23313	208730	64706	217572	67447	224371	69555
ORD	1/15/75	322964	100116	403024	124937	407170	126222	412680	127930
ORD	1/29/75	325906	101030	572394	177597	613718	190252	672224	208389
ORD	2/05/75	1304909	404521	1652503	512276	1700867	527268	1739161	554639
ORD	2/15/75	630603	195546	847500	262725	906870	281129	951397	294933
ORD	2/23/75	0	0	2716	841	8834	2738	17682	5431
ORD	2/25/75	137143	42514	330641	102493	365259	113230	414825	128595
ORD	3/24/75	57268	17753	150434	46634	182186	56477	200816	62252
ORD	3/27/75	0	0	29130	9030	37535	11635	43369	13444
ORD	4/02/75	386131	119716	465935	144456	475016	147254	496098	153790
ORD	4/03/75	379321	117589	431599	133795	439638	136287	453042	140443
ORD	4/13/75	156654	48562	198743	61610	210486	65250	232567	72095
ORD	4/19/75	6205	1923	73144	22674	90397	28023	115247	35726
ORD	5/30/75	16557	5132	51759	16045	53813	16683	56587	17541
ORD	6/12/75	28286	8768	25531	7914	30359	9411	32432	10053
ORD	6/17/75	2030	629	91168	28262	92526	28683	94570	29316
ORD	8/20/75	0	0	0	0	0	0	0	0
ORD	8/22/75	0	0	0	0	0	0	0	0
ORD	9/11/75	70389	21820	4828	1496	4828	1496	4828	1496
ORD	10/17/75	6920	2145	0	0	0	0	0	0
ORD	10/22/75	0	0	0	0	0	0	0	0
ORD	10/23/75	0	0	4074	1262	17010	5273	27216	8436
ORD	10/24/75	395739	122694	446029	138268	466108	144493	479502	148645
ORD	10/31/75	16402	5084	22963	7118	24921	7725	26892	8336
ORD	11/02/75	0	0	0	0	681	211	10351	3208
ORD	11/09/75	8960	2777	8278	2566	8278	2566	8278	2566
ORD	11/13/75	196634	60972	295360	91561	305711	94770	333316	103327
ORD	11/26/75	255339	79310	439451	136227	473385	146904	526542	163228
TOTALS		5185715		7413577		7828273		8372466	
			1607560		2298196		2426753		2595450

TABLE A-20. ORD DEMAND SENSITIVITY: DEMAND SCENARIO D DECREASED BY 20% (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	580331	179918	836262	259861	882070	273441	943850	292593
ORD	1/09/75	169978	52693	342671	106223	352134	109177	358983	111284
ORD	1/10/75	438226	135850	539671	167298	545876	169221	554155	171788
ORD	1/29/75	487158	151013	749798	232437	791294	245301	849814	263442
ORD	2/05/75	1500429	465132	1859242	576365	1910404	592225	1998712	619600
ORD	2/15/75	793322	245929	1023330	317247	1084231	336111	1128753	349914
ORD	2/23/75	4760	1475	36736	11388	55790	17294	70756	21934
ORD	2/25/75	243050	75345	485443	150487	526180	163115	584560	181213
ORD	3/24/75	115928	35937	265000	82150	302261	93700	322283	99907
ORD	3/27/75	2584	801	116523	36122	133346	41337	139180	43145
ORD	4/02/75	476618	147720	579646	179690	590959	183196	613810	191631
ORD	4/03/75	451705	140028	504645	156439	512698	158936	526102	163091
ORD	4/13/75	235322	72949	278602	86423	291909	90491	316759	98195
ORD	4/19/75	75217	23317	186332	57762	205644	63749	230494	71453
ORD	5/30/75	46235	14332	127672	39578	131804	40859	133024	42787
ORD	6/12/75	82118	25456	91774	28449	96616	29950	98675	30539
ORD	6/17/75	74156	22988	227934	70659	229292	71080	234052	72556
ORD	8/20/75	37260	11550	3450	1069	3450	1069	3450	1069
ORD	8/22/75	22762	7056	0	0	0	0	0	0
ORD	9/11/75	142352	44284	67620	20962	67620	20962	67620	20962
ORD	10/17/75	44284	13945	15906	4930	16603	5146	20064	6219
ORD	10/22/75	10206	3163	26530	8224	26530	8224	26530	8224
ORD	10/23/75	9520	2951	97972	30371	131992	40917	153090	47457
ORD	10/24/75	477490	146021	537103	166501	556519	172520	569913	176673
ORD	10/31/75	81561	25213	101695	31525	103653	32133	105624	32743
ORD	11/02/75	5509	1707	65561	20323	97094	30373	117320	36369
ORD	11/09/75	52440	16256	69012	21393	71766	22247	73144	22674
ORD	11/13/75	302261	93700	433814	134482	448578	139059	478937	148470
ORD	11/24/75	349000	108190	564336	174944	604173	187293	669970	207790
TOTALS		7312724		10236120		10771435		11393629	
			2266929		3173136		3339130		3533562

TABLE A-21. ATL DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20%

FOR 45 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL	2/01/75	15036	4661	109554	33961	303600	94116	303600	94116
ATL	2/19/75	0	0	133899	41508	395970	122750	395970	122750
ATL	2/23/75	179726	55715	450389	139620	694558	215312	694558	215312
ATL	3/12/75	113362	36847	469006	145391	773323	239730	773323	239730
ATL	9/17/75	11456	3551	129603	40176	386661	119864	386661	119864
ATL	11/24/75	150368	46614	436068	135181	716756	222194	716756	222194
TOTALS		475448		1728519		3270868		3270868	
			147388		535837		1013966		1013966

FOR 30 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL	2/01/75	36518	11320	212663	65925	449673	139398	449673	139398
ATL	2/19/75	17901	5549	256342	79466	546338	169364	546338	169364
ATL	2/23/75	242737	75248	537746	166701	799816	247942	799816	247942
ATL	3/12/75	205503	63705	618658	191783	933716	289451	933716	289451
ATL	9/17/75	30073	9322	259206	80353	546338	169364	546338	169364
ATL	11/24/75	234145	72584	534238	131129	883593	273913	883593	273913
TOTALS		766377		2468903		4159474		4159474	
			237728		765357		1289432		1289432

TABLE A-22. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20%

.RUN BAS

FOR 46 MIL. FAIR BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	223407	70806	324394	100717	426288	132149	509493	157942
JFK	1/13/75	48731	15106	144227	44710	232834	72178	322432	99953
JFK	2/05/75	82694	25635	220528	68363	377061	116888	499647	154890
JFK	3/19/75	159490	49441	274161	84996	388888	120555	482418	149549
JFK	4/24/75	33963	10528	116657	36163	204769	63478	296829	92016
JFK	6/12/75	46269	14343	153577	47608	259909	80571	359832	111547
JFK	6/15/75	3436	1065	82193	25481	177694	55085	261875	81181
JFK	6/16/75	34933	10830	140295	43491	239723	74314	340142	105444
JFK	6/24/75	190792	59207	281070	87131	393315	121927	489802	151838
JFK	6/26/75	2461	762	91548	28379	182617	56611	271720	84233
JFK	7/13/75	76780	23801	170310	52796	281070	87131	374120	115977
JFK	8/04/75	7863	2437	117648	36470	220032	68209	325374	100865
JFK	8/24/75	25538	7932	114691	35554	211673	65618	311101	96441
JFK	8/25/75	33963	10523	105341	32655	184599	57225	252525	78282
JFK	8/26/75	81223	25179	170310	52796	261875	81181	338176	104834
JFK	10/25/75	8854	2744	73314	22736	144722	44863	221023	68517
JFK	11/12/75	247602	76756	418904	129860	583332	180832	718210	222645
JFK	11/13/75	78762	24416	204769	63478	318485	98730	421860	130776
JFK	11/14/75	60046	18614	157029	48679	247107	76603	331287	102698
JFK	11/21/75	69396	21512	171301	53103	265327	82251	349507	108347
JFK	11/30/75	30015	9304	119118	36926	204769	63478	276643	85759
TOTALS		1551473		3651940		5806089		7754016	
			480946		1132091		1799877		2403734

TABLE A-22. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20% (CONTINUED)

FOR 30 MIN. FAA BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263841	81790	367216	113836	477000	147870	563146	174575
JFK	1/18/75	79737	24713	190001	58900	285017	88355	383470	118875
JFK	2/05/75	130449	40439	279104	86522	442542	137188	572001	177320
JFK	3/19/75	197335	61189	319476	99037	442542	137188	543456	168471
JFK	4/24/75	60046	18614	159965	49595	259413	80418	359352	111399
JFK	6/12/75	72843	22582	195419	60579	313562	97204	424817	131693
JFK	6/15/75	19690	6103	117648	36470	227912	70652	321937	99800
JFK	6/16/75	62012	19223	180651	56001	290915	90183	401675	124519
JFK	6/24/75	219057	67907	316024	97967	435158	134898	540004	167401
JFK	6/28/75	25093	7778	134381	41658	235791	73095	335714	104071
JFK	7/13/75	107302	33418	211673	65618	334739	103769	438594	135964
JFK	8/04/75	32972	10221	156038	48371	273686	84842	389368	120704
JFK	8/24/75	50201	15562	164908	51121	271225	84079	378547	117349
JFK	8/25/75	56610	17549	143731	44556	234305	72634	308640	95678
JFK	8/26/75	106316	32957	206235	63939	307665	95376	391829	121466
JFK	10/25/75	29040	9002	115632	35861	196419	60887	280590	86982
JFK	11/12/75	289940	89881	473548	146799	644865	199908	779743	241720
JFK	11/13/75	112230	34791	247602	76756	370668	114907	482898	149698
JFK	11/14/75	93530	28994	199346	61803	295358	91560	386427	119792
JFK	11/21/75	102384	31739	214134	66381	315048	97664	406117	125896
JFK	11/30/75	60046	18614	158004	48981	253515	78589	333748	103461
TOTALS		2171229	673071	4550846	1410751	6907336	2141266	9022073	2796834

FIGURE A-23. LGA DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20%

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA 1/13/75	65262	20231	101337	31429	172350	53428	216071	66982
LGA 1/20/75	121556	37713	188192	58339	279433	86625	302253	93698
LGA 1/25/75	89336	27694	111515	34569	168545	52248	205307	63645
LGA 3/12/75	3791	1175	16464	5103	53225	16499	68431	21213
LGA 3/14/75	19010	5893	54484	16890	117229	36340	135603	42036
LGA 3/19/75	129246	40072	161536	50091	211643	65609	233185	72287
LGA 5/04/75	0	0	3791	1175	43084	13356	65899	20428
LGA 8/04/75	20905	6480	51952	16105	133071	41252	198333	61483
LGA 9/26/75	79331	24747	133071	41252	216707	67179	261064	80929
LGA 11/21/75	67158	20813	129246	40072	209734	65017	256637	79557
LGA 11/24/75	0	0	6959	2157	63367	19643	89336	27694
LGA 11/30/75	29774	9229	49421	15320	82377	25536	99478	30838
TOTALS	625989	194052	1008038	312502	1750770	542732	2131597	660790

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA 1/13/75	107087	33196	147003	45570	230653	71502	274374	85055
LGA 1/20/75	190724	59124	261701	81127	356115	110395	380203	117862
LGA 1/25/75	130525	40462	153340	47535	213539	66197	256000	79360
LGA 3/12/75	22178	6875	40552	12571	88714	27501	107724	33394
LGA 3/14/75	48764	15123	96310	29856	175519	54410	195165	60501
LGA 3/19/75	166013	51464	205307	63645	255364	79162	276906	85840
LGA 5/04/75	6336	1964	25969	8050	83000	25730	110392	34376
LGA 8/04/75	37383	11588	84909	26321	135660	57554	262973	81521
LGA 9/26/75	144471	44786	202138	62662	289579	89769	337741	104699
LGA 11/21/75	126098	39090	191997	59519	282606	87607	332041	102932
LGA 11/24/75	1259	390	34215	10606	119124	36928	150803	46750
LGA 11/30/75	62094	19249	89336	27694	130525	40462	148912	46162
TOTALS	1042952	323311	1532777	475156	2410398	747217	2633739	878452

TABLE A-24. ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20%

FOR 43 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	403636	125142	637845	197731	665868	206419	729082	226015
ORD	1/09/75	76319	23813	212801	65963	227771	70609	274679	85150
ORD	1/10/75	322964	100118	514321	159594	551400	170934	594184	184197
ORD	1/29/75	325906	101030	556556	172532	586502	181815	653856	202695
ORD	2/05/75	1304909	404521	1635639	507063	1672835	518579	1770242	548775
ORD	2/15/75	630803	195548	847500	262725	907602	281356	951397	294933
ORD	2/23/75	0	0	2716	841	8834	2738	19040	5902
ORD	2/25/75	137143	42514	323852	100394	347615	107760	405325	125650
ORD	3/24/75	57268	17753	146302	45353	170456	52841	195988	60756
ORD	3/27/75	0	0	36896	11437	45954	14245	77682	24081
ORD	4/02/75	386131	119716	465985	144455	475016	147254	496098	153790
ORD	4/03/75	379321	117589	431599	133795	439633	136287	453042	140443
ORD	4/13/75	156654	48562	237395	73592	244992	75947	260172	80653
ORD	4/19/75	6205	1923	73144	22674	90397	28023	115247	35726
ORD	5/30/75	16557	5132	75217	23317	86946	26953	106968	33160
ORD	6/12/75	28236	8753	126230	39146	144925	44926	169079	52414
ORD	6/17/75	2030	629	87756	27207	101374	31425	143556	44502
ORD	8/20/75	0	0	39334	12193	55891	17326	69012	21393
ORD	8/22/75	0	0	38638	11977	50367	15613	62110	19254
ORD	9/11/75	70389	21820	153935	47701	186310	51556	191160	59259
ORD	10/17/75	6920	2145	66429	20592	81652	25312	97572	30247
ORD	10/22/75	0	0	14260	4420	26530	8224	39452	12230
ORD	10/23/75	0	0	34692	10754	53060	16448	71442	22147
ORD	10/24/75	395739	122694	575273	178334	600050	186015	649616	201380
ORD	10/31/75	16402	5084	82012	25423	103005	31931	124659	38644
ORD	11/02/75	0	0	6901	2139	25531	7914	35883	11123
ORD	11/09/75	8960	2777	55209	17114	66938	20750	75913	23533
ORD	11/13/75	196634	60972	356093	110383	376115	116595	432006	133921
ORD	11/26/75	255339	79310	446202	138322	474551	147110	541390	167830
TOTALS		5185715		8231312		8848125		9805852	
			1607560		2567190		2742904		3039803

TABLE A-24: ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A DECREASED BY 20% (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	580381	179918	821014	254514	853338	264534	924459	286582
ORD	1/09/75	169978	52693	333829	103486	350827	108756	399778	123931
ORD	1/10/75	438226	135850	652845	202381	692179	214575	735659	228054
ORD	1/29/75	487158	151018	733460	227372	764073	236864	831446	257748
ORD	2/05/75	1500429	465132	1842428	571152	1882372	583535	1979793	613735
ORD	2/15/75	793322	245929	1023360	317247	1084979	336343	1128758	349914
ORD	2/23/75	4760	1475	37422	11600	56462	17503	70756	21934
ORD	2/25/75	243060	75345	469140	145433	499022	154696	566232	175531
ORD	3/24/75	115928	35937	241542	74878	268451	83219	296751	91992
ORD	3/27/75	2584	801	119107	36923	133999	41539	176716	54781
ORD	4/02/75	476518	147720	579566	179696	590958	183196	618810	191831
ORD	4/03/75	451705	140028	504645	156439	512698	158936	526102	163091
ORD	4/18/75	235322	72949	316063	97979	323660	100334	333840	105040
ORD	4/19/75	75217	23317	186332	57762	205644	63749	230494	71453
ORD	5/30/75	46235	14332	131122	40647	151130	46850	187014	57974
ORD	6/12/75	82118	25456	211168	65462	231871	71880	260854	80864
ORD	6/17/75	74158	22998	210238	65173	224532	69604	274876	85211
ORD	8/20/75	37260	11550	127672	39573	153885	47704	167687	51982
ORD	8/22/75	22762	7056	100067	31020	118002	36580	134573	41717
ORD	9/11/75	142352	44234	249124	77223	266377	82576	294678	91350
ORD	10/17/75	44934	13945	126636	39257	143254	44408	164016	50844
ORD	10/22/75	10206	3163	69398	21513	84364	26152	99330	30792
ORD	10/23/75	9520	2951	97972	30371	127232	39441	156492	48512
ORD	10/24/75	477490	148021	665009	206152	693147	214875	751409	232936
ORD	10/31/75	81351	25218	166674	51669	191578	59389	220441	68336
ORD	11/02/75	5509	1707	69012	21393	107650	33371	122146	37865
ORD	11/09/75	52440	16256	121452	37650	140053	43425	155277	48135
ORD	11/13/75	302261	93700	482358	149540	506542	157023	565898	175428
ORD	11/26/75	349000	108190	553246	173062	559991	162897	663566	205705
	TOTALS	7312724	2266929	11247041	3486567	11943305	3703959	13042853	4043268

CPU TIME: 1.35 ELAPSED TIME: 1:51.93
NO EXECUTION ERRORS DETECTED

TABLE A-25. ATL DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D INCREASED BY 20%

FOR 45 MIN. FARE BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	15036	4661	257058	79687	556363	172472	626535	194225
ATL 2/19/75	0	0	350143	108544	613646	190230	632263	196001
ATL 2/23/75	179726	55715	575696	178465	949469	294335	968086	300106
ATL 3/12/75	113362	36347	651526	201994	1011048	313424	1026085	318086
ATL 9/17/75	11456	3551	233551	87900	496931	154048	511968	158710
ATL 11/24/75	150363	46614	604337	187344	946604	293447	958061	296993
TOTALS	475448		2722351		4574061		4722993	
		147738		843934		1417956		1464126

FOR 30 MIN. FARE BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	36516	11320	399550	123860	723916	224413	794088	246167
ATL 2/19/75	17901	5549	504092	156263	778335	241283	796952	247055
ATL 2/23/75	242737	75248	664485	205990	1069763	331626	1088380	337397
ATL 3/12/75	205503	63705	811989	251716	1182182	366476	1197218	371137
ATL 9/17/75	30073	9322	443223	137400	667349	206878	682386	211539
ATL 11/24/75	234145	72584	761866	236173	1116306	346054	1131343	350716
TOTALS	766877		3585210		5537851		5690367	
		237728		1111412		1716730		1764011

CPU TIME: 0.43 ELAPSED TIME: 28.12
NO EXECUTION ERRORS DETECTED

EXIT

.K
Job 63, User [57041,1161] Logged off TTY25 1553 7-Sep-76
Saved all files (42150 blocks)
Runtime 31.36 Sec
3.51 AVERAGE K CORE

TABLE A-26. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D INCREASED BY 20%

FOR 48 HR. FAA BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	224437	70606	406597	126045	572496	177473	718705	222798
JFK	1/18/75	48731	15105	216596	67144	374690	116124	524261	162520
JFK	2/05/75	82194	25636	330792	102545	571506	177166	814696	252555
JFK	3/19/75	159490	49441	366241	113534	560685	173812	734443	227678
JFK	4/24/75	33963	10523	136035	38293	370173	114753	536072	166182
JFK	6/12/75	46269	14343	222494	68973	401675	124519	590716	183121
JFK	6/15/75	3436	1065	145217	45017	316024	97967	477496	148023
JFK	6/16/75	34236	10613	202603	62826	378547	117349	552310	171216
JFK	6/24/75	190792	59225	369577	114579	562156	174268	735934	228139
JFK	6/23/75	2461	762	155063	48069	321937	99800	474044	146953
JFK	7/13/75	76780	23801	256952	79655	450901	139779	632063	195939
JFK	8/04/75	7853	2437	189026	58598	362479	112368	576924	178846
JFK	8/24/75	25568	7932	190001	58900	373129	115669	556738	172588
JFK	8/25/75	33963	10528	167849	52033	311101	96441	444012	137643
JFK	8/29/75	81423	25179	241209	74774	397247	123146	544926	168927
JFK	10/25/75	884	2744	121034	37535	267763	83014	411040	127422
JFK	11/12/75	247532	76756	564276	174925	814201	252402	1030797	319547
JFK	11/13/75	77762	24416	230095	86329	481923	149396	669479	207538
JFK	11/14/75	69046	19614	220523	68363	377557	117042	526722	163283
JFK	11/21/75	69396	21512	236736	73397	405692	125742	540499	167554
JFK	11/30/75	30015	9304	179676	55699	323903	100409	470112	145734
TOTALS		1561473		5240777		9015650		12561994	
			480945		1624693		2794641		3894206

TABLE A-26. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D INCREASED BY 20% (CONTINUED)

FOR 30 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263341	81790	454353	140849	631568	195786	784665	243246
JFK	1/18/75	79737	24713	256302	82553	438114	135915	597605	185257
JFK	2/05/75	130449	40439	396272	122841	650763	201736	900843	279261
JFK	3/19/75	197385	61189	419395	130167	625655	193953	804356	249350
JFK	4/24/75	60046	18614	242679	75230	436133	135201	612373	189835
JFK	6/12/75	72348	22582	277138	85912	472573	146497	675376	209366
JFK	6/15/75	19690	6103	195914	60733	381009	118112	556738	172588
JFK	6/16/75	62012	19223	255431	79199	447960	138867	631568	195786
JFK	6/24/75	219057	67907	411520	127571	623689	193343	807312	250266
JFK	6/23/75	25093	7778	208221	64548	389863	120857	556738	172588
JFK	7/13/75	107302	33413	308144	95524	519843	160841	711321	220509
JFK	8/04/75	32972	10221	242134	75077	454353	140849	657652	203872
JFK	8/24/75	50201	15562	246132	76300	444012	137643	640423	198531
JFK	8/25/75	56610	17549	217571	67447	371659	115214	514895	159617
JFK	8/26/75	106316	32957	287974	89271	457805	141919	617295	191361
JFK	10/25/75	29040	9002	172292	53410	327355	101480	477496	148023
JFK	11/12/75	289940	89881	613348	190137	883118	273766	1105612	342739
JFK	11/13/75	112230	34791	332278	103006	548874	170150	742823	230275
JFK	11/14/75	93530	28994	269259	83470	440080	136424	600066	186020
JFK	11/21/75	102384	31739	282061	87443	465669	144357	609416	188918
JFK	11/30/75	60046	18614	226921	70345	382975	118722	540995	167708
TOTALS		2171229		6325939		10392070		14145568	
			673071		1961031		3221532		4385116

CPU TIME: 1.36 ELAPSED TIME: 1:3.70
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-27. LGA DEMAND SENSITIVITY: FUTURE SCENARIO D INCREASED BY 20%

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA	1/13/75	65262	20231	122293	37910	258532	80144	349773	108431
LGA	1/20/75	121656	37713	203397	63053	345351	107058	422651	131021
LGA	1/25/75	89336	27694	143179	44391	224317	69538	278315	86432
LGA	3/12/75	3791	1175	25346	7857	102646	31820	162209	50284
LGA	3/14/75	19010	5893	62730	19446	167923	52056	235717	73072
LGA	3/19/75	129266	40072	174882	54213	254091	78768	307953	95465
LGA	5/04/75	0	0	10764	3336	72235	22392	136862	42427
LGA	8/04/75	20905	6480	84909	26321	223680	69340	347246	107646
LGA	9/26/75	79831	24747	154613	47930	291489	90361	372593	115503
LGA	11/21/75	67158	20818	155249	48127	302253	93698	401108	124343
LGA	11/24/75	0	0	24074	7462	129266	40072	198333	61483
LGA	11/30/75	29774	9229	57653	17872	117852	36534	164754	51073
TOTALS		625939	194052	1219109	377913	2489635	771781	3378019	1047180

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
LGA	1/13/75	107037	33196	171091	53038	318731	98806	423923	131416
LGA	1/20/75	190724	59124	280074	86822	428987	132985	506937	157150
LGA	1/25/75	130525	40462	185024	57357	275010	85253	330132	102340
LGA	3/12/75	22178	6875	50693	15714	152704	47338	223680	69340
LGA	3/14/75	48784	15123	106451	32999	229381	71108	302253	93698
LGA	3/19/75	166013	51464	218615	67770	297825	92325	359283	111377
LGA	5/04/75	6336	1964	43084	13356	119761	37125	191997	59519
LGA	8/04/75	37383	11589	129902	40269	290852	90164	420755	130434
LGA	9/26/75	144471	44786	223680	69340	368152	114127	449907	139471
LGA	11/21/75	126098	39090	219239	67964	378930	117468	484122	150077
LGA	11/24/75	1259	390	57653	17872	196433	60895	275010	85253
LGA	11/30/75	62094	19249	98842	30641	167286	51858	217980	67573
TOTALS		1042952	323311	1784349	553142	3224057	999452	4185979	1297648

TABLE A-28. ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D INCREASED BY 20%

.ROJ BAS

FOR 46 MIL. FWP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	403936	125142	796597	246945	803780	249171	803096	250509
ORD	1/09/75	76819	23813	227771	70609	231170	71662	233199	72291
ORD	1/15/75	322964	100118	427374	132640	432306	133921	440931	136704
ORD	1/29/75	325906	101039	717522	222521	724625	224634	728700	225897
ORD	2/05/75	1304709	404321	1927253	597448	1979067	613515	1988392	616556
ORD	2/15/75	630803	195548	1053813	326662	1118895	346836	1151770	357048
ORD	2/23/75	0	0	46256	14339	51236	15883	75913	23454
ORD	2/25/75	137143	42514	457601	141856	464390	143960	468469	145225
ORD	3/24/75	57256	17753	246370	76374	250502	77655	251196	77871
ORD	3/27/75	0	0	46506	14417	50452	15640	51733	16054
ORD	4/02/75	336181	119716	522446	161958	536800	166360	554820	171994
ORD	4/03/75	379321	117589	489727	151837	481663	149377	493930	153118
ORD	4/13/75	156654	48562	270524	83862	273279	84716	273802	84826
ORD	4/19/75	6205	1923	160105	49632	178039	55192	209095	64819
ORD	5/30/75	16557	5132	61415	19038	62110	19254	67620	20962
ORD	6/12/75	28266	8763	36566	11336	40015	12404	40711	12620
ORD	6/17/75	2030	629	94570	29316	94570	29316	94570	29316
ORD	8/20/75	0	0	0	0	0	0	0	0
ORD	8/22/75	0	0	0	0	0	0	0	0
ORD	9/11/75	70389	21820	4823	1496	4823	1496	4823	1496
ORD	10/17/75	6920	2145	3460	1072	5525	1712	8301	2573
ORD	10/22/75	0	0	0	0	0	0	0	0
ORD	10/23/75	0	0	91354	28474	112266	34802	149002	46190
ORD	10/24/75	395739	122694	443029	138039	466103	144493	479502	148645
ORD	10/31/75	16402	5084	26892	8336	26892	8336	26892	8336
ORD	11/02/75	0	0	37956	11766	70389	21820	75913	23533
ORD	11/07/75	8960	2777	8273	2564	8273	2564	10351	3209
ORD	11/13/75	194664	60372	345060	106969	346437	107395	347888	108465
ORD	11/26/75	255339	79155	570420	176830	580546	179969	589091	182697
TOTALS		5185715		9100142		9401317		9636227	
			1607560		2821032		2914395		2987219

TABLE A-28. ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO D INCREASED BY 20% (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	580381	179913	993408	307956	1000591	310183	1004906	311520
ORD	1/09/75	169978	52693	362332	112338	365782	113392	369367	114658
ORD	1/10/75	438226	135850	572103	177351	576250	178637	585210	181415
ORD	1/29/75	487153	151018	902202	279682	912408	282846	919212	284955
ORD	2/05/75	1500429	465132	2136770	662393	2192128	679559	2204745	683470
ORD	2/15/75	793322	245929	1231922	381895	1300927	403287	1340263	415481
ORD	2/23/75	4760	1475	108864	33747	131992	40917	153762	47666
ORD	2/25/75	243050	75345	630047	195314	636836	197419	640915	198683
ORD	3/24/75	115923	35937	378174	117233	385771	119589	387148	120015
ORD	3/27/75	2584	801	142417	44149	146293	45350	147585	45751
ORD	4/02/75	476518	147720	652636	202332	670004	207701	694091	215168
ORD	4/03/75	451705	140028	542857	168285	554909	172021	566975	175762
ORD	4/18/75	235322	72949	364372	112955	368518	114240	376797	116807
ORD	4/19/75	75217	23317	275352	85359	293301	90923	325733	100977
ORD	5/30/75	46235	14332	147680	45780	149057	46207	154581	47920
ORD	6/12/75	32118	25456	102322	31874	106272	32944	106968	33160
ORD	6/17/75	74158	22988	238140	73823	240856	74665	242900	75299
ORD	8/20/75	37260	11550	3450	1069	3450	1069	3450	1069
ORD	8/22/75	22762	7056	1377	426	2754	853	6205	1923
ORD	9/11/75	142852	44284	74521	23101	75217	23317	75217	23317
ORD	10/17/75	44984	13945	24222	7508	26287	8148	29063	9009
ORD	10/22/75	10206	3163	26530	8224	26530	8224	26530	8224
ORD	10/23/75	9520	2951	246302	76353	271474	84156	310254	96178
ORD	10/24/75	477490	148021	537103	166501	556519	172520	569913	176673
ORD	10/31/75	81351	25218	106933	33149	108256	33559	110875	34371
ORD	11/02/75	5509	1707	156654	48562	202889	62895	212545	65888
ORD	11/09/75	52440	16256	79363	24602	80045	24813	82814	25672
ORD	11/13/75	302261	93700	490666	152106	492044	152533	495494	153603
ORD	11/26/75	349000	108190	725002	224750	738503	228935	747948	231863
TOTALS		7312724		12254321		12615863		12891966	
			2266929		3798822		3910902		3996497

CPU TIME: 1.38 ELAPSED TIME: 1:30.92

TABLE A-29. ATL DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20%

FOR 48 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	15036	4661	262736	81463	665917	206434	749693	232404
ATL 2/19/75	0	0	342267	106102	832754	258153	905074	280572
ATL 2/23/75	179726	55715	655892	203325	1149244	356265	1260230	390671
ATL 3/12/75	118362	36647	721052	223526	1237317	383568	1334698	413756
ATL 9/17/75	11456	3551	329378	102107	808409	250606	915815	283902
ATL 11/24/75	150368	46614	669497	207544	1163565	360705	1260946	390893
TOTALS	475448		2980872		5857206		6426456	
		147738		924063		1815731		1992198

FOR 30 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	36516	11320	404562	125414	833470	258375	917247	284346
ATL 2/19/75	17901	5549	491203	152272	1006036	311871	1078356	334290
ATL 2/23/75	242737	75248	754706	233953	1291020	400216	1405586	435731
ATL 3/12/75	205503	63705	881445	273247	1408450	436619	1515140	469693
ATL 9/17/75	30073	9322	439055	151607	983122	304767	1096973	340061
ATL 11/24/75	234145	72584	831322	257709	1342575	416198	1439956	446386
TOTALS	766877		3852293		6864673		7453258	
		237728		1194207		2128046		2310507

CPU TIME: 0.48 ELAPSED TIME: 33.48
NO EXECUTION ERRORS DETECTED

TABLE A-30. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20%

.RUN DAS

FOR 48 SIM. FAA BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	225407	70606	405622	125742	567078	175794	716244	222035
JFK	1/18/75	43731	15106	217076	67293	369193	114451	521304	161604
JFK	2/05/75	82694	25635	332278	103006	569540	176557	822560	254993
JFK	3/19/75	159490	49441	365250	113227	554772	171979	725594	224934
JFK	4/24/75	33963	10528	187060	57998	351963	109110	512929	159007
JFK	6/12/75	45269	14343	226921	70345	407093	126198	603023	186937
JFK	6/15/75	3436	1065	149149	46236	328330	101782	504075	156263
JFK	6/16/75	34938	10830	210187	65157	396752	122993	590716	183121
JFK	6/24/75	190992	59207	370173	114753	561130	173965	733473	227376
JFK	6/28/75	2461	762	160961	49897	336705	104378	500623	155193
JFK	7/13/75	76780	23801	255977	79352	445003	137950	623193	193189
JFK	8/04/75	7863	2437	195914	60733	387402	120094	589726	182815
JFK	8/24/75	25588	7932	190001	58900	375095	116279	563146	174575
JFK	8/25/75	33963	10528	166574	51730	306674	95068	435153	134898
JFK	8/26/75	81223	25179	241689	74923	395777	122690	539508	167247
JFK	10/25/75	8854	2744	123545	38298	259413	80418	402665	124826
JFK	11/12/75	247502	76756	553301	171523	808288	250569	1021927	316797
JFK	11/13/75	75762	24416	232556	37592	481923	149396	664061	205858
JFK	11/14/75	60046	18614	224460	69582	351504	118266	539029	167098
JFK	11/21/75	69396	21512	235296	72941	404631	125435	551815	171062
JFK	11/30/75	30015	9304	179676	55699	323408	100256	474539	147107
TOTALS		1551473		5273946		9011734		12635308	
			480946		1634917		2793628		3916935

TABLE A-30. JFK DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20% (CONTINUED)

FOR 30 MIN. FAAP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	263341	81790	453352	140542	625655	193953	782204	242483
JFK	1/13/75	79737	24713	266797	82707	432696	134135	594643	184340
JFK	2/05/75	130449	40439	397743	123300	648797	201127	908706	281698
JFK	3/19/75	197335	61189	419004	129860	619757	192124	795486	246600
JFK	4/24/75	60046	18614	241639	74923	417929	129557	589230	182661
JFK	5/12/75	72343	22532	279104	86522	477975	148172	684726	212265
JFK	6/15/75	19590	6103	194924	60425	393315	121927	580376	179916
JFK	6/16/75	62012	19223	253918	80264	466164	144510	667017	206775
JFK	6/24/75	219057	67907	412015	127724	619757	192124	798938	247670
JFK	6/26/75	25093	7773	211173	65465	404136	125282	580371	180070
JFK	7/13/75	107302	33413	307169	95222	512929	159007	702451	217759
JFK	8/04/75	32972	10221	245141	75993	456814	141612	667497	206924
JFK	8/24/75	50201	15562	246132	76300	445003	137950	644370	199754
JFK	8/25/75	56610	17549	216596	67141	365745	113330	506041	156872
JFK	8/26/75	106316	32957	286933	88964	451692	140086	608425	188611
JFK	10/25/75	29040	9002	174753	54173	318980	98883	469121	145427
JFK	11/12/75	269940	83681	612373	189835	877205	271933	1096758	339994
JFK	11/13/75	112230	34791	334244	103615	547863	169843	736909	228441
JFK	11/14/75	93530	28994	269754	83623	441551	136880	610407	189226
JFK	11/21/75	102334	31739	280590	86982	461242	142935	615309	190900
JFK	11/30/75	60046	18614	226921	70345	382479	118568	545422	169080
TOTALS		2171229		6335290		10367904		14185412	
			673071		1963929		3214033		4397466

TABLE A-31. LGA DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20%

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	65262	20231	122293	37910	258532	80144	350415	108628
LGA	1/20/75	121656	37713	203397	63053	345351	107058	422651	131021
LGA	1/25/75	89336	27694	143199	44391	224317	69538	278815	86432
LGA	3/12/75	3791	1175	25346	7857	103283	32017	162209	50284
LGA	3/14/75	19010	5893	62730	19446	167923	52056	235717	73072
LGA	3/19/75	129266	40072	174882	54213	254091	78768	308590	95662
LGA	5/04/75	0	0	10764	3336	72872	22590	136862	42427
LGA	3/04/75	20905	6480	34909	26321	223680	69340	348519	108040
LGA	9/26/75	79331	24747	154613	47936	292111	90554	372593	115503
LGA	11/21/75	67158	20813	155249	48127	302253	93698	401745	124540
LGA	11/24/75	0	0	24074	7462	129902	40269	198333	61483
LGA	11/30/75	29774	9229	57653	17872	117852	36534	165377	51266
TOTALS		625939	194052	1219109	377913	2492167	772566	3381826	1048358

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	107067	33196	171091	53033	318731	98806	424560	131613
LGA	1/20/75	190724	59124	280074	86822	428987	132985	506937	157150
LGA	1/25/75	130525	40462	185024	57357	275010	85253	330132	102340
LGA	3/12/75	22178	6875	50693	15714	153340	47535	223680	69340
LGA	3/14/75	48784	15123	106451	32999	229381	71108	302253	93698
LGA	3/19/75	166013	51464	218616	67771	297825	92325	359920	111575
LGA	5/04/75	6336	1964	43054	13355	120397	37323	191997	59519
LGA	3/04/75	37383	11588	129902	40269	290852	90164	422014	130824
LGA	9/26/75	144471	44786	223650	69340	368733	114324	449907	139471
LGA	11/21/75	126098	39090	219159	67964	378930	117468	484759	150275
LGA	11/24/75	1259	390	57653	17872	197061	61088	275010	85253
LGA	11/30/75	62094	19249	98542	30541	167286	51858	218616	67770
TOTALS		1042952	323311	1784349	553142	3226585	1000237	4189785	1298828

CPU TIME: 0.33 ELAPSED TIME: 41.95

TABLE A-32. ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20%

FOR 48 MIN. FAOP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/08/75	403686	125142	813831	252287	870586	269881	928050	287695
ORD	1/09/75	76819	23813	323630	100325	359668	111497	390950	121194
ORD	1/10/75	322964	100118	687351	213078	720479	223348	766033	237470
ORD	1/29/75	325906	101030	734832	227797	789264	244671	849814	263442
ORD	2/05/75	1304909	404521	1887981	585274	1955957	606346	2038656	631983
ORD	2/15/75	630603	195548	1055294	327141	1117626	346464	1151770	357048
ORD	2/23/75	0	0	48300	14973	63266	19612	80962	25098
ORD	2/25/75	137143	42514	480009	148802	532284	165008	584560	181213
ORD	3/24/75	57268	17753	248443	77017	263623	81723	294678	91350
ORD	3/27/75	0	0	123636	38327	155364	48162	181897	56388
ORD	4/02/75	386181	119716	522446	161958	536000	166160	554820	171994
ORD	4/03/75	379321	117589	469797	145637	481863	149377	493930	153118
ORD	4/18/75	156654	48562	294678	91350	306407	94986	341609	105898
ORD	4/19/75	6205	1923	160786	49843	178735	55407	209790	65034
ORD	5/30/75	16557	5132	147680	45780	160786	49843	186332	57762
ORD	6/12/75	28286	8768	212545	65888	247747	76801	280190	86855
ORD	6/17/75	2030	629	188468	58425	225204	69813	254464	78883
ORD	8/20/75	0	0	103518	32090	127672	39578	154581	47920
ORD	8/22/75	0	0	103518	32090	124903	38719	153885	47704
ORD	9/11/75	70389	21820	239468	74235	265000	82150	291909	90491
ORD	10/17/75	6920	2145	130794	40546	142556	44192	169555	52562
ORD	10/22/75	0	0	72800	22568	80962	25098	101374	31425
ORD	10/23/75	0	0	121736	37753	136752	42393	183022	56736
ORD	10/24/75	395789	122694	575273	178334	600050	186015	649616	201380
ORD	10/31/75	16402	5084	160744	49830	177147	54915	194859	60406
ORD	11/02/75	0	0	75217	23317	97994	30378	114551	35510
ORD	11/09/75	8960	2777	124903	38719	142156	44068	163555	50702
ORD	11/13/75	196634	60972	517590	160452	545676	169221	594880	184412
ORD	11/26/75	255839	79310	622397	192943	681804	211359	741378	229982
TOTALS		5185715		11247715		12087731		13102160	
			1607560		3486779		3747185		4061655

TABLE A-32. ORD DEMAND SENSITIVITY: FUTURE DEMAND SCENARIO A INCREASED BY 20% (CONTINUED)

FOR 30 MIN. FAPP BENEFIT ANALYSIS TABLE

TITLE		1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ORD	1/03/75	580381	179913	1010656	313303	1067396	330892	1123453	348320
ORD	1/09/75	169978	52693	456213	141426	499365	154493	533046	165244
ORD	1/10/75	438226	135850	835045	258863	863159	269129	919913	285174
ORD	1/29/75	487158	151013	921942	285802	981806	304359	1043042	323343
ORD	2/05/75	1500429	465132	2097519	650231	2169705	672608	2260118	700636
ORD	2/15/75	793322	245929	1233403	382354	1301675	403519	1340263	415481
ORD	2/23/75	4760	1475	109536	33956	131992	40917	153762	47666
ORD	2/25/75	243050	75345	647020	200576	697980	216993	760415	235728
ORD	3/24/75	115928	35937	362313	112317	380943	118092	417522	129431
ORD	3/27/75	2534	801	225920	70035	265414	82278	297791	92312
ORD	4/02/75	476318	147720	652636	202332	670004	207701	694091	215168
ORD	4/03/75	451705	140028	542357	168285	554909	172021	566975	175762
ORD	4/13/75	235322	72949	381625	118303	395427	122582	433226	134350
ORD	4/19/75	75217	23317	276013	85574	293982	91134	326415	101188
ORD	5/30/75	46235	14332	242223	75089	252476	80437	278458	89421
ORD	6/12/75	82118	25456	320210	99265	362994	112528	400269	124083
ORD	6/17/75	74158	22989	327950	101664	366044	113473	395990	122756
ORD	3/20/75	37260	11550	210486	65250	242919	75304	276729	85785
ORD	8/22/75	22762	7056	132136	56477	206340	63965	238091	73809
ORD	9/11/75	142352	44284	345060	106963	373346	115737	403024	124937
ORD	10/17/75	44984	13945	209684	65002	224920	69725	253984	78735
ORD	10/22/75	10206	3163	144242	44715	156492	48512	187782	58212
ORD	10/23/75	9520	2951	238140	73823	259910	80572	312298	96812
ORD	10/24/75	477490	148021	665009	206152	693147	214875	751409	232936
ORD	10/31/75	81351	25218	264397	81963	280800	87048	299835	92948
ORD	11/02/75	5509	1707	172530	53484	204267	63322	227739	70589
ORD	11/09/75	52440	16256	213937	66320	233249	72307	256721	79583
ORD	11/13/75	302261	93700	654918	203024	687351	213078	743938	230620
ORD	11/26/75	349000	108190	758074	235002	820190	254258	884320	274139
TOTALS		7312724	2266929	14701328	4557554	15651202	4851359	16800614	5208177

CPU TIME: 1.34 ELAPSED TIME: 1:18.68
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-33. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 53 PER HOUR DURING NONADVERSE CONDITIONS)

FOR 43 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	15036	4661	166121	51497	431056	133627	483327	149831
ATL 2/19/75	0	0	210515	65259	579992	179797	621522	192671
ATL 2/23/75	179726	55715	480462	148943	796952	247055	830606	257487
ATL 3/12/75	119362	36997	564935	175130	961690	304323	1013912	314312
ATL 9/17/75	11436	3551	214025	66369	564955	175136	618658	191783
ATL 11/24/75	146736	46170	517696	160485	911518	282570	943740	292559
TOTALS	474016		2153644		4246163		4511765	
		146944		667689		1322508		1398643

FOR 30 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	36518	11320	233551	37900	591449	183349	643719	199552
ATL 2/19/75	17901	5549	346563	107434	744681	230851	786211	243725
ATL 2/23/75	242021	75024	570663	176911	911513	282570	950185	294557
ATL 3/12/75	205503	63705	717472	222416	1147812	355821	1183614	366920
ATL 9/17/75	30073	9322	355871	110320	737521	223631	792656	245723
ATL 11/24/75	233429	72362	673793	208875	1084064	336066	1116306	346054
TOTALS	765445		2947933		5217065		5472691	
		237284		913356		1617288		1696531

CPU TIME: 0.43 ELAPSED TIME: 30.87
NO EXECUTION ERRORS DETECTED

TABLE A-34. ATL FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 70 PER HOUR DURING NONADVERSE CONDITIONS)

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.RUN BAS


FOR  48 MIN. FADP BENEFIT ANALYSIS TABLE

     TITLE          1975                1980                1985                1990
                  FUEL  DOLLARS       FUEL  DOLLARS       FUEL  DOLLARS       FUEL  DOLLARS

ATL  2/01/75     15036    4661      156812   48611      360884  111874     396686  122972
ATL  2/19/75         0       0      189750   58822      476882  147833     505524  156712
ATL  2/23/75    103109   31963      297872   92340      451821  140064     462561  143393
ATL  3/12/75    118362   36847      499795  154936      842779  261261     871420  270140
ATL  9/17/75     11456    3551      198343   61486      475450  147389     517696  160485
ATL 11/24/75    148936   46170      465426  144282      753274  233514     774755  240174

  TOTALS        397899           1307998             3361090             3528642
                       123192              560477              1041935             1093876


FOR  30 MIN. FADP BENEFIT ANALYSIS TABLE

     TITLE          1975                1980                1985                1990
                  FUEL  DOLLARS       FUEL  DOLLARS       FUEL  DOLLARS       FUEL  DOLLARS

ATL  2/01/75     36518   11320      269231   83461      501228  155380     542042  168033
ATL  2/19/75     17901    5549      315773   97869      636559  197333     673793  208875
ATL  2/23/75    148220   45943      375921  116535      536313  166257     549202  170252
ATL  3/12/75    205503   63705      637091  197777     1012480  313868    1041122  322747
ATL  9/17/75     30073    9322      330094  102329      634411  196667     665250  212427
ATL 11/24/75    228416   70808      600757  186234      915099  283680     943740  292559

  TOTALS        666631           2529767             4236090             4435149
                       206652              784225              1313185             1374893


CPU TIME: 0.47  ELAPSED TIME: 29.82
NO EXECUTION ERRORS DETECTED

EXIT
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TABLE A-35. LGA FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 32 PER HOUR DURING NONADVERSE CONDITIONS)

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	84272	26124	134330	41642	252196	78180	326963	101358
LGA	1/20/75	126098	39090	202775	62860	324431	100573	401108	124343
LGA	1/25/75	93778	29071	143835	44589	219239	67964	252196	78180
LGA	3/12/75	3791	1175	17737	5498	72872	22590	121656	37713
LGA	3/14/75	22301	7068	64626	20034	149535	46355	205307	63645
LGA	3/19/75	137498	42624	185660	57554	250923	77786	293384	90949
LGA	5/04/75	0	0	10127	3139	65899	20428	105178	32605
LGA	8/04/75	20905	6480	76040	23572	211007	65412	280074	86822
LGA	9/26/75	79831	24747	152704	47338	275010	85253	325068	100771
LGA	11/21/75	83636	25927	160313	49697	290852	90164	370698	114916
LGA	11/24/75	0	0	9505	2946	93778	29071	154613	47930
LGA	11/30/75	29774	9229	55757	17284	103919	32214	136239	42234
TOTALS		682384	211535	1213409	376152	2309661	715990	2972484	921466

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	124325	38695	181855	56375	310499	96254	388435	120414
LGA	1/20/75	196438	60895	275647	85450	403004	124931	483486	149880
LGA	1/25/75	133071	41252	188828	58536	268037	83091	304785	94483
LGA	3/12/75	22178	6875	42447	13158	112738	34964	175519	54410
LGA	3/14/75	51316	15907	110256	34179	209734	65017	268674	83289
LGA	3/19/75	176155	54603	225576	69929	296553	91931	339014	105094
LGA	5/04/75	6336	1964	40652	12571	113424	35161	155249	48127
LGA	8/04/75	39915	12373	116592	36143	273101	84661	352318	109219
LGA	9/26/75	147003	45570	221735	68753	347883	107843	403904	124931
LGA	11/21/75	141303	43803	224953	69735	346257	113539	447997	138879
LGA	11/24/75	1259	390	39279	12176	153340	47535	227435	70520
LGA	11/30/75	62094	19249	98342	30641	151444	46947	189465	58734
TOTALS		1101393	341581	1766612	547645	3006064	931874	3735423	1157976

CPU TIME: 0.32 ELAPSED TIME: 43.25
NO EXECUTION ERRORS DETECTED

TABLE A-36. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 35 PER HOUR DURING NONADVERSE HOURS)

FOR 48 TIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	251534	77975	424317	131693	595144	184494	750702	232717
JFK	1/18/75	48731	15106	139026	58593	346550	107430	495700	153667
JFK	2/05/75	82694	25635	303717	94152	522279	161906	759557	235462
JFK	3/19/75	170306	52949	364275	112925	543874	170150	718210	222645
JFK	4/24/75	36919	11444	173267	53712	327835	101629	481923	149396
JFK	6/12/75	46269	14343	204759	63473	394291	122230	580376	179916
JFK	6/15/75	3436	1065	116161	36009	260404	80725	432201	133982
JFK	6/16/75	34938	10830	179676	55699	342123	106058	525236	162823
JFK	6/24/75	194244	60277	352443	109253	533611	165419	699494	216843
JFK	6/26/75	2461	762	122570	37996	273206	84693	434167	134591
JFK	7/13/75	80232	24871	236236	73248	407588	126352	586274	181744
JFK	8/04/75	7863	2437	161951	50204	327355	101480	513425	159161
JFK	8/24/75	25593	7932	167849	52033	331782	102852	515391	159771
JFK	8/25/75	34938	10830	159490	49441	291411	90337	429244	133065
JFK	8/26/75	84660	26244	226407	70806	378052	117196	525236	162823
JFK	10/25/75	12786	3963	136843	42421	278609	86368	406597	126045
JFK	11/12/75	270249	83777	547338	169690	775795	240496	980085	303826
JFK	11/13/75	82198	25481	259413	80418	439585	136271	623193	193189
JFK	11/14/75	60046	13614	197335	61189	346516	103039	496195	153820
JFK	11/21/75	71358	22275	214614	66530	373625	115823	510468	158245
JFK	11/30/75	30015	9304	156038	48371	293376	90946	417929	129557
TOTALS		1632665		4896390		8390011		11981603	
			506114		1517671		2600893		3683288

TABLE A-36. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK 1/11/75	238749	89574	474044	146953	650763	201736	812235	251792
JFK 1/18/75	81703	25327	239748	74011	409059	126808	564122	174877
JFK 2/05/75	132415	41043	367711	113990	599571	185867	842251	261097
JFK 3/19/75	207230	64241	416938	129250	609912	189072	785640	243548
JFK 4/24/75	62012	19223	225450	69889	394786	122383	560190	173658
JFK 6/12/75	74314	23192	253295	78733	462232	143291	657652	203872
JFK 6/15/75	19690	6103	157029	48673	320946	99493	502109	155653
JFK 6/16/75	62012	19223	225450	69889	406597	126045	599571	185867
JFK 6/24/75	226441	70196	395231	122537	585298	181442	759557	235462
JFK 6/28/75	25093	7778	166840	52340	338176	104834	506536	157026
JFK 7/13/75	109768	34028	234027	38043	475034	147260	662095	205249
JFK 8/04/75	32972	10221	210187	65157	392820	121774	588735	182507
JFK 8/24/75	50201	15562	221098	68819	399709	123909	593178	183885
JFK 8/25/75	58576	18158	204769	63476	349987	108495	498657	154583
JFK 8/26/75	109273	33874	273206	84693	436623	135354	590221	182968
JFK 10/25/75	37595	11747	186564	57834	336210	104225	469616	145580
JFK 11/12/75	317014	98274	603023	186937	833319	259878	1049002	325190
JFK 11/13/75	114195	35400	307465	95376	493657	154583	690640	214098
JFK 11/14/75	95496	29603	244645	75839	407093	126198	561180	173965
JFK 11/21/75	104350	32348	259909	80571	429740	133219	572001	177320
JFK 11/30/75	60046	18614	270342	62105	351473	108956	481428	149242
TOTALS	2270145	703734	5919321	1835133	9693010	3004822	13346616	4137439

TABLE A-37. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 30 PER HOUR DURING NONADVERSE HOURS)

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	213686	34842	432428	149694	675376	209366	954073	264764
JFK	1/13/75	50697	15716	203298	63022	389363	120704	555267	172132
JFK	2/05/75	84660	26244	323903	100409	572692	177627	834387	258659
JFK	3/19/75	179676	55699	405127	125589	610027	189374	801399	248433
JFK	4/24/75	38335	12054	193948	60123	382479	118568	571026	177018
JFK	6/12/75	48235	14952	226921	70345	454353	140849	664556	206012
JFK	6/15/75	3436	1065	122076	37843	236963	73464	476505	147716
JFK	6/16/75	34933	10830	188530	58444	375095	116279	575453	178390
JFK	6/24/75	200337	62259	379523	117652	579385	179609	762513	236379
JFK	6/28/75	2461	762	120097	39369	299735	92933	477496	148023
JFK	7/13/75	82193	25481	255977	79352	455824	141305	655191	203109
JFK	8/04/75	7563	2437	173763	53866	361814	112162	566103	175491
JFK	8/24/75	25633	7932	182517	56611	380018	117805	590716	183121
JFK	8/25/75	36719	11444	176120	55233	340637	105597	502109	155653
JFK	8/25/75	86526	26854	250869	77673	426753	132302	592682	183731
JFK	10/25/75	19195	5950	175728	54475	358176	104834	484880	150312
JFK	11/12/75	269740	89731	533332	180332	830440	257436	1051958	326106
JFK	11/13/75	84164	26090	276507	86366	460437	143935	682760	211655
JFK	11/14/75	60542	18768	210187	65157	389363	120704	554276	171825
JFK	11/21/75	73839	22890	230363	71569	409059	126803	561660	174114
JFK	11/30/75	30015	9304	192447	60353	321442	99647	458780	142221
TOTALS		1714400		5335497		9360701		13273795	
			531454		1653693		2901803		4114364

TABLE A-37. JFK FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	312537	96901	530654	164502	731987	226915	916090	283987
JFK	1/13/75	82694	25635	254491	78892	451396	139932	622713	193041
JFK	2/05/75	133391	41351	388388	120559	648797	201127	914620	283532
JFK	3/19/75	217571	67447	457310	141766	671445	208147	868350	269188
JFK	4/24/75	65960	20447	247107	76603	452387	140239	645841	200210
JFK	5/12/75	78266	24262	278129	86219	521709	161757	740957	229665
JFK	6/15/75	19690	6103	162927	50507	343021	107386	544926	168927
JFK	6/16/75	62012	19223	235791	73095	436133	135201	648302	200973
JFK	6/24/75	231843	71871	422351	131083	629107	195023	822080	254844
JFK	6/28/75	25093	7778	173267	53712	365250	113227	549354	170299
JFK	7/13/75	111239	34484	304705	94459	521304	161604	728550	225850
JFK	8/04/75	32972	10221	221513	68670	424817	131693	639943	198382
JFK	8/24/75	50201	15562	238252	73858	450901	139779	666027	206468
JFK	8/25/75	63003	19530	226441	70196	401675	124519	569044	176403
JFK	8/26/75	113700	35247	296333	91863	483393	149851	655191	203109
JFK	10/25/75	46269	14343	224955	69735	394786	122383	547883	169843
JFK	11/12/75	337200	104532	639447	198228	890997	276209	1120380	347317
JFK	11/13/75	115186	35707	329816	102242	539029	167093	749216	232256
JFK	11/14/75	96471	29906	253919	78714	447464	138713	617791	191515
JFK	11/21/75	105341	32655	277633	86066	464694	144055	621723	192734
JFK	11/30/75	60046	18614	208716	64701	380019	117805	521799	161757
TOTALS		2360735	731819	6378152	1977217	10655400	3303163	14710680	4560300

TABLE A-38. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 66 PER HOUR DURING NONADVERSE HOURS)

FOR 48 MIN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	397212	123135	720451	223339	748473	232026	802347	248727
ORD	1/09/75	76147	23605	272637	84517	289634	89786	321588	99692
ORD	1/10/75	320905	99480	590052	182916	634910	196822	683218	211797
ORD	1/29/75	321618	99763	647052	200586	676498	209869	728028	225689
ORD	2/05/75	1297900	402349	1759730	545516	1799673	557898	1877469	582015
ORD	2/15/75	623382	193248	940998	291709	996657	308963	1044895	323917
ORD	2/23/75	0	0	19040	5902	32648	10120	48300	14973
ORD	2/25/75	137143	42514	403235	125013	431129	133649	477969	148170
ORD	3/24/75	57263	17753	195222	60540	214618	66531	247747	76801
ORD	3/27/75	0	0	77029	23879	95153	29498	122996	38128
ORD	4/02/75	386181	119716	496093	153789	502123	155658	522446	161958
ORD	4/03/75	379321	117589	453042	140443	464433	143974	469797	145637
ORD	4/13/75	155277	48135	258009	80013	281557	87282	292605	90707
ORD	4/19/75	6205	1923	114551	35519	138024	42787	160105	49632
ORD	5/30/75	16557	5132	105577	32723	117320	36369	145606	45137
ORD	6/12/75	28236	8763	168333	52193	195292	60540	211864	65677
ORD	6/17/75	2030	629	142334	44294	156492	48512	186424	57791
ORD	8/20/75	0	0	64365	20013	84873	26310	99371	30805
ORD	8/22/75	0	0	62110	19254	85569	26526	102822	31874
ORD	9/11/75	69693	21604	189037	58616	209095	64819	237395	73592
ORD	10/17/75	5525	1712	90651	28101	105874	32820	123873	38400
ORD	10/22/75	0	0	36050	11175	48986	15185	69398	21513
ORD	10/23/75	0	0	68040	21092	89810	27841	117026	36278
ORD	10/24/75	393777	122070	571249	177087	596040	184772	645593	200133
ORD	10/31/75	16402	5084	123977	38439	130558	40472	158773	49219
ORD	11/02/75	0	0	32432	10053	47612	14759	71766	22247
ORD	11/09/75	8960	2777	75217	23317	97994	30378	122830	38077
ORD	11/13/75	194611	60329	427374	132540	459611	142479	513443	159167
ORD	11/26/75	255159	79099	539362	167202	570420	176830	620369	192314
	TOTALS	5149759		9645134		10301580		11226063	
			1596414		2989973		3193475		3480066

TABLE A-38. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 IN. FADP BENEFIT ANALYSIS TABLE

	TITLE	1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	573922	177915	915842	283911	948166	293931	1002039	310632
ORD	1/09/75	169978	52693	379106	123722	416104	128992	454171	140793
ORD	1/10/75	437530	135634	733616	227411	771894	242337	832972	258221
ORD	1/22/75	485114	150335	827353	256420	857976	265972	915138	283692
ORD	2/05/75	1496233	463932	1972765	611563	2012729	623945	2090510	648058
ORD	2/15/75	788138	244320	1121337	347614	1176996	364869	1225234	379822
ORD	2/23/75	4760	1476	70756	21934	89810	27841	109535	33956
ORD	2/26/75	243050	75345	565547	175319	595429	184582	646349	200368
ORD	3/24/75	115928	35937	296751	91992	320210	99265	361617	112101
ORD	3/27/75	2584	801	176716	54781	194844	60401	225267	69832
ORD	4/02/75	476516	147720	618510	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140023	526102	163091	537492	166622	542857	168285
ORD	4/13/75	234540	72736	338158	104829	364372	112955	379566	117665
ORD	4/19/75	75217	23317	230494	71453	253952	78725	276043	85574
ORD	5/30/75	46235	14332	136332	57762	200316	62252	241542	74878
ORD	6/12/75	82118	25456	250354	80364	297433	92204	319514	99049
ORD	6/17/75	74153	22993	274140	84993	291200	90272	327264	101451
ORD	8/20/75	35137	10907	164933	51129	137709	58189	206340	63965
ORD	8/22/75	22762	7056	134573	41717	164237	50913	132186	56477
ORD	9/11/75	142352	44284	293952	91134	314686	97552	344364	106752
ORD	10/17/75	39444	12227	154318	47833	175080	54274	200000	62000
ORD	10/22/75	9162	2839	99614	29950	112966	34802	140154	43447
ORD	10/23/75	7476	2317	153090	47457	137110	58004	233366	72343
ORD	10/24/75	475492	147402	663010	205533	687124	213623	747385	231689
ORD	10/31/75	81351	25213	219793	68135	223973	70981	263749	81762
ORD	11/02/75	4132	1280	119379	37007	139401	43214	169079	52414
ORD	11/09/75	52440	16256	154861	47920	136332	57762	213241	66104
ORD	11/13/75	301579	93489	553325	174795	596953	185065	652345	202281
ORD	11/26/75	348319	107973	661552	205061	697319	216169	756060	234378
TOTALS		7277016		12694374		13644951		14711079	
			2255636		3934240		4229920		4560421

TABLE A-39. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (ARRIVAL CAPACITY = 54 PER HOUR DURING NONADVERSE HOURS)

EXIT

.RUN BAS

DAY: 1:23:49 RUN: 13.43 RD:2124 WR:260 BAS 9+11P RH* PC:403436

FOR 43 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	466221	150750	370536	269381	907211	281235	979041	303502
ORD	1/09/75	82261	25590	296434	91894	316031	98217	354226	109819
ORD	1/10/75	369214	114455	755831	234261	813473	253726	895764	277636
ORD	1/29/75	368774	114319	761362	236022	795382	246652	863422	267660
ORD	2/05/75	1374233	426027	1731435	536360	1935639	600043	2021136	626552
ORD	2/15/75	709459	219932	1070869	331969	1130967	350605	1185155	367401
ORD	2/23/75	0	0	29246	9066	53746	16661	70070	21721
ORD	2/25/75	140536	43566	423654	131332	451496	139963	499022	154696
ORD	3/24/75	57268	17753	201512	62468	222097	69093	260354	80564
ORD	3/27/75	0	0	82850	25683	100973	31303	120317	37933
ORD	4/02/75	386131	119710	496023	153790	532123	165658	522446	161952
ORD	4/08/75	379321	117589	455042	141063	464433	143974	469797	145637
ORD	4/13/75	175234	54333	234326	72641	312613	96910	327111	101404
ORD	4/17/75	6205	1923	120771	37439	144229	44710	166310	51556
ORD	5/30/75	20703	6417	142852	44284	155277	48135	174611	54129
ORD	6/12/75	42033	13047	220335	68457	262245	81295	296751	91992
ORD	6/17/75	4760	1475	251062	77829	274776	85211	324543	100607
ORD	6/20/75	0	0	120075	37223	162652	50416	194611	60329
ORD	8/22/75	0	0	120771	37439	153935	47704	180112	55834
ORD	9/11/75	75913	23533	243443	77017	230876	71071	334703	103759
ORD	10/17/75	63205	19593	231341	71716	265746	82331	319032	98900
ORD	10/22/75	0	0	66653	20662	71163	22062	133350	41338
ORD	10/23/75	0	0	75674	23459	102732	31846	137438	42606
ORD	10/24/75	433292	134322	626139	194103	654963	203038	711888	220685
ORD	10/31/75	16422	5091	152212	47186	171234	53083	215199	66712
ORD	11/02/75	0	0	157336	48774	187709	58190	240150	74446
ORD	11/07/75	10551	3276	171138	53052	207717	64392	253099	[illegible]
ORD	11/13/75	226348	70167	559675	173500	605232	187621	677695	210085
ORD	11/26/75	267313	82867	569740	176619	604840	187500	660372	204715
TOTALS		5692451	1764692	11454212	3550815	12333327	3824299	13699236	4246763

TABLE A-39. ORD FADP BENEFITS FOR FUTURE DEMAND SCENARIO A (CONTINUED)

FOR 30 YR. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD	1/03/75	662277	205305	1070938	332006	1107627	343364	1179458	365631
ORD	1/09/75	182205	56483	429017	132995	449414	139318	488852	151544
ORD	1/10/75	494117	153176	920614	285390	984798	305287	1068294	331171
ORD	1/29/75	535472	165996	943712	292551	962492	304572	1057336	327774
ORD	2/05/75	1573322	487729	2102436	651755	2146575	665438	2234177	692594
ORD	2/15/75	877918	272154	1251956	388106	1312059	406738	1366237	423533
ORD	2/23/75	4760	1475	85050	26365	120428	37332	142198	44081
ORD	2/25/75	246444	76397	532521	130581	616463	191105	673507	208787
ORD	3/24/75	119579	37007	309858	96055	335369	103970	376797	116807
ORD	3/27/75	2584	801	131397	56384	203915	63213	239520	74251
ORD	4/02/75	476318	147720	618310	191831	626338	194164	652686	202332
ORD	4/03/75	451705	140023	526102	163091	537492	166622	542357	168295
ORD	4/18/75	249320	77444	370591	114883	399573	123867	415449	128789
ORD	4/19/75	75217	23317	233945	72522	258099	80010	283630	87925
ORD	5/30/75	51759	16045	236679	73376	253952	78725	307785	95413
ORD	6/12/75	106272	32944	334703	103759	380247	117876	420973	130501
ORD	6/17/75	97972	30371	404338	125499	434770	134778	494648	153340
ORD	7/20/75	37260	11550	239468	74235	285704	88568	318136	98622
ORD	7/22/75	22752	7054	202839	62890	245674	76158	282949	87714
ORD	9/11/75	146302	45353	360239	111674	393873	123652	456160	141409
ORD	10/17/75	123031	39689	341176	105764	363397	113853	445683	138161
ORD	10/22/75	10206	3163	144242	44715	178262	55261	232694	72135
ORD	10/23/75	9520	2951	170109	52731	206150	63906	252420	78250
ORD	10/24/75	509639	157978	721934	223799	750734	232727	814356	252450
ORD	10/31/75	84631	26235	251937	78100	272929	84607	319518	99050
ORD	11/02/75	31737	9838	286399	88763	322964	100118	385771	119589
ORD	11/09/75	55391	17326	273279	84716	319514	99049	377492	117022
ORD	11/13/75	331939	102901	703922	218215	750157	232548	827448	256508
ORD	11/26/75	363167	112581	695972	215751	731752	226843	793855	246095
TOTALS		7938326		14995299		15995751		17450886	
			2461023		4648533		4958669		5409763

TABLE A-40. ATL OPTIMAL FADP BENEFITS

15 PT. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	43320	15093	360168	111652	629571	216867	757570	234846
ATL 2/10/75	34369	10654	436734	135403	849939	263481	891469	276355
ATL 2/23/75	277323	86125	682336	211539	1122034	347830	1160700	359817
ATL 3/12/75	260638	80797	817001	253270	1268422	393334	1304624	404433
ATL 9/17/75	52270	16203	444663	137844	846359	262371	901494	279463
ATL 11/24/75	265564	82454	776187	240617	1207243	374245	1243045	385343
TOTALS	963264		3517136		5923968		6258902	
		298326		1090326		1858128		1940257

FOR 0 IN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ATL 2/01/75	102393	31741	472536	146501	824174	257043	887173	275023
ATL 2/10/75	83776	25973	557795	172916	982406	304545	1023233	317252
ATL 2/23/75	346563	107434	780433	241949	1237317	383568	1280279	396786
ATL 3/12/75	360163	111652	943024	292337	1403438	435065	1439240	446164
ATL 9/17/75	104652	32443	567103	175801	977394	302992	1034677	320749
ATL 11/24/75	375217	116317	901494	279463	1346156	417308	1391957	431406
TOTALS	1372764		4222385		6771884		7051559	
		427737		1308967		2100521		2185980

[illegible] TIME: 0.43 ELAPSED TIME: 30.00
[illegible] EXECUTION ERRORS DETECTED

TABLE A-41. JFK OPTIMAL FADP BENEFITS

FOR 15 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	282061	87433	432696	134135	574953	178236	709340	219895
JFK	1/13/75	99428	30822	247602	76756	394786	122383	522775	162060
JFK	2/05/75	155543	48218	376036	116586	573487	177780	736136	243702
JFK	3/19/75	215605	66837	309213	123756	560190	173658	711801	220658
JFK	4/24/75	77276	23955	226407	70305	368702	114297	493734	153057
JFK	6/12/75	87616	27160	256952	79655	429244	133065	586769	181898
JFK	6/15/75	30511	9458	175233	54322	325869	101019	480437	148935
JFK	6/16/75	76780	23801	242164	75077	400204	124063	570530	176864
JFK	6/24/75	235296	72941	388393	120401	553301	171523	708860	219746
JFK	6/28/75	38385	12054	188530	58444	344584	106821	488311	151531
JFK	7/13/75	125527	38913	289445	89727	451396	139932	608425	188611
JFK	8/04/75	46765	14497	224460	69582	382975	118722	557233	172742
JFK	8/24/75	68916	21363	230368	71569	382479	118568	536567	166335
JFK	8/25/75	72348	22582	208221	64543	327835	101628	443037	137341
JFK	8/26/75	119118	36926	271225	84079	408083	126505	534586	165721
JFK	10/25/75	46765	14497	168345	52186	290435	90034	401195	124370
JFK	11/12/75	311101	96441	574958	178236	791058	245227	982066	304440
JFK	11/13/75	125963	39048	311596	96594	477496	148023	649293	201280
JFK	11/14/75	113220	35098	254491	78892	395777	122690	522279	161906
JFK	11/21/75	119613	37080	263361	81641	411040	127422	537543	166638
JFK	11/30/75	76300	23653	216596	67144	349507	108347	461242	142985
TOTALS		2528137		5948362		9193406		12292659	
			783712		1844136		2849943		3810715

TABLE A-41. JFK OPTIMAL FADP BENEFITS (CONTINUED)

FOR 0 IN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
JFK	1/11/75	311101	96441	473053	146646	621227	192580	761027	235918
JFK	1/18/75	131425	40741	288454	89420	443037	137341	576428	178692
JFK	2/05/75	195419	60579	426733	132302	633039	196242	853087	264456
JFK	3/19/75	247107	76603	442542	137188	610407	189226	765950	237444
JFK	4/24/75	109763	34026	270249	83777	416938	129250	551815	171062
JFK	6/12/75	119613	37080	301751	93542	435855	150615	649293	201280
JFK	6/15/75	55124	17088	217076	67293	373625	115823	539508	167247
JFK	6/16/75	106316	32957	234532	38201	452882	140393	630577	195478
JFK	6/24/75	262365	81433	426238	132149	604989	187546	763009	236532
JFK	6/28/75	67926	21057	234305	72634	396272	122844	550344	170606
JFK	7/13/75	157524	48832	334214	103615	502109	155653	669479	207538
JFK	8/04/75	76300	23653	268763	83316	437124	135508	617791	191515
JFK	8/24/75	103355	32195	277133	85912	434662	134745	598100	185411
JFK	8/25/75	102980	31892	247602	76756	372634	115516	493734	153057
JFK	8/26/75	150140	46543	311101	96441	454353	140849	590221	182968
JFK	10/25/75	73266	24262	211673	65619	339166	105141	455344	141156
JFK	11/12/75	344534	106821	621723	192734	843242	261405	1035720	321073
JFK	11/13/75	160465	49744	354909	110021	528193	163739	703442	218067
JFK	11/14/75	144722	44863	293872	91100	444508	137797	576924	178846
JFK	11/21/75	146588	45473	303222	93993	458780	142221	590716	183121
JFK	11/30/75	107307	33265	254936	79045	395281	122537	512434	158854
TOTALS		3179395		6844256		10248323		13484943	
			935605		2121703		3176971		4180321

CPU TIME: 1.36 ELAPSED TIME: 1:3.05
NO EXECUTION ERRORS DETECTED

EXIT

TABLE A-42. LGA OPTIMAL FADP BENEFITS

FOR 15 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	143212	46162	204670	63447	336469	104305	415055	128667
LGA	1/20/75	251559	77983	330763	102533	451802	140058	526879	163328
LGA	1/25/75	171714	53231	226849	70323	304745	94463	337105	104502
LGA	3/12/75	43720	13553	70326	21801	154613	47930	219876	68161
LGA	3/14/75	89336	27694	153340	47535	250300	77593	307330	95272
LGA	3/19/75	203397	63053	252832	78377	315731	97876	363088	112557
LGA	5/04/75	28515	8839	78572	24357	160949	49894	204034	63250
LGA	8/04/75	66535	20625	162845	50481	325704	100968	401103	124343
LGA	9/26/75	205943	63842	279433	86625	406172	125913	456866	141628
LGA	11/21/75	186933	57949	264159	82109	400472	124146	477785	148113
LGA	11/24/75	27878	8642	85546	26519	214175	66394	288320	89379
LGA	11/30/75	98842	30641	140000	43409	192633	59716	230017	71305
TOTALS		1523234	472214	2250034	697520	3516605	1090206	4229063	1311005

FOR 0 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE		1975		1980		1985		1990	
		FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
LGA	1/13/75	202138	62662	264559	82102	403600	125123	485015	150355
LGA	1/20/75	314926	97627	394135	122181	521505	161666	595183	135436
LGA	1/25/75	214312	66591	272473	84466	352310	109216	389071	120612
LGA	3/12/75	78572	24357	111513	34569	212280	65804	278515	86432
LGA	3/14/75	142579	44199	203475	63077	310497	96254	369425	114521
LGA	3/19/75	242754	75254	293384	90949	367529	113933	411886	127684
LGA	5/04/75	63970	19835	124725	38665	212302	65814	256001	79360
LGA	8/04/75	115320	35749	192693	59735	395103	122482	476513	147719
LGA	9/26/75	263583	81711	343442	106467	470176	145754	523311	162226
LGA	11/21/75	247754	76803	332361	103032	469217	145361	561294	174001
LGA	11/24/75	78572	24357	148912	46162	248600	77067	359283	111377
LGA	11/30/75	136135	42202	181219	56177	240153	74448	278813	86432
TOTALS		2102445	651751	2790253	864978	4237931	1313751	4980614	1543985

TABLE A-43. ORD OPTIMAL FADP BENEFITS

FOR 15 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975		1980		1985		1990	
	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS	FUEL	DOLLARS
ORD 1/08/75	668735	207307	1019997	316199	1052321	326219	1106194	342920
ORD 1/09/75	228442	70817	467769	145003	488167	151331	529647	164190
ORD 1/10/75	502396	155742	810891	251376	859881	266563	913713	283251
ORD 1/29/75	567448	175908	923972	286431	958678	297190	1015326	314906
ORD 2/05/75	1592934	493809	2079306	644584	2119249	656967	2201948	682603
ORD 2/15/75	871993	270317	1214850	376603	1272739	394549	1326901	411339
ORD 2/23/75	18368	5694	104090	32267	124502	38595	146286	45348
ORD 2/25/75	316378	98077	651734	202053	682336	211524	733927	227517
ORD 3/24/75	162359	50486	358156	111031	383698	118946	426482	132209
ORD 3/27/75	19420	6020	230449	71439	250522	77661	288071	89302
ORD 4/02/75	545031	168959	687306	213064	694834	215398	721183	223566
ORD 4/03/75	485890	150625	560273	173684	571664	177215	577028	178878
ORD 4/18/75	277425	86001	339222	120658	418204	129643	433384	134349
ORD 4/19/75	124903	38719	289154	89637	313308	97125	335389	103970
ORD 5/30/75	68316	21177	242919	75304	257403	79794	299506	92846
ORD 6/12/75	120075	37223	320905	99480	359544	111458	382320	118519
ORD 6/17/75	133350	41338	352436	109255	369446	114528	405510	125708
ORD 8/20/75	79363	24602	223593	69313	251198	77871	271205	84073
ORD 8/22/75	45539	14117	175234	54333	207717	64392	226348	70167
ORD 9/11/75	185636	57547	347119	107606	367822	114024	393878	123652
ORD 10/17/75	71271	22094	206223	63929	228381	70798	254668	78947
ORD 10/22/75	29246	9066	138110	42814	161252	49988	197316	61167
ORD 10/23/75	28574	8857	221130	68550	263312	81626	312984	97025
ORD 10/24/75	520360	161311	719260	222970	749722	232103	807659	250374
ORD 10/31/75	123997	38439	274900	85219	284080	88064	318856	98845
ORD 11/02/75	33114	10265	173211	53695	193061	61398	232567	72095
ORD 11/09/75	87542	27169	200816	62252	233945	72522	262245	81295
ORD 11/13/75	358362	111247	632141	195963	665270	206233	728076	225703
ORD 11/26/75	403004	124931	733100	227261	770228	238770	832330	258022
TOTALS	8670571	2687864	14748376	4571983	15556484	4322495	16686447	5172786

TABLE A-43. ORD OPTIMAL FADP BENEFITS (CONTINUED)

FOR 0 MIN. FADP BENEFIT ANALYSIS TABLE

TITLE	1975 FUEL	1975 DOLLARS	1980 FUEL	1980 DOLLARS	1985 FUEL	1985 DOLLARS	1990 FUEL	1990 DOLLARS
ORD 1/03/75	812397	251843	1175113	364294	1209624	374983	1269956	393686
ORD 1/09/75	339957	105386	594239	184214	614635	190537	656117	203396
ORD 1/10/75	625936	194040	940572	291592	994454	[illegible]	1068114	328465
ORD 1/22/75	704335	218514	1075724	333463	1110410	344227	1167553	361942
ORD 2/05/75	1743593	540514	2245375	696072	2289549	709760	2375046	736264
ORD 2/15/75	1005575	311723	1362526	422383	1422644	441019	1476322	457814
ORD 2/23/75	58506	18136	176213	54627	202075	62643	225204	69813
ORD 2/25/75	446732	138486	794352	246252	823977	255433	886012	274665
ORD 3/24/75	258795	80226	470659	145904	495190	153513	539671	167298
ORD 3/27/75	106813	33112	341791	105955	363809	112780	403289	125019
ORD 4/02/75	657953	203965	800223	248070	807757	250404	836367	259273
ORD 4/03/75	542151	168076	616576	191139	627969	194670	633333	196333
ORD 4/13/75	352642	109319	483084	149756	512747	158951	529319	164089
ORD 4/19/75	217337	67374	386457	119802	414753	128573	440236	136473
ORD 5/30/75	145606	45137	348510	108038	365763	113386	414753	128573
ORD 6/12/75	207717	64392	434079	134564	473413	146758	497563	154246
ORD 6/17/75	246302	76353	476280	147646	493290	152919	529340	164095
ORD 6/20/75	165623	51344	328473	101831	356789	110604	376797	116807
ORD 8/22/75	102322	31720	264304	81934	303652	94132	326415	101188
ORD 9/11/75	269828	83646	443054	137347	467890	145045	505165	156601
ORD 10/17/75	128031	39689	294127	91179	313349	97138	346032	107270
ORD 10/22/75	95236	29523	234733	72767	259910	80572	297332	92172
ORD 10/23/75	110894	34377	357210	110735	400064	124019	451094	139839
ORD 10/24/75	605410	187677	818380	253697	848517	263040	909452	281930
ORD 10/31/75	204039	63252	368725	114304	378567	117355	413991	128337
ORD 11/02/75	116624	36153	283630	87925	311235	96482	347112	107606
ORD 11/09/75	148190	45939	283630	87925	321585	99691	354020	109746
ORD 11/13/75	459611	142479	763264	236611	801916	248593	868855	269345
ORD 11/25/75	512360	158831	864059	267861	902544	279788	965327	299251
TOTALS	11401527	3534460	18025504	5587694	18609063	5768790	20095360	6229549

CPU TIME: 1.85 ELAPSED TIME: 1:17.87
NO EXECUTION ERRORS DETECTED

APPENDIX B
SIMULATION METHODOLOGY

B.1 INTRODUCTION

The original simulation runs were made utilizing AIRS I as a simulation tool. Because of the number of simulation runs required and the combination of cost and time required in using AIRS I a Benefit Analysis Simulation (BAS) was developed and used to calculate the fuel saving benefits presented in this report. The BAS results were verified by comparison to the AIRS I simulation runs. This appendix delineates the simulation methodology used, a verification of the simulation tools, and a description of the BAS.

B.2 AIRS I SIMULATION

The AIRS I primary and test systems' data bases contain demand data for the current, previous, and subsequent months. The only way to simulate the 1975 cases was to utilize this data base. However, the hourly demand for the 1975 cases differed from the available 1976 data. This problem was circumvented as follows:

a. For each problem day in 1975 the hourly demand and capacity were tabulated.

b. The hourly demand for the 1976 day used for simulation purposes was retrieved from the computer system.

c. The hourly differences between the 1976 day and each 1975 problem day were determined to obtain demand numbers.

d. The 1975 hourly capacity numbers were then adjusted by the demand numbers.

e. These adjusted capacity numbers were then entered into the AIRS I program and the simulation runs made.

The benefits of the problem days that occurred in October 1975 were simulated in 1975 using the actual days' AIRS I demand data.

A verification run was made for the October 24, 1975, data, using the above methodology and compared to the original run. The results are delineated below for the ADP period.

ITEM	ORIGINAL RUN	NEW RUN	PERCENT DIFFERENCE
Predicted Delays-Minutes	52,507	52,410	0.2
Predicted Delays-No. of A/C	362	354	2.2
Percent of Delay Time Shifted to Ground	55	54	1.8
Percent of A/C Ground Delayed	85	80	6.2
Gallons of Fuel Saved	402,449	406,120	0.9

These results are considered to have an excellent correlation, and the same methodology was used for all runs made for the baseline simulation study.

B.3 ESTIMATION OF MISSING CAPACITY DATA

The Performance Summary Profiles generally had any reduced hourly capacity figures delineated. In several cases these figures were missing, but the time the delays reached 30 minutes were recorded. Using this recorded time the capacities were estimated as follows:

a. A graph was plotted of the hourly demand rate.

b. The time where the delays initially exceeded 30 minutes was plotted on the graph.

c. A line parallel to the time axis scaled for 30 minutes was plotted between the demand curve and the initial 30-minute delay.

d. A line drawn between the origin and the 30-minute delay line intersction yields the hourly capacity rate.

An example of this is shown in Figure B-1.

B.4 BENEFIT ANALYSIS SIMULATION (BAS)

B.4.1 BAS General Description

The Benefit Analysis Simulation (BAS) is an hourly event simulation. It models arrival delay problems and the Fuel Advisory Departure (FAD) procedures for an airport on an hour-by-hour basis. It considers the arrivals during an hour and the aircraft holding from the previous hour in computing the landed flights for a given landing capacity. In the event that aircraft must be held (in the air) into the next hour, the BAS examines the stack situation in view of the modeled flow control procedures (FAD 48-minute destination hold limit or FAD 30-minute hold limit). The average destination hold stack size is computed based on the FAD hold limit and the projected landing capacity in the following hour. The aircraft holding in excess of this destination stack size are considered to be flow controlled. Since FAD does not ground delay every flow controlled flight (i.e., only those within a 2-1/2 hour flight time), the ground delayed flights are determined by applying a percentage ground factor derived from a series of AIRS I flow control simulations covering most of the problem days which occurred at the airport during 1975. Having the number of flights flow control ground delayed each hour and assuming that they are delayed during the entire hour, the number of ground delay minutes are computed by multiplying by 60. A simple multiplication of these ground delay minutes by the average holding fuel consumption rate of the fleet mix for that airport (derived also from the AIRS I 1975 problem day simulations) gives the projected FAD fuel savings in gallons. Multiplying the gallon savings by the cost per gallon gives the fuel dollar saving benefit. Summing up the savings for each hour in the day produces the total fuel and dollar savings for the simulated problem day.

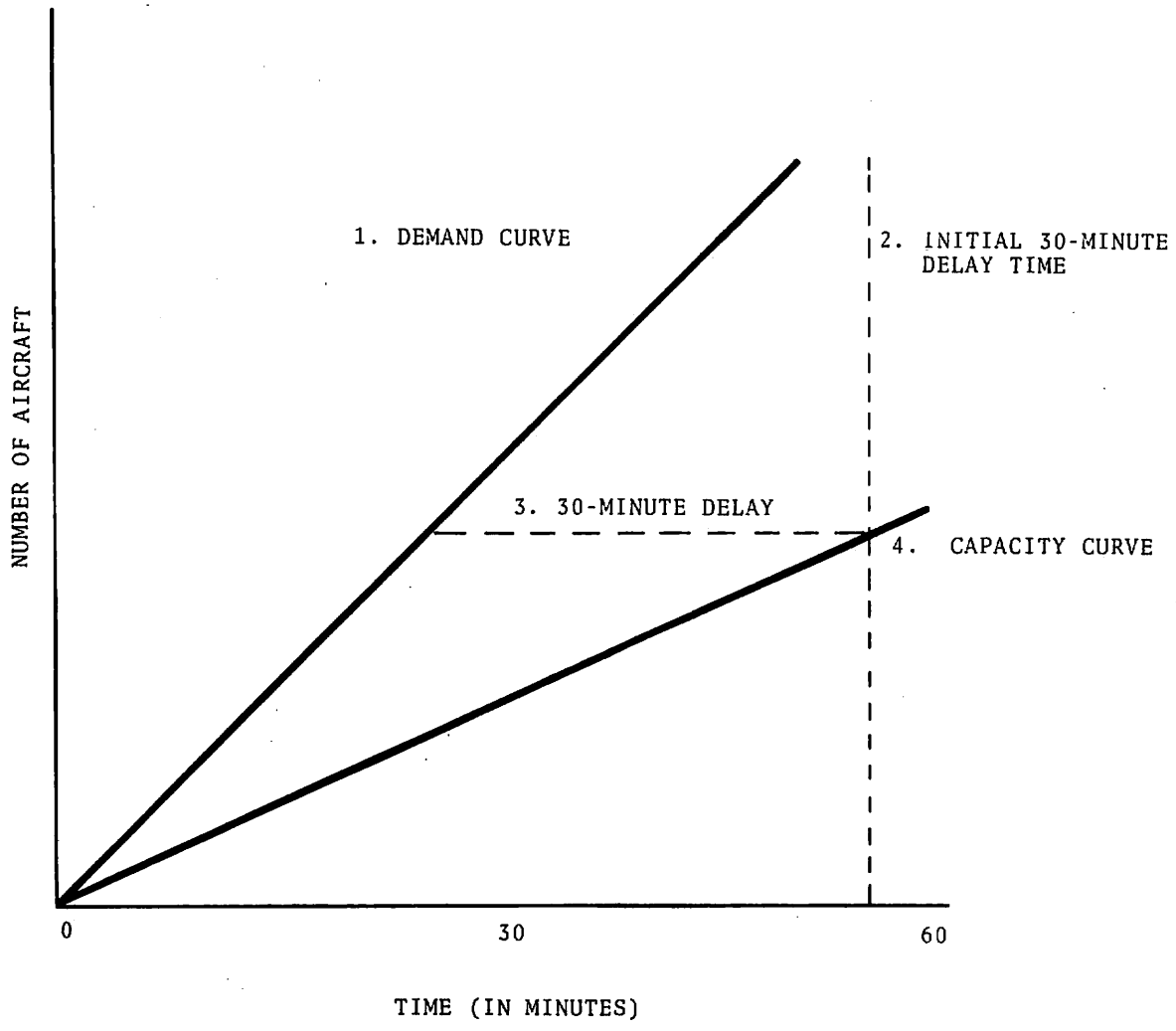

FIGURE B-1. GRAPHIC EXTRAPOLATION OF HOURLY CAPACITY

In modeling a given problem day for an airport, two sets of data must be prepared: the hourly arrival traffic loads and the hourly landing capacities. The preparation of traffic loads starts with a given (exact) traffic load condition experienced during the airport's 1975 actual problem situation to be extrapolated into the future. A given percentage traffic increase (from third generation FAA system studies) is applied to these hourly traffic loads. To approximate a rescheduling of this traffic, if greatly over the normal landing capacity, a spread algorithm is employed. The algorithm is given an allowable percentage over normal landing capacity, and if the increased load exceeds this allowable schedule, it spreads the excess traffic into the nearest hours where no excess exists. The spread is divided uniformly, half being spread into earlier hours and half spread into later hours. Obviously, this traffic spread is controlled such that it does not overload any other hour. The hourly landing capacity is also obtained from the actual problem day in 1975, and the hours for which no data were recorded are given the normal IFR capacity value.

The BAS is constructed in such a way that it performs a batch of simulations in one run. It thus is capable of simulating hundreds of problem situations at one time, efficiently and timely. Specifically, it models several problem day profiles (a profile corresponds to one 1975 problem day). For each problem day profile, it simulates the traffic increases for 1980, 1985, and 1990. For each of these, it simulates the benefits from the 48-minute FADP procedure and from the 30-minute FAD. A spread factor can be entered for each batch run, and thus several runs would produce the results of rescheduling traffic peaks to various degrees.

B.4.2 BAS Specific Simulation Functional Description

The following paragraphs present the functional steps involved in performing the Benefit Analysis Simulation. The functional steps have been abstracted from the software design and are presented in a pseudo design language mode. This section is presented as an aid in understanding the BAS methodology and is not intended to give an accurate reproduction of the simulation program structure.

STEP NUMBER	FUNCTIONAL DESCRIPTION
1	Initialize report tables for generation of two pages of output, one for each of two FAD criteria (e.g., 48-minute desired airborne stack). Each page must have four groups of two columns of date. Each group represents a prediction year (i.e., 1975, 1980, 1985, and 1990), and each column represents the gallons saved and the fuel cost savings. Provide for column totals at the bottom of each page.
2	Read in the two FAD criteria (e.g., 48, 30 minutes)
3	Process through Step 23 for one page of output for each of the two criterion.
4	Read in all airborne arrival counts and landing capacity data for all problem days for airport being analyzed.
5	Process through Step 21 for one days' problem (loop back for next problem).
6	Process through Step 20 for one years' arrival projections (loop back for next year until 1990 processed).
7	Process through Step 10 for each hour of the problem day.
8	Add growth factor to hours' arrivals count except for 1975 to determine the projected arrival increases.
9	If a growth increment has to be added to the hours' arrival count and the new arrival counts exceed the spread threshold, the spreading algorithm will be used. The number of flights which exceed the capacity threshold will be spread into the nearest nonoverloaded arrival hours. Half of the excess arrivals will be moved forward in time and half backwards.

10 Loop back to Step 7 until each hour of the day has been processed.

11 Process through Step 16 for each hour of the problem day.

12 Add this hours' arrival count to the arrival stack.

13 Subtract this hours' landing capacity from the arrival stack, and if negative, stack reset stack to zero.

14 Using the next hours' landing capacity, compute the number of aircraft to be held in the air in accordance with the FAD criterion (an empirically derived fraction based on AIRS I).

15 Add to the flow controlled aircraft count the number of aircraft in the arrival stack which exceed the FAD airborne holding count of Step 14.

16 Loop back to Step 11 until each hour of the day has been processed.

17 Using the empirically derived (from AIRS I) fraction of flow controlled aircraft which would be given ground delays, compute the number of aircraft grounded of the flow controlled aircraft count. The resulting count represents the number of aircraft hours of ground delay for the day.

18 Multiply the results of Step 17 by the average hourly fuel consumption for the traffic mix (derived emperically from AIRS I for the airport being processed). The resulting answer is the gallon savings for that day and for the year in question, and the FAD criterion of the page.

19 Similarly, multiply the gallon savings by the average cost per gallon of aviation fuel to give the days' dollar savings due to FAD ground delays.

20 Loop back to Step 6 until each of the 4 years has been processed.

21 Loop back to Step 5 until each problem day of the run has been processed.

22 Compute each of the column totals for the page (one FAD criterion).

23 Loop back to Step 3 until both FAD criteria have been processed.

24 Print both pages of data with appropriate headings and problem day identifications.

B.4.3 BAS Verification

For FY75, 53 AIRS I simulation runs were made. A total of 31 and 22 simulation runs were made for the 48- and 30-minute criteria, respectively. The same runs were then made with the BAS. The overall results were as follows:

For the 48-minute FADP criterion the overall BAS results were within 1.8 percent of the AIRS I results.

For the 30-minute FADP criterion the overall BAS results were within 2.2 percent of the AIRS I results.

For FY90, three 48-minute FADP criterion and four 30-minute FADP criterion AIRS I simulation runs were made. For these seven runs all the BAS results were within 6.1 percent of the AIRS I simulation results.

APPENDIX C
FUNCTIONAL DESCRIPTION OF THE ADVANCED SYSTEM

The description contained herein is based upon the June 28, 1976, Computer Program Functional Specification for the Advanced System. It is not intended to be a complete description.

There are four major service areas activated by input messages and producing an assortment of reports, listings, and flow control tables. These areas are defined as data count messages, data list messages, simulation messages, and data base update messages.

The first area, data count messages, provides the users with flight traffic loading information. The user is given the option of either an arrival traffic report or a departure traffic report. Each report can be obtained for any airport of interest or ARTCC of interest. Further selectivity is provided, reporting the activity of specific airlines, aircraft types, and specified time periods. The user is also given a report option to tabulate arrival traffic at a specified arrival fix associated with one of the pacing airports. There are about 10 to 20 pacing in the system and an estimated 200 fixes of interest.

The second service area, data list messages, supplies the users with individual flight information, airport landing capacity estimates (previously entered), and/or airport general aviation estimates (previously entered). The latter estimates are used in approximating future traffic loads attributed to the general aviation segment of the air traffic. The flight information listings may be obtained by selecting the airport or the ARTCC of interest and specifying the qualifiers similar to the data count messages. An additional option is provided to produce a listing of all flights with the same flight identification. This option is useful in retrieving multiple leg flights without specifying the airport involved. The flight listings are sorted by arrival or departure time corresponding to arrival listings or departure listings.

The third area concerns simulation messages. There are three types of simulation messages: airport arrival delay predictions, quota flow control procedures, and Fuel Advisory Departure (FAD) procedures. These simulations can be performed for any of the pacing airports, on the current day. The simulation products include a delay prediction report, a release rate table, an FAD-assigned delay table, and a listing of individual flight flow control assignments.

The last area deals with data base updating messages. The users can enter or cancel individual flight records from the centralized data base. They may also inhibit a pseudo cancellation, on a temporary basis, of a specified flight or an entire airline's flights. This inhibit message (and its converse activate message) provides a simple method of updating the data base, as might be required in anticipation of an airline strike. The user can also enter two types of data associated with an airport for use in generating the simulations: the hourly estimated landing capacity and the hourly general aviation estimates. These data entries provide the means to structure the problem environment for airport delay predictions and flow control simulations.

It must be noted that the Advanced System is designed to collect automatically flight status and position data from the NAS computers and to incorporate these data into its centralized data base to improve accuracy.

APPENDIX D

FUNCTIONAL DESCRIPTION OF THE CURRENT AIRS I SYSTEM

The AIRS I automational features are described as they now exist on a commercial computer service (a DECsystem-10 computer system). The AIRS I system has been supporting the operations of the ATC Systems Command Center continuously since January 1971. Although AIRS I employs a free form command language, the messages can be discussed for convenience in the service area groupings used in the Advanced System description, Appendix C. These areas are: data count messages, data list messages, simulation messages, and data base update messages.

The first area, data count messages, provides the users with flight traffic loading information presentable in a variety of formats. The user can request either arrival or departure traffic reports or both in one report. Each report can be obtained for any airport or group of airports and/or for any ARTCC or group of ARTCC's. Further selectivity is provided, reporting only an airline or airlines flights and/or for an aircraft type or types, for a specified report time period. In addition, the reports may be specified to contain the traffic activity for airport pair and/or ARTCC pair relationships. This feature permits the user to obtain traffic loads between a specified set or sets of geographic locations. AIRS I has the option of negating any or all of the selectivity parameters to provide traffic loading reports for "all except" situations. For example, this can be used to report on all arrivals at an airport except for a specified airline which is on strike. The variety of formats supported by AIRS includes the standard reports, optional subdivision reports, and graphical (plotted) presentations. The data subdivision reports allow the user to obtain traffic loading information tabulated by any of the qualifiers or selectivity parameters. For example, it provides the users with optional tables of hourly traffic by airlines, origin airports, aircraft types, Estimated Time Enroute (ETE) ranges, and carrier classifications. The graphical presentation

options yield bar and line graphs showing traffic loading and landing capacity estimates by time. Last in this first area of reports is a traffic load report by fix association. This fix report can be obtained for any flow controlled airport with predefined zone structures. Zones and flow controls are supported for all airports in the AIRS I data base.

The second service area, data list messages, supplies the users with individual flight information, airport landing capacity estimates (previously entered), and/or airport general aviation estimates (previously entered). The flight information listings may be obtained in association with any or all of the data count messages and simulation messages. Either the entire traffic listing or any part thereof may be listed. Listings can be qualified by any of the selection parameters used in the data count service area messages. The listings are automatically sorted by time but have optional sorting choices using any of the listed data fields. Listings may be subsorted down to nine levels. For example, the user may request a list of flights sorted primarily by airline, subsorted by aircraft type. He may also request flight listing estimated time enroute and within that by ARTCC. AIRS I has an optional compressed format feature, which takes the normal listing and tabularly compacts the information for more efficient communication network transmission.

The third area concerns simulation messages. There are four types of simulation messages: airport arrival delay predictions, quota flow control procedures, Fuel Advisory Departure (FAD) procedures, and Advanced Flow Control Procedures (AFCP). These simulations can be performed on any airport known to the AIRS I data base of over 1200 airports. The simulation products include delay prediction reports, a release rate table, an FAD-assigned delay table, the previously mentioned individual flight (assignments) listings, a compressed FAD-assigned delay table for efficient transmission, a graphical plot selection covering eight parameters and having up to four per plot, and a Quota-Flow-map-based display depicting directional traffic loadings and flow control data. The simulation products have the additional

capability of being produced for any date or day within the normal 45-day coverage supplied by the AIRS I data base. This enables advanced problem assessments and past problem reconstruction and analysis.

The last area deals with data base updating messages. The user can enter or cancel individual flight records from the centralized data base. The user can enter three types of data associated with an airport for use in generating simulation products and loading reports. The types are: hourly estimated landing capacities, hourly general aviation estimates, and hourly departure delay estimates. These data entries provide the means to structure the problem environment for airport delay predictions and flow control simulations.

It is noted that AIRS I has a subsystem which collects and summarizes flight status and position data from the NAS computers received in real time through the existing FAA Center B communication network. At the present time AIRS I does not have these data incorporated into the central data base used by the retrieval and simulation subsystems.

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