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Terminal Area Air Traffic Control Simulation

Final Report

Prepared for

NASA AMES RESEARCH CENTER
Mountain View, California

June 1977

Prepared by

TRANSPORTATION GROUP DIRECTORATE
ENERGY AND TRANSPORTATION DIVISION

Contract No. NAS 2-6473

THE AEROSPACE CORPORATION

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FOREWORD

This study was performed by the Transportation Group Directorate, H. Bernstein, Director, of the Energy and Transportation Division, Dr. A.B. Greenberg, General Manager. The Project Manager was S. Sokolsky. Mention must be made of the computer programming efforts of B.R. Kubert and, particularly, of Dr. Dianne Sakaguchi, without whose support and counsel this effort could not have been completed. The authors also wish to thank Elwood C. Stewart, the NASA/Ames Research Center Contracting Officer's Technical Representative for this study, for his leadership, wise counsel, patience and confidence throughout the simulation development and validation effort.

SECTION I

INTRODUCTION

As part of a continuing effort concerned with short-haul air transportation, the Ames Research Center of the National Aeronautics and Space Administration is investigating the impact of advanced aeronautical technologies on operations to and from terminal area airports. To accomplish this, NASA has undertaken the development of a capability designed to permit them to analyze the extent and severity of interactions occurring in terminal airspace. NASA thereby expects to attain a more complete understanding of the need for advanced aircraft and flight control systems, designed to cope better with the terminal area environment by increasing total airside capacity, decreasing delays experienced by arriving aircraft, and decreasing energy usage by aircraft maneuvering to a landing.

In the expectation that fast-time simulation of terminal area events would be useful in supporting their objectives, Ames sponsored the development and validation by The Aerospace Corporation of a computer model of air traffic movements in a terminal area environment. This model is intended to strike a balance between the conflicting requirements of realism and complexity on the one hand, and speed of computation on the other. In a simulation, the level of detail, complexity and sophistication of the individual models is limited only by the power and speed of the computer available, the resources which can be devoted to model development and debug of the resulting giant computer program, and the extent of the validation effort to determine if the end-product really does replicate the modeled events. For example, the Federal Aviation Administration (FAA) operates an elaborate, interactive real-time air traffic simulation in support of its role as manager of the personnel needed to make available a safe and effective U.S. air traffic control system. The real-time nature of the FAA's methodology, and its dependence on sophisticated software and on the availability of personnel to "fly" simulated aircraft and experienced controllers to guide the simulated traffic, makes it inappropriate to NASA's needs.

There are many specific reasons for using a simulation methodology, and, in particular, a fast-time methodology, in preference to other approaches:

- The simulation approach overcomes the limitations inherent in a variety of analytical approaches. The latter require that the process being modeled be amenable to description by one or a set of equations. A typical model of this type is that developed in Reference 1 for estimating runway capacity under various visual and instrument scenarios. In general, those models which consider the movement of traffic only between the outer marker and the runway can use the analytical approach. Aircraft speeds and separations may be unequal (or even statistically distributed), both arrivals and departures may be included, and non-standard approach geometries can be accommodated. Even multiple runways and/or airports are possible within this framework, but the complexity of the system of equations needed escalates rapidly as each new requirement is added.
- A simulation methodology is basically better suited to the detailed study and analysis of aircraft maneuvers and interactions in the airspace leading to the outer marker. Criteria for metering, spacing and merging traffic from multiple entry points (feeder fixes) into a single final approach queue must be studied, and it becomes impractical to consider further the use of analytical models. In fact, many investigators have found that simulation models are attractive even where multiple routes leading to merging of traffic are not considered (for example, see Reference 2).
- A simulation has an unique feature that it can, in effect, be taken apart and models developed for each major element.

The various pieces may then be called upon, in turn, to mimic the operation of the real system.

- A fast-time simulation has the virtue that many air traffic scenarios may be studied relatively quickly and at low cost.
- Statistical aspects of aircraft flight in terminal airspace are best handled within the fast-time simulation framework. Potential deterioration of ideal separation requirements can be quickly examined, and the impact of controller, pilot and equipment errors readily assessed.

The origins of Aerospace's work in terminal air traffic control simulation stem from a short-haul study conducted by the company in the Western Region of the United States and comprising thirteen western states (Reference 3). Aerospace undertook the simulation development with support from its own company-sponored research program, because it was felt that the capability to assess the impact of implementing new airline systems on air traffic in already busy terminal areas was a necessary adjunct to any corridor air transportation analysis. The characteristics of an earlier version of the simulation are described in Reference 4, while References 5 and 6 describe several Aerospace studies completed some years ago and using the simulation approach. This effort provided the framework for a large-scale simulation, but the work was terminated before the methodology could be fully developed.

The objectives of the Ames Research Center in terminal area research could be met by utilizing the Aerospace simulation as a starting point for the development of a number of major modifications and improvements, as follows:

- Develop capability to schedule departures as well as arrivals. The departure algorithm was to be less comprehensive than that used to schedule arrivals, in the sense that departures would only be considered on the airport and for a short distance after takeoff. This approach would permit modeling the detailed interaction between arriving and departing traffic, but contained the inherent assumption that such traffic could be adequately separated in terminal airspace away from the airport. The issue of handling aircraft on the airport after turning off or before entering the runway was not considered.

- Add algorithm for examining individual aircraft fuel consumption in terminal airspace. This would permit different strategies for metering and spacing traffic to be examined, both in terms of effects on capacity and on overall fuel consumption.

- Develop methodology for considering effects of navigation equipment and pilot errors. This would permit the analysis of separation standards required to limit the effects of observed separation degradation to levels considered safe.

- Increase number of modeled feeder fixes. This would permit the analysis of larger, more complex terminal areas, which experience most capacity problems.

- Achieve fully operational status. The computer program existing at the beginning of this project was built as a research tool, rather than as an operational development tool. This required a major rework of many elements in the program to improve coding and running time, and, in general, convert the simulation to one capable of routinely perfroming operational analyses.

NASA deemed it a major objective of the effort that the developed computer code be validated against experience in an actual air traffic arena. Such validation is necessary to provide confidence in the accuracy of the algorithms used and in the overall fidelity of the simulation. To model real-world events, it was learned that the FAA collects and stores data on all arrivals and departures at the three major jetports in the New York Terminal Control Area. It was thought that this data, when combined with data contained on controller flight strips for each controlled aircraft, would provide enough information against which the computer code could be validated. It has been found that only a portion of the required data is actually available, so that a full validation of the code was not possible.

The terminal air traffic simulation developed for NASA models the zone referred to as the Terminal Control Area, in which air taffic moves from certain designated entry points, called feeder fixes, to final approach courses leading to touchdown on the desired runway. The transitional airspace connecting the en route sector with the terminal section is also modeled, but with less precision. Air traffic is generated in the transition region and, on the basis of the generation times and certain priority considerations, "optimal" approaches are planned, constrained by limits on interference with other terminal area traffic. These ideal approach plans comprise a series of way-points, each of which has three space coordinates and time associated with it. Each leg of the resultant path is characterized by an ideal velocity and descent rate. Utilizing statistical error distributions, the code also simulates the flight of aircraft trying to maintain the planned ideal paths. Errors associated with pilot response time are modeled on the basis of a specially developed statistical distribution whose end points are fixed at one input-specified number of standard deviations, in order that such errors would not become excessively large. Navigational equipment errors are randomly generated on the basis of specified standard deviations. Thus an aircraft arrives at a feeder fix with errors in time and spatial location, and departs with errors in heading, speed and descent rate. To further add to the realism of the simulation, a command system (or "controller") is also modeled. Observed differences between "actual" and ideal paths result in commanded path changes in order to adjust an obviously growing error in the flight path. Because the observed position is also error-prone, the aircraft "hunts" for the ideal path, never quite reaching it. This technique also admits of a capability to make small path corrections when separation between aircraft is seen to deteriorate below a specified safe level.

The simulation is exceedingly flexible, providing the user with the capability to examine in detail the operation of highly complex terminals. As part of the input, feeder fixes and navigational aids are identified, types and classifications of traffic defined, and points of generation indicated. Traffic may be generated in either a random or prescribed manner. Additionally, flight paths in the Terminal Control Area may be optimized by the computer or prespecified by the user. In any case, a specified set of separation criteria will be met, while the computer program attempts to find the shortest and least time-consuming route for each aircraft. The simulation does not merely make a statistical count of traffic between the outer marker and the runway in a selected time period; it also accounts for any merging and sequencing delays resulting from traffic interactions in the airspace between the feeder fix and the outer marker. Clearly, such interactions could be very severe if a single approach course is fed by several feeder fixes and the traffic from each must finally be merged before reaching the outer marker.

This document includes a complete report on the work performed by Aerospace for NASA in developing and validating the terminal area air traffic simulation model. Section II provides a detailed description of the model and its algorithms. Section III is a report on the validation activity, performed using data on actual operations in the New York

Terminal Control Area (detailed information on the New York area operations used by Aerospace in the validation process, and a listing of one complete New York area case, are included in the Appendices). Sections IV and V include User's and Programmer's Guides, respectively, both of which are designed to enable NASA and other government agency computer programmers to use the simulation without support from Aerospace. A rights-in-data clause, made a part of the original contract for this effort between Aerospace and the Government, stipulated that use of the simulation would be restricted to the Government.

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SECTION II
SIMULATION DESCRIPTION

A. OVERVIEW

The Aerospace Terminal Area Air Traffic Simulation was designed to permit the analysis of air traffic movements in high density controlled airspace serving major air terminals, including the interactions of arriving aircraft with those waiting to depart. It is a large-scale model. permitting the simulation of all major (interacting) traffic movements in an arena in a single scenario. In this report, the model's inherent capability is demonstrated through the simultaneous analysis of the three major airports serving the New York area (Kennedy, LaGuardia, and Newark). Indeed, reliever airports, such as Teterboro, Westchester County, and MacArthur (Islip), could also have been handled by the simulation, had sufficient traffic data been available.

Arriving traffic examined by the computer program is generated some distance from the Terminal Control Area (TCA), although it is possible to generate pop-up traffic much closer to the final approach region. Departing traffic is generated on the airport, but initially considered earlier than the announced desired departure time, to assist in mixing with arrivals. As arrivals approach their respective feeder fixes, their approaches are planned in detail, or they are held pending availability of a satisfactory approach slot. An approach is satisfactory when it meets a stringent set of separation criteria. Aircraft arrive at the feeder fix with a variety of errors in flight parameters. When these errors are observed, commands are issued in an attempt to improve each aircraft's path as it approaches the outer marker. Each aircraft's fuel consumption is also computed during the flight from feeder fix to touchdown.

In the following subsections, the operation of the simulation will be explained in detail. Scheduling of arrivals is discussed in terms of paths projected in the horizontal plane, velocity assignments, and altitude variations. Particular attention is given to sequencing techniques and the establishment of adequate separation between aircraft. Simulation of aircraft flights is explained by reference to system and pilot errors. Scheduling of departures is explained in terms of its relationship to arrivals. Finally, the method adopted for estimating fuel consumption in approach airspace is indicated.

B. ARRIVAL SCHEDULING

There are three distinct areas of concern when scheduling arrivals. The first involves aircraft approach flight path planning in space and time. Second is the selection of a path for a given aircraft from among several possible paths, utilizing a set of control variables. Third is the choice among several possible sequences of aircraft, to determine which of several aircraft shall arrive first, etc. Each of these areas is described in detail in the subsections below.

1. Approach Paths

Approach planning can become extremely complicated when many aircraft converge on each airport of a closely spaced group of airports served by multiple feeder fixes. Such planning may even be complicated when only a single aircraft is being considered, because of the diversity of possible paths which may be flown. In this simulation, the beginning of the path is taken at a feeder fix. The last portion of the path is assumed to be along a glide slope to the touchdown point. Varying the coordinates of points on a path in three-dimensional space can yield a large number of acceptable paths; freedom to also vary time at each point further complicates the problem. To constrain the analysis and place a reasonable limit on the number of calculations required, two basic assumptions are made:

- First, all paths are approximations of types actually in use by FAA control facilities.
- Second, all paths are formed from a series of straight line segments, thus allowing a set of vertices (x, y, z, and time values) to completely describe any given path.

A typical approach geometry resulting from these assumptions is shown schematically in Figure 1. Detailed descriptions of path parameters for a given aircraft are found in the ensuing discussion.

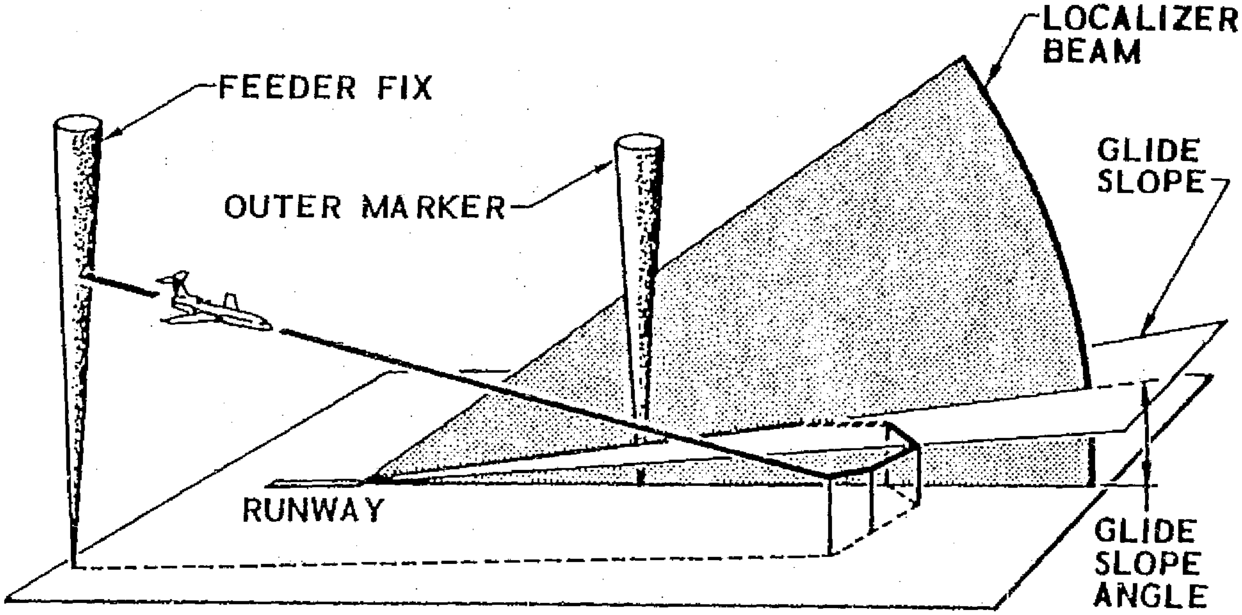


Figure 1. Schematic of Typical Approach

a. Shapes of Paths

The shapes formed by the ideal paths of aircraft projected on a horizontal plane may be specified by a method external to the program (on the basis, for example, of charted routes in a terminal area) and merely input as a series of vertices; or they may be determined within the program based upon established constraints. Shapes of paths externally determined are restricted only in that they are expected to be reasonable (i.e., two segments of the same path shall not intersect each other except at their end points; aircraft shall not be expected to make turns that are appreciably over 90° to move from one segment to another; and aircraft shall not have to descend at angles which are known to adversely affect passengers).

Paths calculated under program control can have one of four basic shapes, shown in Figure 2. It should be noted that the first three paths (Figures 2a, 2b, 2c) are characterized by the feeder fix being on the approach end of the runway, while for the last (Figure 2d), the feeder fix is on the opposite end. For convenience, the first three paths are lumped together and denoted as Type 1 paths; the last is a Type 2 path.

Type 1 Paths

The subfamily (or subfamilies) of Type 1 paths selected by the program are dependent upon five inputs:

- the position of the feeder fix
- the angle between a line through the feeder fix parallel to the extended runway centerline and the path segment leaving the fix (denoted ϕ)
- The minimum distance between the touchdown point and the final approach course intercept point
- the maximum distance between the touchdown point and the final approach course intercept point (designed to constrain airspace useage)
- the intercept angle, θ.

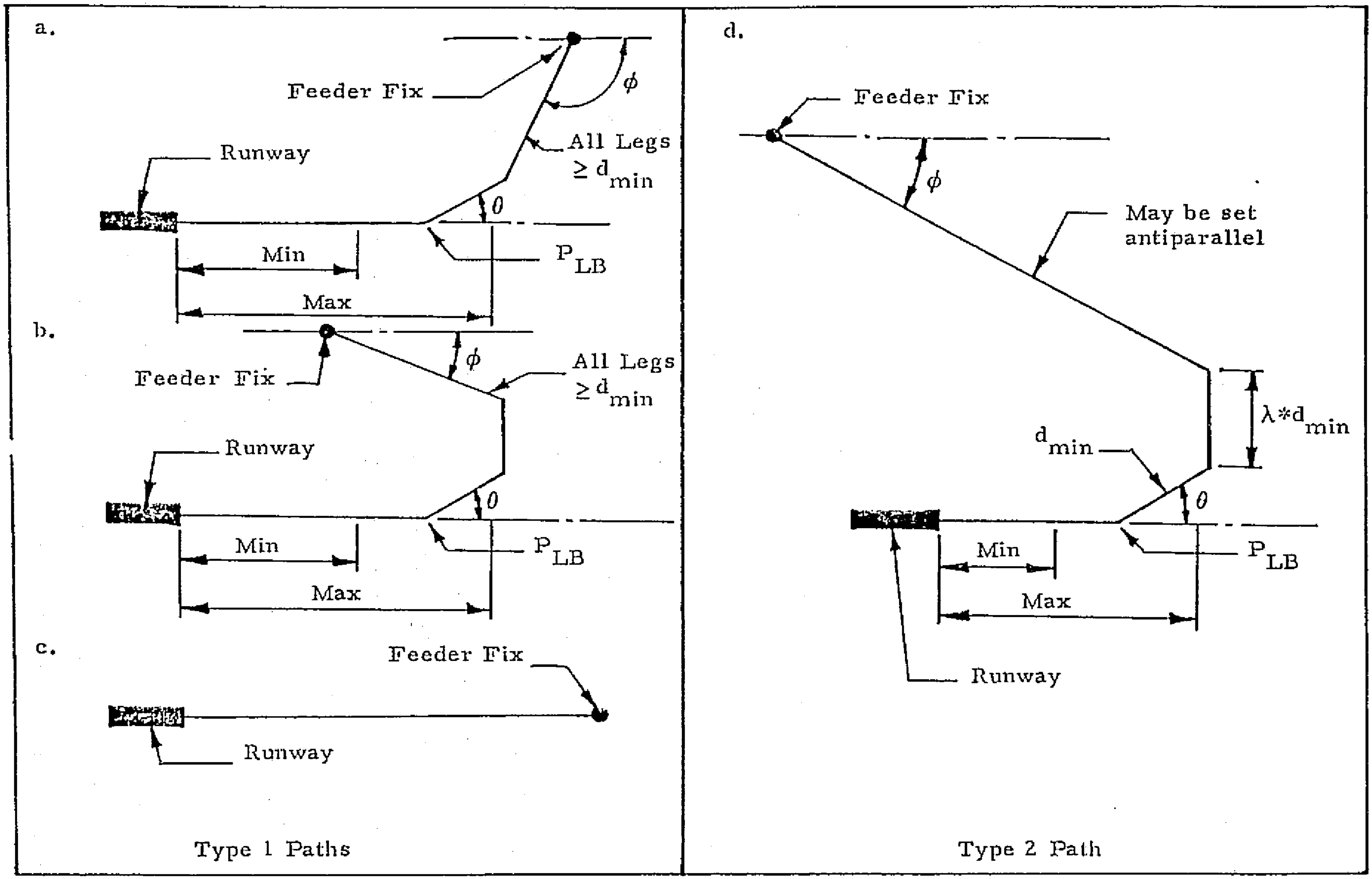


FIGURE 2. Basic Approach Path Shapes

The families in Figures 2a and 2b apply when the feeder fix is relatively far from the extended centerline, and for which θ is normally between 20° and 30°. For a straight-in approach (Figure 2c), the feeder fix must be placed just slightly to either side of the runway centerline, and θ must be specified as being small.

To determine which of the paths of Figures 2a and 2b will apply in a given problem, consider the line segment between the minimum and actual intercept points plus the projection of the intercept segment on the extended runway centerline. If a perpendicular to the extended runway centerline is dropped from the feeder fix and all of the above noted line segment falls between the foot of the perpendicular and the touchdown point, only paths of the shape denoted in Figure 2a will appear; if all of the line segment lies outside the zone between the perpendicular and the touchdown point, only paths of the shape denoted in Figure 2b will appear; if the line segment contains the foot of the perpendicular, either path shape may appear, as dictated by traffic.

Once the proper path family is determined, two "control variables" are used to select the precise path parameters. The first is angle ϕ, the feeder fix departure heading, measured positive clockwise between a parallel to the extended runway centerline through the feeder fix and the initial path segment. A constant value for ϕ may be specified, or ϕ may be varied by the computer program. If ϕ is allowed to vary, the largest acceptable value will be chosen, since this value corresponds to the shortest path. The second control variable, P_{LB}, selects the final approach course intercept point. This parameter can also be fixed or varied. If allowed to vary, the smallest possible value of P_{LB} will be chosen to produce the shortest path. All path legs must be at least equal to a specified length d_{min}.

Figure 3 indicates some possible Type 1 paths.

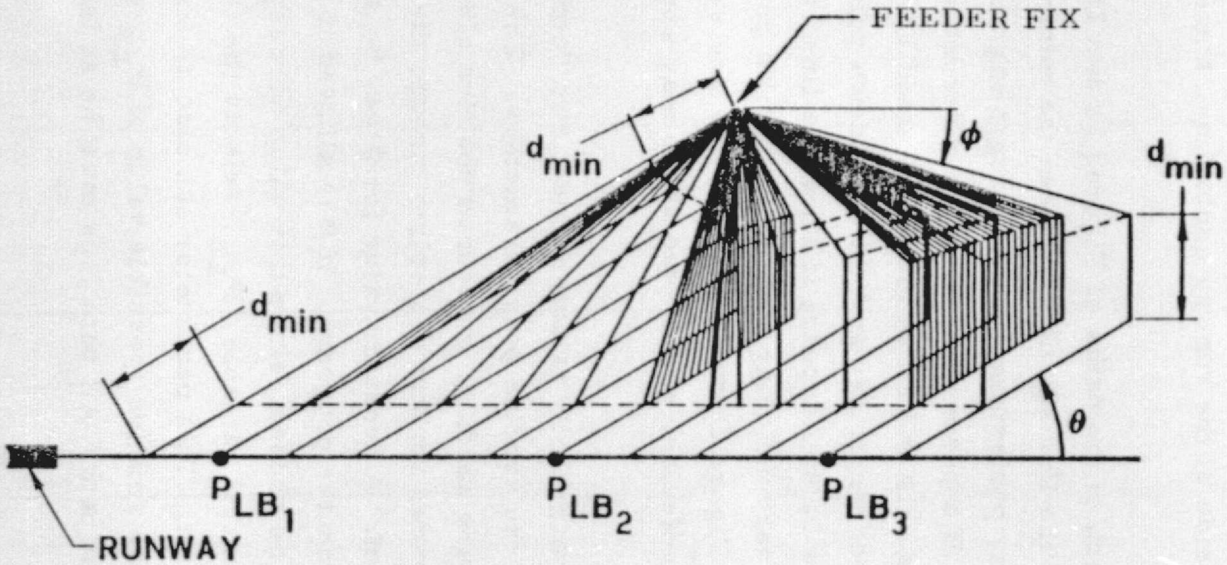


Figure 3. Family of Horizontal Approach Path Projections for Type 1 Paths

Type 2 Paths

Type 2 paths (Figure 2d) also require five input values. The first four include position of the feeder fix, the minimum and maximum intercept points, and angle θ. The fifth is the value of a scalar, λ, which replaces angle ϕ of the Type 1 paths. The two control variables used to select the best path from this family of paths are λ and P_{LB}. It should be noted that λ, for which minimum and maximum allowable values are provided as input quantities, determines the length of the path segment perpendicular to the extended runway centerline, and that the intercept segment (of length d_{min}) is the shortest allowable leg. The shortest path will occur when the final approach course is set to its minimum allowable length and the perpendicular is set to its shortest allowable length (i.e., λ set to its minimum value). An antiparallel approach (in which the segment immediately following the feeder fix is parallel to the extended runway centerline) may be selected, for which λ will be chosen accordingly. The longest path will occur when the initial leg diverges from the final approach course, which, in turn, is set to its maximum length. Thus, λ is set equal to λ_{max}, thereby limiting the extent of divergence permitted. Normally, λ will be selected by the program to be the smallest possible value consistent with interference constraints, thereby yielding the shortest possible path.

b. Velocity Assignments

Aircraft are characterized by a range of allowable speeds and by a final approach speed. In addition, speed limits below 10,000 ft and in Terminal Control Areas are observed. Each aircraft departs the feeder fix at the highest speed consistent with traffic and decelerates until it reaches approach speed at the outer marker. Two control variables are necessary to prescribe the velocity distribution along any given flight path. One is the velocity at the feeder fix, which ranges from the maximum permissible in approach control airspace to the minimum specified as allowable on any leg of the approach path (normally equal to final approach speed). Once this velocity range is determined, there are many ways in which the aircraft can decelerate from feeder fix speed to final approach speed. A second control variable, ν, is defined to represent a family of possible velocity distributions.

The velocity distribution may be readily visualized by reference to Figure 4. Variable ζ is defined to be the fraction of the horizontal projection of the path that has been flown at any point. Thus, $\zeta = 0$ at the feeder fix and $\zeta = 1$ at the outer marker. Also, variable μ is defined as the fraction of the velocity change between the feeder fix and outer marker yet to occur at the time a given point is reached. Thus, $\mu = 1$ at the feeder fix and $\mu = 0$ at the outer marker. The variable, ν, is defined such that, for $\nu = 0$, the aircraft decelerates immediately from feeder fix speed to final approach speed, and flies the entire path at this speed, while, for $\nu = 1$, the aircraft flies at feeder fix speed until reaching the outer marker and only then slows to final approach speed. A value of $\nu = 1/2$ produces constant deceleration, while other values of ν will produce various intermediate velocity distributions.

In order to formalize the velocity distribution concept illustrated in Figure 4, it was decided to consider the intermediate curves ($\nu = 3/4$ and $\nu = 1/4$) as arcs of circles, and to generalize the resulting set of equations by the following relationships:

$$\mu^{(1+\Omega)} + \zeta^{(1+\Omega)} = 1, \qquad \Omega \geq 0$$

$$(1-\mu)^{(1-\Omega)} + (1-\zeta)^{(1-\Omega)} = 1, \qquad \Omega \leq 0$$

where: $\Omega = \tan\left[(1-2\nu)\,\pi/2\right]$.

It may be noted that the first equation reduces to a circle for $\nu = 3/4$, while the second is a circle for $\nu = 1/4$. Furthermore, for $\nu = 1/2$, both equations reduce to the line

$$\mu = 1 - \zeta, \qquad \Omega = 0$$

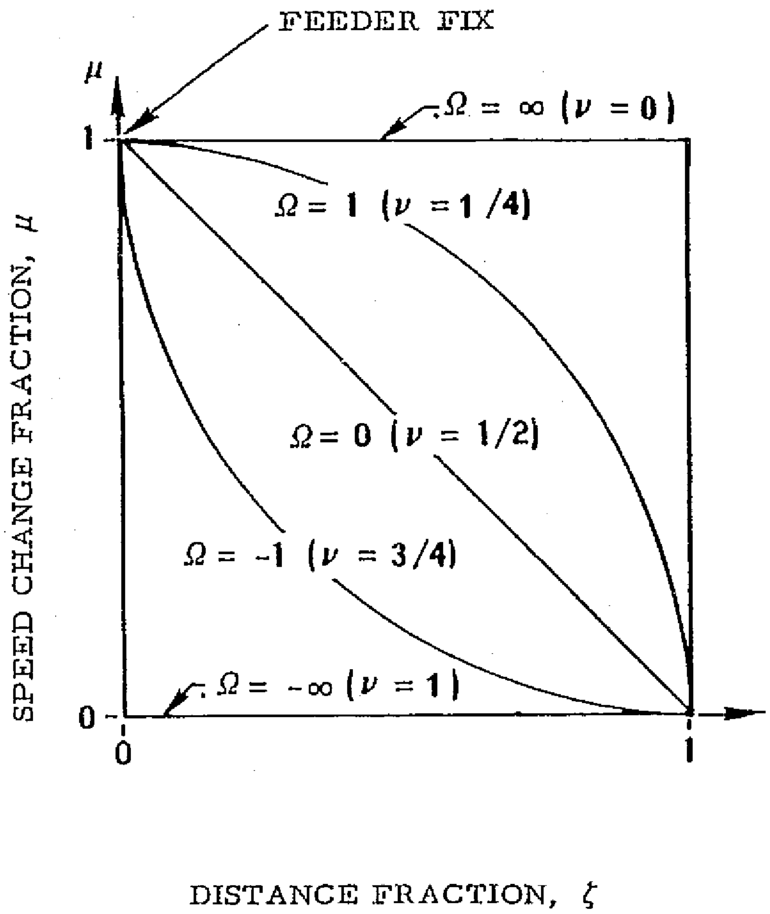


Figure 4. Velocity Functions

At the extremes ($\nu = 1$ and $\nu = 0$), the first equation collapses to

$$\mu = 1, \quad 0 \leq \zeta \leq 1, \quad \Omega = \infty \quad (\nu = 1)$$

and the second equation to

$$\mu = 0, \quad 0 \leq \zeta \leq 1, \quad \Omega = -\infty \quad (\nu = 0)$$

Thus, this simple construction yielded a set of functions exhibiting the complete range of desired properties.

In practice, the velocity distribution function is selected by choosing a value for the control variable, ν. This value may be fixed in advance (as an input quantity) or it may be selected by the program to optimize the paths of individual aircraft. In any case, the selection of ν establishes the relationship between the variables μ and ζ, and hence the relationship between velocity and distance along the path. An actual path is made up of a series of legs (line segments), and the velocity is assumed to remain constant along any given leg. Thus, the smooth velocity distributions shown in Figure 4 are replaced by a series of step changes in velocity, where the convention has been established that the speed on any leg is equal to the speed at the beginning of the leg.

c. Altitude Variations

There are two distinct schemes for varying altitude. One is used for paths planned within the program and the other is used for fixed paths (externally planned in horizontal projection and altitude). For both, the altitude of glide slope intercept, h_{GS}, may be treated as a control variable and allowed to vary in a manner which minimizes interference among aircraft. Approach plans designed by the program allow for one further control variable, σ, related to the point at which descent begins. An aircraft will fly level from the feeder fix until the point for beginning descent is reached. After leveling off, the aircraft will then descend again only on the glide slope. The off-glide slope descent angle is input to the program (it was taken to be 3.5° for most aircraft classes simulated in this study). When allowed to vary, the beginning of descent will occur as late as possible without incurring interference. The least desirable option is to descend immediately upon leaving the feeder fix and thereafter fly level until reaching the glide slope.

For fixed (pre-specified) approach paths, there is less freedom in altitude selection because aircraft are constrained to fly pre-established altitudes at given points on the path. Additional verticies (points connecting path segments) can be added, however, so that aircraft can stay high as long as possible before beginning descent, or descend early and fly level at lower altitudes.

d. Summary

The above paragraphs introduced a number of key concepts related to path selection. Of particular importance are the six control variables which may be exercised to optimize a given path, and, in the larger sense, the total movement of traffic between feeder fixes and runways. For convenience, the controls and other significant path parameters are summarized in Table 1. The next subsection provides details on the methodology adopted for applying the controls.

2. Control Variable Optimization

After an aircraft is generated, the earliest and latest possible touchdown times may be found. Generally, the range will be quite broad, with the earliest time representing the desired touchdown time. Using the six control variables defined in Table 1, a procedure has been developed to search for the best possible approach plan resulting in the desired touchdown time (if no such plan is found to exist, a later touchdown time may be tried). Once values for the control variables are chosen (for a particular touchdown time), the approach is completely planned.

Figure 5 shows a schematic of a path and indicates the various control variables. Two variables, ϕ (or λ for Type 2 paths) and P_{LB}, control the projected (two-dimensional) shape of the path by setting the

TABLE 1. PATH VARIABLES AND CONTROLS

ELEMENT	DESCRIPTOR	PATH		
		TYPE 1	TYPE 2	FIXED
PATH FIXING AND STRETCHING VARIABLES	d_{min}	Minimum length of any leg	Same	N. A.
	θ	Final approach intercept heading	Same	N. A.
	$P_{LB_{min}}$, $P_{LB_{max}}$	Minimum and maximum final approach course intercept	Same	N. A.
	λ_{max}	N. A.	Establishes maximum length of base leg[a]	N. A.
CONTROL VARIABLES	ϕ, λ	Feeder fix departure heading (ϕ)	Base leg length parameter (λ)[b]	N. A.
	V_{FF}	Feeder fix departure speed	Same	Same
	∇	Descent commencement parameter	Same	Same
	h_{GS}	Glide slope intercept altitude	Same	Same
	γ	Speed reduction parameter	Same	Same
	P_{LB}	Final approach course intercept point	Same	N. A.

[a] DIVERGING INITIAL LEG POSSIBLE

[b] INITIAL LEG CAN BE MADE ANTIPARALLEL AND λ SELECTED ACCORDINGLY

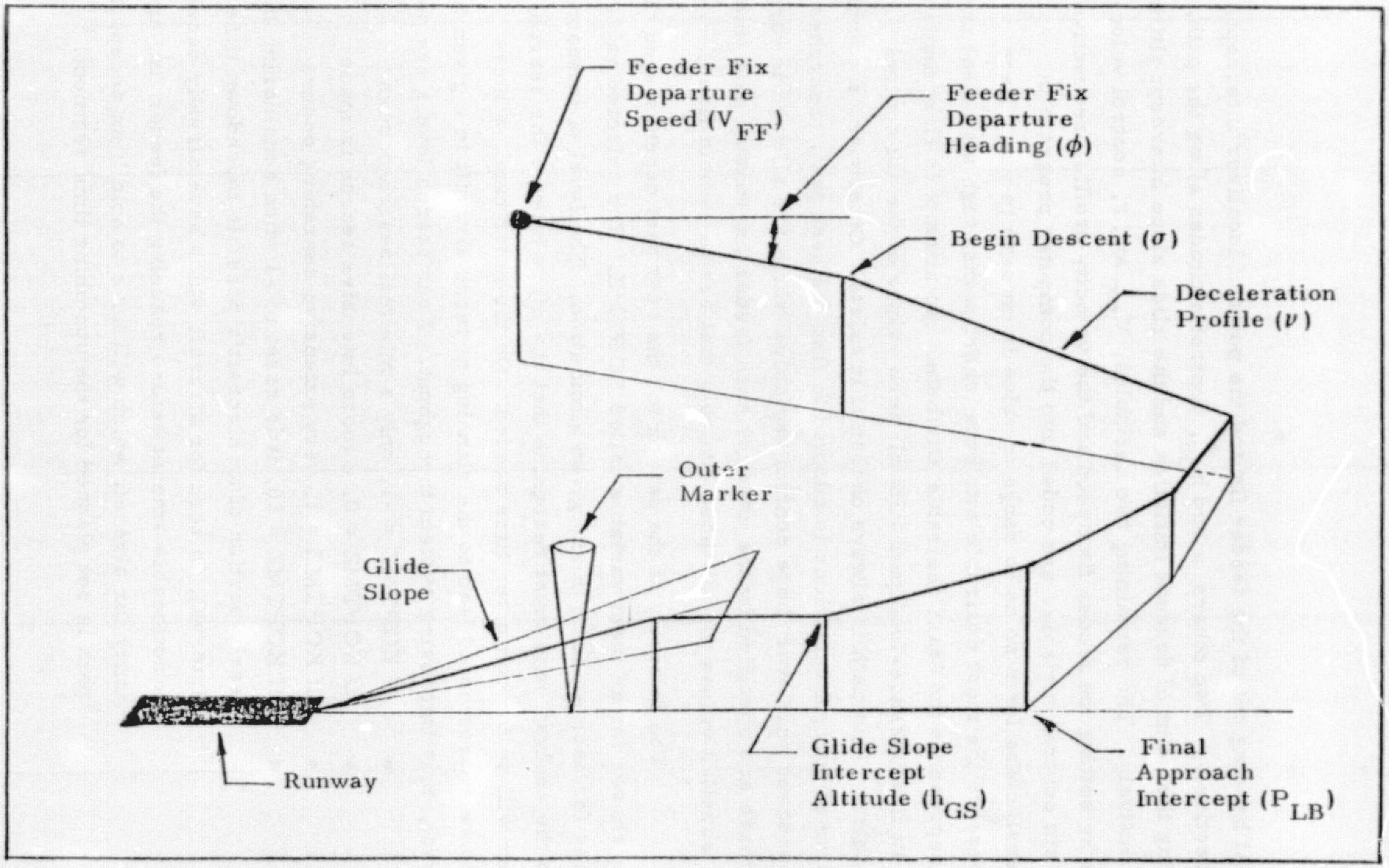


FIGURE 5. Approach Route Geometry Indicating Control Variables

initial heading out of the feeder fix and the point of localizer intercept, respectively. Two others, σ and h_{GS}, control altitudes along the path, setting the point of descent initiation and the glide slope intercept altitude, respectively. The remaining two variables, V_{FF} and ν, control velocities by setting the feeder fix speed and the velocity profile, respectively. The six control variables are coded into the computer program in dimensionless form so as to range in value from zero to one. Zero represents the most desirable attribute (short paths, high altitudes) and one represents the least desirable attribute. An attempt is first made to find an interference-free path with all zero values of the six control variables. This path is always chosen if it exists. Otherwise, a complex scheme of control variations is adopted to find the best path. Searches will proceed only over those control variables which are allowed to vary, and these are specified by the user for each feeder fix-runway pair (the user supplies values for all those controls that are to remain fixed).

The intensity of the search for the best path depends upon the value chosen for an input variable called KOPTMZ. The selected value applies for each aircraft in any given simulation. The level of intensity is up to the analyst, who must recognize that the more intense the search, the higher will be the computer time needed. On the other hand, a more intensive search could lead to the planning of more aircraft in a given time interval, thus improving system throughput. Four search levels are possible:

- If KOPTMZ = -1, only a minimal search occurs
- If KOPTMZ = 0, a more intensive search is made
- If KOPTMZ = 1, very extensive searching occurs
- If KOPTMZ = 10, it is reset to -1 when considering the early portion of an aircraft's possible touchdown time interval, to zero for aircraft which have already decelerated a noticeable amount before reaching the feeder fix, and to unity for aircraft which will have to hold if an acceptable path is not planned for the upcoming time segment.

All higher levels of search also include the lower levels. In each case the search is terminated as soon as an interference-free path providing the desired touchdown time is found. If no path offering the desired touchdown time is found, one or more additional aircraft will be examined before a decision is made on which aircraft will land first.

A minimal search (KOPTMZ = -1) consists of checking seven different paths. First, the path with all control variables held at zero is checked. Then each control is in turn set to its complement, unity, with all others held at zero.

The next more extensive search (KOPTMZ = 0) begins with the set of controls which produced the least amount of interference in the minimal search (KOPTMZ = -1). Then, one at a time, each control variable is switched to its complement, and the corresponding path is checked. Any change which produces less interference is retained and the switching continues. If the end result (all six controls modified) has produced a significant interference reduction, the switching process begins again at the first control. When an interference-free path is found, it must first be determined if a better one exists before this one is accepted. To check this, each control set to unity is reduced to zero (leaving the other controls temporarily unchanged) and, if this new control distribution has not already been checked, the interference is computed. The interference-free path with the most zero values for the controls is preferred, because this path has the most desirable attributes.

The next higher level of search (KOPTMZ = 1) mimics the procedure just described, except that where a value of unity would have been used as the complement of zero, a value of 0.5 is assigned instead. After the distribution of control values which produces the least interference is found, one control at a time is then switched to 0.5 if it's value was unity, and to unity otherwise. If the interference calculation indicates that a more desirable path is produced by this process, the associated control values form a new starting point and the process is repeated. If an acceptable set of control values is found, each non-zero control is in turn reduced by 0.5 and interference checked (those control distributions for which interference was previously computed are ignored). If the new path is interference-free, the old values are replaced with the new and the reduction process is repeated until no further acceptable paths are produced.

The highest level of search sophistication (KOPTMZ = 10) is not necessarily the most complex or time consuming. It represents an attempt to utilize the search level deemed most appropriate to the particular traffic situation encountered. It's value is in determining the extent of traffic improvement possible through the use of a multiple search routine, relative to using a simpler search or even no search at all. It thus provides added flexibility in studies of complex terminal areas with high traffic levels. It should be noted that even this higher level of search (KOPTMZ = 10) does not cover all possible approaches to finding an optimum path. High search levels could become prohibitive of computer time when traffic becomes very heavy; thus, the extent of analysis possible is, as may be expected, limited by resources. On the positive side, it has been found that KOPTMZ = 10 could be used successfully for most cases studied to date.

3. Sequencing

Sequencing can be established according to a number of different philosophies. The traditional method is based on the "first come, first served" doctrine. This has its advantages when there are a minimum of approach routes and all aircraft have similar flight characteristics, but, in general, allowing the first aircraft calling for an approach to land first can cause many unnecessary delays if this aircraft is slow or must follow a long route. The other sequencing extreme is based on an attempt to maximize traffic flow at the expense of those "who can't keep up." This philosophy will greatly add to the approach time of slower aircraft, so that the less flexible higher speed aircraft may land quickly. The resulting traffic seldom matches reality, because controllers cannot make the exacting and lengthy computations necessary to pack traffic so tightly. In the sequencing method selected for the present simulation and described below, an attempt has been made to achieve a balance between these two extremes, thereby simulating more realistically conditions as they are likely to occur in a typical, busy, complex terminal arena.

To be sequenced for an approach, an aircraft must enter the zone of concern to the controllers. This entry process is called "aircraft generation." All aircraft appearing within a certain (small) time period must be given instructions leading to eventual touchdown, or must be placed in holding patterns until they can be sequenced into an approach queue. The Aerospace Terminal Air Traffic Computer Program simulates this scenario in great detail. The process is described in the following paragraphs.

a. Aircraft Generation

The number of aircraft of each type to be simulated in any one scenario is specified by the user (aircraft "type" refers to the triplet of feeder fix, runway and class; aircraft "class" refers to such characteristics as speed ranges, descent angles and separation requirements) and the program randomly generates "appearance" times for each aircraft of each type. (Alternatively, these times and classes may be provided as inputs.) The generated times are initially scanned by the program and modified to produce the required minimum separation between aircraft at the point of generation, if it does not already exist. These modified times are never again changed, and determine when aircraft will first be considered for approach.

Related to times of generation are distances, altitudes, and velocities. For each aircraft class, the distance from the feeder fix to the aircraft when it is first generated is given. Similarly, the altitude at the generation point (normally above feeder fix altitude), and the maximum velocity at the time of generation, are specified. Taken together, these quantities determine the earliest and latest times at which an aircraft may arrive at the feeder fix. In cases where an aircraft cannot be cleared to begin the approach in this interval, it will be held. Holding occurs only after the failure of many attempts to determine a suitable landing time.

b. Touchdown Time Determination

A list is formed of all aircraft which have been generated up to a given time but have not yet been assigned approaches. For each of these candidates, a touchdown interval is calculated. The lower end of the interval is found by calculating the earliest time the aircraft can reach the feeder fix plus the fastest possible approach time (ignoring interference). The high end of the interval is the latest time the aircraft can reach the fix plus the longest reasonable approach time. The aircraft list is then ordered so that the earlier an aircraft can touch down the higher it is on the list. A large interval - defined from the earliest possible touchdown time to the latest possible touchdown time for the group of aircraft on the list - is divided into a number of equal subintervals and each of these is considered in turn. All aircraft whose touchdown intervals have a non-empty intersection with the small interval being considered are grouped together, and each aircraft is processed in turn to see if it has an interference-free path, and, if so, whether it is a "better" path than a previous choice for another aircraft. When the "best" aircraft for this subinterval is found and its "best" approach planned, or, when it is determined that no aircraft can land during this time period, the program moves on to consider the next subinterval. The process stops when all of the candidates in the group have been planned, or it has been determined that the remainder must for now hold due to heavy traffic. Time is now advanced through a small (input) increment, and outstanding aircraft candidates that were not planned at the previous time-step, and newly generated traffic, are formed into a new list of candidates, and the entire process repeats. Eventually, all aircraft have their approaches planned.

c. Interference

Interference is basically a measure of separation, but expands upon that concept. Federal regulations are concerned with miles, minutes, angles, speeds, and altitudes when describing separation, but these basically reduce to a requirement that aircraft be separated by 1,000 feet of altitude or three to five horizontal miles depending on aircraft types. The simplest implementation of this rule would require that separations be exactly as stipulated. It is, however, preferable to distinguish a minor breach of regulations (such as one foot in altitude) from a near-miss. A function has been developed which mathematically permits both distinctions to be accomplished.

The interference concept adopted may be easily understood by reference to Figure 6 showing projections onto a horizontal plane. Here V_i is the vector associated with aircraft i and V_j is the velocity associated with aircraft j. The length of the perpendicular to V_i through the position of aircraft j is the lateral separation, $\eta_{i/j}$. The length of the segment along the velocity vector V_i extending to the foot of this perpendicular is the longitudinal separation $\xi_{i/j}$. Similarly, lateral and longitudinal separations of aircraft j relative to aircraft i are found. Generally, if either η or ξ is greater 3 (or 5) miles or the altitude separation is greater than 1,000 feet, the separation is considered to be interference-free. This condition is expressed by the function

$$\psi^{i/j} = \left(\frac{\xi_{i/j}}{\xi_o}\right)^2 + \left(\frac{\eta_{i/j}}{\eta_o}\right)^2 + \left(\frac{\beta_{i/j}}{\beta_o}\right)^2 - 1$$

Here, ξ_o, η_o, and β_o are the longitudinal, lateral and altitude separations, respectively, required by regulation, and $\xi_{i/j}$, $\eta_{i/j}$, and $\beta_{i/j}$ are the longitudinal, lateral, and altitude separation of aircraft i from aircraft j. The interference is considered to be the minimum of this function taken i to j and j to i, i.e.,

$$\psi^{ij} = \min(\psi^{i/j}, \psi^{j/i})$$

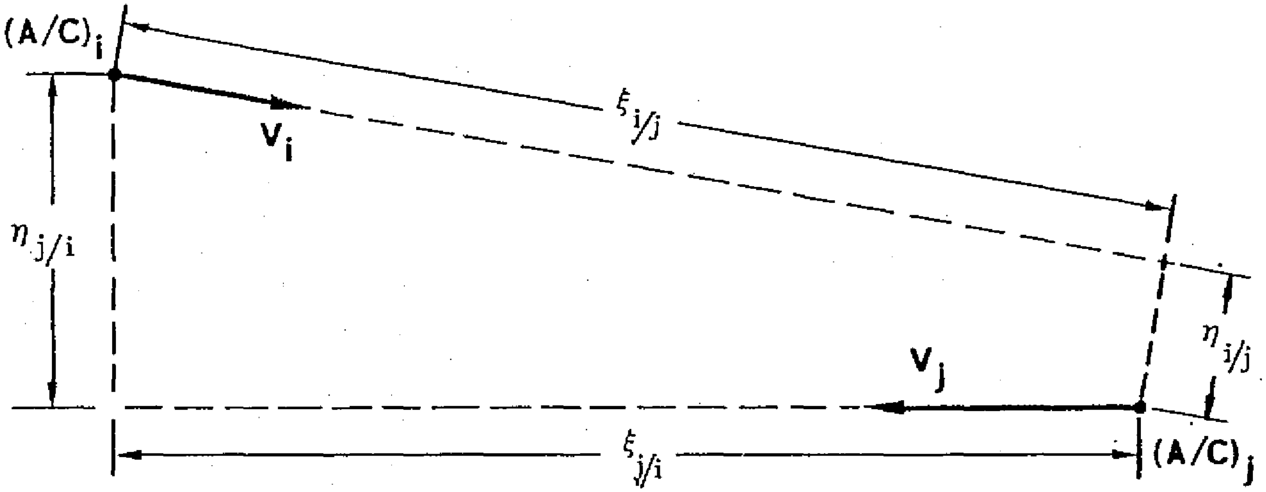


Figure 6. Interference Geometry, Horizontal Plane Projection

This methodology is used throughout the simulation.

The significance of the numerical values of this function needs further elaboration. Any time this function has a value greater than or equal to zero, adequate separation exists. This will always occur if

$$\xi_{ij} \geq \xi_0, \text{ or } \eta_{ij} \geq \eta_0, \text{ or } \beta_{ij} \geq \beta_0$$

Whenever $\psi^{ij} < 0$, interference exists. A value of ψ^{ij} close to -1 suggests either a near-miss or a crash. Flight planning is always accomplished to achieve $\psi^{ij} \geq 0$, but the actual (as opposed to the ideal) flight path of aircraft will occasionally show differing amounts of interference, due to errors attributable to pilotage or to the navigation and control system. If such interference becomes unacceptably large, it may be necessary to establish larger separations, thus reducing system capacity.

When calculating interference on a leg of a path, the time value at which the interference function attains its minimum is computed from the time derivatives of the function taken along the leg. The interference value for an entire leg is taken as the minimum for that leg, since this is the critical quantity.

C. FLIGHT SIMULATION

Few actual events occur exactly as planned. This is no less true of air traffic than it is of other types of events. Any reasonable model of air traffic must, therefore, reflect both the way an idealized system would perform, and the way events might reasonably occur with actual traffic. The latter is accomplished by following each aircraft's flight and generating, at each time simulated, errors as they might actually arise as the aircraft attempts to follow the ideal path developed earlier for it.

Errors considered in the model can be grouped into three basic categories: those attributable to the controller; those inherent in the nature of the pilot/aircraft combination; or those due to guidance equipment imperfections. Controller errors are modeled as differences between "real" and "observed" positions, headings, velocities, etc. These errors are representative of the lack of a method by which controllers may obtain exact instantaneous information about an aircraft's condition, and then provide appropriate commands to improve the aircraft's path. Pilot errors include those due to timing (e.g., response time lags, turns not executed with precision, points reached ahead of or behind schedule). Instrumentation-related errors include inexact headings, rates of turn, descent angles, and speeds. Each type of error is separately controlled and varied to match the given situation. Pilot/aircraft error sources are (or can be, given good data) modeled with more sophistication than the other error sources. Errors are discussed in more detail in Section III.

1. Time Slicing

Aircraft are tracked in detail only from the instant they leave the feeder fix inbound to touchdown. The frequency at which tracking occurs can vary according to the accuracy required, since it is an input to the program. In typical computer runs made for this study, aircraft were generally checked at four second intervals. Since no aircraft can proceed beyond the feeder fix until its path has been planned, it is always known exactly where it should be positioned at any point in time. Errors begin to appear at the feeder fix, however, since it is assumed that aircraft do not always leave the fix at exactly the time, altitude, position, velocity or heading planned.

In-bound from the feeder fix, the following analytical procedure has been adopted:

- First, the current position of each aircraft is compared to its ideal position. This is generally done by dropping perpendiculars from each aircraft's position to segments of the planned path, thus locating the leg each aircraft is closest to and also finding its ideal position in the next time slice.

- Second, any pending controller commands are implemented, and appropriate new commands issued. Actual positions at the next time-slice may now be computed based upon the old positions and updated headings, descent angles, and velocities. Randomly generated observed positions (where the controller thinks the aircraft is located) are also indicated.
- Third, each aircraft is checked to see if it violates the airspace of any other aircraft. Separation problems receive special attention from the controller. Any near misses are noted so that their cause may be determined later.
- Finally, the process repeats until all aircraft have landed.

2. <u>Commands</u>

Commands are the controller's method for guiding aircraft along their intended paths. All commands require a response by the pilot, as well as controller verification of the response. Three times are associated with every command:

- the time at which the command is issued
- the time at which the pilot/aircraft combination responds
- the time at which the controller checks the response

Commands are issued as required, provided there is no pending command and no interfering command. Pilot response time is based upon a random number generated from a piece-wise linear response time distribution. This can be adjusted to reflect any given mixture of pilot skills required by the particular problem being simulated. Intervals at which aircraft are checked by the controller are set to simulate such parameters as the time for several sweeps of a radar antenna.

The action resulting from a command depends upon the relationship between pilot response and controller check times. Commands are carried out as requested (but with error terms added) only if response time occurs before check time, and there is no intervening event taking priority. If check time occurs first, an updated command is issued. This is handled in the same manner as the original command, except that a different response time distribution is used. The assumption made is that a pilot already falling behind will respond more quickly to a new request. Commands may also be cancelled to prevent further interference between aircraft, to correct an earlier error, or to establish a formal turn where one had not yet been issued. Cancellation will occur only when the controller perceives the existence of a new situation prior to the occurence of pilot response time. Therefore, the response time distributions are important to the simulation.

Two basic types of commands may be issued. The normal command consists of any combination of small heading, velocity, and descent angle changes. Descent and heading changes occur instantaneously when finally executed. The velocity change is timed to correspond to the acceleration capability of the particular class of aircraft being examined. Large heading changes, whether planned or required by accumulating errors, are handled by turn commands. The program uses a standard rate of turn, calculates turn radius and turn start and stop times, and finds the turn center. To each of these quantities is added a random error. Turns in progress preclude any other commands (such as a heading change) from being issued.

D. DEPARTURE SCHEDULING

Departures and arrivals are scheduled at the same time, with arrivals controlling the sequence. This is based on the assumption that arrivals should not suffer appreciable departure-caused delays, except when there are very long departure delays coincident with freely flowing arrival traffic. Once the latest arrival time (longest delay) is calculated for an aircraft, all waiting departures for dependent runways (i.e., those on which arrivals and departures must be coordinated) must be checked to see if they may, by normal FAA procedures, safely depart.

There are several steps in determining when a safe departure is possible:

- First, the arrival runway is scanned. As each departure is considered in turn, it is checked for interference with the previous arrival (or departure) on that runway and with the following arrival (the one being scheduled).
- Second, the departure is checked against all possible interfering events on other runways including close parallels and intersecting runways. If there is no interference problem, the departure is tentatively scheduled, and the next scan initiated.
- Third, all other related departures are checked against both scheduled and tentative events.

Current regulations governing arrival/departure and departure/departure separations are modeled, assuming departures can turn as necessary after takeoff.

Special treatment is required for some crossing runways. Since one runway of a crossing pair may have an event scheduled for a time later than that now being considered, arrivals may have to be placed between already scheduled departures. To allow for safe separation at the intersection when this condition occurs but without unnecessarily impacting arrivals, departures on pairs of crossing runways, where both runways are used for mixed traffic (arrivals and departures), are scheduled with more than the minimum time interval normally needed to assure a good arrival slot between departures. Occasionally, this procedure does not work and the arrival may be held or slowed to maintain proper separation at the intersection.

E. FUEL CONSUMPTION

Fuel consumption data computed during a simulation run provides a rough approximation of actual fuel used, and is useful in measuring the effects of various traffic handling strategies. The algorithm adopted is based on data for NASA's CV-990 aircraft and reflects time in the air, velocity at each time, descent angle, flap setting, and altitude. Other variables on which fuel flow depends (e.g., coefficients of lift and drag, weight of the aircraft, temperature and pressure altitude) are approximated for an average situation. Implementation of the fuel flow algorithm is restricted to the larger aircraft classes, which burn the bulk of fuel in major terminal areas.

The calculation begins with a determination of the coefficient of lift, based upon the aircraft's velocity and weight. The flap setting is used to find the coefficient of drag as a function of the coefficient of lift. Drag is then computed as a function of this coefficient and the aircraft's speed. Thrust is found from drag and angle of descent converted to generalized thrust, and used to determine power requirements (EPR). Finally, generalized fuel flow is found as a function of the power needed, and is, in turn, corrected for conditions at altitude to yield actual fuel flow. The altitude corrections are based on an assumption of "standard conditions" at sea level (59°F, 29.92 inches of Hg) and standard lapse rates.

SECTION III
NEW YORK AREA STUDY
CONTENTS

SECTION III
NEW YORK AREA STUDY

A. OVERVIEW

A key step in the development of the terminal air traffic simulation was its validation against scenarios drawn in an actual air traffic arena. This procedure was necessary to provide the user with a high level of confidence that the simulation models real-world events with fidelity. The New York area was selected as the study arena for the following reasons:

- The proximity of three heavily used jetports results in the need for reasonably complex traffic control strategies, the replication of which offered a substantial challenge to the mathematical model .
- The FAA collects and maintains data on all arrivals and departures at the three jetports, and, in addition, operates an integrated traffic control facility, which enabled the centralized acquisition of all required information.
- Routes from feeder fixes through merge points to runways are well-established and rigidly maintained, thus simplifying the path optimization process somewhat since the path stretching controls can be fixed and a high level of search (KOPTMZ = 10) adopted with the remaining controls.
- Changing wind patterns and the availability of alternate runways at each of the airports permitted the development of three distinct traffic control scenarios and resulted in a more generalized validation activity.

The scenarios described in this Section model traffic levels varying from fairly heavy (at Newark) to heavy (at Kennedy) to very heavy (at LaGuardia). While each of these airports has its own set of feeder fixes and approach routes, traffic to one airport must often overfly or underfly that to another airport, thus complicating the development of fail-safe, non-interfering paths. The flexibility and size of the Aerospace simulation permits the detailed modeling and analysis of such a region. Most inputs to the computer program were based on available traffic data, FAA regulations, and New York Common IFR Room manuals. Error distributions and magnitudes were chosen principally on the basis of experience or well-accepted statistical variations. For example, the magnitude of navigational errors, which were assumed to be normally distributed, was determined from discussions with a group of pilots. Pilot responses, on the other hand, were based on a specially designed skewed distribution, whose characteristics include zero frequency at each end, in order to preclude any possibility of incurring extremely large random errors. During the computer program development activity, enough runs were made to assure that the selected error levels neither produced an unreasonable amount of aircraft maneuvering in order to approach the desired path, or, conversely an unreasonably high level of accuracy. The computer program is, however, designed to permit the user to change or adjust both error distributions and magnitudes, and can therefore be used to study the sensitivity of results to changes in these quantities.

The following discussion describes the data obtained to model the New York area; the validation procedure; and the results obtained, including an indication of the generalizations which may be drawn from the results.

B. INPUT DATA

The flexibility of the computer model necessitates the development of a large amount of detailed descriptive material to characterize the various elements of a problem. The environment to be simulated is described in terms of airports, runways, feeder fixes, flight paths, waypoints, aircraft types, traffic density and overall arena geometry. In order to create a reasonable scenario for the New York Terminal Control Area, data was collected and tabulated for each of these factors. The following sections include descriptions of the acquired data base.

1. Airports

The New York area is served by three major airports: John F. Kennedy International; LaGuardia; and Newark International. Each airport has a unique pattern of runways which must be modeled, as must the precise geometric relationship between them.

Figure 7 includes schematrics of each airport. JFK (Figure 7a) is the most complex of the three. It has four major runways capable of supporting heavy jumbo jets and one runway sometimes used by General Aviation aircraft. The major runways are configured in two parallel pairs: 13R-31L and 13L-31R; 4L-22R and 4R-22L. The short runway (14-32) is situated northeast of the 4-22 pair. The 13-31 pair is separated by 6,700 feet, so that simultaneous ILS approaches may be authorized. The 4-22 pair is separated by only 3,000 feet, and is therefore too closely spaced for simultaneous approaches (it will not accommodate staggered simultaneous approaches, either). The flexibility of the geometry is such that a half dozen or more operational runway use combinations are feasible. The airport's terminal complex is surrounded by Runways 13R, 4L, and 13L.

LaGuardia (Figure 7b) is served by only two major runways, supplemented by one STOL runway. The major runways, 13-31 and 4-22, are perpendicular to each other and cross near the northern corner of the field. These are dependent runways, in the sense that simultaneous operations on both depend upon adequate clearance at the intersection. The STOL runway is parallel to Runway 13-31. It was constructed in the late 1960's, when it appeared that implementation of STOL airline systems was imminent, and is little used at present. The major runways allow for a reasonable level of operational flexibility, given that wind conditions do not preclude use of both runways simultaneously. The airport's terminal complex is located south of the intersection of the main runways.

Newark (Figure 7c) consists of one pair of closely spaced parallel runways (1,000 feet apart) and a single runway crossing the

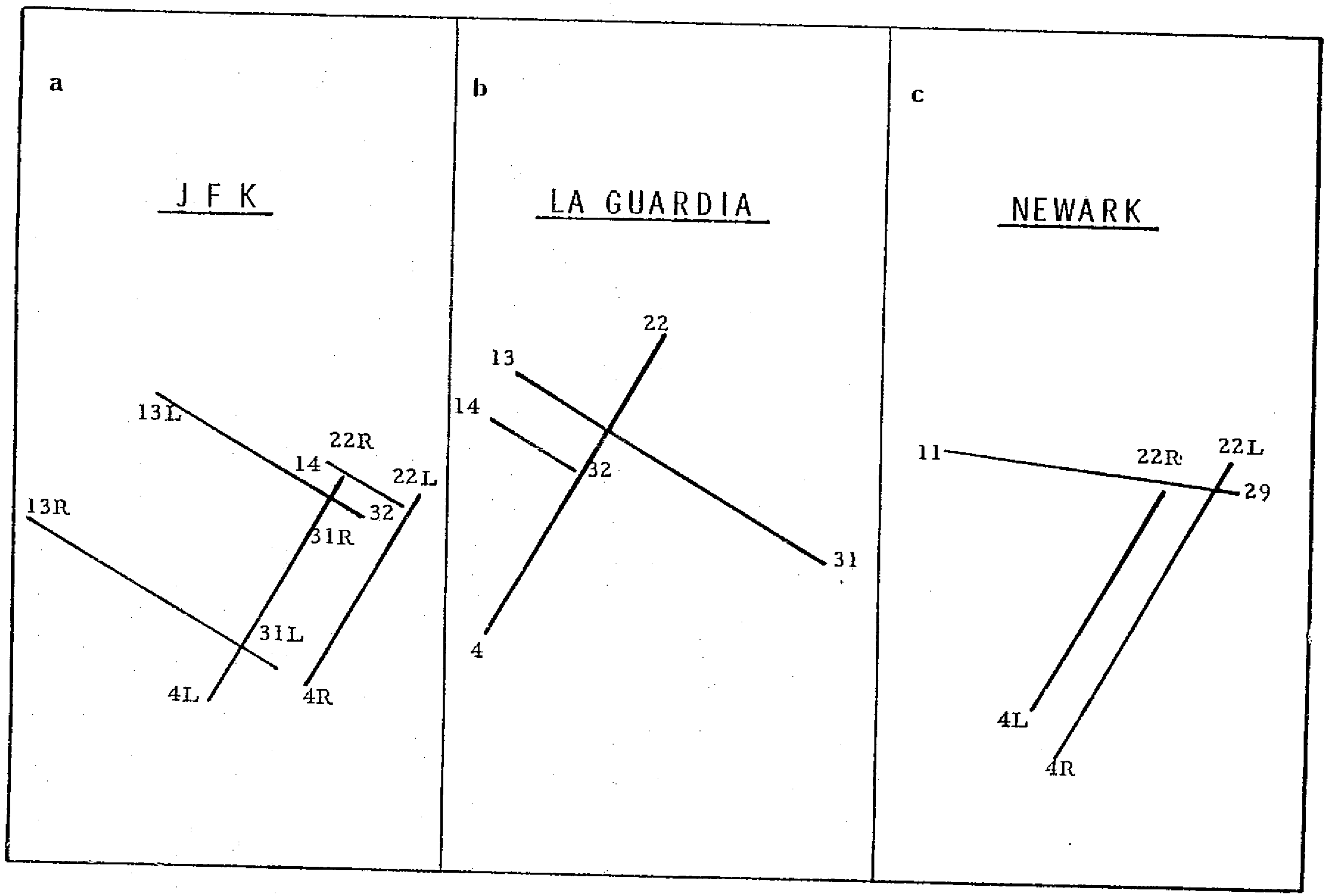


FIGURE 7. NEW YORK AREA AIRPORTS

parallel pair at their northeasternmost end. Parallel approaches are not possible, but the parallels are nevertheless the major arrival runways. Operational flexibility of the runway complex is good in all but very low visibility conditions. Arrivals on Runway 11-29 are generally in VFR conditions, since only a VOR approach is available to Runway 11 and none is published for Runway 29. IFR departures are, of course, possible on this runway, thus effectively increasing airport capacity substantially. The airport's terminal complex lies to the west of the parallel pair of runways.

2. <u>Feeder Fixes</u>

The New York area uses nine fixes to feed traffic to the major jet airports. With the exception of centrally located Empire fix, these are all outside of, but close to, the published boundaries of the New York Terminal Control Area (TCA). Table 2 indicates the nine fixes and the airport served by each. As shown in Figure 8, the fixes are spaced fairly evenly and densely to the west of the airport cluster. The area east of the airports is served mainly by Bohemia fix, located near Long Island's MacArthur Airport (in Islip). Carmel Vortac is north of the airports, and Southgate fix is located almost directly to the south.

JFK, which serves long-haul traffic from all over the globe, has its fixes appropriately spaced in a fairly symmetrical pattern around the airport. Bohemia and Southgate fixes are each about 30 nm from the airport, while Empire fix is only 15 nm away. These distances should not, however, be in any way confused with route lengths, which are occasionally many times the straight line distance from fix to airport.

LaGuardia has the most distant set of fixes. Penwell and Robbinsville fixes are more than 45 nm distant, while Carmel Vortac is over 30 nm away. Even so, the routes from these fixes to the airport are often indirect, so that terminal area maneuvering of up to 100 nm is a possibility for certain runway use configurations. Since LaGuardia is the

TABLE 2. NEW YORK AREA FEEDER FIXES

FEEDER FIX	INTERSECTION (I) OR VORTAC (V)	AIRPORT SERVED	RELATIVE ORIENTATION
EMPIRE	I	JFK	NW
BOHEMIA	I	JFK	NE
SOUTHGATE	I	JFK	S
PENWELL	I[a]	LAGUARDIA	W
CARMEL	V	LAGUARDIA	N
ROBBINSVILLE	V	LAGUARDIA	SW
MONROE	I	NEWARK	NW
SNAPY	I[a]	NEWARK	W
PRINCETON	I	NEWARK	SW

[a] AIRWAY ENDS

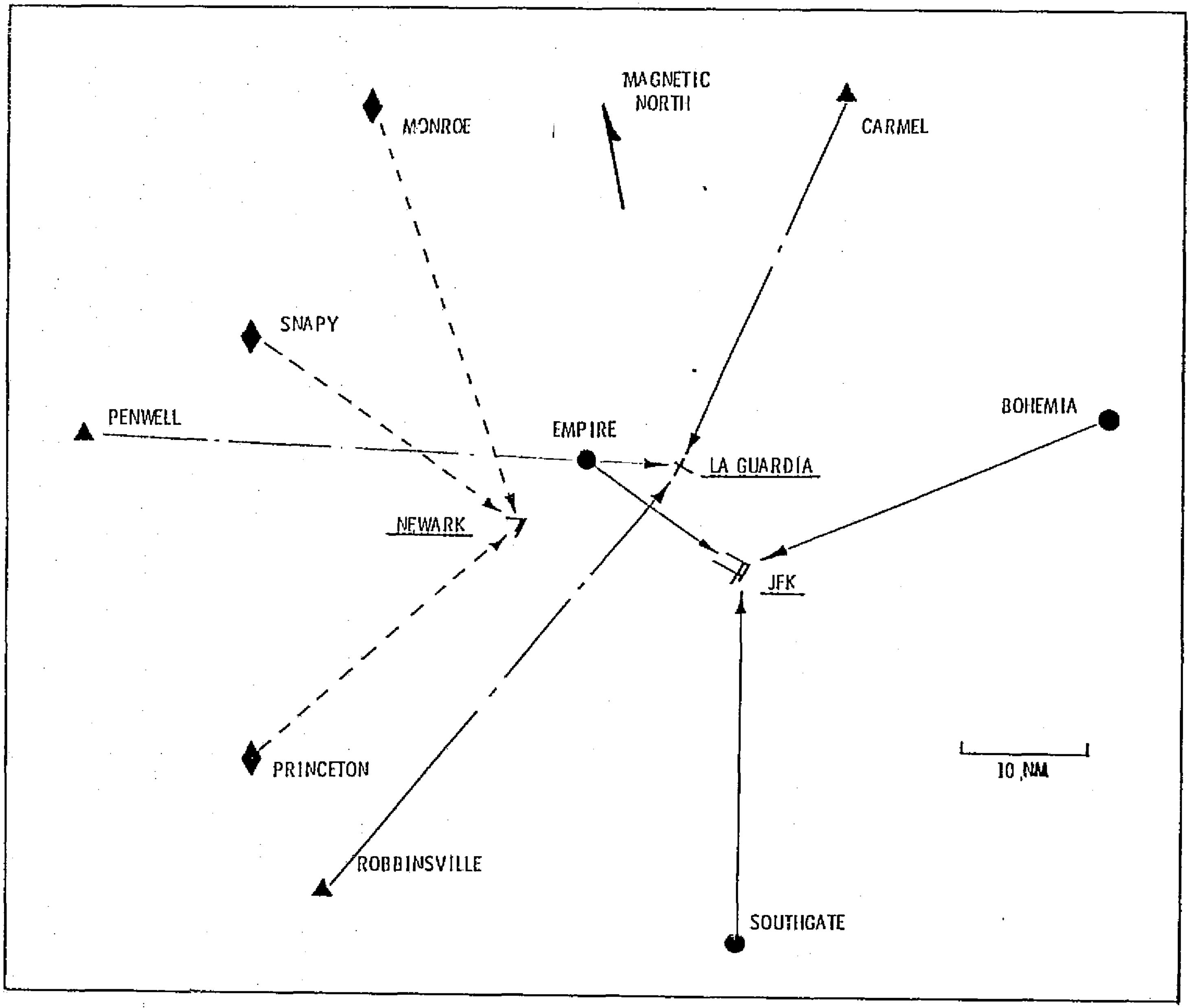


FIGURE 8. NEW YORK TERMINAL AREA FEEDER FIX LOCATIONS

short-haul airport in the region, its traffic originates mainly in the continental United States or in Montreal, Canada (the Eastern Airlines Shuttle).

Newark traffic is handled exclusively in the region to the west of the airport. Snapy is the closest fix at 24 nm, and Monroe fix is farthest away at 35 nm. Because of the proximity to LaGuardia's terminal routes, no direct routing to Newark from any feeder fix is possible. While Newark is an International Airport, it serves little overseas traffic, and does not need an easterly fix. The few overseas flights that may utilize this airport can easily be vectored to one of the established feeder fixes.

3. Paths

Figures 9, 10 and 11 depict computer drawn schematics of paths in use from the various feeder fixes to JFK International Airport, LaGuardia Airport and Newark International Airport, respectively. Coding of these paths for the computer was accomplished with reference to actual paths used by New York Common IFR Room controllers (Reference 7). The normal pattern flown by aircraft approaching an airport, which generally includes downwind, base, and final approach legs, is evident only at JFK (Figure 9), and there only if the paths are studied carefully. The LaGuardia paths (Figure 10) are only slightly reminiscent of the normal pattern, although the path from Penwell resembles a base leg entry to final approach. Some of the jagged Newark paths (Figure 11) are also slightly reminiscent of a normal pattern. The reasons for these odd shapes and for the extremely long routes which often result, is the close proximity of the three airports to one another (Kennedy is only 9 nm from LaGuardia and only 18 nm from Newark). The routings are established to insure that each airport has its own block (or sector) of airspace. These blocks are not continuous in altitude, so that the Newark block underlies portions of the LaGuardia block, which in turn underlies portions of the JFK block. The situation is complicated still further because blocks of airspace must be reserved for

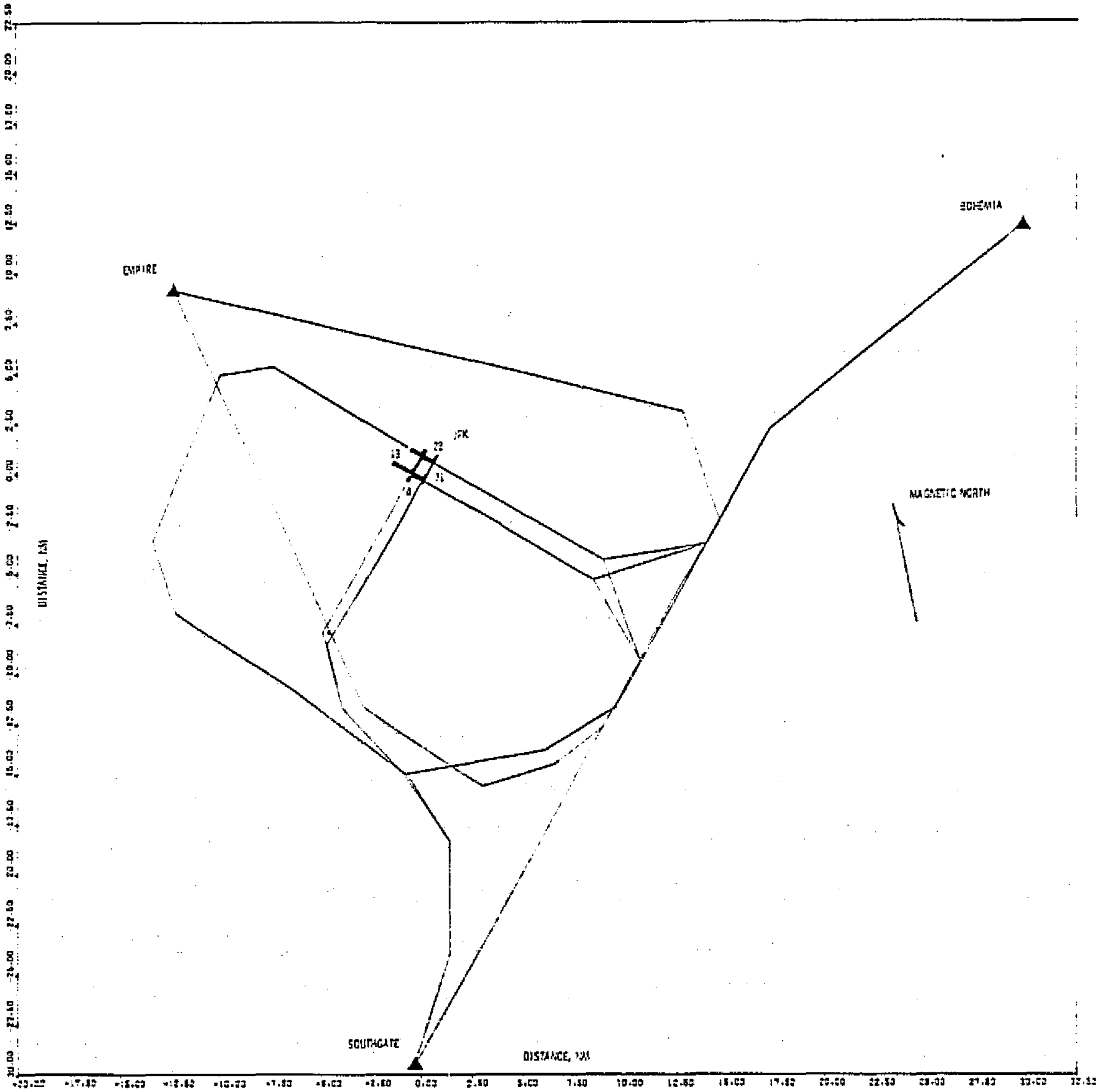


FIGURE 9. APPROACH ROUTES TO JOHN F. KENNEDY INTERNATIONAL AIRPORT

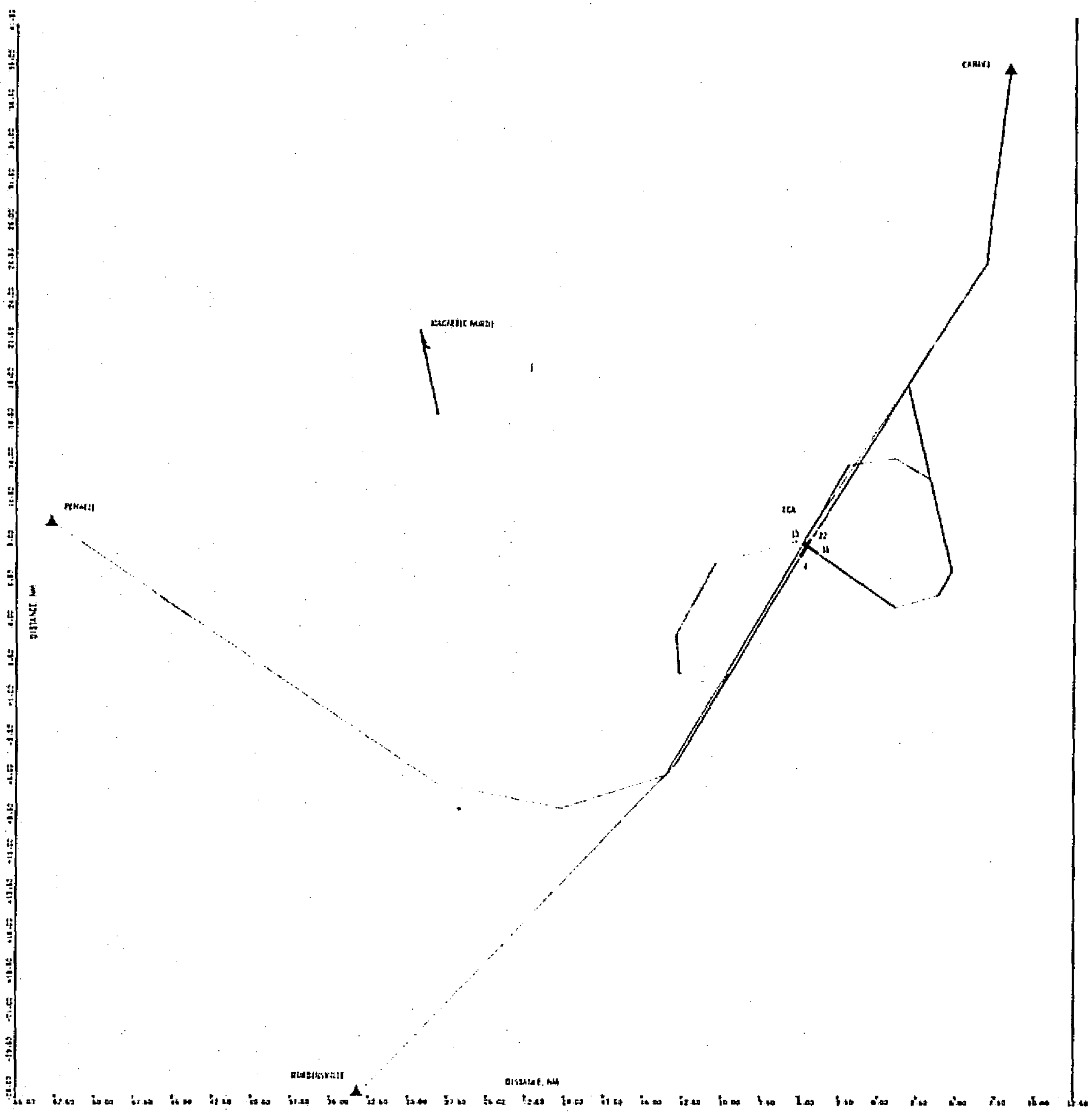


FIGURE 10. APPROACH ROUTES TO LA GUARDIA AIRPORT

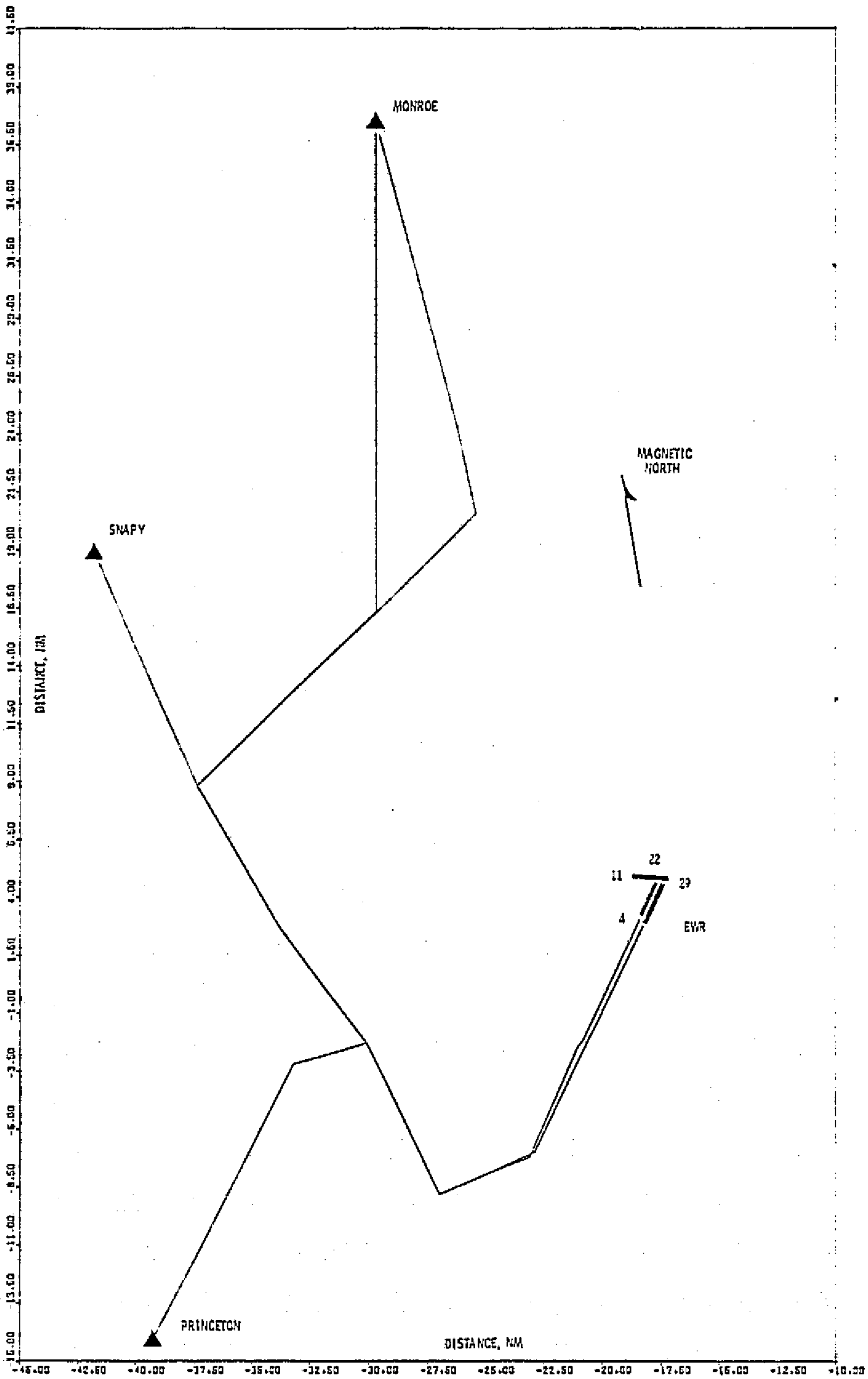


FIGURE 11. APPROACH ROUTES TO NEWARK AIRPORT

departures, which often must thread their way through the maze of arrival paths. New York area operations are also subject to meteorological conditions which often dictate the changing of runway use patterns, occasionally several times in one day. Indeed, JFK uses a dynamic runway operational system, in which runway use patterns change (assuming that metérorological conditions permit crosswind landings and/or takeoffs to occur safely) in order to meet noise abatement objectives.

A number of interesting differences may be noted in the routes to each of the airports. For example, the most uniform routes are those associated with LaGuardia Airport (Figure 10). The route from Penwell, for example, always swings well south of the airport and always merges with the route from Robbinsville, irrespective of landing runway in use. The route from Carmel is always southbound toward the airport. Any additional maneuvering to line up with the active runway occurs in the vicinity of the airport, without disturbing the basic patterns from the feeder fixes. This degree of uniformity is less evident at JFK (Figure 9). The routes from Empire, for example, sometimes take the aircraft well north of the airport before swinging around in a wide arc to line up with the active runway. On the other hand, Empire routes occasionally pass south of the airport before lining up for final approach. Routes from Bohemia and Southgate are substantially more direct, but a major fraction (often over 50%) of Kennedy traffic uses the Empire fix. Finally, at Newark (Figure 11) the route from Snapy swings either southbound, northbound, or eastbound, depending upon runway in use. The other routes, which must merge with the Snapy route, are similarly diversionary.

Figure 12 is a composite of all New York area routes, and shows considerable overlap of some routes to LaGuardia and Kennedy. Of course, the Empire routes overfly routes to LaGuardia, whose several maneuvering areas are designed to be used in conjunction with particular runway use patterns at Kennedy. Potential interference of Newark traffic with the LaGuardia route from Penwell exists, but this is easily handled by means of altitude separation.

FIGURE 12. COMPOSITE OF NEW YORK AREA APPROACH ROUTES

It is clear from an examination of Figures 9, 10 and 11 that New York area approach routes are substantially different in character from the routes built into the Aerospace Terminal Air Traffic Simulation Program (Figure 2). In order to permit the modeling of these non-standard routes, a separate section of coding was developed permitting the user to input a string of waypoints designed to accurately depict, in three dimensions, any desired route shape. To an extent, this causes some loss in flexibility of operation of the code, since paths cannot be stretched. On the other hand, the resulting path simplification enabled the use of a sophisticated search routine (KOPTMZ = 10) to determine the best remaining path parameters (feeder fix velocity, velocity profile, descent profile, and altitude of glide slope intercept).

4. Aircraft Classes

All aircraft appearing in the New York traffic sample selected for analysis were identified and classified. The classification adopted provided a mechanism for specifying flight characteristics of each aircraft in the simulation. Table 3 lists the aircraft classes, a generic description of the aircraft contained within each class, and the speeds (in knots) chosen to represent the class. Table 4 indicates the specific aircraft modeled in each class.

5. Traffic and Runways

FAA has developed a program, called CATER, through which data on each arrival and departure from the three major New York area jetports is tabulated and made available as computer printouts. Originally, the CATER system was to be installed at major terminal areas throughout the country and provide information on arrivals and departures as well as on times over feeder fixes and other information pertinent to performing analyses of actual traffic movements. Funding restraints cut the CATER program short of these goals and a restricted set of data from the program is available only for the New York Terminal Area.

TABLE 3. GENERIC AIRCRAFT CLASSIFICATION

CLASS	DESCRIPTION	SPEED (knots)			
		CRUISE	TERMINAL AIRSPACE		FINAL APPROACH
			MINIMUM	MAXIMUM	
1	COMMERCIAL JETS	500	180	250	130
2	GENERAL AVIATION JETS	400	150	250	110
3	LARGE TURBOPROPS	320	140	250	105
4	SMALL TURBOPROPS	240	110	240	95
5	MULTI-ENGINE GENERAL AVIATION PISTON	190	110	190	90
6	SINGLE ENGINE GENERAL AVIATION PISTON	150	100	150	85

TABLE 4. AIRCRAFT IDENTIFICATION

CLASS	IDENTIFIER	MODEL
1	B707	Boeing 707-120
	B727	Boeing 727-200
	B737	Boeing 737-200
	B747	Boeing 747
	BA11	B. A. C. 1-11
	DC8	Douglas DC8 - 60, 61
	DC9	Douglas DC9 - 14
	DC10	Douglas DC10 - 30, 40
	DC93	Douglas DC9 - 30
	FFJ	Dassault Falcon 20
	G2	Grumman Gulfstream II
	H707	Boeing 707 - 320B
	HB78	Boeing 707 - 320B
	HDC8	Douglas DC8 - 63F
	HS25	Hawker-Siddeley 125
	IL62	Ilyushin IL-62
	L101	Lockheed L1011
	L329	Lockheed Jetstar
	VC15	Vickers 1150
1	N265	Rockwell Sabreliner
2	C500	Cessna Citation
	LR24	Gates Learjet 24D
	LR25	Gates Learjet 25B
2	LR36	Gates Learjet 36
3	CV58	Convair 580
	CV64	Convair 640
	FH7	Fairchild FH-227
	G159	Grumman Gulfstream I
	L188	Lockheed Electra
3	NF20	Hamburger-Flugzeugban HFB-320

TABLE 4. AIRCRAFT IDENTIFICATION (CONT'D.)

CLASS	IDENTIFIER	MODEL
4	BE10	Beech King Air A-100
	BE90	Beech King Air A-90
	BE99	Beech 99A
	DH6	Dehaviland Twin Otter
	DHC6	Dehaviland (Canada) Twin Otter
	ND26	Nord Aviation 260/262
	SW4	Swearingen Merlin IV
4	MU2	Mitsubishi MU-2
5	AC21	Rockwell Aero Commander
	BE50	Beech Twin Bonanza
	BE55	Beech Baron
	BE80	Beech Queen Air
	BT65	Beagle 2065
	PA34	Piper Seneca
	PAZT	Piper Aztec
	C310	Cessna 310
	C402	Cessna 402
	C421	Cessna 421
5	PA31	Navajo
6	BE35	Beech Bonanza
	C206	Cessna Stationair
6	CJ23	Cessna 182

To support the present effort, the FAA has made available copies of the CATER information for 7 and 8 May 1975. These two days were chosen because information of good quality was available, the weather was generally VFR, and traffic levels were generally high. Because of early termination of the CATER development effort, the only information available is arrival and departure time for every aircraft on every runway at the three major airports, as well as some meteorological data. No information is, however, available from CATER on feeder fix passage time. A typical page from a CATER printout is shown in Table 5 for operations at J.F. Kennedy International Airport on 7 May 1975. The symbology used in Table 5 is identified as follows:

- DTG/OP — First two digits: day of the month; last four digits: time in GMT hours
- FLT/ID — Flight identification. Initial letters stand for:
  - Single-general aviation
  - Double-airline
  - Triple- "third-level" carrier

  Numbers following identify aircraft registration or airline flight number.
- A/C — Aircraft type identification
- CT — Type of certification:
  - G-general aviation
  - A-airline
  - S-"third-level" carrier
  - AH, GH-helicopter
- AD — Arrival or departure
- IV — IFR or VFR flight plan

TABLE 5. REPRESENTATIVE AIRPORT TRAFFIC DATA PRINTOUT

JFK DAILY

DATE 05/07/75 LIST OF OPERATIONS PAGE 12

DTG/OP FLT/ID	A/C	CT	AD	IV	RNY	DTR	REMARKS/WEATHER/COMMENTS	
072010.N71IL	LR24	G	A	I	31L			.SO
072011.NA188	B727	A	D	I	31L	2004		.SO
072011.AA186	B707	A	A	I	31R			.SO
072012.TW192	B707	A	A	I	31R			.SO
072013.CMD85	BE99	S	D	V	32	2008		.SO
072014.AA15	H707	A	D	I	31L	2004		.SO
072014.NW234	B727	A	A	I	31L			.SO
072015.LH404	B747	A	A	I	31R			.SO
072016.BH16	B727	A	A	I	31R			.SO
072016.DL224	B727	A	A	I	31L			.SO
072017.AA5	B707	A	D	I	31L	2006		.SO
072017.OV868	DC8	A	A	I	31R			.SO
072019.N720CR	BE10	G	A	V	32			.SO
072019.SBH801	DH6	S	A	V	32			.SO
072019.N235Z	LR24	G	A	I	31L			.SO
072021.PA1422	B707	A	A	I	31L			.SO
072022.NY4	HELO	AH	A	V	///			.SO
072023.VA751	HDC8	A	D	I	31L	2007		.SO
072023.UA768	DC8	A	A	I	31R			.SO
072025.UA6	DC10	A	A	I	31R			.SO
072026.N5000C	L329	G	D	I	31L	2014		.SO
072026.NY7	HELO	AH	A	V	///			.SO
072026.DL878	DC8	A	A	I	31R			.SO
072027.PA1422	B707	A	A	I	31L			.SO
072028.TW881	B747	A	A	I	31R			.SO
072030.BN11	B727	A	D	I	31L	2013		.SO
072030.UA2878	HDC8	A	A	I	31R			.SO
072031.UA22	DC10	A	A	I	31R			.SO
072032.AC750	DC93	A	A	I	31R			.SO
072034.DL372	B727	A	A	I	31L			.SO
072036.N15G	HELO	GH	A	V	///			.SO
072036.EA196	DC9	A	A	I	31L			.SO
072037.TW191	B707	A	D	I	31L	2031		.SO
072038.AA2	DC10	A	A	I	31R			.SO
072038.NY4	HELO	AH	D	V	///			.SO
072039.UA40	DC10	A	A	I	31R			.SO
072039.AL920	DC9	A	A	I	31L			.SO
072040.							A4R D4L 010/8 R	.SO
072040.N15G	HELO	GH	D	V	///			.SO
072042.MMH97	BE99	S	A	V	4L			.SO
072044.FT144	HDC8	A	D	I	4L	2027		.SO
072044.PA542	B707	A	A	I	4R			.SO
072045.JM014	DC9	A	D	I	4L	2033		.SO
072045.NY3	HELO	AH	A	V	///			.SO
072045.PA093	B707	A	A	I	4R			.SO
072047.PMT223	DH6	S	A	V	13L			.SO
072048.AA187	B707	A	D	I	4L	2034		.SO
072049.N720CR	BE10	G	D	V	31L	2040		.SO

- RNY — Runway used
- DTR — Requested time of departure

The data contained in Table 5 is insufficient to permit a complete validation of the computer code, because it contains no information on time over feeder fix. FAA therefore supplied Aerospace with controller flight strips for the same time covered by the CATER printouts. Flight strips are used by controllers to identify each aircraft calling for service, whether the aircraft has filed a flight plan, is merely requesting radar following while transiting the area, or pops up and asks for an approach to any of the airports handled by the New York Common IFR Room. Schematics of typical arrival, departure and overflight strips are shown in Figures 13a, 13b, and 13c, respectively, while Figure 14 is a reproduction of four actual strips used during 7 May 1975. Strips are pre-printed when the FAA computer is fed information on aircraft filing flight plans. Blank strips are utilized by controllers for unpreplanned traffic. The arrival strip in Figure 13a contains a space for the controller to list the time of aircraft arrival at a holding fix (such as each of the nine feeder fixes modeled in this study), but only when an aircraft was actually held. There is no requirement for the routine recording of aircraft time over a feeder fix, and, on most of the flight strips obtained, the only available time was a pre-printed estimated time of arrival (ETA) developed by the flight planning computer or by the pilot at the time the flight plan was filed. This ETA is generally not representative of the time the aircraft passed a particular feeder fix. Indeed, ETA often refers to expected arrival time at the airport, since the pilot normally has no way of knowing which feeder fix he will be directed to at the time he files his flight plan. Thus, controller flight strips, while interesting, are useful only in helping to determine which feeder fix a particular aircraft may have flown through.

After a detailed examination of all the data for the two-day period in May 1975, it was concluded that the most interesting activity occurred in the early evening of 7 May, between the hours of 4:00 and

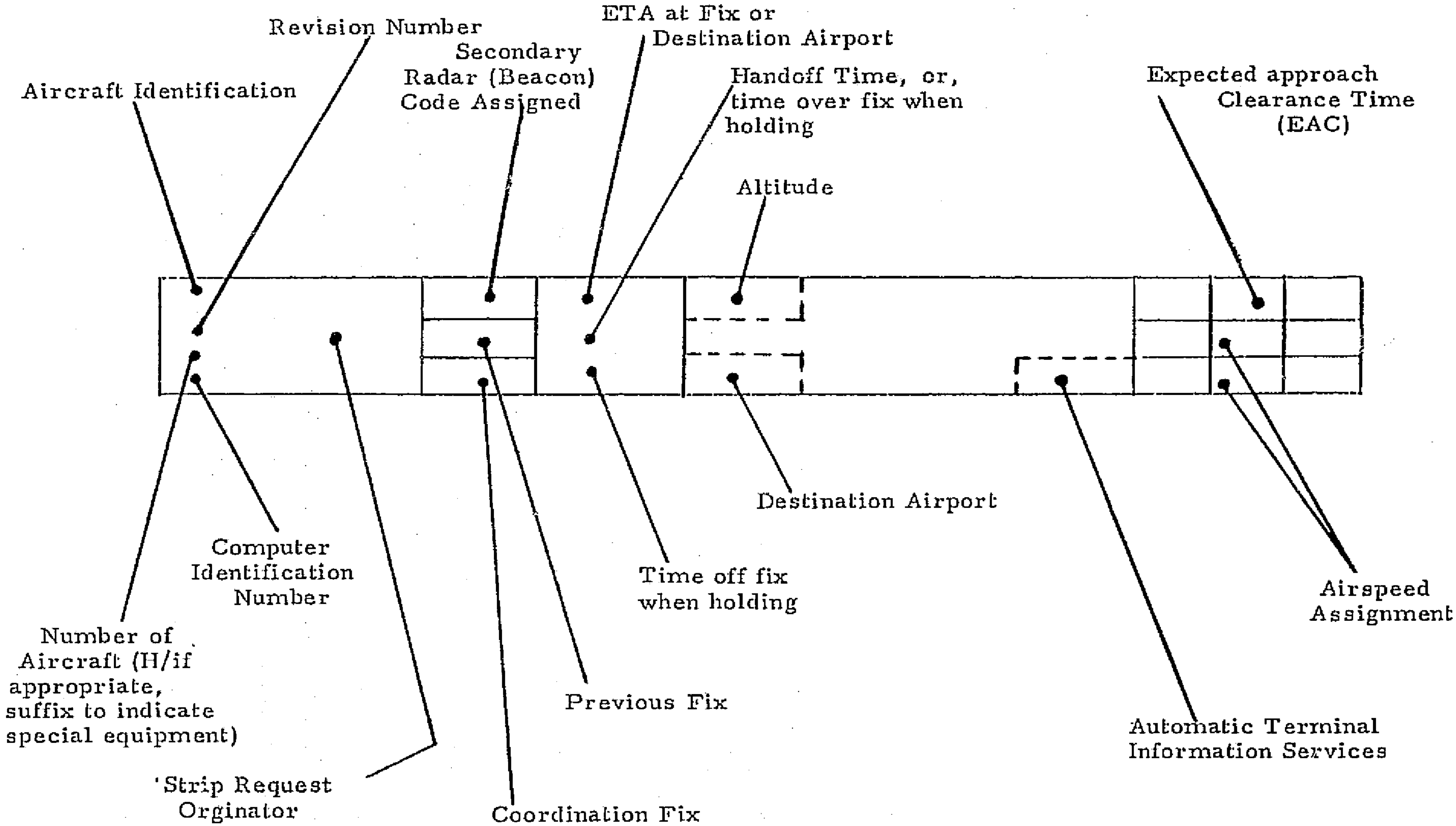


FIGURE 13a. SCHEMATIC OF FLIGHT STRIP ARRIVAL STRIP

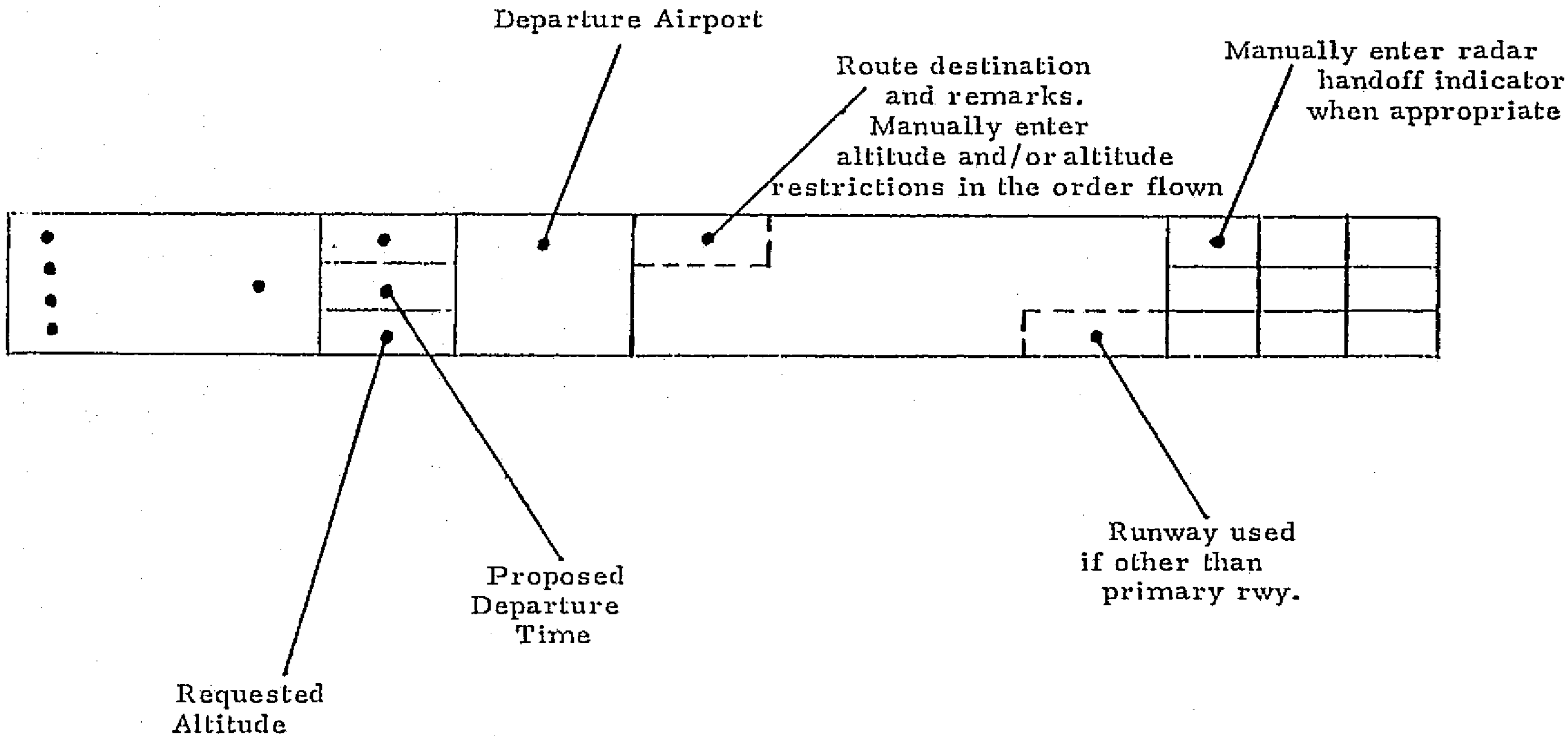


FIGURE 13b. SCHEMATIC OF FLIGHT STRIP (CONT'D.)
DEPARTURE STRIP

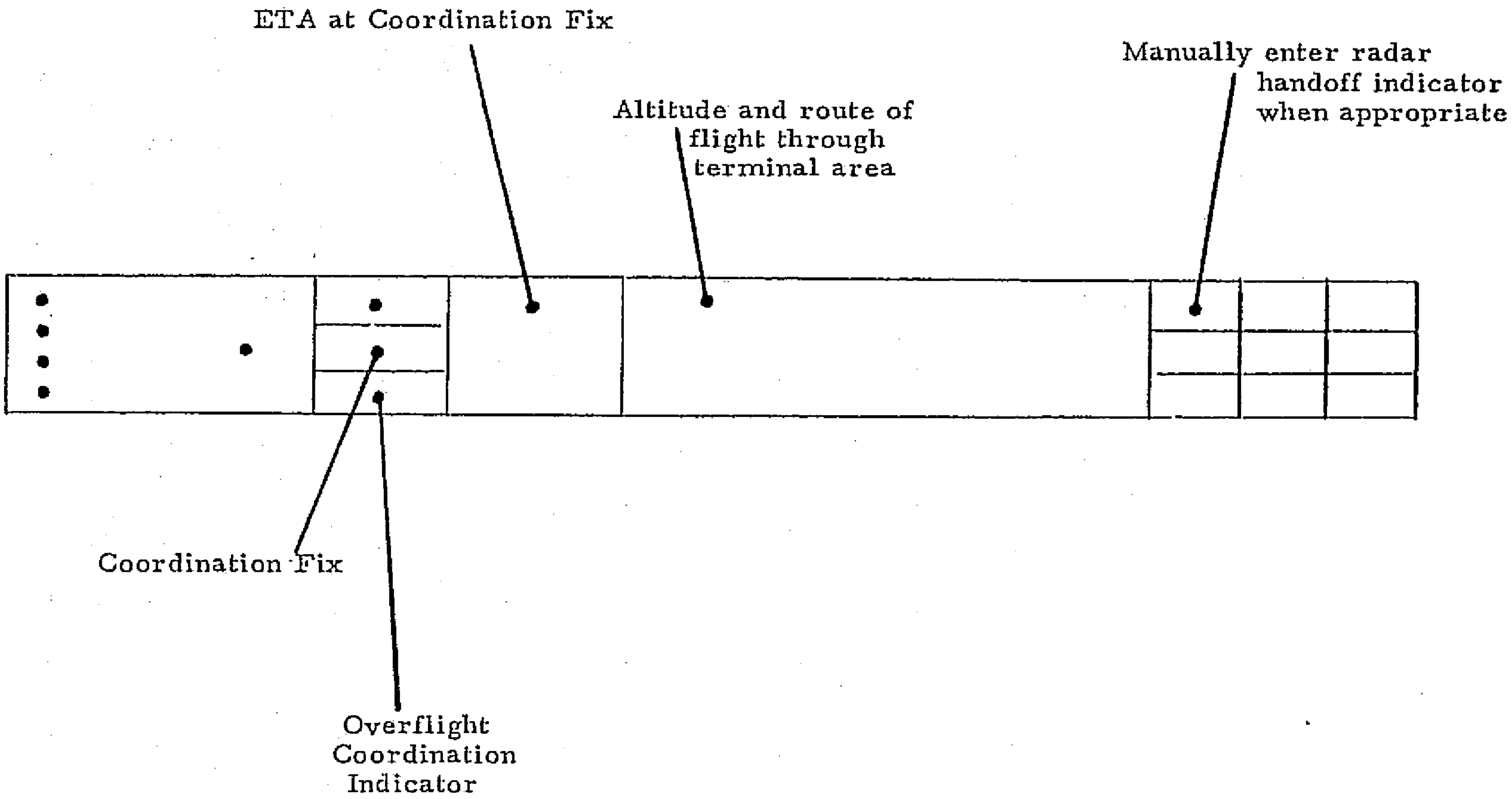
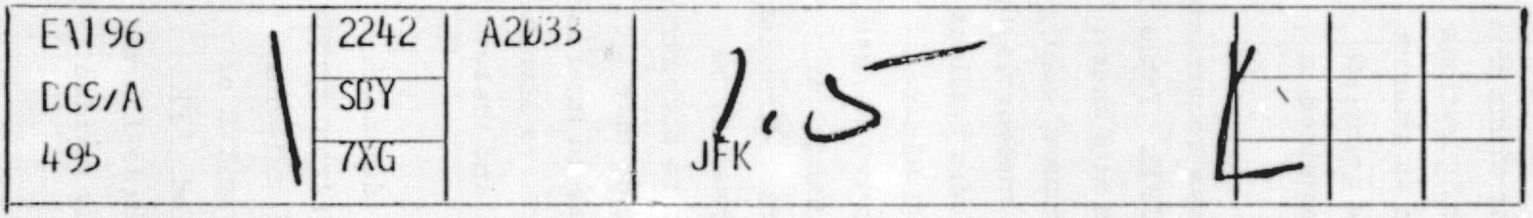
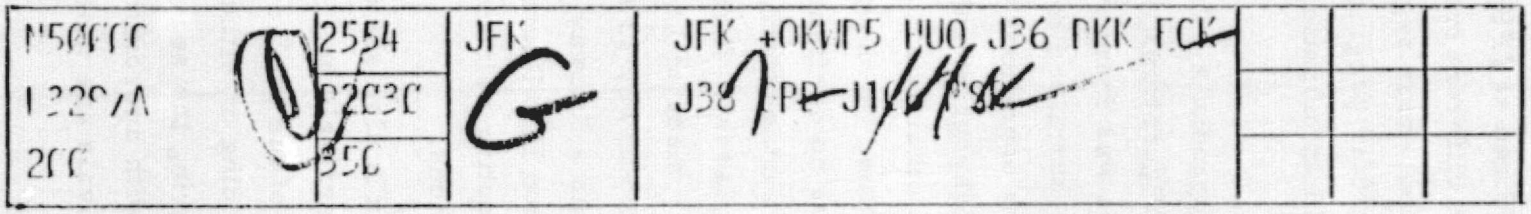


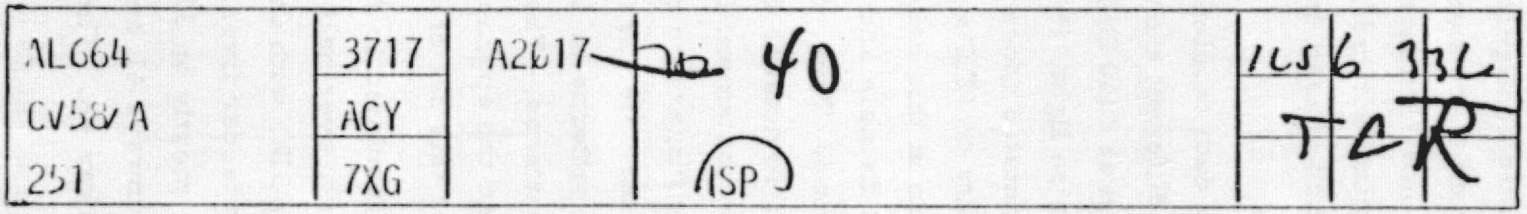
FIGURE 13c. SCHEMATIC OF FLIGHT STRIP (CONCLUDED)
OVERFLIGHT STRIP



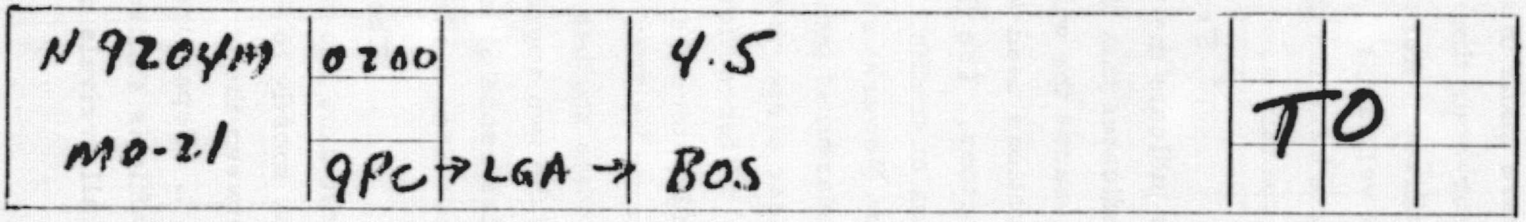
(a) ARRIVAL AT JFK



(b) DEPARTURE FROM JFK



(c) ARRIVAL AT RELIEVER AIRPORT (ISLIP)



(d) VFR OPERATION THROUGH TCA

FIGURE 14. SAMPLE CONTROLLER FLIGHT STRIPS

8:00 pm local time (2000-0000 GMT). During this period, two changes were made in the traffic configuration utilized at JFK, so that within this four-hour time segment there were three different traffic configurations utilized. Aerospace has simulated this four-hour segment in an attempt at validating the terminal air traffic computer program. The complete data base for the period, based on CATER information, is contained in Appendix A.

From the data tabulated in Appendix A, Table 6 was constructed to indicate the three different runway configurations used at JFK. Table 5 indicates that the wind at 2040 GMT hours was from the north at 8 knots. Because the wind was so light, it may be surmised that the runway configurations used were dictated more by noise conditions than by meteorological factors. The flexibility of JFK's runway layout permits periodic reallocation of traffic, as seen in this case. The other two airports (LaGuardia and Newark) are less flexible and constrained by shorter runways to head departures into the wind. Thus, there are no configuration changes at these airports (it is also notable that the northeasterly departure direction is preferred for noise abatement in both places). It must, however, be understood that path changes are normally made at LaGuardia to accommodate traffic at JFK. For example, arrivals on Runway 13 at Kennedy may dictate northeasterly patterns to LaGuardia's Runway 31, to avoid interference of the two approach patterns. The Common IFR Room Controllers Manual (Reference 8) indicates the appropriate routing relationships, and these have been modeled for this set of simulations.

The data tabulated in Appendix A also shows that, during the first time sub-segment, over half of the arrivals at JFK stem from Empire fix, mostly to Runway 31R, with the rest of the traffic spread uniformly between the other two feeder fixes and landing on either Runway 31R or 31L. Departures are mostly on 31L. During the second period, JFK traffic is shifted to Runways 4L and 4R, with approximately three-fourths of all arrivals on Runway 4R. These arrivals are more evenly divided

TABLE 6. RUNWAYS IN USE

AIRPORT	TYPE OF OPERATION	TIME PERIOD		
		2001-2039 GMT	2040-2148 GMT	2149-0000 GMT
JFK	A	31 R/L	4 R/L	13 R/L
	D	31 L	4 L	13 R/L
LGA	A	31	31	31
	D	4	4	4
EWR	A	4 R	4 R	4 R
	D	4 L	4 L	4 L

JFK - Occassional operations on crossing Runways 13-31 when Runways 4 R/L in use. Occassional operations on Runway 14 and 32 when Runways 13-31 in use.

LGA - Occasional arrival on Runway 4 and departure on Runway 31.

EWR - Occasional arrival on Runway 4 L and departure on Runway 4 R. Occasional operations on Runways 11 and 29.

among the three feeder fixes. Departures in this period occur mostly on Runway 4L. The third period reallocates JFK traffic to Runways 13L and 13R. In this case, most arrival traffic came from Empire or Southgate fixes to Runway 13L. Departures were mostly on Runway 13R. LaGuardia exhibited a fairly uniform pattern of traffic over the entire period. Arrivals were almost entirely on Runway 31, while departures were normally on Runway 4 and occasionally on Runway 31. Traffic was fairly uniformly divided among the three feeder fixes. Newark traffic is lighter than that at the other two airports. Most arrivals use Runway 4R, although a few arrive on Runway 4L. Snapy and Princeton feeder fixes handle most of the traffic. Departures are mostly, but not exclusively, on Runway 4L.

In its present form, it is difficult (though not impossible) for the Aerospace simulation to handle an abrupt runway change in the midst of a run. As a result, it was decided to separately simulate traffic conditions during each of the time sub-segments. Thus, the first run simulated a 40 minute period, the second an hour and ten minute period, and the third a two hour and ten minute period. This last case represented the longest single run ever made with the computer program. Coming between 6:00 and 8:00 pm in the evening, it was also the heaviest traffic period of the day for the three-airport complex.

6. Statistics

The standard deviations of the various error sources, modeled in this study and assumed to be normally distributed, are contained in Table 7. The magnitudes indicated are based on experience (rather than measured data). Some amount of experimentation was carried out before settling upon the values contained in the table, in order to achieve paths that were neither extremely bad (exhibiting large excursions in path parameters) nor unrealistically good (essentially replicating the ideal path parameters). Standard deviations are accessible to the user through program input.

TABLE 7. AIRCRAFT AND OBSERVED ERROR DISTRIBUTIONS

Error Reference	Location of Error	Type of Error	Standard Deviation
Aircraft[a] ↓	Feeder Fix ↓	Velocity (knots)	10.0
		Position (NM)	0.10 - 0.35
		Altitude (feet)	100 - 200
		Descent Angle (degrees)	1.0
		Heading (degrees)	1.0
		Time	Dependent
	Turn ↓	Rate (degrees/sec.)	0.3
		Final Heading (degrees)	3.0
		Initial Point Relative to Plan (NM)	0.33
Observer[b] ↓	Airspace ↓	Heading (degrees)	1.0
		Descent Rate (ft/min)	40 - 100
		Velocity (knots)	5.0 - 10.0
		Position (NM)	0.05 - 0.1
		Altitude (feet)	50 - 100

[a] Pilot/aircraft and Guidance Equipment Errors

[b] Controller Errors

Errors associated with pilot/aircraft response to commands, given to a straying aircraft to aid in achieving a return to the ideal path, are modeled by the distributions shown in Figure 15. It is notable that these distributions were designed with finite end points, to preclude the random selection of extremely large errors. The first (or skewed) distribution applies after the pilot has received an initial command. The skewness (i.e., the sharp rise) was selected to model the concept that most pilots would respond quickly to commands. Furthermore, the distribution indicates that pilots will never respond instantaneously. If the pilot's response is very slow, a second command will be issued, and this time pilot response is much faster, in accordance with the second distribution. The standard deviations for the two distributions are 2.58 and 2.04 seconds, respectively. These pilot/aircraft error distributions permit rapid shape change, so that available data may be readily applied and the sensitivity of results to shape-related factors examined.

C. VALIDATION PROCEDURE

The unavailability of complete data on traffic movements from feeder fixes to runways limits the degree to which a complete validation of the terminal area simulation could be accomplished. The major piece of information lacking is the time over the feeder fix, which could then be related to touchdown time and routing to completely specify a flight. To circumvent this problem, a partial traffic sample was first run on a random generation basis, to determine the average time taken by each class of aircraft from each feeder fix to each runway. The average flight time was applied to the known touchdown times from the CATER information and a set of generation times obtained. The simulation was run with this set of non-random aircraft generation times. Clearly, this technique is less than satisfactory, because no two aircraft flying from a given feeder fix to a given runway take the same amount of time to perform the flight. Furthermore, the order of generation at each fix had to be based on computations rather than on data. Occasionally, an aircraft will have a

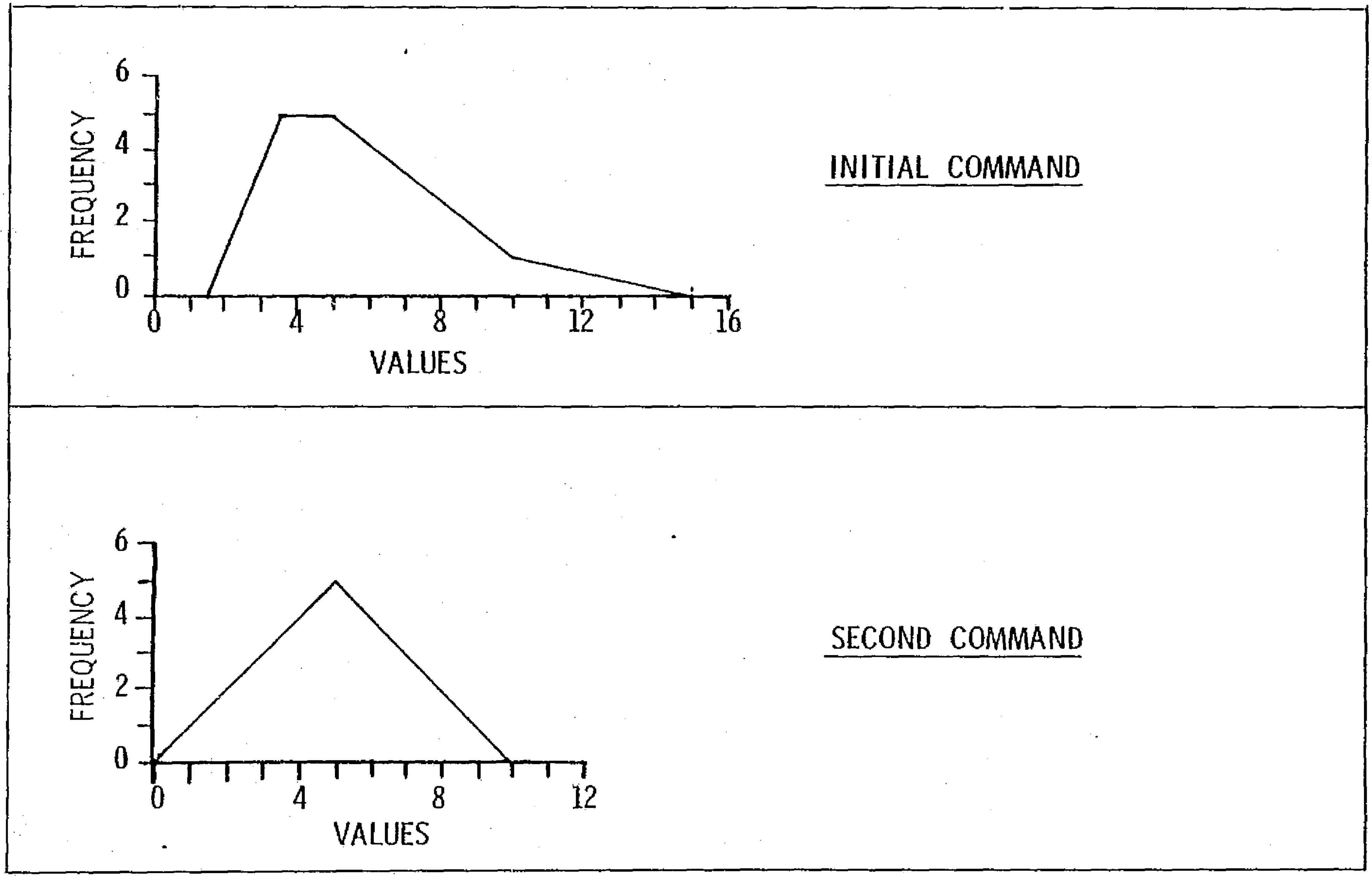


FIGURE 15. PILOT RESPONSE DISTRIBUTIONS

reasonably clear route and be able to fly at relatively high speed. On other occasions, when traffic is heavy and there is significant merging and sequencing taking place, aircraft will be slowed at various points along the route and the flight will take longer. It seemed, however, that the adopted approach was the best that could be accomplished on the basis of the available information. Departures, of course, could be generated at the times indicated in the CATER printouts and the difference between actual and simulated takeoff time observed (generating a departure should not be confused with releasing a departure). Simulated arrival times, as well as the order in which aircraft arrived, could also be compared with the actual times and sequence indicated by CATER.

During the four-hour period examined, there were a number of operations by general aviation aircraft at the three airports. Because of the low density of this traffic and indications that it was handled on a non-interfering basis with the flow of jet traffic (often showing up on other runways), it was decided not to simulate these generally slower aircraft. In the case of JFK, for example, it was noted that many of the general aviation operations occurred on short Runways 14-32, which can be operated independently of the other runways at the airport in VFR conditions. Where general aviation operations by high-speed jets occurred, these were, however, simulated.

D. SIMULATION RESULTS

The results of three simulations of New York area air traffic are presented in this subsection. The computer produces results in a variety of formats, and only a limited sampling is included here. For example, complete information on the flight path parameters, the closest approach to other aircraft, and all commands given to each aircraft and all responses made, is produced in printed form for every arriving aircraft in the simulation. The results for each aircraft may be automatically plotted and presented in terms of an elevation, a profile on a time base, and a histogram (velocity vs. time).

Figures 16 through 22 include a small sample of plotted data (over 300 arriving aircraft were modeled). Each of these plots includes a horizontal and a vertical projection for a particular aircraft flying from a particular feeder fix to a runway at one of the three New York area jetports. The small numbers appearing on the horizontal projection corresponds to particular flight times, while the dots appearing on the vertical projection correspond to specific control commands.

Figure 16 depicts an approach from EMPIRE feeder fix to JFK runway 31R. This approach may be contrasted with that shown from the same feeder fix to JFK's Runway 4R in Figure 18 and to Runway 13R in Figure 19. In each case, the aircraft passed EMPIRE feeder fix while in level flight at 15,000 feet. The route flown by the aircraft in Figure 19 is by far the longest of the three, requiring 28 minutes of flight time vs. the 17 minutes of Figure 16. The extremely circuitous routes are required in order to provide sufficient airspace for Kennedy departures as well as for LaGuardia arrivals and departures. A typical LaGuardia arrival is shown in Figure 20, where it is noted that the approach traffic passes over the airport at 4000 feet (this route parallels the Hudson River while the aircraft flys northeast bound). The aircraft in Figure 18, from EMPIRE to JFK Runway 4R, overflys LaGuardia airport and its traffic pattern while still at an altitude of 15,000 feet. The airspace between these routes (11,000 feet altitude) is utilized for departing traffic or for aircraft transiting the New York TCA. It may be noted in Figure 20 that LaGuardia traffic leaves PENWELL feeder fix at 9000 feet and remains at that altitude for some 32 nm. This makes it possible for traffic to Newark starting from SNAPY feeder fix at 6000 feet and destined for Runway 4R (Figure 22) to remain well below the LaGuardia traffic. Thus, while very complex, these routes appear to be sensible. Very little interference is found in the simulation between aircraft approaching the three modeled airports, an indication that the routes are also safe.

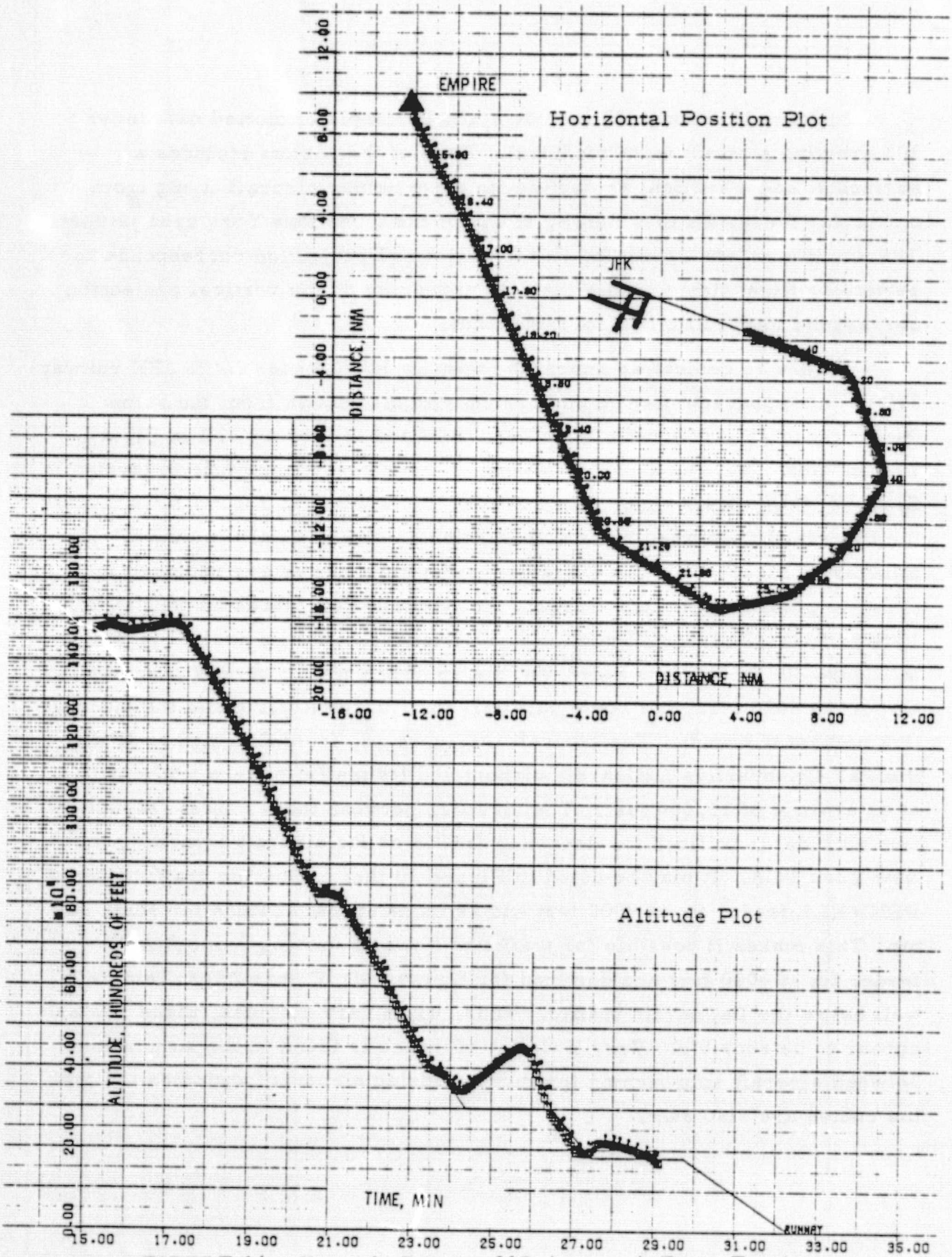


FIGURE 16. Kennedy Runway 31R Approach From Empire
(Touchdown Time = 2011 GMT)

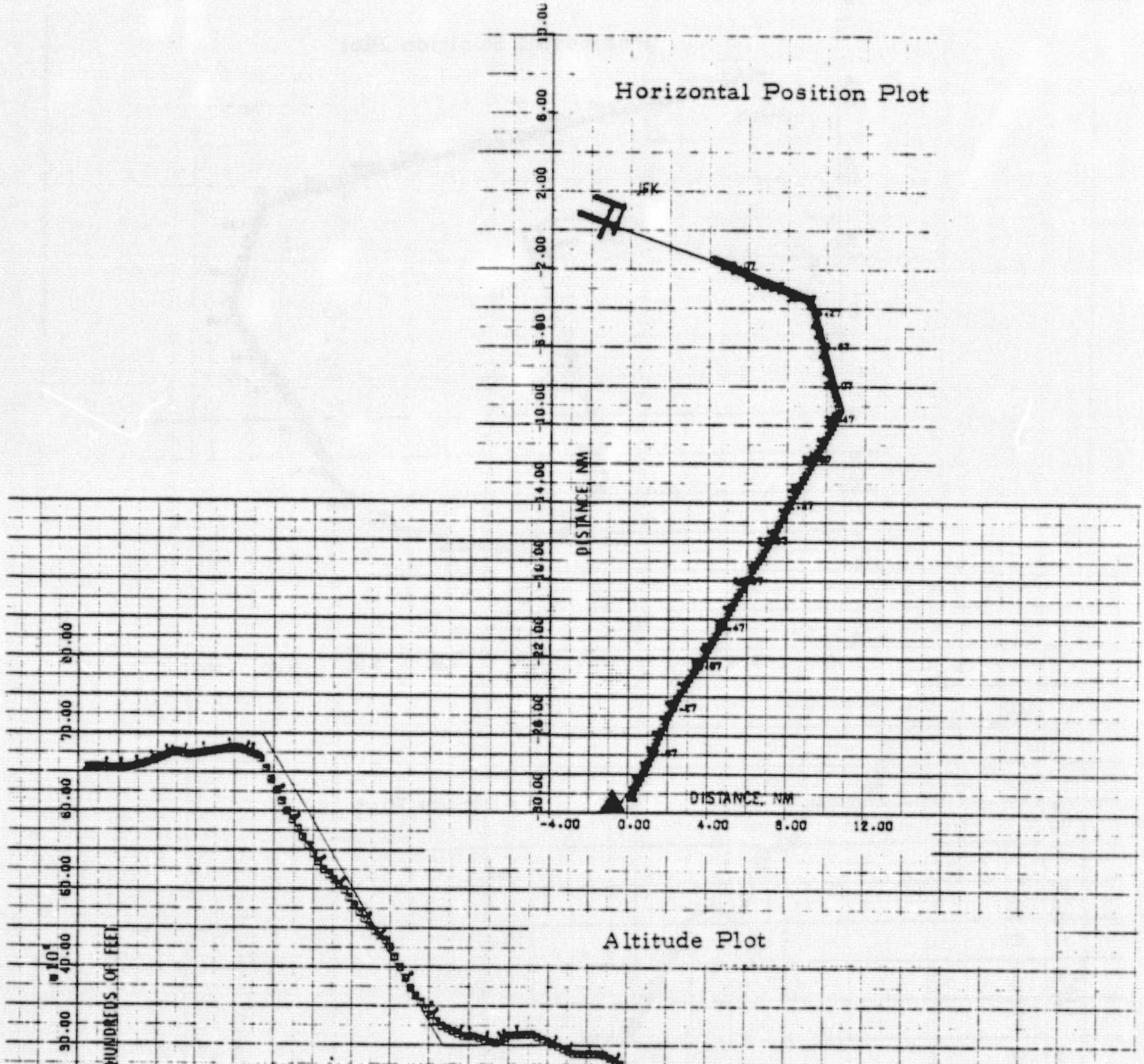


FIGURE 17. Kennedy Runway 31L Approach From Southgate
(Touchdown Time = 2016 GMT)

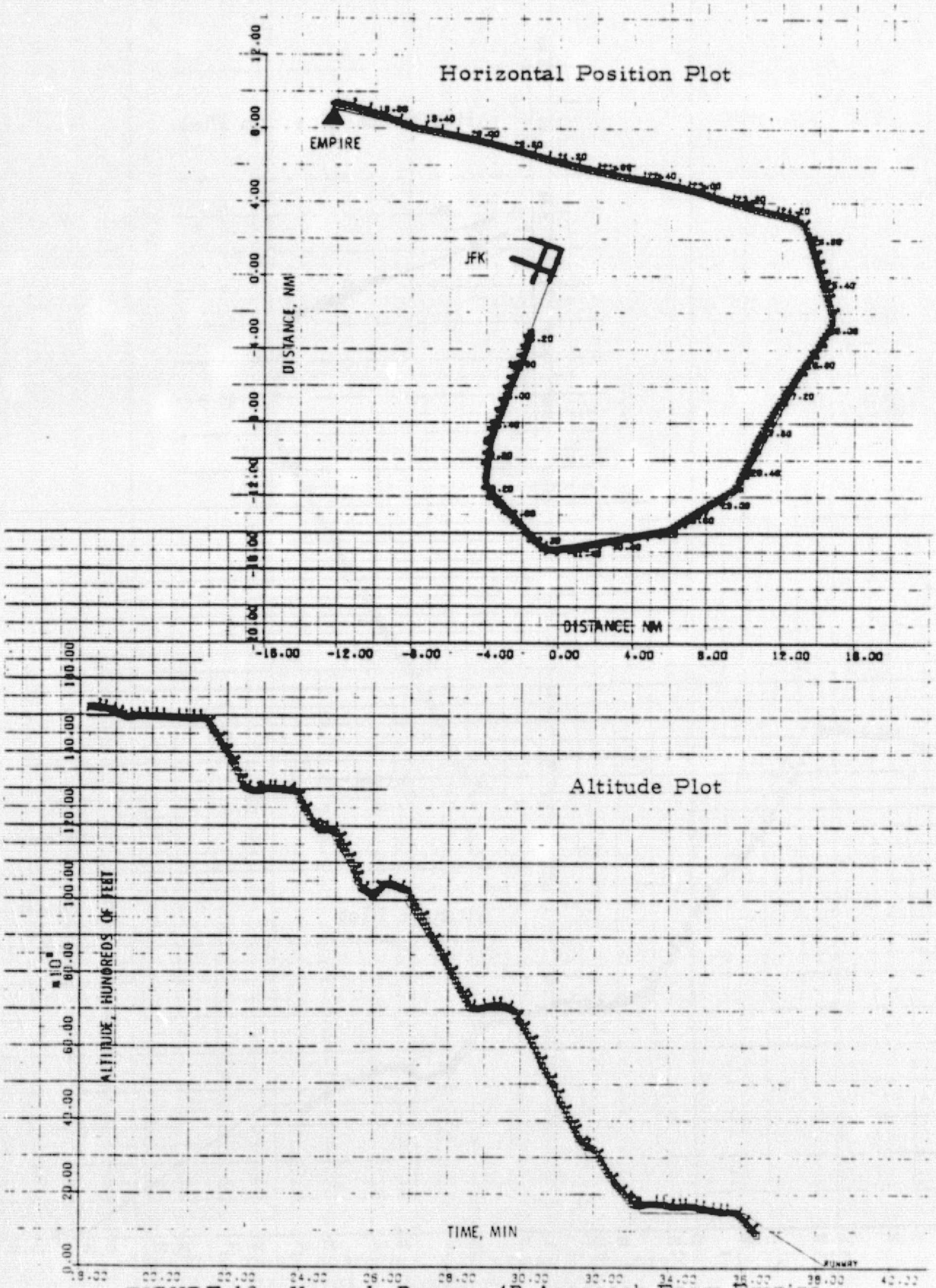


FIGURE 18. Kennedy Runway 4R Approach From Empire
(Touchdown Time = 2059 GMT)

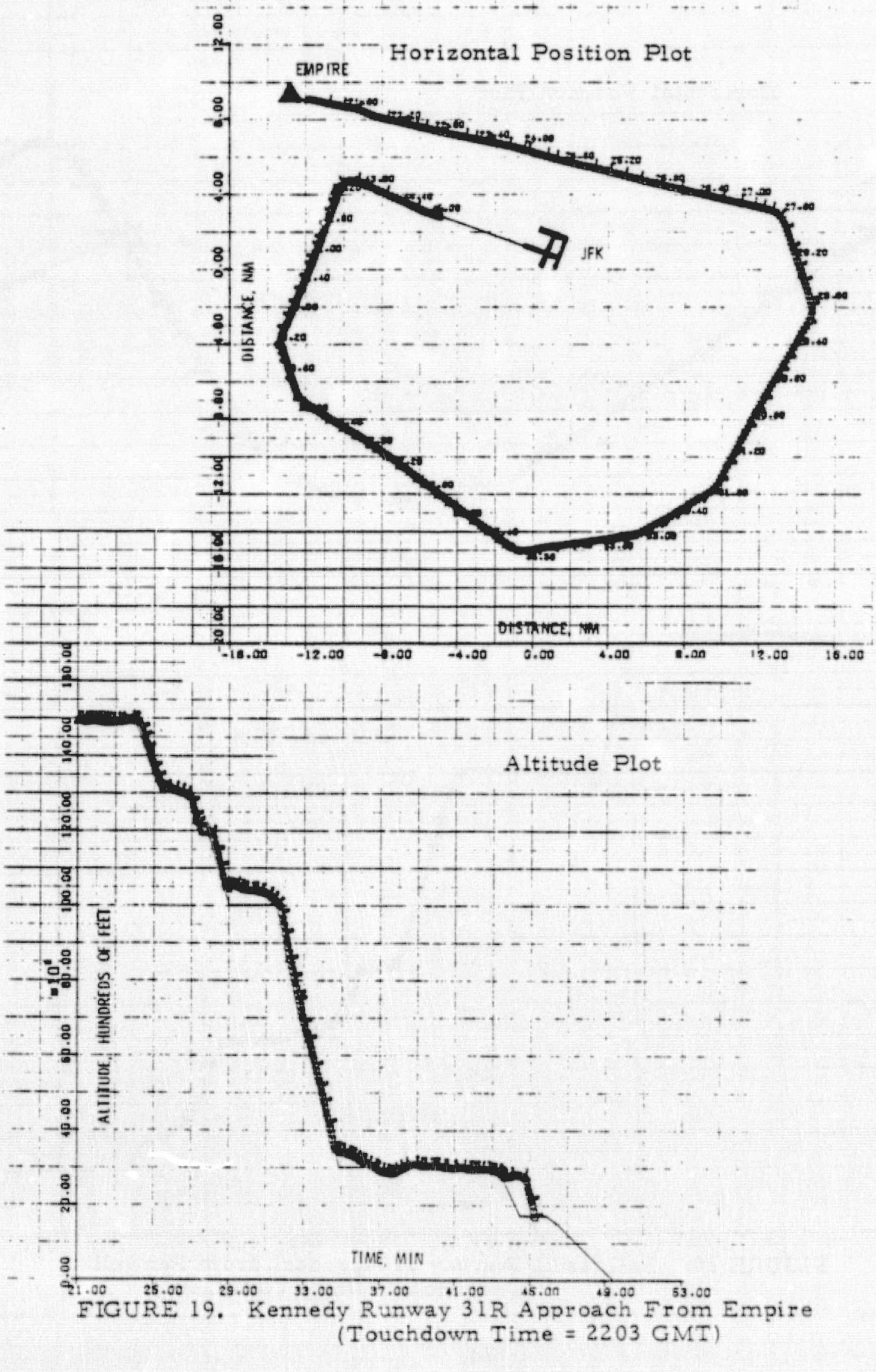
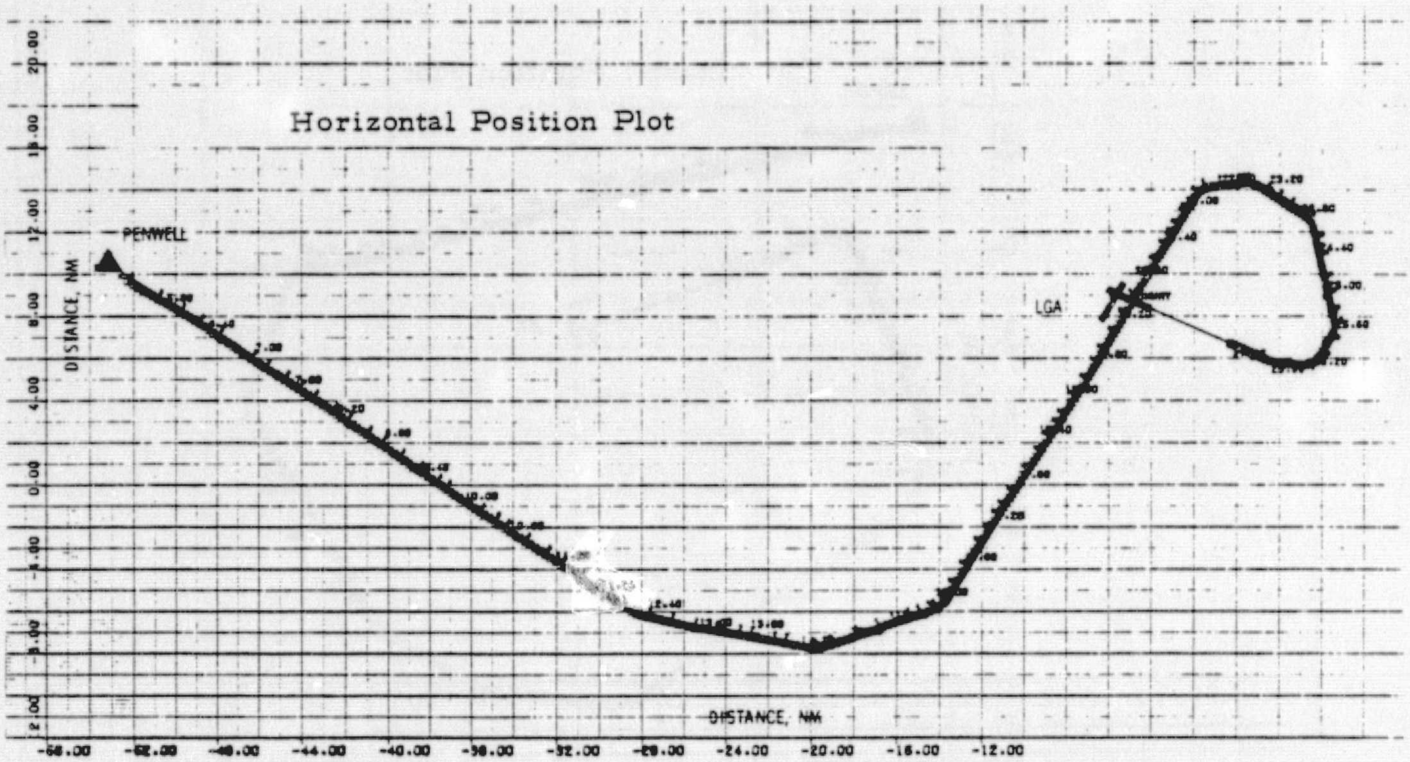


FIGURE 19. Kennedy Runway 31R Approach From Empire
(Touchdown Time = 2203 GMT)



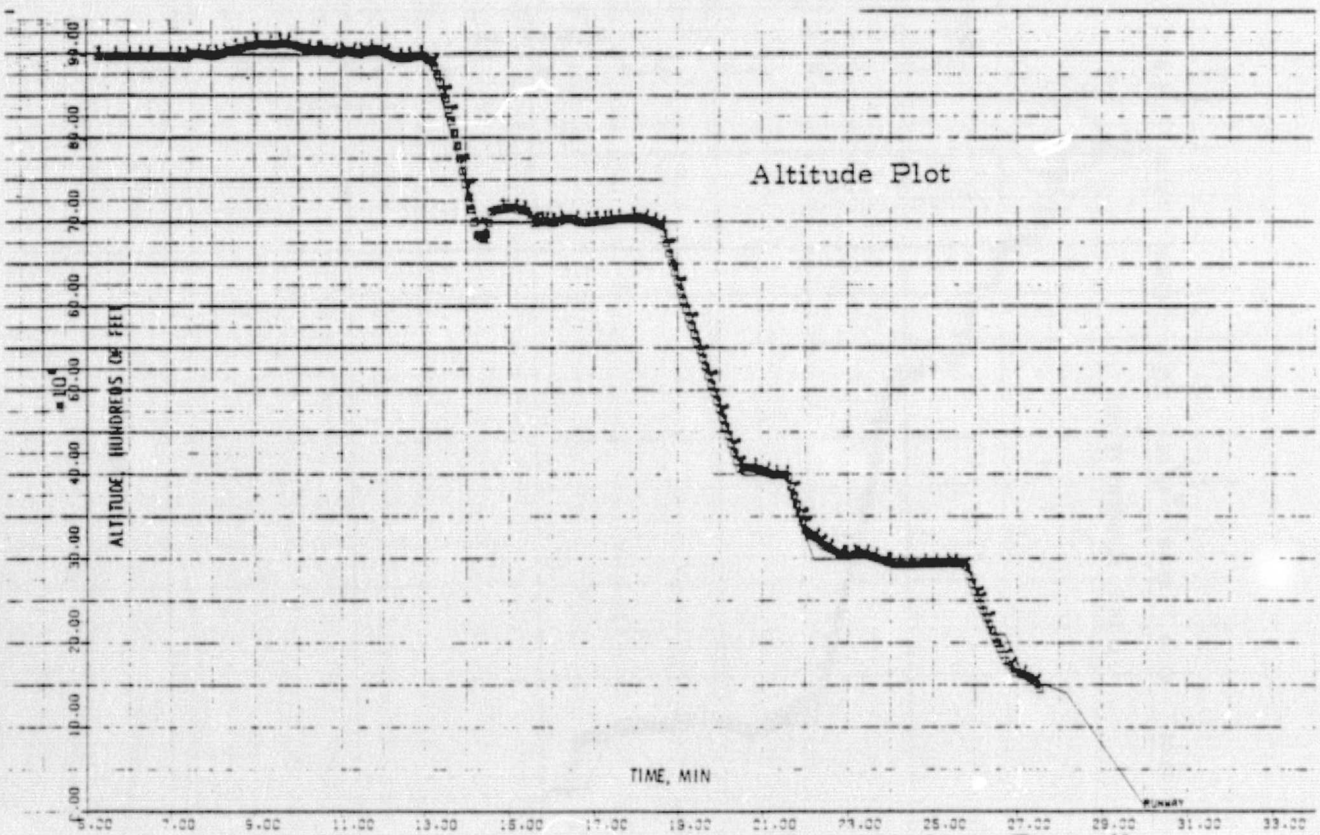


FIGURE 20. LaGuardia Runway 31 Approach from Penwell
(Touchdown Time = 2001 GMT)

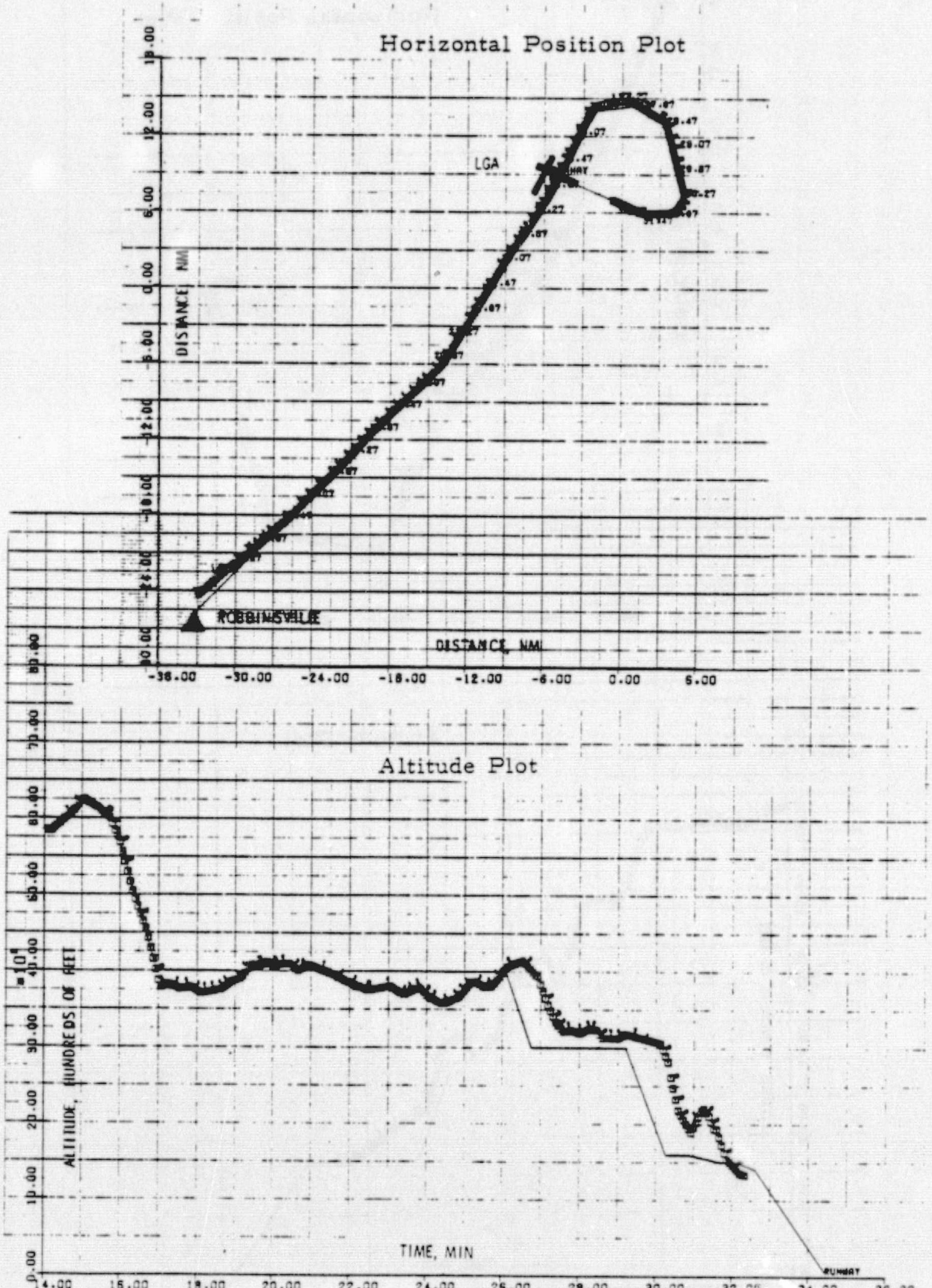


FIGURE 21. LaGuardia Runway 31 Approach From Robbinsville
(Touchdown Time = 2002 GMT)

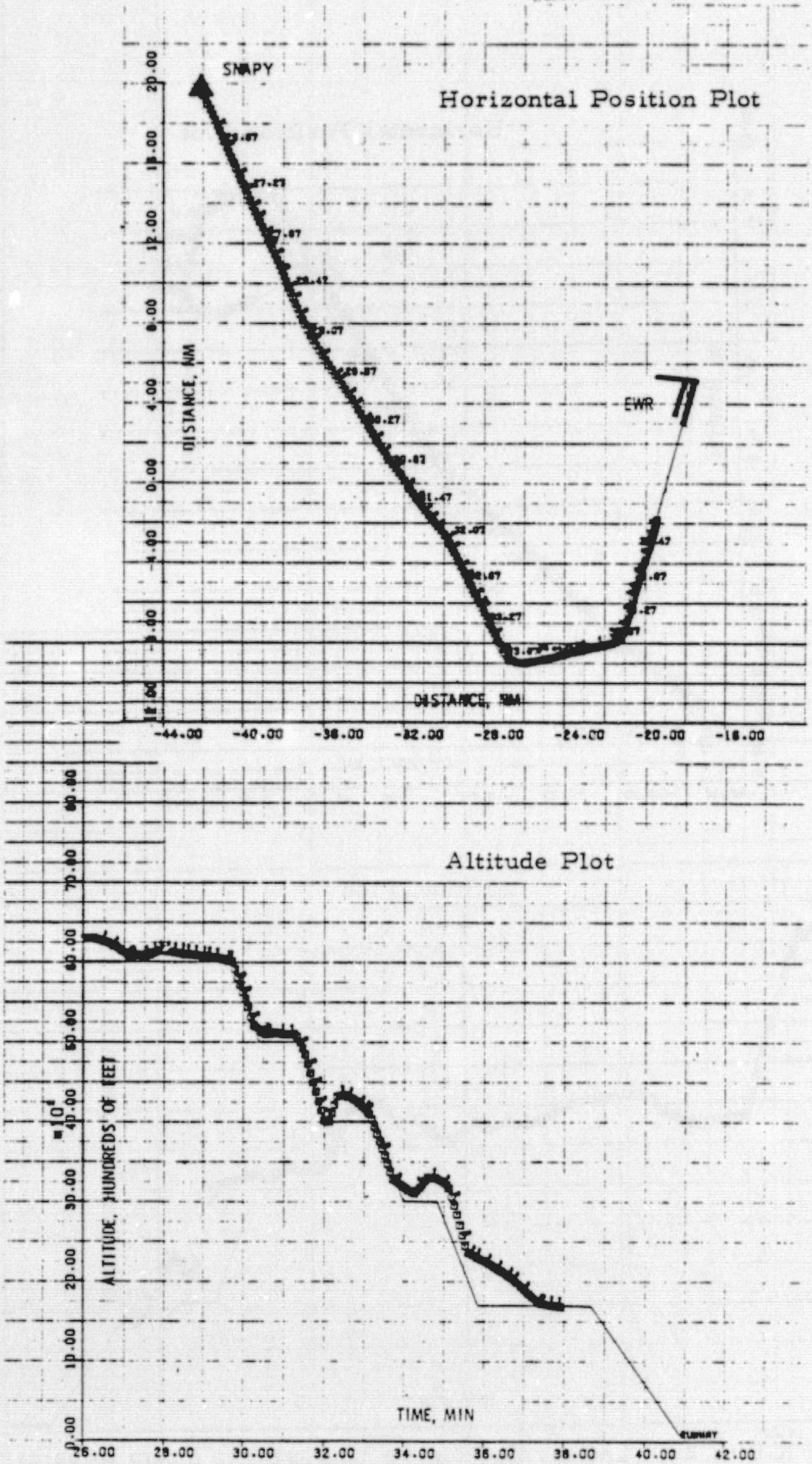


FIGURE 22. Newark Runway 4R Approach From Snapy
(Touchdown Time = 2158 GMT)

A close examination of Figures 16 through 22 indicate the effects of navigational and pilot errors as well as the aircraft's ability to follow the ideal path (shown as the thin solid line). For example, the horizontal projection of Figure 16 indicates that the aircraft was able to follow the assigned route with good precision but exhibited a few problems in maintaining assigned altitude. The horizontal projection of Figure 21 represents an instance in which the aircraft was approximately 1.5 nm off course while passing Robbinsville Vortac, but was able to return to the assigned course. In addition, this aircraft did not precisely maintain altitude and time assignments, but did finally reach the outer marker at the proper altitude. Figure 17 shows an instance in which an aircraft was approximately 500 feet below assigned altitude at SOUTHGATE feeder fix. This did not deter the aircraft from accurately tracing its route in the horizontal projection and finally reaching the outer marker at the proper altitude.

Summaries of complete results from the first simulation (2001 - 2039 GMT) and the third simulation (2149-000 GMT) are contained in Section IVF. Portions of these results have been analyzed in detail and are contained in Tables 8 through 15. Tables 8 through 10 are for a portion of the first run, while Tables 11 through 15 are for a portion of the third run. Each of these tables is arranged in the same way, i.e., actual operations conducted at the indicated airport and on the indicated runway are listed in the first three columns, while simulated operations are compared with actuals in the last three columns. The column headed "Equivalent GMT" is computed from the arrival and departure times listed on the computer output, corrected by an appropriate factor to enable comparisons with actual operating times.

Table 8 shows a portion of the results for JFK's Runway 31L, starting at the beginning of the first simulation. This runway is used both for arrivals and departures, mixed almost evenly. Because of the large separation between Runways 31L and 31R (over 1nm), the two runways can operate totally independent of one another. In this case, it is seen that

TABLE 8. JFK RUNWAY 31L
(First Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	A	2001	1953	-8	1
2	A	2002	2001	-1	4
3	D	2002	1955	-7	2
4	A	2005	2005	0	6
5	D	2007	1959	-8	3
6	A	2010	2008	-2	7
7	D	2011	2003	-8	5
8	D	2014	2012	-2	9
9	A	2014	2011	-3	8
10	A	2016	2014	-2	10
11	D	2017	2016	-1	11
12	A	2019	2018	-1	12
13	A	2021	2021	0	14
14	D	2023	2020	-3	13
15	D	2026	2023	-3	15
16	D	2030	2024	-6	16
17	A	2034	2036	+2	18
18	A	2036	2037	+1	19
19	D	2037	2029	-8	17

TABLE 9. LGA RUNWAY 31
(First Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	A	2001	1956	-5	1
2	A	2002	1957	-5	2
3	A	2005	2000	-5	3
4	A	2007	2002	-5	4
5	D	2008	2007	-1	8
6	A	2009	2003	-6	5
7	A	2011	2004	-7	6
8	A	2013	2006	-7	7
9	A	2015	2011	-4	9
10	A	2017	2019	+2	10
11	A	2022	2020	-2	11
12	A	2023	2021	-2	12
13	A	2029	2026	-3	13
14	A	2032	2028	-4	14
15	A	2033	2029	-4	15
16	A	2034	2031	-3	16
17	A	2036	2034	-2	17
18	A	2038	2035	-3	18
19	A	2039	2036	-3	19

TABLE 10. LGA RUNWAY 4
(First Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	D	2001	1953	-8	1
2	D	2003	2009	+6	2
3	D	2004	2014	+10	3
4	D	2006	2016	+10	4
5	D	2008	2024	+16	5
6	D	2010			
7	D	2010	NO ADDITIONAL DEPARTURES SCHEDULED		
8	D	2012			
9	D	2014			
10	D	2016			
11	D	2019			
12	D	2023			
13	D	2025			
14	D	2026			
15	D	2028			
16	D	2029			
17	D	2031			
18	D	2034			
19	D	2036			
20	D	2039			

TABLE 11. JFK RUNWAY 13L
(Third Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	A	2205	2205	0	1
2	D	2207	2208	+1	3
3	A	2208	2206	-2	2
4	A	2209	2212	+3	6
5	D	2211	2209	-2	4
6	D	2213	2211	-2	5
7	D	2214	2216	+2	8
8	A	2217	2214	-3	7
9	D	2218	2217	-1	9
10	A	2220	2219	-1	10
11	D	2226	2220	-6	11
12	A	2228	2223	-5	12
13	A	2229	2230	+1	14
14	D	2231	2224	-7	13
15	A	2233	2234	+1	15
16	A	2234	2236	+2	16
17	D	2236	2238	+2	17
18	A	2243	2244	+1	19
19	A	2244	2252	+8	20
20	D	2246	2242	-4	18

TABLE 12. LGA RUNWAY 31
(Third Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δ t	Order
1	A	2300	2314	+14	1
2	A	2301	2315	+14	2
3	A	2303	2318	+15	3
4	A	2304	2318	+14	4
5	A	2306	2319	+13	5
6	A	2307	2321	+14	6
7	A	2309	2322	+13	7
8	A	2310	2323	+13	8
9	A	2312	2324	+12	9
10	A	2316	2325	+ 9	10
11	A	2318	2327	+ 9	11
12	A	2320	2329	+ 9	12
13	A	2323	2330	+ 7	13
14	A	2323	2331	+ 8	14
15	A	2324	2332	+ 8	15
16	A	2330	2335	+ 5	16
17	A	2332	2336	+ 4	17
18	A	2336	2336	0	18
19	A	2337	2339	+ 2	19
20	A	2339	2341	+ 2	20

TABLE 13. LGA RUNWAY 4
(Third Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	D	2149	2139	-10	1
2	D	2152	2146	- 6	2
3	D	2155	2148	- 7	3
4	D	2156	2149	- 7	4
5	D	2158	2151	- 7	5
6	D	2159	2152	- 7	6
7	D	2200	2203	+ 3	7
8	D	2202	2213	+11	8
9	D	2203	2215	+12	9
10	D	2205	2217	+12	10
11	D	2207	2222	+15	11
12	D	2208	2223	+15	12
13	D	2209	2248	+39	13
14	D	2210	2249	+39	14
15	D	2211	2352	+101	15
16	D	2214			
17	D	2215			
18	D	2216	NO ADDITIONAL		
19	D	2219	DEPARTURES SCHEDULED		
20	D	2220			

TABLE 14. EWR RUNWAY 4R
(Third Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	A	2213	2223	+10	1
2	A	2222	2230	+ 8	2
3	A	2229	2301	+32	3
*	D	2249	----	---	-
4	A	2258	2301	+ 3	4
5	A	2259	2303	+ 4	5
6	A	2302	2318	+16	6
7	A	2316	2319	+ 3	7
8	A	2317	2320	+ 3	8
9	A	2320	2327	+ 7	9
10	A	2326	2328	+ 2	10
11	A	2326	2336	+10	11
*	D	2331	----	---	--
12	A	2333	2347	+ 4	12
13	A	2335	2338	+ 3	13

* GENERATION TIMES CODES INCORRECTLY

TABLE 15. EWR RUNWAY 4L
(Third Simulation)

ACTUAL OPERATION			SIMULATED OPERATION		
Order	A/D	GMT	Equiv. GMT	Δt	Order
1	D	2208	2245	+37	3
2	D	2214	2247	+33	4
3	D	2216	2248	+32	5
4	D	2221	2252	+31	7
5	D	2226	2253	+27	8
6	A	2232	2237	+ 5	1
7	A	2234	2241	+ 7	2
8	D	2235	2305	+30	11
9	D	2239	2307	+28	12
10	D	2240	2308	+28	13
11	A	2244	2250	+ 6	6
12	A	2250	2255	+ 5	9
13	A	2256	2259	+ 3	10
14	D	2302	2309	+ 7	14
15	D	2305	2311	+ 6	15

the simulated operations were very close to the actual operations, both in time and in order of occurrence. Considering the unavailability of time-over-feeder-fix data, these results are very encouraging. The same can be said for the results in Table 9, depicting traffic using LaGuardia's Runway 31. In this case, almost all operations on this runway were arrivals.

Table 10, however, is indicative of a serious problem in the Aerospace simulation as it was formulated at the time of this activity. The table depicts operations on LaGuardia's Runway 4, all of which are departures. This runway crosses arrival Runway 31 near the northwest corner of the airport. Thus, operations on the two runways are highly dependent on one another. Departures on a given runway were modeled as being dependent on arrivals on that runway. When there are no arrivals on a particular runway, the departures on that runway become dependent on arrivals on the crossing runway. The scheduling of arrivals on Runway 31 in effect precluded any departures from being scheduled on Runway 4, because the latter was modeled as being too dependent on spacing at the intersection. Indeed the five aircraft in Table 10 which did depart were scheduled near the beginning of the run, while the simulated airspace was still relatively free of traffic. As soon as the airspace filled up with traffic and a significant number of arrivals were scheduled on Runway 31, no further dependent departures could be scheduled on Runway 4.

Similar results are evident in Tables 11 through 15, which are based on the third run. This run begins at time 2149 GMT, so that the simulated airspace is reasonably well filled up by 2200 GMT. In this case, JFK traffic is southeast bound, landing on Runways 13L and 13R. The simulated traffic on Runway 13L is seen to be in excellent agreement with actual traffic, even though arrivals and departures were highly mixed. The same is true with traffic to LaGuardia's Runway 31, all of which were arrivals in this case (Table 12). It may be noted in Table 12 that the simulated arrivals were precisely in the same order as the actual arrivals for the 39 minute time segment shown. The simulated traffic landed at a somewhat higher rate than the actual, although the rate drops as time increases. Table 13 again depicts LaGuardia Runway 4 departures. The segment shown starts at the beginning of the run. Initially, while the airspace was still filling up, departures were handled with ease. As arrivals began to be scheduled on Runway 31, there was less and less space for departures to occur. Finally, the 15th departure is seen to be one hour and 41 minutes late, with no further departures scheduled during the run.

Tables 14 and 15 indicate conditions at Newark, where traffic uses Runways 4L and 4R. Runway 4R is used mainly for arrivals and Table 14 indicates that reasonably good results were achieved. There are two aircraft that arrived quite late, for reasons which have not presently been clarified. Indeed, a glance at the output data contained in the listing of Section IVF shows no delays occurring among Newark arrivals. Table 14 indicates that departures were again adversely affected by the existence of a dependent runway, but that the problem was not nearly as severe when the runways are parallel as it was when they cross. Furthermore, there was some arrival traffic mixed with departures on Runway 4L, which, because of the way departures were simulated to depend on arrivals on the same runway, allowed more departures to be scheduled than for the crossing runway case.

In summary, the results indicate that the Aerospace Terminal Air Traffic Simulation modeled arriving traffic with good precision in terms of arrival times, sequence, and rate, even though traffic to each airport was merged and sequenced from three separate fixes and the time-over-feeder-fix had to be approximated for lack of data. Departures were adequately modeled only on independent runways, apparently because they were scheduled at too early a time (essentially when the arrivals are scheduled) and given more separation than is necessary for dependent parallels or crossing runways. Departures should, instead, be scheduled close to their announced time of availability, thus taking advantage of space in the arrival queue. (The dependent runway departure vs. approach problem was eliminated after this study effort was concluded, and several reruns of LaGuardia cases indicated no unexpected departure delays.)

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SECTION IV
USER'S GUIDE

A. PROGRAM OVERVIEW

The Aerospace Terminal Air Traffic Simulation has two main capabilities, viz.: the planning of flights so that traffic flow is fast and safe; and the methodology for determining how well the plan can be expected to function at various levels of pilot and controller error. Both portions of the model (the "ideal" and the "real") are quite complex, so that the model is applicable to many different airport configurations, flight paths, cross sections of air traffic, and sets of priorities.

The program must be supplied with information about the particular environment to be simulated. The airport or airports in the region must be fully described. The types of aircraft predominating (general aviation, large jets, etc.) must also be indicated, as must information about the pilot population (i.e., level of errors to be expected). Other variables include such factors as required separations, types of paths requested, feeder fixes, and priorities.

Basically, the results provided by the computer program include descriptions of what should have happened at each time step and a listing of what did happen. Usually, the two coincide fairly closely, but there will be an occasional "near miss" or other such occurrence, due generally to pilot error. These results may be viewed at various levels of printed output, in plot form, or as an easy-to-read activity summary.

As an aid in using this guide to the Aerospace Terminal Air Traffic Simulation, a glossary is provided, containing definitions of key terms appearing in later subsections. The remaining subsections contain detailed information on program input and output; a description of the deck structure; a sample listing of input data; and two sample output listings.

B. GLOSSARY

FEEDER FIX (F/F)

Point, distant from the runway, at which aircraft monitoring begins

APPROACH PLAN (AP)

An ideal route which the aircraft shall follow from the feeder fix to the runway. Path, altitude, and speed are all specified. (Appears as a number of line segments.)

LOCALIZER BEAM (L/B)

A VHF (very high frequency) radio signal which provides directional guidance for pilots on the final portion of their approach

OUTER MARKER (OM)

A cone shaped beam which intersects the localizer beam. It provides a measure of distance from touchdown for the pilots (The program monitors planes only to this point.)

INTERFERENCE FUNCTION (I/F)

A measure of whether two aircraft are becoming dangerously close. It depends on the types of aircraft, where they are, and how close in altitude and X-Y coordinates they are

COMMAND

That which the plane is told to do.

HEADING CHANGE

A minor course correction.

TURN

A major course correction.

GLIDE SLOPE (G/S)

A radio signal (associated with the localizer beam) providing altitude guidance.

RUNWAY COORDINATES

This is the second of two coordinate systems used by the program. It uses the runway centerline as the x-axis with values opposite the flow of traffic, and the origin placed at the touchdown point indicated by the extended glide slope

VERTEX OF IDEAL PATH

The ideal paths which are calculated consist of a sequence of line segments. With each of these is associated an x value, y value, z value, and a time. This set of values constitutes a vertex.

C. PROGRAM INPUT

1. GENERAL INPUT DECK FORMAT

Group I	five cards controlling debug printout
Group II	four cards containing such quantities as numbers of runways, time of run, time increment, velocity of exit, etc.
Group III	sets (2 cards each) describing feeder fixes
Group IV	sets (2 cards each) describing runways (with additional cards if departure times are used)
Group V	sets (at least 3 cards each) describing feeder fix-runway pairs
Group VI	several cards describing separation requirements
Group VII	sets (2 cards each) describing classes of aircraft
Group VIII	sets (3 cards each) describing types of aircraft (with additional cards if arrival times are used)
Group IX	two cards containing miscellaneous information

Groups must appear in order. See individual groups for a complete description of input quantities.

2. DETAILED GROUP DESCRIPTION

GROUP I	SPECIAL INSTRUCTIONS
Card 1	resets path-planning debug flag (KBUG); a blank card may be used
col 1-5 right justified	value to which debug flag is to be reset
col 6-10 right justified	aircraft after which debug flag is to be reset (if blank defaults to 10000)
col 11-20 decimal	time after which debug flag is to be reset (in minutes) - defaults to "not reset"
Card 2	
as in card 1	
Card 3	resets actual flight debug flag (LBUG); a blank card may be used
as in card 1	
Card 4	resets actual flight debug flag a second time
as in card 1	
Card 5 col 1-10 right justified	stops the run before normal termination; number of aircraft after which the run is to stop (defaults to 10000)
col 11-20 decimal	time after which the run is to stop (defaults to "normal termination")
GROUP II	PROBELM DESCRIPTION
Card 1 col 1-5 right justified	number of feeder fixes
col 6-10 right justified	number of runways
col 11-15 right justified	number of runway-feeder fix pairs

col 16-20 right justified	number of aircraft types (feeder fix, runway, class)
col 21-25 right justified	switch to control approach plan searches. Only four values are valid -1: minimal searching 0: fairly extensive searching 1: fairly extensive searching but with higher control variable values 10: procedure flips between those for -1, 1, & 0 depending on the length of the interval in which a given plane can still land Note: This may have a great effect on run time.
col 26-30 right justified	debug flag (see Group I) KBUG
col 31-35 right justified	debug flag (see Group I) LBUG
col 36-40 right justified	number of times RANDOM is called before a run begins (can effect results) (Negative for fixed arrival and departure times)
col 41-45 right justified	flag 0: instant acceleration 1: constant acceleration
col 46-50 right justified	flag 0: no time printouts 1: prints time spent in each subroutine
col 51-55 right justified	flag controlling output to plot tape (Described in a separate section) 0: don't write on tape 1: write
col 56-60 right justified	length of wait (in seconds) for take-off that is considered excessive
col 61-65 right justified	number of aircraft waiting for take-off that is considered excessive
col 66-70 right justified	number of holding aircraft that is though to be too many

col 71-75 right justified	flag 0: allows multiple runways/type 1: only one runway/type
col 76-80 right justified	number of classes of aircraft

<u>Card 2</u>

col 1-10	any comment (e.g., Times)
col 11-20 decimal	duration of search interval in minutes
col 21-30 decimal	nominal time of approach leg in minutes
col 31-40 decimal	time from localizer interception to glide slope in minutes
col 41-50 decimal	fraction of run time reserved for a clean termination (if run will time out)
col 51-60 decimal	correction for magnetic deviation (in degrees)
col 61-70 decimal	time (in "aircraft minutes") of the computer run

<u>Card 3</u>

col 1-10	any comment (e.g., Times 2)
col 11-20 decimal	amount in minutes by which "aircraft time" is incremented (usually about .0667)
col 21-30 decimal	duration (in minutes of time) for examining candidates for approach plans (usually about 3.)
col 31-40 decimal	maximum touchdown interval in minutes (usually about 5.)
col 41-50 decimal	time (in minutes) used as a test for aircraft being "far out" (usually about 3.)
col 51-60 decimal	fraction of actual time to feeder fix that is used as an error estimate

col 61-70 decimal	velocity in knots of speed of aircraft before the feeder fix in heavy traffic (for maintaining separation)
<u>Card 4</u> col 1-10	any comment (e.g., Auxdata)
col 11-20 decimal	maximum "ideal" time in minutes for initial segment of flight path
col 21-30 decimal	maximum "ideal" time in minutes of any segment after the first and before the localizer
col 31-40 decimal	maximum "ideal" time in minutes of any segment after localizer interception
col 41-50 decimal	velocity in feet/seconds of aircraft upon exit from the runway
col 51-60 decimal	safety separation factor (in seconds) between times adjacent aircraft are on the runway
col 61-70 decimal	safety separation in feet between departing aircraft
col 71-80 decimal	safety time factor (in seconds) between a departure and the following arrival
<u>GROUP III</u>	FEEDER FIX DATA (one set/feeder fix)
<u>Card 1</u> col 1-10	any comment
col 11-20 decimal	X co-ordinate of feeder fix in nautical miles
col 21-30 decimal	Y co-ordinate of feeder fix in nautical miles
col 31-40 decimal	Z co-ordinate of feeder fix in feet
<u>Card 2</u> col 1-10	any comment
col 11-20 decimal	standard deviation of errors in X and Y at feeder fix (in nautical miles)

col 21-30 decimal	standard deviation of altitude at feeder fix (in feet)
col 31-40 decimal	standard deviation of error in heading at feeder
<u>GROUP IV</u>	RUNWAY DATA (one set/runway)
<u>Card 1</u> col 1-10	any comment
col 11-20 decimal	X co-ordinate of touchdown point in nautical miles
col 21-30 decimal	Y co-ordinate of touchdown point in nautical miles
col 31-40 decimal	Z co-ordinate of touchdown point in feet
col 41-45 decimal	true runway heading in degrees
col 51-60 decimal	distance from outer marker to touchdown in nautical miles
col 61-70 decimal	glide slope angle in degrees
<u>Card 2</u> col 1-10 right justified	0 if no dependent runways number of parallel runway if runways parallel - number of crossing runway if runways crossing
col 11-20 right justified	as in first field, but for a second dependent runway
col 21-30 decimal	distance between take-off and landing points on this runway (in feet)
col 31-40 decimal	for the first dependent runway, distance between parallel runways, or distance from threshold to crossing point for crossing runways (in feet)

col 41-50 decimal	as in the field (col 31-40) above but for the second dependent runway
col 51-60 decimal	(only used if first dependent runway is parallel) offset of the thresholds in feet
col 61-70 decimal	(only used if second dependent runway is parallel) offset of the thresholds in feet
col 71-80 right justified	number of departures/hour for this runway

Additional cards only if departure times are to be input rather than generated.

Cards (as needed)

col 1-5 decimal	first time
col 6-10 right justified	class of first aircraft
col 11-15 decimal	second time
col 16-20 right justified	class of second aircraft
col 21-25 decimal	third time
col 26-30 right justified	class of third aircraft
col 31-35 decimal	fourth time
col 36-40 right justified	class of fourth aircraft
col 41-45 decimal	fifth time
col 46-50 right justified	class of fifth aircraft

col 51-55 decimal	sixth time
col 56-60 right justified	class of sixth aircraft
col 61-65 decimal	seventh time
col 66-70 right justified	class of seventh aircraft
<u>GROUP V</u>	DATA FOR FEEDER FIX - RUNWAY PAIRS (one set/pair)
<u>Card 1</u> col 1-10	any comment
col 11-15 right justified	number of feeder fix
col 16-20 right justified	number of runway
col 21-30 decimal	minimum distance between touchdown and localizer interception in nautical miles
col 31-40 decimal	maximum distance between touchdown and localizer interception in nautical miles
col 41-50 decimal	angle in degrees between localizer and intersecting segment of approach plan
col 51-60 decimal	minimum time on approach plan leg in minutes
col 61-70 decimal	nominal time for localizer interception to glide slope in minutes
col 71-75 right justified	path type number: 1: method of path construction 1 (does not use lambda) 2: method of path construction 2 (uses lambda) -2: method of path construction 2 (antiparallel approach) 3: path coordinates are read in on the next cards
col 76-80 decimal	maximum value of lambda (used to define shape of type 2 paths)

Card 2	A control variable card. For each 0 indicates that the control is not to vary, and 1 indicates that it is to vary.
col 1-10	any comment
col 11-20 right justified	flag if the first control variable is to vary (this controls the localizer intercept point)
col 21-30 right justified	flag for second control variable (this controls height of glide slope interception)
col 31-40 right justified	flag for third control variable (this controls angle of first path segment)
col 41-50 right justified	flag for fourth control variable (this controls point at which descent starts)
col 51-60 right justified	flag for fifth variable (this controls velocity at the feeder fix)
col 61-70 right justified	flag for sixth control variable (this controls the velocity profile for the aircraft
Card 3	
col 1-10	any comment
col 11-20 decimal	value of first control variable if it is to be constant
col 21-30 decimal	value of second control variable if it is to be constant
col 31-40 decimal	value of third control variable if it is to be constant
col 41-50 decimal	value of fourth control variable if it is to be constant
col 51-60 decimal	value of fifth control variable if it is to be constant
col 61-70 decimal	value of sixth control variable if it is to be constant

Additional Cards as needed

Must be in groups of three: (All with respect to magnetic runway coordinates)

Card 1	up to 7 X coordinates of vertices, in nautical miles, 10 columns each, first 10 not used
Card 2	up to 7 Y coordinates of vertices in nautical miles, 10 columns each, first 10 not used
Card 3	up to 7 Z coordinates of vertices in feet

GROUP VI SEPARATION DATA

There must be N^2 cards where N is the number of classes (one for each of the possible combinations of leading and following aircraft). Each has the same format.

col 1-4	any comment
col 5-7 right justified	class of first aircraft (must be 1 to 4)
col 8-10 right justified	class of second aircraft (must be 1 to 4)
col 11-20 decimal	required longitudinal separation second aircraft ahead of first, one not on localizer
col 21-30 decimal	required longitudinal separation first aircraft ahead of second, one not on localizer
col 31-40 decimal	required longitudinal separation second aircraft ahead of first, both on localizer
col 41-50 decimal	required longitudinal separation first aircraft ahead of second, both on localizer
col 51-60 decimal	required lateral separation one not on localizer
col 61-70 decimal	required lateral separation both on localizer

GROUP VII — AIRCRAFT CLASS CHARACTERISTICS
(one set/class-last set to be general aviation)

Card 1

Col 1-10 decimal	velocity when generated in outer air space (knots) (cruise)
col 11-20 decimal	minimum velocity within traffic area but before localizer (knots)
col 21-30 decimal	maximum velocity within traffic area (knots)
col 31-40 decimal	velocity on the localizer (knots)
col 41-50 decimal	velocity at the outer marker (knots)
col 51-60 decimal	acceleration (ft/sec^2)
col 61-70 decimal	dive angle (degrees)

Card 2

col 1-10 decimal	climbing velocity (knots)
col 11-20 decimal	lift-off velocity (knots)
col 21-30 decimal	thrust to weight ratio
col 31-40 decimal	distance (in nautical miles) from the feeder fix at which an aircraft is generated
col 41-50 decimal	height (in feet) above the feeder fix at which an aircraft is generated

GROUP VIII	AIRCRAFT TYPE CHARACTERISTICS (one set/type)
Card 1 col 1-10	any comment (e.g., Type 1)
col 11-15 right justified	number of the relevant runway-feeder fix pairs (between 1 and the number of pairs)
col 16-20 right justified	number of a second feeder fix-runway pair (the feeder fix must be the same as in the first pair)
col 21-25 decimal	fraction of the total to be class 1 (all fractions must total 1.)
col 26-30 decimal	fraction of the total to be class 2
col 31-35 decimal	fraction to be class 3
col 36-40 decimal	fraction to be class 4
col 41-45 decimal	fraction to be class 5
col 46-50 decimal	fraction to be class 6
col 51-55 decimal	fraction to be class 7
col 55-60 decimal	fraction to be class 8
col 61-65 decimal	fraction to be class 9
col 66-70 decimal	fraction to be class 10
Card 2 col 1-10	any comment
col 11-20	standard deviation of horizontal velocity errors at the feeder fix (knots)

col 21-30	standard deviation of errors in descent angle at the feeder fix (degrees)
col 31-40	standard deviation of errors in time at the feeder fix (in seconds)

<u>Card 3</u>

col 1-10	any comment
col 11-15 right justified	number of this type to be generated/hour

Additional cards only if departure times are to be input rather than generated.

Cards (as needed)

col 1-5 decimal	first time
col 6-10 right justified	class of first aircraft
col 11-15 decimal	second time
col 16-20 right justified	class of second aircraft
col 21-25 decimal	third time
col 26-30 right justified	class of third aircraft
col 31-35 decimal	fourth time
col 36-40 right justified	class of fourth aircraft
col 41-45 decimal	fifth time
col 46-50 right justified	class of fifth aircraft

col 51-55 decimal	sixth time
col 56-60 right justified	class of sixth aircraft
col 61-65 decimal	seventh time
col 66-70 right justified	class of seventh aircraft
<u>GROUP IX</u>	ADDITIONAL DATA
<u>Card 1</u> col 1-10	any comment (e.g., Misc.)
col 11-20 decimal	minimum heading change for which a turn is required (in degrees)
col 21-30 decimal	turn rate (in degrees/sec)
col 31-40 decimal	standard deviation of the error in turn rate (in degrees/sec)
col 41-50 decimal	standard deviation in the error in the final turn heading (in degrees)
col 51-60 decimal	standard deviation in the error of the starting point of a turn (in nautical miles from planned position)
<u>Card 2</u> col 1-10	any comment (e.g., St. Dev.)
col 11-20 decimal	standard deviation of errors in observed heading before the localizer (degrees)
col 21-30 decimal	standard deviation of errors in observed heading on the localizer (degrees)
col 31-40 decimal	standard deviation in observed descent rate in feet per minute before localizer intercept
col 41-50 decimal	standard deviation in observed descent rate in feet per minute after localizer intercept

col 51-60 decimal	standard deviation in observed velocity after localizer intercept (in knots)
col 61-70 decimal	standard deviation in observed velocity after localizer intercept (in knots)

D. PROGRAM OUTPUT

Many different combinations of output are available. The basic input consists of the data input, a summary of the run, and any major error messages. Additional printout is controlled by two numbers which are programmed as LBUG & KBUG. The former controls information concerning actual flights, and the latter information about ideal paths. Each may be set to a positive integer.

Two lists follow. In each list an integer appears followed by a list of options. When the variable is set to that integer or any HIGHER INTEGER all information listed is printed.

KBUG (in normal use, this would be set to 0, 1, 2, or 3)

1. a. final approach plans

2. a. number of approach plans required each time-slice
   b. all holding of aircraft
   c. any change in planned times
   d. any aircraft rejected at a given time

3. a. any deferred assignment
   b. touchdown intervals being considered
   c. aircraft types being considered in each interval
   d. priority assignments for each aircraft considered
   e. summary of approach routes
   f. tentative approach plans

4. a. statement numbers and variable values in MAIN
   b. statement numbers and variable values in MAIX
   c. debug information from the planning call to PATH
   d. debug information from FNDEGX
   e. interference values from ENTERF

5. a. touchdown schedule summary

6. a. statement numbers and variable values from PATH
   b. statement numbers and variable values from ENTERF
   c. statement numbers and variable values from PSI

LBUG (in normal use this would be set to 0, 1, 2, or 3)

1. a. time
   b. available channels
   c. aircraft generated
   d. departures selected

2. a. aircraft passing the outer marker
   b. commands given to aircraft

3. a. positions and observed positions
   b. aircraft removed from the system

4. a. additional position, type, feeder fix, etc. printout from MAIN
   b. statement numbers and variables from MAIN
   c. statement numbers and variables from PANDV

5. a. variable values on return from PANDV
   b. statement numbers and variable values from CHECK
   c. statement numbers and variable values from MSTAR

6. a. statement numbers and variable values from TURN

E. DECK STRUCTURE

1. Compilation and Linkage Editing (standard IBM routines are assumed.)

Note: This need only be done once unless the FORTRAN coding is modified.

```
CARD 1: // EXEC FORTGCL
CARD 2: //FORT. SYSIN DD *          followed by a source deck
    or
        //FORT.SYSIN DD DSN=ATC.FORT,DISP=OLD
                                    for source on disk or labeled tape
CARD 3: //LKED.SYSLMOD DD DSN=ATC.LOAD(MAIN),DISP=(,CATLG)
        // UNIT=D,SPACE=(TRK,(20,10,5))
CARD 4: //LKED.SYSLIN DD *          followed by the object deck of
                                    RANDOM
     or
       // LKED.SYSLIN DD DSN=RANDOM.OBJ,DISP=OLD
                                    for object module on disk or tape
```

2. Program Execution

```
CARD 1: // EXEC PGM=MAIN,REGION=512K
CARD 2: //STEPLIB DD DSN=ATC.LOAD,DISP=OLD
CARD 3: //FT08F001 DD DUMMY
                                    or if a plot tape is used
        //FT08F001 DD VOL=SER=  ,UNIT=T,DISP=(,KEEP),
and     // DCB=(RECFM=VBS,BLKSIZE=20000,BUFNO=1)
CARD 4: //FT06F001 DD SYSOUT=A
CARD 5: //FT05F001 DD *
```

These are followed by all input cards as described in the input section.

It should be noted that data set names may be chosen to suit local conventions but must remain consistent.

F. SAMPLE LISTINGS

1. INPUT DATA

A listing of input data from the New York Terminal Area Study (discussed in Section III) is attached to this subsection. This input is for the first of the three New York runs made, and corresponds to the results included in Tables 8-10 and the output for times 2001-2039 GMT. In essence, the listing is an image of the input cards in the card deck, and as such may be compared with the nine input groups described in Subsection B of this section.

```
//                 MSGLEVEL=2
/*JOBPARM ACCT=Z60700,TIME=20
//  EXEC PGM=MAIN,REGION=512K
//STEPLIB DD DSN==12504.ATC.LOAD,DISP=SHR
//FT08F001  DD UNIT=T,DSN==6349.ATCTEST,DISP=OLD,
//    VOL=SER=06311R,LABEL=(1,BLP),
//  DCB=(RECFM=VBS,BLKSIZE=20000,BUFNO=1)
//FT06F001 DD SYSOUT=A,UNIT=D,SPACE=(TRK,100),
//  DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1693)
//FT05F001 DD *



          120.
    9    10   30    12   10     1    1   -5    1     0    1  600    5    3    0    6
TIMES       2.          1.          .3          .1         -11.       60.
TIMES2      .066667      .7          5.          45.         .02       300.
AUXDATA     1.          3.          2.          29.3       10.        18240.    5.
EMPIRE 1   -12.2        9.1         15000.      50.        20000.
            .20         200.
BOHEMIA 2  29.9         12.5        7000.       50.        12000.
            .20         200.
SOUTHGATE3-.3           -29.5       7000.       50.        12000.
            .35         200.
PENWELL 4  -52.7        10.2        9000.       50.        14000.
            .35         200.
CARMEL 5   8.4          38.7        6000.       50.        11000.
            .10         100.
ROBBINSV 6-33.2         -25.9       6000.       50.        11000.
            .35         200.
MONROE 7   -29.7        37.5        6000.       50.        11000.
            .35         200.
SNAPY 8    -41.8        18.9        6000.       50.        11000.
            .35         200.
PRINCETON9-39.3         -15.1       6000.       50.        11000.
            .35         200.
13L JFK 1 -.48          1.23        50.         121.       4.57       3.
       0               01000.       9000.       0.         0.         0.         0
4L JFK  2 -.61          -.41        60.         31.        2.86       2.86
```

```
          0        -51000.     9500.     9500.     0.        0.                 0
4R JFK    3 .13      -.31      48.       31.       2.96      2.75
          0         01000.     0.        0.        0.        0.                 0
31L JFK 4 -.66       .12       50.       301.      5.22      3.0
          0         01000.     0.        0.        0.        0.                 9
  32.     1  37.    1  41.   1  44.    1  47.    1  53.    1  56.    1
  60.     1  67.    1
31R JFK 5 .27        .77       50.       301.      5.75      2.50
          0         01000.     0.        0.        0.        0.                 0
31  LGA 6 -3.99     8.37       50.       305.      4.0       3.
         -7         01000.     4750.     0.        0.        0.                 1
  38.     1
4 LGA   7 -4.98     8.1        50.       33.       4.        3.
         -6         01000.     4000.     0.        0.        0.                21
  31.     1  33.    1  34.   1  36.    2  38.    1  40.    5  40.    1
  42.     1  44.    1  46.   1  49.    3  53.    1  54.    5  55.    1
  56.     3  58.    1  59.   1  61.    1  64.    1  66.    1  69.    6
4L NEWK 8 -18.34    3.15       50.       26.       4.87      2.6
          9         01000.     950.      0.        0.        0.                10
  37.     1  39.    1  41.   1  43.    1  44.    1  47.    1  49.    1
  51.     1  53.    1  69.   3
4R NEWK 9 -18.20    2.89       55.       26.       4.87      3.0
          8         01000.     950.      0.        0.        0.                 1
  35.     1
13R JFK 10 -1.55     .64       50.       121.       4.57      3.
                                1000.
PAIR 1         1    1                                               3
            0                                     1
                                                          .25
           13.710    -4.042    -12.022   -15.594   -13.983   -11.412   -5.339
           -3.360    -5.458    -6.340    -1.788    8.696     11.866    15.354
13L JFK E 15000.    13000.     12000.    10000.    10000.    7000.     3000.
          1.454     8.11       10.469    10.113    7.9       5.6       4.505
           13.357    11.735    8.763     0.0       0.0       0.0
          3000.     3000.      3000.     2800.     1712.     1712.     1500.


PAIR 2         2    1                                               3
            0                                     1
                                                          .25
```

```
                -24.688    -16.370    -15.594    -13.983    -11.412    -5.339     1.454
                -20.954     -6.965     -1.788      8.696     11.866    15.354    13.357
13L JFK B 7000.      7000.      7000.      7000.      7000.      3000.      3000.
          8.11       10.469     10.113     7.9        5.6        4.505
              11.735     8.763      0.0        0.0        0.0
          3000.      3000.      2800.      1712.      1712.      1500.
PAIR 3          3    1                                                       3
           0                                        1
                                                           .25
                -10.674    -10.390     -8.441     -5.339      1.454      8.110    10.469
                 28.842     23.093     17.736     15.354     13.357     11.735     8.763
13L JFK S 7000.      7000.      7000.      3000.      3000.      3000.      3000.
          10.113     7.9        5.6        4.505
              0.0        0.0        0.0
          2800.      1712.      1712.      1500.
PAIR 4          1    2                                                       3
           0                                        1
                                                           .25
                 -4.967     -7.065     -7.948     -3.395     -0.311      7.123    10.293
                -14.116      3.637     11.616     15.189     14.609     13.483    10.912
4L JFK    E 15000.     13000.     12000.     10000.     10000.     7000.      7000.
              13.781     11.740     8.511      4.817      2.802
               4.839     0.797      0.0        0.0        0.0
          3000.      1500.      1500.      1500.      900.
PAIR 5          3    2                                                       3
           0                                        1
                                                           .25
                 27.235     21.485     16.129     13.781     11.740      8.511     4.817
                 10.268      9.984      8.035      4.839      0.797      0.0       0.0
4L JFK    S 7000.      5250.      4500.      3000.      1500.      1500.      1500.
               2.802
               0.0
          900.
PAIR 6          2    2                                                       3
           0                                        1
                                                           .25
                -22.561     -8.667     -3.489     -0.311      7.123     10.293    13.781
                 24.282     15.930     15.154     14.609     13.483     10.912     4.839
4L JFK    B 7000.      7000.      7000.      7000.      7000.      7000.      3000.
              11.740     8.511      4.817      2.802
               0.797     0.0        0.0        0.0
```

```
          1500.      1500.      1500.      900.
PAIR 7         1    3                                                      3
          0                                        1
                                                              .25
             -4.620     -6.718     -7.601     -3.048     0.036      7.470      10.640
            -14.778      2.975     10.955     14.527     13.947     12.822     10.251
4R   JFK E 15000.    13000.    12000.    11000.    11000.    7000.    7000.
             14.128     12.087      9.354      5.035      2.842
              4.178      0.136      0.0        0.0        0.0
          3000.      1500.      1500.      1500.      900.
PAIR 8         3    3                                                      3
          0                                        1
                                                              .25
             27.582     21.832     16.476     14.128     12.087      9.354      5.035
              9.607      9.323      7.374      4.178      0.136      0.0        0.0
4R   JFK S 7000.     5250.     4500.     3000.     1500.     1500.     1500.
              2.842
              0.0
          900.
PAIR 9         2    3                                                      3
          0                                        1
                                                              .25
            -22.214     -8.320     -3.142      0.036      7.470     10.640     14.128
             23.621     15.269     14.493     13.947     12.822     10.251      4.178
4R   JFK B 7000.     7000.     7000.     7000.     7000.     7000.     3000.
             12.087      9.354      5.035      2.842
              0.136      0.0        0.0        0.0
          1500.      1500.      1500.      900.
PAIR 10        1    4                                                      3
          0                                        1
                                                              .25
            -13.910     -4.731      2.037      8.821     11.828     13.468     14.090
              4.519     -4.911    -11.812    -13.493    -11.228     -8.716     -4.871
31L  JFK E 15000.    13000.    8000.     6000.     4000.     3000.     3000.
             10.561      5.484      5.142
              0.0        0.0        0.0
          1800.      1800.      1732.
PAIR 11        3    4                                                      3
          0                                        1
                                                              .25
             10.474     13.468     14.090     10.561      5.484      5.142
```

```
           -27.683     -8.716     -4.871      0.0        0.0        0.0
31L JFK S 7000.     3000.      3000.      1800.      1800.      1712.
PAIR 12        2    4
        0                                                               3
                                                    1
                                                        .25
             24.488     16.137     15.787     15.114     10.561     5.484      5.142
             22.113      8.218      5.963      1.674      0.0       0.0        0.0
31L JFK B 7000.     5500.      4000.      3000.      1800.      1800.      1712.

****
PAIR 13        1    5
        0                                                               3
                                                    1
                                                        .25
           -14.561     -5.383      1.386      8.170     11.176     12.816     13.439
             3.590     -5.839    -12.741    -14.422    -12.157     -9.645     -5.800
31R JFK E 15000.    13000.     8000.      6000.      4000.      3000.      3000.
            10.037      6.010      5.681
             0.0        0.0        0.0
      1600.      1600.      1560.
PAIR 14        3    5
        0                                                               3
                                                    1
                                                        .25
             9.823     12.816     13.439     10.037      6.010      5.681
           -28.612     -9.645     -5.800      0.0        0.0        0.0
31R JFK S 7000.     3000.      3000.      1600.      1600.      1560.
PAIR 15        2    5
        0                                                               3
                                                    1
                                                        .25
            23.837     15.485     15.136     14.462     10.037      6.010      5.681
            21.184      7.290      5.034      0.745      0.0        0.0        0.0
31R JFK B 7000.     5500.      4000.      3000.      1600.      1600.      1560.

****
PAIR 16        6    6
        0                                                               3 .
                                                    1
                                                        .25
           -12.737    -11.520     -8.459     -3.047     -0.946     -0.331      2.247
           -43.159    -39.990    -31.621    -16.733      0.184      5.931      7.517
31 LGA  R 6000.     6000.      4000.      4000.      4000.      3000.      3000.
```

```
          4.786      8.424      8.212      6.058      5.081  4.
          7.224      2.495      0.759      0.0        0.0
       3000.     1600.     1600.     1550.     1500.     1400.
PAIR 17      5    6                                                    3
       0                                  1
                                                          .25
          -1.008     1.597      2.583      1.491      1.107      4.786      8.424
          32.777     23.975     21.021     14.624     12.045     7.224      2.495
31 LGA  C 6000.    6000.     5000.     4000.     3000.     3000.     1600.
          8.212      6.058      5.081  4.
          0.759      0.0        0.0
       1600.     1550.     1500.     1400.
PAIR 18      4    6                                                    3
       0                                  1
                                                          .25
         -45.234    -16.182     -8.223     -3.047     -0.946     -0.331      2.247
         -18.111    -23.128    -21.336    -16.733      0.184      5.931      7.517
31 LGA  P 9000.    9000.     7000.     7000.     4000.     3000.     3000.
          4.786      8.424      8.212      6.058      5.081  4.
          7.224      2.495      0.759      0.0        0.0
       3000.     3000.     2100.     1550.     1500.     1400.
PAIR 19      5    7                                                    3
       0                                  1
                                                          .25
         -33.346    -24.459    -21.472    -15.117     -1.087      2.439      7.548
          0.989      3.285      4.169      2.853     -0.106     -4.830     -5.462
4 LGA   C 6000.    6000.     5000.     4000.     4000.     4000.     3000.
          9.698      9.843      8.630      8.407      4.009
         -4.377     -3.133      0.0        0.0        0.0
       3000.     3000.     2800.     2700.     1400.
PAIR 20      4    7                                                    3
       0                                  1
                                                          .25
          15.967     21.995     20.482     16.062     15.058     8.630      8.407
         -44.986    -16.126     -8.109     -2.777     -2.427     0.0        0.0
LGA   P    9000.    9000.     7000.     7000.     3500.     2800.     2700.
          4.009
          0.0
       1400.
PAIR 21      6    7                                                    3
       0                                  1
```

```
                                                                    .25
          42.134     39.009     30.753     16.062     15.058     8.630      8.407
         -13.382    -12.056     -8.705     -2.777     -2.427     0.0        0.0
4 LGA   R 6000.      6000.      4000.      4000.      3500.      2800.      2700.
           4.009
           0.0
      1400.
PAIR 22        7    8
     0                                                                 3
                                                     1
                                                                    .25
         -30.453     -9.975     -0.738      4.223      8.095     13.571     10.771
         -20.037    -14.550    -20.047    -14.990    -10.122     -5.446      0.0
4R NEWK MJ6000.      6000.      6000.      5000.      4000.      3000.      2500.
           5.299      4.800
           0.0        0.0
      1700.      1646.
PAIR 23        8    8
     0                                                                 3
                                                                    .25
          -9.355     -0.738      4.223      8.095     13.571     10.771      5.299
         -26.911    -20.047    -14.990    -10.122     -5.446      0.0        0.0
4R NEWK S 6000.      6000.      5000.      4000.      3000.      2500.      1700.
           4.800
           0.0
      1646.
PAIR 24        9    8
     0                                                                 3
                                                     1
                                                                    .25
          22.840      9.766      8.095     13.571     10.964      5.299      4.800
         -15.696    -12.884    -10.122     -5.446      0.0        0.0        0.0
4R NEWK P 6000.      4000.      4000.      3000.      2500.      1700.      1646.

****
PAIR 25        7    9
     0                                                                 3
                                                     1
                                                                    .25
         -30.240     -9.763     -0.525      4.435      8.307     13.783     11.228
         -19.825    -14.339    -19.834    -14.778     -9.910     -5.234      0.0
4L NEWK MJ6000.      6000.      6000.      5000.      4000.      3000.      2500.
           6.075      5.779
```

```
              0.0          0.0
          1700.       1688.
PAIR 26        8     9                                                                  3
            0                                                     1
                                                                           .25
               -9.142      -0.525      4.435       8.307      13.783     11.228      6.075
              -26.699     -19.834    -14.778      -9.910      -5.234      0.0         0.0
4L NEWK S 6000.      6000.      5000.      4000.      3000.      2500.      1700.
              5.779
              0.0
          1688.
PAIR 27        9     9                                                                  3
            0                                                     1
                                                                           .25
               23.052       9.979      8.307      13.783     11.228      6.075       5.779
              -15.484     -12.672     -9.910      -5.234      0.0         0.0         0.0
4L NEWK P 6000.      4000.      4000.      3000.      2500.      1700.      1688.


****
PAIR 28        1    10                                                                  3
            0                                                     1
                                                                           .25
               13.710      -4.042    -12.022     -15.594     -13.983    -11.412     -5.339
               -4.63       -6.73      -7.61       -3.06        7.43      10.60      14.08
13R JFK E 15000.     13000.     12000.     10000.     10000.     7000.      3000.
          1.454      8.11       10.469     10.113     7.9        5.6        4.505
               12.09       10.46       7.49        0.0         0.0         0.0
          3000.      3000.      3000.      2800.      1712.      1712.      1500.


PAIR 29        2    10                                                                  3
            0                                                     1
                                                                           .25
              -24.688     -16.370    -15.594     -13.983     -11.412     -5.339      1.454
              -22.22       -8.23      -3.06        7.43       10.60      14.08      12.09
13R JFK B 7000.      7000.      7000.      7000.      7000.      3000.      3000.
          8.11       10.469     10.113     7.9        5.6        4.505
             10.46        7.49        0.0         0.0         0.0
          3000.      3000.      2800.      1712.      1712.      1500.
```

```
PAIR 30        3    10                                                           3
         0                                             1
                                                                 .25
          -10.674   -10.390    -8.441    -5.339     1.454     8.110     10.469
           27.47     21.82     16.47     14.08      12.09     10.46      7.49
13R JFK S 7000.     7000.     7000.     3000.      3000.     3000.      3000.
         10.113     7.9       5.6       4.505
            0.0       0.0       0.0
         2800.      1712.     1712.     1500.
      1  13.        3.        3.        3.         1.5       .88
      1  23.        5.        3.        5.         1.5       .88
      1  33.        5.        3.        5.         1.5       .88
      1  43.        5.        3.        5.         1.5       .88
      1  5 3.        5.        3.        5.         1.5       .88
      1  6 3.        5.        3.        5.         1.5       .88
      2  15.        3.        5.        3.         1.5       .88
      2  23.        3.        3.        3.         1.5       .88
      2  33.        3.        3.        3.         1.5       .88
      2  43.        3.        3.        3.         1.5       .88
      2  5 3.        3.        3.        3.         1.5       .88
      2  6 3.        3.        3.        3.         1.5       .88
      3  15.        3.        5.        3.         1.5       .88
      3  23.        3.        3.        3.         1.5       .88
      3  33.        3.        3.        3.         1.5       .88
      3  43.        3.        3.        3.         1.5       .88
      3  5 3.        3.        3.        3.         1.5       .88
      3  6 3.        3.        3.        3.         1.5       .88
      4  15.        3.        5.        3.         1.5       .88
      4  23.        3.        3.        3.         1.5       .88
      4  33.        3.        3.        3.         1.5       .88
      4  43.        3.        3.        3.         1.5       .88
      4  5 3.        3.        3.        3.         1.5       .88
      4  6 3.        3.        3.        3.         1.5       .88
      5  1 5.        3.        5.        3.         1.5       .88
      5  2 3.        3.        3.        3.         1.5       .88
      5  3 3.        3.        3.        3.         1.5       .88
      5  4 3.        3.        3.        3.         1.5       .88
      5  5 3.        3.        3.        3.         1.5       .88
      5  6 3.        3.        3.        3.         1.5       .88
      6  1 5.        3.        5.        3.         1.5       .88
      6  2 3.        3.        3.        3.         1.5       .88
```

```
        6  3 3.          3.          3.          3.        1.5        .88
        6  4 3.          3.          3.          3.        1.5        .88
        6  5 3.          3.          3.          3.        1.5        .88
        6  6 3.          3.          3.          3.        1.5        .88
     500.     180.       250.        135.        130.        6.44        4.
     160.     120.       .25         50.         3000.
     400.     150.       250.        115.        110.        6.44        4.
     150.     110.       .25         50.         3000.
     320.     140.       250.        110.        105.        6.44        4.
     140.     100.       .25         40.         2000.
     240.     110.       240.        100.         95.        6.44        4.
     140.     100.       .25         20.         2000.
     190.     110.       190.         95.         90.        6.44        4.
     120.      90.       .25         15.         1000.
     150.     100.       150.         90.         85.        6.44        4.
      85.      75.       .25         10.         1000.
  TYPE1        18        .88               .12
          10.        1.
               8
     4.    1  12.    1  18.    1  20.    4  26.    1  36.    1  37.    1
    39.    1
  TYPE2        16        .71        .14              .15
          10.        1.
               7
     2.    1   5.    3   7.    1  22.    1  29.    1  32.    1  38.    3
  TYPE3        17       1.00
          10.        1.
               3
    16.    1  18.    1  44.    1
  TYPE4        26       1.00
          10.        1.
               3
    15.    1  35.    1  38.    1
  TYPE5        22       1.00
          10.        1.
               1
    11.    1
  TYPE6        27        .67               .33
          10.        1.
               3
    21.    1  31.    1  50.    4
```

```
TYPE7       11       1.00
          10.       1.
              4
  16.    1  31.    1  49.    1  51.    1
TYPE8       10        .50  .50
          10.       1.
              4
  12.    1  20.    2  24.    1  29.    2
TYPE9       14       1.00
          10.       1.
              4
  19.    1  31.    1  40.    1  41.    1
TYPE10      12       1.00
          10.       1.
              2
  20.    1  36.    1
TYPE11      15       1.00
          10.       1.
              3
  24.    1  31.    1  44.    1
TYPE12      13       1.00
          10.       1.
             10
  21.    1  22.    1  27.    1  33.    1  40.    1  41.    1  42.    1
  48.    1  49.    1  49.    1
MISC.     10.       3.       .3       3.       .3333
ST.DEV.   3.        0.       300.     100.     10.      5.
/*
```

2. OUTPUT DATA

Listings of all aircraft operations simulated in the first (2001-2039 GMT) and third (2149-0000 GMT) New York Terminal Area computer runs are attached to this subsection. These data should be viewed in conjunction with Tables 8-10 and 11-15, respectively, of Section IIID. Table 16 provides a guide to coded runway numbers. A complete output listing, including all approach plans and the output table, for a specially run New York case with random traffic generation, is provided in Appendix B. The latter should be studied in conjunction with the explanatory material contained in Subsection D of this section.

TABLE 16. SIMULATED RUNWAY GUIDE

Simulated Runway	Airport	Actual Runway
1	JFK	13 L
2	JFK	4 L
3	JFK	4 R
4	JFK	31 L
5	JFK	31 R
6	LGA	31
7	LGA	4
8	EWR	4 L
9	EWR	4 R
10	JFK	13 R

SIMULATED AIRCRAFT OPERATIONS, 2001-2039 GMT (ADD 1922 GMT TO TIMES SHOWN TO OBTAIN EQUIVALENT GMT)

SUMMARY TABLE OF ALL RUNWAY ACTIVITY

RUNWAY	TIME	A/C	SEQ	DELAY(AIR/GRND)	HOLDING	CLOSEST(A/C	VALUE)	FUEL(K LBS)
4	30.99	6	6A	-1.28	0.0	3	16.4	7.587
4	32.74		2D	0.74				
4	37.00		7D	0.0				
4	39.20	9	9A	-1.18	0.0	3	10.6	4.921
4	41.00		14D	0.0				
4	42.91	14	14A	-1.16	0.0	13	0.2	4.567
4	45.84	15	14A	-1.36	0.0	17	-0.0	6.379
4	46.55	21	21A	-0.98	0.0	19	-0.4	7.581
4	50.00		18D	6.00				
4	52.14	25	25A	-1.69	0.0	24	0.2	7.441
4	54.24		22D	7.24				
4	55.97	26	27A	-1.06	0.0	27	0.1	4.911
4	57.52		27D	4.52				
4	59.29	31	34A	-1.04	0.0	7	1.0	4.780
4	60.80		32D	4.80				
4	62.22		36D	2.22				
4	67.00		40D	0.0				
4	73.90	21	48A	-1.00	0.0	22	0.0	4.733
4	75.22	19	52A	-1.07	0.0	21	0.8	5.095
5	42.12	13	13A	-1.21	0.0	14	0.2	4.902
5	46.22	17	17A	-0.91	0.0	15	-0.0	7.695
5	47.55	19	19A	-0.96	0.0	21	-0.4	7.451
5	48.81	22	21A	-1.08	0.0	21	0.7	4.335
5	50.25	24	24A	-1.05	0.0	25	0.2	7.164
5	54.06	6	27A	-0.68	0.0	27	0.7	4.897
5	54.96	27	27A	-1.16	0.0	28	0.1	4.745
5	56.99	1	32A	-1.14	0.0	28	0.2	7.511
5	60.31	7	40A	-1.05	0.0	31	1.0	7.403
5	63.19	4	40A	-1.15	0.0	5	1.1	5.011
5	64.46	5	42A	-1.24	0.0	4	1.1	7.673
5	65.94	10	42A	-1.17	0.0	14	0.8	4.967
5	67.31	14	44A	-1.18	0.0	10	0.8	7.450
5	68.92	15	45A	-0.96	0.0	12	0.8	4.421
5	70.34	12	47A	-0.95	0.0	24	0.5	7.457
5	71.49	24	48A	-1.16	0.0	12	0.5	7.670
5	73.42	22	48A	-0.62	0.0	21	0.0	7.638
6	33.77	1	1A	-0.70	0.0	2	0.8	8.069
6	35.06	2	2A	-0.86	0.0	1	0.8	9.485
6	36.26	3	3A	-0.63	0.0	2	1.1	7.840

6	39.74	4	4A	-0.53	0.0	7	0.4	7.894
6	40.82	7	6A	-0.84	0.0	4	0.4	9.217
6	41.86	10	9A	-1.17	0.0	7	1.7	4.793
6	43.86	11	11A	-0.57	0.0	10	2.1	5.122
6	44.90		9D	6.90				
6	49.34	12	11A	-0.63	0.0	10	8.9	9.551
6	57.01	16	14A	-0.26	0.0	20	3.1	0.0
6	57.81	20	19A	-0.87	0.0	23	0.9	7.993
6	59.16	23	23A	-0.89	0.0	20	0.9	9.460
6	64.26	26	25A	-0.83	0.0	30	1.4	7.884
6	65.96	30	31A	-0.51	0.0	32	0.5	8.273
6	67.01	32	34A	-0.85	0.0	30	0.5	9.409
6	68.74	3	36A	-0.51	0.0	33	0.8	9.737
6	71.51	33	37A	-0.76	0.0	3	0.8	7.815
6	73.02	8	39A	-0.64	0.0	18	1.5	9.523
6	74.25	18	45A	-0.80	0.0	8	1.5	5.511
7	31.06		1D	0.0				
7	47.15		24D	0.0				
7	52.21		3D	19.21				
7	53.63		4D	19.63				
7	62.31		6D	26.31				
8	37.00		7D	0.0				
8	39.00		11D	0.0				
8	41.00		14D	0.0				
8	42.63	5	5A	-1.17	0.0	8	3.3	7.462
9	40.60	8	8A	-1.34	0.0	5	3.3	5.715
9	44.62	16	17A	-1.24	0.0	5	3.8	6.895
9	46.33		5D	11.33				
9	54.71	29	27A	-1.15	0.0	26	3.0	4.962
9	60.85	2	33A	-1.08	0.0	33	3.1	5.814
9	65.81	9	37A	-1.13	0.0	25	3.6	5.683
9	69.68	25	51A	-0.57	0.0	9	3.6	0.0

SIMULATED AIRCRAFT OPERATIONS, 2149-000 GMT (ADD 2110 GMT TO TIME SHOWN TO OBTAIN EQUIVALENT GMT)

SUMMARY TABLE OF ALL RUNWAY ACTIVITY

RUNWAY	TIME	A/C	SEQ	DELAY(AIR/GRND)	HOLDING	CLOSEST(A/C	VALUE)	FUEL(K LBS)
1	29.00		1D	0.0				
1	33.00		7D	0.0				
1	37.00		12D	0.0				
1	38.42		14D	0.42				
1	39.64		16D	0.64				
1	41.70	5	5A	-0.94	0.0	9	0.8	6.120
1	49.74	11	8A	0.39	0.0	19	-0.7	0.0
1	50.55	13	12A	-1.06	0.0	15	0.3	6.528
1	51.40	15	15A	-1.18	0.0	13	0.3	6.780
1	53.49	16	15A	-0.83	0.0	17	0.3	10.116
1	54.53	17	17A	-0.80	4.38	16	0.3	6.558
1	56.41	21	20A	-0.96	0.0	17	2.0	9.991
1	57.84		28D	10.84				
1	59.26		38D	8.26				
1	60.68		40D	7.68				
1	62.68	25	26A	-0.81	0.0	26	0.1	5.997
1	64.44	26	28A	-0.60	0.0	30	-0.0	10.080
1	65.51		42D	11.51				
1	66.93		50D	8.93				
1	68.91	5	36A	-0.82	0.0	31	-0.3	6.362
1	70.20		56D	4.20				
1	73.25	33	36A	-0.61	0.0	5	2.5	11.888
1	74.27		63D	3.27				
1	79.96	11	49A	-1.19	0.0	13	1.1	6.391
1	84.31	24	54A	-0.85	0.0	1	3.9	6.366
1	86.34	1	57A	-0.81	0.0	24	3.9	7.643
1	87.62		84D	1.62				
1	92.00		89D	0.0				
1	93.64	2	57A	-1.17	0.0	29	0.0	8.426
1	101.71	29	59A	5.93	0.0	2	0.0	13.251
1	100.06	36	72A	-0.09	0.0	23	1.0	9.546
1	105.96	14	77A	-0.58	0.0	5	0.4	10.819
1	125.37	3	83A	14.83	0.0	33	-0.2	16.605
1	111.68	43	87A	-0.86	0.0	8	-0.2	11.065
1	112.51	8	90A	-1.02	0.0	43	-0.2	10.110
1	116.50	15	95A	-0.03	0.0	38	-0.0	10.966
1	117.61	4	96A	-0.93	0.0	17	0.1	9.915
1	119.25	17	97A	-0.18	0.0	4	0.1	6.749
1	119.90		117D	2.90				
1	121.32		118D	3.32				
1	123.13	19	100A	-1.02	0.0	45	3.4	6.294
1	137.74	29	104A	7.20	0.0	46	3.1	35.483
1	132.00		139D	0.0				

1	134.00		141D	0.0				
1	137.00		146D	0.0				
1	140.15	23	112A	-1.46	0.0	30	0.5	8.286
1	142.22	30	113A	-0.35	0.0	33	0.4	6.671
1	143.94	33	119A	-0.20	0.0	30	0.4	11.128
1	146.63	37	123A	-0.91	0.0	35	0.1	9.915
1	147.46	15	125A	-1.05	0.0	37	0.3	6.452
1	159.12	36	138A	-0.04	0.0	18	0.1	6.942
1	159.94	13	138A	-0.76	0.0	2	0.4	11.139
1	160.87	2	141A	-0.80	0.0	13	0.4	8.811
1	163.51	29	145A	-0.64	0.0	9	1.2	7.341
6	31.03	1	1A	-0.99	0.0	2	3.6	9.133
6	33.41	2	2A	-0.61	0.0	1	3.6	9.202
6	44.48	3	3A	-0.73	0.0	7	0.1	7.712
6	46.75	7	5A	-0.96	0.0	3	0.1	7.838
6	47.75	8	8A	-0.93	0.0	7	0.1	10.654
6	48.65	9	8A	-0.66	0.0	12	-0.2	7.545
6	49.69	12	12A	-0.63	0.0	9	-0.2	9.350
6	54.46	14	14A	-0.84	0.0	11	-0.5	7.812
6	56.05	19	18A	-0.76	0.0	11	-0.7	7.763
6	59.31	22	22A	-0.33	12.05	19	0.5	0.0
6	59.63	24	26A	-0.82	0.0	22	0.5	4.782
6	60.23	27	29A	-0.68	0.0	24	1.2	4.933
6	69.08	28	29A	-0.75	0.0	25	0.9	7.676
6	75.21	31	33A	-0.56	0.0	32	-0.3	7.840
6	75.96	32	35A	-0.61	0.0	31	-0.3	9.026
6	80.40	34	36A	-0.36	3.98	32	0.1	0.0
6	80.33	7	39A	-0.89	0.0	3	-0.1	9.272
6	82.97	3	39A	-0.74	3.55	7	-0.1	7.660
6	83.58	18	41A	-0.59	0.0	8	0.0	7.619
6	87.27	8	41A	-0.37	5.86	18	0.0	0.0
6	67.41	13	44A	-0.69	0.0	8	0.8	7.865
6	88.58	12	44A	-0.67	11.79	15	0.5	5.008
6	69.75	15	46A	-0.94	0.0	16	0.2	9.227
6	93.18	16	47A	-0.35	19.94	17	-0.1	0.0
6	93.03	17	48A	-0.96	0.0	16	-0.1	9.370
6	94.58	19	51A	-0.73	0.0	17	1.0	7.658
6	103.14	9	51A	-0.56	6.92	17	0.1	0.0
6	103.50	22	54A	-0.66	17.70	27	1.2	4.868
6	105.13	27	56A	-0.55	6.05	25	-0.3	9.583
6	105.81	25	61A	-0.65	0.0	27	-0.3	9.370
6	108.44	23	61A	-0.72	11.00	25	0.0	7.723
6	109.69	6	64A	-0.71	11.25	30	0.2	8.178
6	110.13	30	66A	-0.74	5.22	6	0.2	8.892
6	112.59	35	67A	-0.73	20.21	5	0.1	4.477

6	113.04	5	68A	-0.74	8.51	28	-0.4	7.724
6	113.84	28	69A	-0.94	4.14	5	-0.4	9.272
6	115.50	33	70A	-0.83	8.07	3	-0.2	7.586
6	116.67	20	70A	-0.50	25.57	33	0.3	0.0
6	116.99	31	73A	-0.64	4.99	37	-0.1	9.131
6	120.05	37	75A	-0.55	3.97	31	-0.1	9.099
6	122.42	38	75A	-0.71	11.97	7	-0.2	8.665
6	122.78	7	79A	-0.81	3.95	11	-0.4	9.334
6	123.69	11	80A	-0.87	3.92	7	-0.4	9.374
6	124.62	34	81A	-0.84	16.20	40	0.4	4.972
6	127.53	40	81A	-0.69	12.07	41	-0.0	7.958
6	127.87	41	83A	-0.67	6.05	40	-0.0	9.134
6	129.18	18	85A	-0.67	18.39	1	0.6	4.859
6	130.51	1	90A	-0.63	5.50	18	0.6	9.227
6	131.53	45	90A	-0.83	11.09	13	0.5	7.953
6	132.56	13	93A	-0.92	19.02	45	0.5	4.855
6	134.32	2	98A	-0.70	0.0	16	-0.2	9.428
6	135.12	16	100A	-0.68	0.0	2	-0.2	9.086
6	136.59	21	100A	-0.89	17.02	46	0.4	4.953
6	139.41	46	100A	-0.77	8.03	36	0.1	7.866
6	139.84	27	107A	-0.81	0.0	25	-0.0	7.904
6	141.15	25	106A	-0.51	0.0	27	-0.0	9.837
6	142.01	32	108A	-0.61	9.36	39	0.5	4.863
6	144.60	39	115A	-0.69	0.0	24	0.3	10.015
6	146.01	24	115A	-0.76	9.67	28	-0.2	4.463
6	146.30	28	118A	-0.94	0.0	24	-0.2	9.225
6	148.78	20	121A	-0.71	4.02	4	0.4	4.778
6	151.08	4	121A	-0.89	0.0	17	-0.2	10.105
6	151.82	17	123A	-0.78	0.0	4	-0.2	9.134
6	154.45	35	125A	-0.65	0.0	17	0.0	8.216
6	154.67	3	130A	-0.94	0.0	35	0.1	9.030
6	158.81	34	130A	-0.51	11.75	3	0.2	0.0
6	158.96	22	133A	-0.80	0.0	34	0.6	9.251
6	164.04	18	134A	-0.70	0.0	36	0.1	7.852
6	165.26	14	135A	-0.64	8.44	1	0.4	5.147
6	166.71	1	136A	-0.65	0.0	14	0.4	9.430
6	167.92	45	137A	-0.64	0.0	41	-0.1	7.477
6	168.65	41	138A	-0.90	0.0	45	-0.1	9.203
6	170.17	9	141A	-0.97	0.0	29	1.2	7.491
6	171.54	12	144A	-0.76	7.84	21	0.2	5.002
6	172.90	21	145A	-0.59	0.0	12	0.2	7.661
7	29.00		1D	0.0				
7	36.27		5D	4.27				
7	37.69		8D	2.69				
7	39.11		10D	3.11				

7	40.99		14D	2.99				
7	42.41		16D	3.41				
7	52.57		19D	12.57				
7	63.16		21D	21.16				
7	64.58		24D	21.58				
7	66.46		26D	21.46				
7	71.54		28D	24.54				
7	72.96		32D	24.96				
7	97.56		35D	48.56				
7	98.97		37D	48.97				
7	162.03		36D	111.03				
8	81.41		4D	50.41				
8	82.82		5D	50.82				
8	84.24		8D	49.24				
8	85.66		12D	48.66				
8	87.14	21	51A	-1.34	0.0	4	9.0	5.606
8	88.95		16D	49.95				
8	90.61	4	60A	-1.14	0.0	21	9.0	4.688
8	92.23		21D	50.23				
8	93.64		28D	46.64				
8	95.06		32D	47.06				
8	96.95		42D	42.95				
8	98.36		46D	42.36				
8	99.88	10	64A	-1.29	0.0	6	6.8	7.162
8	101.64		53D	40.64				
8	103.40		56D	37.40				
8	105.18	32	74A	-1.04	0.0	42	0.4	5.139
8	109.41	42	87A	-0.57	3.67	32	0.4	0.0
8	115.13		70D	40.13				
8	116.54		76D	37.54				
8	117.96		78D	37.96				
8	119.38		99D	17.38				
8	120.80		104D	15.80				
8	122.39	26	99A	-1.22	0.0	45	7.3	4.841
8	149.93		112D	35.93				
8	151.35		115D	35.35				
8	152.99	11	132A	-1.16	0.0	18	6.2	4.892
8	159.33		124D	36.33				
8	160.75		129D	34.75				
8	162.17		132D	35.17				
8	163.59		135D	34.59				
8	165.00		144D	30.00				
8	166.79	23	147A	-1.02	0.0	25	0.4	4.357
8	168.28		148D	29.28				
8	169.70		162D	20.70				

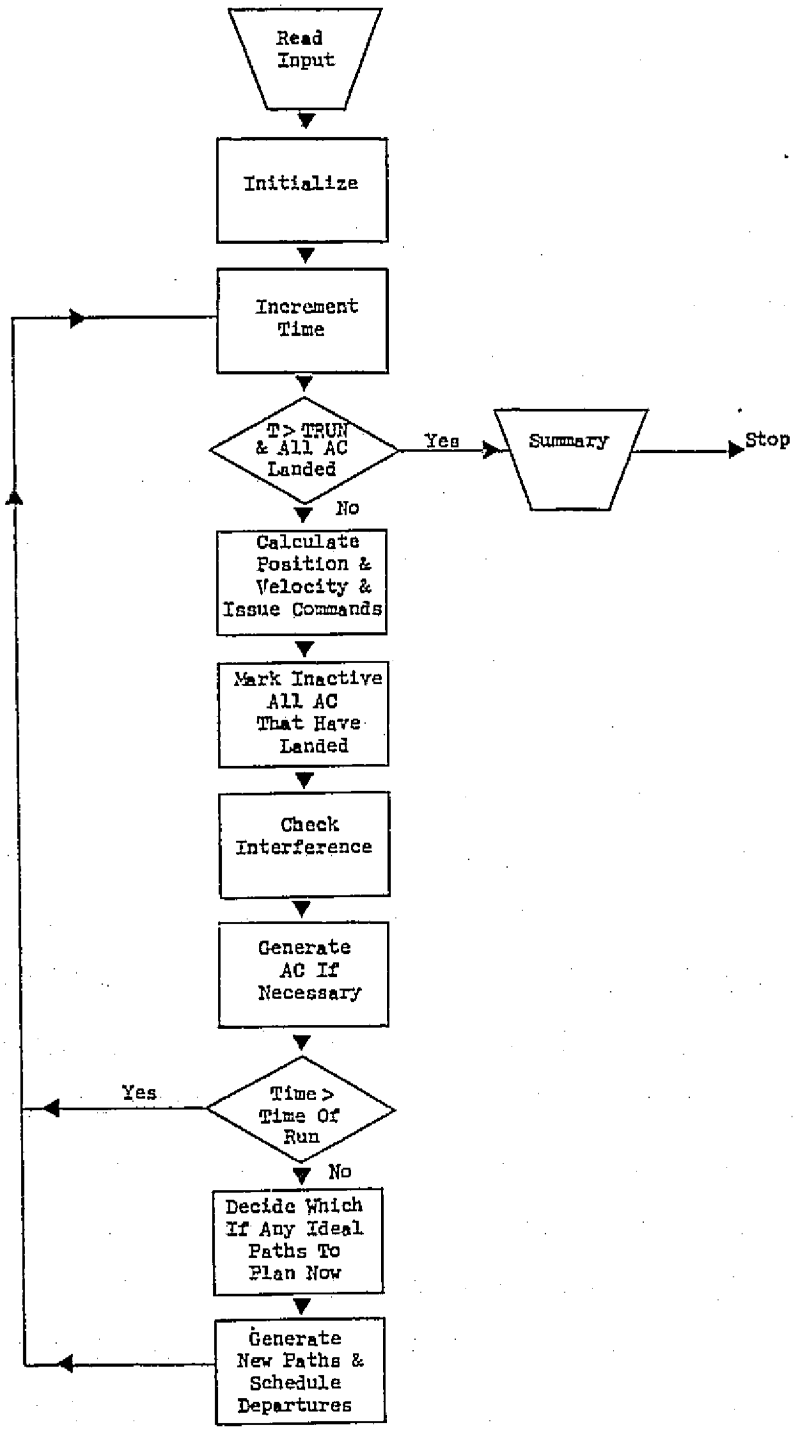
8	171.32	39	149A	-1.12	0.0	28	0.0	5.124
9	29.00		1D	0.0				
9	39.54	4	4A	-1.40	0.0	9	6.6	5.622
9	47.20	10	8A	-1.33	0.0	20	2.1	7.289
9	48.59	20	20A	-1.35	0.0	10	2.1	5.836
9	59.79	23	23A	-1.74	0.0	2	0.1	8.386
9	61.27	2	25A	-1.12	0.0	23	0.1	4.775
9	62.00	29	31A	-1.36	0.0	4	-0.0	4.789
9	63.05	4	33A	-1.26	0.0	29	-0.0	4.537
9	71.00		63D	0.0				
9	72.63	20	41A	-1.11	0.0	3	5.2	5.563
9	79.67	14	49A	-1.26	0.0	24	9.7	5.420
9	106.68		68D	15.68				
9	110.53	39	77A	-1.23	0.0	24	2.3	8.588
9	111.04	24	65A	-1.24	0.0	44	0.1	5.674
9	113.29	44	67A	-1.42	0.0	24	0.1	6.262
9	127.71	9	104A	-1.23	0.0	22	0.3	5.706
9	128.61	22	106A	-1.27	0.0	9	0.3	4.530
9	130.41	14	108A	-1.53	0.0	22	2.7	5.767
9	136.54	6	116A	-1.39	0.0	12	0.4	5.810
9	137.57	12	117A	-1.46	0.0	8	0.4	4.703
9	146.20	5	119A	-1.33	0.0	31	0.6	7.361
9	147.27	31	125A	-1.26	0.0	19	0.0	4.416
9	148.36	19	129A	-1.10	0.0	31	0.0	4.475
9	157.77	16	141A	-1.09	0.0	45	5.5	4.540
9	165.66	25	148A	-1.06	0.0	23	0.4	5.555
9	172.34	28	150A	-1.27	0.0	39	0.0	5.736
10	36.00		10D	0.0				
10	40.00		19D	0.0				
10	44.61	6	5A	0.22	0.0	11	0.4	10.310
10	44.86		21D	2.86				
10	46.27		25D	2.27				
10	48.27	18	18A	-0.78	0.0	14	0.0	5.731
10	49.52		26D	4.52				
10	50.94		28D	3.94				
10	52.35		32D	4.35				
10	53.77		35D	4.77				
10	55.19		40D	2.19				
10	56.61		46D	0.61				
10	58.03		49D	1.03				
10	61.75	1	24A	-0.79	0.0	28	1.9	10.064
10	65.36	30	32A	-0.22	0.0	26	-0.0	7.626
10	67.00		54D	0.0				

10	69.00		60D	0.0					
10	70.42		61D	0.42					
10	71.84		63D	0.84					
10	73.25		66D	1.25					
10	74.67		69D	0.67					
10	76.09		72D	0.09					
10	77.51		72D	1.51					
10	79.00		76D	0.0					
10	81.00		80D	0.0					
10	82.42		81D	0.42					
10	84.00		83D	0.0					
10	88.00		86D	0.0					
10	96.28	26	81A	-1.01		0.0	29	2.4	8.524
10	97.76		92D	1.76					
10	99.17		95D	1.17					
10	100.59		98D	0.59					
10	102.01		99D	0.01					
10	103.43		102D	0.43					
10	106.00		105D	0.0					
10	108.00		106D	0.0					
10	109.42		107D	0.42					
10	111.00		109D	0.0					
10	113.93	12	94A	-0.08		0.0	8	-0.1	6.896
10	114.48		110D	2.48					
10	115.90		113D	0.90					
10	117.31		113D	2.31					
10	119.16		119D	0.16					
10	123.00		124D	0.0					
10	125.00		127D	0.0					
10	126.42		129D	0.42					
10	128.30		133D	0.30					
10	132.80	36	111A	-0.01		0.0	46	0.1	6.758
10	133.28		137D	2.28					
10	134.70		140D	1.70					
10	136.12		141D	2.12					
10	137.54		145D	1.54					
10	139.00		148D	0.0					
10	140.42		148D	1.42					
10	141.84		152D	0.84					
10	143.25		153D	1.25					
10	144.67		156D	0.67					
10	146.09		158D	0.09					
10	148.00		160D	0.0					
10	149.42		162D	0.42					
10	151.00		165D	0.0					
10	154.01	44	125A	-0.27		0.0	18	8.0	8.786

SECTION V
PROGRAMMER'S GUIDE
CONTENTS

PAGE

A. FLOW CHART
(OVERVIEW)



B. PROGRAM SEGMENTATION

MAIN

Purpose: The first segment of the program reads all input, printing all values for verification, and initializes many of the variables used later.

The major portion of the program both flies aircraft and controls the selection of candidates for approach route planning. All of this is done in time slices with positions and candidates updated once each time slice

The last piece of coding prints a summary table for the run, so that results may be more easily determined.

CALLS:

PLDIST	2
TIM2GO	MANY
ASCEND	3
PANDV	1
CHECK	1
GAUS2P	MANY
PRESET	1
SETVAR	2
PATH	2
MAIX	3

CALLED BY: NONE

MAIX

Purpose: This routine accepts a list of eligible candidates for arrival from main, and produces a list of approach plans for these aircraft or signals that they must be for now held. The list of candidates is first ordered by priorities and then planned one aircraft per time increment and one time increment at a time. with each of the arrivals is paired a list of departures, and selection of the arrival signals selection of the departures as well.

CALLS: TIM2GO	MANY
PRIORF	1
PRESET	1
GETCOD	MANY
FNDEGX	MANY
SETVAR	1
PATH	1
ADDACK	1
GAUS2F	1

CALLED BY: MAIN

PANDV

Purpose: PANDV is called once for each active aircraft. The position and velocity of this aircraft are calculated and based on this information, and on the ideal approach, any necessary commands to the aircraft are issued.

calls: TIM2GO MANY
GAUS2F MANY
MSTAR 1
PRANGL 4
TURN 2
RANDPL 2

Called By: MAIN

FNDEGX

Purpose: This is a very small routine which calls other routines to calculate the interference associated with a proposed approach plan.

CALLS: SETVAR 1
PATH B' 1
ADDACK 1
ENTERF 1

CALLED BY: MAIN

TURN

Purpose: Decides if a turn is needed, and if one can be established in a reasonable manner. If a turn is necessary all parameters are set here.

CALLS: TIM2GO MANY
GAUS2F MANY

CALLED BY: PANDV

PATH

Purpose: this routine is called once for each tentative path for each aircraft. That is,control variables and aircraft characteristics are set external to the routine and one path is calculated depending upon these values. (For fixed paths, the input vertices are retained, but extra vertices are added as needed and speeds and altitudes are calculated.)

CALLS: INSERT 3
TRANSX 1

CALLED BY: MAIN
MAIX
FNDEGX

DEPART

Purpose: for each tentative arrival, a set of all possible departures on all dependent runways (based upon various priorities) is calculated and returned. Only times earlier than that of this arrivals touchdown are considered

CALLS: none

called by: MAIX

ADDACK

Purpose: Adds an aircraft to the system

Addition permanent if called from MAIN

Addition temporary if called from FNDEGX

CALLS: TRANSX 1

TRANSV 1

CALLED BY: MAIX

FNDEGX

GAUSSF - ENTRY GAUS2F

Purpose: Add "errors" to positions, headings,etc.

CALLS: RANGEN 1

CALLED BY: MAIN

MAIX

PANDV

TURN

PRESET

Purpose: Computes parameters used by PATH

CALLS: TRANSX 1

CALLED BY: MAIN

MAIX

MSTAR

Purpose: Finds which mode (segment of approach plan) the aircraft is now on. this calculation is skipped if the aircraft is in a turn. It is otherwise accomplished by dropping perpendiculars to various segments of the approach plan and checking relative distances.

CALLS: NONE

CALLED BY: PANDV

ENTERF

Purpose: Checks planned path for interference

CALLS: PSI

CALLED BY: FNDEGX

PSI

Purpose: Calculate interference

CALLS: NONE

CALLED BY: ENTERF

ASCEND

Purpose: Order paired arrays

CALLS: NONE

CALLED BY: MAIN

CHECK

Purpose: calculates interference for active aircraft only. The interference values (real and observed) between the aircraft being considered and the closest other aircraft are stored in PSILOW. The channel number of the closest aircraft (real and observed) is stored in KLOS. (called once per active aircraft each time slice).

CALLS: NONE

CALLED BY: MAIN

GETCOD

Purpose: Scan code words to see what has and has not been tried

CALLS: NONE

CALLED BY: MAIX

INSERT

Purpose: Creates new vertex in the approach plan (this may be required by altitude,interference, velocity, or other considerations .)

CALLS: NONE

CALLED BY: PATH

PLDIST - ENTRY RANDPL

Purpose: Create distribution of response times

CALLS: NONE

CALLED BY: MAIN

PANDV

PRANGL

Purpose: Calculate principal value of angle

CALLS: NONE

CALLED BY: PANDV

RANGEN

Purpose: Generates random number from a distribution

CALLS: NONE

CALLED BY: GAUSSF (GAUS2F)

SETVAR

Purpose: Fill array CNTRLS with a mixture of fixed and current values

CALLS: NONE

CALLED BY: MAIN

MAIX

FNDEGX

TRANSX - ENTRY TRANSV

Purpose: Translates between basic coordinates and runway coordinates

CALLS: NONE

CALLED BY: ADDACK

PATH

PRESET

C. VARIABLES

ACCELN

acceleration

CAPPNI

angle through which aircraft should turn

CONTBL

control parameters for aircraft

DAR array storing delay time for output

DAT10K

distance from feeder fix at which aircraft altitude is 10K feet (in feet)

DDIV

horizontal distance covered during descent (in feet)

DELTAT

cycle time in seconds

DEPRUN

for each runway, 0 if no runway dependent on this runway, greater then 0 for runways parallel, less than 0 for crossing runway

DIVNGL

descent angle

DMIN

minimum distance on any approach plane leg (in feet)

DNEAR

has to do with when a turn will start (in feet).

DPICKUP

number of miles from feeder fix aircraft
is picked up

DPNDCY

distance between parallel runways or from threshold
to crossing point of crossing runways (in feet)

DTACCL

time interval through which aircraft will accelerate
(in seconds)

DTINTER

duration of search interval (in seconds)

DTOFF

distance of aircraft from feeder fix (in feet)

DTSAFE

interval required between aircraft and preceeding
aircraft for separation (in feet)

DTSCHD

maximum touchdown time interval for "far out" aircraft (in seconds)

DTSPAC

time between aircraft for separation at outer marker (in seconds)

DTVXIT

safety separation factor in seconds to prevent two planes on one runway

DXLBGS

distance between glide slope and localizer acquisition (in feet)

FXDCON

fixed control variables

HOF10K

10,000 feet

HSEPx

various required separations (input in n. miles)

HPIKUP

altitude at which aircraft is picked up (in feet)

IDNO

identification number of aircraft in Channel k

IECLAS

class of last ac in last scheduled event

IEVENT

nature of last scheduled event (0=no event, 1=arrival, 2=departure)

IFF

number of feeder fix

IFFLAG

flag that more than 1 aircraft is generated at the feeder fix

IPTYPE

path type number

IR

number of runway

IRTENT

runways for tentative departures

ISCNT

Counter of how many events have occured on each runway

ITATFF

type of aircraft at the feeder fix

JECLAS

class of ac involved in last tentative event

JEVENT

nature of last tentative event (0=no event, 1=arrival, 2=departure)

KACCEL

flag where 0 means acceleration is instant and non-zero means acceleration is constant

KANDII

array storing the kype-index of each candidate for an ap<-

KANDIT

array storing the ktype of each candidate for planning

KDIV

number of vertex of approach plan where descent begins

KGS

number of the vertex where the glide slope is acquired

KHOLDI

type-index of each holding aircraft

KHOLDT

ktype of each holding aircraft

KL1,KL2

classes for separation tables

KLB

number of vertex of the approach plan at which the localizer is acquired

KLDPAC

class of departing aircraft

KLOSAC

number of the aircraft that interferes most with the present aircraft

KLSTBL

class to which this type aircraft belongs

KLTENT

class for tentative departures

KOM

number of the vertex which outer marker is reached

KOPTMZ

switch to control approach plan searches (can be-1,0, or 10)

KPAIR

runway feeder fix pair for this type aircraft

KRHO

number of type I aircraft to be generated this run

KSTACK

which stack each class of aircraft belongs to (1,2, or 3)

KSTART

Flag, 0 before feeder fix, one to outer marker, 0 later

KSW

"too close" flag

KREJ

candidate number of rejected aircraft

KTYPON

type number of last scheduled touchdown

KWAS

array indicating where a planned aircraft came from
first subscript is type, and second type-index

LONGQ

number of aircraft waiting for take-off that is considered
to require special consideration

LONGWT

length of a wait for take-off (in seconds) that
is considered excessive

NAFD

maximum number of feeder fixes

NAFTOT

total number of feeder fixes

NAPLAN

number of approach plans

NAVAIL

number of available channels

NCAR

Number of the ac closest to each arrival

NCHNL

number of channels

NCURNT

number currently in system

NDEPRU

number of departures requested for a runway

NDKTOR

for a pair, flags to indicate varying or non-varying controls

NDRQST

number of departures which have been requested up to current time

NDSCHD

number of departures which have been scheduled

NDXDEP

index pointing to the next departure

NDXPOS

to time next aircraft to be generated

NHMANY

number of holding aircraft that is thought to be "too many"

NPAIRS

Number of feeder fix-runway pairs

NRA

Channel number for arrivals; -1 for departures

NRCALL

..umber of calls to random before calculation

NRTOT

number of runways

NTD

number of touchdowns

NTH

Saves order of requests for arrival and departure

NTOTNT

total number of tentative departures

NTYPED

maximum number of aircraft types

NTYPES

number of aircraft types

NVARS

number of variables allowed to vary

NVTXD

Maximum number of vertices

OFFSTA

offset in feet between a pair of parallel runways

ORCORR

correction for magnetic deviation (in degrees)

ORIENT

runway heading (in degrees true) ; changed to radians ccw from due east

PCAR

Interference value associated with the worst case for this ac

PCTEND

percentage of runtime reserved for termination procedure

PSIMOD

interference value on current aircraft in mode m

RAMMAX

maximum lambda

SEPK1,SEPK2

constants used in checking separation

SHRST

Time for the shortest path this candidate

SIGxx

standard deviation of .....

SUNEST

earliest touchdown time by type (in seconds)

TACCUM

Time interval during which aircraft are accumulated before any path planning is attempted

TAR

array storing time of event for output

TCRIT

time used as a test for aircraft being considered "far out" (in minutes)

TDMIN

minimum time on approach path leg (input in min., converted to seconds)

TDREQ

time of departure request in seconds from beginning

THAR

array storing hold times of aircraft for output

THETA

angle between localizer and intersecting segment of approach plan

TITENT

times for tentative departures(in seconds)

TIVENT

time of the latest scheduled event
for a runway (in seconds)

TJEVENT

time of last tentative event for a runway (in seconds)

TKNDLH

time this candidate is estimate to leave the holding stack

TLAG

duration of time for examining candidates for
approach plans (read in minutes converted to seconds)

TLEGS

time from localizer interception to glide slope
(in minutes, converted to secnds)

TLEG

nominal time of approach leg (input in minutes,
converted to seconds)

TLHOLD

time holding aircraft is expected to leave the stack

TMINFF

earliest time aircraft can reach feeder fix with
5 mile separation (in seconds)

TRATE

turn rate (in degrees)

TRATEA

actual turn rate (in degrees)

TRERLY

earliest time next touchdown scheduled (in seconds)

TRUN

time simulated (in minutes, converted to seconds)

TTDLO

earliest acceptable touchdown time for aircraft (in seconds)

TTOW

thrust to weight ratio

TURNGL

minimum heading change for which a turn is required

VARS

values of parameters allowed to vary

VAT10K

maximum velocity below 10,000 feet (feet/sec.)

VHCLIM

velocity in a climb (read in knots, converted to feet/sec.)

VLB

velocity in feet/sec. at the localizer (input in knots)

VLO

velocity at lift-off (input in knots,converted to feet/sec.)

VMAX

maximum velocity of aircraft (read in knots, converted to feet/sec.)

VMIN

minimum velocity of aircraft on a normal leg (read in knots, co to feet/sec.)

VOM

velocity at outer marker (knots, converted to feet/sec.)

VPIKUP

velocity in feet/sec. at pickup (input in knots)

VXIT

velocity in feet/sec. of aircraft upon exit from the runway.

XAF,YAF,ZAF

feeder fix coordinates (input in n. miles,converted to feet

XIPRE

safety separation in feet between an aircraft and a preceding aircraft

XLFMAX

maximum distance between touchdown and localizer interception (read in n. miles, converted to feet)

XLFMIN

minimum distance between touchdown and localizer interception (read in n. miles, converted to feet)

XOM

distance from outer marker to touchdown (in feet)

XRUN,YRUN,ZRUN

runway coordinates (input in nautical miles converted to feet)

XTOAR

distance between takeoffs and landing points on this runway (in feet)

WORST

most negative value of interference function produced

D. COMMONS

The program contains five COMMON areas each with a distinct purpose. Care has been taken to maintain consistent names within subroutines for easy identification, and each COMMON has been alphabetized to aid in programming changes. A description of each follows.

1. CONST - This area contains constants. These are set in MAIN and never modified. It includes:

   FINITY,FPERNM,FPSNMH,KLASGA,KODE(25),
   MAD(10),NOPTAP,PI,PIOV2,ZETASQ

2. IDEAL - This is the largest of the COMMONs. All variables are concerned with planning the ideal paths. Values will usually be set or modified by MAIN, MAIX, or PATH but are referenced by almost all routines. (Even in determining the real paths the ideal paths must be known.) Generally variables with a dimension of 10 are subscripted in aircraft class, with a dimension of 20 are on runway number, with 30 are on feeder fix, with 50 are on candidate count, and on 75 are on channel number. If there is any doubt, the matter can easily be resolved from the code. This area contains:

   CODE(75),CNTRLS(10),D(3),DLB,DMIN(25),
   DTSPAC,DXLEGS(25),GOTIME,IAF,
   ICHG,IDIV,IDNO(75),IECLAS(20),IEVENT(20),
   IGS,ILB,ILEV,IOM,IPAIR,IRTENT(25),IRUN,
   ITD,JECLAS(20),JEVENT(20),K,KAF(75),KANDII(50),
   KANDIT(50),KAVAIL(75),KCHG(75),KCURNT(75),
   KDIV(75),KFIXD(10),KGS(75),KHLDI(30,3,15),

KHOLDT(30,3,15),KLB(75),KLEV(75),KLOSAC(30),

KLTENT(25),KOM(75),KPATH,KPSAV(50),KREJ(50),

KRUN(75),KSTACK(10),KSTART(75),KTD(75),

KTYPE,KTYPON(20),KVARS(10),KWAS(50,2),LRUN,NAPLAN,

NAVAIL,NCODE,NCURNT,NDRQST(20),NDSCHD(20),

NDXDEP(20),NDXPOS(25),NFIXD,

NREJ,NSTACK(30,3),NTOADD,NTOTNT,NVMAX,NVARS,

NVRTCS(30),PSIMOD(30),SIGMA(30),SIGTAF(25),

SUNEST(25),TDHI(49,25),TDLO(49,25),TITENT(25),

TIVENT(20),TJVENT(20),TKNDLH(50),TLHOLD(30,3,15),

TSEPAR(25),TSTART(75),

TTD,TTDHI,TTDLO,TTDLOO,TTDNOM,TTDR(20),

TTRY(30),TVTX(30,50),TYPE(75),VARS(10),

VXTRY(30,VXVTX(30,50),VXVTZ(30,50),VYTRY(30),

VYVTX(30,50),VYVTZ(30,50),VZTRY(30),VZVTX(30,50),

XAFX,XMNACT,XTRY(30),XT3(30,30),XVTX(30,50),

XVTZ(30,50),YAFX,YTRY(30),YVTX(30,50),

YVTZ(30,50),ZTRY(30),ZT3(30,30),ZVTX(30,50)

3. INPUT - This COMMON contains only variables set in the input section of MAIN and never modified. This contains values from the input cards, values from the input cards with units modified, values which are defaults for omitted inputs, and numbers randomly generated based upon inputs (such as classes of aircraft.) Subscripting is basically as described in the preceding section. Variables contained here are:

ACCELN(10),COSGS(20),DELTAT,DEPRUN(20,2),DPIKUP(10),

```
DPNDCY(20,2)DTAMIN,DTIMSQ,DTINTR,DTVXIT,
ENDTIM,ETATBL(10,10,2),FXDCON(10,30),
IARFLG(20),IFF(30),IPTYPE(30),IR(30),KACCEL,
KBUG,KGEN(49,25),KLDPAC(20,75),KOPTMZ,
KPAIR(2,25),KTAPE,LBUG,LONGQ,LONGWT,MRSUPR,
NDEPRU(20),NDKTOR(10,30),NHMANY,NKLAS,NRTOT,
NTYPES,OFFSTA(20,2),ORIENT(20),RAMMAX(30),
SAFTY,SDOBD1,SDOBD2,SDOBH1,SDOBH2,SDOBV1,
SDOBV2,SIGTHT,SIGTIN,SIGTR,TANDIV(10),
TANGS(20),TDFAR,TDMIN(30),TONEAR,TDREQ(20,75),
TGEN(49,25),
THETA(30),T12,TIIPL1(2),TLBGSX(30),TRATE,
TTOW(10),TURNGL,VHCLIM(10),VLO(10),
VMAX(10),VMIN(10),VOM(10),VOPTMZ,VXIT,XAF(30),
XIPRE,XITBL(10,2,2),XLBMAX(30),SLBMIN(30),
XOM(20),XRUN(20),XTOAR(20),YAF(30),YRUN(20),
ZAF(30),ZRUN(20)
```

4. OUTPUT - The OUTPUT COMMON collects information for output. Most arrays are set in either MAIN or MAIX and most values appear in the summary table. These variables do not influence program flow. Dimensions of 20 have corresponding subscripts referencing runway. Similarly, 50 corresponds to candidate and 150 to the number of events per runway. The variables contained herein are:

```
CONTBL(6,75),DAR(20,150),ISCNT(20),ISUB,
KTIME(21),NCAR(20,150),NRA(20,150),
NTH(20,150),NTRYS(21),OUT(75),PCAR(20,150),
```

SHRST(50),TAR(20,150),TBEG,TDREQS(20,75),

THAR(20,150)

5. REAL - All values grouped here have some connection with the actual flight path of the aircraft. Dual arrays frequently appear, one for observed values and one for actual values. Most are set in PANDV. Subscripting is almost exclusively on channel number. This grouping has:

ACCEL(75),DDIVAR(75),DHEDAR(75),DIVOBS(75),
DIVTRU(75),DSFRID(75),DTHETA(75),DVAR(75),
DZFRID(75),ERRHED,HEDOBS(75),HEDTRU(75),
KAFLAG(75),KDANGR(75),KHCORR(75),KLOS(75,2),
KLSTBL(75),
KVCORR(75),MODCOM(75),MODE(75),MODTRN(75),
NEXTM,NINKAF,PSILOW(75,2),RHOA(75),T,TAU1A(75),
TAU2A(75),TCHECK(75),THETA1(75),TNEWV(75),
TRETEA(75),TRSPNS(75),TWORST,VHOBS(75),
VHTRUE(75),VXOBS,VYOBS,VXTRUE,VYTRUE,WORST,
XCENT(75),XOBS,XOBSAR(75),XTRUE(75),YCENT(75),
YOBS,YOBSAR(75),YTRUE(75),ZOBS,ZOBSAR(75),
ZTRUE(75)

E. TAPE OUTPUT DESCRIPTION

When requested (by setting the appropriate input to 1) the program writes on tape information describing both the ideal paths and the simulated flight paths. This tape may later be used to plot or print specific portions of the simulation. A description of this material follows.

There are three groupings of records. Each is identified by its first record, and each of these has an identical format so that it may be read before braching occurs:

GROUP 1:

First Record:	1, N where N is the number of aircraft
Second Record:	TIME, K1, K2,...Kn where K's are channel numbers
Next Records:	KODE, K, BUF1, BUF2, BUF3, BUF4, BUF5 These records are described in the following table (Description Records). There may be one or more of them with the last always such that KODE = 2, and K = 2.
Last N Records:	(there is one per active aircraft) K, XTRUE, YTRUE, ZTRUE, X OBSERVED, Y OBSERVED, Z OBSERVED where Z is the channel number

GROUP 2:

First Record:	3, K where K is a channel number
Second Record:	TIME, X, Y, Z HEADING, VELOCITY, DESCENT ANGLE where all of these are for the point of generation (near the feeder fix) of the aircraft

GROUP 3:

First Record:	4, NV is the number of vertices in the following plan
Second Record:	K, TIME1, X1, Y1, Z1, TIME2, X2, Y2, Z2,..., TIMENV, XNV, YNV where TIMEI is the tune at the ith vertex, and X, Y, Z are the corresponding coordinates

Description Records

These all have the form KODE, K, BUF1, BUF2,..., BUF5. KODE identifies the remaining information

KODE = 2	(BUF has no significance)
K = 3	means an aircraft has landed and there will be one less position report
K ≠ 3	means position records follow. That is, it is a termination for this group of description records
KODE = 11	means a turn has been cancelled for aircraft K.
KODE = 12	means a heading or velocity change has been cancelled for aircraft K.
KODE = 13	Means cancel any command given aircraft K.
KODE = 14	BUF1 is heading change, BUF2 contains dive angle change, and BUF3 contains velocity change, all for aircraft K.
KODE = 15	An update request was issued for aircraft K. The response time is stored in BUF1 and the check time in BUF2.
KODE = 16	Response to the last instruction is to occur at the value in BUF1. The check time is in BUF2.
KODE = 17	Aircraft K began a course correction at time equal to BUF1. Its current heading (BUF2), current dive angle (BUF3), and current velocity (BUF4) are also given.

KODE = 18 A late term was attempted for aircraft K

KODE = 19 A turn was issued to aircraft K. The turn center (X and Y) is given as BUF1 and BUF2. The turn radius is BUF3. The angles of turn start and end are BUF4 and BUF5.

SECTION VI

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5. Analysis of Detroit Metropolitan Airport Capacity Under Noise Abatement Conditions, The Aerospace Corporation, Report ATR-71(S8145)-2, 11 June 1971.

6. S. Sokolsky and B.R. Kubert, Terminal Air Traffic Simulation, ASME Paper No. 70-Tran-15, October, 1970.

7. Standard Operational Procedures Manual, New York Common IFR Room, Federal Aviation Administration, September, 1974.

APPENDIX A

NEW YORK AREA AIR TRAFFIC DATA

This Appendix includes data on operations at John F. Kennedy International, LaGuardia and Newark International Airports, for 7 May 1975, between the hours of 4:00 and 8:00 p.m. local time (2000 - 0000 GMT). The data stems from CATER printouts provided by FAA, and is supplemented by an analysis of controller flight strips and airline schedules to determine (or estimate) the feeder fix from which each arrival was vectored to the airport.

A discussion of CATER printouts was contained in Section IIIB. The location of feeder fixes and vortacs indicated in the traffic data Tables A-2 - A-4 is shown in Table A-1.

TABLE A-1

LOCATIONS OF NEW YORK AREA NAVIGATIONAL FIXES

IDENTIFIER	LOCATION
HFD	Hartford, Connecticut
7SM	Salem, Connecticut
SBY	Salisbury, Maryland
ACY	Atlantic City, New Jersey
MIV	Millville, New Jersey
OOD	Woodstown, New Jersey
RBV	Robbinsville, New Jersey
SAX	Sparta, New Jersey
SNAPY	(Near) Budd Lake, New Jersey
STW	Stillwater, New Jersey
7PW	Pennwell, New Jersey
7XG	Southgate, New Jersey
9PC	Princeton, New Jersey
BUF	Buffalo, New York
CMK	Carmel, New York
COL	Colts Neck, New York
DPK	Deer Park, New York
HPN	White Plains, New York
HTO	Hampton, New York
IGN	Kingston, New York
JFK	New York, New York
PWL	Pawling, New York
7EL	Ellenville, New York
7QM	Bohemia, New York
7QN	Walden, New York
7XO	Monroe, New York
9EM	Empire, New York
9NK	Nyack, New York
ABE	Allentown, Pennsylvania
AVP	Wilkes-Barre, Scranton, Pennsylvania
IPT	Williamsport, Pennsylvania
LHY	Lake Henry, Pennsylvania
MIP	Milton, Pennsylvania
PHL	Philadelphia, Pennsylvania
SLT	State Run, Pennsylvania
9QR	Cedar Run, Pennsylvania
EWT	Elizabethtown, Tennessee

TABLE A-2

JFK AIRPORT

OPERATIONS FOR MAY 7, 1975, 2000-0000 HOURS GMT

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2001	EA64	B727	A	A	I	31L		A1954	ACY	7XG
2002	AC780	DC93	A	A	I	31L		A1957	7QN	9EM
2002	AC749	DC9	A	D	I	31L	1953	P1950		
2003	CMD20	BE99	S	D	V	32	1959			
2004	AA678	H707	A	A	I	31R		A1954	COL	7XG
2005	PA73	B747	A	A	I	31L		A1953	7SM	7QM
2007	UA239	B727	A	D	I	31L	2001	P2000		
2008	TW901	B747	A	A	I	31R		P2002	HTO	7QM
2009	MMH 113	PA34	S	A	V	32				
2010	N711L	LR24	G	A	I	31L		A1959	SAX	9EM
2011	NA188	B727	A	D	I	31L	2004	P2000		
2011	AA186	B707	A	A	I	31R		A1951	SAX	9EM
2012	TW192	B707	A	A	I	31R		A1955	SAX	9EM
2013	CMD85	BE99	S	D	V	32	2008			
2014	AA15	H707	A	D	I	31L	2004	P2000		
2014	NW234	B727	A	A	I	31L		A1958	SAX	9EM
2015	LH404	B747	A	A	I	31R		A2000	7SM	7QM
2016	BN16	B727	A	A	I	31R		A2005	ACY	7XG
2016	DL224	B727	A	A	I	31L		A2010	ACY	7XG
2017	AA5	B707	A	D	I	31L	2006	P2000		
2017	OV868	DC8	A	A	I	31R		A2000	SAX	9EM
2019	N7200R	BE10	G	A	V	32				
2019	SBN 801	DH6	S	A	V	32				
2019	N235Z	LR24	G	A	I	31L		A2003	SLT	9EM
2021	PA1422	B707	A	A	I	31L		A2004	HTO	7QM

① A = estimated time of arrival at Coordination Fix; P = proposed departure time

② Previous Fix (approximately 50 NM from Coordination Fix)

③ Coordination Fix

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2023	VA751	HDC8	A	D	I	31L	2007	P2000		
2023	UA768	DC8	A	A	I	31R		A2005	SAX	9EM
2025	UA6	DC10	A	A	I	31R		A2018	ACY	7XG
2026	N50-00C	L329	G	D	I	31L	2014	P2030		
2026	DL878	DC8	A	A	I	31R		A2016	SBY	7XG
2028	TW881	B747	A	A	I	31R		A2017	7SM	7QM
2030	BN11	B727	A	D	I	31L	2013	P2010		
2030	UA2878	HDC8	A	A	I	31R		A2016	SAX	9EM
2031	UA22	DC10	A	A	I	31R		A2014	SAX	9EM
2032	AC750	DC93	A	A	I	31R		A2019	IGN	9EM
2034	DL372	B727	A	A	I	31L		A2024	SBY	7XG
2036	EA196	DC9	A	A	I	31L		A2033	SBY	7XG
2037	TW191	B707	A	D	I	31L	2031	P2030		
2038	AA2	DC10	A	A	I	31R		A2025	SAX	9EM
2039	UA40	DC10	A	A	I	31R		A2030	7QN	9EM
2039	AL920	DC9	A	A	I	31R		A2026	SLT	9EM
2042	MMH-97	BE99	S	A	V	4L				
2044	FT144	HDC8	A	D	I	4L	2027	P2030		
2044	PA542	B707	A	A	I	4R		A2035	ACY	7XG
2045	JM014	DC9	A	D	I	4L	2033	P2030		
2045	PA093	B707	A	A	I	4R		A2030	7SM	7QM
2047	PMT-223	DH6	S	A	V	13L			DPK	
2048	AA187	B707	A	D	I	4L	2034	P2030		
2049	N72-00R	B10	G	D	V	31L	2040			

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2050	TW880	B727	A	A	I	4L		A2027	SAX	9EM
2052	AA126	B707	A	A	I	4L		A2027	SLT	9EM
2053	AL858	DC9	A	A	I	4L		A2033	7EL	9EM
2054	EA750	L101	A	A	I	4R		A2045	SBY	7XG
2056	TW833	H707	A	A	I	4L		A2041	HTO	7QM
2057	BN101	B727	A	D	I	4L	2048	P2045		
2058	NA403	B727	A	A	I	4R		A2043	7SM	7QM
2059	EA555	B727	A	D	I	4L	2050	P2160		
2059	NW220	B747	A	A	I	4R		A2029	SAX	9EM
2102	EA103	B727	A	A	I	4R		A2048	7SM	7QM
2104	UA165	DC10	A	D	I	4L	2058	P2115		
2104	TW800	L101	A	A	I	4L		A2039	SAX	9EM
2104	AY103	HDC8	A	A	I	4R		A2048	7SM	7QM
2105	NA1007	B727	A	A	I	4R		A2048	7SM	7QM
2105	AL548	BA11	A	A	I	4L		A2052	ACY	7XG
2106	NA73	B727	A	D	I	4L	2058	P2055		
2106	TW156	B707	A	A	I	4L		A2051	SAX	9EM
2107	SR112	B747	A	A	I	4R				7QM
2107	PA206	H707	A	A	I	4R		A2049	SBY	7XG
2110	AA164	H707	A	D	I	4L	2057	P2055		
2110	NA66	B727	A	A	I	4R		A2051	SBY	7XG
2112	AL920	DC9	A	D	I	4L	2104	P2100		
2112	SB305	B747	A	A	I	4R		A2133	7SM	7QM
2112	DL2950	HDC8	A	A	I	4L				7XG*
2113	AA14	H707	A	A	I	4R		A2110	7QM	9EM
2114	MMH114	PA34	S	D	V	31R	2110			
2115	EA108	B727	A	A	I	4R		A2108	ACY	7XG

*Assumed

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2116	TW1	B747	A	D	I	4L	2106	P2100		
2116	PA92	B707	A	A	I	4R		A2058	SAX	9EM
2118	EA27	L101	A	D	I	4L	2109	P2100		
2119	PMT92	DH6	S	D	V	31R	2115			
2119	UA120	DC8	A	A	I	4R		A2048	SAX	9EM
2120	BN19	B727	A	D	I	4L	2109	P2105		
2120	UA160	DC8	A	A	I	4R		A2110	SAX	9EM
2122	EA883	B727	A	D	I	4L	2114	P2110		
2122	EA162	DC9	A	A	I	4R		A2109	ACY	7XG
2123	TW49	B747	A	D	I	4L	2114	P2100		
2123	PMT-361	DH6	S	A	V	31R				
2125	TW842	B747	A	A	I	4R		A2038	SAX	9EM
2126	DL1023	L101	A	D	I	4L	2118	P2110		
2127	UA-2846	HDC8	A	A	I	4R		A2110-	7SM	7QM
2128	N86Q	C172	G	A	V	13L				
2129	N235Z	LR24	G	D	I	4L	2121	P2045		
2129	EA922	L101	A	A	I	4R		A2138	COL	7XG
2130	CMD23	DH6	S	A	V	13L				
2131	NW4	B747	A	A	I	4R		A2048	SAX	9EM
2133	CRA-260	PA31	S	A	V	13R				
2134	BN118	B727	A	A	I	4R		A2209	ACY	7XQ
2134	EA167	DC9	A	D	I	4L	2130	P2125		
2137	EA156	B727	A	A	I	4R		A2132	SBY	7XG
2138	AC693	DC93	A	A	I	4R		A2152	7SM	7QM
2139	UA991	B737	A	D	I	4L	2131	P2130		

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2140	TW904	B707	A	A	I	4R		A2128	SAX	9EM
2142	TW486	B707	A	A	I	4R		A2138	SLT	9EM
2146	NA463	B727	A	A	I	4R		A2129	SBY	7XG
2148	RG552	B707	A	A	I	4R				7XG
2149	AA665	B747	A	D	I	13L	2143	P2130		
2150	EA586	DC9	A	A	I	13L		A2133	ACY	7XG
2151	SBN802	DH6	S	D	V	14	2147			
2153	AC781	DC93	A	D	I	13L	2144	P2140		
2154	PMT76	DH6	S	A	V	14				
2154	NA496	B727	A	A	I	13L		A2142	ACY	7XG
2155	TW218	B727	A	A	I	13L		A2153	MIV	7XG
2156	EA757	B727	A	D	I	13R	2148	P2130		
2157	AA81	B707	A	D	I	13L	2149	P2115		
2157	AF-1110	B747	A	A	I	13R				7XG
2158	TW703	B707	A	D	I	13L	2146	P2145		
2159	NA1007	B727	A	D	I	13L	2150	P2146		
2200	N86Q	C310	G	D	V	14	2155			
2200	TW843	H707	A	A	I	13L		A1940	HTO	7QM
2200	AL457	BA11	A	A	I	13R		A2145	9NK	9EM
2202	EA103	B727	A	D	I	13R	2149	P2110		
2202	N10AC	BE90	G	A	I	13L		A2140	LHY	9EM
2203	CMD24	DH6	S	D	V	14	2159			
2203	MMH-119	PA34	S	A	V	14				
2203	NW46	DC10	A	A	I	13R		A2142	SAX	9EM
2204	N711L	LR24	G	D	I	13R	2152	P2130		

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2205	DL869	DC8	A	D	I	13R	2150	P2145		
2205	EA111	DC9	A	A	I	13L		A2147	IGN	9EM
2207	DL371	B727	A	D	I	13R	2154	P2150		
2207	AC751	DC93	A	D	I	13L	2202	P2200		
2208	AL439	BA11	A	D	I	13R	2156	P2155		
2208	TW832	HB7S	A	A	I	13L		A2158	ACY	7XG
2209	EA927	L101	A	D	I	13R	2202	P2145		
2209	TW700	B727	A	A	I	13L		A2160	SAX	9EM
2211	NA403	B727	A	D	I	13L	2204	P2200		
2212	DL924	HDC8	A	A	I	13R		A2200	ACY	7XG
2213	DL121	B727	A	D	I	13R	2204	P2200		
2213	AA21	DC10	A	D	I	13L	2205	P2200		
2214	TW289	HB7S	A	D	I	13L	2205	P2200		
2216	UA29	DC10	A	D	I	13R	2205			
2217	UA15	DC10	A	D	I	13R	2206	P2200		
2217	BN8	B727	A	A	I	13L		A2210	ACY	7XG
2218	TW841	B727	A	D	I	13L	2212			
2219	N34-2AP	C500	G	A	I	13R		[illegible]201	ABE	7PW
2220	UA74	DC8	A	A	I	13L		A2204	SAX	9EM

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2224	PMT-224	DH6	S	D	V	14	2220			
2226	NA463	B727	A	D	I	13L	2220			
2227	AL803	DC9	A	D	I	13R	2211			
2228	N75PX	C500	G	A	I	13L		A2209	SLT	9EM
2229	EA65	B727	A	D	I	13R	2212	P2200		
2229	AV54	B720	A	A	I	13L		A2213	SBY	7XG
2230	TW8727	B7S	A	D	I	13R	2215			
2231	AA14	H707	A	D	I	13L	2223			
2231	EA159	DC9	A	D	I	13R	2217			
2232	EA108	B727	A	D	I	13R	2217			
2233	CMD88	DH6	S	A	V	14				
2233	EA816	B727	A	A	I	13L		A2225	COL	7XG
2234	TW880	B747	A	D	I	13R	2217			
2234	BN904	DC8	A	A	I	13L		A2222	SBY	7XG
2236	PA72	B747	A	D	I	13R	2220			
2236	BN119	B727	A	D	I	13L	2220			
2239	TW877	HB7S	A	D	I	13R	2220	P2000		
2241	AL457	BA11	A	D	I	13R	2227			
2242	UA215	B727	A	D	I	13R	2235			
2243	NA437	B727	A	A	I	13L		A2225	7SM	7QM

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2244	PA93	H707	A	D	I	13R	2234			
2244	SU313	IL62	A	A	I	13L		A2229	HTO	7QM
2245	LL203	HDC8	A	A	I	13R		A2228	7SM	7QM
2246	CRA-261	BE18	S	D	V	13L	2240			
2248	PMT-366	DH6	S	D	V	14	2245			
2248	DL2921	HDC8	A	D	I	13R	2239			
2248	AA656	B727	A	A	I	13L		A2231	COL	7XG
2252	TW165	B707	A	D	I	13L	2245			
2256	AA155	B707	A	D	I	13R	2245			
2258	UA767	DC8	A	D	I	13R	2250			
2300	LH8-409	H707	A	D	I	13R	2248			
2302	UA47	DC10	A	D	I	13R	2257			
2302	PA110	B727	A	A	I	13R		P2230	MIV	7XG
2303	DL924	HDC8	A	D	I	13R	2253			
2304	PA002	B747	A	A	I	13L		A2245	SAX	9EM
2306	PA92	H707	A	D	I	13R	2251			
2307	PA230	B707	A	A	I	13L		A2245	COL	7XG
2308	EA157	DC9	A	D	I	13R	2253			
2308	AA822	B747	A	A	I	13L		A2250	SAX	9EM
2309	TW830	H707	A	D	I	13R	2249			
2310	AC752	DC93	A	A	I	13L		A2250	IGN	9EM
2311	EA111	DC9	A	D	I	13R	2255			
2311	AL823	DC9	A	A	I	13L		A2300	9NK	9EM

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2312	SK912	B747	A	D	I	13R	2253			
2312	NA28	B727	A	A	I	13L		A2235	MIV	7XG
2314	AC784	DC90	A	A	I	13L		A2302	7QN	9EM
2315	EA903	L101	A	D	I	13R	2304	P2259		
2315	N10AC	BE90	G	D	I	13R	2301			
2316	TW900	H707	A	A	I	13L		A2300	SLT	9EM
2317	NA71	B727	A	D	I	13L	2300	P2255		
2318	AC692	DC93	A	D	I	13L	2302	P2250		
2319	PA190	H707	A	D	I	13R	2307	P2300		
2321	MMH86	BE99	S	D	V	4L	2312			
2321	DL250	B727	A	A	I	13R		A2310	SBY	7XG
2323	IB952	B747	A	D	I	13R	2305	P2300		
2324	DL176	B727	A	A	I	13L		A2315	SBY	7XG
2325	AF070	B747	A	D	I	13R	2309	P2300		
2326	N75PX	C500	G	D	I	13R	2316	P2300		
2328	TW842	H707	A	D	I	13R	2311	P2300		
2328	CMD27	DH6	S	A	V	14				
2328	AA74	H707	A	A	I	13L		A2315	7QN	9EM
2330	TW701	H707	A	A	I	13L		A2315	7SM	7QM
2331	TW573	B707	A	D	I	13R	2315	P2315		
2332	TW910	HB7S	A	D	I	13L	2321	P2315		
2333	EA355	DC9	A	D	I	13R	2320	P2320		
2334	MMH-122	PA34	S	D	V	14	2330			
2334	AA656	B727	A	D	I	13L	2323	P2320		
2334	EA816	B727	A	D	I	13R	2321	P2320		
2335	KL989	DC8	A	A	I	13L		A2528	COL	7XG

JFK AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2336	UA229	DC8	A	D	I	13R	2330	P2310		
2337	NA437	B727	A	D	I	13L	2327	P2325		
2339	TW904	B747	A	D	I	13R	2322	P2315		
2339	DL328	B727	A	A	I	13R		A2334	ACY	7XG
2340	CMD48	BE99	S	D	V	14	2334			
2341	EA571	B727	A	D	I	13R	2332	P2330		
2341	TW840	B747	A	A	I	13L		A2323	SAX	9EM
2342	BN3	B727	A	D	I	13R	2331	P2330		
2342	DL959	HDC8	A	A	I	13R				7QM
2344	KL642	B747	A	D	I	13R	2329	P2315		
2345	UA8	B747	A	A	I	13L		A2327	SAX	9EM
2346	TW11	B707	A	D	I	13R	2330	P2330		
2347	PA234	B747	A	A	I	13L		A2325	COL	7XG
2348	OA412	B747	A	D	I	13R	2332	P2315		
2349	BA538	VC15	A	D	I	13R	2333	P2330		
2349	EA26	L101	A	A	I	13L		A2338	SBY	7XG
2351	TP311	HB7S	A	D	I	13R	2334	P2330		
2352	BA491	B747	A	A	I	13L		A2337	COL	7XG
2353	TW800	B747	A	D	I	13R	2335	P2330		
2356	NW221	B747	A	D	I	13R	2346	P2330		
2358	PMT-227	DH6	S	A	V	14				
2358	UA890	HDC8	A	A	I	13L		A2342	SAX	9EM

TABLE A-3
LGA AIRPORT

OPERATIONS FOR MAY 7, 1975, 2000-0000 HOURS GMT

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2001	N2N1	C310	G	D	V	32	1957			
2001	UA803	B737	A	D	I	4	1949	P1945		
2001	AA558	B727	A	A	I	31			BUF	7PW
2002	PI30	B737	A	A	I	31		P1948	OOD	RBV
2003	AL945	DC9	A	D	I	4	1950	P1945		
2004	EA1090	DC9	A	D	I	4	1951	P2000		
2005	EA1484	L188	A	A	I	31		A1955	OOD	RBV
2006	N24G	N265	G	D	I	4	1953	P1945		
2007	EA748	DC9	A	A	I	31		A1954	OOD	RBV
2008	TW343	B727	A	D	I	4	1954	P1945		
2008	EA1491	DC9	A	D	I	31	1953	P2000		
2009	TW144	B727	A	A	I	31		A1953	MIP	7PW
2010	N2227Q	C421	G	D	I	4	1957			
2010	UA763	B737	A	D	I	4	2005	P1955		
2011	AA538	B727	A	A	I	31		A1954	7QN	CMK
2012	UA351	B727	A	D	I	4	2000	P1955		
2013	AA25	B727	A	A	I	31		A2002	HFD	CMK
2014	EA577	B727	A	D	I	4	2000	P2005		
2015	AA106	B727	A	A	I	31		A1958	MIP	7PW
2016	UA921	B727	A	D	I	4	2005	P2000		
2017	N37DC	BE90	G	A	I	31				7PW*
2019	EA1092	L188	A	D	I	4	2006	P2010		
2022	N82Y	BE50	G	A	V	4				
2022	N4345F	FFJ	G	A	I	31		A2010	OOD	RBV
2023	AA175	B727	A	D	I	4	2009	P1959		
2023	TW334	B727	A	A	I	31		A2005	MIP	7PW
2024	N1731G	C310	G	D	V	4	2008			

① A = estimated time of arrival at Coordination Fix; P = proposed departure time.

② Previous fix (approximately 50 NM from Coordination Fix)

③ Coordination Fix

* Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2025	AA326	B727	A	D	I	4	2009	P1955		
2026	CMD21	DH6	S	A	V	4				
2026	EA1493	L188	A	D	I	4	2010	P2010		
2028	AA305	B727	A	D	I	4	2013	P2000		
2029	CSK-116	BE60	S	A	V	4				
2029	AA488	B727	A	D	I	4	2019	P2010		
2029	EA898	B727	A	A	I	31		A2013	OOD	RBV
2031	NW235	B727	A	D	I	4	2018	P2015		
2032	N320HG	B727	G	A	I	31		A2017	EWT	RBV
2033	UA650	B737	A	A	I	31		A2017	MIP	7PW
2034	UA415	B727	A	D	I	4	2019	P2015		
2034	OZ528	DC9	A	A	I	31		A2015	MIP	7PW
2036	EA365	B727	A	D	I	4	2024	P2005		
2036	AL826	DC9	A	A	I	31		A2018	MIP	7PW
2038	N6MK	HF20	G	A	I	31		A2026	EWT	RBV
2039	N257H	L329	G	D	I	4	2032	P2000		
2039	EA1091	B727	A	A	I	31		A2025	HFD	CMK
2040	ANE444	DH6	A	D	V	4	2032			
2040	N9652Y	BE50	G	D	V	4	2037			
2041	EA20	B727	A	A	I	31		A2028	OOD	RBV
2042	UA544	B737	A	A	I	31		A2026	MIP	7PW
2043	AA375	B727	A	D	I	4	2033	P2030		
2044	CFD8E	C206	G	D	I	4	2039			
2044	EA149C	DC9	A	A	I	31		A2031	OOD	RBV
2045	AA552	B727	A	A	I	31		A2026	MIP	7PW
2046	TW572	DC9	A	A	I	31		A2026	MIP	7PW

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2047	AA336	B727	A	A	I	31		A2021	MIP	7PW
2048	N834H	G159	G	A	I	31		A2030	MIP	7PW
2049	N1128M	BE10	G	D	I	4	2036	P2030		
2049	N104UA	C500	G	A	I	31		A2033	HFD	CMK
2050	AA426	B727	A	D	I	4	2037	P2030		
2051	DL120	B727	A	A	I	31		A2034	EWT	RBV
2052	N304 MA	MU2	G	D	I	4	2039	P2030		
2052	NC54	DC9	A	A	I	31		A2033	MIP	7PW
2053	SO321	DC9	A	A	I	31		A2039	OOD	RBV
2054	N7200R	BE10	G	A	V	4				
2054	N37DC	BE90	G	D	I	4	2040			
2055	AL506	BA11	A	A	I	31		A2040	PWL	CMK
2056	TW251	DC9	A	D	I	4	2041	P2035		
2056	AA98	B727	A	A	I	31		A2038	EWT	RBV
2057	N119K	G2	G	A	I	31		A2035	MIP	7PW
7058	N342K	FFJ	G	D	I	4	2042	P2000		
2058	N7928Q	C310	G	A	I	31				CMK*
2059	EA862	L101	A	D	I	4	2045	P2030		
2059	CSK117	BE80	S	D	V	31	2053			
2100	AA348	DC10	A	A	I	31		A2037	7QN	CMK
2102	EA544	B727	A	A	I	31		A2047	EWT	RBV
2103	N879K	BE10	G	D	I	4	2050	P2100		
2104	N4345F	FFJ	G	D	I	4	2054			
2105	CMD46	DH6	S	D	V	32	2102			
2105	DL426	DC9	A	A	I	31		A2051	OOD	RBV
2106	DL723	DC9	A	D	I	4	2051	P2045		
2107	N7200R	BE10	G	D	V	31	2101			

* Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2107	TW347	B727	A	D	I	4	2051	P2045		
2108	EA1494	L188	A	A	I	31		A2058	OOD	RBV
2109	EA1100	DC9	A	D	I	4	2050	P2100		
2110	EA1093	L188	A	A	I	31		A2056	HFD	CMK
2110	EA1501	DC9	A	D	I	4	2052	P2100		
2111	N3B	L329	G	A	I	31		A2056	OOD	RBV
2112	N146C	BE50	G	A	I	31				7PW*
2113	PI33	B737	A	D	I	4	2056	P2050		
2114	AA473	B727	A	A	I	31		A2103	HFD	CMK
2115	EA1492	L188	A	A	I	31		A2101	OOD	RBV
2116	AA25	B727	A	D	I	4	2101	P2055		
2117	N92B	AC21	G	A	I	31		A2106		7PW
2117	N104UA	C500	G	D	I	4	2104	P2115		
2118	BN5	B727	A	D	I	4	2104	P2100		
2119	UA914	B727	A	A	I	31		A2102	MIP	7PW
2120	DL123	B727	A	D	I	4	2105	P2100		
2121	PI74	B737	A	A	I	31		A2105	EWT	RBV
2122	AA391	B727	A	D	I	4	2106	P2100		
2123	N9112Y	PA31	G	D	V	31	2118			
2123	NW228	B727	A	A	I	31		A2105	MIP	7PW
2124	FJ473	LR24	G	A	I	31		P2100	PHL	RBV
2125	AA549	B727	A	D	I	4	2107	P2100		
2126	TW338	B727	A	A	I	31		A2111	MIP	7PW
2127	EA1102	L188	A	D	I	4	2105	P2110		
2128	N146C	BE35	G	D	V	31	2124			
2128	N7928Q	C310	G	D	V	31	2121			
2129	AA460	B727	A	A	I	31		A2116	OOD	RBV

*Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2129	TW163	B727	A	D	I	4	2107	P2105		
2131	EA1503	L188	A	D	I	4	2107	P2110		
2132	N33Y	BE50	G	A	I	31				RBV*
2132	EA1104	L188	A	D	I	4	2112	P2115		
2133	OZ971	DC9	A	D	I	4	2116	P2115		
2134	EA547	DC9	A	D	I	4	2118	P2110		
2135	N5111C	BE90	G	A	I	31		A2117	MIP	7PW
2135	N60BK	N265	G	D	I	4	2120	P2030		
2136	EA1101	DC9	A	A	I	31		A2124	HFD	CMK
2137	AA419	B727	A	D	I	4	2120	P2110		
2139	N18S	BE90	G	A	I	31		A2133	PWL	CMK
2139	AL887	DC9	A	D	I	4	2123	P2120		
2140	UA969	B737	A	D	I	4	2128	P2125		
2141	AA284	B727	A	A	I	31		A2126	MIP	7PW
2142	SU717	DC9	A	D	I	4	2130	P2050		
2143	N640B	BE35	G	D	V	31	2135			
2143	N2W	N265	G	A	I	31		A2126	MIP	7PW
2144	AA552	B727	A	D	I	4	2133	P2130		
2145	EA1500	DC9	A	A	I	31		A2131	OOD	RBV
2146	EA53	B727	A	D	I	4	2131	P2130		
2147	N67B	L329	G	D	I	4	2136	P2115		
2147	N33Y	BE50	G	D	V	31	2141			
2143	N260RA	C310	G	A	I	4				CMK*
2149	AL506	BA11	A	D	I	4	2137	P2130		
2150	UA368	B727	A	A	I	31		A2137	EWT	RBV
2151	AA480	B727	A	A	I	31		A2133	MIP	7PW
2152	N119K	G2	G	D	I	4	2139	P2130		

* Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2153	TW152	B727	A	A	I	31		A2136	MIP	7PW
2154	EA1502	L188	A	A	I	31		A2143	OOD	RBV
2155	EA362	DC9	A	A	I	31		A2141	EWT	RBV
2155	AA595	B727	A	D	I	4	2138	P2130		
2156	EJ473	LR24	G	D	I	4	2141			
2157	EA564	B727	A	A	I	31		A2142	OOD	RBV
2158	AA98	B727	A	D	I	4	2143	P2148		
2159	ANE443	FH7	A	A	I	31		A2149	HFD	CMK
2159	N34C	FFJ	G	D	I	4	2144	P2145		
2200	N9439Q	BE90	G	D	I	4	2144	P2100		
2201	EA364	B727	A	A	I	31		A2146	EWT	RBV
2202	DL221	B727	A	D	I	4	2148	P2145		
2203	N99AA	N265	G	A	I	31		A2142	MIP	7PW
2203	N2HW	N265	G	D	I	4	2151	P2145		
2204	AA466	DC10	A	A	I	31		A2144	MIP	7PW
2205	EA1511	DC9	A	D	I	4	2149	P2200		
2206	EA1103	L188	A	A	I	31		P2150	HFD	CMK
2207	AA261	B727	A	D	I	4	2155	P2150		
2208	DL609	DC9	A	A	I	31		A2157	HFD	CMK
2208	TW351	B727	A	D	I	4	2153	P2145		
2209	EA397	B727	A	D	I	4	2157	P2145		
2210	EA1111	B727	A	D	I	4	2156	P2200		
2211	N26ORA	BE35	G	D	I	4	2157			
2214	EA1504	L188	A	A	I	31		A2200	OOD	RBV
2214	TW411	DC9	A	D	I	4	2200	P2155		
2215	NC057	DC9	A	D	I	4	2200	P2155		
2216	CRA600	SW4	S	A	V	4				

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2216	AA473	B727	A	D	I	4	2204	P2155		
2218	NA94	B727	A	A	I	31		A2204	OOD	RBV
2219	DL565	DC9	A	D	I	4	2205	P2200		
2220	AA437	DC10	A	D	I	4	2205	P2200		
2222	AL848	DC9	A	A	I	31		A2206	7QN	CMK
2223	EA1513	L188	A	D	I	4	2200	P2210		
2224	N22CP	G159	G	A	I	31		A2211	OOD	RBV
2224	EA29	B727	A	D	I	4	2207	P2200		
2225	ANE665	BE99	A	A	I	31		A2210	HFD	CMK
2226	AA350	B727	A	A	I	31		A2208	OOD	RBV
2226	EA1112	L188	A	D	I	4	2208	P2210		
2227	TW456	B727	A	A	I	31		A2209	MIP	7PW
2228	PI52	B737	A	A	I	31		A2213	OOD	RBV
2229	N538M	BE90	G	A	I	31		A2212	MIP	7PW
2230	TW285	B727	A	D	I	4	2218	P2210		
2231	AA511	B727	A	A	I	31		A2206	7QN	CMK
2232	UA712	B737	A	A	I	31		A2213	MIP	7PW
2232	AA35	B727	A	D	I	4	2222	P2216		
2233	NW225	B727	A	D	I	4	2224	P2220		
2234	N5126	CV58	G	A	I	31		A2214	MIP	7PW
2235	PI49	B737	A	D	I	4	2225	P2220		
2236	EA24	B727	A	A	I	31		A2221	OOD	RBV
2237	UA557	B737	A	D	I	4	2223	P2220		
2238	TW342	B727	A	A	I	31		A2213	MIP	7PW
2238	N522M	HS25	G	D	I	4	2212	P2200		
2239	EA1113	L188	A	A	I	31		A2221	HFD	CMK
2240	N105G	L329	G	A	I	31		A2224	MIP	7PW

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2240	UA665	B727	A	D	I	4	2228	P2220		
2242	N715G	G159	G	A	I	31		P2225	EWT	RBV
2243	N725HG	G159	G	A	I	31		P2225	EWT	RBV
2243	N220P	G159	G	D	I	4	2232			
2244	N334UT	BE50	G	A	I	31				7PW*
2245	ANE709	FH7	A	A	I	31		A2225	PWL	CMK
2246	TW538	B727	A	A	I	31		A2221	MIP	7PW
2247	AA480	B727	A	D	I	4	2235	P2230		
2248	EA360	B727	A	A	I	31		A2228	EWT	RBV
2249	CRA601	SW4	S	D	I	4	2234	P2230		
2250	AA388	B727	A	A	I	31		A2224	MIP	7PW
2251	EA1510	DC9	A	A	I	31		A2233	OOD	RBV
2252	AA228	B727	A	A	I	31		A2228	MIP	7PW
2254	EA873	B727	A	D	I	4	1142			
2254	AL906	DC9	A	A	I	31		A2230	7QN	CMK
2254	EA541	DC9	A	D	I	4	2248	P2245		
2255	N745G	G159	G	A	I	31		A2236	EWT	RBV
2256	EA1111	DC9	A	A	I	31		A2235	HFD	CMK
2256	TW355	B727	A	D	I	4	2250	P2245		
2256	TW495	B727	A	D	I	4	2243	P2240		
2257	TW576	B727	A	A	I	31		A2230	MIP	7PW
2258	AL909	DC9	A	D	I	4	1148			
2259	AA593	B727	A	A	I	31		A2238	7EL	CMK
2259	N538M	BE90	G	D	I	4	2247	P2300		
2300	EA1512	L188	A	A	I	31		A2242	OOD	RBV
2301	AA296	B727	A	A	I	31		A2240	MIP	7PW
2302	ANE668	BE99	A	D	I	4	2300	P2215		

* Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2303	AA424	B727	A	A	I	31		A2240	MIP	7PW
2303	EA1120	DC9	A	D	I	4	2256	P2300		
2304	TW464	B727	A	A	I	31		A2243	EWT	RBV
2306	NW242	B727	A	A	I	31		A2240	MIP	7PW
2307	AA290	B727	A	A	I	31		A2248	MIP	7PW
2309	N5LC	BA11	G	A	I	31		A2247	MIP	7PW
2310	AL979	DC9	A	A	I	31		A2252	HFD	CMK
2310	AA511	B727	A	D	I	4	2303	P2259		
2312	AA144	B727	A	A	I	31		A2244	MIP	7PW
2312	AA531	DC10	A	D	I	4	2303	P2300		
2314	CMD47	DH6	S	A	V	4				
2316	N7	GI59	G	A	I	31		A2257	OOD	RBV
2316	UA929	B727	A	D	I	4	2304	P2300		
2318	AA341	B727	A	A	I	31		A2304	HFD	CMK
2319	EA357	B727	A	D	I	4	2303	P2300		
2320	UA464	B737	A	A	I	31		A2259	MIP	7PW
2320	EA1521	DC9	A	D	I	4	2301	P2300		
2321	DL402	DC9	A	D	I	4	2303	P2300		
2323	UA332	B737	A	A	I	31		A2308	EWT	RBV
2323	EA1115	L188	A	A	I	31		A2321	HFD	CMK
2323	A350	B727	A	D	I	4	2305	P2208		
2324	TW346	B727	A	A	I	31		A2307	MIP	7PW
2325	TW81	B727	A	D	I	4	2305	P2255		
2326	AA259	B727	A	D	I	4	2306	P2300		
2328	EA1122	L188	A	D	I	4	2308	P2310		
2329	ANE442	FH7	A	D	I	4	2307	A2245		
2330	N937	C402	G	A	V	31				

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2330	AA430	B727	A	A	I	31		A2320	7QN	CMK
2331	NA93	B727	A	D	I	4	2312	P2300		
2332	AL496	BA11	A	A	I	31		A2315	MIP	7PW
2334	AL861	DC9	A	D	I	4	2312	A2305		
2336	N33HM	LR25	G	A	I	31		A2317	MIP	7PW
2337	N8CR	BE55	G	A	I	31			DPK	CMK*
2337	ANE710	FH7	A	D	I	4	2315	P2305		
2339	N5619D	G159	G	A	I	31		A2328	OOD	RBV
2339	EA565	B727	A	D	I	4	2318	P2315		
2341	TW256	DC9	A	A	I	31		A2325	MIP	7PW
2342	AL588	BA11	A	A	I	31		A2328	7EL	CMK
2342	EA1523	L188	A	D	I	4	2325	P2310		
2343	AL979	DC9	A	D	I	4	2327	P2325		
2344	N731GA	LR35	G	A	I	31		A2327	MIP	7PW
2345	PI53	B737	A	D	I	4	2333	P2330		
2346	AA476	B727	A	A	I	31		A2328	MIP	7PW
2346	AA228	B727	A	D	I	4	2335	P2330		
2347	DL200	B727	A	A	I	31		A2328	EWT	RBV
2348	AA447	B727	A	D	I	4	2335	P2330		
2349	EA1121	DC9	A	A	I	31		A2331	HFD	CMK
2350	UA424	B727	A	A	I	31		A2331	EWT	RBV
2350	TW465	B727	A	D	I	4	2335	P2335		
2351	TW166	DC9	A	A	I	31		A2330	MIP	7PW
2352	EA360	B727	A	D	I	4	2337	P2325		
2353	EA1520	DC9	A	A	I	31		A2334	OOD	RBV
2353	EA595	B727	A	D	I	4	2339	P2335		
2354	AA154	B727	A	A	I	31		A2334	MIP	7PW

* Assumed

LGA AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2355	UA635	B737	A	D	I	4	2242	P2315		
2356	EA52	B727	A	A	I	31		A2338	EWT	RBV
2357	UA922	B727	A	A	I	31		A2336	MIP	7PW
2358	AL973	DC9	A	D	I	4	2344			
2359	NW224	B727	A	A	I	31		A2336	MIP	7PW
2359	N33HM	LR25	G	D	I	4	2351			

TABLE A-4

EWR AIRPORT

OPERATIONS FOR MAY 7, 1975, 2000 - 0000 HOURS GMT

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2003	TW160	DC9	A	A	I	4R		A1951	IPT	SNAPY
2004	EA367	B727	A	A	I	4L		A1942	PWL	7XO
2005	N328K	G2	G	D	I	4R	1955	P1945		
2007	EA538	B727	A	A	I	4R		A1955	EWT	9PC
2007	NW223	B727	A	D	I	4L	2001	P2000		
2009	EA549	B727	A	D	I	4L	2002	P1955		
2011	PI81	B737	A	D	I	4L	2004	P2000		
2013	TW575	DC9	A	D	I	4L	2005	P1930		
2014	UA305	DC8	A	D	I	4L	2004	P2000		
2015	N6217Y	PAZT	G	D	V	29	2008			
2017	UA788	B737	A	A	I	4R		A2008	EWT	9PC
2017	BN21	B727	A	D	I	4L	2006	P2005		
2019	EA197	B727	A	D	I	4L	2011	P2006		
2021	AL587	BA11	A	D	I	4L	2017	P2015		
2023	TW384	B707	A	A	I	4R		A2006	IPT	SNAPY
2023	UA489	B727	A	D	I	4L	2017	P2005		
2026	N20JM	FFJ	G	A	I	4R		A2006	9QR	SNAPY
2036	RAN108	ND26	S	A	I	4R				9PC
2036	POC333	BE99	S	D	V	29	2030	E2025		
2039	N910BS	G159	G	D	I	4L	2029	P2000		
2040	EA505	B727	A	A	I	4R		A2022	PWL	7XO
2043	TW504	B727	A	A	I	4R		A2029	IPT	SNAPY
2044	AA540	B727	A	A	I	4R		A2035	EWT	9PC
2046	AA47	H707	A	A	I	4R		A2035	EWT	9PC
2049	NW236	B727	A	A	I	4R		A2032	IPT	SNAPY
2053	N5109	N265	G	A	I	4R		A2040	EWT	9PC
2053	N312RF	BE90	G	A	I	4R		A2044	EWT	9PC
2053	EA367	B727	A	D	I	4L	2047	P2025		

① A = estimated time of arrival at Coordination Fix; P = proposed departure time

② Previous Fix (approximately 50 NM from Coordination Fix)

③ Coordination Fix

EWR AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time [1]	PF [2]	CF [3]
2053	NA121	B727	A	D	I	4L	2041	P2045		
2055	N27R	FFJ	G	A	I	4R		A2042	EWT	9PC
2056	N20JM	FFJ	G	D	I	4L	2047	P2045		
2059	EA538	B727	A	D	I	4L	2053	P2045		
2103	EA112	B727	A	A	I	4R		A2052	EWT	9PC
2104	RAN107	ND26	S	D	I	4L	2100	P2100		
2105	EA806	L101	A	D	I	4L	2056	P2050		
2108	PI43	B737	A	D	I	4L	2103	P2100		
2109	NA123	B727	A	D	I	4L	2104	P2100		
2111	BN28	B727	A	A	I	4L		A2100	EWT	9PC
2111	TW305	DC9	A	D	I	4L	2107	P2105		
2113	DL119	B727	A	D	I	4L	2108	P2105		
2114	N5109	N265	G	D	I	4L	2105	P2100		
2115	N256-EN	N265	G	A	I	4R		A2103	EWT	9PC
2116	AL516	BN11	A	A	I	4R		A2102	LHY	SNAPY
2118	DL368	B727	A	A	I	4R		A2107	EWT	9PC
2121	N410W	BE90	G	A	I	11		A2108	IPT	SNAPY
2122	UA142	DC10	A	A	I	4R		A2106	9QR	SNAPY
2124	EA505	B727	A	D	I	4L	2119	P2111		
2125	N256-MA	FFJ	G	A	I	4R		A2118	EWT	9PC
2127	N312RT	BE99	G	D	V	29	2123			
2133	EA852	DC9	A	A	I	4R		A2124	EWT	9PC
2134	UA909	B737	A	D	I	4L	2128	P2125		
2134	UA454	DC8	A	A	I	4R		A2120	9QR	SNAPY
2136	UA434	B727	A	A	I	4R		A2122	9QR	SNAPY
2139	N2525	HS25	G	A	I	4R		A2117	IGN	7XO
2144	TW6	B707	A	A	I	4R		A2127	9QR	SNAPY

EWR AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2146	AA8	B707	A	A	I	4R		A2134	IPT	SNAPY
2148	EA112	B727	A	D	I	4L	2141	P2130		
2149	AA220	B707	A	A	I	4R		A2138	IPT	SNAPY
2151	AL516	BA11	A	D	I	4L	2147	P2140		
2152	AA47	H707	A	D	I	4L	2147	P2145		
2155	NW231	B727	A	D	I	4L	2148	P2145		
2157	UA817	B737	A	D	I	4L	2147	P2145		
2158	AL442	BA11	A	A	I	4R		A2146	AVP	SNAPY
2159	TW387	B727	A	D	I	4L	2152	P2145		
2159	POC332	BE99	S	A	I	29		A2148	IPT	SNAPY
2200	N1515P	HS25	G	A	I	4R			HPN	7XO*
2202	TW239	B707	A	D	I	4L	2158	P2150		
2205	EA752	B727	A	A	I	4R		P2153	EWT	9PC
2207	BN29	B727	A	D	I	4L	2201	P2200		
2208	N900KC	C500	G	D	I	4L	2158	P2100		
2209	NA448	B727	A	A	I	4R		A2157	EWT	9PC
2212	EA354	B727	A	A	I	4R		A2158	EWT	9PC
2212	CRA-950	PA31	S	A	I	11				SNAPY
2213	AL965	DC9	A	A	I	4R		A2156	PWL	7XO
2214	TW15	B707	A	D	I	4L	2208	P2200		
2216	DL368	B727	A	D	I	4L	2211	P2210		
2216	SBN-274	DHC6	S	A	I	11				9PC
2221	N4444U	CJ23	G	D	I	4L	2213	P2100		
2222	UA586	B737	A	A	I	4R		A2209	9QR	SNAPY
2226	N1515P	HS25	G	D	I	4L	2216	P2200		

* Assumed

EWR AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2229	N20JM	FFJ	G	A	I	4R		A2006	PQR	SNAPY
2232	TW518	DC9	A	A	I	4L		A2217	IPT	SNAPY
2234	EA205	DC9	A	A	I	4L		A2223	EWT	9PC
2235	AL443	BA11	A	D	I	4L	2235	P2230		
2237	POC333	BE99	S	A	V	11				
2239	UA11	HDC8	A	D	I	4L	2232	P2200		
2240	EA759	DC9	A	D	I	4L	2235	P2230		
2244	EA893	B727	A	A	I	4L		A2228	PWL	7XO
2245	SBN-275	DHC6	S	D	I	29	2239			
2249	AL965	DC9	A	D	I	4R	2243	P2240		
2250	AL429	BA11	A	A	I	4L	.	A2237	IPT	SNAPY
2256	RAN137	ND26	S	A	I	4L				9PC
2258	NW94	DC10	A	A	I	4R		A2240	9QR	SNAPY
2259	N80K	N265	G	A	I	4R		A2245	9QR	SNAPY
2302	NA417	B727	A	D	I	4L	2255	P2250		
2302	N50SF	LR36	G	A	I	4R		A2243	PWL	7XO
2304	CRA951	PA31	S	D	V	29	2256	P2245		
2305	UA237	DC10	A	D	I	4L	2250	P2255		
2307	POC-338	BE99	S	D	I	29	2300	P2255		
2307	EA954	DC9	A	A	I	4L		A2253	EWT	9PC
2314	AA327	B727	A	D	I	4L	2308	P2155		
2316	EA655	B727	A	D	I	4L	2311	P2308		
2316	UA344	B727	A	A	I	4R		A2306	EWT	9PC
2317	AA28	B727	A	A	I	4R		A2304	IPT	SNAPY
2317	SBN504	BE99	S	A	I	11		A2250	ABE	9PC
2319	POC325	BE99	S	D	I	29	2312	P3300		

EWR AIRPORT (Cont'd)

Hours GMT	FLT/ ID	A/C	CT	AD	IV	RNY	DTR	Time[1]	PF[2]	CF[3]
2319	SBN-505	BE99	S	D	V	29	2342			
2320	UA72	HDC8	A	A	I	4R		A2307	9QR	SNAPY
2323	EA893	B727	A	D	I	4L	2318	P2259		
2326	EA205	DC9	A	D	I	4L	2318	P2315		
2326	TW82	B707	A	A	I	4R		A2311	IPT	SNAPY
2326	EA606	DC9	A	A	I	4R		A2313	EWT	9PC
2327	UA627	B737	A	D	I	4L	2320	P2320		
2329	AL429	BA11	A	D	I	4L	2321	P2320		
2331	RAN-106	ND26	S	D	V	4R	2328	P2324		
2333	DL1248	B727	A	A	I	4R		A2322	EWT	9PC
2335	UA657	B737	A	D	I	4L	2332	P2330		
2335	UA780	B727	A	A	I	4R		A2324	EWT	9PC
2337	PI78	B737	A	A	I	4L		P2329	EWT	9PC
2339	EA359	B727	A	D	I	4L	2333	P2325		
2339	EA535	B727	A	A	I	4R		A2318	PWL	7XO
2346	N477EC	BT6S	G	A	V	11		A2334	STW	JFK
2347	EA378	DC9	A	A	I	4R		A2335	EWT	7ZNX*
2349	XIA-15K	CV64	S	D	I	4L	2343			
2351	UA5802	HDC8	A	D	I	4R	2345	P2330		
2351	NA1070	B727	A	A	I	4L		A2339	EWT	9PC
2355	TW258	DC9	A	A	I	4R		A2338	IPT	SNAPY
2357	TW559	DC9	A	D	I	4L	2353	P2350		
2359	AL438	BA11	A	A	I	4L		A2338	AVP	SNAPY
0000	UA144	HDC8	A	A	I	4R		A2344	9QR	SNAPY

*Assume 9PC

APPENDIX B

LISTING OF COMPLETE NEW YORK CASE

A short run has been made in order to provide a complete listing of the output. It is for the New York area but includes a randomly generated traffic sample.

```
DISTRIBUTION  1 HAS (MEAN,STD DEV)=      5.09       2.58
DISTRIBUTION  2 HAS (MEAN,STD DEV)=      5.00       2.04
CHANGE KBUG TO  0 AFTER A/C NO.*** OR AFTER TIME=****** MINUTES.
CHANGE KBUG TO  0 AFTER A/C NO.*** OR AFTER TIME=****** MINUTES.
CHANGE LBUG TO  0 FOR A/C NO.  0 AFTER TIME=******* MINUTES.
CHANGE LBUG TO  0 FOR A/C NO.  0 AFTER TIME=******* MINUTES.
STOP AFTER A/C NO.*** OR AFTER TIME=200.00 MINUTES.
```

```
TAIM 4 INPUT

  9  10  30  15  10   1   1   5   1   0   1 600   5   3   0   6

TIMES                 1.00     1.00     0.30     0.10    -11.00    10.00

TIMES2                0.07     0.70     5.00    45.00      0.02   300.00

AUXDATA               1.00     3.00     2.00    29.30     10.00 18240.00      5.00

FEEDER FIX  1   EMPIRE 1         -12.20      9.10  15000.00      0.20    200.00      0.0

FEEDER FIX  2   BOHEMIA 2         29.90     12.50   7000.00      0.20    200.00      0.0

FEEDER FIX  3   SOUTHGATE3        -0.30    -29.50   7000.00      0.35    200.00      0.0

FEEDER FIX  4   PENWELL 4        -52.70     10.20   9000.00      0.35    200.00      0.0

FEEDER FIX  5   CARMEL 5           8.40     38.70   6000.00      0.10    100.00      0.0

FEEDER FIX  6   ROBBINSV 6       -33.20    -25.90   6000.00      0.35    200.00      0.0

FEEDER FIX  7   MONROE 7         -29.70     37.50   6000.00      0.35    200.00      0.0

FEEDER FIX  8   SNAPY 8          -41.80     18.90   6000.00      0.35    200.00      0.0

FEEDER FIX  9   PRINCETON9       -39.30    -15.10   6000.00      0.35    200.00      0.0

RUNWAY 1   13L JFK 1          -0.48      1.23     50.00    121.00      4.57      3.00
         0         0     1000.    9000.       0.        0.        0.       19
RUNWAY DEPARTURE TIMES AND CLASSES
   1.30 1  187.74 3  244.59 5  450.51 6  774.08 5  810.38 4 1145.26 5 1153.78 2 1776.01 1

RUNWAY 2   4L JFK  2          -0.61     -0.41     60.00     31.00      2.86      2.86
        -5         0     1000.    2000.    9500.        0.        0.        1

RUNWAY 3   4R JFK  3           0.13     -0.31     48.00     31.00      2.86      2.75
         0         0     1000.      0.        0.        0.        0.        0

RUNWAY 4   31L JFK 4          -0.66      0.12     50.00    301.00      5.22      3.00
         0         0     1000.      0.        0.        0.        0.        0

RUNWAY 5   31R JFK 5           0.27      0.77     50.00    301.00      5.75      2.50
        -2         0     1000.    2000.       0.        0.        0.        0

RUNWAY 6   31  LGA 6          -3.99      8.37     50.00    305.00      4.00      3.00
        -7         0     1000.    4750.       0.        0.        0.        0

RUNWAY 7   4 LGA   7          -4.98      8.10     50.00     33.00      4.00      3.00
        -6         0     1000.    4000.       0.        0.        0.       18
RUNWAY DEPARTURE TIMES AND CLASSES
   3.52 2    7.31 5  280.27 6 1026.49 1 1283.64 3 1400.18 2 1492.84 6 1654.14 2 1782.39 2

RUNWAY 8   4L NEWK 8         -18.34      3.15     50.00     26.00      4.87      2.60
         9         0     1000.     950.       0.        0.        0.       10
RUNWAY DEPARTURE TIMES AND CLASSES
 619.76 6  663.53 3  957.64 3 1259.21 5 1602.77 5

RUNWAY 9   4R NEWK 9         -18.20      2.09     55.00     26.00      4.87      3.00
         8         0     1000.     950.       0.        0.        0.        3
RUNWAY DEPARTURE TIMES AND CLASSES
1373.93 6
```

```
RUNWAY10   13R JFK 10        -1.55      0.64     50.00    121.00      4.57      3.00
     0          0         0.      1000.      0.        0.        0.       56
RUNWAY DEPARTURE TIMES AND CLASSES
  81.72 6  127.82 6  382.31 1  382.63 1  438.30 6  504.80 2  518.24 3  536.58 6  716.73 3  753.74 3  766.88 2  781.50 4
 816.07 5  947.53 4  961.12 2  997.91 1 1064.41 4 1170.05 1 1172.41 3 1263.45 5 1265.08 4 1325.54 1 1400.17 5 1418.78 1
1500.16 5 1626.50 6 1697.36 5 1711.47 5

PAIR  1    1    1      0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     13.71     -4.04    -12.02    -15.59    -13.98    -11.41     -5.34
Y COORDS OF IDEAL A/P     -3.36     -5.46     -6.34     -1.79      8.70     11.87     15.35
Z COORDS OF IDEAL A/P  15000.00  13000.00  12000.00  10000.00  10000.00   7000.00   3000.00

X COORDS OF IDEAL A/P      1.45      8.11     10.47     10.11      7.90      5.60      4.50
Y COORDS OF IDEAL A/P     13.36     11.73      8.76       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   3000.00   3000.00   2800.00   1712.00   1712.00   1500.00

X COORDS OF IDEAL A/P       0.0       0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P       0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P       0.0       0.0       0.0       0.0       0.0       0.0       0.0

PAIR  2    2    1      0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -24.69    -16.37    -15.59    -13.98    -11.41     -5.34      1.45
Y COORDS OF IDEAL A/P    -20.95     -6.96     -1.79      8.70     11.87     15.35     13.36
Z COORDS OF IDEAL A/P.  7000.00   7000.00   7000.00   7000.00   7000.00   3000.00   3000.00

X COORDS OF IDEAL A/P      8.11     10.47     10.11      7.90      5.60      4.50       0.0
Y COORDS OF IDEAL A/P     11.73      8.76       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   3000.00   2800.00   1712.00   1712.00   1500.00       0.0

PAIR  3    3    1      0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -10.67    -10.39     -8.44     -5.34      1.45      8.11     10.47
Y COORDS OF IDEAL A/P     28.84     23.09     17.74     15.35     13.36     11.73      8.76
Z COORDS OF IDEAL A/P   7000.00   7000.00   7000.00   3000.00   3000.00   3000.00   3000.00

X COORDS OF IDEAL A/P     10.11      7.90      5.60      4.50       0.0       0.0       0.0
Y COORDS OF IDEAL A/P       0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   2800.00   1712.00   1712.00   1500.00       0.0       0.0       0.0

PAIR  4    1    2      0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     -4.97     -7.06     -7.95     -3.39     -0.31      7.12     10.29
Y COORDS OF IDEAL A/P    -14.12      3.64     11.62     15.19     14.61     13.48     10.91
Z COORDS OF IDEAL A/P  15000.00  13000.00  12000.00  10000.00  10000.00   7000.00   7000.00

X COORDS OF IDEAL A/P     13.78     11.74      8.51      4.82      2.80       0.0       0.0
Y COORDS OF IDEAL A/P      4.84      0.80       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   1500.00   1500.00   1500.00    900.00       0.0       0.0

PAIR  5    3    2      0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
```

```
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P     27.23     21.48     16.13     13.78     11.74      8.51      4.82
Y COORDS OF IDEAL A/P     10.27      9.98      8.03      4.84      0.80      0.0       0.0
Z COORDS OF IDEAL A/P   7000.00   5250.00   4500.00   3000.00   1500.00   1500.00   1500.00

X COORDS OF IDEAL A/P      2.80      0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P    900.00      0.0       0.0       0.0       0.0       0.0       0.0

PAIR  6    2    2     0.0      0.0      0.0      1.00      0.30     3 0.0
(NDKTOR)=           0        0        0        0        1        0
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P    -22.56     -8.67     -3.49     -0.31      7.12     10.29     13.78
Y COORDS OF IDEAL A/P     24.28     15.93     15.15     14.61     13.48     10.91      4.84
Z COORDS OF IDEAL A/P   7000.00   7000.00   7000.00   7000.00   7000.00   7000.00   3000.00

X COORDS OF IDEAL A/P     11.74      8.51      4.82      2.80      0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.80      0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1500.00   1500.00   1500.00    900.00      0.0       0.0       0.0

PAIR  7    1    3     0.0      0.0      0.0      1.00      0.30     3 0.0
(NDKTOR)=           0        0        0        0        1        0
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P     -4.62     -6.72     -7.60     -3.05      0.04      7.47     10.64
Y COORDS OF IDEAL A/P    -14.78      2.97     10.95     14.53     13.95     12.82     10.25
Z COORDS OF IDEAL A/P  15000.00  13000.00  12000.00  11000.00  11000.00   7000.00   7000.00

X COORDS OF IDEAL A/P     14.13     12.09      9.35      5.03      2.84      0.0       0.0
Y COORDS OF IDEAL A/P      4.18      0.14      0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   1500.00   1500.00   1500.00    900.00      0.0       0.0

PAIR  8    3    3     0.0      0.0      0.0      1.00      0.30     3 0.0
(NDKTOR)=           0        0        0        0        1        0
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P     27.58     21.83     16.48     14.13     12.09      9.35      5.03
Y COORDS OF IDEAL A/P      9.61      9.32      7.37      4.18      0.14      0.0       0.0
Z COORDS OF IDEAL A/P   7000.00   5250.00   4500.00   3000.00   1500.00   1500.00   1500.00

X COORDS OF IDEAL A/P      2.84      0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P    900.00      0.0       0.0       0.0       0.0       0.0       0.0

PAIR  9    2    3     0.0      0.0      0.0      1.00      0.30     3 0.0
(NDKTOR)=           0        0        0        0        1        0
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P    -22.21     -8.32     -3.14      0.04      7.47     10.64     14.13
Y COORDS OF IDEAL A/P     23.62     15.27     14.49     13.95     12.82     10.25      4.18
Z COORDS OF IDEAL A/P   7000.00   7000.00   7000.00   7000.00   7000.00   7000.00   3000.00

X COORDS OF IDEAL A/P     12.09      9.35      5.03      2.84      0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.14      0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1500.00   1500.00   1500.00    900.00      0.0       0.0       0.0

PAIR 10    1    4     0.0      0.0      0.0      1.00      0.30     3 0.0
(NDKTOR)=           0        0        0        0        1        0
(FXDCON)=        0.0      0.0      0.0      0.0      0.0      0.25
```

X COORDS OF IDEAL A/P	-13.91	-4.73	2.04	8.82	11.83	13.47	14.09
Y COORDS OF IDEAL A/P	4.52	-4.91	-11.81	-13.49	-11.23	-8.72	-4.87
Z COORDS OF IDEAL A/P	15000.00	13000.00	8000.00	6000.00	4000.00	3000.00	3000.00

X COORDS OF IDEAL A/P	10.56	5.48	5.14	0.0	0.0	0.0	0.0
Y COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	1800.00	1800.00	1712.00	0.0	0.0	0.0	0.0

PAIR 11 3 4 0.0 0.0 0.0 1.00 0.30 3 0.0

(NDKTOR)=	0	0	0	0	1	0
(FXDCON)=	0.0	0.0	0.0	0.0	0.0	0.25

X COORDS OF IDEAL A/P	10.47	13.47	14.09	10.56	5.48	5.14	0.0
Y COORDS OF IDEAL A/P	-27.68	-8.72	-4.87	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	7000.00	3000.00	3000.00	1800.00	1800.00	1712.00	0.0

PAIR 12 2 4 0.0 0.0 0.0 1.00 0.30 3 0.(

(NDKTOR)=	0	0	0	0	1	0
(FXDCON)=	0.0	0.0	0.0	0.0	0.0	0.25

X COORDS OF IDEAL A/P	24.49	16.14	15.79	15.11	10.56	5.48	5.14
Y COORDS OF IDEAL A/P	22.11	8.22	5.96	1.67	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	7000.00	5500.00	4000.00	3000.00	1800.00	1800.00	1712.00

X COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PAIR 13 1 5 0.0 0.0 0.0 1.00 0.30 3 0.0

(NDKTOR)=	0	0	0	0	1	0
(FXDCON)=	0.0	0.0	0.0	0.0	0.0	0.25

X COORDS OF IDEAL A/P	-14.56	-5.38	1.39	8.17	11.18	12.82	13.44
Y COORDS OF IDEAL A/P	3.59	-5.84	-12.74	-14.42	-12.16	-9.64	-5.80
Z COORDS OF IDEAL A/P	15000.00	13000.00	8000.00	6000.00	4000.00	3000.00	3000.00

X COORDS OF IDEAL A/P	10.04	6.01	5.68	0.0	0.0	0.0	0.0
Y COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	1600.00	1600.00	1560.00	0.0	0.0	0.0	0.0

PAIR 14 3 5 0.0 0.0 0.0 1.00 0.30 3 0.0

(NDKTOR)=	0	0	0	0	1	0
(FXDCON)=	0.0	0.0	0.0	0.0	0.0	0.25

X COORDS OF IDEAL A/P	9.82	12.82	13.44	10.04	6.01	5.68	0.0
Y COORDS OF IDEAL A/P	-28.61	-9.64	-5.80	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	7000.00	3000.00	3000.00	1600.00	1600.00	1560.00	0.0

PAIR 15 2 5 0.0 0.0 0.0 1.00 0.30 3 0.0

(NDKTOR)=	0	0	0	0	1	0
(FXDCON)=	0.0	0.0	0.0	0.0	0.0	0.25

X COORDS OF IDEAL A/P	23.84	15.48	15.14	14.46	10.04	6.01	5.68
Y COORDS OF IDEAL A/P	21.18	7.29	5.03	0.74	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	7000.00	5500.00	4000.00	3000.00	1600.00	1600.00	1560.00

X COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Z COORDS OF IDEAL A/P	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PAIR 16 6 6 0.0 0.0 0.0 1.00 0.30 3 0.0

(NDKTOR)=	0	0	0	0	1	0

```
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P    -12.74   -11.52    -8.46    -3.05    -0.95    -0.33     2.25
Y COORDS OF IDEAL A/P    -43.16   -39.99   -31.62   -16.73     0.18     5.93     7.52
Z COORDS OF IDEAL A/P   6000.00  6000.00  4000.00  4000.00  4000.00  3000.00  3000.00

X COORDS OF IDEAL A/P      4.79     8.42     8.21     6.06     5.08     4.00      0.0
Y COORDS OF IDEAL A/P      7.22     2.49     0.76      0.0      0.0      0.0      0.0
Z COORDS OF IDEAL A/P   3000.00  1600.00  1600.00  1550.00  1500.00  1400.00      0.0

PAIR 17    5    6     0.0      0.0      0.0      1.00     0.30    3 0.0
(NDKTOR)=         0        0        0        0        1        0
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P     -1.01     1.60     2.58     1.49     1.11     4.79     8.42
Y COORDS OF IDEAL A/P     32.78    23.97    21.02    14.62    12.04     7.22     2.49
Z COORDS OF IDEAL A/P   6000.00  6000.00  5000.00  4000.00  3000.00  3000.00  1600.00

X COORDS OF IDEAL A/P      8.21     6.06     5.08     4.00      0.0      0.0      0.0
Y COORDS OF IDEAL A/P      0.76      0.0      0.0      0.0      0.0      0.0      0.0
Z COORDS OF IDEAL A/P   1600.00  1550.00  1500.00  1400.00      0.0      0.0      0.0

PAIR 18    4    6     0.0      0.0      0.0      1.00     0.30    3 0.0
(NDKTOR)=         0        0        0        0        1        0
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P    -45.23   -16.18    -8.22    -3.05    -0.95    -0.33     2.25
Y COORDS OF IDEAL A/P    -18.11   -23.13   -21.34   -16.73     0.18     5.93     7.52
Z COORDS OF IDEAL A/P   9000.00  9000.00  7000.00  7000.00  4000.00  3000.00  3000.00

X COORDS OF IDEAL A/P.     4.79     8.42     8.21     6.06     5.08     4.00      0.0
Y COORDS OF IDEAL A/P      7.22     2.49     0.76      0.0      0.0      0.0      0.0
Z COORDS OF IDEAL A/P   3000.00  3000.00  2100.00  1550.00  1500.00  1400.00      0.0

PAIR 19    5    7     0.0      0.0      0.0      1.00     0.30    3 0.0
(NDKTOR)=         0        0        0        0        1        0
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P    -33.35   -24.46   -21.47   -15.12    -1.09     2.44     7.55
Y COORDS OF IDEAL A/P      0.99     3.28     4.17     2.85    -0.11    -4.83    -5.46
Z COORDS OF IDEAL A/P   6000.00  6000.00  5000.00  4000.00  4000.00  4000.00  3000.00

X COORDS OF IDEAL A/P      9.70     9.84     8.63     8.41     4.01      0.0      0.0
Y COORDS OF IDEAL A/P     -4.38    -3.13      0.0      0.0      0.0      0.0      0.0
Z COORDS OF IDEAL A/P   3000.00  3000.00  2800.00  2700.00  1400.00      0.0      0.0

PAIR 20    4    7     0.0      0.0      0.0      1.00     0.30    3 0.0
(NDKTOR)=         0        0        0        0        1        0
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25

X COORDS OF IDEAL A/P     15.97    21.99    20.48    16.06    15.06     8.63     8.41
Y COORDS OF IDEAL A/P    -44.99   -16.13    -8.11    -2.78    -2.43      0.0      0.0
Z COORDS OF IDEAL A/P   9000.00  9000.00  7000.00  7000.00  3500.00  2800.00  2700.00

X COORDS OF IDEAL A/P      4.01      0.0      0.0      0.0      0.0      0.0      0.0
Y COORDS OF IDEAL A/P       0.0      0.0      0.0      0.0      0.0      0.0      0.0
Z COORDS OF IDEAL A/P   1400.00      0.0      0.0      0.0      0.0      0.0      0.0

PAIR 21    6    7     0.0      0.0      0.0      1.00     0.30    3 0.0
(NDKTOR)=         0        0        0        0        1        0
(FXDCON)=      0.0      0.0      0.0      0.0      0.0      0.25
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X COORDS OF IDEAL A/P     42.13     39.01     30.75     16.06     15.06      8.63      8.41
Y COORDS OF IDEAL A/P    -13.38    -12.06     -8.70     -2.78     -2.43      0.0       0.0
Z COORDS OF IDEAL A/P   6000.00   6000.00   4000.00   4000.00   3500.00   2800.00   2700.00

X COORDS OF IDEAL A/P      4.01      0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1400.00      0.0       0.0       0.0       0.0       0.0       0.0

PAIR 22    7    8    0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -30.45     -9.97     -0.74      4.22      8.09     13.57     10.77
Y COORDS OF IDEAL A/P    -20.04    -14.55    -20.05    -14.99    -10.12     -5.45      0.0
Z COORDS OF IDEAL A/P   6000.00   6000.00   6000.00   5000.00   4000.00   3000.00   2500.00

X COORDS OF IDEAL A/P      5.30      4.80      0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1700.00   1646.00      0.0       0.0       0.0       0.0       0.0

PAIR 23    8    8    0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     -9.35     -0.74      4.22      8.09     13.57     10.77      5.30
Y COORDS OF IDEAL A/P    -26.91    -20.05    -14.99    -10.12     -5.45      0.0       0.0
Z COORDS OF IDEAL A/P   6000.00   6000.00   5000.00   4000.00   3000.00   2500.00   1700.00

X COORDS OF IDEAL A/P      4.80      0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1646.00      0.0       0.0       0.0       0.0       0.0       0.0

PAIR 24    9    8    0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     22.84      9.77      8.09     13.57     10.96      5.30      4.80
Y COORDS OF IDEAL A/P    -15.70    -12.88    -10.12     -5.45      0.0       0.0       0.0
Z COORDS OF IDEAL A/P   6000.00   4000.00   4000.00   3000.00   2500.00   1700.00   1646.00

X COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0

PAIR 25    7    9    0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -30.24     -9.76     -0.52      4.43      8.31     13.78     11.23
Y COORDS OF IDEAL A/P    -19.82    -14.34    -19.83    -14.78     -9.91     -5.23      0.0
Z COORDS OF IDEAL A/P   6000.00   6000.00   6000.00   5000.00   4000.00   3000.00   2500.00

X COORDS OF IDEAL A/P      6.07      5.78      0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1700.00   1688.00      0.0       0.0       0.0       0.0       0.0

PAIR 26    8    9    0.0       0.0       0.0       1.00      0.30     3 0.0
(NDKTOR)=       0         0         0         0         1         0
(FXDCON)=     0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     -9.14     -0.52      4.43      8.31     13.78     11.23      6.07
Y COORDS OF IDEAL A/P    -26.70    -19.83    -14.78     -9.91     -5.23      0.0       0.0
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Z COORDS OF IDEAL A/P   6000.00   6000.00   5000.00   4000.00   3000.00   2500.00   1700.00

X COORDS OF IDEAL A/P      5.78      0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   1688.00      0.0       0.0       0.0       0.0       0.0       0.0

PAIR 27    9    9      0.0       0.0       0.0       1.00      0.30    3 0.0
(NDKTOR)=        0         0         0         0         1         0
(FXDCON)=      0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     23.05      9.98      8.31     13.78     11.23      6.07      5.78
Y COORDS OF IDEAL A/P    -15.48    -12.67     -9.91     -5.23      0.0       0.0       0.0
Z COORDS OF IDEAL A/P   6000.00   4000.00   4000.00   3000.00   2500.00   1700.00   1688.00

X COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0

PAIR 28    1   10      0.0       0.0       0.0       1.00      0.30    3 0.0
(NDKTOR)=        0         0         0         0         1         0
(FXDCON)=      0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P     13.71     -4.04    -12.02    -15.59    -13.98    -11.41     -5.34
Y COORDS OF IDEAL A/P     -4.63     -6.73     -7.61     -3.06      7.43     10.60     14.08
Z COORDS OF IDEAL A/P  15000.00  13000.00  12000.00  10000.00  10000.00   7000.00   3000.00

X COORDS OF IDEAL A/P      1.45      8.11     10.47     10.11      7.90      5.60      4.50
Y COORDS OF IDEAL A/P     12.09     10.46      7.49      0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   3000.00   3000.00   2800.00   1712.00   1712.00   1500.00

X COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0

PAIR 29    2   10      0.0       0.0       0.0       1.00      0.30    3 0.0
(NDKTOR)=        0         0         0         0         1         0
(FXDCON)=      0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -24.69    -16.37    -15.59    -13.98    -11.41     -5.34      1.45
Y COORDS OF IDEAL A/P    -22.22     -8.23     -3.06      7.43     10.60     14.08     12.09
Z COORDS OF IDEAL A/P   7000.00   7000.00   7000.00   7000.00   7000.00   3000.00   3000.00

X COORDS OF IDEAL A/P      8.11     10.47     10.11      7.90      5.60      4.50      0.0
Y COORDS OF IDEAL A/P     10.46      7.49      0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   3000.00   3000.00   2800.00   1712.00   1712.00   1500.00      0.0

PAIR 30    3   10      0.0       0.0       0.0       1.00      0.30    3 0.0
(NDKTOR)=        0         0         0         0         1         0
(FXDCON)=      0.0       0.0       0.0       0.0       0.0       0.25

X COORDS OF IDEAL A/P    -10.67    -10.39     -8.44     -5.34      1.45      8.11     10.47
Y COORDS OF IDEAL A/P     27.47     21.82     16.47     14.08     12.09     10.46      7.49
Z COORDS OF IDEAL A/P   7000.00   7000.00   7000.00   3000.00   3000.00   3000.00   3000.00

X COORDS OF IDEAL A/P     10.11      7.90      5.60      4.50      0.0       0.0       0.0
Y COORDS OF IDEAL A/P      0.0       0.0       0.0       0.0       0.0       0.0       0.0
Z COORDS OF IDEAL A/P   2800.00   1712.00   1712.00   1500.00      0.0       0.0       0.0

HSEPS  1  1      3.00      3.00      1.00      1.00      1.50      0.88

HSEPS  1  2      3.00      5.00      1.00      1.00      1.50      0.88
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HSEPS	1	3	3.00	5.00	1.00	1.00	1.50	0.88
HSEPS	1	4	3.00	5.00	1.00	1.00	1.50	0.88
HSEPS	1	5	3.00	5.00	1.00	1.00	1.50	0.88
HSEPS	1	6	3.00	5.00	1.00	1.00	1.50	0.88
HSEPS	2	1	5.00	3.00	1.00	1.00	1.50	0.88
HSEPS	2	2	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	2	3	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	2	4	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	2	5	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	2	6	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	1	5.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	2	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	3	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	4	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	5	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	3	6	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	1	5.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	2	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	3	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	4	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	5	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	4	6	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	1	5.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	2	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	3	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	4	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	5	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	5	6	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	6	1	5.00	3.00	1.00	1.00	1.50	0.88
HSEPS	6	2	3.00	3.00	1.00	1.00	1.50	0.88
HSEPS	6	3	3.00	3.00	1.00	1.00	1.50	0.88

```
HSEPS  6  4      3.00      3.00      1.00      1.00      1.50      0.88

HSEPS  6  5      3.00      3.00      1.00      1.00      1.50      0.88

HSEPS  6  6      3.00      3.00      1.00      1.00      1.50      0.88
      500.      180.      250.      135.      130.       6.        4.
      160.      120.        0.       50.     3000.
      400.      150.      250.      115.      110.       6.        4.
      150.      110.        0.       50.     3000.
      320.      140.      250.      110.      105.       6.        4.
      140.      100.        0.       40.     2000.
      240.      110.      240.      100.       95.       6.        4.
      140.      100.        0.       20.     2000.
      190.      110.      190.       95.       90.       6.        4.
      120.       90.        0.       15.     1000.
      150.      100.      150.       90.       85.       6.        4.
       85.       75.        0.       10.     1000.

TYPE 1   TYPE1                3     0       1.00 0.0  0.0  0.0  0.0  0.0
     FIX  3     RUNWAY  1
                  10.        1.        0.
RHO =     2

TYPE 2   TYPE2               30     0       1.00 0.0  0.0  0.0  0.0  0.0
     FIX  3     RUNWAY 10
                  10.        1.        0.
RHO =     0

TYPE 3   TYPE3                2     0       1.00 0.0  0.0  0.0  0.0  0.0
     FIX  2     RUNWAY  1
                  10.        1.        0.
RHO =     0

TYPE 4   TYPE4                1     0       0.87 0.07 0.0  0.06 0.0  0.0
     FIX  1     RUNWAY  1
                  10.        1.        0.
RHO =     2

TYPE 5   TYPE5               28     0       0.50 0.50 0.0  0.0  0.0  0.0
     FIX  1     RUNWAY 10
                  10.        1.        0.
RHO =     0

TYPE 6   TYPE6               29     0       1.00 0.0  0.0  0.0  0.0  0.0
     FIX  2     RUNWAY 10
                  10.        1.        0.
RHO =     0

TYPE 7   TYPE7               16     0       0.64 0.0  0.36 0.0  0.0  0.0
     FIX  6     RUNWAY  6
                  10.        1.        0.
RHO =     2

TYPE 8   TYPE8               18     0       0.81 0.09 0.0  0.06 0.04 0.0
     FIX  4     RUNWAY  6
                  10.        1.        0.
RHO =     2

TYPE 9   TYPE9               17     0       0.61 0.17 0.0  0.17 0.05 0.0
     FIX  5     RUNWAY  6
                  10.        1.        0.
RHO =     2
```

```
TYPE10   TYPE10                 26     0        0.91 0.09 0.0  0.0  0.0  0.0
    FIX  8       RUNWAY  9
                  10.           1.              0.
RHO =    1

TYPE11   TYPE11                 25     0        0.75 0.25 0.0  0.0  0.0  0.0
    FIX  7       RUNWAY  9
                  10.           1.              0.
RHO =    0

TYPE12   TYPE12                 27     0        1.00 0.0  0.0  0.0  0.0  0.0
    FIX  9       RUNWAY  9
                  10.           1.              0.
RHO =    1

TYPE13   TYPE13                 23     0        1.00 0.0  0.0  0.0  0.0  0.0
    FIX  8       RUNWAY  8
                  10.           1.              0.
RHO =    0

TYPE14   TYPE14                 24     0        0.80 0.0  0.0  0.20 0.0  0.0
    FIX  9       RUNWAY  8
                  10.           1.              0.
RHO =    0

TYPE15   TYPE15                 22     0        1.00 0.0  0.0  0.0  0.0  0.0
    FIX  7       RUNWAY  8
                  10.           1.              0.
RHO =    0

GENERATION TIMES FOR TYPE  1    0.39    7.83

GENERATION TIMES FOR TYPE  4    0.63    2.49

GENERATION TIMES FOR TYPE  7    4.73    8.34

GENERATION TIMES FOR TYPE  8    5.02    7.43

GENERATION TIMES FOR TYPE  9    1.49    9.86

GENERATION TIMES FOR TYPE 10    4.22

GENERATION TIMES FOR TYPE 12    6.01
CLASSES FOR TYPE   1  1  1
CLASSES FOR TYPE   2  1
CLASSES FOR TYPE   3  1
CLASSES FOR TYPE   4  1  1
CLASSES FOR TYPE   5  2
CLASSES FOR TYPE   6  1
CLASSES FOR TYPE   7  1  1
CLASSES FOR TYPE   8  1  1
CLASSES FOR TYPE   9  1  1
CLASSES FOR TYPE  10  1
CLASSES FOR TYPE  11  1
CLASSES FOR TYPE  12  1
CLASSES FOR TYPE  13  1
CLASSES FOR TYPE  14  1
CLASSES FOR TYPE  15  1

MISC.             10.00      3.00      0.20      1.00      0.10
```

ST.DEV. 1.00 0.0 100.00 40.00 7.00 3.00

TIME(MIN)= 0.0 TIME(SEC)= 0.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.07 TIME(SEC)= 4.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.13 TIME(SEC)= 8.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.20 TIME(SEC)= 12.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.27 TIME(SEC)= 16.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.33 TIME(SEC)= 20.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.40 TIME(SEC)= 24.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.47 TIME(SEC)= 28.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.53 TIME(SEC)= 32.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.60 TIME(SEC)= 36.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.67 TIME(SEC)= 40.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

TIME(MIN)= 0.73 TIME(SEC)= 44.0 KCURNT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 3 2 1 NAVAIL= 75

*****APPROACH**A/C 1**TYPE 1**CNTRL VARS 0.0 0.0 0.0 0.0 0.0 0.25**(IDIV,ILEV,ILB)= 0 0 10**(IAF,IRUN)= 3 1

*VERTEX	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
*TIME(MIN)	12.05	13.44	14.81	15.78	17.53	19.28	20.31	22.67	22.84	23.62	24.64	25.10	27.21		
*X(N.MILE)	-10.674	-10.390	-8.441	-5.339	1.454	8.110	10.469	10.132	10.113	7.900	5.600	4.570	0.0		
*Y(N.MILE)	28.842	23.093	17.736	15.354	13.357	11.735	8.763	0.470	0.0	0.0	0.0	0.0	0.0		
*Z(FEET)	7000.	7000.	7000.	3000.	3000.	3000.	3000.	3000.	2800.	1712.	1712.	1500.	50.		
*V(KNOTS)	250.00	249.01	246.05	242.78	233.97	220.91	210.96	174.51	170.98	135.00	135.00	130.00			
*VX(KNOTS)	12.33	85.14	192.45	232.93	227.32	137.34	-8.56	-7.07	-170.43	-135.00	-134.92	-129.82			
*VY(KNOTS)	-249.70	-234.01	-147.78	-68.48	-55.39	-173.03	-210.79	-173.94	0.0	0.0	0.0	0.0			
*VZ(FT/MN)	0.	0.	-4136.	0.	0.	0.	0.	-1234.	-1398.	0.	-463.	-687.			
*X0(NM)	-0.314	1.305	1.386	-0.714	-6.415	-12.114	-13.315	-10.162	-9.983	-7.904	-5.742	-4.774	-0.480		
*Y0(NM)	-29.523	-24.024	-18.323	-15.024	-10.824	-7.024	-3.424	4.254	4.689	3.932	3.145	2.793	1.230		

****

A DEPARTURE WAS SCHEDULED AT TIME = 0.02 FOR A CLASS 1 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 3.13 FOR A CLASS 3 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 4.48 FOR A CLASS 5 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 7.51 FOR A CLASS 6 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 12.90 FOR A CLASS 5 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 14.72 FOR A CLASS 4 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 19.09 FOR A CLASS 5 ON RUNWAY 1
A DEPARTURE WAS SCHEDULED AT TIME = 20.90 FOR A CLASS 2 ON RUNWAY 1

*****APPROACH**A/C 2**TYPE 4**CNTRL VARS 0.0 0.0 0.0 0.0 0.0 0.25**(IDIV,ILEV,ILB)= 0 0 17**(IAF,IRUN)= 1 1

*VERTEX	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
*TIME(MIN)	3.80	4.80	6.96	8.10	9.48	10.06	10.32	11.48	14.12	15.18	17.01	18.92	20.86	21.99	24.58
*TIME(MIN)	24.75	25.57	26.60	27.06	29.17										
*X(N.MILE)	13.710	9.572	0.630	-4.042	-9.604	-12.022	-12.690	-15.594	-13.983	-11.412	-5.339	1.454	8.110	10.469	10.132
*X(N.MILE)	10.113	7.900	5.600	4.570	0.0										
*Y(N.MILE)	-3.360	-3.849	-4.906	-5.458	-6.082	-6.340	-5.489	-1.788	8.696	11.866	15.354	13.357	11.735	8.763	0.470
*Y(N.MILE)	0.0	0.0	0.0	0.0	0.0										
*Z(FEET)	15000.	15000.	15000.	13000.	13000.	12000.	12000.	10000.	10000.	7000.	3000.	3000.	3000.	3000.	3000.
*Z(FEET)	2800.	1712.	1712.	1500.	50.										
*V(KNOTS)	250.00	249.05	248.51	247.24	245.17	244.12	243.61	241.09	233.56	229.89	222.36	212.79	200.82	192.46	164.16
*V(KNOTS)	161.52	135.00	135.00	130.00											
*VX(KNOTS)	-248.27	-248.12	-246.19	-245.74	-243.09	-150.70	-150.02	36.62	146.06	198.47	213.34	206.74	124.85	-7.81	-6.55

```
+VX(KNOTS) -161.00 -135.00 -134.92 -129.82
+VY(KNOTS)  -29.34  -29.32  -29.10  -27.16  -26.87  192.05  191.18  238.29  180.09  113.99  -62.72  -50.38 -157.30 -192.31 -163.63
+VY(KNOTS)    0.0     0.0     0.0     0.0
+VZ(FT/MN)      0.      0.  -1757.      0.  -1733.      0.  -1722.      0.  -2840.  -2179.      0.      0.      0.      0.  -1160.
+VZ(FT/MN)  -1319.      0.   -463.   -687.
+X0(NM)    -12.214  -8.158   0.606   5.185  10.700  12.985  13.322  14.785   9.686   6.185  -0.714  -6.415 -12.114 -13.315 -10.162
+X0(NM)     -9.983  -7.904  -5.742  -4.774  -0.480
+Y0(NM)      9.076   8.121   6.055   4.976   3.633   3.076   2.048  -2.423 -11.724 -13.823 -15.024 -10.824  -7.024  -3.424   4.254
+Y0(NM)      4.689   3.932   3.145   2.793   1.230
**********

TIME(MIN)=  0.80   TIME(SEC)=   48.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  0.87   TIME(SEC)=   52.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  0.93   TIME(SEC)=   56.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.00   TIME(SEC)=   60.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.07   TIME(SEC)=   64.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.13   TIME(SEC)=   68.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.20   TIME(SEC)=   72.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.27   TIME(SEC)=   76.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.33   TIME(SEC)=   80.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.40   TIME(SEC)=   84.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.47   TIME(SEC)=   88.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73
TIME(MIN)=  1.53   TIME(SEC)=   92.0   KCURNT  1  2  0  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  7  6  5  4  3   NAVAIL= 73

*****APPROACH**A/C  3**TYPE  9**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 13**(IAF,IRUN)= 5 6
+VERTEX          1       2       3       4       5       6       7       8       9      10      11      12      13      14      15
+TIME(MIN)   13.44   14.44   15.65   15.84   16.41   17.43   18.02   18.69   20.28   21.03   22.00   22.57   23.35   23.79   24.27
+TIME(MIN)   26.12
+X(N.MILE)  -1.008   0.174   1.597   1.838   2.583   1.887   1.491   1.107   4.786   6.416   8.424   8.212   6.058   5.081   4.000
+X(N.MILE)   0.0
+Y(N.MILE)  32.777  28.782  23.975  23.252  21.021  16.943  14.624  12.045   7.224   5.105   2.495   0.759   0.0     0.0     0.0
+Y(N.MILE)   0.0
+Z(FEET)     6000.   6000.   6000.   6000.   5000.   5000.   4000.   3000.   3000.   3000.   1600.   1600.   1500.   1500.   1400.
+Z(FEET)       50.
+V(KNOTS)   250.00  249.29  246.49  245.87  243.63  238.34  234.49  229.40  213.22  203.32  186.91  174.54  135.00  135.00  130.00
+VX(KNOTS)   70.95   70.74   78.04   77.66  -41.00  -40.01  -34.47  139.17  130.01  123.67  -22.66 -164.62 -135.00 -134.98 -129.80
+VY(KNOTS) -239.72 -239.04 -233.81 -232.66 -240.15 -234.37 -231.48 -182.37 -169.00 -160.76 -185.53  -58.01    0.0     0.0     0.0
+VZ(FT/MN)      0.      0.      0.  -1738.      0.  -1685.  -1496.      0.      0.  -1437.      0.   -127.      0.   -208.   -730.
+X0(NM)      8.421   7.876   7.220   7.147   6.920   4.625   3.320   1.920   3.320   3.948   4.721   3.821   1.544   0.652  -0.336
+X0(NM)     -3.990
+Y0(NM)     38.723  34.592  29.623  28.864  26.523  23.080  21.123  18.923  13.023  10.424   7.223   5.723   5.906   6.303   6.743
+Y0(NM)      8.370
**********

A DEPARTURE WAS SCHEDULED AT TIME =    0.06 FOR A CLASS  2 ON RUNWAY    7
A DEPARTURE WAS SCHEDULED AT TIME =    1.44 FOR A CLASS  5 ON RUNWAY    7
A DEPARTURE WAS SCHEDULED AT TIME =    4.67 FOR A CLASS  6 ON RUNWAY    7
A DEPARTURE WAS SCHEDULED AT TIME =   17.11 FOR A CLASS  1 ON RUNWAY    7
A DEPARTURE WAS SCHEDULED AT TIME =   21.39 FOR A CLASS  3 ON RUNWAY    7
A DEPARTURE WAS SCHEDULED AT TIME =   23.34 FOR A CLASS  2 ON RUNWAY    7
```

```
TIME(MIN)=  1.60   TIME(SEC)=   96.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  1.67   TIME(SEC)=  100.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  1.73   TIME(SEC)=  104.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  1.80   TIME(SEC)=  108.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  1.87   TIME(SEC)=  112.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  1.93   TIME(SEC)=  116.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.00   TIME(SEC)=  120.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.07   TIME(SEC)=  124.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.13   TIME(SEC)=  128.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.20   TIME(SEC)=  132.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.27   TIME(SEC)=  136.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.33   TIME(SEC)=  140.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.40   TIME(SEC)=  144.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.47   TIME(SEC)=  148.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72
TIME(MIN)=  2.53   TIME(SEC)=  152.0   KCURNT  1  2  3  0  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  8  7  6  5  4   NAVAIL= 72

*****APPROACH**A/C  4**TYPE  4**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 17**(IAF,IRUN)= 1 1
*VERTEX           1       2       3       4       5       6       7       8       9      10      11      12      13      14      15
*TIME(MIN)     5.66    6.66    8.82    9.96   11.34   11.92   12.18   13.34   15.98   17.04   18.88   20.79   22.72   23.85   26.44
*TIME(MIN)    26.61   27.44   28.46   28.92   31.03
*X(N.MILE)   13.710   9.572   0.630  -4.042  -9.684 -12.022 -12.690 -15.594 -13.983 -11.412  -5.339   1.454   8.110  10.469  10.132
*X(N.MILE)   10.113   7.900   5.600   4.570   0.0
*Y(N.MILE)   -3.360  -3.849  -4.906  -5.458  -6.082  -5.340  -5.489  -1.788   8.696  11.866  15.354  13.357  11.735   8.763   0.470
*Y(N.MILE)    0.0     0.0     0.0     0.0     0.0
*Z(FEET)     15000.  15000.  15000.  13000.  13000.  12000.  12000.  10000.  10000.   7000.   3000.   3000.   3000.   3000.   3000.
*Z(FEET)      2800.   1712.   1712.   1500.     50.
*V(KNOTS)    250.00  249.85  248.51  247.24  245.17  244.12  243.61  241.09  233.56  229.89  222.36  212.79  200.82  192.46  164.16
*V(KNOTS)    161.52  135.00  135.00  130.00
*VX(KNOTS) -248.27 -248.12 -246.19 -245.74 -243.09 -150.70 -150.02   36.62  146.06  198.47  213.34  206.74  124.85   -7.81   -6.65
*VX(KNOTS) -161.00 -135.00 -134.92 -129.82
*VY(KNOTS)   -29.34  -29.32  -29.10  -27.16  -26.87  192.05  191.18  238.29  180.09  113.99  -62.72  -50.38 -157.30 -192.31 -163.63
*VY(KNOTS)     0.0     0.0     0.0     0.0
*VZ(FT/MN)       0.      0.  -1757.      0.  -1733.      0.  -1722.      0.  -2840.  -2179.      0.      0.      0.      0.  -1160.
*VZ(FT/MN)   -1319.      0.   -463.   -687.
*XO(NM)     -12.214  -8.158   0.606   5.185  10.700  12.985  13.322  14.785   9.686   6.185  -0.714  -6.415 -12.114 -13.315 -10.162
*XO(NM)      -9.983  -7.904  -5.742  -4.774  -0.480
*YO(NM)       9.076   8.121   6.055   4.976   3.633   3.076   2.048  -2.423 -11.724 -13.823 -15.024 -10.824  -7.024  -3.424   4.254
*YO(NM)       4.689   3.932   3.145   2.793   1.230
**********

TIME(MIN)=  2.60   TIME(SEC)=  156.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  2.67   TIME(SEC)=  160.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  2.73   TIME(SEC)=  164.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
```

```
TIME(MIN)=  2.80   TIME(SEC)=  168.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  2.87   TIME(SEC)=  172.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  2.93   TIME(SEC)=  176.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.00   TIME(SEC)=  180.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.07   TIME(SEC)=  184.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.13   TIME(SEC)=  188.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.20   TIME(SEC)=  192.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.27   TIME(SEC)=  196.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.33   TIME(SEC)=  200.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.40   TIME(SEC)=  204.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.47   TIME(SEC)=  208.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.53   TIME(SEC)=  212.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.60   TIME(SEC)=  216.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.67   TIME(SEC)=  220.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.73   TIME(SEC)=  224.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.80   TIME(SEC)=  228.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TYPE  4 A/C IN CH  2 GENERATED.   0.04 -12.32   9.03 15123.  -0.23  -0.23  -0.23 422.22 237.50 395.72   0.0     1
   1216.00      -74176.      55328.
TIME(MIN)=  3.87   TIME(SEC)=  232.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  3.93   TIME(SEC)=  236.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  4.00   TIME(SEC)=  240.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  4.07   TIME(SEC)=  244.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  4.13   TIME(SEC)=  248.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  4.20   TIME(SEC)=  252.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71
TIME(MIN)=  4.27   TIME(SEC)=  256.0   KCURNT  1  2  3  4  0  0  0  0  0  0  0  0  0  0  0   KAVAIL  9  8  7  6  5   NAVAIL= 71

*****APPROACH**A/C  5**TYPE 10**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 11**(IAF,IRUN)= 8 9
```

*VERTEX	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
*TIME(MIN)	16.17	17.17	18.82	19.98	20.57	21.56	22.18	23.49	24.17	25.02	26.03	28.32	28.86	31.11	
*X(N.MILE)	-9.142	-5.883	-0.525	2.788	4.435	6.843	8.307	11.994	13.783	12.569	11.228	6.075	4.870	0.0	
*Y(N.MILE)	-26.699	-24.103	-19.834	-16.457	-14.778	-11.751	-9.910	-6.761	-5.234	-2.748	0.0	0.0	0.0	0.0	
*Z(FEET)	6000.	6000.	6000.	6000.	5000.	5000.	4000.	4000.	3000.	3000.	1700.	1700.	1688.	55.	
*V(KNOTS)	250.00	249.28	244.88	239.28	235.59	228.00	222.27	206.81	196.67	180.57	135.00	135.00	130.00		
*VX(KNOTS)	195.53	194.97	171.49	167.16	146.65	141.58	169.03	156.89	-86.28	-79.02	-135.00	-135.00	-129.80		
*VY(KNOTS)	155.78	155.33	174.81	170.39	184.38	178.00	144.34	133.97	176.74	161.88	0.0	0.0	0.0		
*VZ(FT/MN)	0.	0.	0.	-1691.	0.	-1612.	0.	-1462.	0.	-1276.	0.	-22.	-725.		
*XO(NM)	-41.623	-39.959	-37.222	-34.818	-33.622	-31.321	-29.922	-27.835	-26.823	-24.107	-21.106	-19.772	-19.460	-18.200	
*YO(NM)	18.631	14.811	8.531	4.457	2.431	-0.678	-2.569	-6.946	-9.069	-8.540	-7.955	-2.978	-1.814	2.890	

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A DEPARTURE WAS SCHEDULED AT TIME =  10.33 FOR A CLASS  6 ON RUNWAY   8
A DEPARTURE WAS SCHEDULED AT TIME =  12.09 FOR A CLASS  3 ON RUNWAY   8
A DEPARTURE WAS SCHEDULED AT TIME =  15.96 FOR A CLASS  3 ON RUNWAY   8
A DEPARTURE WAS SCHEDULED AT TIME =  20.99 FOR A CLASS  5 ON RUNWAY   8
A DEPARTURE WAS SCHEDULED AT TIME =  22.90 FOR A CLASS  6 ON RUNWAY   9
A DEPARTURE WAS SCHEDULED AT TIME =  26.71 FOR A CLASS  5 ON RUNWAY   8

TIME(MIN)=  4.33   TIME(SEC)=  260.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.40   TIME(SEC)=  264.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.47   TIME(SEC)=  268.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.53   TIME(SEC)=  272.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.60   TIME(SEC)=  276.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.67   TIME(SEC)=  280.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.73   TIME(SEC)=  284.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.80   TIME(SEC)=  288.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.87   TIME(SEC)=  292.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  4.93   TIME(SEC)=  296.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  5.00   TIME(SEC)=  300.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

TIME(MIN)=  5.07   TIME(SEC)=  304.0   KCURNT  1  2  3  4  5  0  0  0  0  0  0  0  0  0  0   KAVAIL 10  9  8  7  6   NAVAIL= 70

*****APPROACH**A/C   6**TYPE   8**CNTRL VARS 0.0   0.0   0.0   0.0   0.0   0.25**(IDIV,ILEV,ILB)=   0   0 17**(IAF,IRUN)= 4 6
*VERTEX           1        2        3        4        5        6        7        8        9       10       11       12       13       14       15
*TIME(MIN)     8.19     9.19    11.22    15.29    16.14    17.32    19.07    21.65    23.57    24.54    25.22    26.12    26.91    28.79    29.41
*TIME(MIN)    29.74    30.28    30.71    31.19    33.04
*X(N.MILE)  -45.234  -41.128  -32.813  -16.102  -12.812   -8.223   -3.047   -1.816   -0.946   -0.581   -0.331    2.247    4.786    8.424    8.212
*X(N.MILE)    7.389    6.058    5.081    4.000      0.0
*Y(N.MILE)  -18.111  -18.820  -20.256  -23.128  -22.369  -21.336  -16.733   -6.818    0.184    3.592    5.931    7.517    7.224    2.495    0.759
*Y(N.MILE)    0.469      0.0      0.0      0.0      0.0
*Z(FEET)      9000.    9000.    9000.    9000.    9000.    7000.    7000.    7000.    4000.    4000.    3000.    3000.    3000.    3000.    2100.
*Z(FEET)      2100.    1500.    1500.    1400.      50.
*V(KNOTS)    250.00   249.85   248.67   242.50   240.55   237.49   232.00   221.65   212.03   206.41   202.09   195.82   189.73   170.42   161.80
*V(KNOTS)    156.12   135.00   135.00   130.00
*VX(KNOTS)   246.35   246.21   245.04   236.57   234.11   177.46    28.59    27.25    22.56    21.91   172.12   194.53   115.69   -20.58  -152.60
*VX(KNOTS)  -146.89  -135.00  -134.98  -129.80
*VY(KNOTS)   -42.54   -42.52   -42.32    53.27    52.71   157.82   230.23   219.42   210.82   204.74   105.89   -22.45  -150.38  -168.56   -53.77
*VY(KNOTS)   -51.76      0.0      0.0      0.0
*VZ(FT/MN)       0.       0.       0.       0.   -1700.       0.       0.   -1567.       0.   -1459.       0.       0.       0.   -1456.       0.
*VZ(FT/MN)   -1104.       0.    -208.    -730.
*XO(NM)     -52.680  -49.217  -42.205  -28.180  -24.793  -20.180  -13.579   -8.422   -4.779   -3.060   -1.880    1.120    3.320    4.721    3.821
*XO(NM)       2.951    1.544    0.652   -0.336   -3.990
*YO(NM)      10.223    7.905    3.211   -6.177   -6.854   -7.777   -5.677    2.880    8.923   11.888   13.923   14.323   13.023    7.223    5.723
*YO(NM)       5.793    5.906    6.303    6.743    8.370
**********

A DEPARTURE WAS SCHEDULED AT TIME =  28.37 FOR A CLASS  6 ON RUNWAY   7
A DEPARTURE WAS SCHEDULED AT TIME =  30.13 FOR A CLASS  2 ON RUNWAY   7

*****APPROACH**A/C   7**TYPE   7**CNTRL VARS 0.0   0.0   0.0   0.0   0.0   0.25**(IDIV,ILEV,ILB)=   0   0 16**(IAF,IRUN)= 6 6
*VERTEX           1        2        3        4        5        6        7        8        9       10       11       12       13       14       15
*TIME(MIN)    16.39    17.20    18.21    19.35    21.26    23.21    25.34    27.56    28.50    29.16    30.03    30.79    31.61    32.66    33.26
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*TIME(MIN)    34.10   34.53   35.01   36.86
*X(N.MILE) -12.737 -11.520 -10.075  -8.459  -5.753  -3.047  -1.997  -0.946  -0.581  -0.331   2.247   4.786   6.416   8.424   8.212
*X(N.MILE)   6.058   5.081   4.000   0.0
*Y(N.MILE) -43.159 -39.990 -36.039 -31.621 -24.177 -16.733  -8.274   0.184   3.592   5.931   7.517   7.224   5.105   2.495   0.759
*Y(N.MILE)   0.0     0.0     0.0     0.0
*Z(FEET)     6000.   6000.   6000.   4000.   4000.   4000.   4000.   4000.   4000.   3000.   3000.   3000.   3000.   1600.   1600.
*Z(FEET)     1500.   1500.   1400.     50.
*V(KNOTS)   250.00  249.85  249.25  248.02  244.56  239.21  230.97  219.42  213.53  208.94  202.22  195.62  187.45  174.42  164.87
*V(KNOTS)   135.00  135.00  130.00
*VX(KNOTS)   89.63   85.82   85.41   84.73   83.55   29.48   28.47   23.35   22.67  177.96  200.89  119.28  114.02  -21.14 -155.49
*VX(KNOTS) -135.00 -134.98 -129.80
*VY(KNOTS)  233.38  234.65  233.51  233.09  229.85  237.39  229.21  218.18  211.80  109.48  -23.18 -155.05 -148.21 -173.14  -54.79
*VY(KNOTS)   0.0     0.0     0.0
*VZ(FT/MN)      0.      0.  -1762.      0.      0.      0.      0.      0.  -1509.      0.      0.      0.  -1325.      0.   -120.
*VZ(FT/MN)      0.   -208.   -730.
*XO(NM)    -33.180 -30.779 -27.852 -24.579 -19.079 -13.579  -9.179  -4.779  -3.060  -1.880   1.120   3.320   3.948   4.721   3.821
*XO(NM)      1.544   0.652  -0.336  -3.990
*YO(NM)    -25.877 -23.477 -20.455 -17.077 -11.377  -5.677   1.623   8.923  11.888  13.923  14.323  13.023  10.424   7.223   5.723
*YO(NM)      5.906   6.303   6.743   8.370
**********

TIME(MIN)=  5.13   TIME(SEC)=  308.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.20   TIME(SEC)=  312.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.27   TIME(SEC)=  316.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.33   TIME(SEC)=  320.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.40   TIME(SEC)=  324.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.47   TIME(SEC)=  328.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.53   TIME(SEC)=  332.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.60   TIME(SEC)=  336.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.67   TIME(SEC)=  340.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TYPE  4 A/C IN CH  4 GENERATED.   0.06 -12.07   9.01 14750.  -0.23  -0.23  -0.23 422.22 257.24 413.87   0.0     1
    1216.00      -74176.       55328.

TIME(MIN)=  5.73   TIME(SEC)=  344.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.80   TIME(SEC)=  348.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.87   TIME(SEC)=  352.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  5.93   TIME(SEC)=  356.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  6.00   TIME(SEC)=  360.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

TIME(MIN)=  6.07   TIME(SEC)=  364.0   KCURNT  1  2  3  4  5  6  7  0  0  0  0  0  0  0  0   KAVAIL 12 11 10  9  8   NAVAIL= 68

*****APPROACH**A/C  8**TYPE 12**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0  9**(IAF,IRUN)= 9 9
*VERTEX          1       2       3       4       5       6       7       8       9      10      11      12      13      14      15
*TIME(MIN)    19.55   20.55   21.64   22.79   23.61   24.87   25.53   26.35   27.34   29.63   30.16   32.41
*X(N.MILE)   23.052  18.978  14.578   9.979   8.307  11.994  13.783  12.569  11.228   6.075   4.870   0.0
*Y(N.MILE)  -15.484 -14.606 -13.661 -12.672  -9.910  -6.761  -5.234  -2.748   0.0     0.0     0.0     0.0
*Z(FEET)      6000.   6000.   6000.   4000.   4000.   4000.   3000.   3000.   1700.   1700.   1688.     55.
*V(KNOTS)    250.00  248.86  244.97  237.62  230.25  214.33  203.47  185.88  135.00  135.00  130.00
```

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+VX(KNOTS) -244.41 -243.29 -238.91 -123.05  175.10  162.59  -89.26  -81.34 -135.00 -135.00 -129.80
+VY(KNOTS)   52.57   52.33   51.39  203.27  149.52  138.84  182.85  166.64     0.0     0.0     0.0
+VZ(FT/MN)      0.      0.  -1732.      0.      0.  -1515.      0.  -1314.      0.    -22.   -725.
+XO(NM)    -39.123 -37.222 -35.169 -33.023 -29.922 -27.835 -26.823 -24.107 -21.106 -19.772 -19.460 -18.200
+YO(NM)    -15.369 -11.661  -7.655  -3.469  -2.569  -6.946  -9.069  -8.540  -7.955  -2.978  -1.814   2.890
++++++++++

TIME(MIN)=  6.13   TIME(SEC)=  368.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.20   TIME(SEC)=  372.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.27   TIME(SEC)=  376.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.33   TIME(SEC)=  380.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.40   TIME(SEC)=  384.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.47   TIME(SEC)=  388.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.53   TIME(SEC)=  392.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.60   TIME(SEC)=  396.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.67   TIME(SEC)=  400.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.73   TIME(SEC)=  404.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.80   TIME(SEC)=  408.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.87   TIME(SEC)=  412.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  6.93   TIME(SEC)=  416.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.00   TIME(SEC)=  420.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.07   TIME(SEC)=  424.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.13   TIME(SEC)=  428.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.20   TIME(SEC)=  432.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.27   TIME(SEC)=  436.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.33   TIME(SEC)=  440.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.40   TIME(SEC)=  444.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

TIME(MIN)=  7.47   TIME(SEC)=  448.0   KCURNT  1  2  3  4  5  6  7  8  0  0  0  0  0  0  0   KAVAIL 13 12 11 10  9   NAVAIL= 67

+++++APPROACH++A/C  9++TYPE  8++CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25++(IDIV,ILEV,ILB)=  0  0 17++(IAF,IRUN)= 4 6
+VERTEX          1       2       3       4       5       6       7       8       9      10      11      12      13      14      15
+TIME(MIN)   13.10   14.10   16.13   20.20   21.05   22.23   23.98   26.56   28.48   29.45   30.13   31.03   31.82   33.70   34.32
+TIME(MIN)   34.64   35.19   35.62   36.10   37.95
+X(N.MILE) -45.234 -41.128 -32.873 -16.182 -12.812  -8.223  -3.047  -1.816  -0.946  -0.581  -0.331   2.247   4.786   8.424   8.212
+X(N.MILE)   7.389   6.058   5.081   4.000     0.0
+Y(N.MILE) -18.111 -18.820 -20.256 -23.128 -22.369 -21.336 -16.733  -6.818   0.184   3.592   5.931   7.517   7.224   2.495   0.759
+Y(N.MILE)   0.469     0.0     0.0     0.0     0.0
+Z(FEET)     9000.   9000.   9000.   9000.   9000.   7000.   7000.   7000.   4000.   4000.   3000.   3000.   3000.   3000.   2100.
+Z(FEET)     2100.   1500.   1500.   1400.     50.
+V(KNOTS)   250.00  249.85  248.67  242.50  240.55  237.49  232.00  221.65  212.03  206.41  202.09  195.82  189.73  170.42  161.80
+V(KNOTS)   156.12  135.00  135.00  130.00
```

```
*VX(KNOTS)  246.35  246.21  245.04  236.57  234.11  177.46   28.59   27.25   22.56   21.91  172.12  194.53  115.69  -20.58 -152.60
*VX(KNOTS) -146.89 -135.00 -134.98 -129.80
*VY(KNOTS)  -42.54  -42.52  -42.32   53.27   52.71  157.82  230.23  219.42  210.82  204.74  105.89  -22.45 -150.38 -168.56  -53.77
*VY(KNOTS)  -51.76     0.0     0.0     0.0
*VZ(FT/MN)      0.      0.      0.      0.  -1700.      0.      0.  -1567.      0.  -1459.      0.      0.      0.  -1456.      0.
*VZ(FT/MN)  -1104.      0.   -208.   -730.
*XO(NM)    -52.680 -49.217 -42.205 -28.180 -24.793 -20.180 -13.579  -8.422  -4.779  -3.060  -1.880   1.120   3.320   4.721   3.821
*XO(NM)      2.951   1.544   0.652  -0.336  -3.990
*YO(NM)     10.223   7.905   3.211  -6.177  -6.854  -7.777  -5.677   2.880   8.923  11.888  13.923  14.323  13.023   7.223   5.723
*YO(NM)      5.793   5.906   6.303   6.743   8.370
**********

TIME(MIN)=  7.53   TIME(SEC)=  452.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.60   TIME(SEC)=  456.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.67   TIME(SEC)=  460.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.73   TIME(SEC)=  464.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.80   TIME(SEC)=  468.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.87   TIME(SEC)=  472.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  7.93   TIME(SEC)=  476.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  8.00   TIME(SEC)=  480.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  8.07   TIME(SEC)=  484.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  8.13   TIME(SEC)=  488.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TIME(MIN)=  8.20   TIME(SEC)=  492.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

TYPE  8 A/C IN CH  6 GENERATED.   0.08 -53.11  10.44  9028.  -0.59  -0.59  -0.59 422.22 247.48 418.19   0.0     4
    2128.00    -320416.     62016.

TIME(MIN)=  8.27   TIME(SEC)=  496.0   KCURNT  1  2  3  4  5  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13 12 11 10   NAVAIL= 66

*****APPROACH**A/C 10**TYPE  1**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 10**(IAF,IRUN)= 3 1
*VERTEX          1       2       3       4       5       6       7       8       9      10      11      12      13      14      15
*TIME(MIN)   19.40   20.78   22.16   23.12   24.87   26.63   27.66   30.02   30.18   30.96   31.98   32.44   34.55
*X(N.MILE) -10.674 -10.390  -8.441  -5.339   1.454   8.110  10.469  10.132  10.113   7.900   5.600   4.570     0.0
*Y(N.MILE)  28.842  23.093  17.736  15.354  13.357  11.735   8.763   0.470     0.0     0.0     0.0     0.0     0.0
*Z(FEET)     7000.   7000.   7000.   3000.   3000.   3000.   3000.   3000.   2800.   1712.   1712.   1500.     50.
*V(KNOTS)   250.00  249.01  246.05  242.78  233.97  220.91  210.96  174.51  170.98  135.00  135.00  130.00
*VX(KNOTS)   12.33   85.14  192.45  232.93  227.32  137.34   -8.56   -7.07 -170.43 -135.00 -134.92 -129.82
*VY(KNOTS) -249.70 -234.01 -147.78  -68.48  -55.39 -173.03 -210.79 -173.94     0.0     0.0     0.0     0.0
*VZ(FT/MN)      0.      0.  -4136.      0.      0.      0.      0.  -1234.  -1396.      0.   -463.   -687.
*XO(NM)     -0.314   1.305   1.386  -0.714  -6.415 -12.114 -13.315 -10.162  -9.983  -7.904  -5.742  -4.774  -0.480
*YO(NM)    -29.523 -24.024 -18.323 -15.024 -10.824  -7.024  -3.424   4.254   4.689   3.932   3.145   2.793   1.230
**********

A DEPARTURE WAS SCHEDULED AT TIME =  31.50 FOR A CLASS  1 ON RUNWAY   1

TIME(MIN)=  8.33   TIME(SEC)=  500.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65

TIME(MIN)=  8.40   TIME(SEC)=  504.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65

TIME(MIN)=  8.47   TIME(SEC)=  508.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
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TIME(MIN)=  8.53   TIME(SEC)=  512.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.60   TIME(SEC)=  516.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.67   TIME(SEC)=  520.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.73   TIME(SEC)=  524.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.80   TIME(SEC)=  528.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.87   TIME(SEC)=  532.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  8.93   TIME(SEC)=  536.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  9.00   TIME(SEC)=  540.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65
TIME(MIN)=  9.07   TIME(SEC)=  544.0   KCURNT  1  2  3  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13 12 11   NAVAIL= 65

*****APPROACH**A/C 11**TYPE  7**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 16**(IAF,IRUN)= 6 6
*VERTEX          1        2        3        4        5        6        7        8        9       10       11       12       13       14       15
*TIME(MIN)   19.62    20.44    21.45    22.58    24.50    26.44    28.58    30.79    31.73    32.39    33.26    34.02    34.84    35.90    36.50
*TIME(MIN)   37.33    37.77    38.25    40.10
*X(N.MILE) -12.737  -11.520  -10.075   -8.459   -5.753   -3.047   -1.997   -0.946   -0.581   -0.331    2.247    4.786    6.416    8.424    8.212
*X(N.MILE)   6.058    5.081    4.000    0.0
*Y(N.MILE) -43.159  -39.990  -36.039  -31.621  -24.177  -16.733   -8.274    0.184    3.592    5.931    7.517    7.224    5.105    2.495    0.759
*Y(N.MILE)   0.0      0.0      0.0      0.0
*Z(FEET)     6000.    6000.    6000.    4000.    4000.    4000.    4000.    4000.    4000.    3000.    3000.    3000.    3000.    1600.    1600.
*Z(FEET)     1500.    1500.    1400.      50.
*V(KNOTS)   250.00   249.85   249.25   248.02   244.56   239.21   230.97   219.42   213.53   208.94   202.22   195.62   187.45   174.42   164.87
*V(KNOTS)   135.00   135.00   130.00
*VX(KNOTS)   89.63    85.82    85.41    84.73    83.55    29.48    28.47    23.35    22.67   177.96   200.89   119.28   114.02   -21.14  -155.49
*VX(KNOTS) -135.00  -134.98  -129.80
*VY(KNOTS)  233.38   234.65   233.51   233.09   229.85   237.39   229.21   218.18   211.80   109.48   -23.18  -155.05  -148.21  -173.14   -54.79
*VY(KNOTS)   0.0      0.0      0.0
*VZ(FT/MN)      0.       0.   -1762.       0.       0.       0.       0.       0.   -1509.       0.       0.       0.   -1325.       0.    -120.
*VZ(FT/MN)      0.    -208.    -730.
*XO(NM)    -33.180  -30.779  -27.852  -24.579  -19.079  -13.579   -9.179   -4.779   -3.060   -1.880    1.120    3.320    3.948    4.721    3.821
*XO(NM)      1.544    0.652   -0.336   -3.990
*YO(NM)    -25.877  -23.477  -20.455  -17.077  -11.377   -5.677    1.623    8.923   11.888   13.923   14.323   13.023   10.424    7.223    5.723
*YO(NM)      5.906    6.303    6.743    8.370
**********

TIME(MIN)=  9.13   TIME(SEC)=  548.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.20   TIME(SEC)=  552.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.27   TIME(SEC)=  556.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.33   TIME(SEC)=  560.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.40   TIME(SEC)=  564.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.47   TIME(SEC)=  568.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.53   TIME(SEC)=  572.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.60   TIME(SEC)=  576.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.67   TIME(SEC)=  580.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
TIME(MIN)=  9.73   TIME(SEC)=  584.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64
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```
TIME(MIN)=  9.80   TIME(SEC)=  588.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64

TIME(MIN)=  9.87   TIME(SEC)=  592.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13 12   NAVAIL= 64

*****APPROACH**A/C 12**TYPE  9**CNTRL VARS 0.0  0.0  0.0  0.0  0.0  0.25**(IDIV,ILEV,ILB)=  0  0 13**(IAF,IRUN)= 5 6
*VERTEX          1        2        3        4        5        6        7        8        9       10       11       12       13       14       15
*TIME(MIN)     28.54    29.54    30.75    30.93    31.51    32.53    33.12    33.79    35.38    36.13    37.10    37.66    38.45    38.88    39.36
*TIME(MIN)     41.21
*X(N.MILE)    -1.008    0.174    1.597    1.838    2.583    1.887    1.491    1.107    4.786    6.416    8.424    8.212    6.058    5.081    4.000
*X(N.MILE)     0.0
*Y(N.MILE)    32.777   28.702   23.975   23.252   21.021   16.943   14.624   12.045    7.224    5.105    2.495    0.759    0.0      0.0      0.0
*Y(N.MILE)     0.0
*Z(FEET)       6000.    6000.    6000.    6000.    5000.    5000.    4000.    3000.    3000.    3000.    1600.    1600.    1500.    1500.    1400.
*Z(FEET)         50.
*V(KNOTS)     250.00   249.29   246.49   245.87   243.63   238.34   234.49   229.40   213.22   203.32   186.91   174.54   135.00   135.00   130.00
*VX(KNOTS)     70.95    70.74    78.04    77.66   -41.00   -40.01   -34.47   139.17   130.01   123.67   -22.66  -164.62  -135.00  -134.98  -129.80
*VY(KNOTS)   -239.72  -239.04  -233.81  -232.66  -240.15  -234.37  -231.48  -182.37  -169.00  -160.76  -185.53   -58.01     0.0      0.0      0.0
*VZ(FT/MN)        0.       0.       0.   -1738.       0.   -1685.   -1496.       0.       0.   -1437.       0.    -127.       0.    -208.    -730.
*XO(NM)        8.421    7.876    7.220    7.147    6.920    4.625    3.320    1.920    3.320    3.948    4.721    3.821    1.544    0.652   -0.336
*XO(NM)       -3.990
*YO(NM)       38.723   34.592   29.623   28.864   26.523   23.080   21.123   18.923   13.023   10.424    7.223    5.723    5.906    6.303    6.743
*YO(NM)        8.370
**********

TIME(MIN)=  9.93   TIME(SEC)=  596.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.00   TIME(SEC)=  600.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.07   TIME(SEC)=  604.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.13   TIME(SEC)=  608.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.20   TIME(SEC)=  612.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.27   TIME(SEC)=  616.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.33   TIME(SEC)=  620.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.40   TIME(SEC)=  624.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.47   TIME(SEC)=  628.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.53   TIME(SEC)=  632.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.60   TIME(SEC)=  636.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.67   TIME(SEC)=  640.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.73   TIME(SEC)=  644.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.80   TIME(SEC)=  648.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.87   TIME(SEC)=  652.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 10.93   TIME(SEC)=  656.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 11.0    TIME(SEC)=  660.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TIME(MIN)= 11.07   TIME(SEC)=  664.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
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TIME(MIN)= 11.13   TIME(SEC)=  668.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.20   TIME(SEC)=  672.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.27   TIME(SEC)=  676.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.33   TIME(SEC)=  680.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.40   TIME(SEC)=  684.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.47   TIME(SEC)=  688.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.53   TIME(SEC)=  692.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.60   TIME(SEC)=  696.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.67   TIME(SEC)=  700.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.73   TIME(SEC)=  704.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.80   TIME(SEC)=  708.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.87   TIME(SEC)=  712.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 11.93   TIME(SEC)=  716.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.00   TIME(SEC)=  720.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.07   TIME(SEC)=  724.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE  1 A/C IN CH  1 GENERATED.   0.12   0.18 -29.67  7233.   1.27   1.27   1.27 422.22 230.14 395.81   0.0    3
   2128.00      -1824.    -179360.
TIME(MIN)= 12.13   TIME(SEC)=  728.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.20   TIME(SEC)=  732.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.27   TIME(SEC)=  736.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.33   TIME(SEC)=  740.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.40   TIME(SEC)=  744.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.47   TIME(SEC)=  748.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.53   TIME(SEC)=  752.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.60   TIME(SEC)=  756.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.67   TIME(SEC)=  760.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.73   TIME(SEC)=  764.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.80   TIME(SEC)=  768.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.87   TIME(SEC)=  772.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 12.93   TIME(SEC)=  776.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.00   TIME(SEC)=  780.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.07   TIME(SEC)=  784.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
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TIME(MIN)= 13.13   TIME(SEC)=  788.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TYPE  8 A/C IN CH  9 GENERATED.   0.13 -53.17  10.67  9261.  -0.59  -0.59  -0.59 422.22 225.69 378.35   0.0     4
     2128.00     -320416.       62016.

TIME(MIN)= 13.20   TIME(SEC)=  792.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.27   TIME(SEC)=  796.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.33   TIME(SEC)=  800.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.40   TIME(SEC)=  804.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.47   TIME(SEC)=  808.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63

TYPE  9 A/C IN CH  3 GENERATED.   0.13   8.37  38.63  6062.  -1.70  -1.70  -1.70 422.22 248.85 424.22   0.0     5
      608.00        51072.      235296.

TIME(MIN)= 13.53   TIME(SEC)=  812.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.60   TIME(SEC)=  816.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.67   TIME(SEC)=  820.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.73   TIME(SEC)=  824.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.80   TIME(SEC)=  828.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.87   TIME(SEC)=  832.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 13.93   TIME(SEC)=  836.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.00   TIME(SEC)=  840.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.07   TIME(SEC)=  844.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.13   TIME(SEC)=  848.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.20   TIME(SEC)=  852.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.27   TIME(SEC)=  856.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.33   TIME(SEC)=  860.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.40   TIME(SEC)=  864.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.47   TIME(SEC)=  868.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.53   TIME(SEC)=  872.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.60   TIME(SEC)=  876.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.67   TIME(SEC)=  880.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.73   TIME(SEC)=  884.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.80   TIME(SEC)=  888.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.87   TIME(SEC)=  892.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 14.93   TIME(SEC)=  896.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
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TIME(MIN)= 15.00   TIME(SEC)=  900.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.07   TIME(SEC)=  904.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.13   TIME(SEC)=  908.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.20   TIME(SEC)=  912.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.27   TIME(SEC)=  916.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.33   TIME(SEC)=  920.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.40   TIME(SEC)=  924.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.47   TIME(SEC)=  928.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.53   TIME(SEC)=  932.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.60   TIME(SEC)=  936.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.67   TIME(SEC)=  940.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.73   TIME(SEC)=  944.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.80   TIME(SEC)=  948.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.87   TIME(SEC)=  952.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 15.93   TIME(SEC)=  956.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.00   TIME(SEC)=  960.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.07   TIME(SEC)=  964.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.13   TIME(SEC)=  968.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.20   TIME(SEC)=  972.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE 10 A/C IN CH  5 GENERATED.   0.16 -41.50  18.99  5840.  -1.16  -1.16  -1.16 422.22 269.50 444.87   0.0     8
     2128.00     -254144.      114912.
TIME(MIN)= 16.27   TIME(SEC)=  976.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.33   TIME(SEC)=  980.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.40   TIME(SEC)=  984.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE  7 A/C IN CH  7 GENERATED.   0.16 -33.19 -25.88  5750.   0.79   0.79   0.79 422.22 257.01 436.96   0.0     6
     2128.00     -201856.     -157472.
TIME(MIN)= 16.47   TIME(SEC)=  988.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.53   TIME(SEC)=  992.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.60   TIME(SEC)=  996.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.67   TIME(SEC)= 1000.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.73   TIME(SEC)= 1004.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.80   TIME(SEC)= 1008.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
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TIME(MIN)= 16.87   TIME(SEC)= 1012.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 16.93   TIME(SEC)= 1016.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.00   TIME(SEC)= 1020.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.07   TIME(SEC)= 1024.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.13   TIME(SEC)= 1028.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.20   TIME(SEC)= 1032.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.27   TIME(SEC)= 1036.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.33   TIME(SEC)= 1040.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.40   TIME(SEC)= 1044.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.47   TIME(SEC)= 1048.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.53   TIME(SEC)= 1052.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.60   TIME(SEC)= 1056.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.67   TIME(SEC)= 1060.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.73   TIME(SEC)= 1064.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.80   TIME(SEC)= 1068.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.87   TIME(SEC)= 1072.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 17.93   TIME(SEC)= 1076.0   KCUPNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.00   TIME(SEC)= 1080.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.07   TIME(SEC)= 1084.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.13   TIME(SEC)= 1088.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.20   TIME(SEC)= 1092.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.27   TIME(SEC)= 1096.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.33   TIME(SEC)= 1100.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.40   TIME(SEC)= 1104.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.47   TIME(SEC)= 1108.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.53   TIME(SEC)= 1112.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.60   TIME(SEC)= 1116.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.67   TIME(SEC)= 1120.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.73   TIME(SEC)= 1124.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.80   TIME(SEC)= 1128.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 18.87   TIME(SEC)= 1132.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
```

```
TIME(MIN)= 18.93   TIME(SEC)= 1136.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.00   TIME(SEC)= 1140.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.07   TIME(SEC)= 1144.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.13   TIME(SEC)= 1148.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.20   TIME(SEC)= 1152.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.27   TIME(SEC)= 1156.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.33   TIME(SEC)= 1160.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.40   TIME(SEC)= 1164.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.47   TIME(SEC)= 1168.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE  1 A/C IN CH 10 GENERATED.   0.19  -0.33 -29.05  6977.    1.27    1.27    1.27 422.22 250.14 442.70   0.0      3
     2128.00       -1824.      -179360.
TIME(MIN)= 19.53   TIME(SEC)= 1172.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.60   TIME(SEC)= 1176.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE 12 A/C IN CH  8 GENERATED.   0.19 -39.52 -14.84  5587.    1.10    1.10    1.10 422.22 257.44 440.48   0.0      9
     2128.00      -238944.      -91808.
TIME(MIN)= 19.67   TIME(SEC)= 1180.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TYPE  7 A/C IN CH 11 GENERATED.   0.19 -33.07 -26.24  6203.    0.79    0.79    0.79 422.22 268.79 469.48   0.0      6
     2128.00      -201856.      -157472.
TIME(MIN)= 19.73   TIME(SEC)= 1184.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.80   TIME(SEC)= 1188.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.87   TIME(SEC)= 1192.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 19.93   TIME(SEC)= 1196.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.00   TIME(SEC)= 1200.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.07   TIME(SEC)= 1204.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.13   TIME(SEC)= 1208.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.20   TIME(SEC)= 1212.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.27   TIME(SEC)= 1216.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.33   TIME(SEC)= 1220.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.40   TIME(SEC)= 1224.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.47   TIME(SEC)= 1228.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.53   TIME(SEC)= 1232.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
TIME(MIN)= 20.60   TIME(SEC)= 1236.0   KCURNT  1  2  3  4  5  6  7  8  9 10 11 12  0  0  0   KAVAIL 17 16 15 14 13   NAVAIL= 63
```

TIME(MIN)=	20.67	TIME(SEC)=	1240.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	20.73	TIME(SEC)=	1244.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	20.80	TIME(SEC)=	1248.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	20.87	TIME(SEC)=	1252.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	20.93	TIME(SEC)=	1256.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.00	TIME(SEC)=	1260.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.07	TIME(SEC)=	1264.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.13	TIME(SEC)=	1268.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.20	TIME(SEC)=	1272.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.27	TIME(SEC)=	1276.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.33	TIME(SEC)=	1280.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.40	TIME(SEC)=	1284.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.47	TIME(SEC)=	1288.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.53	TIME(SEC)=	1292.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.60	TIME(SEC)=	1296.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.67	TIME(SEC)=	1300.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.73	TIME(SEC)=	1304.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.80	TIME(SEC)=	1308.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.87	TIME(SEC)=	1312.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	21.93	TIME(SEC)=	1316.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.00	TIME(SEC)=	1320.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.07	TIME(SEC)=	1324.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.13	TIME(SEC)=	1328.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.20	TIME(SEC)=	1332.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.27	TIME(SEC)=	1336.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.33	TIME(SEC)=	1340.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.40	TIME(SEC)=	1344.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.47	TIME(SEC)=	1348.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.53	TIME(SEC)=	1352.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.60	TIME(SEC)=	1356.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.67	TIME(SEC)=	1360.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63

TIME(MIN)=	22.73	TIME(SEC)=	1364.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.80	TIME(SEC)=	1368.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.87	TIME(SEC)=	1372.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	22.93	TIME(SEC)=	1376.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.00	TIME(SEC)=	1380.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.07	TIME(SEC)=	1384.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.13	TIME(SEC)=	1388.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.20	TIME(SEC)=	1392.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.27	TIME(SEC)=	1396.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.33	TIME(SEC)=	1400.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.40	TIME(SEC)=	1404.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.47	TIME(SEC)=	1408.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.53	TIME(SEC)=	1412.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.60	TIME(SEC)=	1416.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.67	TIME(SEC)=	1420.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.73	TIME(SEC)=	1424.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.80	TIME(SEC)=	1428.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.87	TIME(SEC)=	1432.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	23.93	TIME(SEC)=	1436.0	KCURNT	1	2	3	4	5	6	7	8	9	10	11	12	0	0	0	KAVAIL	17	16	15	14	13	NAVAIL=	63
TIME(MIN)=	24.00	TIME(SEC)=	1440.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.07	TIME(SEC)=	1444.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.13	TIME(SEC)=	1448.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.20	TIME(SEC)=	1452.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.27	TIME(SEC)=	1456.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.33	TIME(SEC)=	1460.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.40	TIME(SEC)=	1464.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.47	TIME(SEC)=	1468.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.53	TIME(SEC)=	1472.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.60	TIME(SEC)=	1476.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.67	TIME(SEC)=	1480.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64
TIME(MIN)=	24.73	TIME(SEC)=	1484.0	KCURNT	1	2	12	4	5	6	7	8	9	10	11	0	0	0	0	KAVAIL	16	15	14	13	3	NAVAIL=	64

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TIME(MIN)= 24.80   TIME(SEC)= 1488.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 24.87   TIME(SEC)= 1492.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 24.93   TIME(SEC)= 1496.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.00   TIME(SEC)= 1500.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.07   TIME(SEC)= 1504.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.13   TIME(SEC)= 1508.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.20   TIME(SEC)= 1512.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.27   TIME(SEC)= 1516.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.33   TIME(SEC)= 1520.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.40   TIME(SEC)= 1524.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.47   TIME(SEC)= 1528.0   KCURNT  1  2 12  4  5  5  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.53   TIME(SEC)= 1532.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.60   TIME(SEC)= 1536.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.67   TIME(SEC)= 1540.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.73   TIME(SEC)= 1544.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.80   TIME(SEC)= 1548.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.87   TIME(SEC)= 1552.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 25.93   TIME(SEC)= 1556.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.00   TIME(SEC)= 1560.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.07   TIME(SEC)= 1564.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.13   TIME(SEC)= 1568.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.20   TIME(SEC)= 1572.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.27   TIME(SEC)= 1576.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.33   TIME(SEC)= 1580.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.40   TIME(SEC)= 1584.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.47   TIME(SEC)= 1588.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.53   TIME(SEC)= 1592.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.60   TIME(SEC)= 1596.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.67   TIME(SEC)= 1600.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.73   TIME(SEC)= 1604.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.80   TIME(SEC)= 1608.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
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```
TIME(MIN)= 26.87   TIME(SEC)= 1612.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 26.93   TIME(SEC)= 1616.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.00   TIME(SEC)= 1620.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.07   TIME(SEC)= 1624.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.13   TIME(SEC)= 1628.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.20   TIME(SEC)= 1632.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.27   TIME(SEC)= 1636.0   KCURNT  1  2 12  4  5  6  7  8  9 10 11  0  0  0  0   KAVAIL 16 15 14 13  3   NAVAIL= 64
TIME(MIN)= 27.33   TIME(SEC)= 1640.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.40   TIME(SEC)= 1644.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.47   TIME(SEC)= 1648.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.53   TIME(SEC)= 1652.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.60   TIME(SEC)= 1656.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.67   TIME(SEC)= 1660.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.73   TIME(SEC)= 1664.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.80   TIME(SEC)= 1668.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.87   TIME(SEC)= 1672.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 27.93   TIME(SEC)= 1676.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 28.00   TIME(SEC)= 1680.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 28.07   TIME(SEC)= 1684.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 28.13   TIME(SEC)= 1688.0   KCURNT  1 11 12  4  5  6  7  8  9 10  0  0  0  0  0   KAVAIL 15 14 13  3  2   NAVAIL= 65
TIME(MIN)= 28.20   TIME(SEC)= 1692.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.27   TIME(SEC)= 1696.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.33   TIME(SEC)= 1700.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.40   TIME(SEC)= 1704.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.47   TIME(SEC)= 1708.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.53   TIME(SEC)= 1712.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.60   TIME(SEC)= 1716.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TYPE  9 A/C IN CH 12 GENERATED.   0.28    8.36   38.68   6139.   -1.70   -1.70   -1.70 422.22 267.74 460.80    0.0      5
      608.00        51072.       235296.
TIME(MIN)= 28.67   TIME(SEC)= 1720.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.73   TIME(SEC)= 1724.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
TIME(MIN)= 28.80   TIME(SEC)= 1728.0   KCURNT  1 11 12  4 10  6  7  8  9  0  0  0  0  0  0   KAVAIL 14 13  3  2  5   NAVAIL= 66
```

TIME(MIN)= 28.87	TIME(SEC)= 1732.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 28.93	TIME(SEC)= 1736.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 29.00	TIME(SEC)= 1740.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 29.07	TIME(SEC)= 1744.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 29.13	TIME(SEC)= 1748.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 29.20	TIME(SEC)= 1752.0	KCURNT 1 11 12 4 10 6 7 8 9 0 0 0 0 0 0	KAVAIL 14 13 3 2 5	NAVAIL= 66
TIME(MIN)= 29.27	TIME(SEC)= 1756.0	KCURNT 1 11 12 9 10 6 7 8 0 0 0 0 0 0 0	KAVAIL 13 3 2 5 4	NAVAIL= 67
TIME(MIN)= 29.33	TIME(SEC)= 1760.0	KCURNT 1 11 12 9 10 6 7 8 0 0 0 0 0 0 0	KAVAIL 13 3 2 5 4	NAVAIL= 67
TIME(MIN)= 29.40	TIME(SEC)= 1764.0	KCURNT 1 11 12 9 10 6 7 8 0 0 0 0 0 0 0	KAVAIL 13 3 2 5 4	NAVAIL= 67
TIME(MIN)= 29.47	TIME(SEC)= 1768.0	KCURNT 1 11 12 9 10 6 7 8 0 0 0 0 0 0 0	KAVAIL 13 3 2 5 4	NAVAIL= 67
TIME(MIN)= 29.53	TIME(SEC)= 1772.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.60	TIME(SEC)= 1776.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.67	TIME(SEC)= 1780.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.73	TIME(SEC)= 1784.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.80	TIME(SEC)= 1788.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.87	TIME(SEC)= 1792.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 29.93	TIME(SEC)= 1796.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.00	TIME(SEC)= 1800.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.07	TIME(SEC)= 1804.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.13	TIME(SEC)= 1808.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.20	TIME(SEC)= 1812.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.27	TIME(SEC)= 1816.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.33	TIME(SEC)= 1820.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.40	TIME(SEC)= 1824.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.47	TIME(SEC)= 1828.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.53	TIME(SEC)= 1832.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.60	TIME(SEC)= 1836.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.67	TIME(SEC)= 1840.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
TIME(MIN)= 30.73	TIME(SEC)= 1844.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68
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TIME(MIN)= 30.87	TIME(SEC)= 1852.0	KCURNT 1 11 12 9 10 6 7 0 0 0 0 0 0 0 0	KAVAIL 3 2 5 4 8	NAVAIL= 68

TIME(MIN)=	30.93	TIME(SEC)=	1856.0	KCURNT	1	11	12	9	10	6	7	0	0	0	0	0	0	0	0	KAVAIL	3	2	5	4	8	NAVAIL=	68
TIME(MIN)=	31.00	TIME(SEC)=	1860.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.07	TIME(SEC)=	1864.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.13	TIME(SEC)=	1868.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.20	TIME(SEC)=	1872.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.27	TIME(SEC)=	1876.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.33	TIME(SEC)=	1880.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.40	TIME(SEC)=	1884.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.47	TIME(SEC)=	1888.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.53	TIME(SEC)=	1892.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.60	TIME(SEC)=	1896.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.67	TIME(SEC)=	1900.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.73	TIME(SEC)=	1904.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.80	TIME(SEC)=	1908.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.87	TIME(SEC)=	1912.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	31.93	TIME(SEC)=	1916.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.00	TIME(SEC)=	1920.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.07	TIME(SEC)=	1924.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.13	TIME(SEC)=	1928.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.20	TIME(SEC)=	1932.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.27	TIME(SEC)=	1936.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.33	TIME(SEC)=	1940.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.40	TIME(SEC)=	1944.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.47	TIME(SEC)=	1948.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.53	TIME(SEC)=	1952.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.60	TIME(SEC)=	1956.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.67	TIME(SEC)=	1960.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.73	TIME(SEC)=	1964.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.80	TIME(SEC)=	1968.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.87	TIME(SEC)=	1972.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69
TIME(MIN)=	32.93	TIME(SEC)=	1976.0	KCURNT	1	11	12	9	10	7	0	0	0	0	0	0	0	0	0	KAVAIL	2	5	4	8	6	NAVAIL=	69

TIME(MIN)= 33.00 TIME(SEC)= 1980.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.07 TIME(SEC)= 1984.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.13 TIME(SEC)= 1988.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.20 TIME(SEC)= 1992.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.27 TIME(SEC)= 1996.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.33 TIME(SEC)= 2000.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.40 TIME(SEC)= 2004.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.47 TIME(SEC)= 2008.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.53 TIME(SEC)= 2012.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.60 TIME(SEC)= 2016.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.67 TIME(SEC)= 2020.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.73 TIME(SEC)= 2024.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.80 TIME(SEC)= 2028.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.87 TIME(SEC)= 2032.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 33.93 TIME(SEC)= 2036.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.00 TIME(SEC)= 2040.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.07 TIME(SEC)= 2044.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.13 TIME(SEC)= 2048.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.20 TIME(SEC)= 2052.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.27 TIME(SEC)= 2056.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.33 TIME(SEC)= 2060.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.40 TIME(SEC)= 2064.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.47 TIME(SEC)= 2068.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.53 TIME(SEC)= 2072.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.60 TIME(SEC)= 2076.0 KCURNT 1 11 12 9 7 0 0 0 0 0 0 0 0 0 0 KAVAIL 5 4 8 6 10 NAVAIL= 70
TIME(MIN)= 34.67 TIME(SEC)= 2080.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71
TIME(MIN)= 34.73 TIME(SEC)= 2084.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71
TIME(MIN)= 34.80 TIME(SEC)= 2088.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71
TIME(MIN)= 34.87 TIME(SEC)= 2092.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71
TIME(MIN)= 34.93 TIME(SEC)= 2096.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71
TIME(MIN)= 35.00 TIME(SEC)= 2100.0 KCURNT 1 11 12 9 0 0 0 0 0 0 0 0 0 0 0 KAVAIL 4 8 6 10 7 NAVAIL= 71

TIME(MIN)= 35.07	TIME(SEC)= 2104.0	KCURNT	1	11	12	9	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	4	8	6	10	7	NAVAIL= 71
TIME(MIN)= 35.13	TIME(SEC)= 2108.0	KCURNT	1	11	12	9	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	4	8	6	10	7	NAVAIL= 71
TIME(MIN)= 35.20	TIME(SEC)= 2112.0	KCURNT	1	11	12	9	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	4	8	6	10	7	NAVAIL= 71
TIME(MIN)= 35.27	TIME(SEC)= 2116.0	KCURNT	1	11	12	9	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	4	8	6	10	7	NAVAIL= 71
TIME(MIN)= 35.33	TIME(SEC)= 2120.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.40	TIME(SEC)= 2124.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.47	TIME(SEC)= 2128.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.53	TIME(SEC)= 2132.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.60	TIME(SEC)= 2136.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.67	TIME(SEC)= 2140.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.73	TIME(SEC)= 2144.0	KCURNT	9	11	12	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	8	6	10	7	1	NAVAIL= 72
TIME(MIN)= 35.80	TIME(SEC)= 2148.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 35.87	TIME(SEC)= 2152.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 35.93	TIME(SEC)= 2156.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.00	TIME(SEC)= 2160.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.07	TIME(SEC)= 2164.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.13	TIME(SEC)= 2168.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.20	TIME(SEC)= 2172.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.27	TIME(SEC)= 2176.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.33	TIME(SEC)= 2180.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.40	TIME(SEC)= 2184.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.47	TIME(SEC)= 2188.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.53	TIME(SEC)= 2192.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.60	TIME(SEC)= 2196.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.67	TIME(SEC)= 2200.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.73	TIME(SEC)= 2204.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.80	TIME(SEC)= 2208.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.87	TIME(SEC)= 2212.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 36.93	TIME(SEC)= 2216.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.00	TIME(SEC)= 2220.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.07	TIME(SEC)= 2224.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73

TIME(MIN)= 37.13	TIME(SEC)= 2228.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.20	TIME(SEC)= 2232.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.27	TIME(SEC)= 2236.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.33	TIME(SEC)= 2240.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.40	TIME(SEC)= 2244.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.47	TIME(SEC)= 2248.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.53	TIME(SEC)= 2252.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.60	TIME(SEC)= 2256.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.67	TIME(SEC)= 2260.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.73	TIME(SEC)= 2264.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.80	TIME(SEC)= 2268.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.87	TIME(SEC)= 2272.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 37.93	TIME(SEC)= 2276.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 38.00	TIME(SEC)= 2280.0	KCURNT	12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	6	10	7	1	9	NAVAIL= 73
TIME(MIN)= 38.07	TIME(SEC)= 2284.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.13	TIME(SEC)= 2288.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.20	TIME(SEC)= 2292.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.27	TIME(SEC)= 2296.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.33	TIME(SEC)= 2300.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.40	TIME(SEC)= 2304.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.47	TIME(SEC)= 2308.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.53	TIME(SEC)= 2312.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.60	TIME(SEC)= 2316.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.67	TIME(SEC)= 2320.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.73	TIME(SEC)= 2324.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.80	TIME(SEC)= 2328.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.87	TIME(SEC)= 2332.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 38.93	TIME(SEC)= 2336.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 39.00	TIME(SEC)= 2340.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74
TIME(MIN)= 39.07	TIME(SEC)= 2344.0	KCURNT	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KAVAIL	10	7	1	9	11	NAVAIL= 74

SUMMARY TABLE OF ALL RUNWAY ACTIVITY

RUNWAY	TIME	A/C	SEQ	DELAY(AIR/GRND)	HOLDING	CLOSEST(A/C	VALUE)	FUEL(K LBS)
1	0.02		1D	0.0				
1	3.13		6D	0.0				
1	4.48		7D	0.40				
1	7.51		12D	0.0				
1	12.90		21D	0.0				
1	14.72		23D	1.21				
1	19.09		31D	0.0				
1	20.90		32D	1.67				
1	36.83	1	1A	9.62	0.0	2	1.7	12.303
1	28.38	2	2A	-0.78	0.0	1	1.7	11.083
1	30.30	4	4A	-0.73	0.0	7	[illegible]	10.316
1	31.50		51D	1.90				
1	34.40	10	10A	-0.15	0.0	11	[illegible]	8.768
6	25.33	3	3A	-0.78	0.0	6	9.4	4.833
6	32.34	6	7A	-0.71	0.0	11	7.8	9.338
6	35.97	7	6A	-0.89	0.0	9	0.1	7.637
6	37.19	9	9A	-0.76	0.0	7	0.1	9.338
6	39.41	11	11A	-0.69	0.0	10	0.3	7.689
6	40.48	12	12A	-0.74	0.0	11	0.8	4.849
7	0.06		2D	0.0				
7	1.44		3D	1.32				
7	4.67		8D	0.0				
7	17.11		29D	0.0				
7	21.39		38D	0.0				
7	23.34		42D	0.0				
7	28.37		44D	3.49				
7	30.13		48D	2.56				
8	10.33		16D	0.0				
8	12.09		17D	1.03				
8	15.96		26D	0.0				
8	20.99		35D	0.0				
8	26.71		46D	0.0				
9	22.90		40D	0.0				
9	29.81	5	5A	-1.30	0.0	8	1.6	5.549
9	31.12	8	8A	-1.29	0.0	5	1.6	4.578