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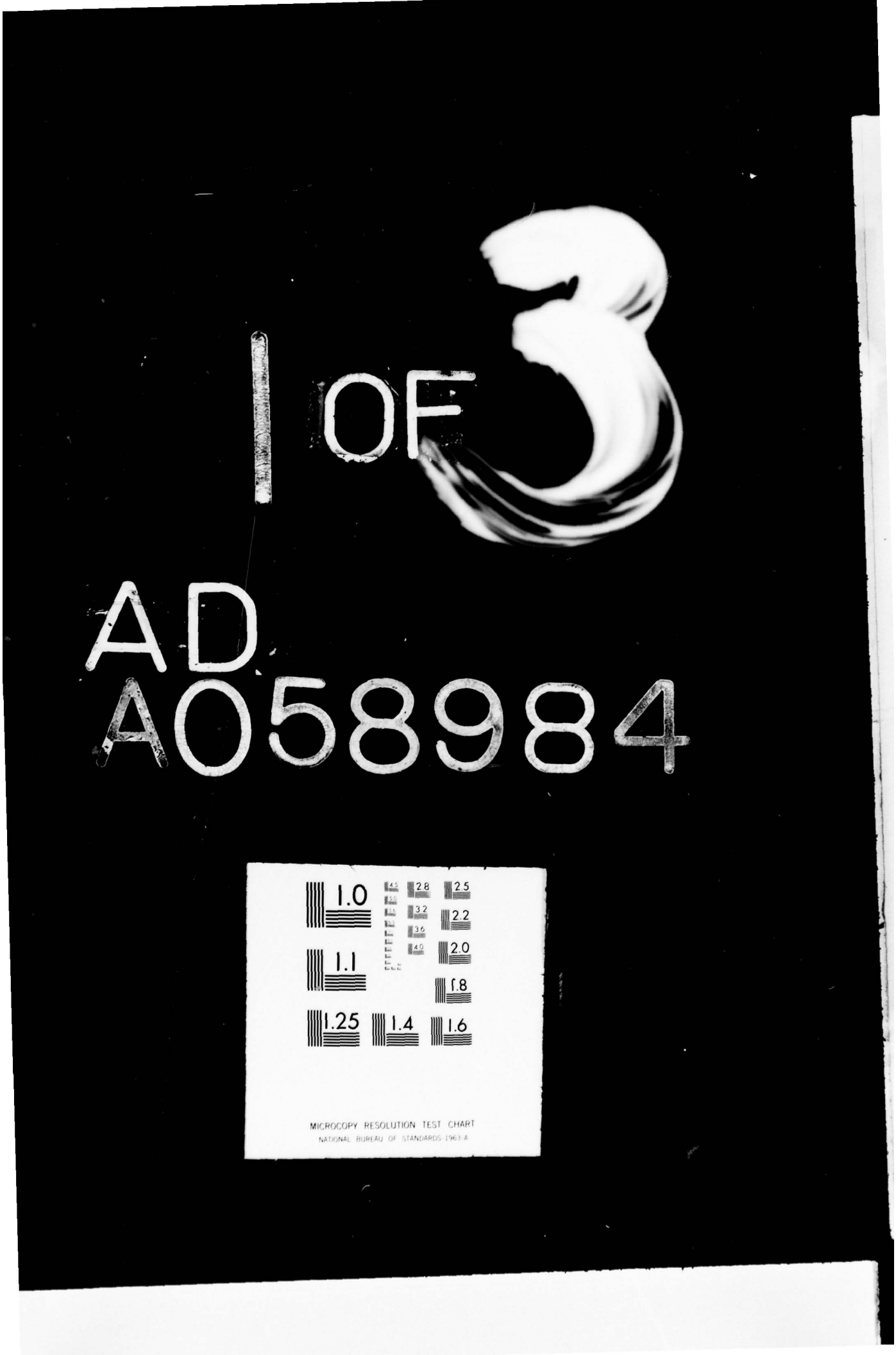
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USER DELAY COST MODEL AND FACILITIES MAINTENANCE COST MODEL FOR A TERMINAL CONTROL AREA

Volume II: User's Manual and Program Documentation for the User Delay Cost Model

L. B. Greene
J. Witt
M. Sternberg-Powidzki

ARINC RESEARCH CORPORATION
2551 RIVA ROAD
ANNAPOLIS MD 21401

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FINAL REPORT

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Prepared for

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION
Airway Facilities Service
Washington DC 20590

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16. Abstract

The User Delay Cost Model (UDCM) is a Monte Carlo simulation of certain classes of movement of air traffic in the Boston Terminal Control Area (TCA). It incorporates a weather module, an aircraft generation module, a facilities module, and an air control module to simulate delays, resulting from facility outage, imposed on four user classes: Air Carrier, Air Taxi, General Aviation, and Military Aircraft. The model can also be used to measure delays due to changing aircraft arrival rates, weather and other environmental considerations, approach types available, or any other factor that affects trail separation in final approach of the maximum number of aircraft an air controller can handle.

This is the second of three volumes. Volume I documented the model formulation and demonstration. Volume III is a user's manual and program documentation for the facilities maintenance cost model.

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PREFACE

The Federal Aviation Administration is responsible for operating and maintaining the airway facilities of the National Aviation System. The magnitude of annual operating and maintenance costs is such that means for reducing these costs are being sought.

This report documents the results of a study to model the relationship between airway facility maintenance practices and (1) aircraft delays in terminal areas, and (2) maintenance costs.

These models are intended to serve as tools for estimating the impact on system users and system operators of proposed maintenance cost reduction initiatives.

The models were formulated, demonstrated, and documented by ARINC Research Corporation under contract to the Transportation Systems Center. Mr. F. Frankel of the Transportation Systems Center provided the technical guidance. The dedication and expertise of Mr. L. B. Greene, Dr. J. Witt, and Mr. M. Sternberg-Powidzki of ARINC Research is acknowledged to be the major contribution to this work.

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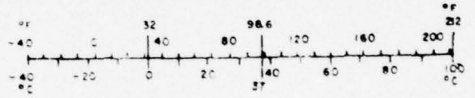
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

Approximate Conversions from Metric Measures

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



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CHAPTER ONE

INTRODUCTION

The User Delay Cost Model (UDCM) is one of two programs prepared by ARINC Research Corporation for the DOT/Transportation Systems Center (TSC) under Project Number TSC/420-0137-WD. The purpose of the two programs or models is to provide the FAA Airway Facilities organization with management tools to estimate the effect of variations in airway facilities maintenance scenarios on:

Costs to the user community due to excessive delays caused by facility outage

Costs of preventive and corrective maintenance.

The UDCM is to be used to address the first issue, while the companion model, the Facilities Maintenance Cost Model (FMCM), addresses the second.

This report provides the documentation of the UDCM, including a description of the model, a program description, and an example application of the model. It is the second of three reports prepared under contract to TSC. The first report, entitled "User Delay Cost Model and Facilities Maintenance Cost Model for a Terminal Control Area", provides documentation of the entire model development efforts. The third report, entitled "Users' Manual and Program Documentation for the Facilities Maintenance Cost Model", provides data on the FMCM, comparable to that contained in this report.

CHAPTER TWO

PROBLEM DESCRIPTION

The FAA is currently spending $1,000,000 a day, principally for labor, to maintain the facilities of the National Airways System. It was recognized that economies should be possible, particularly in the area of changing personnel and preventive maintenance policies, but that these economies might have an adverse effect on facility availability. If facility availability were reduced, an impact could be felt by the user community (defined here as air carriers, air taxis, general aviation, and military) in the form of delays over and above those attributable solely to weather and schedule. The UDCM is designed to measure these delays as the various navigation and landing aids and other facilities in a Terminal Control Area (TCA) fail and are restored to service.

The Boston TCA was used to provide guidance in the development of this model. However, the model is constructed in such a way that by changes in appropriate input data it can be made to reflect the characteristics of any comparable TCA.

CHAPTER THREE

METHOD OF SOLUTION

The UDCM is a Monte Carlo simulation model that combines the three primary stochastic processes that induce user delays:

Facility outage

Traffic intensity

Weather.

The underlying premise of the model is that these three factors are intrinsically interrelated in the creation of delay and that the only way delay can be attributed to any one is to hold two constant and measure the differential delay caused by variations of the third. Differential delay associated with a facility outage depends not only on the change of facility status but also on the existing weather conditions and traffic intensity. The weather and levels of aircraft activity can be set in any manner, but a large quantity of recent historical weather data for Boston's Logan Airport is already incorporated in the model. Several options are available for assessing the impact of facility outage. One or more facilities can be taken out of the system, e.g., the Airport Surveillance Radar (ASR), to determine the consequences of their being inoperative. An alternative method would be to assign values of Mean Time Between Outages (MTBO) and Mean Time To Restore (MTTR) to all facilities simulated in the model and let the model treat the outage and restoration times as random variables.

The model logic duplicates the complex rules and procedures that govern the movement of aircraft as a function of the aircraft traffic intensity, the status of FAA facilities, and the prevailing weather. An aircraft is generated at the boundary of the Boston TCA (at one of five holding fixes about 40 miles from the airport), and its movement from there to Logan or one of the secondary airports is simulated. For aircraft landing at Logan, a randomized time delay is used to schedule a subsequent departure. Aircraft departing from secondary airports are not simulated in the model.

The basic questions that the model is concerned with in moving an aircraft are as follows:

a. Will aircraft separation exceed the instantaneous traffic-handling capability of a controller (controller capacity)?

b. Will aircraft separation be in conformance with FAA standards? The answer to this question is dependent on the status of FAA facilities, the weather, and aircraft weight.

c. Can the aircraft land? The answer to this question is dependent on the status of FAA approach facilities and the weather.

As will be shown in the ensuing discussions of the model, there are a large number of detailed conditions or factors that must be considered in resolving these three key questions. For example, the aircraft type and approach category are needed to establish separation criteria, as are minimum weather conditions for landing. There are also many runways, combinations of facilities, and geographical factors to be considered. The model has been developed to consider the above issues in some detail. To expedite the model development and its execution time, however, it was decided not to simulate every step-by-step command (e.g., heading vectors) that a controller issues to an aircraft but rather the overall set of rules being followed in generating these commands.

Figure 3-1 is a generalized flow diagram for the UDCM. It illustrates the logical relationships among the main decision processes and files that constitute the model. More detailed discussions of these model elements are presented in the following paragraphs. As in nature, the weather assumes a major role. The state of the weather determines directly the level of air activity, especially among general aviation users. This is true because the level of general aviation activity declines during actual instrument conditions. Furthermore, wind direction and speed determine, in main part, the runway in use. The runway choice influences the types of approach available, which, interacting with the weather, determines the landing minima. For these reasons, Figure 3-1 shows weather generation as the first, or driving, model element.

The second program element is aircraft generation. This consists of determining, by random processes, and as a function of weather conditions (IFR or VFR) and time of day, the time of creation of the next arriving aircraft, its type (air carrier, air taxi, general aviation, or military), weight (small, large, or heavy), landing approach category (A, B, C, or D), destination, speed, and original position when first considered by the model.

The third program element, aircraft control, is more complex than the first two and is the heart of the model. It addresses, as a logical unit, the five questions that must be answered by tower and air control personnel in real life and by the model. These are:

What is the preferred landing or takeoff runway, taking into account wind speed and direction and other priorities, such as noise abatement?

If there are one or more instrument approaches for the preferred runway, is there at least one instrument approach for which all facilities required for landing are "up"?

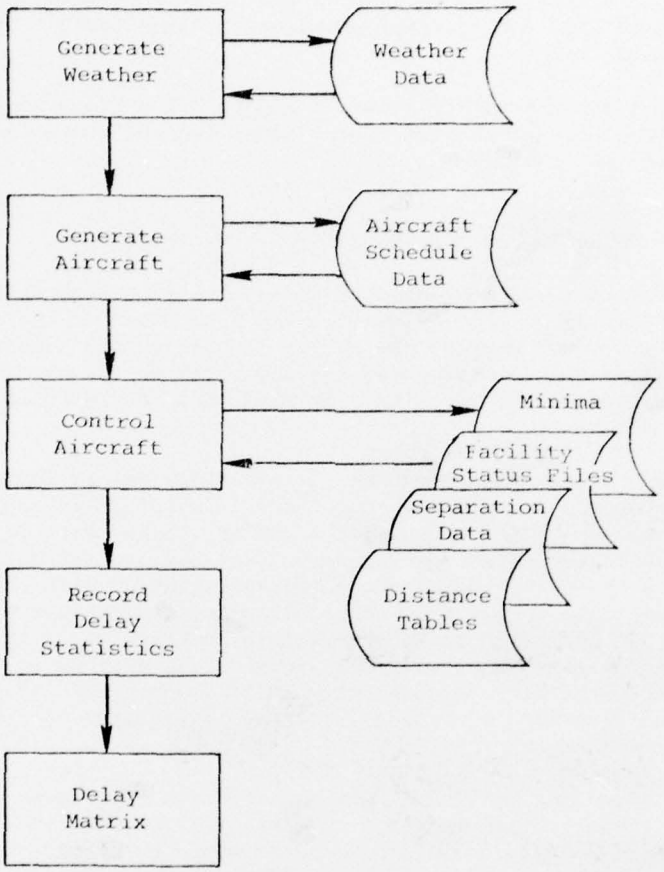


Figure 3-1. GENERALIZED FLOW CHART FOR THE UDCM

Is the weather such that, for the preferred runway, it is above minima for at least one of the available approaches for the preferred runway?

Having a runway and usable instrument approach, how should the aircraft be moved to the runway and proper separation established in the final approach?

For aircraft taking off from Logan, how should proper separation be established between landing aircraft and other aircraft taking off?

There are, of course, many variations and details related to how these questions are dealt with and to other necessary program tasks. These are discussed in Section 3.4.

The remaining model elements shown in Figure 3-1 correspond to the input data required in the exercise of the model and the generation of the aircraft delay statistics.

3.1 OVERVIEW OF MODEL AND ITS CAPABILITIES

Although the model was developed to assess the impact of changing facility availabilities on user delays, it was recognized during model development that it would provide the ability to evaluate a number of additional issues as well. Therefore, the capabilities discussed in the following paragraphs should be kept in mind when the features of the model are being assessed.

The UDCM can be used to analyze the differential delays induced not only by facility outage but also by the effect of aircraft schedule and weather variations, as well as by a host of other related factors. For example, at Logan there is no ILS on runway 27. A typical question might be "What would be the delay impact of equipping runway 27 with an ILS?" All that is required to answer this question, using the present model, is to insert a set of ILS minima for a straight-in approach on 27 in the minima table. It is easy to extend this argument to "What would be the effect of replacing the ILS on runway 4R with a Category III ILS or the Microwave Landing System?" Here, too, all that is required is a simple change in the minima table.

Many other questions and issues may be addressed. In fact, anything that affects spacing in final approach, number of aircraft a controller can handle simultaneously, or minima can be examined by simple input-data changes. It is emphasized, however, that the model cannot determine what these data changes will be; this must be done by analysis external to the model. This being the case, the model could answer the question "What would be the benefit (as measured by aircraft delay reductions) of increasing the number of aircraft per controller from 10 to 20?", without regard for how it was to be done. If the savings were appreciable, this could be taken as justification to examine the feasibility of attempting to achieve this increased controller capacity.

The model can also serve as an aid in airport design and layout, such as runway orientation. In this use, in particular, accurate weather data are required for the weather module; but with such data, it would be possible to decide whether a runway array of (4,22), (15,33), (9,27), for example, is better than (5,23), (17,35), (11,22), where the numbers in parentheses are runway directions in tenths of degrees, magnetic.

The model is not all-encompassing, but enlarging the basic logic makes many new options possible at little cost in terms of incremental analysis and additional modeling.

3.2 WEATHER GENERATION

Figure 3-2 is a logic diagram of this module. The following set of assumptions were used in formulating this module.

Weather phenomena are associated with the presence and movement of pressure systems. Wind direction and velocity are a direct consequence of these movements and are correlated with one another.

Cloud cover and height are, through the movement of pressure systems, correlated with wind direction and velocity.

Visibility is correlated with wind direction and ceiling height.

There is a tendency to persistence in weather conditions.

These assumptions, while certainly not an exhaustive set, are deemed essential to a realistic model, or simulation, of weather phenomena (wind direction, velocity, ceiling, and visibility) in any locale. Fortunately, a good data base is available from Boston upon which a simulation of these phenomena can be based.*

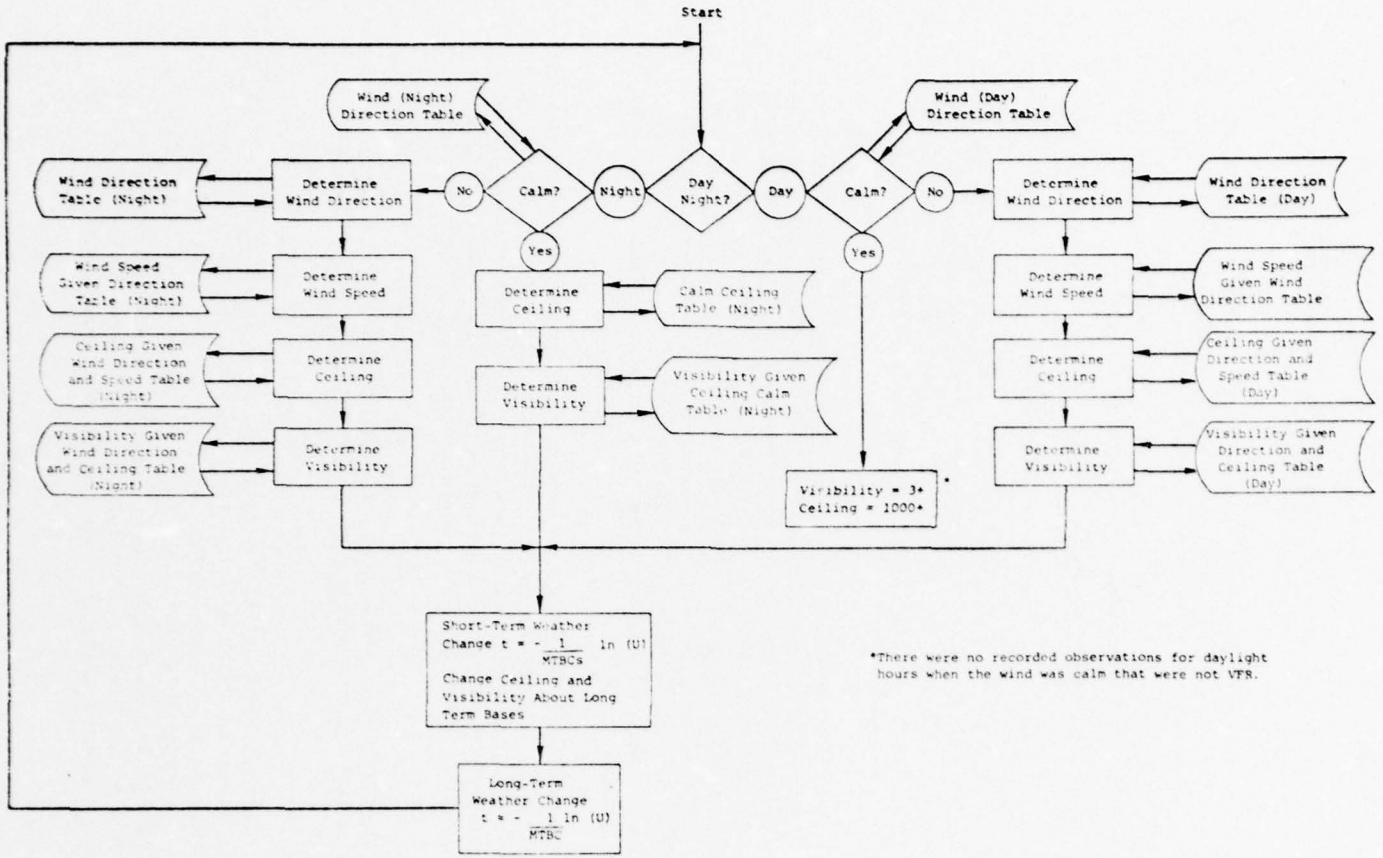
The available data, samples of which are presented in Appendix A, consist of the frequencies of occurrence of wind direction, on a 16-point compass with associated frequencies of wind velocity, grouped as follows: 1 to 4, 5 to 9, 10 to 14, 15 to 29, and 30+ knots, as well as conditions of calm. For each wind direction-velocity combination, frequencies of occurrence of ceilings are provided. Ceilings are grouped as follows: 1000+, 600 to 900, 500, 400, 300, 200, and 100 feet. Visibilities are grouped as follows: 0 to 1/4, 5/16 to 1/2, 5/8 to 7/8, 1, 1-1/4 to 1-1/2, and 3+ nautical miles.

These frequencies are presented as conditional probabilities; thus they allow the calculation, by randomizing on the unit interval, of a particular wind direction; and, given the wind direction, a wind speed; and, given the wind direction and speed, a ceiling; and, given the wind direction and ceiling, a visibility. The data are presented to the computer through input matrices.

A related issue is when and how to simulate changes in the prevailing weather. Two studies, also performed by the National Climatic Center,

---

*A statistical summary prepared by the National Climatic Center, Asheville, North Carolina, "Special Ceiling-Visibility Wind Tabulation", was used for Boston. The period of observation was from January 1970 through December 1974. Observations were made for daytime hours at 1000, 1300, 1600, and 1900 Local Standard Time (LST), and for nighttime hours at 2200, 0100, 0400, and 0700 LST. The data are published in two separate sets of tables (night and day), each with 7304 observations.



*There were no recorded observations for daylight hours when the wind was calm that were not VFR.

Figure 3-2. WEATHER MODULE LOGIC

suggested a basis for such simulation.* Under the assumption that wind direction and speed determine, in part at least, ceiling and visibility, the data provide a basis for answering the question of when to vary the weather. The wind persistence data fit an exponential decay curve fairly well with a Mean Time Between Changes (MTBC) of about 3 hours. The weather module, therefore, defines an exponentially distributed random variable called Time to Change the Weather. Its density function is

$$f(t) = \frac{1}{MTBC} e^{-t/MTBC}. \qquad (3\text{-}1)$$

A nominal value of 3 hours for MTBC has been selected on the basis of these studies.

The question of how much to allow the weather to vary, once the time has been decided, is not so obvious and bears some discussion. In general, except when thunderstorms or strong fronts pass a station, the variation in wind and weather is gradual and highly correlated with past history. For example, an abrupt change from VFR to zero-zero would be rare. A completely realistic model would capture this historicity; however, the creation of such a model is not necessary. What is needed instead is a model that in the long run produces statistical similarity to the phenomena of interest. This has been done by merely allowing the weather to change randomly at the time selected, i.e., randomizing on the exponential Time to Change variable. As an added refinement, the model allows for small short-term variations. The model assumes that ceiling and visibility will vary uniformly about the basic "long term" values determined above. These "short term" variations are induced at times that are also exponentially distributed but with a nominal mean of 15 minutes. This is in conformance with observed short-term weather fluctuations and allows the model to simulate the conditions underlying a pilot's decision to wait for a short-term weather change if conditions are marginally below minima.

Figure 3-2 incorporates all of these weather factors. In the figure it can be seen that two sets of weather data tables, one each for night and day, are used in the model. The model checks the time first, then by a random process determines, in order, the wind direction, wind speed, ceiling, and visibility.

3.3 AIRCRAFT GENERATION

The objective of the aircraft generation module is to create aircraft to be routed through the Boston TCA in the exercise of the model. Figure 3-3

*The studies are "Seasonal and Annual Persistence of Surface Wind Direction by Wind Speed" at Binghamton, New York, for the period January 1960 to December 1964, with 24 observations per day; and "Duration of High Surface Wind Speeds" at Oscoda, Michigan AFB, for the period November 1950 to December 1970.

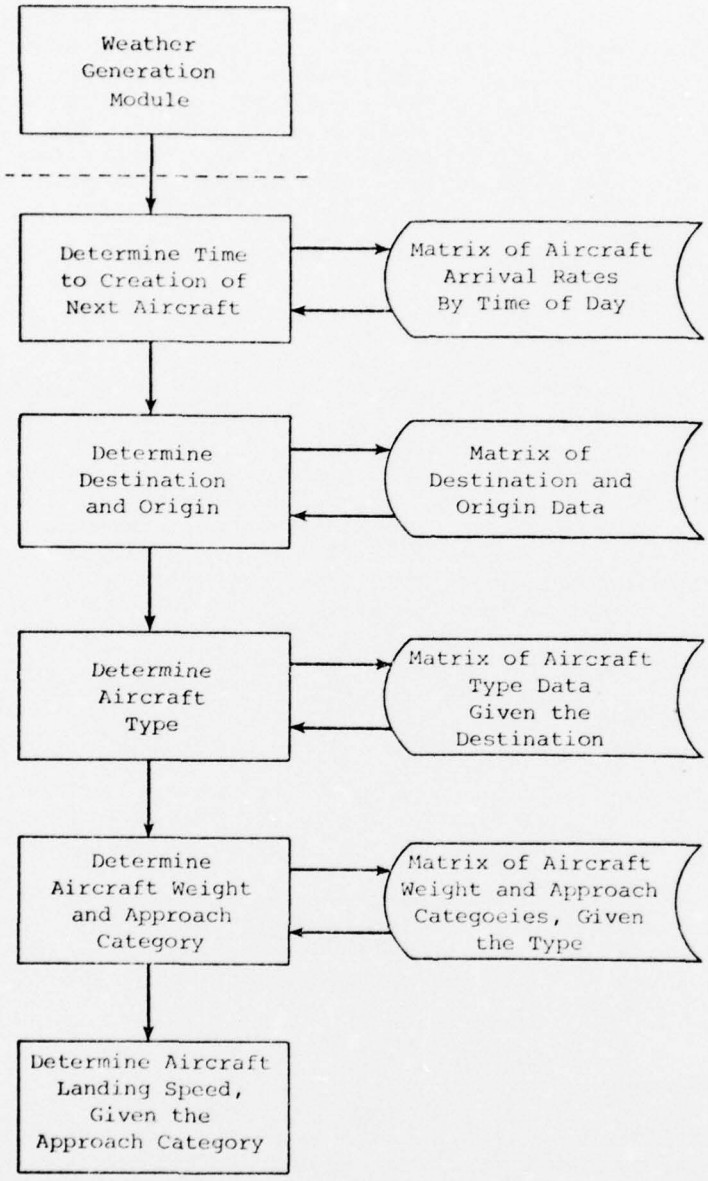


Figure 3-3. AIRCRAFT GENERATION MODULE LOGIC

displays the module logic. Each aircraft will be defined in terms of the following descriptors:

a. Time of creation

b. Destination

c. Type

   Air carrier

   Air taxi

   General aviation

   Military

d. Origin

e. Aircraft characteristics

   Weight

   Landing approach category

   Landing speed.

The following discussion explains two methods of simulating aircraft generation time. The first of these is a method that could be used if complete data were available. It is presented so that future data-gathering efforts by the FAA can be properly directed. The second method described is that which was actually used in the model. This method, though less direct, was considered necessary in order for the model demonstration to be representative and interpretable.

3.3.1 Aircraft Creation Time, Given Complete Data

The time to creation of the next aircraft will be considered a random variable having the exponential distribution, with the rate of creation a function of destination, time of day, and weather conditions. The rate of creation can be represented as

$$\lambda_{ijk},$$

where

i = 1,2,..,n the destination airport, and n is the number of destination airports in the model

j = 1,2,...,24 corresponding to the time periods 0000-0059, 0100-0159,..., 2300-2359

k = 0,1 where 0 implies IFR conditions and 1 implies VFR conditions.

The time of day influences the intensity of air activity into all airports in the model. Most of the secondary airports, for example, shut down at night, thus

$$\lambda_{ijk} = 0,$$

for values of j lying in the period of shutdown for airport i.

If k is assigned a value, say 0, corresponding to IFR conditions, then the λ_{ij0} can be arrayed in an n × 24 matrix.

$$\begin{array}{l} \\ \text{Destination} \end{array} \begin{array}{c} \text{Time} \\ \begin{bmatrix} 1, & 2, & \ldots, & 24 \\ \lambda_{1,1,0}, & \lambda_{1,2,0,\ldots,} & & \lambda_{1,24,0} \\ \lambda_{2,1,0}, & \lambda_{2,2,0,\ldots,} & & \lambda_{2,24,0} \\ \vdots & \vdots & & \vdots \\ \lambda_{n,1,0}, & \lambda_{n,2,0,\ldots,} & & \lambda_{n,24,0} \end{bmatrix} \end{array} \begin{array}{l} 1 \\ 2 \\ \\ \\ \\ n \end{array}.$$

For any time, e.g., j = 23, some airports will be closed and some open. If $\lambda_{i,23,0}$ is summed over i, then

$$\lambda_{.23,0} = \sum_{i=1}^{n} \lambda_{i,23,0},$$

and is the overall arrival rate to all airports in IFR conditions in the hour 2200-2259. The time of arrival (creation) of the next aircraft, t_a, has the exponential distribution with parameter $\lambda_{.,23,0}$

$$f(t_a) = \lambda_{.,23,0} \left[\exp -t_a \lambda_{.,23,0}\right],$$

and t_a can be found by sampling the unit interval for a uniformly distributed random variable, U, and solving the equation

$$t_a = \frac{-1}{\lambda_{.,23,0}} (\ell n\ U).$$

3.3.2 Aircraft Creation Time, Complete Data Not Available

Section 3.3.1 discussed how overall arrival rates could be calculated. The arrival rate data have not been collected in the form discussed there; that is, arrival rates for both weather conditions at all destination airports, by time of day, are not known. An approximation was used in the model demonstration. The source for this approximation was data from the

Performance Measurement System (PMS) for Airports, dated November 1975. Figure 3-4 was taken from this report and shows arrivals of scheduled aircraft as a function of time. This graph was converted by manual measurement into a table of approximate numbers. This table was extended quite arbitrarily to cover a 24-hour day. It was assumed that these rates could be made applicable to IFR or VFR conditions by multiplying them by a constant. This, in fact, was done in the demonstration runs. It is suggested that before the model is exercised for analysis that these data be collected in the form called for in the discussion contained in Section 3.3.1.

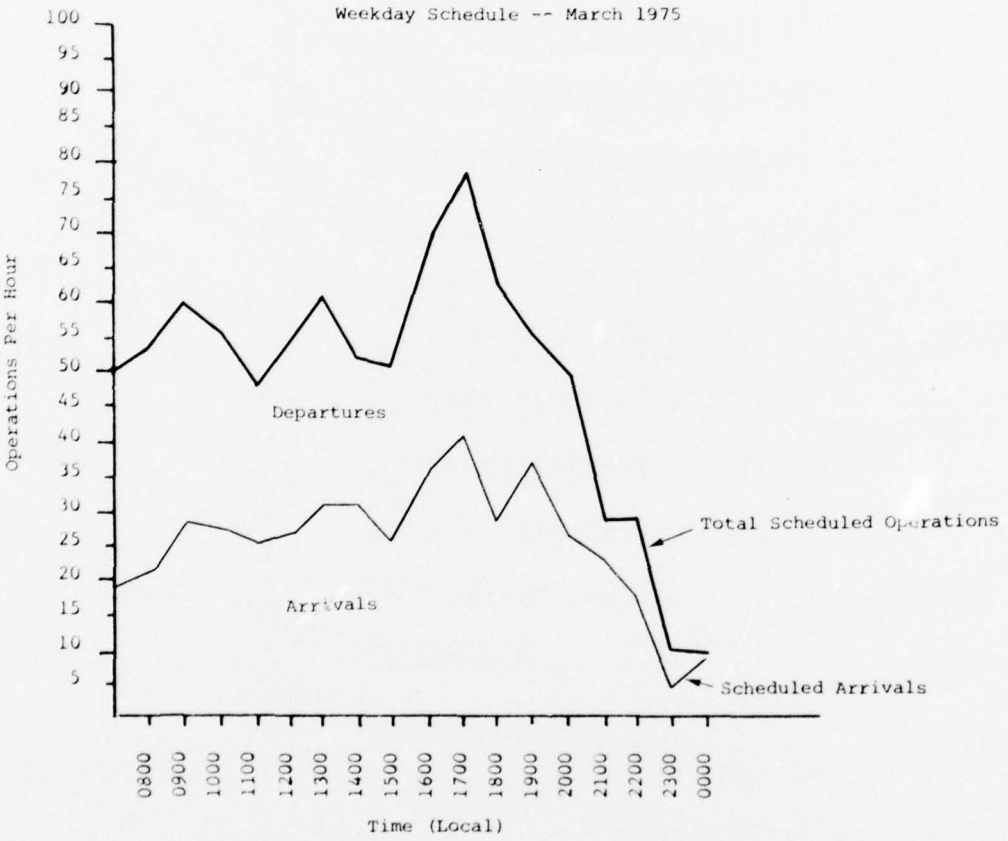


Figure 3-4. SCHEDULED ARRIVAL RATE AT LOGAN

The last column in Figure 3-5 shows the rate of arrival, derived from Figure 3-4, by time of day, for VFR conditions. These figures are the same as those used in the demonstration at TSC on 20-22 September 1976. Other uses of the matrix in Figure 3-5 are discussed in Section 3.3.3.2.

MATRIX HALFWORD SAVEVALUEVFRAC

		Hold Areas					Secondary Airports												
	COL.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 Default to Tow Mac
ROW	1	297	597	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	7
	2	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	9
	3	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	5
	4	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	8
	5	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	11
	6	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	17
	7	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	25
	8	260	522	740	784	871	871	871	954	955	955	955	955	955	998	998	1000	1000	30
	9	251	502	711	752	836	929	946	947	948	954	954	955	955	996	997	998	999	41
	10	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
	11	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	39
Time of	12	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
Day	13	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
	14	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	46
	15	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	46
	16	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	53
	17	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	60
	18	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	43
	19	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	53
	20	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	46
	21	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	33
	22	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	26
	23	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	7
	24	269	538	763	807	897	997	997	997	998	998	998	998	998	998	998	1000	1000	12

Number of aircraft created in VFR conditions

Figure 3-5. DISTRIBUTION OF AIRCRAFT DESTINATIONS AND OVERALL ARRIVAL RATES AS A FUNCTION OF TIME OF DAY

3.3.3 Destination Assignment

3.3.3.1 Ideal Method of Destination Assignment

Just as the availability of the λ_{ijk} would have made the task of generating an arrival time simple and precise, it would also make the task of destination assignment simple and precise, as shown below.

Let P_i be the probability that the next aircraft will have airport i at its destination, then

$$P_i = \frac{\lambda_{ijk}}{\lambda_{.jk}} .$$

A table of cumulative values of P_i can be formed from the function

$$F_m = \frac{\sum_{i=1}^{m} \lambda_{ijk}}{\lambda_{.jk}} ,$$

where

$m \leq n$ = the number of airports.

If a uniform random variable is again drawn from the unit interval, a destination is assigned by comparing U with this cumulative probability for all values of m. This method assures that aircraft will not be created with destination airports which are shut down because of time of day.

3.3.3.2 Pragmatic Method of Destination Assignment

Since the λ_{ijk} was not available, another method was used to take advantage of the data which were available. As will be seen, even with this method, the data were still incomplete.

The analysis, "FAA Air Traffic Activity for Calendar Year 1975", published by the FAA Office of Management Systems in March 1976, contained a number of statistical tables descriptive of various aircraft operations nationwide. Table 14 of this analysis identifies the number of instrument approaches handled by FAA-operated Approach Control Facilities, RAPCONS, and RATCCS. Table 3-1 is an extract from this FAA table and provides the data for Logan Airport and its secondary airports.

It can be seen that of the 31282 instrument approaches made in the Boston TCA, 26142 or 83.6 percent were made at Logan. At Bedford, 2902 or 9.3 percent instrument approaches were made, etc. A cumulative table was constructed to be used, in conjunction with a random number selection, to assign these destinations. Unfortunately, a similar table was not available for VFR approaches; therefore, the data in Table 3-1 were used for both cases.

Table 3-1. IFR APPROACHES IN THE BOSTON TCA FOR 1975

Airport	Airport Totals	Air Carrier	Air Taxi	General Aviation	Military
Primary Airport					
(Boston Logan)	26142	20450	3012	2587	93
Secondary Airports					
Bedford	2902	87	235	2425	155
Beverly Municipal	548	0	1	446	101
Fitchburg	38	0	0	38	0
Fort Devens	26	0	0	1	25
Lawrence	200	0	38	162	0
Mansfield	12	0	0	12	0
Marshfield	19	0	0	19	0
Newburyport	1	0	0	1	0
Norwood	1275	2	12	1094	167
Plymouth	15	0	0	15	0
South Weymouth	69	0	0	12	57
Taunton	19	0	0	19	0
Tewkesbury	17	0	4	13	0
Area Totals	31283	20530	3302	6844	598

A further refinement was made in the model. Since aircraft bound for Logan appear at one of the five holding fixes situated around Logan, namely, Manjo, Millis, Bridgewater, Skipper, and Lawrence, and since their time of flight from the holding fix (an important program variable) is dependent on which fix they are leaving and to which runway they are proceeding, it is necessary to assign each aircraft created to one of these fixes.

For those aircraft destined for Logan, the percentages assigned to the five holding fixes are as presented in Table 3-2.

Table 3-2. PERCENTAGE OF AIRCRAFT BOUND FOR LOGAN ENTERING OVER HOLDING FIXES

Fix	Fix Number	Percentage
Manjo	1	30
Millis	2	30
Bridgewater	3	25
Skipper	4	5
Lawrence	5	10

Combining these data with the percentages calculated from Table 3-1 shows that of all instrument approaches to be made in the Logan TCA (83.6 percent of the total), $0.3 \times 0.836 = .251$ will appear at Manjo and Millis; $0.25 \times 0.836 = .209$ at Bridgewater, etc. These numbers were then cumulated and are displayed in Figure 3-5. When all airports are open, between 0800 and 2000, .251 percent of IFR aircraft will appear at Manjo. In Figure 3-5, the unnumbered left column represents the time of day; column number 1 represents Manjo, column 2 is Millis, and so forth through column 5 (the order shown in Table 3-2). Consider, for example, row 13, representing the time from 1201 to 1300, where the number 251 represents the frequency, on a scale from 1 to 1000, of created IFR (or VRF) aircraft assigned to Manjo. Note that column 2 contains the value 502, which is the sum of 251 and 251, the latter number being the frequency of assignment to Millis. If a random number is drawn, e.g., 138, the aircraft would be assigned to Manjo. If it were 312, since $251 < 312 \leq 502$, it would indicate assignment to Millis. Each row is cumulative from left to right, where the columns from 6 through 17 represent, respectively, Bedford, Beverly, Fitchburg, Fort Devens, Lawrence, Mansfield, Marshfield, Newburyport (Plum Island), Norwood, Plymouth, South Weymouth, and Taunton. The last column, treated by the program as a default, is Tew-Mac and also shows the hourly rate of total arrivals.

3.3.4 Assignment of User Types

Having the destination, the user type can be assigned on the basis of the data in Table 3-1. Figure 3-6 shows the program selection matrix; its relationship to Table 3-1 is shown in the following program example.

Suppose the destination is Bedford, where 2902 is the total. Of these, 87 or 2.99 percent are air carriers, 235 or 8.09 percent are air taxis, 2425 or 83.56 percent are general aviation, and 155 or 5.34 percent are military. If these percentages are changed to numbers between 0 and 1000, the cumulative distribution is 30, 111, 947, and 1000. Row 6 of Figure 3-6 shows, for columns 1, 2, and 3, corresponding to air carrier, air taxi, and general aviation, respectively, the first three of these numbers. Military aircraft are treated as defaults.

3.3.5 Aircraft Origin

Aircraft proceeding to secondary airports are assumed to appear at the airport ready to land. The only question is whether or not they can, depending on facility status and weather conditions. On the other hand, aircraft destined for Logan appear at one of the five holding fixes that serve Logan -- Manjo, Millis, Bridgewater, Skipper, or Lawrence. For the purpose of the model configuration, these holding fixes are destinations from the point if view of creation, and are also origins of aircraft bound for Logan. No departures from secondary airports are simulated. Aircraft landing at Logan appear as Logan departures after a turnaround time is generated by the program function MODSP. At present, air carriers turn around uniformly in the interval of 10-15 minutes after landing, air taxis 180-240 minutes, general aviation 20-35 minutes, and military 240-300 minutes.

MATRIX HALFWORD SAVEVALUEVFRPT

ROW	COL. 1	2	3
1	782	897	996
2	782	897	996
3	782	897	996
4	782	897	996
5	782	897	996
6	30	111	947
7	0	2	816
8	0	0	1000
9	0	0	38
10	0	190	1000
11	0	0	1000
12	0	0	1000
13	0	0	1000
14	2	11	869
15	0	0	1000
16	0	0	174
17	0	0	1000
18	0	235	1000

A/C Destinations

A/C Type (Default = type 4)

Matrix is used to determine aircraft type once destination is known in VFR conditions.

Figure 3-6. USER TYPE BY DESTINATION

3.3.6 Aircraft Weight, Category, and Speed

With knowledge of the type of aircraft, three other pieces of information are required: the weight class, the aircraft approach category, and speed. The weight class is required to determine separation criteria in the final approach. The approach category is required to determine landing minima.

A small aircraft, designated S, is an aircraft whose maximum certified takeoff weight is 12,500 pounds or less. A large aircraft, L, weighs more than 12,500 pounds and no more than 300,000 pounds. A heavy aircraft, H, weighs more than 300,000 pounds.

Approach category definitions are tabulated as follows:

a. Landing approach speed less than 91 knots, landing weight less than 30,001 pounds

b. Landing approach speed 91 knots or more but less than 132 knots; landing weight 30,001 pounds or more but less than 60,001 pounds

c. Landing approach speed 121 knots or more but less than 141 knots; landing weight 60,001 pounds or more but less than 150,001 pounds

d. Landing approach speed 141 knots or more but less than 166 knots; landing weight 150,001 pounds or more

e. Landing approach speed greater than 166 knots is not considered.

Both weight class and approach category are treated as a function of aircraft type. The model assigns aircraft weight class and approach category through two separate random processes. Although there could theoretically be a high correlation between these two factors, the actual mix of aircraft is such that there is little need to correlate the weight class and approach category selection. For example, all general aviation aircraft in the available Logan data base were both small and approach category a. The only problem concerned commercial aircraft, wherein some heavy aircraft could be erroneously assigned to approach category c. However, a model refinement in this one area did not seem to be warranted.

Table 3-3 presents aircraft distribution data derived from information supplied by TSC, and based in part on FAA equipment forecast for air carrier operations at Logan.

Table 3-3. FREQUENCY DISTRIBUTION OF AIRCRAFT WEIGHT CLASSES

Type	Weight Class		
	Small	Large	Heavy
Air Carrier	0	.9	.1
Air Taxi	.1	.9	0
General Aviation	.9	.1	0
Military	.02	.9	.08

Table 3-4 presents approach category data which was also based on information supplied by TSC.

Table 3-4. LAND APPROACH CATEGORY DISTRIBUTION, BY TYPE

Type	Approach Category			
	A	B	C	D
Air Carrier	0	.05	.1	.85
Air Taxi	.9	.1	0	0
General Aviation	.9	.07	.03	0
Military	.1	.3	.3	.3

Table 3-3 is combined with Table 3-4 as a single input matrix, and is displayed in Figure 3-7. The data are shown as cumulative probability distributions.

MATRIX HALFWORD SAVEVALUECATWT

	COL. 1	2	3	4	5	6	7	
ROW 1	0	0	787	1000	0	787	1000	Air Carrier
2	0	1000	1000	1000	0	1000	1000	Air Taxi
A/C 3	1000	1000	1000	1000	1000	1000	1000	General Aviation
Type 4	300	500	1000	1000	500	1000	1000	Military
	Approach Category				Weight Class			

Matrix is used to define aircraft category and weight, once type has been determined.

Figure 3-7. CUMULATIVE FREQUENCY DISTRIBUTION OF AIRCRAFT APPROACH CATEGORIES AND WEIGHT CLASSES

With weight and approach category decided, an approach speed is all that remains to be assigned. The speed is selected on the basis of a uniform speed distribution applicable to the various approach categories:

Category	*Speed (Knots)*	Distribution *Range (Knots)*
A	71-90	20
B	91-120	30
C	121-140	20
D	141-165	25

3.4 AIRCRAFT CONTROL

3.4.1 Air Traffic Control

Figure 3-8 depicts the air traffic control module.

As described previously, when an aircraft bound for Logan is generated, it is assigned to one of the five inbound holding fixes, where it is held until it can be accepted by a controller for vectors to an approach. A central assumption of this model is that three factors primarily affect delays:

- The number of aircraft a controller can handle at one time

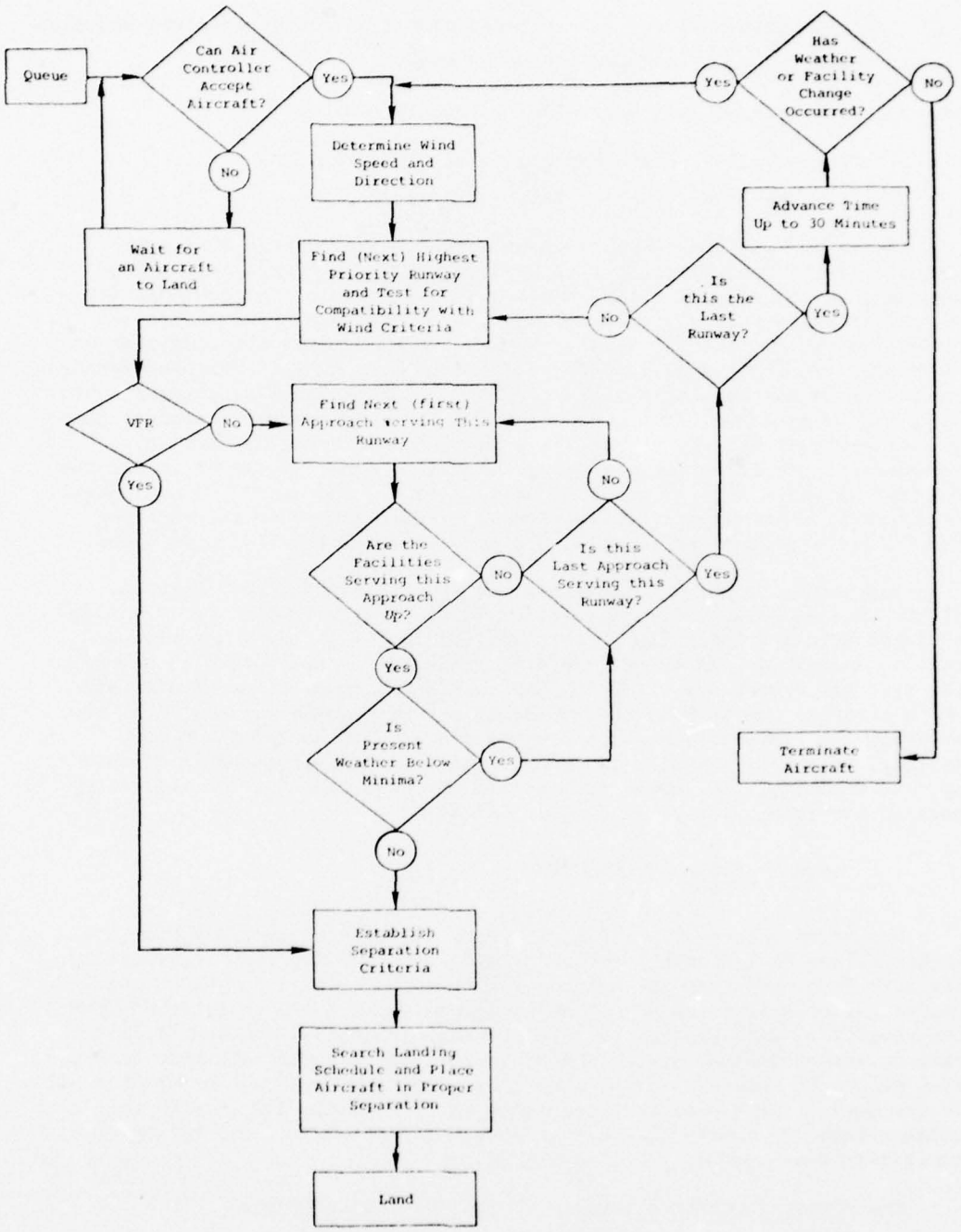


Figure 3-8. AIR TRAFFIC CONTROL MODULE

The longitudinal, or trail, separation of aircraft in final approach

Whether or not an approach can be made.

The number of aircraft per controller is determined by:

A controller's innate capability and training

Accuracy and information rate of the radar.

Interviews with personnel in Boston TRACON showed that while the capabilities of controllers varied considerably, an average controller, working with the ASR, ARTS-III, and SECRA all operable, could handle ten aircraft between the holding fixes and the point where the aircraft are handed over to the tower control. These same interviews revealed that as the several radars became inoperable (the Winthrop ARSR is included because its raw video can be displayed in the TRACON), the number of aircraft per controller diminished. The last column in Table 3-5 displays nominal numbers of aircraft per controller, as a function of the radar facility environment. To illustrate, suppose the ASR is down, the SECRA is up, the ARTS-III is down, and the Winthrop ARSR is down. The SECRA (beacon radar) is the only radar information available, and the number of aircraft per controller is reduced from a nominal, or average, value of ten to eight.

The manner in which the maximum number of aircraft per controller (MAPC) affects delay is readily seen. Assume that a controller is moving aircraft from a holding fix to a runway and that the runway acceptance rate is unlimited. If the distance from the fix to the runway is D and the aircraft speeds are S, define MAPC as the maximum number of aircraft per controller and NAPH as the number of aircraft moved per hour. If the aircraft the controller handles are assumed equally distant from one another, then this distance is D/MAPC. If the aircraft speed is divided by this quantity, the number of aircraft per hour that the controller can move to the runway, NAPH, is given; that is,

$$\text{NAPH} = \frac{S}{D/\text{MAPC}} = \frac{(\text{MAPC})(S)}{D} .$$

For given values of S and D, the rate of removing aircraft from the holding fixes is a linear function of MAPC. If a controller is receiving aircraft from more than one holding fix, then the rate at which he can remove aircraft from any one of these (assuming they are equidistant from the runway) is NAPH/N, where N is the number of holding fixes. If this rate is less than the rate at which aircraft are arriving at these fixes, then queues or stacks will develop. The longer the queues, the greater will be the delay. If the runway acceptance rate if finite and if NAPH is greater than the runway acceptance rate, then, of course, the runway acceptance rate becomes the limiting factor.

The runway acceptance rate is controlled primarily by:

Trail separation in final approach

Runway clearance rate.

Table 3-5. AIRCRAFT SEPARATION TABLE

Row Number	Facility Status				Trail Separation Standards (Nautical Miles)						Number of Aircraft per Controller
					Nominal Separation (I)	Differentials (Add to Nominal Separation)*					
	ASR	SECRA	ARTS-III	ARSR		H,H** (II)	L,H** (III)	S,H** (IV)	L,L** (V)	S,L** (VI)	
1	Up	Up	Up	Up	3	1	2	3	0	1	10
2				Down	3	1	2	3	0	1	10
3			Down	Up	3	1	2	3	0	1	8
4				Down	3	1	2	3	0	1	8
5		Down	Up	Up	4	0	1	2	0	0	6
6				Down	4	0	1	2	0	0	6
7			Down	Up	4	0	1	2	0	0	6
8				Down	4	0	1	2	0	0	6
9	Down	Up	Up	Up	3	1	2	3	0	1	10
10				Down	3	1	2	3	0	1	10
11			Down	Up	5	0	0	1	0	0	8
12				Down	5	0	0	1	0	0	8
13		Down	Up	Up	5	0	0	1	0	0	5
14				Down	12	0	0	0	0	0	4
15			Down	Up	5	0	0	1	0	0	5
16				Down	12	0	0	0	0	0	4

*See Paragraph 1420, Air Traffic Control, 1770.65, 1 January 1976, FAA, Air Traffic Service.

**H,H means a heavy aircraft following a heavy; L,H means a large aircraft following a heavy, etc.

Trail separation in final approach, the only one of these two factors allowed to vary in the model, is controlled by several factors, among which are:

Accuracy of navigation

Precision and information rate of the radar

Separation required for wake-vortex avoidance

Runway clearance time.

Table 3-5 is also used by the model to determine separation. A nominal separation is given in column I as a function of radar status. If all radars are up, a nominal separation of 3 nautical miles is provided. Other radar outage combinations give different nominal separations up to a maximum of 5 nautical miles. In the event that all radars are down, radar vectors cannot be provided and the model acts as if any approach to Logan must be made on the Boston VORTAC. In this event, a nominal separation of 12 miles is called for. This is an approximation; it is understood that the actual separation in this case would be achieved by not clearing a following aircraft from a holding fix until the one ahead reports at some prescribed fix. The distance between the two aircraft would therefore be a variable dependent on the holding fix involved and the particular runway in use. The 12-nautical-mile separation is thought, however, to be an adequate approximation.

Columns II through VI of Table 3-5 are incremental separations that are added to the nominal separation determined by column I to provide wake-turbulence avoidance. For example, in the top row, with all radar equipment up, column IV represents a small aircraft following a heavy, and an additional 3-nautical-mile separation is provided, giving a total separation of 6 nautical miles.

The model utilizes the separation-table data to establish the landing sequence. How this sequencing is established is a key aspect of the model, as will be shown in Section 3.4.2. As mentioned earlier, in the description of the aircraft generation module, aircraft bound for Logan are placed at one of the five peripheral holding fixes for the purpose of determining the distance from the fix to Logan. It is not necessary, however, to establish five different queues in the model in order to simulate their handling. A single, first-in/first-out (FIFO) suffices. This reflects the fact that the two approach controllers are in communication with one another and coordinate their activity so that all aircraft handed off to them are allowed to proceed in approximately their order of appearance.

3.4.2 Runway Selection and Landing Sequencing

Before a simulated aircraft is released from the queue that represents the holding fixes, the following steps are taken:

The controllers must be free to handle the aircraft.

A runway is assigned, taking into account wind speed and direction, types of approach available, weather conditions, and facilities status.

When a runway is found, the distance to that runway from the assigned holding point is found in the distance table and, by use of the aircraft speed, a time of flight is calculated.

By summing the time of flight and present time, an ETA is found. This ETA is used to determine where the aircraft is placed in the landing sequence.

Runway selection is based on the current wind direction and speed coupled with a priority system. It also takes into account the status of facilities that define the several approaches available, the ceiling and visibility conditions, and landing minima. At Logan, the following landing runway priority system is used:

Priority	Day	Night
1	4R/L	33L
2	27-22L	4R
3	33R/L	22L
4	15R/L	

The model first makes a tentative runway selection by taking into account this priority system and wind constraints. It then determines whether or not a landing can actually be made on this runway under prevailing weather conditions and approach availability.

If the wind is 5 knots or less, it is assumed that the wind is calm, as is done at Logan. In this case the highest-priority runway is noted and a check is made, approach by approach, to determine if the facilities necessary for that approach are in an up status. As available approaches are found for the runway under consideration, the minima corresponding to each approach are examined. If the minima are lower than the prevailing ceiling and visibility conditions for that particular runway-approach combination, a viable approach exists and it is assumed that a landing can be made. If the first approach is not viable, the second is checked, and this cycle is continued until a viable approach is found or all approaches for that runway are exhausted. In this case, the next-lower-priority runway is examined. If no viable approach on any runway can be found, the aircraft is delayed at the holding fix until either a viable approach becomes available or 30 minutes have elapsed, at which time the aircraft is presumed to divert to its alternate.

If the wind is greater than 5 knots and is 15 knots or less, the highest-priority runway having the wind direction within ±80 of its direction is selected and tested for the availability of a viable approach. If no viable approach exists on this runway, the next-highest-priority runway is

examined, etc., until either a viable approach is found or the aircraft is forced to wait for a weather or facility status change to take place.

When the wind is greater than 15 knots, the runway priority is not considered. The model cycles through each runway, searching for a viable approach, if one or more runways are found having a viable approach, the runway closest to the wind is chosen, regardless of wind direction and speed. Of course, if no viable approaches are available, the aircraft, as before, stays at the holding fix.

All of these checks are made before the aircraft is released from the holding fix. When a runway and approach have been found, a distance table is entered. This table contains the distances in nautical miles from all five holding fixes to all the runways at Logan. The data were taken by direct measurement from the Boston (Logan International), Mass., ASR-7 60-nautical-mile video map prepared by the National Ocean Survey, revised 4 February 1976. The routes were laid out in conformity with the Boston Tower Standard Operating Procedures, dated 15 March 1976, BOS TWR 7110.35. It is understood that these routes vary in length from approach to approach, but the tabulated distances are believed to be representative.

When the distance is found, a time of flight is calculated. In calculating the time of flight, the model increases the landing speed by some factor greater than 1; e.g., in the delivered version of the UDCM, time of flight is set equal to the distance divided by the landing speed doubled. This time of flight is added to the present time to obtain an ETA.

Assuming that there are aircraft ahead of the one being considered, there is a landing schedule that contains the landing time, speed, and weight class of the aircraft already en route to land. The ETA of the present aircraft is compared with those of the aircraft on the landing schedule. When the aircraft just ahead (the lead aircraft, with a landing time just less than this ETA) is found, the required separation between the two aircraft is looked up (see Table 3-5) and a calculation is made, using the two aircraft's speeds, to determine if the ETA will allow proper separation. If it does, then a similar calculation is made for the next, or trail, aircraft on the landing schedule. If separation is assured, the ETA is assigned as the landing time and the aircraft is released from the holding fix. Once an aircraft is released, it will be assumed to land regardless of any subsequent changes in weather or facilities. If it does not clear the lead aircraft, a delay is calculated to assure separation, and a check is made on the trailing aircraft, using the ETA plus the calculated delay. If separation is assured, the landing time is the ETA plus this delay. If separation for the trail aircraft is not assured, it is then treated as the lead aircraft and the cycle is continued until a landing time is found. The difference between the landing time and the ETA is the delay time due to spacing. When a delay is necessary, the aircraft is not automatically released from the holding fix at the termination of the delay, but the whole cycle is repeated to ensure that no weather or facility changes have taken place and that the landing schedule has not changed. If the originally determined conditions continue to prevail, the aircraft is released at the end of its delay time and is assumed to land.

If a viable landing runway cannot be found, aircraft are held for up to 30 minutes, during which time the weather may change or facilities may be restored to service, which will allow landings to be made. If no landing is possible within 30 minutes, the aircraft is scrubbed, as if it were going to an alternate airport. Aircraft bound for secondary airports that cannot land are either scrubbed, as if they are going to another secondary airport, or they are diverted to Logan. An aribtrary proportion, one-half in the present model, are assigned to Logan. For those which are diverted to Logan, a distance table is entered to enable calculation of a time of flight. They are put on the landing schedule in the usual way, with one exception: they are assigned a higher priority than other inbound aircraft. This has the effect of putting them ahead of aircraft waiting to be released from the holding fixes.

At Logan, several different situations are encountered in the assignment of runways for takeoff and landing. These assignments are based on wind conditions and states of the weather. For example, if the wind is less than 15 knots and the weather is VFR, landings are permitted on certain runways intersecting the primary, or preferred, runway. Under these conditions the model sets up another landing schedule to which it assigns small aircraft, and the assumption is made that they land on schedule, with separation at the intersection being maintained by the tower. It is also assumed that when the wind is less than 15 knots, landings and takeoffs are scheduled on different runways and collision is avoided on the landing and takeoff runway intersections by tower action. On the other hand, when the wind is greater than 15 knots, landing and takeoffs will be taking place only on the primary runway, and all landings occur on the primary runway.

If the landing and takeoff runways are different, departing aircraft will be allowed to depart as soon as the first landing aircraft lands, unless the first landing aircraft is two miles or more out in final approach. In this case, the departing aircraft will be allowed to take off ahead of it, given proper separation from any aircraft taking off. In a nonradar (VORTAC only) environment, three-minute separation will be simulated.

If landings and takeoffs are occurring on the same runway, when the wind speed is greater than fifteen knots, the model will simulate a one-minute roll-out and runway clearance time for landing aircraft; i.e., departures will be permitted one minute after prior landing if the next landing aircraft is two or more miles out at runway clearance time. Aircraft taking off are assumed to be handed off to ARTCC immediately. Takeoff is not permitted if the ceiling is less than 375 feet and visibility is less than 1 mile.

When three or more aircraft are in the takeoff queue, aircraft coming off the holding fix will go to five-miles separation or more in final.

3.5 DATA REQUIRED TO EXERCISE THE MODEL

A key element in any simulation model is the input data base. The input data must be complete enough to reflect the elements being simulated, and they must be accurate if the model is to have predictive value. This section will identify the nature of the data necessary to exercise the UDCM. Chapter Five discusses and explains the data in greater detail, while Appendix A, the program listing, displays all of the input data matrices with specific numerical values used during the model demonstration. Some of the data appearing in Chapter Five has already been presented in the previous discussions. The input data required by the model fall into the following categories:

Weather data

Arrival rates as a function of:

Destination*

Weather, VFR or IFR

Time of day

Distribution of aircraft types (air carrier, air taxi, general aviation, military) as a function of weather (VFR, IFR) and destination

Distribution of weight class as a function of type

Distribution of approach category as a function of type

Turnaround time as a function of type

Distribution of holding-fix assignment, e.g., percentage of Logan-bound aircraft coming in over each of the five holding fixes

Distances from holding fixes to the primary airport under radar and nonradar (VORTAC) environment, by runway

Minima for each approach serving each runway, by approach category

Identity of all facilities necessary for each approach at each runway

MTBF and MTTR of each facility for the Facility Status File

Trial separations required in landing as a function of radar/VORTAC outage and leading/following aircraft weight classes, and maximum number of aircraft per controller as a function of radar outage

Airport description data

Turnaround times for landing aircraft by type.

---

*Note the discussion in Section 3.3.3.1.

3.6 MODEL OUTPUTS

The program produces and prints out three kinds of data:

Output data of the run, i.e., delay data of various kinds

Program administrative data*

Current values of program parameters*.

Run delay output data are presented in the form of a computer-printed matrix, an annotated example of which is shown in Figure 3-9. This matrix gives an overall synopsis of the model's operation. The four columns in this matrix signify aircraft type. Column 1 represents air carriers, Column 2 air taxis, Column 3 general aviation, and Column 4 military aircraft. The delay measures, with amplifying comments, are presented in Table 3-6.

3.7 MODEL LIMITATIONS

The model has several limitations, some minor, some larger in scope. The development effort was subject to constraints on time and money. The model development began with an identification of the possible features that could be included in the model. Then the time and budget constraints were used in formulating the required model limitations and basic assumptions. To illustrate the sort of questions considered, the issue of incorporating collision-avoidance logic in the route network was examined. Conversations with TSC personnel and persons in the academic community indicated that this would be a very extensive and unnecessary undertaking; it was therefore abandoned in favor of a simpler concept, namely, that "The aircraft will be assumed to be separated by the controller".

Another question was whether or not to simulate traffic through the TCA, understood to be a very large burden on the air controller. It was decided, however, that the first order of priority was what happened at Logan and, more particularly, what happened to aircraft landing at Logan. This priority also dictated the decision to assume that aircraft taking off from Logan are simply handed off to the Boston Center, thus disappearing from the model.

Secondary airport operations are dealt with in very simple fashion. The major simplifications are:

Aircraft appear at the airport at time of creation, rather than at the TCA boundary.

Takeoffs are not simulated at all.

The effect of secondary traffic in the Boston Sector on controller capacity is neglected.

---

*These outputs are explained in Chapter Five, Section 5.2.

MATRIX HALFWORD SAVEVALUEDELAY

ROW	COL. 1	2	3	4
1	515	64	160	12
2	514	56	87	8
3	0	0	21	4
4	0	0	462	83
5	356	33	60	4
6	7419	801	1418	91
7	4694	629	968	49
8	51	9	6	2
9	462	47	81	6
10	346	29	56	2
11	1252	80	153	2
12	39	2	4	0
13	461	44	81	2

See accompanying explanation of rows

Aircraft Type

1. Number of aircraft created at holding fixes and secondary airports
2. Number of aircraft originally scheduled to the primary airport through the holding fixes
3. Number of aircraft diverted from secondary airport to primary airport
4. Time of flight accumulated by secondary-airport aircraft diverted to the primary airport
5. Number of aircraft landing at primary airport that experienced delay
6. Total delay of landing aircraft
7. Total delay accumulated, for both landing and diverting aircraft, due to separation criteria
8. Number of aircraft not able to land at primary airport and diverted
9. Number of aircraft that landed at primary airport
10. Number of aircraft that experienced takeoff delay at primary airport
11. Total takeoff delay time
12. Total takeoff delay time experienced by aircraft at head of takeoff queue waiting to achieve separation on aircraft taking off ahead
13. Number of aircraft entering the takeoff queue.

Figure 3-9. OUTPUT DELAY MATRIX

The reasons for a simplified secondary airport model are, as explained previously, the constraints of limited time and money, and the fact that the Logan events were considered paramount. All of these elements can be added to the model incrementally.

The placement of aircraft in the landing schedule does not take into account a system of priorities based on aircraft speed and weight. It is recognized that in practice the controllers do take these factors into account, but in a way that reflects the extreme complexity of the human decision process. Refinement is possible in this area.

Table 3-6. EXPLANATION OF DELAY MEASURES

Delay Measure	Comment
1. Number of aircraft created at holding fixes and secondary airports.	This is simply the sum of all aircraft-creation events in the program.
2. Number of aircraft originally scheduled to the primary airport through the holding fixes.	This number is contained in the total shown in line 1.
3. Number of aircraft diverted from secondary airports to primary airport.	When weather is below minimum at secondary airports, 50% divert to Logan. They are assigned a higher priority for air controller pick-up than aircraft at the holding fixes.
4. Time of flight accumulated by secondary-airport aircraft diverted to the primary airport.	A distance table in the program contains the distance from each secondary airport to the primary airport. When a diversion to Logan takes place, the time of flight is calculated. Line 4 is the sum of these times.
5. Number of aircraft landing at primary airport that experienced delay.	Delay is defined as the difference between time of creation plus time of flight and landing time. This line shows the number of aircraft for which this difference was not zero.
6. Total delay of landing aircraft	This is the sum of delay times experienced by aircraft delayed (reported in line 5).
7. Total delay accumulated, for both landing and diverting aircraft, due to separation criteria	The ETA is the sum of the time of acceptance by a controller and the time of flight. If the ETA will not fit the landing schedule, a later scheduled landing time is found. The difference is delay due to spacing. An aircraft may not be able to leave the holding fix at the end of its separation delay; a facility may have gone down in the interim. If it cannot leave the fix within 30 minutes, it diverts. Thus it is possible for both landing and diverting aircraft to accumulate spacing delays.
8. Number of aircraft not able to land at primary airport and diverted	If an aircraft is not released from a holding fix within 30 minutes of its creation time, it is assumed to divert. It is possible for an aircraft previously diverted to Logan from a secondary airport to subsequently be diverted from the primary airport.
9. Number of aircraft that landed at primary airport	This is the total number of aircraft landing at the primary airport. It includes aircraft previously diverted from secondary airports.
10. Number of aircraft that experienced takeoff delay at primary airport	Since takeoffs from secondary airports are not simulated in the model, this measure is applicable only to the primary airport. Delay here is defined as the difference between the time the aircraft enters the takeoff queue and its actual time of departure.
11. Total takeoff delay time	This is the sum of the delay times for all aircraft delayed taking off.
12. Total takeoff delay time experienced by aircraft at head of takeoff queue waiting to achieve separation on aircraft taking off ahead	If an aircraft otherwise ready for takeoff is delayed because the aircraft taking off ahead has not achieved proper time separation (1 minute in radar environment, 3 minutes in non-radar environment), it is delayed until this separation is assured.
13. Number of aircraft entering the takeoff queue	After an aircraft lands at the primary airport, it is assigned a random turnaround time. At this time it enters the takeoff queue. This measure is the total number of aircraft entering this queue. This line was not available for runs 1 through 5.

There is no provision in the model for the effect of deterioration in the quality of voice radio communications. Quantification of this phenomenon is the subject of a more sophisticated and extensive form of analysis, which has not been undertaken.

An important meteorological phenomenon is the cloud deck between 1000 and 3000 feet. A descent through such a deck must be IFR, and an IFR approach must be made to landing. The model does not recognize this, simply because data relating to the distribution of this condition were not known. The impact of this limitation is that IFR approaches are made less frequently by the model than in reality. Acquiring data for the weather module was a major source of delay in model development. Given more complete weather data, this limitation can be easily overcome.

The model is programmed in General Purpose Simulation System (GPSS) language. The basic cycling interval for the UDCM is one minute. This means that every clock GPSS pulse is interrupted as one minute of simulated real time. The use of a one-minute clock implies an analytical error in calculation because all calculations involving time are integer quantities. For example, any calculation, such as a distance divided by a speed, will truncate downward to the next lower integer so that, say, all times between 4.0 and 4.999 minutes will be interpreted as 4 minutes. Thus the same time of flight would be obtained over a range of distances and/or velocities. Obviously, then, some error is built into the model. This could be reduced by allowing one clock pulse to stand for 0.1 or 0.01 minute, or any other fraction of a minute. Such reduction would, however, increase the model's already very tight core constraints since, in order to obtain runs of any reasonable simulated duration, the halfword savevalues and matrices would have to be increased to fullword values.

In summary, it is believed that the limitations noted are important but that the model does handle the first-order effects and that, given the modular construction and central logic, second-order effects can easily be incorporated later.

CHAPTER FOUR

GENERAL PROGRAM DESCRIPTION

This section provides the program description, the operating environment, and flow charts. The program is written in GPSS IV and was demonstrated at TSC using the GPSS V compiler in the MITRE Corporation's IBM 360/165.

The program has a central logic that couples the three main delay factors of any Terminal Control Area; namely, weather, aircraft schedule, and facility status. This central logic is supported by input variable data matrices which carry the characteristics of a particular TCA. This arrangement makes it possible for the model to be easily changed or enlarged and made to reflect any TCA. It also enables the program to be used to evaluate a wide range of decision options, such as:

Changing facility characteristics

Adding facilities

Airport design alternatives, e.g., runway location and direction.

4.1 OPERATING ENVIRONMENT

Any computer with GPSS 360 or GPSS V capability can be used to exercise the model. Approximately 280K bytes of core are required. This is variable and depends upon the number of transactions generated by a particular run. The only peripherals required are a card reader and printer. Since the card deck is in excess of 3000 cards, a high speed reader is a distinct advantage. The program can be stored on tape, but any changes must be made in the basic card deck.

4.2 PROGRAM SPECIFICATION

The program is written in standard GPSS IV and is completely self-contained and self-descriptive.

4.3 SUBPROGRAM

There are no subprograms.

4.4 FLOW CHARTS

Flow charts, shown in Figures 4-1 through 4-6 depict the logic at a medium level of depth. Each block or logic transaction is keyed by numerals to the program statements which are pertinent. The program listing serves, therefore, as the ultimate logic statement. If the flow charts are read in conjunction with the listing by an experienced GPSS programmer, there will be no difficulty interpreting the program.

4.5 SOURCE LISTING

The program listing is provided in Appendix A. The listing has annotated descriptions of all variables and functions. The logic section contains comments adjacent to each GPSS instruction. The data and output matrices are annotated with explanations of rows, columns, and data elements. With this information it is an easy task to change data inputs.

The listing, plus the flow charts and the model description provided in Chapter Three can be used jointly to understand the model. It should be noted, however, that any extensive changes contemplated for the model will require study and analysis by an experienced GPSS-oriented analyst.

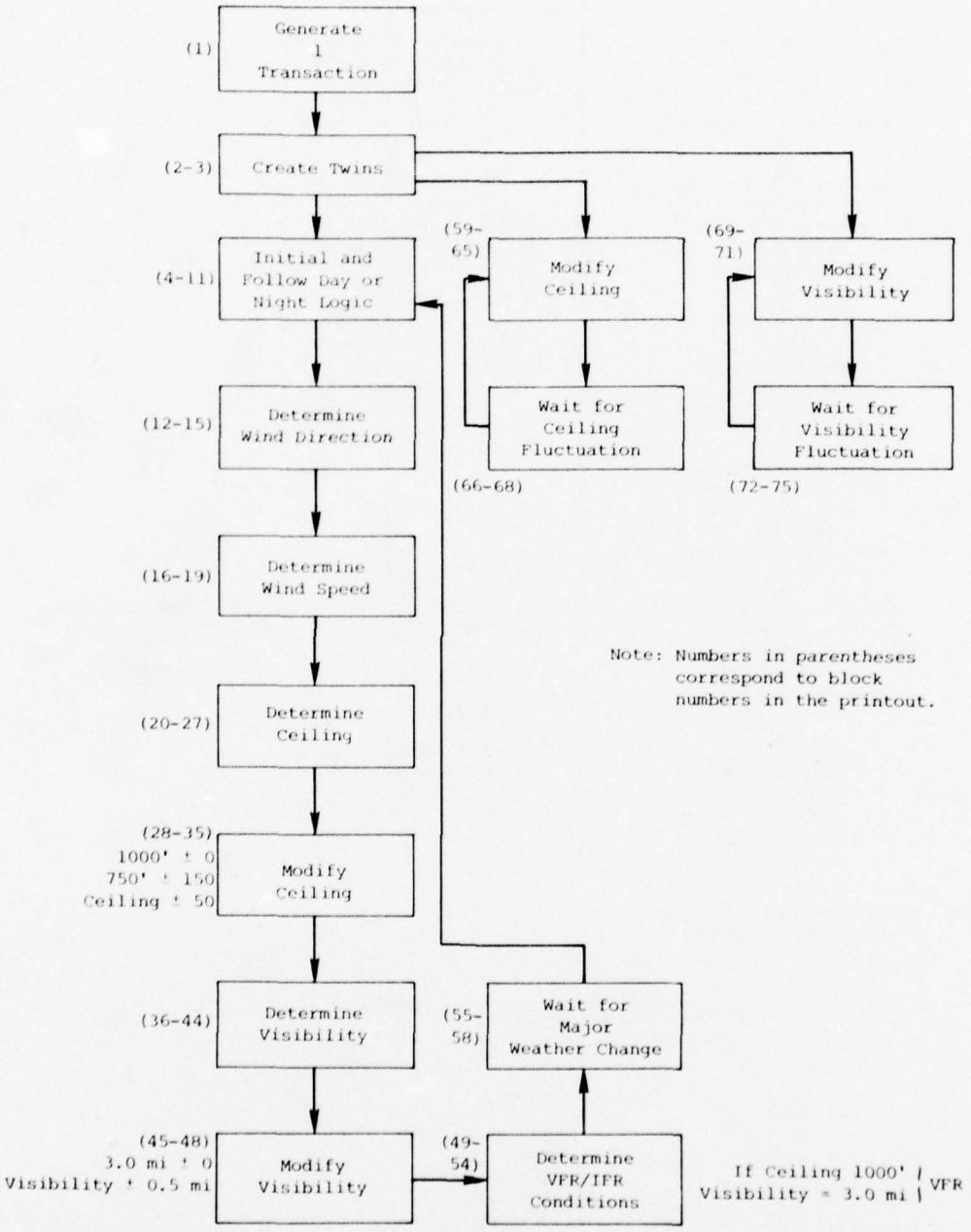
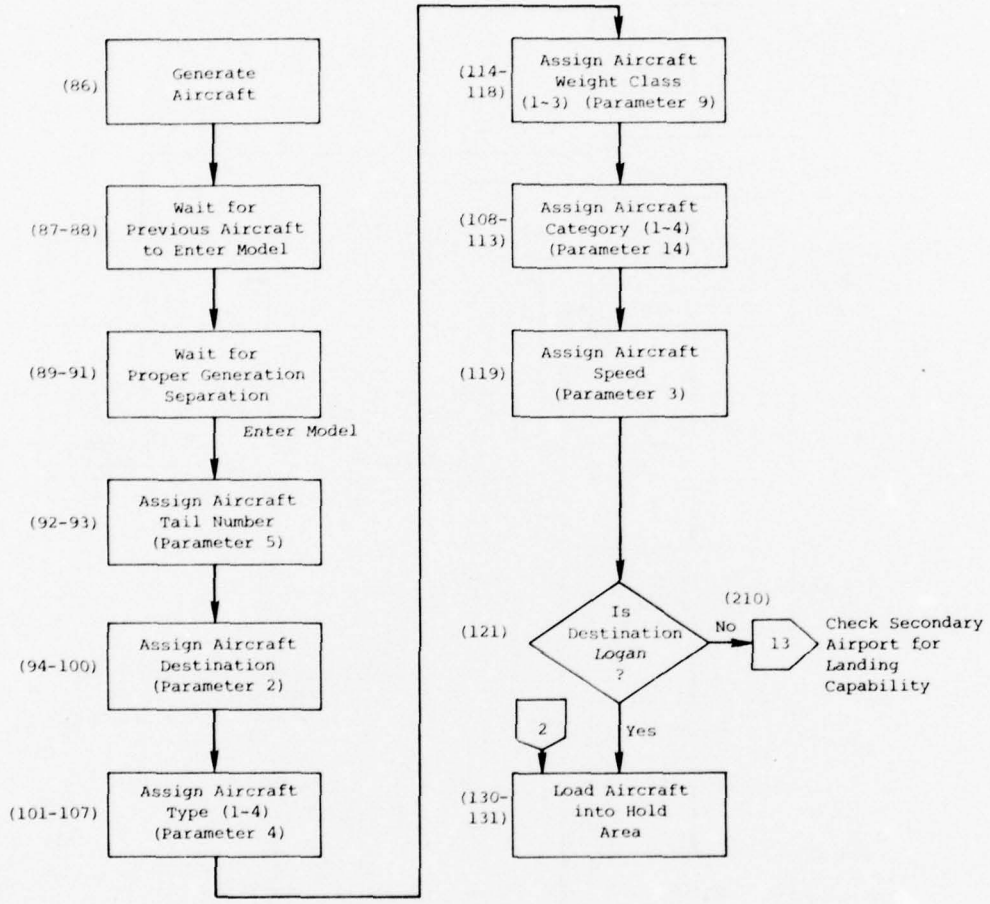
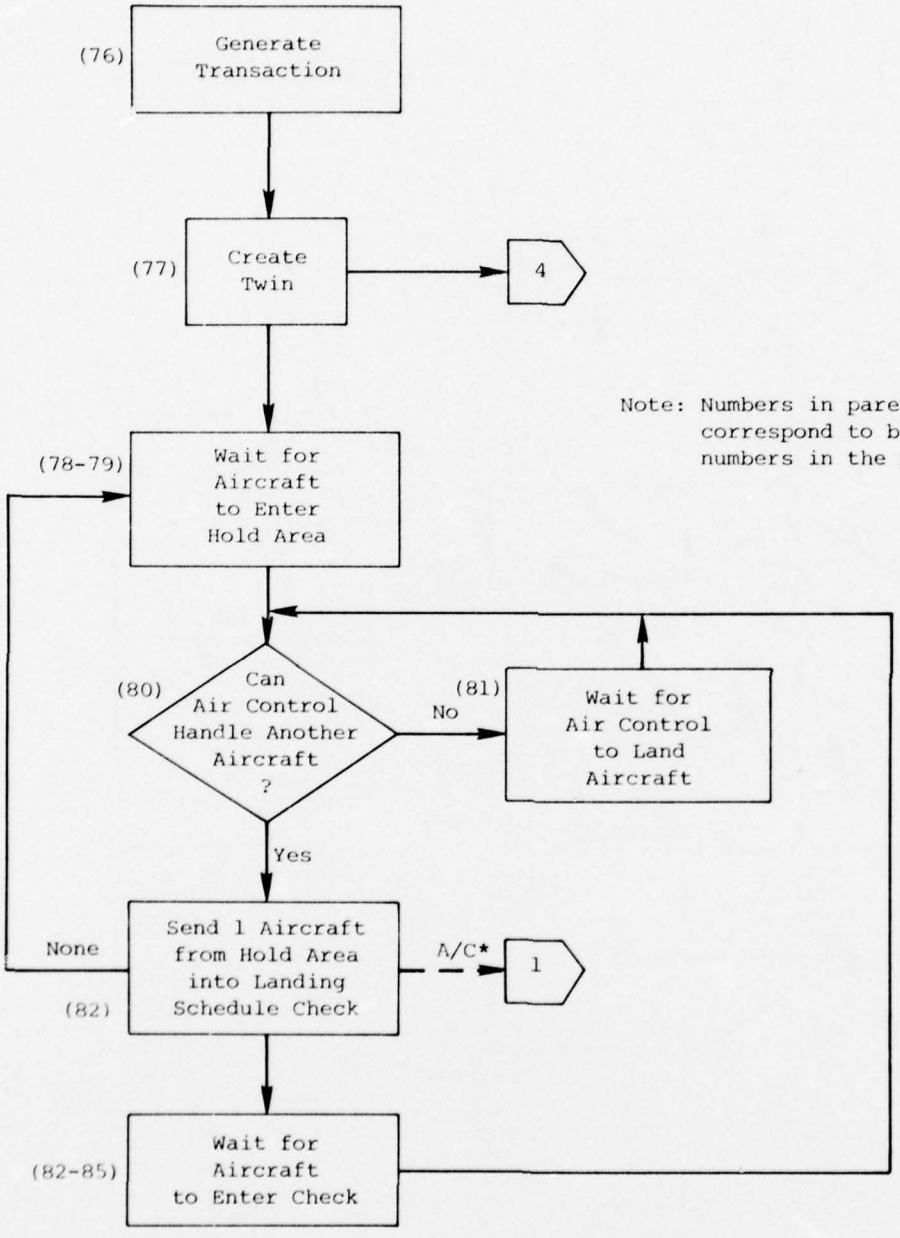


Figure 4-1. WEATHER MODULE



Note: Numbers in parentheses correspond to block numbers in printout.

Figure 4-2. AIRCRAFT GENERATION MODULE



*Dotted lines represent flow of aircraft transactions. Solid lines represent flow of logic transactions.

Figure 4-3. AIRCRAFT ACCEPTANCE FUNCTION

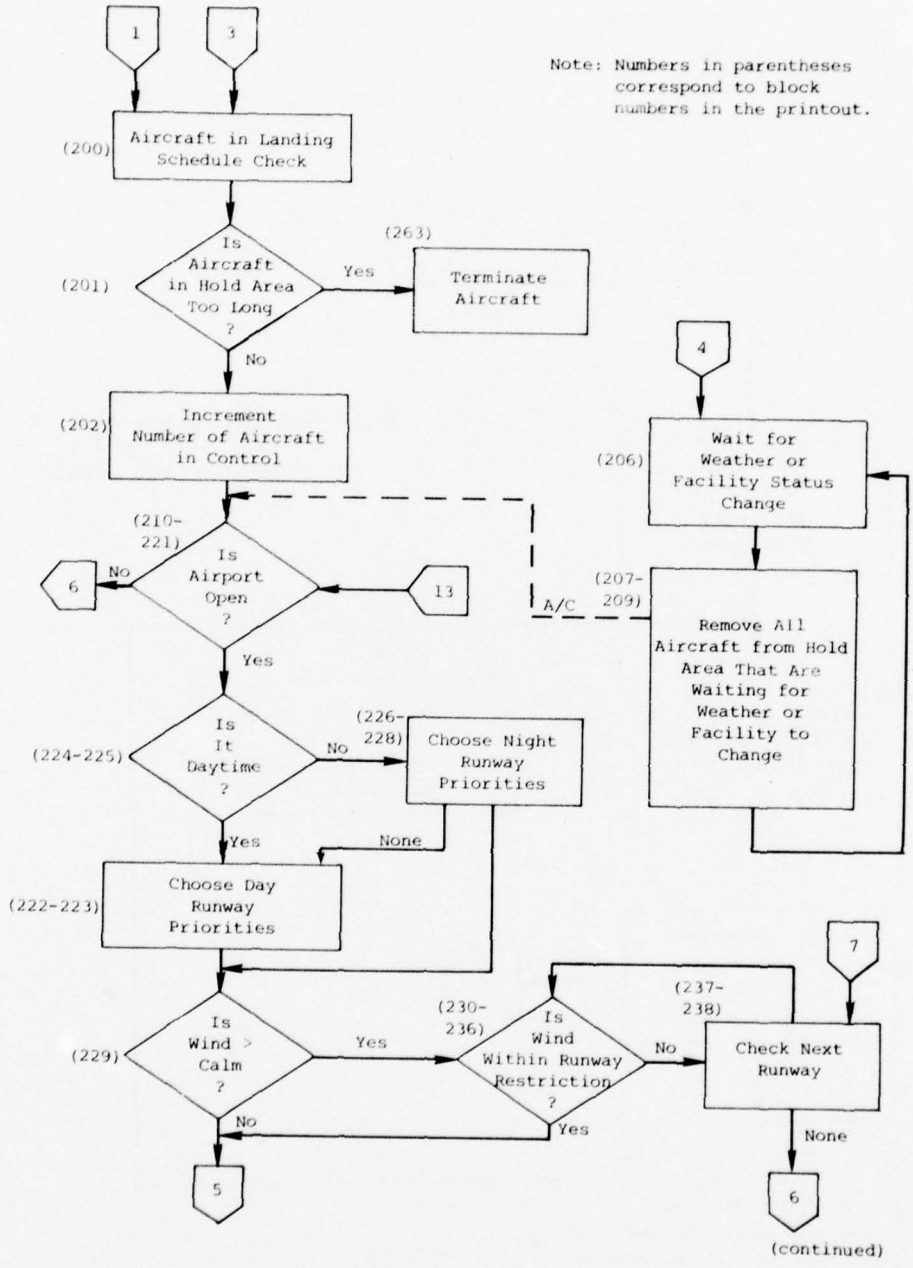


Figure 4-4. MAIN CONTROL LOGIC

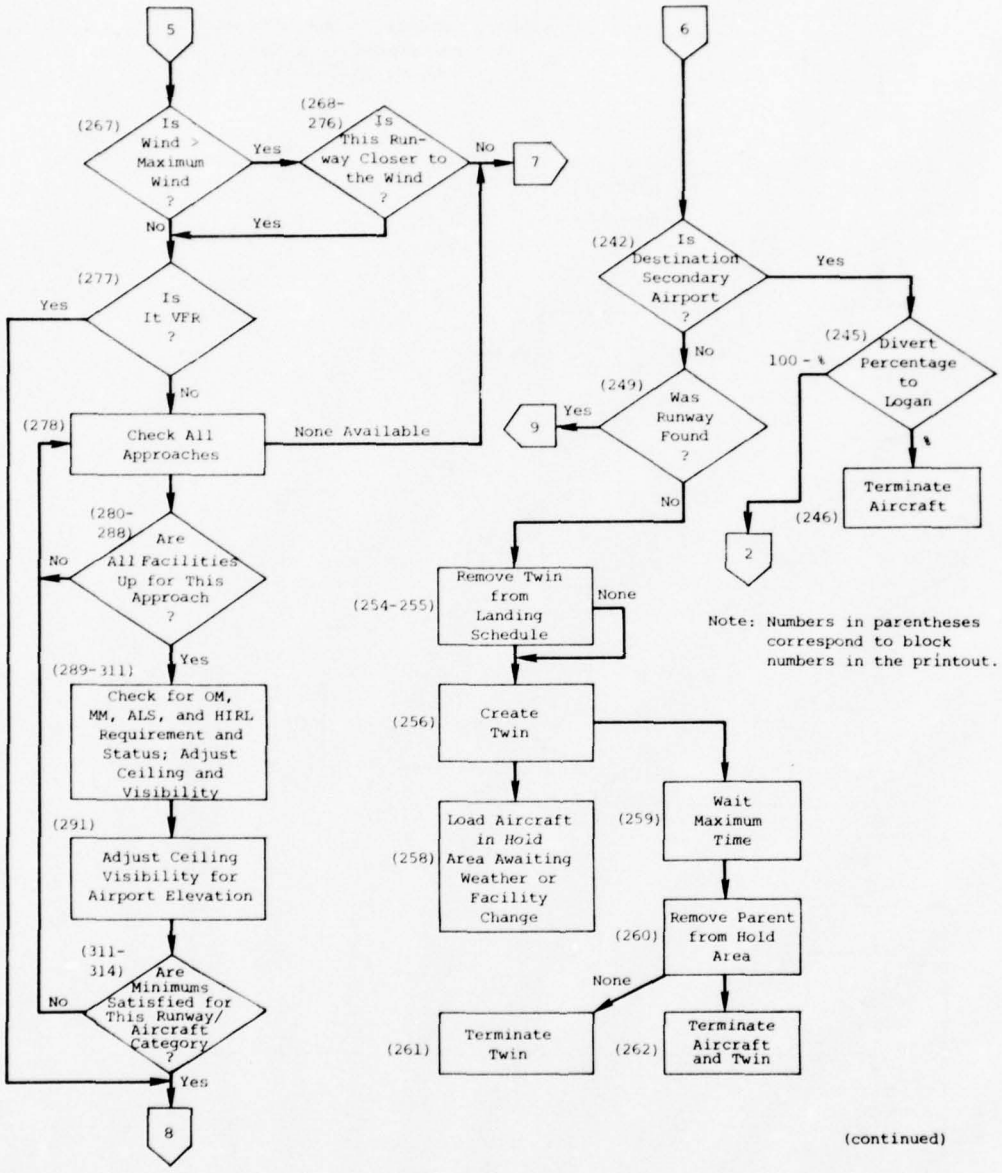
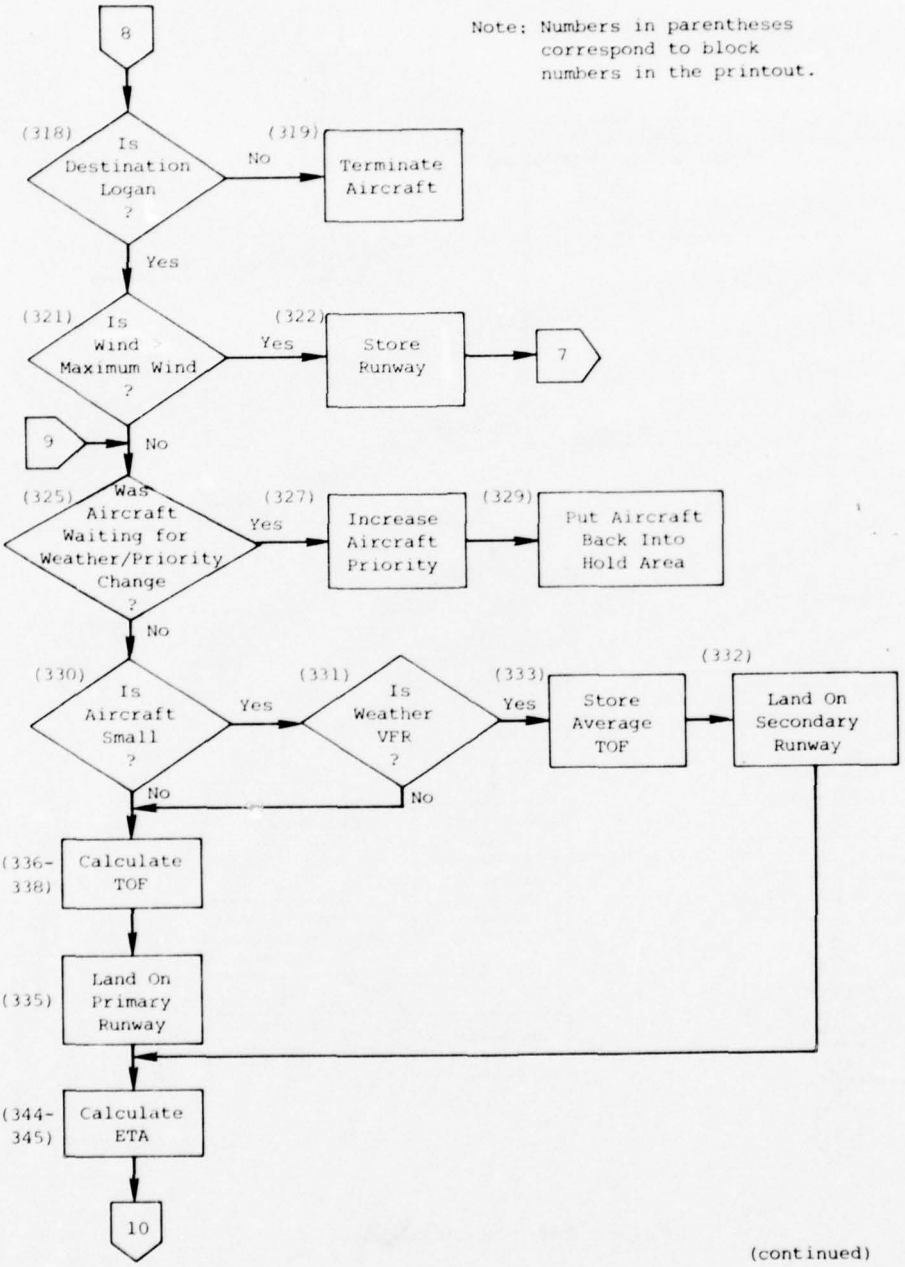


Figure 4-4. (continued)



(continued)

Figure 4-4. (continued)

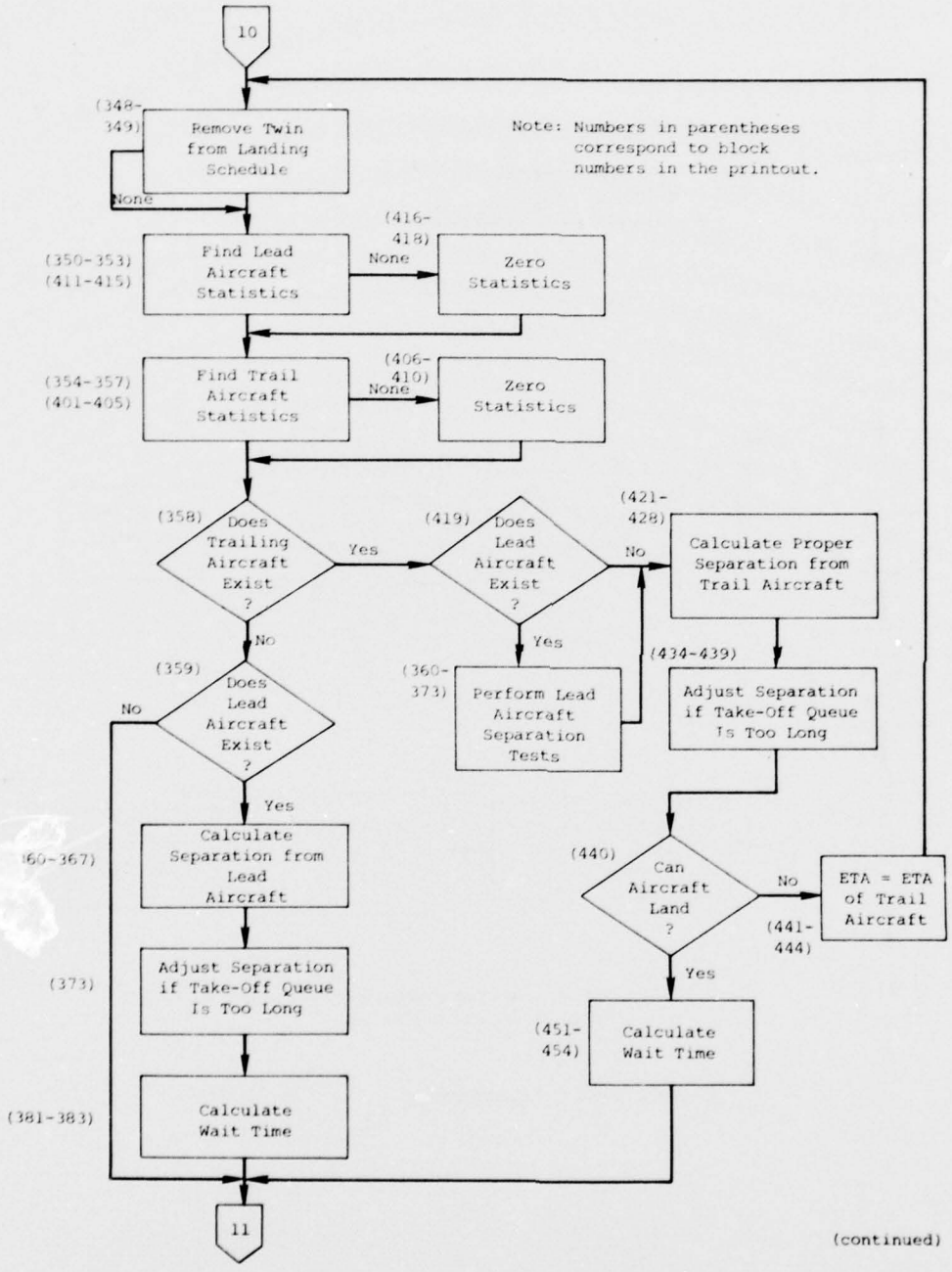


Figure 4-4. (continued)

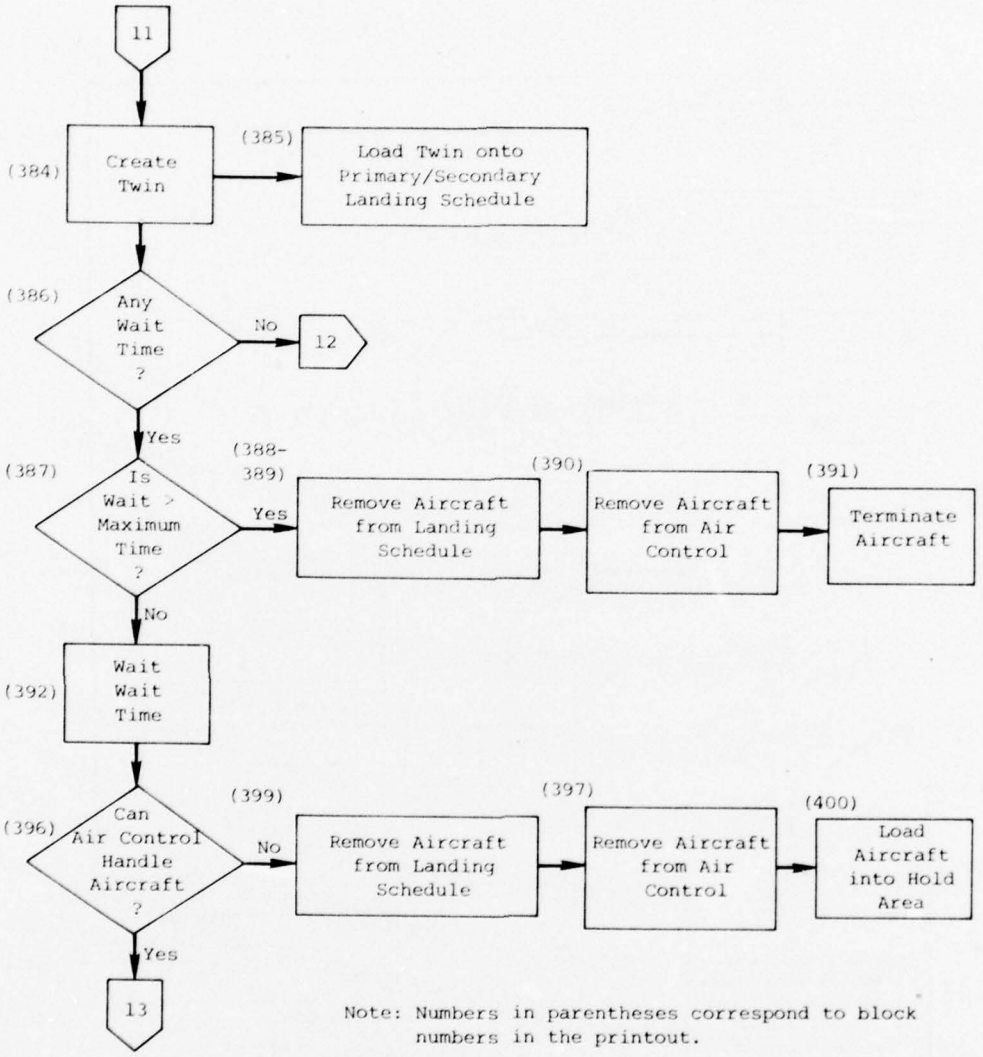


Figure 4-4. (continued)

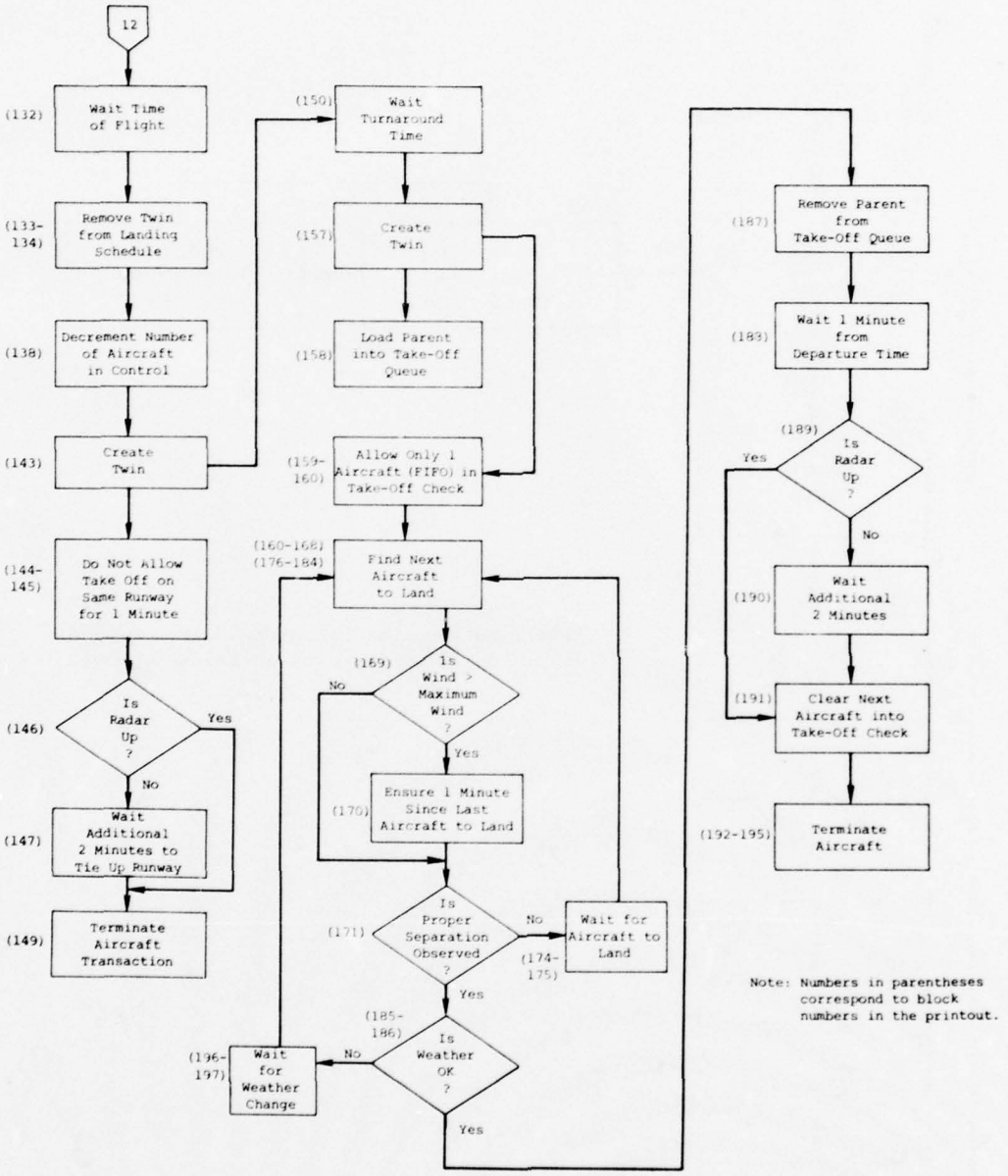
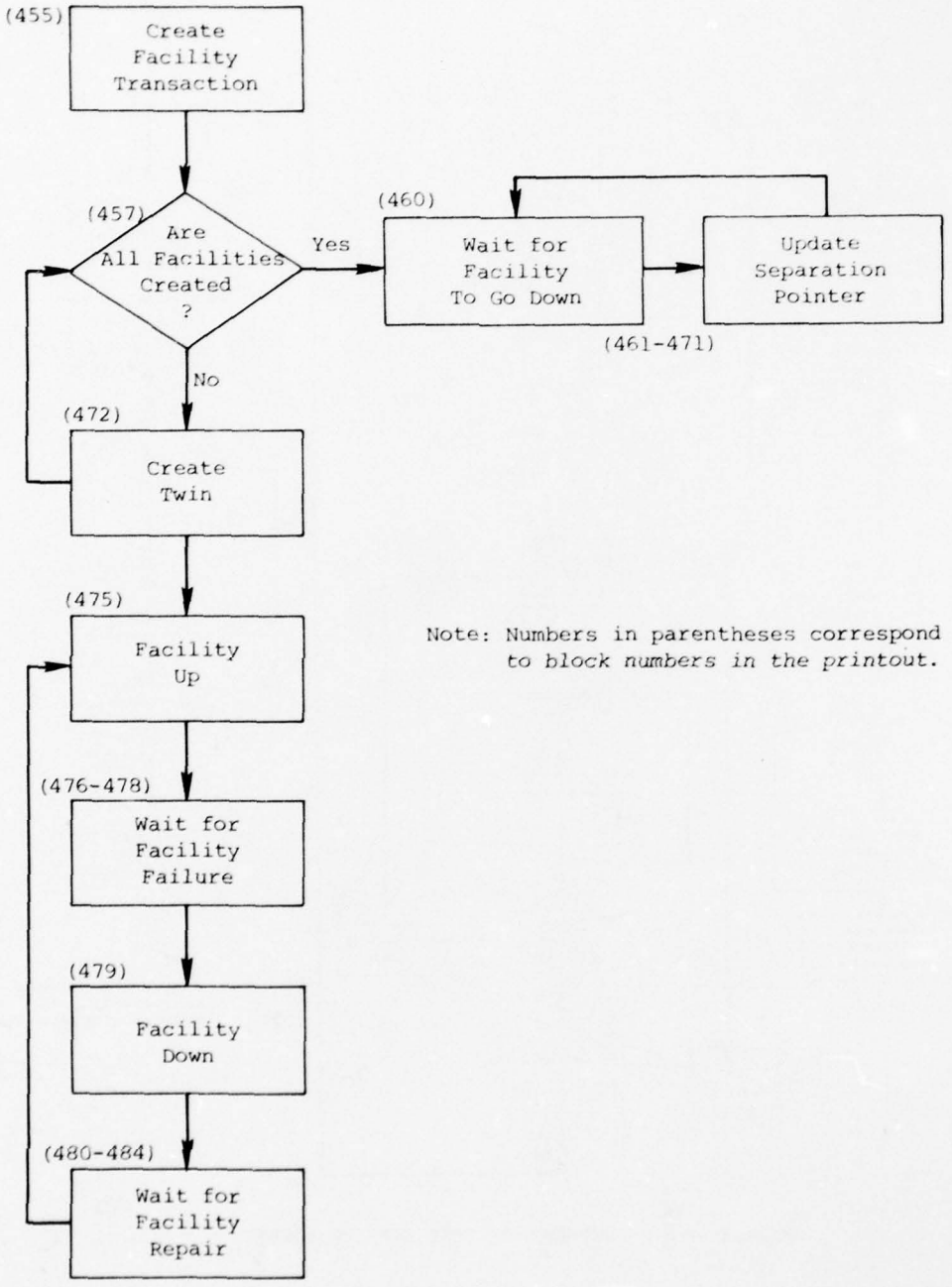


Figure 4-5. LANDING TO TAKE OFF AT LOGAN



Note: Numbers in parentheses correspond to block numbers in the printout.

Figure 4-6. FACILITY STATUS MODULE

CHAPTEF FIVE

PROGRAM USE

The deck set up for any GPSS program consists of the GPSS card deck with the Job Control Language (JCL) cards. The JCL will vary from machine to machine. Instructions concerning how to use the JCL deck will depend, therefore, on the machine in use.

Unlike most computer languages, GPSS does not use conventional input data cards at the end of the program. Input data in GPSS is organic to the model in the form of matrices and savevalues which are initialized at the beginning of the source program (GPSS does not have an object program). Descriptions of these inputs are provided in Section 5.1. The model can produce outputs tailored to the user's need. Outputs are presented in Section 5.2.

5.1 *REQUIRED UDCM INPUT DATA*

This section describes the nature of the data required by the UDCM. The numerical quantities presented herein are those used in the model as it was configured for demonstration. Examples of input matrices are included in their respective subsections. A complete listing of the input data matrices is included in the program printout in Appendix A.

5.1.1 Weather Data

Figure 5-1 provides a sample of how weather data was received from the National Climatic Survey. This figure shows weather conditions during daylight hours with the wind from the North. The study used 32 such tables, corresponding to all 16 points of the compass for day and night.

Table 5-1 is derived from Figure 5-1. The derivation was performed manually and displays ceiling frequencies as a function of wind direction and velocity. For example, summing over the columns of Figure 5-1 for a wind speed of 10-14 knots, wind column under ceiling category 1000^{+}, gives a frequency of 103 observations. This figure is displayed in the first row, third column of Table 5-1. The same procedure is repeated for all entries in Table 5-1.

STA	DIR	CEILING GROUPS IN FEET	VEL GROUPS M.P.H.	VISIBILITY GROUPS IN MILES 0-1/4	5/16-1/2	5/8-7/8	1	1 1/4-1 1/2	1 3/4-2 1/2	3+	TOT OPS
14739	N	1000+	1-4					1		21	22
			5-9				1			131	132
			10-14				1	1	1	100	103
			15-29							57	57
			30+								
			TOT				2	2	1	309	314
		600-900	1-4							2	2
			5-9		1		1	1	2	6	11
			10-14		1	1			1	15	18
			15-29		1		2	2	1	10	16
			30+							3	3
			TOT		3	1	3	3	4	36	50
		500	1-4							1	1
			5-9				1		1	3	5
			10-14							3	3
			15-29		1	1		2	1	3	8
			30+								
			TOT		1	1	1	2	2	10	17
		400	1-4					1			1
			5-9						1	1	2
			10-14	1	1				2	3	7
			15-29							3	3
			30+							1	1
			TOT	1	1			1	3	8	14
		300	1-4							1	1
			5-9				3			1	4
			10-14					2		3	5
			15-29			1		1		2	4
			30+								
			TOT			1	3	3		7	14
		200	1-4		1				1		2
			5-9								
			10-14					1			1
			15-29								
			30+								
			TOT		1			1	1		3
14739	N	0-100	1-4	1							1
			5-9		1	1	1				3
			10-14								
			15-29	1							1
			30+								
			TOT	2	1	1	1				5
		TOT VIS		3	7	4	10	12	11	370	417

	VEL GRPS	1-4	5-9	10-14	15-29	30+	CALM	
	TOT VEL	30	157	137	89	4		417
	% VEL	7.2	37.6	32.9	21.3	1.0		100.0
	% DIR							5.7

Figure 5-1. SAMPLE OF NATIONAL CLIMATIC SURVEY WEATHER DATA

Table 5-1. FREQUENCY OF OCCURRENCE OF CEILING, GIVEN WIND DIRECTION (NORTH), SPEED, AND DAYLIGHT HOURS

Ceiling (Feet)	Velocity (Knots)				
	1-4	5-9	10-14	15-29	30+
1000+	22	132	103	57	0
600-900	2	11	18	16	3
500	1	5	3	8	0
400	1	2	7	3	1
300	1	4	5	4	0
200	2	0	1	0	0
0-100	1	3	0	1	0
Total	30	157	137	89	4

Table 5-2. FREQUENCY OF OCCURRENCE OF VISIBILITY, GIVEN CEILING, WIND DIRECTION (NORTH), AND DAYLIGHT HOURS

Visibility (Nautical Miles)	Ceiling (Feet)						
	1000+	600-900	500	400	300	200	0-100
0 to 1/4	0	0	0	1	0	0	2
5/16 to 1/2	0	3	1	1	0	1	1
5/8 to 7/8	0	1	1	0	1	0	1
1	2	3	1	0	3	0	1
1-1/4 to 1-1/2	2	3	2	1	3	1	0
1-3/4 to 2-1/2	1	4	2	3	0	1	0
3	309	36	10	8	7	0	0
Total	314	50	17	14	14	3	5

Table 5-2 is derived from Table 5-1. Given the ceiling of, for example, 1000+, a total of 314 observations occur, as can be seen by summing over the first row of Table 5-1. Of these, 309 occured when the visibility was 3^{+}, 1 when the ceiling was 1-3/4 - 2-1/2 nautical mile, and so on. These data were converted to cumulative percentages, expressed as numbers 000 to 999, for computer utilization.* Figure 5-2 shows an example of such a table, expressed as a matrix, as printed out in a program run.

The top matrix in this figure is first used to find the wind direction, or whether it is calm. Column 1 displays 17 entries, row 1 representing a calm condition, and each of the others display one of the 16 points of the compass. Columns 2 and 3 contain cumulative percentages of occurrences for each of these conditions -- column 3 for daylight hours, column 2 for night. A uniform random variable, U, is drawn from the unit interval and compared with the numbers in column 2 or 3. For example, assume daylight hours, and let the number drawn be .045, or equivalently 045 and, thus, since $045 \leq 058$ (row 2, column 3), the wind is from the north. To determine wind speed, another U is drawn and compared with the odd-numbered column elements in row 2. If U = 720, and $448 < 720 \leq 777$ (where 448 is in row 2, column 7 and 777 is in row 2, column 9) the wind speed is 12 knots.

To determine ceiling, columns 12 and 13 identify the ceiling and visibility matrices for each wind direction and matrix 4 (the middle table of the figure) is used for ceiling determination with a north wind. Column 6 corresponding to a speed of 12 knots, daylight, is entered with another value of U, for example 921. Since $905 < 921 \leq 956$, the ceiling is 400 feet.

When the ceiling is determined, matrix 5 (the last table in the figure) is used to find the visibility. A new U is obtained and compared with the entries in column 8, which corresponds to a 400-foot ceiling, north wind, daylight hours. If U = 415, and $214 < 415 \leq 429$, the visibility is 2 miles.

There is no row in the wind direction, ceiling, and visibility matrices corresponding to 30 knots, 50 feet, and 3 miles, respectively. These are defaults which, if U is greater than any number in the column, the value associated with these quantities is assigned. The tabulated values of wind direction and speed, ceiling and visibility are thus found and treated by

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*Using a portable calculator, the cumulative distributions shown in the weather matrices were derived from the National Climatic Service (NCS) data. For future applications of the model to TCAs other than Boston, it is recommended that the weather data base be acquired from NCS on magnetic tape and the conversion be made by computer. A simple FORTRAN program could be written to convert the data to the desired format and punch a card deck for GPSS input.

MATRIX HALFWORD SAVEVALUE[IRVL

		NT	DY	NT	DY	NT	DY	NT	DY	NT	DY		
	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13
						Wind Direction in Degrees							
Calm	1	360	7	1	1000	1000	1000	1000	1000	1000	1000	2	3
N	2	0	96	58	61	7	576	448	839	777	1000	4	5
NNE	3	22	128	85	152	76	704	510	891	753	996	6	7
NE	4	45	163	118	113	29	510	324	755	639	981	8	9
ENE	5	67	198	169	82	441	494	0	724	770	981	10	11
E	6	90	232	263	167	49	642	437	776	820	976	12	13
ESE	7	112	254	348	207	47	671	0	866	804	994	14	15
SE	8	135	272	398	237	66	777	680	935	962	993	16	17
SSE	9	157	296	425	153	101	736	641	939	924	1000	18	19
S	10	180	365	489	109	53	757	456	949	803	1000	20	21
SSW	11	202	424	550	58	20	569	211	845	602	1000	22	23
SW	12	225	496	591	48	17	479	195	779	510	998	24	25
WSW	13	247	616	663	19	15	439	302	827	645	999	26	27
W	14	270	776	777	69	14	312	211	651	498	990	28	29
WNW	15	292	836	874	33	101	295	184	649	439	974	30	31
NW	16	315	937	958	26	20	396	225	734	554	996	32	33
NNW	17	337	1000	1000	30	13	413	835	835	658	1000	34	35
	18	0	0	0	0	0	0	0	0	0	0	0	0
					3 Knots		7 Knots		12 Knots		22 Knots		

Ceiling Matrix

Visibility Matrix

Wind direction in degrees

Number of cumulative occurrences, out of 1000, of wind direction in Day/Night

Wind Velocity

Default = 30 Knots

MATRIX HALFWORD SAVEVALUE 4

Ceiling	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10
1000'	1	825	733	798	841	762	752	714	640	1000	0
750'	2	850	800	857	911	878	883	876	820	1000	750
500'	3	850	833	881	943	901	905	933	910	1000	750
400'	4	850	866	914	956	948	956	962	944	1000	1000
300'	5	875	900	950	981	977	992	991	989	1000	1000
200'	6	950	967	977	981	994	1000	1000	989	1000	1000
				3	7	12		22		30	
Wind Velocity				Knots		Knots		Knots		Knots	

Default = 50'

Ceiling matrix for wind N

MATRIX HALFWORD SAVEVALUE 5

Visibility in Miles	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10	NT 11	DY 12	NT 13	DY 14
.25	1	0	0	0	0	0	0	0	71	0	0	63	0	455	400
.50	2	2	0	0	60	0	59	0	143	0	0	313	333	728	600
.80	3	2	0	17	80	56	118	91	143	48	71	501	333	819	800
1.00	4	6	6	51	120	111	176	136	143	238	286	564	333	910	1000
1.50	5	6	13	85	200	222	294	227	214	381	500	814	667	910	1000
2.00	6	12	16	171	260	389	412	485	429	810	500	877	1000	1000	1000
Ceiling		1000'		750'		500'		400'		300'		200'		50'	

Default = 3.00

Visibility matrix for wind N

Figure 5-2. SAMPLE OF WEATHER MATRIX INPUTS

the computer as nominal values to which, within their respective ranges of values, a random uniform increment is added or subtracted. As mentioned in Section 3.2 of Chapter Three, between wind changes, ceiling and visibility are allowed to fluctuate randomly within their ranges by an exponential process with a mean time of change of 15 minutes.

5.1.2 Arrival Rates

Chapter Three discussed how overall arrival rates can be calculated. The arrival rate data were not collected in the form discussed; that is, arrival rates for both weather conditions at all destination airports by time of day were not known. Were these available, the overall arrival rate for any hour, both VFR and IFR, could be found by summing λ_{ijk} over i — the destination airports. An approximation was used in the model demonstration. The source for this approximation was data from the Performance Measurement System (PMS) for Airports, dated November 1975. Figure 5-3 was taken from this report and shows arrivals of scheduled aircraft as a function of time. This graph was converted, by manual measurement, into a table of approximate numbers. The table was extended quite arbitrarily to cover a 24-hour day. It was assumed that these rates could be made applicable to IFR or VFR conditions by multiplying them by a constant. This, in fact, was done in the demonstration runs. In other words, at present, these data are not authoritative. The last column in Figure 5-4 shows the rate of arrival, by time of day, for VFR conditions. These figures are the same as those used in the demonstration at TSC on September 20-22, 1976. Other uses of the matrix in Figure 5-4 are discussed in the following section. It is suggested that before the model is exercised for analysis that these data be collected in the form called for in the previous discussions. Assuming the total arrival rates for weather conditions and time of day for each destination airport were available, the model could be expected to simulate accurately the phenomenon of arrival time creation.

5.1.3 Destination Assignment

Although it was desired to have the percentage of aircraft, by type, time of day, and weather condition, landing at each airport, this information was not available.

Table 3-1 of Chapter Three gives some of the requisite data for instrument approaches. No corresponding data was available for VFR approaches. Thus, while it can be surmised that, for example, the relative number of general aviation aircraft would materially increase under VFR conditions, more so relatively than air carriers, the factor is unknown. For lack of better information, the data in Table 3-1 was used for both weather conditions.

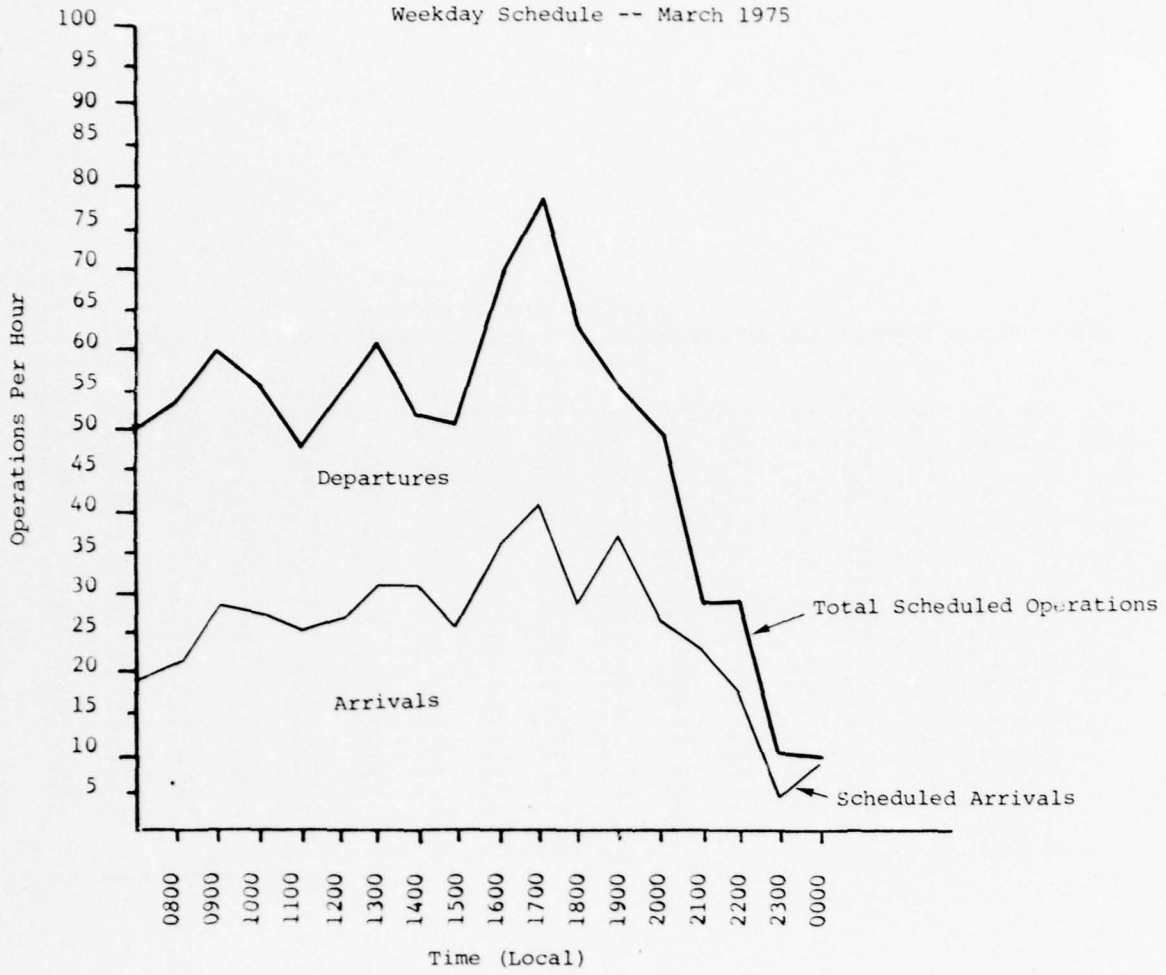


Figure 5-3. SCHEDULED ARRIVAL RATE AT LOGAN

MATRIX HALFWORD SAVEVALUEVFRAC

		Hold Areas					Secondary Airports												
	COL.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ROW	1	297	597	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	1
	2	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	6
	3	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	6
	4	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	8
	5	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	11
	6	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	17
	7	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	25
	8	260	522	740	784	871	871	871	954	955	955	955	955	955	998	998	1000	1000	30
	9	251	502	711	752	836	929	946	947	948	954	954	955	955	996	997	998	999	+1
	10	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	+0
	11	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	39
Time of	12	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	+0
Day	13	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	+0
	14	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	+0
	15	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	+0
	16	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	53
	17	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	60
	18	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	43
	19	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	53
	20	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	46
	21	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	33
	22	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	26
	23	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	7
	24	269	538	763	807	897	997	997	997	998	998	998	998	998	998	998	1000	1000	12

Default to Two Mac

Number of aircraft created in VFR conditions

Figure 5-4. DISTRIBUTION OF AIRCRAFT DESTINATIONS AND OVERALL ARRIVAL RATES AS A FUNCTION OF TIME OF DAY

These data are incorporated in Figure 5-4 in the following way. Of the 31283 aircraft arriving in the Boston TCA, 26142 or 83.6 percent, are destined for Logan. It is assumed that this condition prevails when all airports are open. When some of the secondary airports are closed, the percentage will be higher. The first five columns of Figure 5-4 correspond to holding fixes serving Logan. Between the hours of 0800 and 1800 all airports are open, and in column five the figure 836, corresponding to 83.6 percent, tells the model to assign that percentage of all aircraft to Logan. These aircraft are assigned to each holding fix on the basis of information supplied by Logan approach control personnel. For those aircraft destined for Logan, the percentages assigned to the five holding fixes are as presented in Table 5-3.

Table 5-3. PERCENTAGE OF AIRCRAFT BOUND FOR LOGAN ENTERING OVER HOLDING FIXES

Fix	Fix Number	Percentage
Manjo	1	30
Millis	2	30
Bridgewater	3	25
Skipper	4	5
Lawrence	5	10

The figures are then reflected in the cumulative percentages in the first five columns of Figure 5-4. For example, Manjo, holding fix number 1 in Figure 5-4, gets 30 percent of Logan traffic, thus $.3 \times .836 = .251$, and this number 251 is seen in the first column between the hours of 0800 and 1800. For times of day when some of the secondary airports are closed, the traffic totals were distributed over the airports which were open.

To find a destination, a uniform random number is drawn and is compared for the time of day with the cumulative distributions shown in Figure 5-4. For example, at 0915 the number 943 is drawn. Entering row 10 it can be seen that $928 < 943 \leq 946$, hence the destination is airport number 7 — Beverly.

Columns 1 through 5 correspond, respectively, to Manjo, Millis, Bridgewater, Skipper, and Lawrence. Columns 6 through 17 correspond to Bedford, Beverly, Fitchburg, Fort Devens, Lawrence, Mansfield, Marshfield, Newburyport (Plum Island), Norwood, Plymouth, South Weymouth, and Taunton, respectively. The last column, treated by the program as a default, is Tew-Mac, and shows the hourly rate of total arrivals.

5.1.4 Assignment of User Types

Having the destination, the user type can be assigned on the basis of the data in Table 3-1 of Chapter Three. Figure 5-5 shows the selection matrix. Its relationship to Table 3-1 can be seen in the following example.

Suppose the destination is Bedford, where 2902 is the total. Of these, 87 or 2.99 percent are air carriers, 235 or 8.09 percent are air taxis, 2425 or 83.56 percent are general aviation, and 155 or 5.34 percent are military. If these percentages are changed to numbers between 0 and 1000, the cumulative distribution is 30, 111, 947, and 1000. Row 6 of Figure 5-5 shows, for columns 1, 2, and 3, corresponding to air carrier, air taxi, and general aviation, respectively, the first three of these numbers. Military aircraft are treated as defaults.

MATRIX HALFWORD SAVEVALUEVFRPT

		COL. 1	2	3
ROW	1	782	897	996
	2	782	897	996
	3	782	897	996
	4	782	897	996
	5	782	897	996
	6	30	111	947
	7	0	2	816
	8	0	0	1000
	9	0	0	38
	10	0	190	1000
	11	0	0	1000
	12	0	0	1000
	13	0	0	1000
	14	2	11	869
	15	0	0	1000
	16	0	0	174
	17	0	0	1000
	18	0	235	1000

A/C Destinations

A/C Type (Default = type 4)

Matrix is used to determine aircraft type once destination is known in VFR conditions.

Figure 5-5. USER TYPE BY DESTINATION

Since no VFR data, corresponding to Table 3-1 exists, the matrix corresponding to IFR conditions is identical to Figure 5-4.

5.1.5 Distribution of Weight Class as a Function of Type

Table 5-4 presents aircraft distribution data derived from information supplied by TSC, and based in part on FAA equipment forecast for air carrier operations at Logan. The weight classes were assigned to the forecast aircraft types in accordance with Appendix 3 to Reference 5. The figures are approximations; therefore, before the model is used for analysis, they should be verified.

Table 5-4. FREQUENCY DISTRIBUTION OF AIRCRAFT WEIGHT CLASSES			
Type	Weight Class		
	Small	Large	Heavy
Air Carrier	0	.9	.1
Air Taxi	.1	.9	0
General Aviation	.9	.1	0
Military	.02	.9	.08

5.1.6 Distribution of Approach Category as a Function of Type

Table 5-5 presents approach category data which was also based on information supplied by TSC. The figures are approximations; therefore, before the model is used for analysis, they should be verified.

Table 5-5. FREQUENCY DISTRIBUTION OF AIRCRAFT APPROACH CATEGORIES				
Type	Approach Category			
	A	B	C	D
Air Carrier	0	.05	.1	.85
Air Taxi	.9	.1	0	0
General Aviation	.9	.07	.03	0
Military	.1	.3	.3	.3

Table 5-4 is combined with Table 5-5 as a single input matrix, and is displayed in Figure 5-6. The data are shown as cumulative probability distributions.

5.1.7 Route Distances from Holding Fixes to Logan under Radar and Nonradar (VORTAC) Environments

The distance tables are shown in Figures 5-7 and 5-8 as program input matrices. The numbers in row 6 (Figure 5-8) define the matrices that carry airport data.

MATRIX HALFWORD SAVEVALUECATWT

	COL. 1	2	3	4	5	6	7	
ROW 1	0	0	787	1000	0	787	1000	Air Carrier
2	0	1000	1000	1000	0	1000	1000	Air Taxi
A/C 3	1000	1000	1000	1000	1000	1000	1000	General Aviation
Type 4	300	500	1000	1000	500	1000	1000	Military
	Approach Category				Weight Class			

Matrix is used to define aircraft category and weight, once type has been determined.

Figure 5-6. CUMULATIVE FREQUENCY DISTRIBUTION OF AIRCRAFT APPROACH CATEGORIES AND WEIGHT CLASSES

5.1.8 Distances from Secondary Airports to Logan

The distances from the secondary airports to Logan are also shown in Figures 5-7 and 5-8.

5.1.9 Minima for Each Approach Serving Each Runway by Approach Category

Ceiling-visibility and landing approach data are tabulated for each runway at each airport. Table 5-6 shows these minima for Logan, and Figure 5-9 shows the same data displayed as they are presented to the computer except that the order of the runways is different. In Table 5-6, different minima are shown for the same type of approach on different runways. This is because the minima depend on whether a straight-in or circling approach is used.

5.1.10 Identity of All Facilities Necessary for Each Approach at Each Runway

Table 5-7 was compiled by examination of the Instrument Approach Procedure Charts, and defines those facilities which are necessary for a particular approach. The numbers are either zero or non-zero. A zero indicates that the facility is not necessary. A non-zero entry is the number of the facility as carried in the Facility Status File.

Figure 5-10 displays the same data in the form of the program input matrix. The first four columns show those facilities essential to the approach. The last four columns are facilities which, if down, have only the effect of raising the minima for the approach, as prescribed by FAA regulations.

MATRIX HALFWORD SAVEVALUEDSTNR

	COL.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ROW	1	26	49	39	55	26	15	14	38	49	27	34	31	27	28	31	28	45	24
	2	38	39	39	38	36	38	21	62	55	38	45	31	35	38	42	28	45	35
	3	26	38	46	26	43	28	14	49	45	27	55	41	27	48	52	38	55	24
	4	19	18	29	25	39	45	35	66	62	51	34	21	48	28	31	17	34	45
	5	27	38	29	44	27	15	24	38	48	28	42	55	38	28	58	38	52	17

Same as DSTN matrix

Figure 5-7. DISTANCE TABLE HOLDING FIXES AND SECONDARY AIRPORTS TO PRIMARY AIRPORT - RADAR DOWN

MATRIX HALFWORD SAVEVALUE DSTN

Hold Areas — Secondary Airport

	COL.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ROW	1 (4)	34	25	19	31	49	27	36	46	39	46	22	29	55	12	33	14	30	38
Logan Runways	2 (27)	39	45	41	18	33	16	22	37	31	25	22	29	34	12	33	14	30	38
	3 (22)	33	45	41	20	26	26	16	38	43	23	47	36	28	43	45	35	49	24
	4 (33)	50	29	25	20	44	43	35	68	63	43	29	20	40	26	29	30	32	49
	5 (15)	25	32	47	41	26	16	22	37	31	25	36	51	34	34	55	35	52	17
	6	101	101	101	101	101	106	107	108	109	110	111	112	113	114	115	116	117	118

Airport definition matrix number (Row)

Distance from hold area/secondary airport to Logan in a radar environment

Column Headings

1	Manjo	10	Lawrence
2	Millis	11	Mansfield
3	Bridgewater	12	Marshfield
4	Skipper	13	Newburyport
5	LWM	14	Norwood
6	Bedford	15	Plymouth
7	Beverly	16	S. Weymouth
8	Fitchburg	17	Taunton
9	Ft. Devens	18	Tew-Mac

Figure 5-8. DISTANCE TABLE HOLDING FIXES AND SECONDARY AIRPORTS TO PRIMARY AIRPORT - RADAR UP

Table 5-6. RUNWAY APPROACH MINIMA

Approach	Runway					Approach Category
	27	22L	33L	4R	15R	
VOR	460 - 1	680 - 1	680 - 01	680 - 01	680 - 1	A
	460 - 1	680 - 1	680 - 01	680 - 01	680 - 1	B
	460 - 1	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	C
	460 - 1	820 - 2	820 - 2	820 - 2	820 - 2	D
VOR DME	680 - 1	560 - 1	560 - 1	560 - 1	780 - 1	A
	680 - 1	560 - 1	560 - 1	560 - 1	780 - 1-1/4	B
	820 - 1-1/2	560 - 1	560 - 1	560 - 1	780 - 1-1/2	C
	820 - 2	560 - 1-1/4	560 - 1-1/2	560 - 1-1/2	780 - 1-3/4	D
ILS	680 - 1	680 - 1	680 - 1	216 - 1/2	268 - 3/4	A
	680 - 1	680 - 1	680 - 1	216 - 1/2	268 - 3/4	B
	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	216 - 1/2	268 - 3/4	C
	820 - 2	820 - 2	820 - 2	216 - 1/2	268 - 3/4	D
LOC	680 - 1	680 - 1	820 - 2	466 - 3/4	580 - 1	A
	680 - 1	680 - 1	820 - 2	466 - 3/4	580 - 1	B
	820 - 1-1/2	820 - 1-1/2	820 - 2	466 - 3/4	580 - 1	C
	820 - 2	820 - 2	820 - 2	466 - 3/4	580 - 1-1/4	D
NDB	680 - 1	680 - 1	680 - 1	680 - 1	680 - 1	A
	680 - 1	680 - 1	680 - 1	680 - 1	680 - 1	B
	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	820 - 1-1/2	C
	820 - 2	820 - 2	820 - 2	820 - 2	820 - 2	D
LOC BC	680 - 1	420 - 1	420 - 1	420 - 1	420 - 1	A
	680 - 1	420 - 1	420 - 1	420 - 1	420 - 1	B
	820 - 1-1/2	420 - 1	420 - 1	420 - 1	420 - 1	C
	820 - 2	420 - 1	420 - 1	420 - 1	420 - 1	D
ASR	460 - 1	540 - 1	480 - 1/2	620 - 1/2	800 - 1	A
	460 - 1	540 - 1	480 - 1/2	620 - 1/2	800 - 1-3/4	B
	460 - 1	540 - 1	480 - 1/2	620 - 1/2	800 - 1-1/2	C
	460 - 1	540 - 1-1/4	480 - 1	620 - 1	800 - 1-3/4	D

It is possible that a different set of facilities may define the same approach on the same runway. For example, when lacking a DME, the necessary fixes can be established either with another DME or from bearing information solely. For this reason, the model contains more than one matrix of the form of Figure 5-10. The separate entries are a requirement to maintain unique program look-up logic.

MATRIX FULLWORD SAVEVALUE MINMA

			(4R)	(27)	(22L)	(33L)	(15R)
	COLUMN		1	2	3	4	5
					Runway Number		
ROW	1	1	680100	460100	680100	680100	680100
VOR 1	2	2	680100	460100	680100	680100	680100
	3	3	820150	460100	820150	820150	820150
	4	4	820200	460100	820200	820200	820200
	5	1	680100	680100	560100	680100	780100
VOR DME 2	6	2	680100	680100	560100	680100	780125
	7	3	820150	820150	560100	820150	780150
	8	4	820200	820200	560125	820200	780175
	9	1	216050	680100	680100	680100	268075
ILS 3	10	2	216050	680100	680100	680100	268075
	11	3	216050	820150	820150	820150	268075
	12	4	216050	820200	820200	820200	268075
	13	1	460075	680100	680100	680100	580100
LOC 4	14	2	460075	680100	680100	680100	580100
	15	3	460075	820150	820150	820150	580100
	16	4	460075	820200	820200	820200	580125
	17	1	680100	680100	680100	680100	680100
NDB 5	18	2	680100	680100	680100	680100	680100
	19	3	820150	820150	820150	820150	820150
	20	4	820200	820200	820200	820200	820200
	21	1	680100	680100	420100	680100	680100
LOC BC 6	22	2	680100	680100	420100	680100	680100
	23	3	820150	820150	420100	820150	820150
	24	4	820200	820200	420100	820200	820200
	25	1	620050	460100	540100	480050	800100
ASR 7	26	2	620050	460100	540100	480050	800175
	27	3	620050	460100	540100	480050	800150
	28	4	620100	460100	540125	480100	800175

← Minimum visibility requirement (in 100ths of a mile)

Approach Type

A/C Category

Minimum ceiling requirement (in feet)

Logan Minima Matrix

Figure 5-9. LANDING APPROACH MINIMA

Table 5-7. FACILITY-APPROACH DEFINITIONS -- BOSTON (LOGAN), RUNWAY 4R

Facility	ID	Frequency	Approach Type						
			1	2	3	4	5	6	7
			VOR	VOR DME	ILS	LOC	NDB	LOC BC	ASR
LOC	I-BOS	110.3	0	0	15	15	0	15	0
LOC	I-LIP	110.7	0	0	0	0	0	0	0
LOC	I-MDC	110.7	0	0	0	0	0	0	0
GS			0	0	0	0	0	0	0
GS			0	0	10	0	0	0	0
GS			0	0	0	0	0	0	0
VOR	HTM	109.0	2	0	0	0	0	0	0
VOR	BOS	112.7	4	4	0	0	0	0	0
VOR	LWM	112.0	0	0	0	0	0	0	0
VOR	MHT	114.2	0	0	0	0	0	0	0
DME	BOS	Ch.27	0	7	7	7	0	7	0
NDB	SEW	382	0	0	0	0	35	35	0
ASR-7			0	0	0	0	0	0	37
LOM			0	0	19	0	19	0	0
MM			0	0	23	23	0	0	0
ALS			0	0	56	56	56	0	0
HIRL			0	0	43	43	0	0	0

MATRIX HALFWORD SAVEVALUEAIR03

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	0	0
Approaches 2	4	7	0	0	0	0	0	0
3	15	10	7	0	19	23	56	43
4	15	7	0	0	0	0	56	43
5	35	0	0	0	19	0	56	0
6	15	7	35	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Approach Definition Matrixes
(matrix AIR03 to matrix 161)

Facility number required up for approach to be used

Outer marker facility number (if required by approach)

Middle marker facility number (if required by approach)

ALS facility number (if required by approach)

HIRL facility number (if required by approach)

Figure 5-10. APPROACH DEFINITION MATRIX

5.1.11 MTBF and MTTR for Facility Status File

These two failure and repair parameters are required for each of the following facilities or functions. Table 5-8* shows the facilities carried in the Facility Status File. Figure 5-11 shows the program matrix.

Table 5-8. FACILITY FILE

Facility Number	Type	Location	ID	Frequency	Facility Number	Type	Location	ID	Frequency
1	VOR	Lawrence	LWM	112.0	33	SDF	Beverly	BVY	108.7
2	VOR	Whitman	HTM	109.0	34	SDF	Norwood	OWD	108.3
3	VOR	Manchester	MHT	114.2	35	NDB	Boston	SEW	382
4	VOR	Boston	BOS	112.7	36	TACAN	S. Weymouth	IAF	Ch.67
5	DME	Whitman		Ch.27	37	ASR	Boston		
6	DME	Manchester		Ch.89	38	ARSR	Boston		
7	DME	Boston		Ch.74	39	SECRA	Boston		
8	GS	Bedford			40	ARTS-3	Boston		
9	GS	Boston 15R			41	HIRL	Lawrence 5		
10	GS	Boston 4R			42	HIRL	Lawrence 23		
11	GS	Boston 33L			43	HIRL	Boston 4R		
12	LOC	Bedford	I-BED	109.5	44	HIRL	Boston 22L		
13	LOC	Lawrence	I-LWM	111.7	45	HIRL	Boston 15R		
14	LOC	Boston 15R	I-MDC	110.7	46	HIRL	Boston 33L		
15	LOC	Boston 4R	I-BOS	110.3	47	HIRL	Boston 9		
16	LOC	Boston 33L	I-LIP	110.7	48	HIRL	Boston 27		
17	LOM	Bedford	BE	332	49	FDEA	Boston		
18	LOM	Boston 15R	MD	375	50	DEDS	Boston		
19	LOM	Boston 4R	BO	221	51	FM	Beverly		
20	LOM	Boston 33L	LI	346	52	FM	Norwood		
21	MM	Bedford			53	NDB	Bedford	SKR	251
22	MM	Boston 15R			54	HIRL	Lawrence 5		
23	MM	Boston 4R			55	HIRL	Lawrence 23		
24	MM	Boston 22L			56	ALS	Boston 4R		
25	NDB	Beverly	TOF	269	57	ALS	Boston 33L		
26	NDB	Devens	DKO	352	58	HIRL	S. Weymouth 8		
27	NDB	S. Weymouth	IAF	236	59	HIRL	S. Weymouth 26		
28	NDB	Tew-Mac	HRX	402	60	HIRL	S. Weymouth 17		
29	NDB	Taunton	TAN	227	61	HIRL	S. Weymouth 35		
30	NDB	Plymouth	PYM	257	62	ALS	S. Weymouth 26		
31	NDB	Norwood	SOG	201	63	HIRL	Bedford 22		
32	NDB	Fitchburg	FIT	206					

*The data source is "Air Navigation and Air Traffic Control Facility Performance and Availability" (RIS:SM 6040-20), Report for Calendar Year 1975, prepared by the Airways Facilities Service, FAA, Washington, D.C.

MATRIX FULLWORD SAVEVALUE FACIL

ROW	COLUMN 1	2 (MTBF in minutes)	3 (MTTR in minutes)
1	1	60300	318
2	1	60300	318
3	1	60300	318
4	1	60300	318
5	1	72300	402
6	1	24600	534
7	1	24600	534
8	1	28500	1260
9	1	28500	1260
10	1	28500	1260
11	1	28500	1260
12	1	23400	900
13	1	23400	900
14	0	23400	900
15	0	23400	900
16	0	23400	900
17	0	111900	1920
18	0	111900	1920
19	0	111900	1920
20	0	111900	1920
21	0	130500	2580
22	0	130500	2580
23	0	130500	2580
24	0	130500	2580
25	0	2100000	660
26	0	2100000	660
27	0	2100000	660
28	0	2100000	660
29	0	2100000	660
30	0	2100000	660
31	0	2100000	660
32	0	2100000	660
33	0	2100000	660
34	0	2100000	660
35	0	2100000	660
36	0	24600	534
37	0	36300	96
38	0	5160	180
39	0	29100	120
40	0	20100	114
41	0	25200	780
42	0	25200	780
43	0	25200	780
44	0	25200	780
45	0	25200	780
46	0	25200	780
47	0	25200	780
48	0	25200	780
49	0	2100000	616
50	0	2100000	616
51	0	2100000	660
52	0	2100000	660
53	0	2100000	660
54	0	25200	780
55	0	25200	780
56	0	25200	780
57	0	25200	780
58	0	25200	780
59	0	25200	780
60	0	25200	780
61	0	25200	780
62	0	25200	780
63	0	25200	780

Facility Number

Facility Status: 1-facility up; 0-facility down

Facility Status Matrix

Figure 5-11. FACILITY STATUS FILE

5.1.12 Table of Trail Separation and Numbers of Aircraft per Controller

Table 3-2 in Chapter Three lists the data used in this model. Figure 5-12 shows the same data as an input matrix.

MATRIX HALFWORD SAVEVALUEARSEP

	COL. 1	2	3	4	5	6	7	8	9	10	11
ROW 1	37	39	40	38	3	1	2	3	0	1	20
2	37	39	40	0	3	1	2	3	0	1	20
3	37	39	0	38	3	1	2	3	0	1	16
4	37	39	0	0	3	1	2	3	0	1	16
5	37	0	40	38	4	0	1	2	0	0	10
6	37	0	40	0	4	0	1	2	0	0	10
7	37	0	0	38	4	0	1	2	0	0	12
8	37	0	0	0	4	0	1	2	0	0	12
9	0	39	40	38	3	1	2	3	0	1	20
10	0	39	40	0	3	1	2	3	0	1	20
11	0	39	0	38	5	0	0	1	0	0	16
12	0	39	0	0	5	0	0	1	0	0	16
13	0	0	40	38	5	0	0	1	0	0	10
14	0	0	0	38	5	0	0	1	0	0	8
15	0	0	40	0	12	0	0	1	0	0	10
16	0	0	0	0	12	0	0	1	0	0	8

Radar Conditions (rows 1–14); Non-Radar Conditions (rows 15–16)

Equipment required up to determine which separation criteria to use (row number)

Required separation in miles

Additional separation in miles for various weights of aircraft

Number of aircraft air control can handle at one time

Figure 5-12. SEPARATION MATRIX

5.1.13 Airport Definition Data

Figure 5-13 displays the matrix used by the model to define the airport layout. Two different matrix formats are used, one for a principal airport such as Logan, and another for the secondary airports. The matrices are self-explanatory. One note of importance is that the field elevation number is used in conjunction with the minima tables to determine ceiling heights above the ground.

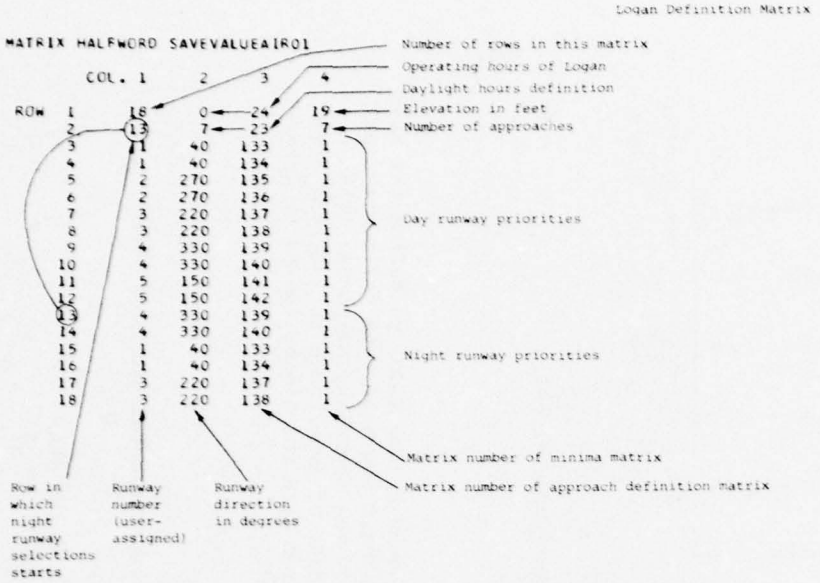
5.2 *MODEL OUTPUTS*

As was mentioned in Chapter Three, the model produces three kinds of output data:

Output data of the run; i.e., delay data

Program administrative data

Current values of program parameters.



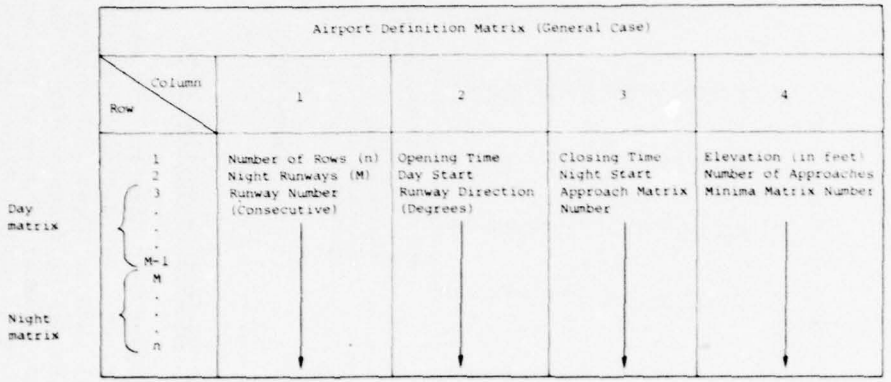


Figure 5-13. FIELD DEFINITION MATRIX

5.2.1 Delay Data

The delay matrix and its contents were described and discussed in Section 3.6, Chapter Three.

5.2.2 Program Administrative Data

Block Counts (Figure 5-14) show the number of transactions that passed through each block in the model. The figure gives the number of transactions that passed through the block, under the "TOTAL" columns, and the number of transactions presently at the block, under the columns labelled "CURRENT".

User Chain Data (Figure 5-15) is an example of this printout. Three user chains, or queues, are shown. Four may actually appear, depending on events within the program. The user chain identified as "LDSCD" is the landing schedule for the primary runway. If a secondary runway were used during a program run, the symbol "2" would be printed under LDCSCD -- this is the fourth possible chain. HDARC is the user chain used for the holding fixes; TAKOF represents the take-off queue.

The column labelled "AVERAGE TIME/TRANS" gives the average time the transaction remains in the queue. The very low time associated with LDSCD is, again, reflective of the fact that a transaction may be placed on the chain several times before a vacancy is found. For the other two chains these numbers may be thought of as average waiting times, with one proviso. The HDARC queue is not as active as LDSCD; nonetheless, the same transaction may appear more than once on their chain. Only TAKOF has the property that a transaction can enter only once.

The column labelled "CURRENT CONTENTS" is self explanatory, as are the columns labelled "AVERAGE CONTENTS" and "MAXIMUM CONTENTS".

5.2.3 Current Contents of Program Parameters

Figure 5-16 is a typical printout of program parameters. The output "Contents of Halfword Savevalues" gives the present value of all non-zero halfword savevalues.* Most of these outputs are input data or dummy counters used in the model; however, the user may input savevalues of his own to gather data of interest. The following is a partial list of outputs of interest:

ARSEP - Row of present separation assignment

WNDIR - Wind direction in degrees at current clock time

WNVEL - Wind velocity in knots at current clock time

VISAB - Visibility in (miles/100) at current clock time

ACNOM - Number of aircraft created

ACCTR - Number of aircraft landing at primary airport

ARCGO - Number of aircraft under air control at current clock time

TAKOF - Number of aircraft that took off.

*A halfword savevalue is a GPSS term for a 2-byte program variable.

Block printout prints, for each GPSS statement number, the number of transactions currently at each block, and the total number of transactions passing through that block.

ERROR NO. 599
TRANS 22 FROM 451 TO 466 CLOCK 1 TERMINATIONS TO GO 1
BLOCK COUNTS

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
1	0	1	11	0	1	21	0	1	31	0	1	41	0	7
2	0	2	12	0	6	22	0	1	32	0	0	42	0	7
3	0	2	13	0	6	23	0	1	33	0	0	43	0	6
4	0	1	14	0	1	24	0	1	34	0	0	44	0	1
5	0	1	15	0	1	25	0	1	35	0	0	45	0	1
6	0	1	16	0	2	26	0	1	36	0	1	46	0	1
7	0	1	17	0	2	27	0	1	37	0	1	47	0	1
8	0	0	18	0	2	28	0	1	38	0	1	48	0	0
9	0	0	19	0	1	29	0	1	39	0	1	49	0	1
10	0	0	20	0	1	30	0	1	40	0	1	50	0	1
51	0	1	61	0	0	71	0	0	81	0	0	91	0	0
52	0	1	62	0	0	72	0	1	82	0	0	92	0	0
53	0	1	63	0	0	73	0	1	83	0	0	93	0	0
54	0	1	64	0	0	74	1	1	84	0	0	94	0	0
55	0	1	65	0	0	75	0	0	85	0	0	95	0	0
56	0	1	66	0	1	76	0	1	86	1	2	96	0	0
57	1	1	67	1	1	77	1	2	87	0	1	97	0	0
58	0	0	68	0	0	78	0	0	88	0	1	98	0	0
59	0	1	69	0	1	79	0	0	89	0	1	99	0	1
60	0	1	70	0	1	80	0	0	90	1	1	100	0	0
101	0	0	111	0	0	121	0	0	131	0	0	141	0	0
102	0	0	112	0	0	122	0	0	132	0	0	142	0	0
103	0	0	113	0	0	123	0	0	133	0	0	143	0	0
104	0	0	114	0	0	124	0	0	134	0	0	144	0	0
105	0	0	115	0	0	125	0	0	135	0	0	145	0	0
106	0	0	116	0	0	126	0	0	136	0	0	146	0	0
107	0	0	117	0	0	127	0	0	137	0	0	147	0	0
108	0	0	118	0	0	128	0	0	138	0	0	148	0	0
109	0	0	119	0	0	129	0	0	139	0	0	149	0	0
110	0	0	120	0	0	130	0	0	140	0	0	150	0	0
151	0	0	161	0	0	171	0	0	181	0	0	191	0	0
152	0	0	162	0	0	172	0	0	182	0	0	192	0	0
153	0	0	163	0	0	173	0	0	183	0	0	193	0	0
154	0	0	164	0	0	174	0	0	184	0	0	194	0	0
155	0	0	165	0	0	175	0	0	185	0	0	195	0	0
156	0	0	166	0	0	176	0	0	186	0	0	196	0	0
157	0	0	167	0	0	177	0	0	187	0	0	197	0	0
158	0	0	168	0	0	178	0	0	188	0	0	198	0	0
159	0	0	169	0	0	179	0	0	189	0	0	199	0	0
160	0	0	170	0	0	180	0	0	190	0	0	200	0	0
201	0	0	211	0	0	221	0	0	231	0	0	241	0	0
202	0	0	212	0	0	222	0	0	232	0	0	242	0	0
203	0	0	213	0	0	223	0	0	233	0	0	243	0	0
204	0	0	214	0	0	224	0	0	234	0	0	244	0	0
205	0	0	215	0	0	225	0	0	235	0	0	245	0	0
206	0	1	216	0	0	226	0	0	236	0	0	246	0	0
207	0	1	217	0	0	227	0	0	237	0	0	247	0	0
208	0	1	218	0	0	228	0	0	238	0	0	248	0	0
209	1	1	219	0	0	229	0	0	239	0	0	249	0	0
210	0	0	220	0	0	230	0	0	240	0	0	250	0	0

Figure 5-14. BLOCK COUNTS

USER CHAIN	TOTAL ENTRIES	AVERAGE TIME/TRANS	CURRENT CONTENTS	AVERAGE CONTENTS	MAXIMUM CONTENTS
LDSCD	57661	.258	1	10.363	20
HOLDS	665	7.458		3.444	34
TAKOF	588	2.528		1.032	9

Figure 5-15. USER CHAIN DATA

CONTENTS OF HALFWORD SAVEVALUES (NON-ZERO)

SAVEVALUE	NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE
	DUMMY	5	DIVRT	500	AIPPT	18	HOLD	5	NORAD	15	RADDW	16	TOF	10	WNMAX	15
	MAXTV	30	TAKOU	3	LNDST	5	MNONE	-1	LNDSP	2	TAKVS	100	TAKCL	375	CALN	5
	TYPCT	2	IFRWT	1	DIRWN	-70	LNDVL	129	CEILT	467	VISAT	150	WNVEL	16	CEIL	600
	VISAB	150	ARSEP	9	ACNUM	751	ACCTR	665	ARCGO	1	TAKOF	588	DUMMY	2	LEDWT	3

Figure 5-16. NON-ZERO HALFWORD SAVEVALUES

A complete list of halfword savevalues is given in Chapter Six. The Matrix FACIL inputs the MTBF and MTTR for each facility. Column 1 is the present status of each facility -- 1 indicates facility operational; 0 indicates facility down. This matrix is shown in Figure 5-17.

5.3 RESTRICTIONS AND/OR LIMITATIONS

The basic cycling interval for the UDCM is one minute. This means that every clock GPSS pulse is interpreted as one minute of simulated real time. The use of a one-minute clock implies an analytic error in calculation because all calculations involving time are integer quantities. For example, any calculation, such as a distance divided by a speed, will truncate downward to the next lower integer, and all times between 4.0 and 4.999 minutes, for example, will be interpreted as 4 minutes. Thus the same time of flight would be obtained over a range of distances and/or velocities. Obviously, then, some error is built into the model. This could be reduced by allowing one clock pulse to stand for .1 or .01 minute, or any other fraction of a minute. Such reduction would, however, increase the model's already tight core constraints, since, in order to obtain runs of any reasonable simulated duration, the halfword savevalues and matrices would have to be increased to fullword values.

5.4 EDITING AND DIAGNOSTICS

With the exception of the ERR statement, which is used for debug purposes in the takeoff and landing schedules, all error outputs and program diagnostics are standard GPSS. When the error statement is reached in the model the UDCM stops and prints output error statistics. It is only reached when an anomaly exists in the model logic, i.e., when a transaction twin* cannot be found.

*A transaction twin is an exact duplicate of a GPSS transaction.

```
MATRIX FULLWORD SAVEVALUE FACIL

                COLUMN    1
ROW  1                    1
     2                    1
     3                    1
     4                    1
     5                    1
     6                    1
     7                    1
     8                    1
     9                    1
    10                    1
    11                    1
    12                    1
    13                    1
    14                    1
    15                    1
    16                    1
    17                    1
    18                    1
    19                    1
    20                    1
    21                    1
    22                    1
    23                    1
    24                    1
    25                    1
    26                    1
    27                    1
    28                    1
    29                    1
    30                    1
    31                    1
    32                    1
    33                    1
    34                    1
    35                    1
    36                    1
    37                    0
    38                    1
    39                    1
    40                    1
    41                    1
    42                    1
    43                    1
    44                    1
    45                    1
    46                    1
    47                    1
    48                    1
    49                    1
    50                    1
    51                    1
    52                    1
    53                    1
    54                    1
    55                    1
    56                    1
    57                    1
    58                    1
    59                    1
    60                    1
    61                    1
    62                    1
    63                    1
```

Figure 5-17. MATRIX FACIL

CHAPTER SIX

SYMBOLS

All symbols, variables, and matrices appear in the program listing, shown in Appendix A, and are summarized in this chapter for convenience.

6.1 MATRIX SAVEVALUES

Halfword

DSTN - Contains distance from holding fixes and secondary airports to Logan runway thresholds, radar environment.

DSTNR - Same as DSTN, but for all radar facilities down.

VFRAC - Contains cumulative probabilities for aircraft assignment to Logan holding fixes and secondary airports. Also, in last column, contains aircraft arrival rates. VFR conditions.

IFRAC - Same as VFRAC, except IFR conditions.

CATWT - Contains cumulative probabilities for assignment of aircraft weight and landing categories, by aircraft user type.

VFRPT - Contains cumulative probabilities for assignment of aircraft type, given the destination, VFR.

IFRPT - Same as VFRPT, except IFR conditions.

DIRVL - Contains cumulative probabilities to assign wind direction and speed.

DELAY - Output delay matrix.

ARSEP - Contains nominal and incremental trail separation distances as a function of radar status. Also contains numbers of aircraft a controller can handle.

A1RO1, A1RO2, A1RO3 - Contain airport definition data, facilities required for approaches, and approach definitions.

Fullword

FACIL - Define facilities by number, MTBF, MTTR, and current status.

MINMA - Contains minima for each airport runway and approach.

6.2 HALFWORD SAVEVALUE SYMBOLS

ACCTR - Accumulator used to count aircraft going to Logan

ACNUM - Counts aircraft created

AIRPT - Number of holding fixes and secondary airports

ARCGO - Counter used to count number of aircraft under air control

ARSEP - Pointer used to determine which row of the separation matrix is in use

CALM - Maximum wind speed for calm

CEIL - Present ceiling in feet

CEILP - Present ceiling column number

CEILT - Dummy counter used to manipulate the ceiling

DAYEN - End of day, time, for weather determination

DAYST - Start of day, time, for weather determination

DIRWN - Dummy counter used to manipulate the wind direction and runway direction

DIVRT - Number, out of 1000 aircraft, that divert to Logan from secondary airport

ERROR - Dummy counter used to bomb model if an impossible situation exists

FACIL - Number of facilities modeled

HOLD - Number of Logan holding fixes

IFRWT - Dummy counter is equal to zero in VFR and one if IFR conditions

LEDWT - Dummy counter used to store the lead aircraft's weight

LNDSP - Separation in miles between landing and taking off aircraft

LNDST - Separation increase if takeoff queue is greater than TAKQU

LNDVL - Dummy counter used to store the approach aircraft's landing velocity

MAXTM - Maximum holding time

MNONE - Dummy input

NORAD - Row number in the separation matrix where no radar condition exists

RADOW - Last row in separation matrix

RUNWY - The number of runways at Logan

TAKCL - Maximum takeoff ceiling

TAKOF - Departing aircraft counter

TAKQU - Maximum number of aircraft in takeoff queue before landing separation increases

TAKVS - Minimum takeoff visibility

TOF - Time of flight from holding fix or secondary airport to Logan

TRLVL - Dummy counter used to store trailing aircraft velocity

TRLWT - Dummy counter used to store trailing aircraft weight

TYPCT - Dummy counter used in the generation of aircraft

VFRWT - Dummy counter is equal to zero in IFR and one in VFR conditions

VISAB - Present visibility in miles

VISAP - Present visibility in column number

VISAT - Dummy counter used to manipulate the visibility

WNDIR - Present wind direction in degrees

WNMAX - Wind speed above which aircraft land on runway closest to the wind

WNVEL - Present wind velocity

WTCHG - Mean time between major weather change

WTVAR - Mean time between minor weather change.

6.3 BOOLEAN VARIABLE SYMBOLS

CLRD - Boolean variable used to find approaching aircraft

LEDAC - Boolean variable used to find lead aircraft

TRLAC - Boolean variable used to find trailing aircraft

WEATH - Boolean variable used to determine if weather is below minimum for approach in question.

6.4 FUNCTION SYMBOLS

CEIL - Function converts column number to ceiling in feet

LOGRN - Function converts random number into a logarithm of the random number

MODSP - Function defines the modifier and spread of aircraft turnaround time

PMFTY - Function randomly chooses between 50 and 150

PMOFY - Function randomly chooses between 150 and 300

SPEED - Function defines speed of aircraft based on aircraft type

VISAB - Function converts column number to visibility in miles

WNVEL - Function converts column number to wind velocity.

6.5 CHAIN SYMBOLS

HDARC - Hold area chain

LDSCD - Landing schedule chain (1 - primary runway, 2 - secondary runway)

TAKOF - Departure chain.

6.6 LOGIC SWITCH SYMBOLS

ARCGO - Logic switch is set when air control can accept aircraft

CHANG - Logic switch is set when there is a change in facility status or weather

CLRD - Logic switch is set when aircraft is allowed to take off

ENTER - Logic switch is set when an aircraft is in the hold area

FCHAN - Logic switch is set when there is a change in facility status

FINI1 - Logic switch which allows only one transaction at a time to examine the landing schedule.

FINI2 - Logic switch prevents next generated aircraft into the system until previous aircraft is in the system

FINI3 - Logic switch used to hold an aircraft transaction until trail aircraft statistics are gathered

FINI4 - Logic switch used to hold an aircraft transaction until lead aircraft statistics are gathered

FINI5 - Logic switch used to allow aircraft into the landing schedule before air control checks next aircraft

FINI6 - Logic switch prevents generation of aircraft until all facilities are created

LNDSP - Logic switch prevents aircraft takeoff on land runway until landing aircraft has cleared

TAKOF - Logic switch is set when proper separation is experienced between taking off aircraft.

6.7 VARIABLE SYMBOLS

APPCT - Dummy variable used to store row number of minima matrix based on aircraft category

ARSEP - Variable used to calculate separation between lead aircraft and aircraft of interest

CEIL - Variable used to modify ceiling ±50 feet

CEILO - Variable used to modify ceiling ±150 feet

CEILT - Variable used to convert minima matrix entry into feet of ceiling

CLOCK - Variable which converts the computer clock time into simulated hour in the day

DELAY - Variable used to determine if an aircraft has experienced any delay

DELTM, DELT1, DELT2 - Variables used to determine elapsed time between aircraft arrivals

DESTN, DEST1 - Variables used to determine aircraft destination

DIRWN - Dummy variable used to square difference between wind direction and runway direction

LNDSP - Variable used to calculate the approaching aircraft distance from touch down

MORWN - Dummy variable used to change the sign of the wind direction off the runway direction

MOD - Variable used to calculate the turnaround time of a landing aircraft

MTBF - Variable used to determine the minutes until next failure for a facility

MTTR - Variable used to determine the minutes required to repair a downed facility

SEPAR - Variable used to calculate separation between aircraft of interest and trailing aircraft

SPRED - Variable used to put a spread on the variable MOD

TAKDY - Variable used to determine if an aircraft experienced any delay during takeoff

TOF - Variable used to calculate the time of flight of an aircraft in a radar environment

TOFNR - Variable used to calculate the time of flight of an aircraft in a non-radar environment

TYPEA, TYPED - Variables used to assign an aircraft type based on the aircraft destination

VISAB - Variable used to vary the visibility ±.25 miles

VISAT - Variable used to convert minima matrix entry into miles of visibility

WTCHG - Variable used to determine the number of minutes until the next major weather change

WTVAR - Variable used to determine the number of minutes until the next minor weather variation.

6.8 SAVEVALUE SYMBOLS

LEDTM - Dummy counter used to store lead aircraft landing time

LNDTM - Dummy counter used to store approach aircraft landing time

TESS - Dummy counter used to store wind direction

TMCTR - Dummy counter used to store aircraft landing time

TRLTM - Dummy counter used to store trailing aircraft landing time.

APPENDIX A

PROGRAM PRINTOUT

```
// JOB 1324  LOGAN SIMULATION   MARTIN STERNBERG-POWIDZKI              DATE 11/01/76,CLOCK 02/01/16
// ASSGN SYS000,X'131'
// ASSGN SYS001,X'131'
// ASSGN SYS002,X'131'
// ASSGN SYS003,X'131'
// DLBL IJSYS00,'SYSTEM WORK FILE NO. 0',0,SD
// EXTENT SYS000,999999,1,0,00020,00600
// DLBL INTER0I,'SYSTEM WORK FILE NO. 0',0,SD
// EXTENT SYS000,999999,1,0,00020,00600
// DLBL IJSYS01,'SYSTEM WORK FILE NO. 1',0,SD
// EXTENT SYS001,999999,1,0,00620,01200
// DLBL SIMIN1I,'SYSTEM WORK FILE NO. 1',0,SD
// EXTENT SYS001,999999,1,0,00620,01200
// DLBL IJSYS02,'SYSTEM WORK FILE NO. 2',0,SD
// EXTENT SYS002,999999,1,0,01820,00600
// DLBL SYMTAB1,'SYSTEM WORK FILE NO. 2',0,SD
// EXTENT SYS002,999999,1,0,01820,00600
// DLBL IJSYS03,'SYSTEM WORK FILE NO. 3',0,SD
// EXTENT SYS003,999999,1,0,02420,01200
// DLBL REPORGI,'SYSTEM WORK FILE NO. 3',0,SD
// EXTENT SYS003,999999,1,0,02420,01200
// EXEC DAR01V2

        REALLOCATE XAC,300                                              1
        REALLOCATE BLO,490                                              2
        REALLOCATE FAC,0                                                3
        REALLOCATE FSV,5                                                4
        REALLOCATE VAR,31                                               5
        REALLOCATE LOG,14                                               6
        REALLOCATE CHA,4                                                7
        REALLOCATE FUN,12                                               8
        REALLOCATE FMS,15                                               9
        REALLOCATE HMS,165                                             10
        REALLOCATE GRP,0                                               11
        REALLOCATE STO,0                                               12
        REALLOCATE QUE,0                                               13
        REALLOCATE TAB,0                                               14
        REALLOCATE BVR,5                                               15
        REALLOCATE HSV,45                                              16

BLOCK                                                                  CARD
NUMBER  *LOC    OPERATION  A,B,C,D,E,F,G        COMMENTS               NUMBER
        SIMULATE           30                                          17
        LDSCD   EQU        1(2),C                                      18
        MINMA   EQU        1(14),M     Assigns numbers to GPSS entity names.   19
        AIR01   EQU        101(11),Y                                   20
        AIR03   EQU        133(29),Y                                   21
        AIR02   EQU        106(13),Y                                   22
        SPEED   EQU        1(4),Z                                      23
        DIRVL   EQU        1(5),Y                                      24
        1       MATRIX     H,18,13                                     25
        2       MATRIX     H,6,10                                      26
        4       MATRIX     H,6,10                                      27
        6       MATRIX     H,6,10                                      28
        8       MATRIX     H,6,10                                      29
        10      MATRIX     H,6,10                                      30
        12      MATRIX     H,6,10                                      31
        14      MATRIX     H,6,10                                      32
        16      MATRIX     H,6,10                                      33
        18      MATRIX     H,6,10                                      34
        20      MATRIX     H,6,10                                      35
        22      MATRIX     H,6,10                                      36
        24      MATRIX     H,6,10                                      37
        26      MATRIX     H,6,10                                      38
        28      MATRIX     H,6,10                                      39
        30      MATRIX     H,6,10                                      40
        32      MATRIX     H,6,10                                      41
        34      MATRIX     H,6,10                                      42
        3       MATRIX     H,6,14                                      43
        5       MATRIX     H,6,14                                      44
        7       MATRIX     H,6,14      Defines matrixes, rows and columns, size, and halfword or fullword.   45
        9       MATRIX     H,6,14      Halfword allows entries up to (2^15 - 1).   46
        11      MATRIX     H,6,14      Fullword allows entries up to (2^31 - 1).   47
        13      MATRIX     H,6,14                                      48
        15      MATRIX     H,6,14                                      49
        17      MATRIX     H,6,14                                      50
        19      MATRIX     H,6,14                                      51
        21      MATRIX     H,6,14                                      52
        23      MATRIX     H,6,14                                      53
        25      MATRIX     H,6,14                                      54
        27      MATRIX     H,6,14                                      55
        29      MATRIX     H,6,14                                      56
```

(continued)

```
31      MATRIX      H,6,14
33      MATRIX      H,6,14
35      MATRIX      H,6,14
158     MATRIX      H,2,8
157     MATRIX      H,2,8
111     MATRIX      H,4,4
112     MATRIX      H,4,4
113     MATRIX      H,4,4
117     MATRIX      H,4,4
118     MATRIX      H,6,4
106     MATRIX      H,6,4
107     MATRIX      H,6,4
109     MATRIX      H,6,4
110     MATRIX      H,6,4
114     MATRIX      H,6,4
115     MATRIX      H,6,4
116     MATRIX      H,6,4
108     MATRIX      H,5,4
101     MATRIX      H,18,4
148     MATRIX      H,2,8
149     MATRIX      H,1,8
150     MATRIX      H,1,8
151     MATRIX      H,4,8
152     MATRIX      H,1,8
153     MATRIX      H,3,8
159     MATRIX      H,3,8
160     MATRIX      H,3,8
161     MATRIX      H,3,8
154     MATRIX      H,3,8
155     MATRIX      H,2,8
133     MATRIX      H,7,8
134     MATRIX      H,7,8
135     MATRIX      H,7,8
136     MATRIX      H,7,8
137     MATRIX      H,7,8
138     MATRIX      H,7,8
139     MATRIX      H,7,8
140     MATRIX      H,7,8
141     MATRIX      H,7,8
142     MATRIX      H,7,8
143     MATRIX      H,5,8
156     MATRIX      H,5,8
144     MATRIX      H,4,8
145     MATRIX      H,1,8
146     MATRIX      H,1,8
147     MATRIX      H,2,8
DSTN    MATRIX      H,6,18
DSTNR   MATRIX      H,5,18
VFRAC   MATRIX      H,24,19
IFRAC   MATRIX      H,24,18
CATWT   MATRIX      H,4,7
VFRPT   MATRIX      H,18,3
IFRPT   MATRIX      H,18,3
ARSEP   MATRIX      H,16,11
DELAY   MATRIX      H,13,4
FACIL   MATRIX      X,63,3
1       MATRIX      X,28,5
2       MATRIX      X,20,4
3       MATRIX      X,16,4
4       MATRIX      X,4,4
5       MATRIX      X,4,4
6       MATRIX      X,8,4
7       MATRIX      X,8,2
8       MATRIX      X,4,2
9       MATRIX      X,4,2
10      MATRIX      X,16,4
11      MATRIX      X,4,4
12      MATRIX      X,12,4
13      MATRIX      X,12,2
14      MATRIX      X,8,4
```

Defines matrixes, rows and columns, size, and halfword or fullword.
Halfword allows entries up to $(2^{15} - 1)$.
Fullword allows entries up to $(2^{31} - 1)$.

```
INITIAL     MX$FACIL(1-4,2),60300
INITIAL     MX$FACIL(1-4,3),318
INITIAL     MX$FACIL(5,2),72300
INITIAL     MX$FACIL(5,3),402
INITIAL     MX$FACIL(6-7,2),24600
INITIAL     MX$FACIL(6-7,3),534
INITIAL     MX$FACIL(8-11,2),28500
INITIAL     MX$FACIL(8-11,3),1260
INITIAL     MX$FACIL(12-16,2),23400
INITIAL     MX$FACIL(12-16,3),900
INITIAL     MX$FACIL(17-20,2),111900
INITIAL     MX$FACIL(17-20,3),1920
INITIAL     MX$FACIL(21-24,2),130500
INITIAL     MX$FACIL(21-24,3),2580
```

Initializes the Facility Matrix with MTBFs and MTTRs.

(continued)

```
INITIAL    MX$FACIL(25-35,2),2100000
INITIAL    MX$FACIL(25-35,3),660
INITIAL    MX$FACIL(36,2),24600
INITIAL    MX$FACIL(36,3),534
INITIAL    MX$FACIL(37,2),36300
INITIAL    MX$FACIL(37,3),96
INITIAL    MX$FACIL(38,2),5160
INITIAL    MX$FACIL(38,3),180
INITIAL    MX$FACIL(39,2),29100
INITIAL    MX$FACIL(39,3),120
INITIAL    MX$FACIL(40,2),20100
INITIAL    MX$FACIL(40,3),114
INITIAL    MX$FACIL(41-48,2),25200
INITIAL    MX$FACIL(49-50,2),2100000
INITIAL    MX$FACIL(54-55,2),25200
INITIAL    MX$FACIL(58-61,2),25200
INITIAL    MX$FACIL(63,2),25200
INITIAL    MX$FACIL(41-48,3),780
INITIAL    MX$FACIL(49-50,3),616
INITIAL    MX$FACIL(54-55,3),780
INITIAL    MX$FACIL(58-61,3),780
INITIAL    MX$FACIL(63,3),780
INITIAL    MX$FACIL(51-53,2),2100000
INITIAL    MX$FACIL(51-53,3),660
INITIAL    MX$FACIL(56-57,2),25200
INITIAL    MX$FACIL(56-57,3),780
INITIAL    MX$FACIL(62,2),25200
INITIAL    MX$FACIL(62,3),780
```

Initializes the Facility Matrix with MTBFs and MTTRs.

```
INITIAL    MH$DSTN(1,1),34
INITIAL    MH$DSTN(1,2),25
INITIAL    MH$DSTN(1,3),19
INITIAL    MH$DSTN(1,4),31
INITIAL    MH$DSTN(1,5),49
INITIAL    MH$DSTN(1,6),27
INITIAL    MH$DSTN(1,7),36
INITIAL    MH$DSTN(1,8),46
INITIAL    MH$DSTN(1,9),39
INITIAL    MH$DSTN(1,10),46
INITIAL    MH$DSTN(1,11),22
INITIAL    MH$DSTN(1,12),29
INITIAL    MH$DSTN(1,13),55
INITIAL    MH$DSTN(1,14),12
INITIAL    MH$DSTN(1,15),33
INITIAL    MH$DSTN(1,16),14
INITIAL    MH$DSTN(1,17),30
INITIAL    MH$DSTN(1,18),38
INITIAL    MH$DSTN(2,1),39
INITIAL    MH$DSTN(2,2),45
INITIAL    MH$DSTN(2,3),41
INITIAL    MH$DSTN(2,4),18
INITIAL    MH$DSTN(2,5),33
INITIAL    MH$DSTN(2,6),16
INITIAL    MH$DSTN(2,7),22
INITIAL    MH$DSTN(2,8),37
INITIAL    MH$DSTN(2,9),31
INITIAL    MH$DSTN(2,10),25
INITIAL    MH$DSTN(2,11),22
INITIAL    MH$DSTN(2,12),29
INITIAL    MH$DSTN(2,13),34
INITIAL    MH$DSTN(2,14),12
INITIAL    MH$DSTN(2,15),33
INITIAL    MH$DSTN(2,16),14
INITIAL    MH$DSTN(2,17),30
INITIAL    MH$DSTN(2,18),38
INITIAL    MH$DSTN(3,1),33
INITIAL    MH$DSTN(3,2),45
INITIAL    MH$DSTN(3,3),41
INITIAL    MH$DSTN(3,4),20
INITIAL    MH$DSTN(3,5),26
INITIAL    MH$DSTN(3,6),26
INITIAL    MH$DSTN(3,7),16
INITIAL    MH$DSTN(3,8),38
INITIAL    MH$DSTN(3,9),43
INITIAL    MH$DSTN(3,10),23
INITIAL    MH$DSTN(3,11),47
INITIAL    MH$DSTN(3,12),36
INITIAL    MH$DSTN(3,13),28
INITIAL    MH$DSTN(3,14),43
INITIAL    MH$DSTN(3,15),45
INITIAL    MH$DSTN(3,16),35
INITIAL    MH$DSTN(3,17),49
INITIAL    MH$DSTN(3,18),24
INITIAL    MH$DSTN(4,1),50
INITIAL    MH$DSTN(4,2),29
INITIAL    MH$DSTN(4,3),25
INITIAL    MH$DSTN(4,4),20
```

Initializes the Distance Matrix [distance from holding points and secondary airports to the 5 runways at Logan (radar environment)].

(continued)

```
INITIAL     MH$DSTN(4,5),44
INITIAL     MH$DSTN(4,6),43
INITIAL     MH$DSTN(4,7),35
INITIAL     MH$DSTN(4,8),68
INITIAL     MH$DSTN(4,9),63
INITIAL     MH$DSTN(4,10),43
INITIAL     MH$DSTN(4,11),29
INITIAL     MH$DSTN(4,12),20
INITIAL     MH$DSTN(4,13),40
INITIAL     MH$DSTN(4,14),26
INITIAL     MH$DSTN(4,15),29
INITIAL     MH$DSTN(4,16),30
INITIAL     MH$DSTN(4,17),32
INITIAL     MH$DSTN(4,18),49
INITIAL     MH$DSTN(5,1),25
INITIAL     MH$DSTN(5,2),32
INITIAL     MH$DSTN(5,3),47
INITIAL     MH$DSTN(5,4),41
INITIAL     MH$DSTN(5,5),26
INITIAL     MH$DSTN(5,6),16
INITIAL     MH$DSTN(5,7),22
INITIAL     MH$DSTN(5,8),37
INITIAL     MH$DSTN(5,9),31
INITIAL     MH$DSTN(5,10),25
INITIAL     MH$DSTN(5,11),36
INITIAL     MH$DSTN(5,12),51
INITIAL     MH$DSTN(5,13),34
INITIAL     MH$DSTN(5,14),34
INITIAL     MH$DSTN(5,15),55
INITIAL     MH$DSTN(5,16),35
INITIAL     MH$DSTN(5,17),52
INITIAL     MH$DSTN(5,18),17
INITIAL     MH$DSTN(6,1-5),101
INITIAL     MH$DSTN(6,6),106
INITIAL     MH$DSTN(6,7),107
INITIAL     MH$DSTN(6,8),108
INITIAL     MH$DSTN(6,9),109
INITIAL     MH$DSTN(6,10),110
INITIAL     MH$DSTN(6,11),111
INITIAL     MH$DSTN(6,12),112
INITIAL     MH$DSTN(6,13),113
INITIAL     MH$DSTN(6,14),114
INITIAL     MH$DSTN(6,15),115
INITIAL     MH$DSTN(6,16),116
INITIAL     MH$DSTN(6,17),117
INITIAL     MH$DSTN(6,18),118
INITIAL     MH$DSTNR(1,1),26
INITIAL     MH$DSTNR(1,2),49
INITIAL     MH$DSTNR(1,3),39
INITIAL     MH$DSTNR(1,4),55
INITIAL     MH$DSTNR(1,5),26
INITIAL     MH$DSTNR(1,6),15
INITIAL     MH$DSTNR(1,7),14
INITIAL     MH$DSTNR(1,8),38
INITIAL     MH$DSTNR(1,9),49
INITIAL     MH$DSTNR(1,10),27
INITIAL     MH$DSTNR(1,11),34
INITIAL     MH$DSTNR(1,12),31
INITIAL     MH$DSTNR(1,13),27
INITIAL     MH$DSTNR(1,14),28
INITIAL     MH$DSTNR(1,15),31
INITIAL     MH$DSTNR(1,16),28
INITIAL     MH$DSTNR(1,17),45
INITIAL     MH$DSTNR(1,18),24
INITIAL     MH$DSTNR(2,1),38
INITIAL     MH$DSTNR(2,2-3),39
INITIAL     MH$DSTNR(2,4),38
INITIAL     MH$DSTNR(2,5),36
INITIAL     MH$DSTNR(2,6),38
INITIAL     MH$DSTNR(2,7),21
INITIAL     MH$DSTNR(2,8),62
INITIAL     MH$DSTNR(2,9),55
INITIAL     MH$DSTNR(2,10),38
INITIAL     MH$DSTNR(2,11),45
INITIAL     MH$DSTNR(2,12),31
INITIAL     MH$DSTNR(2,13),35
INITIAL     MH$DSTNR(2,14),38
INITIAL     MH$DSTNR(2,15),42
INITIAL     MH$DSTNR(2,16),28
INITIAL     MH$DSTNR(2,17),45
INITIAL     MH$DSTNR(2,18),35
INITIAL     MH$DSTNR(3,1),26
INITIAL     MH$DSTNR(3,2),38
INITIAL     MH$DSTNR(3,3),46
INITIAL     MH$DSTNR(3,4),26
INITIAL     MH$DSTNR(3,5),43
```

Initializes the Distance Matrix [distance from holding points and secondary airports to the 5 runways at Logan (radar environment)].

Same as DSTN matrix, except distances are for a non-radar environment.

(continued)

```
INITIAL   MH$DSTNR(3,6),28                                                  313
INITIAL   MH$DSTNR(3,7),14                                                  314
INITIAL   MH$DSTNR(3,8),49                                                  315
INITIAL   MH$DSTNR(3,9),45                                                  316
INITIAL   MH$DSTNR(3,10),27                                                 317
INITIAL   MH$DSTNR(3,11),55                                                 318
INITIAL   MH$DSTNR(3,12),41                                                 319
INITIAL   MH$DSTNR(3,13),27                                                 320
INITIAL   MH$DSTNR(3,14),48                                                 321
INITIAL   MH$DSTNR(3,15),52                                                 322
INITIAL   MH$DSTNR(3,16),38                                                 323
INITIAL   MH$DSTNR(3,17),55                                                 324
INITIAL   MH$DSTNR(3,18),24                                                 325
INITIAL   MH$DSTNR(4,1),19                                                  326
INITIAL   MH$DSTNR(4,2),18                                                  327
INITIAL   MH$DSTNR(4,3),29                                                  328
INITIAL   MH$DSTNR(4,4),25                                                  329
INITIAL   MH$DSTNR(4,5),39                                                  330
INITIAL   MH$DSTNR(4,6),45                                                  331
INITIAL   MH$DSTNR(4,7),35                                                  332
INITIAL   MH$DSTNR(4,8),66                                                  333
INITIAL   MH$DSTNR(4,9),62                                                  334
INITIAL   MH$DSTNR(4,10),51                                                 335
INITIAL   MH$DSTNR(4,11),34                                                 336
INITIAL   MH$DSTNR(4,12),21                                                 337
INITIAL   MH$DSTNR(4,13),48                                                 338
INITIAL   MH$DSTNR(4,14),28                                                 339
INITIAL   MH$DSTNR(4,15),31                                                 340
INITIAL   MH$DSTNR(4,16),17                                                 341
INITIAL   MH$DSTNR(4,17),34                                                 342
INITIAL   MH$DSTNR(4,18),45                                                 343
INITIAL   MH$DSTNR(5,1),27                                                  344
INITIAL   MH$DSTNR(5,2),38                                                  345
INITIAL   MH$DSTNR(5,3),29                                                  346
INITIAL   MH$DSTNR(5,4),44                                                  347
INITIAL   MH$DSTNR(5,5),27                                                  348
INITIAL   MH$DSTNR(5,6),15                                                  349
INITIAL   MH$DSTNR(5,7),24                                                  350
INITIAL   MH$DSTNR(5,8),38                                                  351
INITIAL   MH$DSTNR(5,9),48                                                  352
INITIAL   MH$DSTNR(5,10),28                                                 353
INITIAL   MH$DSTNR(5,11),42                                                 354
INITIAL   MH$DSTNR(5,12),55                                                 355
INITIAL   MH$DSTNR(5,13),38                                                 356
INITIAL   MH$DSTNR(5,14),28                                                 357
INITIAL   MH$DSTNR(5,15),58                                                 358
INITIAL   MH$DSTNR(5,16),38                                                 359
INITIAL   MH$DSTNR(5,17),52                                                 360
INITIAL   MH$DSTNR(5,18),17                                                 361
INITIAL   MH$CATWT(1-4,1-7),1000                                            362
INITIAL   MH$CATWT(1,1-2),0                                                 363
INITIAL   MH$CATWT(1,3),787                                                 364
INITIAL   MH$CATWT(1,5),0      } Same as DSTN matrix, except distances are  365
INITIAL   MH$CATWT(1,6),787    } for a non-radar environment.               366
INITIAL   MH$CATWT(2,1),0      }                                            367
INITIAL   MH$CATWT(2,5),0      }                                            368
INITIAL   MH$CATWT(4,1),300    }                                            369
INITIAL   MH$CATWT(4,2),500    }                                            370
INITIAL   MH$CATWT(4,5),500    }                                            371
INITIAL   MH$VFRPT(1-5,1),782  }                                            372
INITIAL   MH$VFRPT(1-5,2),897  }                                            373
INITIAL   MH$VFRPT(1-5,3),996  }                                            374
INITIAL   MH$VFRPT(6,1),30     }                                            375
INITIAL   MH$VFRPT(14,1),2     }                                            376
INITIAL   MH$VFRPT(6,2),111    }                                            377
INITIAL   MH$VFRPT(7,2),2      }                                            378
INITIAL   MH$VFRPT(10,2),190   }                                            379
INITIAL   MH$VFRPT(14,2),11    }                                            380
INITIAL   MH$VFRPT(18,2),235   }                                            381
INITIAL   MH$VFRPT(6,3),947    }                                            382
INITIAL   MH$VFRPT(7,3),816    }                                            383
INITIAL   MH$VFRPT(8,3),1000   }                                            384
INITIAL   MH$VFRPT(9,3),38     }                                            385
INITIAL   MH$VFRPT(10-13,3),1000 }                                          386
INITIAL   MH$VFRPT(14,3),869   } Initializes matrix used to determine from  387
INITIAL   MH$VFRPT(15,3),1000  } generated aircraft destinations the        388
INITIAL   MH$VFRPT(16,3),174   } aircraft type based on VFR and IFR         389
INITIAL   MH$VFRPT(17-18,3),1000 } conditions.                              390
INITIAL   MH$IFRPT(1-5,1),782  }                                            391
INITIAL   MH$IFRPT(1-5,2),897  }                                            392
INITIAL   MH$IFRPT(1-5,3),996  }                                            393
INITIAL   MH$IFRPT(6,1),30     }                                            394
INITIAL   MH$IFRPT(14,1),2     }                                            395
INITIAL   MH$IFRPT(6,2),111    }                                            396
INITIAL   MH$IFRPT(7,2),2      }                                            397
INITIAL   MH$IFRPT(10,2),190                                                398
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INITIAL    MH$IFRPT(14,2),11                                                    399
INITIAL    MH$IFRPT(18,2),235                                                   400
INITIAL    MH$IFRPT(6,3),947                                                    401
INITIAL    MH$IFRPT(7,3),816                                                    402
INITIAL    MH$IFRPT(8,3),1000    Initializes matrix used to determine from generated  403
INITIAL    MH$IFRPT(9,3),38      aircraft destinations the aircraft type based on     404
INITIAL    MH$IFRPT(10-13,3),1000 VFR and IFR conditions.                           405
INITIAL    MH$IFRPT(14,3),869                                                   406
INITIAL    MH$IFRPT(15,3),1000                                                  407
INITIAL    MH$IFRPT(16,3),174                                                   408
INITIAL    MH$IFRPT(17-18,3),1000                                               409
INITIAL    MH$IFRAC(1,1),297                                                    410
INITIAL    MH$IFRAC(1,2),597                                                    411
INITIAL    MH$IFRAC(1-7,3),847                                                  412
INITIAL    MH$IFRAC(1-7,4),897                                                  413
INITIAL    MH$IFRAC(1-7,5-8),996                                                414
INITIAL    MH$IFRAC(1-7,9-15),997                                               415
INITIAL    MH$IFRAC(1-7,16-17),1000                                             416
INITIAL    MH$IFRAC(2-7,1),299                                                  417
INITIAL    MH$IFRAC(2-7,2),598                                                  418
INITIAL    MH$IFRAC(8,1),260                                                    419
INITIAL    MH$IFRAC(8,2),522                                                    420
INITIAL    MH$IFRAC(8,3),740                                                    421
INITIAL    MH$IFRAC(8,4),784                                                    422
INITIAL    MH$IFRAC(8,5-7),871                                                  423
INITIAL    MH$IFRAC(8,8),954                                                    424
INITIAL    MH$IFRAC(8,9-13),955                                                 425
INITIAL    MH$IFRAC(8,14-15),998                                                426
INITIAL    MH$IFRAC(8,16-17),1000                                               427
INITIAL    MH$IFRAC(9-18,1),251                                                 428
INITIAL    MH$IFRAC(9-18,2),502                                                 429
INITIAL    MH$IFRAC(9,3),711                                                    430
INITIAL    MH$IFRAC(10-18,3),710                                                431
INITIAL    MH$IFRAC(9-18,4),752                                                 432
INITIAL    MH$IFRAC(9-18,5),836                                                 433
INITIAL    MH$IFRAC(9,6),929                                                    434
INITIAL    MH$IFRAC(10-18,6),928                                                435
INITIAL    MH$IFRAC(9-18,7),946                                                 436
INITIAL    MH$IFRAC(9-18,8),947                                                 437
INITIAL    MH$IFRAC(9-18,9),948                                                 438
INITIAL    MH$IFRAC(9,10),954                                                   439
INITIAL    MH$IFRAC(10-18,10),954                                               440
INITIAL    MH$IFRAC(9-18,11-13),955                                             441
INITIAL    MH$IFRAC(9,11),954    Initializes the number of aircraft to generate per  442
INITIAL    MH$IFRAC(9-18,14),996 hour in both IFR and VFR conditions and the aircraft 443
INITIAL    MH$IFRAC(9-18,15),997 destinations.                                    444
INITIAL    MH$IFRAC(9-18,16),998                                                445
INITIAL    MH$IFRAC(9-18,17),999                                                446
INITIAL    MH$IFRAC(19-23,1),258                                                447
INITIAL    MH$IFRAC(19-23,2),516                                                448
INITIAL    MH$IFRAC(19-23,3),731                                                449
INITIAL    MH$IFRAC(19-23,4),774                                                450
INITIAL    MH$IFRAC(19-23,5),860                                                451
INITIAL    MH$IFRAC(19-23,6-8),955                                              452
INITIAL    MH$IFRAC(19-23,9-13),956                                             453
INITIAL    MH$IFRAC(19-24,14-15),998                                            454
INITIAL    MH$IFRAC(19-24,16-17),1000                                           455
INITIAL    MH$IFRAC(24,1),269                                                   456
INITIAL    MH$IFRAC(24,2),538                                                   457
INITIAL    MH$IFRAC(24,3),763                                                   458
INITIAL    MH$IFRAC(24,4),807                                                   459
INITIAL    MH$IFRAC(24,5),897                                                   460
INITIAL    MH$IFRAC(24,6-8),997                                                 461
INITIAL    MH$IFRAC(24,9-13),998                                                462
INITIAL    MH$IFRAC(1,18),3                                                     463
INITIAL    MH$IFRAC(2,18),5                                                     464
INITIAL    MH$IFRAC(3,18),5                                                     465
INITIAL    MH$IFRAC(4,18),7                                                     466
INITIAL    MH$IFRAC(5,18),9                                                     467
INITIAL    MH$IFRAC(6,18),14                                                    468
INITIAL    MH$IFRAC(7,18),20                                                    469
INITIAL    MH$IFRAC(8,18),24                                                    470
INITIAL    MH$IFRAC(9,18),33                                                    471
INITIAL    MH$IFRAC(10,18),32                                                   472
INITIAL    MH$IFRAC(11,18),30                                                   473
INITIAL    MH$IFRAC(12,18),32                                                   474
INITIAL    MH$IFRAC(13,18),37                                                   475
INITIAL    MH$IFRAC(14,18),37                                                   476
INITIAL    MH$IFRAC(15,18),31                                                   477
INITIAL    MH$IFRAC(16,18),43                                                   478
INITIAL    MH$IFRAC(17,18),48                                                   479
INITIAL    MH$IFRAC(18,18),35                                                   480
INITIAL    MH$IFRAC(19,18),43                                                   481
INITIAL    MH$IFRAC(20,18),37                                                   482
INITIAL    MH$IFRAC(21,18),27                                                   483
INITIAL    MH$IFRAC(22,18),20                                                   484
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INITIAL    MH$IFRAC(23,18),6                                                    485
INITIAL    MH$IFRAC(24,18),10                                                   486
INITIAL    MH$VFRAC(1,1),297                                                    487
INITIAL    MH$VFRAC(1,2),597                                                    488
INITIAL    MH$VFRAC(1-7,3),847                                                  489
INITIAL    MH$VFRAC(1-7,4),897                                                  490
INITIAL    MH$VFRAC(1-7,5-8),996                                                491
INITIAL    MH$VFRAC(1-7,9-15),997                                               492
INITIAL    MH$VFRAC(1-7,16-17),1000                                             493
INITIAL    MH$VFRAC(2-7,1),299                                                  494
INITIAL    MH$VFRAC(2-7,2),598                                                  495
INITIAL    MH$VFRAC(8,1),260                                                    496
INITIAL    MH$VFRAC(8,2),522                                                    497
INITIAL    MH$VFRAC(8,3),740                                                    498
INITIAL    MH$VFRAC(8,4),784                                                    499
INITIAL    MH$VFRAC(8,5-7),871                                                  500
INITIAL    MH$VFRAC(8,8),954                                                    501
INITIAL    MH$VFRAC(8,9-13),955                                                 502
INITIAL    MH$VFRAC(8,14-15),998                                                503
INITIAL    MH$VFRAC(8,16-17),1000                                               504
INITIAL    MH$VFRAC(9-18,1),251                                                 505
INITIAL    MH$VFRAC(9-18,2),502                                                 506
INITIAL    MH$VFRAC(9,3),711                                                    507
INITIAL    MH$VFRAC(10-18,3),710                                                508
INITIAL    MH$VFRAC(9-18,4),752                                                 509
INITIAL    MH$VFRAC(9-18,5),836                                                 510
INITIAL    MH$VFRAC(9,6),929                                                    511
INITIAL    MH$VFRAC(10-18,6),928                                                512
INITIAL    MH$VFRAC(9-18,7),946                                                 513
INITIAL    MH$VFRAC(9-18,8),947                                                 514
INITIAL    MH$VFRAC(9-18,9),948                                                 515
INITIAL    MH$VFRAC(9,10),954                                                   516
INITIAL    MH$VFRAC(10-18,10),954                                               517
INITIAL    MH$VFRAC(9-18,11-13),955                                             518
INITIAL    MH$VFRAC(9,11),954                                                   519
INITIAL    MH$VFRAC(9-18,14),996                                                520
INITIAL    MH$VFRAC(9-18,15),997                                                521
INITIAL    MH$VFRAC(9-18,16),998                                                522
INITIAL    MH$VFRAC(9-18,17),999                                                523
INITIAL    MH$VFRAC(19-23,1),258                                                524
INITIAL    MH$VFRAC(19-23,2),516                                                525
INITIAL    MH$VFRAC(19-23,3),731                                                526
INITIAL    MH$VFRAC(19-23,4),774                                                527
INITIAL    MH$VFRAC(19-23,5),860                                                528
INITIAL    MH$VFRAC(19-23,6-8),955                                              529
INITIAL    MH$VFRAC(19-23,9-13),956                                             530
INITIAL    MH$VFRAC(19-24,14-15),998                                            531
INITIAL    MH$VFRAC(19-24,16-17),1000                                           532
INITIAL    MH$VFRAC(24,1),269                                                   533
INITIAL    MH$VFRAC(24,2),538                                                   534
INITIAL    MH$VFRAC(24,3),763                                                   535
INITIAL    MH$VFRAC(24,4),807                                                   536
INITIAL    MH$VFRAC(24,5),897                                                   537
INITIAL    MH$VFRAC(24,6-8),997                                                 538
INITIAL    MH$VFRAC(24,9-13),998                                                539
INITIAL    MH$VFRAC(1,18),7                                                     540
INITIAL    MH$VFRAC(2,18),6                                                     541
INITIAL    MH$VFRAC(3,18),6                                                     542
INITIAL    MH$VFRAC(4,18),8                                                     543
INITIAL    MH$VFRAC(5,18),11      } Initializes the number of aircraft to       544
INITIAL    MH$VFRAC(6,18),17      } generate per hour in both IFR and VFR       545
INITIAL    MH$VFRAC(7,18),25      } conditions and the aircraft destinations.   546
INITIAL    MH$VFRAC(8,18),30                                                    547
INITIAL    MH$VFRAC(9,18),41                                                    548
INITIAL    MH$VFRAC(10,18),40                                                   549
INITIAL    MH$VFRAC(11,18),39                                                   550
INITIAL    MH$VFRAC(12,18),40                                                   551
INITIAL    MH$VFRAC(13,18),46                                                   552
INITIAL    MH$VFRAC(14,18),46                                                   553
INITIAL    MH$VFRAC(15,18),40                                                   554
INITIAL    MH$VFRAC(16,18),53                                                   555
INITIAL    MH$VFRAC(17,18),60                                                   556
INITIAL    MH$VFRAC(18,18),43                                                   557
INITIAL    MH$VFRAC(19,18),53                                                   558
INITIAL    MH$VFRAC(20,18),46                                                   559
INITIAL    MH$VFRAC(21,18),33                                                   560
INITIAL    MH$VFRAC(22,18),26                                                   561
INITIAL    MH$VFRAC(23,18),7                                                    562
INITIAL    MH$VFRAC(24,18),12                                                   563
INITIAL    MH$ARSEP(1-8,1),37                                                   564
INITIAL    MH$ARSEP(1-4,2),39     } Initializes the separation matrix used      565
INITIAL    MH$ARSEP(9-12,2),39    } to determine, for equipment outages,        566
INITIAL    MH$ARSEP(1-2,3),40     } the separation between aircraft and the     567
INITIAL    MH$ARSEP(5-6,3),40     } maximum number of aircraft under air        568
INITIAL    MH$ARSEP(9-10,3),40    } control.                                    569
INITIAL    MH$ARSEP(13,3),40                                                    570
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INITIAL   MH$ARSEP(15,3),40                                          571
INITIAL   MH$ARSEP(1,4),38                                           572
INITIAL   MH$ARSEP(3,4),38                                           573
INITIAL   MH$ARSEP(5,4),38                                           574
INITIAL   MH$ARSEP(7,4),38                                           575
INITIAL   MH$ARSEP(9,4),38                                           576
INITIAL   MH$ARSEP(11,4),38                                          577
INITIAL   MH$ARSEP(13,4),38                                          578
INITIAL   MH$ARSEP(14,4),38                                          579
INITIAL   MH$ARSEP(1-10,5),3                                         580
INITIAL   MH$ARSEP(5-8,5),4                                          581
INITIAL   MH$ARSEP(11-14,5),5                                        582
INITIAL   MH$ARSEP(15,5),12                                          583
INITIAL   MH$ARSEP(16,5),12                                          584
INITIAL   MH$ARSEP(1-4,6),1                                          585
INITIAL   MH$ARSEP(9-10,6),1                                         586
INITIAL   MH$ARSEP(1-4,7),2                                          587
INITIAL   MH$ARSEP(5-8,7),1                                          588
INITIAL   MH$ARSEP(9-10,7),2                                         589
INITIAL   MH$ARSEP(1-4,8),3                                          590
INITIAL   MH$ARSEP(5-8,8),2                                          591
INITIAL   MH$ARSEP(9-10,8),3                                         592
INITIAL   MH$ARSEP(11-16,8),1   Initializes the separation matrix    593
INITIAL   MH$ARSEP(1-4,10),1    used to determine, for equipment     594
INITIAL   MH$ARSEP(9-10,10),1   outages, the separation between      595
INITIAL   MH$ARSEP(1-12,11),16  aircraft and the maximum number      596
INITIAL   MH$ARSEP(1-2,11),20   of aircraft under air control.       597
INITIAL   MH$ARSEP(5-6,11),10                                        598
INITIAL   MH$ARSEP(7-8,11),12                                        599
INITIAL   MH$ARSEP(9-10,11),20                                       600
INITIAL   MH$ARSEP(13,11),10                                         601
INITIAL   MH$ARSEP(14,11),8                                          602
INITIAL   MH$ARSEP(15,11),10                                         603
INITIAL   MH$ARSEP(16,11),8                                          604
INITIAL   MH01(1,1),360                                              605
INITIAL   MH01(1,2),7                                                606
INITIAL   MH01(1,3),1                                                607
INITIAL   MH01(1,4-11),1000                                          608
INITIAL   MH01(1,12),2                                               609
INITIAL   MH01(1,13),3                                               610
INITIAL   MH01(2,2),96                                               611
INITIAL   MH01(2,3),58                                               612
INITIAL   MH01(2,4),61                                               613
INITIAL   MH01(2,5),7                                                614
INITIAL   MH01(2,6),576                                              615
INITIAL   MH01(2,7),448                                              616
INITIAL   MH01(2,8),839                                              617
INITIAL   MH01(2,9),777                                              618
INITIAL   MH01(2,10),1000                                            619
INITIAL   MH01(2,10),1000                                            620
INITIAL   MH01(2,11),990                                             621
INITIAL   MH01(2,12),4                                               622
INITIAL   MH01(2,13),5          Initializes weather matrix to        623
INITIAL   MH01(3,1),22          determine wind direction and         624
INITIAL   MH01(3,2),128         velocity. Also directs which         625
INITIAL   MH01(3,3),85          ceiling and visibility matrix        626
INITIAL   MH01(3,4),152         to calculate ceiling and             627
INITIAL   MH01(3,5),76          visibility.                          628
INITIAL   MH01(3,6),704                                              629
INITIAL   MH01(3,7),510                                              630
INITIAL   MH01(3,8),891                                              631
INITIAL   MH01(3,9),753                                              632
INITIAL   MH01(3,10),996                                             633
INITIAL   MH01(3,11),995                                             634
INITIAL   MH01(3,12),6                                               635
INITIAL   MH01(3,13),7                                               636
INITIAL   MH01(4,1),45                                               637
INITIAL   MH01(4,2),163                                              638
INITIAL   MH01(4,3),118                                              639
INITIAL   MH01(4,4),113                                              640
INITIAL   MH01(4,5),29                                               641
INITIAL   MH01(4,6),510                                              642
INITIAL   MH01(4,7),324                                              643
INITIAL   MH01(4,8),755                                              644
INITIAL   MH01(4,9),639                                              645
INITIAL   MH01(4,10),981                                             646
INITIAL   MH01(4,11),979                                             647
INITIAL   MH01(4,12),8                                               648
INITIAL   MH01(4,13),9                                               649
INITIAL   MH01(5,1),67                                               650
INITIAL   MH01(5,2),198                                              651
INITIAL   MH01(5,3),169                                              652
INITIAL   MH01(5,4),82                                               653
INITIAL   MH01(5,5),41                                               654
INITIAL   MH01(5,6),494                                              655
INITIAL   MH01(5,5),441                                              656
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INITIAL    MH01(5,8),724
INITIAL    MH01(5,9),770
INITIAL    MH01(5,10),981
INITIAL    MH01(5,11),992
INITIAL    MH01(5,12),10
INITIAL    MH01(5,13),11
INITIAL    MH01(6,1),90
INITIAL    MH01(6,2),232
INITIAL    MH01(6,3),263
INITIAL    MH01(6,4),167
INITIAL    MH01(6,5),49
INITIAL    MH01(6,6),642
INITIAL    MH01(6,7),431
INITIAL    MH01(6,8),776
INITIAL    MH01(6,9),820
INITIAL    MH01(6,10),976
INITIAL    MH01(6,11),996
INITIAL    MH01(6,12),12
INITIAL    MH01(6,13),13
INITIAL    MH01(7,1),112
INITIAL    MH01(7,2),254
INITIAL    MH01(7,3),348
INITIAL    MH01(7,4),207
INITIAL    MH01(7,5),47
INITIAL    MH01(7,6),671
INITIAL    MH01(6,7),437
INITIAL    MH01(7,8),866
INITIAL    MH01(7,9),804
INITIAL    MH01(7,10),994
INITIAL    MH01(7,11),1000
INITIAL    MH01(7,12),14
INITIAL    MH01(7,13),15
INITIAL    MH01(8,1),135
INITIAL    MH01(8,2),272
INITIAL    MH01(8,3),398
INITIAL    MH01(8,4),237
INITIAL    MH01(8,5),66
INITIAL    MH01(8,6),777
INITIAL    MH01(8,7),680
INITIAL    MH01(8,8),935
INITIAL    MH01(8,9),962
INITIAL    MH01(8,10),993
INITIAL    MH01(8,11),995
INITIAL    MH01(8,12),16
INITIAL    MH01(8,13),17
INITIAL    MH01(9,1),157
INITIAL    MH01(9,2),296
INITIAL    MH01(9,3),425
INITIAL    MH01(9,4),153
INITIAL    MH01(9,5),101
INITIAL    MH01(9,6),736
INITIAL    MH01(9,7),641
INITIAL    MH01(9,8),939
INITIAL    MH01(9,9),924
INITIAL    MH01(9,10),1000
INITIAL    MH01(9,11),995
INITIAL    MH01(9,12),18
INITIAL    MH01(9,13),19
INITIAL    MH01(10,1),180
INITIAL    MH01(10,2),365
INITIAL    MH01(10,3),489
INITIAL    MH01(10,4),109
INITIAL    MH01(10,5),53
INITIAL    MH01(10,6),757
INITIAL    MH01(10,7),456
INITIAL    MH01(10,8),949
INITIAL    MH01(10,9),803
INITIAL    MH01(10,10),1000
INITIAL    MH01(10,11),985
INITIAL    MH01(10,12),20
INITIAL    MH01(10,13),21
INITIAL    MH01(11,1),202
INITIAL    MH01(11,2),424
INITIAL    MH01(11,3),550
INITIAL    MH01(11,4),58
INITIAL    MH01(11,5),20
INITIAL    MH01(11,6),569
INITIAL    MH01(11,7),211
INITIAL    MH01(11,8),845
INITIAL    MH01(11,9),602
INITIAL    MH01(11,10),1000
INITIAL    MH01(11,11),998
INITIAL    MH01(11,12),22
INITIAL    MH01(11,13),23
INITIAL    MH01(12,1),225
INITIAL    MH01(12,2),496
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Initializes weather matrix to determine wind direction and velocity. Also directs which ceiling and visibility matrix to calculate ceiling and visibility.

(continued)

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INITIAL    MH01(12,3),591
INITIAL    MH01(12,4),48
INITIAL    MH01(12,5),17
INITIAL    MH01(12,6),479
INITIAL    MH01(12,7),195
INITIAL    MH01(12,8),779
INITIAL    MH01(12,9),510
INITIAL    MH01(12,10),998
INITIAL    MH01(12,11),1000
INITIAL    MH01(12,12),24
INITIAL    MH01(12,13),25
INITIAL    MH01(13,1),247
INITIAL    MH01(13,2),616
INITIAL    MH01(13,3),663
INITIAL    MH01(13,4),19
INITIAL    MH01(13,5),15
INITIAL    MH01(13,6),439
INITIAL    MH01(13,7),302
INITIAL    MH01(13,8),827
INITIAL    MH01(13,9),645
INITIAL    MH01(13,10),999
INITIAL    MH01(13,11),992
INITIAL    MH01(13,12),26
INITIAL    MH01(13,13),27
INITIAL    MH01(14,1),270
INITIAL    MH01(14,2),776
INITIAL    MH01(14,3),777
INITIAL    MH01(14,4),69
INITIAL    MH01(14,5),14
INITIAL    MH01(14,6),312
INITIAL    MH01(14,7),211
INITIAL    MH01(14,8),651
INITIAL    MH01(14,9),498
INITIAL    MH01(14,10),990
INITIAL    MH01(14,11),966
INITIAL    MH01(14,12),28
INITIAL    MH01(14,13),29
INITIAL    MH01(15,1),292
INITIAL    MH01(15,2),836
INITIAL    MH01(15,3),874
INITIAL    MH01(15,4),33
INITIAL    MH01(15,5),101
INITIAL    MH01(15,6),295
INITIAL    MH01(15,7),184
INITIAL    MH01(15,8),649
INITIAL    MH01(15,9),439
INITIAL    MH01(15,10),974
INITIAL    MH01(15,11),977
INITIAL    MH01(15,12),30
INITIAL    MH01(15,13),31
INITIAL    MH01(16,1),315
INITIAL    MH01(16,2),937
INITIAL    MH01(16,3),958
INITIAL    MH01(16,4),26
INITIAL    MH01(16,5),20
INITIAL    MH01(16,6),396
INITIAL    MH01(16,7),225
INITIAL    MH01(16,8),734
INITIAL    MH01(16,9),554
INITIAL    MH01(16,10),996
INITIAL    MH01(16,11),993
INITIAL    MH01(16,12),32
INITIAL    MH01(16,13),33
INITIAL    MH01(17,1),337
INITIAL    MH01(17,2),1000
INITIAL    MH01(17,3),1000
INITIAL    MH01(17,4),30
INITIAL    MH01(17,5),13
INITIAL    MH01(17,6),413
INITIAL    MH01(17,7),835
INITIAL    MH01(17,8),835
INITIAL    MH01(17,9),658
INITIAL    MH01(17,10),1000
INITIAL    MH01(17,11),1000
INITIAL    MH01(17,12),34
INITIAL    MH01(17,13),35
INITIAL    MH2(1,1-2),857
INITIAL    MH2(2,1-2),877
INITIAL    MH2(3,1-2),918
INITIAL    MH2(4,1-2),938
INITIAL    MH2(5-6,1-2),979
INITIAL    MH3(1,1-2),24
INITIAL    MH3(2,1-2),48
INITIAL    MH3(3,1-2),48
INITIAL    MH3(4,1-2),72
INITIAL    MH3(5,1-2),119
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Initializes weather matrix to determine wind direction and velocity. Also directs which ceiling and visibility matrix to calculate ceiling and visibility.

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

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INITIAL    MH3(6,1-2),143
INITIAL    MH3(6,5-10),1000
INITIAL    MH3(4-5,7-10),1000
INITIAL    MH3(1-3,9-10),500
INITIAL    MH3(1-6,13-14),1000
INITIAL    MH4(1,1),825
INITIAL    MH4(1,2),733
INITIAL    MH4(1,3),798
INITIAL    MH4(1,4),841
INITIAL    MH4(1,5),762
INITIAL    MH4(1,6),752
INITIAL    MH4(1,7),714
INITIAL    MH4(1,8),640
INITIAL    MH4(1-6,9),1000
INITIAL    MH4(2,1),850
INITIAL    MH4(2,2),800
INITIAL    MH4(2,3),857
INITIAL    MH4(2,4),911
INITIAL    MH4(2,5),878
INITIAL    MH4(2,6),883
INITIAL    MH4(2,7),876
INITIAL    MH4(2,8),820
INITIAL    MH4(2-3,10),750
INITIAL    MH4(3,1),850
INITIAL    MH4(3,2),833
INITIAL    MH4(3,3),881
INITIAL    MH4(3,4),943
INITIAL    MH4(3,5),901
INITIAL    MH4(3,6),905
INITIAL    MH4(3,7),933
INITIAL    MH4(3,8),910
INITIAL    MH4(4,1),850
INITIAL    MH4(4,2),866
INITIAL    MH4(4,3),914
INITIAL    MH4(4,4),956
INITIAL    MH4(4,5),948
INITIAL    MH4(4,6),956
INITIAL    MH4(4,7),962
INITIAL    MH4(4,8),944
INITIAL    MH4(4-6,10),1000
INITIAL    MH4(5,1),875
INITIAL    MH4(5,2),900
INITIAL    MH4(5,3),950
INITIAL    MH4(5,4),981
INITIAL    MH4(5,5),977
INITIAL    MH4(5,6),992
INITIAL    MH4(5,7),991
INITIAL    MH4(5,8),989
INITIAL    MH4(6,1),950
INITIAL    MH4(6,2),967
INITIAL    MH4(6,3),977
INITIAL    MH4(6,4),981
INITIAL    MH4(6,5),994
INITIAL    MH4(6,6-7),1000
INITIAL    MH4(6,8),989
INITIAL    MH5(1,8),71
INITIAL    MH5(1,11),63
INITIAL    MH5(1,13),455
INITIAL    MH5(1,14),400
INITIAL    MH5(2,1),2
INITIAL    MH5(2,4),60
INITIAL    MH5(2,6),59
INITIAL    MH5(2,8),143
INITIAL    MH5(2,11),313
INITIAL    MH5(2,12),333
INITIAL    MH5(2,13),728
INITIAL    MH5(2,14),600
INITIAL    MH5(3,1),2
INITIAL    MH5(3,3),17
INITIAL    MH5(3,4),80
INITIAL    MH5(3,5),56
INITIAL    MH5(3,6),118
INITIAL    MH5(3,7),91
INITIAL    MH5(3,8),143
INITIAL    MH5(3,9),48
INITIAL    MH5(3,10),71
INITIAL    MH5(3,11),501
INITIAL    MH5(3,12),333
INITIAL    MH5(3,13),815
INITIAL    MH5(3,14),800
INITIAL    MH5(4,1),6
INITIAL    MH5(4,2),6
INITIAL    MH5(4,3),51
INITIAL    MH5(4,4),120
INITIAL    MH5(4,5),111
INITIAL    MH5(4,6),176
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Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

AD-A058 984 ARINC RESEARCH CORP ANNAPOLIS MD F/G 1/5
USER DELAY COST MODEL AND FACILITIES MAINTENANCE COST MODEL FOR--ETC(U)
MAY 78 L B GREENE, J WITT DOT-TSC-1173-2
UNCLASSIFIED FAA-AAF-220-78-01-2 NL

2 OF 3
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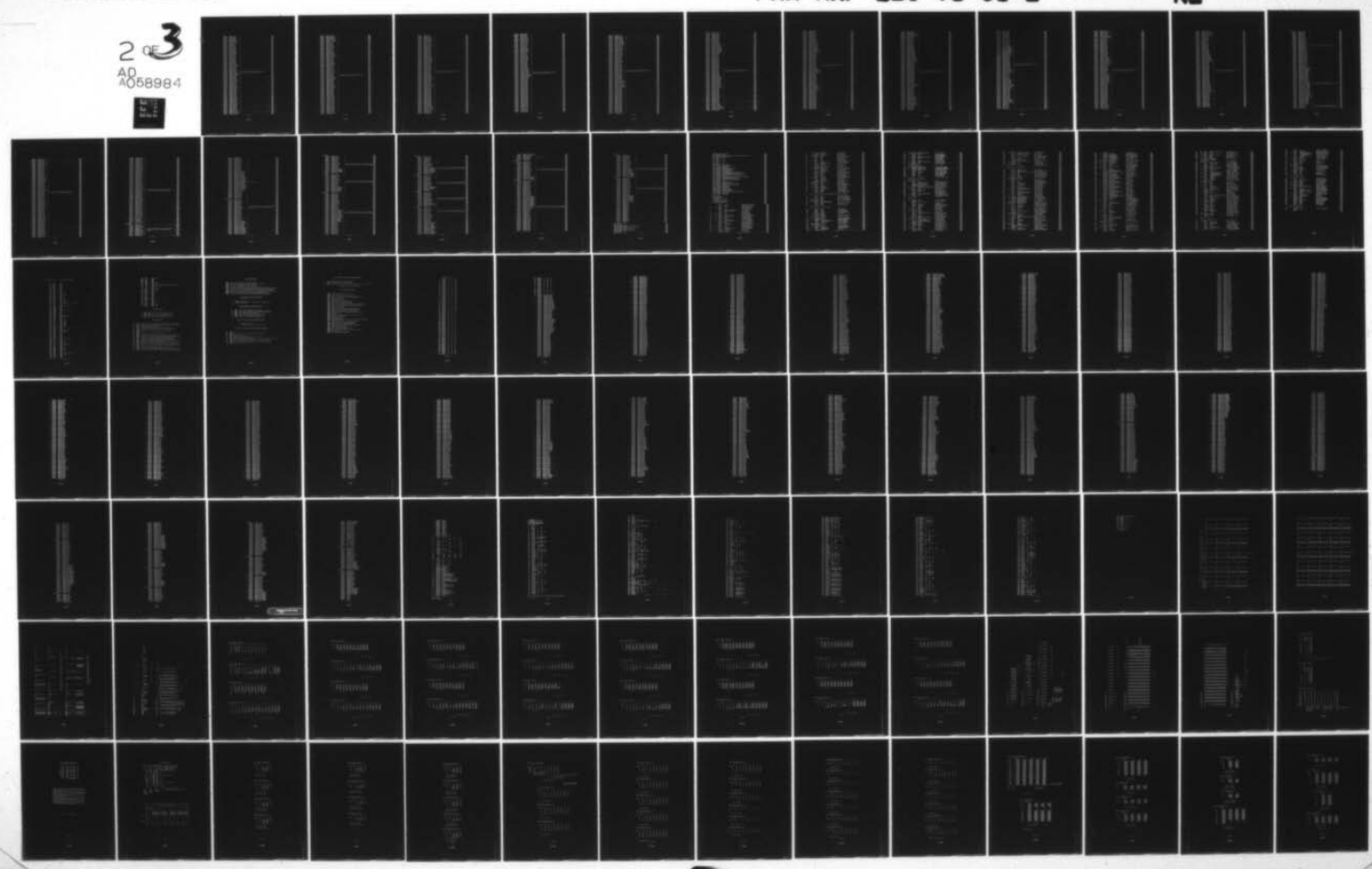

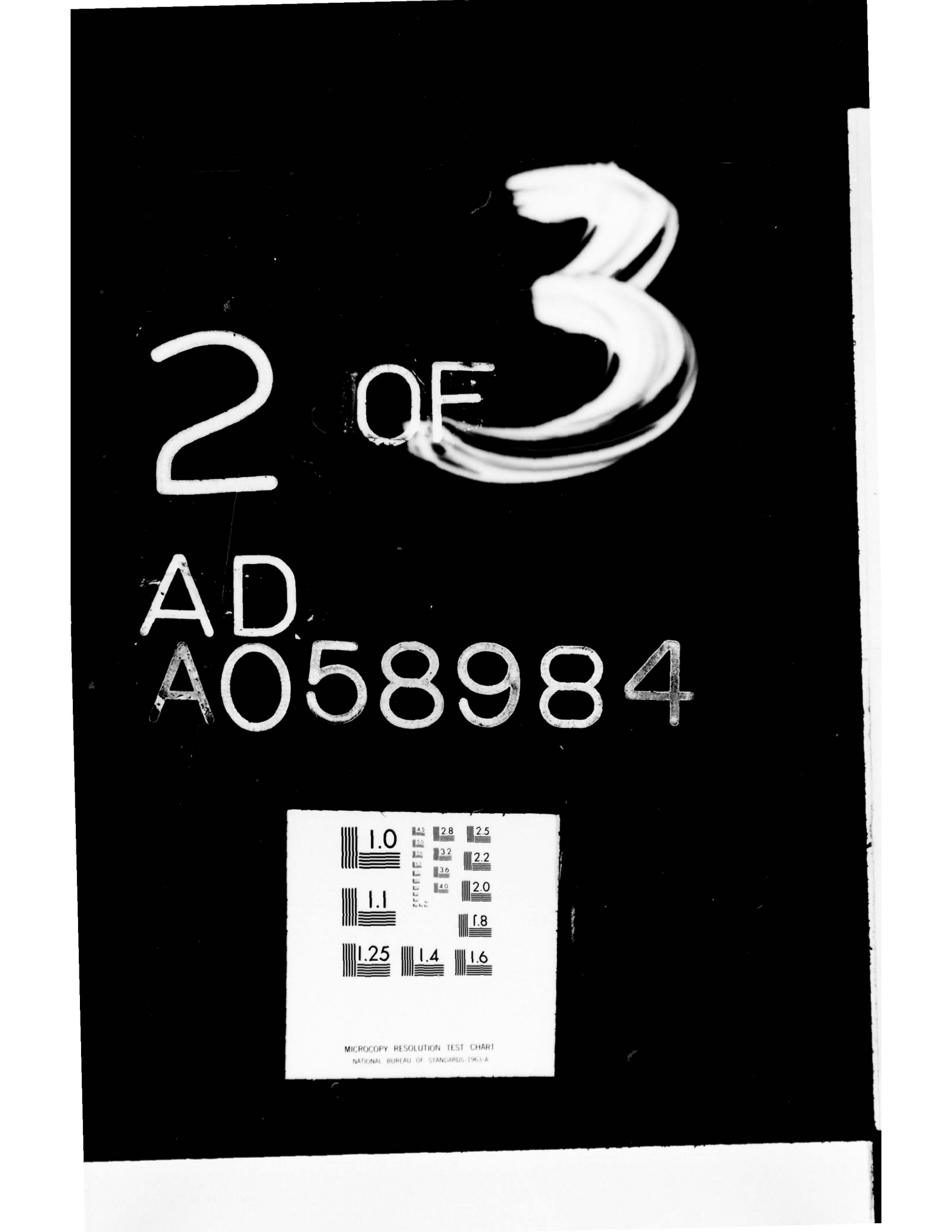
2 OF 3
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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INITIAL    MH5(4,7),136
INITIAL    MH5(4,8),143
INITIAL    MH5(4,9),238
INITIAL    MH5(4,10),286
INITIAL    MH5(4,11),564
INITIAL    MH5(4,12),333
INITIAL    MH5(4,13),910
INITIAL    MH5(4-6,14),1000
INITIAL    MH5(5,1),6
INITIAL    MH5(5,2),13
INITIAL    MH5(5,3),85
INITIAL    MH5(5,4),200
INITIAL    MH5(5,5),222
INITIAL    MH5(5,6),294
INITIAL    MH5(5,7),227
INITIAL    MH5(5,8),214
INITIAL    MH5(5,9),381
INITIAL    MH5(5,10),500
INITIAL    MH5(5,11),814
INITIAL    MH5(5,12),667
INITIAL    MH5(5,13),910
INITIAL    MH5(6,1),12
INITIAL    MH5(6,2),16
INITIAL    MH5(6,3),171
INITIAL    MH5(6,4),260
INITIAL    MH5(6,5),389
INITIAL    MH5(6,6),412
INITIAL    MH5(6,7),485
INITIAL    MH5(6,8),429
INITIAL    MH5(6,9),810
INITIAL    MH5(6,10),500
INITIAL    MH5(6,11),877
INITIAL    MH5(6,12-13),1000
INITIAL    MH06(1-2,1),771
INITIAL    MH06(1,2),867
INITIAL    MH06(1,3),638
INITIAL    MH06(1,4),744
INITIAL    MH06(1,5),628
INITIAL    MH06(1,6),553
INITIAL    MH06(1,7),625
INITIAL    MH06(1,8),813
INITIAL    MH06(1-6,9-10),1000
INITIAL    MH06(2-3,2),933
INITIAL    MH06(2,3),732
INITIAL    MH06(2,4),849
INITIAL    MH06(2,5),857
INITIAL    MH06(2,6),766
INITIAL    MH06(2,7),750
INITIAL    MH06(2,8),983
INITIAL    MH06(3-4,1),800
INITIAL    MH06(3,3),764
INITIAL    MH06(3,4),860
INITIAL    MH06(3,5),884
INITIAL    MH06(3,6),809
INITIAL    MH06(3,7),72
INITIAL    MH06(3,8),938
INITIAL    MH06(4-6,2),1000
INITIAL    MH06(4,3),795
INITIAL    MH06(4,4),884
INITIAL    MH06(4,5),907
INITIAL    MH06(4,6),894
INITIAL    MH06(4,7),875
INITIAL    MH06(4,8),979
INITIAL    MH06(5,1),829
INITIAL    MH06(5,3),874
INITIAL    MH06(5,4),953
INITIAL    MH06(5,5),977
INITIAL    MH06(5,6),979
INITIAL    MH06(5,7),958
INITIAL    MH06(5-6,8),1000
INITIAL    MH06(6,1),914
INITIAL    MH06(6,3),939
INITIAL    MH06(6,4),977
INITIAL    MH06(6,5-7),1000
INITIAL    MH07(1,8),250
INITIAL    MH07(1,11),231
INITIAL    MH07(1,13),545
INITIAL    MH07(1,14),500
INITIAL    MH07(2-5,2),7
INITIAL    MH07(2,8),375
INITIAL    MH07(2,11),385
INITIAL    MH07(2,12),333
INITIAL    MH07(2,13),818
INITIAL    MH07(2-6,14),1000
INITIAL    MH07(3-5,6),167
INITIAL    MH07(3-4,8),500
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Initializes the ceiling and visibility matrixes for various wind directions and velocities.

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(continued)

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INITIAL  MH07(3-4,9),63                                                    1001
INITIAL  MH07(3-4,11),462                                                  1002
INITIAL  MH07(3,12),667                                                    1003
INITIAL  MH07(3,13),818                                                    1004
INITIAL  MH07(4-5,10),273                                                  1005
INITIAL  MH07(4-6,12),1000                                                 1006
INITIAL  MH07(4-5,13),909                                                  1007
INITIAL  MH07(5,1),13                                                      1008
INITIAL  MH07(5,3),40                                                      1009
INITIAL  MH07(5,4),37                                                      1010
INITIAL  MH07(5,5),125                                                     1011
INITIAL  MH07(5,8),625                                                     1012
INITIAL  MH07(5,9),188                                                     1013
INITIAL  MH07(5,11),846                                                    1014
INITIAL  MH07(6,1),20                                                      1015
INITIAL  MH07(6,2),14                                                      1016
INITIAL  MH07(6,3),120                                                     1017
INITIAL  MH07(6,4),74                                                      1018
INITIAL  MH07(6,5-6),500                                                   1019
INITIAL  MH07(6,8),750                                                     1020
INITIAL  MH07(6,9),688                                                     1021
INITIAL  MH07(6,10),909                                                    1022
INITIAL  MH07(6,11-13),1000                                                1023
INITIAL  MH08(1,1),793                                                     1024
INITIAL  MH08(1-4,2),857                                                   1025
INITIAL  MH08(1,3),549                                                     1026
INITIAL  MH08(1,4),629                                                     1027
INITIAL  MH08(1,5),492                                                     1028
INITIAL  MH08(1,6),547                                                     1029
INITIAL  MH08(1,7),586                                                     1030
INITIAL  MH08(1,8),593                                                     1031
INITIAL  MH08(1,9-10),200                                                  1032
INITIAL  MH08(2-3,1),862                                                   1033
INITIAL  MH08(2,3),637                                                     1034
INITIAL  MH08(2,4),743                                                     1035
INITIAL  MH08(2,5),651                                                     1036
INITIAL  MH08(2,6),693                                                     1037
INITIAL  MH08(2,7),776                                                     1038
INITIAL  MH08(2,8),765                                                     1039
INITIAL  MH08(2,9-10),800                                                  1040
INITIAL  MH08(3,3),725                                                     1041
INITIAL  MH08(3,4),757                                                     1042
INITIAL  MH08(3,5),762                                                     1043
INITIAL  MH08(3,6),747   } Initializes the ceiling and visibility matrixes for 1044
INITIAL  MH08(3,7),810   } various wind directions and velocities.         1045
INITIAL  MH08(3,8),852                                                     1046
INITIAL  MH08(3-5,9),800                                                   1047
INITIAL  MH08(3-6,10),1000                                                 1048
INITIAL  MH08(4,1),897                                                     1049
INITIAL  MH08(4,3),775                                                     1050
INITIAL  MH08(4,4),814                                                     1051
INITIAL  MH08(4,5),794                                                     1052
INITIAL  MH08(4,6),800                                                     1053
INITIAL  MH08(4,7),879                                                     1054
INITIAL  MH08(4,8),963                                                     1055
INITIAL  MH08(5-6,1),931                                                   1056
INITIAL  MH08(5-6,2),1000                                                  1057
INITIAL  MH08(5,3),804                                                     1058
INITIAL  MH08(5,4),857                                                     1059
INITIAL  MH08(5,5),873                                                     1060
INITIAL  MH08(5,6),893                                                     1061
INITIAL  MH08(5,7),914                                                     1062
INITIAL  MH08(5,8),975                                                     1063
INITIAL  MH08(6,3),902                                                     1064
INITIAL  MH08(6,4),943                                                     1065
INITIAL  MH08(6,5),1000                                                    1066
INITIAL  MH08(6,6),960                                                     1067
INITIAL  MH08(6,7),966                                                     1068
INITIAL  MH08(6,8-9),1000                                                  1069
INITIAL  MH09(1-4,2),7                                                     1070
INITIAL  MH09(1-5,5),56                                                    1071
INITIAL  MH09(1-5,9),91                                                    1072
INITIAL  MH09(1,11),182                                                    1073
INITIAL  MH09(1,13),357                                                    1074
INITIAL  MH09(1,14),714                                                    1075
INITIAL  MH09(2-5,3),57                                                    1076
INITIAL  MH09(2-3,8),59                                                    1077
INITIAL  MH09(2,11),273                                                    1078
INITIAL  MH09(2,12),154                                                    1079
INITIAL  MH09(2,13),643                                                    1080
INITIAL  MH09(2-5,14),857                                                  1081
INITIAL  MH09(3-5,1),7                                                     1082
INITIAL  MH09(3,10),83                                                     1083
INITIAL  MH09(3,11),409                                                    1084
INITIAL  MH09(3,12),385                                                    1085
INITIAL  MH09(3,13),714                                                    1086
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INITIAL    MH09(4,4),54
INITIAL    MH09(4,6),83
INITIAL    MH09(4,7),167
INITIAL    MH09(4,8),176
INITIAL    MH09(4,10),167
INITIAL    MH09(4,11),500
INITIAL    MH09(4,12),538
INITIAL    MH09(4-6,13),929
INITIAL    MH09(5,2),29
INITIAL    MH09(5,4),81
INITIAL    MH09(5,6-7),250
INITIAL    MH09(5,8),294
INITIAL    MH09(5,10),417
INITIAL    MH09(5,11),545
INITIAL    MH09(5,12),769
INITIAL    MH09(6,1),21
INITIAL    MH09(6,2),36
INITIAL    MH09(6,3),200
INITIAL    MH09(6,4),270
INITIAL    MH09(6,5),222
INITIAL    MH09(6,6),583
INITIAL    MH09(6,7),333
INITIAL    MH09(6,8),647
INITIAL    MH09(6,9),455
INITIAL    MH09(6,10),750
INITIAL    MH09(6,11),773
INITIAL    MH09(6,12),846
INITIAL    MH09(6,14),1000
INITIAL    MH10(1,1),762
INITIAL    MH10(1-2,2),800
INITIAL    MH10(1,3),575
INITIAL    MH10(1,4),764
INITIAL    MH10(1,5),644
INITIAL    MH10(1,6),844
INITIAL    MH10(1,7),576
INITIAL    MH10(1,8),695
INITIAL    MH10(1,9),200
INITIAL    MH10(1,10),333
INITIAL    MH10(2,1),857
INITIAL    MH10(2,2),613
INITIAL    MH10(2,4),831
INITIAL    MH10(2,5),763
INITIAL    MH10(2,6),877
INITIAL    MH10(2,7),833
INITIAL    MH10(2,8),829
INITIAL    MH10(2,9),800
INITIAL    MH10(2,10),667
INITIAL    MH10(3-5,1),905
INITIAL    MH10(3-5,2),933
INITIAL    MH10(3,3),689
INITIAL    MH10(3,4),872
INITIAL    MH10(3,5),780
INITIAL    MH10(3,6),902
INITIAL    MH10(3,7),879
INITIAL    MH10(3,8),878
INITIAL    MH10(3-6,9-10),1000
INITIAL    MH10(4,3),755
INITIAL    MH10(4,4),905
INITIAL    MH10(4,5),831
INITIAL    MH10(4,6),918
INITIAL    MH10(4,7),924
INITIAL    MH10(4,8),951
INITIAL    MH10(5,3),783
INITIAL    MH10(5,4),939
INITIAL    MH10(5,5),898
INITIAL    MH10(5,6),959
INITIAL    MH10(5,7),955
INITIAL    MH10(5,8),988
INITIAL    MH10(6,1),952
INITIAL    MH10(6,2),1000
INITIAL    MH10(6,3),906
INITIAL    MH10(6,4),986
INITIAL    MH10(6,5),949
INITIAL    MH10(6,6),984
INITIAL    MH10(6,7),985
INITIAL    MH10(6,8),1000
INITIAL    MH11(2-3,3),30
INITIAL    MH11(3-5,4),115
INITIAL    MH11(4-5,8),77
INITIAL    MH11(2-4,9),111
INITIAL    MH11(2-3,13),733
INITIAL    MH11(4-6,13),1000
INITIAL    MH11(1,2),3
INITIAL    MH11(1,7),77
INITIAL    MH11(1,10),154
INITIAL    MH11(1,11),105
```

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

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(continued)

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INITIAL    MM11(1,12),83
INITIAL    MM11(1,13),667
INITIAL    MM11(2,2),10
INITIAL    MM11(2,4),77
INITIAL    MM11(2,7),154
INITIAL    MM11(2,10),308
INITIAL    MM11(2,11),263
INITIAL    MM11(2,12),250
INITIAL    MM11(3,2),17
INITIAL    MM11(3,7),231
INITIAL    MM11(3,10),385
INITIAL    MM11(3,11),526
INITIAL    MM11(3,12),417
INITIAL    MM11(4,2),24
INITIAL    MM11(4,3),61
INITIAL    MM11(4,6),63
INITIAL    MM11(4,7),308
INITIAL    MM11(4,10),538
INITIAL    MM11(4,11),632
INITIAL    MM11(4,12),500
INITIAL    MM11(5,1),19
INITIAL    MM11(5,2),31
INITIAL    MM11(5,3),182
INITIAL    MM11(5,6),125
INITIAL    MM11(5,7),385
INITIAL    MM11(5,9),444
INITIAL    MM11(5,10),769
INITIAL    MM11(5,11),789
INITIAL    MM11(5,12),750
INITIAL    MM11(6,1),39
INITIAL    MM11(6,2),49
INITIAL    MM11(6,3),303
INITIAL    MM11(6,4),221
INITIAL    MM11(6,5),71
INITIAL    MM11(6,6),500
INITIAL    MM11(6,7),462
INITIAL    MM11(6,8),692
INITIAL    MM11(6,9),667
INITIAL    MM11(6,10),846
INITIAL    MM11(6,11),947
INITIAL    MM11(6,12),833
INITIAL    MM12(3-4,1),854
INITIAL    MM12(3-4,2),882
INITIAL    MM12(2-3,4),916
INITIAL    MM12(4-5,6),959
INITIAL    MM12(5-6,7-10),1000
INITIAL    MM12(1-4,9),1000
INITIAL    MM12(1-3,10),333
INITIAL    MM12(1,1),756
INITIAL    MM12(1,2),676
INITIAL    MM12(1,3),650
INITIAL    MM12(1,4),885
INITIAL    MM12(1,5),394
INITIAL    MM12(1,6),891
INITIAL    MM12(1,7),531
INITIAL    MM12(1,8),826
INITIAL    MM12(2,1),829
INITIAL    MM12(2,2),824
INITIAL    MM12(2,3),744
INITIAL    MM12(2,5),606
INITIAL    MM12(2,6),925
INITIAL    MM12(2,7),796
INITIAL    MM12(2,8),926
INITIAL    MM12(2,9),167
INITIAL    MM12(3,3),786
INITIAL    MM12(3,5),667
INITIAL    MM12(3,6),944
INITIAL    MM12(3,7),837
INITIAL    MM12(3,8),942
INITIAL    MM12(4,3),829
INITIAL    MM12(4,4),939
INITIAL    MM12(4,5),758
INITIAL    MM12(4,7),918
INITIAL    MM12(4,8),975
INITIAL    MM12(4,10),667
INITIAL    MM12(5,1),878
INITIAL    MM12(5,2),941
INITIAL    MM12(5,3),880
INITIAL    MM12(5,4),943
INITIAL    MM12(5,5),788
INITIAL    MM12(6,1),976
INITIAL    MM12(6,2),971
INITIAL    MM12(6,3),949
INITIAL    MM12(6,4),966
INITIAL    MM12(6,5),909
INITIAL    MM12(6,6),993
```

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

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INITIAL    MH13(2-3,2),2
INITIAL    MH13(2-4,3),57
INITIAL    MH13(2-3,4),29
INITIAL    MH13(2-4,5),133
INITIAL    MH13(2-3,8),133
INITIAL    MH13(2-3,9),250
INITIAL    MH13(4-5,9),333
INITIAL    MH13(3-4,10),286
INITIAL    MH13(2-3,13),600
INITIAL    MH13(2-3,13),900
INITIAL    MH13(2-3,14),750
INITIAL    MH13(4-5,14),833
INITIAL    MH13(1,5),67
INITIAL    MH13(1,11),438
INITIAL    MH13(1,12),188
INITIAL    MH13(1,13),400
INITIAL    MH13(1,14),583
INITIAL    MH13(2,1),7
INITIAL    MH13(2,10),143
INITIAL    MH13(2,11),688
INITIAL    MH13(2,12),563
INITIAL    MH13(3,1),14
INITIAL    MH13(3,11),750
INITIAL    MH13(3,12),688
INITIAL    MH13(4,1),27
INITIAL    MH13(4,2),5
INITIAL    MH13(4,4),59
INITIAL    MH13(4,8),267
INITIAL    MH13(4,11),813
INITIAL    MH13(4,12),813
INITIAL    MH13(5,1),34
INITIAL    MH13(5,2),13
INITIAL    MH13(5,3),143
INITIAL    MH13(5,4),118
INITIAL    MH13(5,5),333
INITIAL    MH13(5,6),222
INITIAL    MH13(5,7),83
INITIAL    MH13(5,8),400
INITIAL    MH13(5,10),429
INITIAL    MH13(5,11-12),875
INITIAL    MH13(6,1),55
INITIAL    MH13(6,2),37
INITIAL    MH13(6,3),314
INITIAL    MH13(6,4),324
INITIAL    MH13(6,5),667
INITIAL    MH13(6,6),778
INITIAL    MH13(6,7),333
INITIAL    MH13(6,8),800
INITIAL    MH13(6,9),582
INITIAL    MH13(6,10),714
INITIAL    MH13(6,11-12),938
INITIAL    MH13(6,13-14),1000
INITIAL    MH14(2-3,1),788
INITIAL    MH14(5-6,2),931
INITIAL    MH14(4-5,5),938
INITIAL    MH14(5-6,8-10),1000
INITIAL    MH14(1-4,9-10),1000
INITIAL    MH14(1,1),758
INITIAL    MH14(1,2),724
INITIAL    MH14(1,3),675
INITIAL    MH14(1,4),896
INITIAL    MH14(1,5),813
INITIAL    MH14(1,6),930
INITIAL    MH14(1,7),286
INITIAL    MH14(1,8),902
INITIAL    MH14(2,2),793
INITIAL    MH14(2,3),727
INITIAL    MH14(2,4),922
INITIAL    MH14(2,5),875
INITIAL    MH14(2,6),961
INITIAL    MH14(2,7),571
INITIAL    MH14(2,8),959
INITIAL    MH14(3,2),828
INITIAL    MH14(3,3),805
INITIAL    MH14(3,4),942
INITIAL    MH14(3,5),906
INITIAL    MH14(3,6),969
INITIAL    MH14(3,7),619
INITIAL    MH14(3,8),975
INITIAL    MH14(4,1),818
INITIAL    MH14(4,2),897
INITIAL    MH14(4,3),844
INITIAL    MH14(4,4),971
INITIAL    MH14(4,6),987
INITIAL    MH14(4,7),762
INITIAL    MH14(4,8),984
```

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344

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```
INITIAL    MH14(5,1),848                                                    1345
INITIAL    MH14(5,3),883                                                    1346
INITIAL    MH14(5,4),979                                                    1347
INITIAL    MH14(5,6),991                                                    1348
INITIAL    MH14(5,7),857                                                    1349
INITIAL    MH14(6,1),909                                                    1350
INITIAL    MH14(6,3),961                                                    1351
INITIAL    MH14(6,4),996                                                    1352
INITIAL    MH14(6,5),969                                                    1353
INITIAL    MH14(6,6),996                                                    1354
INITIAL    MH14(6,7),905                                                    1355
INITIAL    MH15(4-5,3),231                                                  1356
INITIAL    MH15(2-4,4),91                                                   1357
INITIAL    MH15(1-2,8),71                                                   1358
INITIAL    MH15(6,9-14),1000                                                1359
INITIAL    MH15(2-4,10),167                                                 1360
INITIAL    MH15(5,11-14),1000                                               1361
INITIAL    MH15(1,11-12),200                                                1362
INITIAL    MH15(2,11-12),600                                                1363
INITIAL    MH15(3,11-12),800                                                1364
INITIAL    MH15(4,12-14),1000                                               1365
INITIAL    MH15(1-3,13),1000                                                1366
INITIAL    MH15(2-3,14),750                                                 1367
INITIAL    MH15(1,14),250                                                   1368
INITIAL    MH15(2,2),2                                                      1369
INITIAL    MH15(2,9),167                                                    1370
INITIAL    MH15(3,2),5                                                      1371
INITIAL    MH15(3,8),214                                                    1372
INITIAL    MH15(3,9),333                                                    1373
INITIAL    MH15(4,2),12                                                     1374
INITIAL    MH15(4,7),250                                                    1375
INITIAL    MH15(4,8),286                                                    1376
INITIAL    MH15(4,9),500                                                    1377
INITIAL    MH15(4,11),900                                                   1378
INITIAL    MH15(5,2),18                                                     1379
INITIAL    MH15(5,4),182                                                    1380
INITIAL    MH15(5,5),125                                                    1381
INITIAL    MH15(5,7),500                                                    1382
INITIAL    MH15(5,8),643                                                    1383
INITIAL    MH15(5,9),667                                                    1384
INITIAL    MH15(5,10),333                                                   1385
INITIAL    MH15(6,1),18      } Initializes the ceiling and visibility matrixes for  1386
INITIAL    MH15(6,2),29      } various wind directions and velocities.       1387
INITIAL    MH15(6,3),308                                                    1388
INITIAL    MH15(6,4),500                                                    1389
INITIAL    MH15(6,5),250                                                    1390
INITIAL    MH15(6,7),750                                                    1391
INITIAL    MH15(6,8),929                                                    1392
INITIAL    MH16(1-2,1),879                                                  1393
INITIAL    MH16(1-2),2),958                                                 1394
INITIAL    MH16(5-6,1-2),1000                                               1395
INITIAL    MH16(3-4,2),1000                                                 1396
INITIAL    MH16(2-5,4),996                                                  1397
INITIAL    MH16(6,4-5),1000                                                 1398
INITIAL    MH16(3-5,5),1000                                                 1399
INITIAL    MH16(2-3,6),981                                                  1400
INITIAL    MH16(4-6,6),990                                                  1401
INITIAL    MH16(1-3,7),875                                                  1402
INITIAL    MH16(4-6,7-10),1000                                              1403
INITIAL    MH16(4,10),500                                                   1404
INITIAL    MH16(1-3,9),1000                                                 1405
INITIAL    MH16(1,3),720                                                    1406
INITIAL    MH16(1,4),964                                                    1407
INITIAL    MH16(1,5),773                                                    1408
INITIAL    MH16(1,6),942                                                    1409
INITIAL    MH16(1,8),667                                                    1410
INITIAL    MH16(2,3),853                                                    1411
INITIAL    MH16(2,5),909                                                    1412
INITIAL    MH16(2,8),917                                                    1413
INITIAL    MH16(3,1),909                                                    1414
INITIAL    MH16(3,3),893                                                    1415
INITIAL    MH16(3,8),1000                                                   1416
INITIAL    MH16(4,1),970                                                    1417
INITIAL    MH16(4,3),907                                                    1418
INITIAL    MH16(5,3),933                                                    1419
INITIAL    MH16(6,3),973                                                    1420
INITIAL    MH17(1-3,1),9                                                    1421
INITIAL    MH17(3-5,2),6                                                    1422
INITIAL    MH17(4-6,5),667                                                  1423
INITIAL    MH17(5-6,7),250                                                  1424
INITIAL    MH17(1-5,9),333                                                  1425
INITIAL    MH17(1-3,11),333                                                 1426
INITIAL    MH17(4-6,11-14),1000                                             1427
INITIAL    MH17(1-3,12-14),1000                                             1428
INITIAL    MH17(1,5),167                                                    1429
INITIAL    MH17(2,5),333                                                    1430
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(continued)

```
INITIAL    MH17(3,5),500
INITIAL    MH17(4,1),18
INITIAL    MH17(4,4),71
INITIAL    MH17(5,1),27
INITIAL    MH17(5,4),143
INITIAL    MH17(6,1),106
INITIAL    MH17(6,2),35
INITIAL    MH17(6,3),143
INITIAL    MH17(6,4),214
INITIAL    MH17(6,6),500
INITIAL    MH17(6,8),500
INITIAL    MH17(6,9),1000
INITIAL    MH18(6,1-10),1000
INITIAL    MH18(6,2),989
INITIAL    MH18(1-5,2),1000
INITIAL    MH18(2-3,4),981
INITIAL    MH18(4-5,4),991
INITIAL    MH18(2-3,5),938
INITIAL    MH18(4-5,5),969
INITIAL    MH18(2-3,6),964
INITIAL    MH18(4-5,6),1000
INITIAL    MH18(2-5,7),900
INITIAL    MH18(3-5,8-10),1000
INITIAL    MH18(1-2,9-10),1000
INITIAL    MH18(1,3),817
INITIAL    MH18(1,4),935
INITIAL    MH18(1,5),781
INITIAL    MH18(1,6),893
INITIAL    MH18(1,7),800
INITIAL    MH18(1,8),643
INITIAL    MH18(2,1),750
INITIAL    MH18(2,3),946
INITIAL    MH18(2,8),929
INITIAL    MH18(3,1),857
INITIAL    MH18(3,3),957
INITIAL    MH18(4,1),893
INITIAL    MH18(4,3),968
INITIAL    MH18(5,1),929
INITIAL    MH18(5,3),978
INITIAL    MH19(4-5,2),11
INITIAL    MH19(1-2,3),56
INITIAL    MH19(3-5,3),111
INITIAL    MH19(4-5,7),333
INITIAL    MH19(5-6,8-14),1000
INITIAL    MH19(1-4,10),1000
INITIAL    MH19(1-4,12-14),1000
INITIAL    MH19(2,11),400
INITIAL    MH19(3,2),6
INITIAL    MH19(3,11),600
INITIAL    MH19(4,4),385
INITIAL    MH19(4,8),667
INITIAL    MH19(4,11),800
INITIAL    MH19(5,4),692
INITIAL    MH19(6,1),1000
INITIAL    MH19(6,2),28
INITIAL    MH19(6,3),278
INITIAL    MH19(6,4),1000
INITIAL    MH19(6,5),250
INITIAL    MH19(6,7),667
INITIAL    MH20(6,1-10),1000
INITIAL    MH20(5-6,4),995
INITIAL    MH20(3-5,2),1000
INITIAL    MH20(5,5-10),1000
INITIAL    MH20(2-3,6),981
INITIAL    MH20(1-4,7-10),1000
INITIAL    MH20(1,8),965
INITIAL    MH20(1,1),800
INITIAL    MH20(1,2),828
INITIAL    MH20(1,3),987
INITIAL    MH20(1,4),947
INITIAL    MH20(1,5),825
INITIAL    MH20(1,6),957
INITIAL    MH20(2,1),891
INITIAL    MH20(2,2),862
INITIAL    MH20(2,3),948
INITIAL    MH20(2,4),979
INITIAL    MH20(2,5),918
INITIAL    MH20(3,1),927
INITIAL    MH20(3,3),960
INITIAL    MH20(3,4),984
INITIAL    MH20(3,5),959
INITIAL    MH20(4,1),945
INITIAL    MH20(4,3),979
INITIAL    MH20(4,4),989
INITIAL    MH20(4,5),990
INITIAL    MH20(4,6),994
```

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

```
INITIAL    MH20(5,1),964
INITIAL    MH20(5,3),988
INITIAL    MH21(4-5,8),667
INITIAL    MH21(4-5,10~11),500
INITIAL    MH21(1-6,12~14),1000
INITIAL    MH21(2,1),2
INITIAL    MH21(2,11),167
INITIAL    MH21(3,1),5
INITIAL    MH21(3,8),333
INITIAL    MH21(3,11),333
INITIAL    MH21(4,1),7
INITIAL    MH21(5,1),11
INITIAL    MH21(5,3),29
INITIAL    MH21(5,4),727
INITIAL    MH21(5,9),200
INITIAL    MH21(6,1),20
INITIAL    MH21(6,2),11
INITIAL    MH21(6,3),88
INITIAL    MH21(6,4),909
INITIAL    MH21(6,5),100
INITIAL    MH21(6,6),600
INITIAL    MH21(6,7),500
INITIAL    MH21(6,8),1000
INITIAL    MH21(6,9),600
INITIAL    MH21(6,10),1000
INITIAL    MH21(6,12),667
INITIAL    MH22(1-5,1),960
INITIAL    MH22(6,1-2),1000
INITIAL    MH22(2-5,2),1000
INITIAL    MH22(6,4-5),1000
INITIAL    MH22(4-5,4),1000
INITIAL    MH22(4-6,6-10),1000
INITIAL    MH22(1-3,9-10),1000
INITIAL    MH22(1,2),889
INITIAL    MH22(1,3),891
INITIAL    MH22(1,4),940
INITIAL    MH22(1,5),866
INITIAL    MH22(1,6),959
INITIAL    MH22(1,7),955
INITIAL    MH22(1,8),971
INITIAL    MH22(2,3),950
INITIAL    MH22(2,4),952
INITIAL    MH22(2,5),975
INITIAL    MH22(2,6),994
INITIAL    MH22(2,7),985
INITIAL    MH22(2,8),989
INITIAL    MH22(3,3),968
INITIAL    MH22(3,4),976
INITIAL    MH22(3,5),983
INITIAL    MH22(3,6),1000
INITIAL    MH22(3,7),985
INITIAL    MH22(3,8),1000
INITIAL    MH22(4,3),982
INITIAL    MH22(4,5),983
INITIAL    MH22(5,3),991
INITIAL    MH22(5,5),992
INITIAL    MH22(6,3),995
INITIAL    MH23(2-5,1),3
INITIAL    MH23(1-6,10~14),1000
INITIAL    MH23(1-5,11),333
INITIAL    MH23(1-3,13),0
INITIAL    MH23(5,3),71
INITIAL    MH23(5,5),200
INITIAL    MH23(5,9),333
INITIAL    MH23(6,1),5
INITIAL    MH23(6,2),7
INITIAL    MH23(6,3),107
INITIAL    MH23(6,4),1000
INITIAL    MH23(6,5),400
INITIAL    MH23(6,6),200
INITIAL    MH23(6,7),250
INITIAL    MH23(6,9),667
INITIAL    MH24(1-6,1-2),1000
INITIAL    MH24(2-6,4),1000
INITIAL    MH24(4-6,5),994
INITIAL    MH24(2-3,6),989
INITIAL    MH24(4-6,6),1000
INITIAL    MH24(3-4,7),991
INITIAL    MH24(5-6,7),1000
INITIAL    MH24(1-6,8-10),1000
INITIAL    MH24(1-2,8),986
INITIAL    MH24(1,3),930
INITIAL    MH24(1,4),981
INITIAL    MH24(1,5),930
INITIAL    MH24(1,6),958
INITIAL    MH24(1,7),965
```

Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

```
INITIAL    MH24(2,3),965                                                    1603
INITIAL    MH24(2,5),975                                                    1604
INITIAL    MH24(2,7),983                                                    1605
INITIAL    MH24(3,3),974                                                    1606
INITIAL    MH24(3,5),981                                                    1607
INITIAL    MH24(4,3),982                                                    1608
INITIAL    MH24(5,3),987                                                    1609
INITIAL    MH24(6,3),991                                                    1610
INITIAL    MH25(1-5,1),2                                                    1611
INITIAL    MH25(5-6,5),250                                                  1612
INITIAL    MH25(1-6,6-14),1000                                              1613
INITIAL    MH25(1-4,7),0                                                    1614
INITIAL    MH25(1-4,9),0                                                    1615
INITIAL    MH25(1,11),667                                                   1616
INITIAL    MH25(6,1),14                                                     1617
INITIAL    MH25(6,3),118                                                    1618
INITIAL    MH25(6,4),167                                                    1619
INITIAL    MH26(1-6,1),944                                                  1620
INITIAL    MH26(1-6,2),1000                                                 1621
INITIAL    MH26(5-6,3),995                                                  1622
INITIAL    MH26(3-4,4),987                                                  1623
INITIAL    MH26(5-6,4),993                                                  1624
INITIAL    MH26(6,5-10),1000                                                1625
INITIAL    MH26(2-5,6-10),1000                                              1626
INITIAL    MH26(2,7),993                                                    1627
INITIAL    MH26(1-3,8),995                                                  1628
INITIAL    MH26(1,9-10),1000                                                1629
INITIAL    MH26(1,3),935                                                    1630
INITIAL    MH26(1,4),947                                                    1631
INITIAL    MH26(1,5),953                                                    1632
INITIAL    MH26(1,6),967                                                    1633
INITIAL    MH26(1,7),980                                                    1634
INITIAL    MH26(2,3),973                                                    1635
INITIAL    MH26(2,4),980                                                    1636
INITIAL    MH26(2,5),974                                                    1637
INITIAL    MH26(3,3),976                                                    1638
INITIAL    MH26(3,5),985    Initializes the ceiling and visibility matrixes for  1639
INITIAL    MH26(4,3),984    various wind directions and velocities.          1640
INITIAL    MH26(4,5),988                                                    1641
INITIAL    MH26(5,5),997                                                    1642
INITIAL    MH27(3-5,2),2                                                    1643
INITIAL    MH27(3-4,3),43                                                   1644
INITIAL    MH27(5-6,5),500                                                  1645
INITIAL    MH27(4-5,7),286                                                  1646
INITIAL    MH27(2-6,8-14),1000                                              1647
INITIAL    MH27(2-4,9),0                                                    1648
INITIAL    MH27(1,12),1000                                                  1649
INITIAL    MH27(5,1),1                                                      1650
INITIAL    MH27(5,3),130                                                    1651
INITIAL    MH27(6,1),5                                                      1652
INITIAL    MH27(6,2),8                                                      1653
INITIAL    MH27(6,3),174                                                    1654
INITIAL    MH27(6,4),182                                                    1655
INITIAL    MH27(6,7),857                                                    1656
INITIAL    MH28(4-6,1),1000                                                 1657
INITIAL    MH28(1-6,2),1000                                                 1658
INITIAL    MH28(2-3,3),985                                                  1659
INITIAL    MH28(5-6,3),995                                                  1660
INITIAL    MH28(2-4,4),994                                                  1661
INITIAL    MH28(5-6,4-10),1000                                              1662
INITIAL    MH28(2-4,5-10),1000                                              1663
INITIAL    MH28(1-3,6),996                                                  1664
INITIAL    MH28(2-3,8),997                                                  1665
INITIAL    MH28(1-2,10),996                                                 1666
INITIAL    MH28(4,3),990                                                    1667
INITIAL    MH28(3,1),946                                                    1668
INITIAL    MH28(2,1),973                                                    1669
INITIAL    MH28(1,1),892                                                    1670
INITIAL    MH28(1,3),964                                                    1671
INITIAL    MH28(1,4),982                                                    1672
INITIAL    MH28(1,5),989                                                    1673
INITIAL    MH28(1,7),997                                                    1674
INITIAL    MH28(1,8),995                                                    1675
INITIAL    MH28(1,9),875                                                    1676
INITIAL    MH29(4-5,3),91                                                   1677
INITIAL    MH29(5-6,4),333                                                  1678
INITIAL    MH29(5-6,5),1000                                                 1679
INITIAL    MH29(5-6,8),1000                                                 1680
INITIAL    MH29(1-6,11-14),1000                                             1681
INITIAL    MH29(1,13),0                                                     1682
INITIAL    MH29(4,1),1                                                      1683
INITIAL    MH29(5,1),1                                                      1684
INITIAL    MH29(5,2),2                                                      1685
INITIAL    MH29(6,1),5                                                      1686
INITIAL    MH29(6,2),7                                                      1687
INITIAL    MH29(6,3),182                                                    1688
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(continued)

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INITIAL    MH29(6,7),500                                                    1689
INITIAL    MH30(1-6,1-2),1000                                               1690
INITIAL    MH30(1,1),626                                                    1691
INITIAL    MH30(1,2),963                                                    1692
INITIAL    MH30(1-2,4),968                                                  1693
INITIAL    MH30(2-3,5),986                                                  1694
INITIAL    MH30(5-6,6-10),1000                                              1695
INITIAL    MH30(1-4,7-10),1000                                              1696
INITIAL    MH30(1,7),996                                                    1697
INITIAL    MH30(1,8),995                                                    1698
INITIAL    MH30(1,3),953                                                    1699
INITIAL    MH30(1,5),976                                                    1700
INITIAL    MH30(1,6),967                                                    1701
INITIAL    MH30(2,3),967                                                    1702
INITIAL    MH30(2,6),978                                                    1703
INITIAL    MH30(3,3),972                                                    1704
INITIAL    MH30(3,4),976                                                    1705
INITIAL    MH30(3,6),983                                                    1706
INITIAL    MH30(4,3),981                                                    1707
INITIAL    MH30(4,4),984                                                    1708
INITIAL    MH30(4,5),990                                                    1709
INITIAL    MH30(4,6),989                                                    1710
INITIAL    MH30(5,3),991                                                    1711
INITIAL    MH30(5,4),992                                                    1712
INITIAL    MH30(5,5),993                                                    1713
INITIAL    MH30(6,3),1000                                                   1714
INITIAL    MH30(6,4),992                                                    1715
INITIAL    MH30(6,5),997                                                    1716
INITIAL    MH31(3-5,2),1                                                    1717
INITIAL    MH31(5-6,3),222                                                  1718
INITIAL    MH31(6,4-5),500                                                  1719
INITIAL    MH31(6,6-14),1000                                                1720
INITIAL    MH31(5-6,10),667                                                 1721
INITIAL    MH31(1-5,12-14),1000                                             1722
INITIAL    MH31(3-4,7),333                                                  1723
INITIAL    MH31(3-4,8),500                                                  1724
INITIAL    MH31(3-4,9-11),333                                               1725
INITIAL    MH31(4,11),667                                                   1726
INITIAL    MH31(1-2,11),333                                                 1727
INITIAL    MH31(4,3),111                                                    1728
INITIAL    MH31(5,4),250                                                    1729
INITIAL    MH31(5,7),667                                                    1730
INITIAL    MH31(5,8),1000                                                   1731
INITIAL    MH31(5,9),667                                                    1732
INITIAL    MH31(5,11),1000                                                  1733
INITIAL    MH31(6,1),5                                                      1734
INITIAL    MH31(6,2),7                                                      1735
INITIAL    MH32(1-6,1),947                                                  1736
INITIAL    MH32(2-3,2),917                                                  1737
INITIAL    MH32(4-6,2),1000                                                 1738
INITIAL    MH32(5-6,4),992                                                  1739
INITIAL    MH32(6,5-10),1000                                                1740
INITIAL    MH32(4-5,5),1000                                                 1741
INITIAL    MH32(3-4,6),985                                                  1742
INITIAL    MH32(4-5,7),1000                                                 1743
INITIAL    MH32(3-4,8),996                                                  1744
INITIAL    MH32(1-5,9-10),1000                                              1745
INITIAL    MH32(1,2),833                                                    1746
INITIAL    MH32(1,3),937                                                    1747
INITIAL    MH32(1,4),888                                                    1748
INITIAL    MH32(1,5),960                                                    1749
INITIAL    MH32(1,6),965                                                    1750
INITIAL    MH32(1,7),969                                                    1751
INITIAL    MH32(1,8),974                                                    1752
INITIAL    MH32(2,3),952                                                    1753
INITIAL    MH32(2,4),944                                                    1754
INITIAL    MH32(2,5),988                                                    1755
INITIAL    MH32(2,6),980                                                    1756
INITIAL    MH32(2,7),990                                                    1757
INITIAL    MH32(2,8),989                                                    1758
INITIAL    MH32(3,3),956                                                    1759
INITIAL    MH32(3,4),976                                                    1760
INITIAL    MH32(3,5),992                                                    1761
INITIAL    MH32(3,7),995                                                    1762
INITIAL    MH32(4,3),967                                                    1763
INITIAL    MH32(4,4),984                                                    1764
INITIAL    MH32(5,3),993                                                    1765
INITIAL    MH32(5,6),995                                                    1766
INITIAL    MH32(6,3),996                                                    1767
INITIAL    MH33(3-4,1),1                                                    1768
INITIAL    MH33(2-4,2),3                                                    1769
INITIAL    MH33(2-3,4),67                                                   1770
INITIAL    MH33(4-6,5),333                                                  1771
INITIAL    MH33(1-2,7),167                                                  1772
INITIAL    MH33(4-6,7),500                                                  1773
INITIAL    MH33(2-5,8),500                                                  1774
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Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

```
INITIAL    MH33(2-3,9),125
INITIAL    MH33(4-5,10),500
INITIAL    MH33(5-6,11-14),1000
INITIAL    MH33(5,12),0
INITIAL    MH33(1-4,13-14),1000
INITIAL    MH33(1-2,13),500
INITIAL    MH33(1,2),2
INITIAL    MH33(3,7),333
INITIAL    MH33(3,10),250
INITIAL    MH33(4,4),133
INITIAL    MH33(4,6),143
INITIAL    MH33(4,9),375
INITIAL    MH33(5,1),6
INITIAL    MH33(5,2),5
INITIAL    MH33(5,3),67
INITIAL    MH33(5,4),200
INITIAL    MH33(5,6),286
INITIAL    MH33(5,9),500
INITIAL    MH33(6,1),10
INITIAL    MH33(6,2),12
INITIAL    MH33(6,3),200
INITIAL    MH33(6,4),267
INITIAL    MH33(6,6),571
INITIAL    MH33(6,8),1000
INITIAL    MH33(6,9),750
INITIAL    MH33(6,10),750
INITIAL    MH34(1-5,1),786
INITIAL    MH34(6,1-3),1000
INITIAL    MH34(1-5,2),1000
INITIAL    MH34(5-6,4),989
INITIAL    MH34(6,5-10),1000
INITIAL    MH34(5,6-10),1000
INITIAL    MH34(4,7-10),1000
INITIAL    MH34(1-3,8-10),1000
INITIAL    MH34(1,3),903
INITIAL    MH34(1,4),828
INITIAL    MH34(1,5),918
INITIAL    MH34(1,6),879
INITIAL    MH34(1,7),934
INITIAL    MH34(1,8),962
INITIAL    MH34(2,3),938
INITIAL    MH34(2,4),892
INITIAL    MH34(2,5),964
INITIAL    MH34(2,6),935
INITIAL    MH34(2,7),974
INITIAL    MH34(3,3),955
INITIAL    MH34(3,4),946
INITIAL    MH34(3,5),969
INITIAL    MH34(3,6),972
INITIAL    MH34(3,7),987
INITIAL    MH34(4,3),983
INITIAL    MH34(4,4),968
INITIAL    MH34(4,5),974
INITIAL    MH34(4,6),991
INITIAL    MH34(5,3),994
INITIAL    MH34(5,5),990
INITIAL    MH35(1-4,2),4
INITIAL    MH35(4-5,3),125
INITIAL    MH35(5-6,5),400
INITIAL    MH35(1-2,6),111
INITIAL    MH35(4-5,6),333
INITIAL    MH35(4-5,7),143
INITIAL    MH35(2-4,8),250
INITIAL    MH35(5-6,8),500
INITIAL    MH35(3-6,10),667
INITIAL    MH35(3-4,11),333
INITIAL    MH35(1-6,12-14),1000
INITIAL    MH35(1,14),0
INITIAL    MH35(2,10),333
INITIAL    MH35(2,11),167
INITIAL    MH35(3,6),222
INITIAL    MH35(4,5),200
INITIAL    MH35(5,1),10
INITIAL    MH35(5,2),14
INITIAL    MH35(5,9),200
INITIAL    MH35(5,11),500
INITIAL    MH35(6,1),14
INITIAL    MH35(6,2),25
INITIAL    MH35(6,3),56
INITIAL    MH35(6,4),188
INITIAL    MH35(6,6),556
INITIAL    MH35(6,7),429
INITIAL    MH35(6,9),400
INITIAL    MH35(6,11),833
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Initializes the ceiling and visibility matrixes for various wind directions and velocities.

(continued)

```
* LOGAN                                                                  1859
      INITIAL    MH101(1,1),18                                          1860
      INITIAL    MH101(2,1),13                                          1861
      INITIAL    MH101(1,3),24                                          1862
      INITIAL    MH101(1,4),19                                          1863
      INITIAL    MH101(2,2),7                                           1864
      INITIAL    MH101(2,3),23                                          1865
      INITIAL    MH101(2,4),7                                           1866
      INITIAL    MH101(3-4,1),1                                         1867
      INITIAL    MH101(3-4,2),40                                        1868
      INITIAL    MH101(3,3),133                                         1869
      INITIAL    MH101(3-18,4),1                                        1870
      INITIAL    MH101(4,3),134                                         1871
      INITIAL    MH101(5-6,1),2                                         1872
      INITIAL    MH101(5-6,2),270                                       1873
      INITIAL    MH101(5,3),135                                         1874
      INITIAL    MH101(6,3),136      Initializes airport definition     1875
      INITIAL    MH101(7-8,1),3      matrix for Logan.                  1876
      INITIAL    MH101(7-8,2),220                                       1877
      INITIAL    MH101(7,3),137                                         1878
      INITIAL    MH101(8,3),138                                         1879
      INITIAL    MH101(9-10,1),4                                        1880
      INITIAL    MH101(9,3),139                                         1881
      INITIAL    MH101(9-10,2),330                                      1882
      INITIAL    MH101(10,3),140                                        1883
      INITIAL    MH101(11-12,1),5                                       1884
      INITIAL    MH101(11-12,2),150                                     1885
      INITIAL    MH101(11,3),141                                        1886
      INITIAL    MH101(12,3),142                                        1887
      INITIAL    MH101(13-14,1),4                                       1888
      INITIAL    MH101(13,3),139                                        1889
      INITIAL    MH101(13-14,2),330                                     1890
      INITIAL    MH101(14,3),140                                        1891
      INITIAL    MH101(15-16,1),1                                       1892
      INITIAL    MH101(15-16,2),40                                      1893
      INITIAL    MH101(15,3),133                                        1894
      INITIAL    MH101(16,3),134                                        1895
      INITIAL    MH101(17-18,1),3                                       1896
      INITIAL    MH101(17-18,2),220                                     1897
      INITIAL    MH101(17,3),137                                        1898
      INITIAL    MH101(18,3),138                                        1899
      INITIAL    MX001(1-22,1-5),680100                                 1900
      INITIAL    MX001(3,1-5),820150                                    1901
      INITIAL    MX001(4,1-5),820200                                    1902
      INITIAL    MX001(1-4,2),460100                                    1903
      INITIAL    MX001(5-7,3),560100                                    1904
      INITIAL    MX001(5,5),780100                                      1905
      INITIAL    MX001(6,5),780125                                      1906
      INITIAL    MX001(7,1-2),820150                                    1907
      INITIAL    MX001(7,4),820150                                      1908
      INITIAL    MX001(7,5),780150                                      1909
      INITIAL    MX001(8,1-2),820200                                    1910
      INITIAL    MX001(8,3),560125                                      1911
      INITIAL    MX001(8,4),820200                                      1912
      INITIAL    MX001(8,5),780175                                      1913
      INITIAL    MX001(9-12,1),216050                                   1914
      INITIAL    MX001(9-12,5),268075                                   1915
      INITIAL    MX001(11,2-4),820150  Initializes the minimum ceiling  1916
      INITIAL    MX001(12,2-4),820200  and visibility for the various   1917
      INITIAL    MX001(13-16,1),460075 approaches and runways at Logan. 1918
      INITIAL    MX001(13-15,5),580100                                  1919
      INITIAL    MX001(13-15,5),580100                                  1920
      INITIAL    MX001(15,2-4),820150                                   1921
      INITIAL    MX001(16,2-4),820200                                   1922
      INITIAL    MX001(16,5),580125                                     1923
      INITIAL    MX001(19,1-5),820150                                   1924
      INITIAL    MX001(20,1-5),820200                                   1925
      INITIAL    MX001(23,1-5),820150                                   1926
      INITIAL    MX001(24,1-5),820200                                   1927
      INITIAL    MX001(21-24,3),420100                                  1928
      INITIAL    MX001(25-27,1),620050                                  1929
      INITIAL    MX001(25-28,2),460100                                  1930
      INITIAL    MX001(25-27,3),540100                                  1931
      INITIAL    MX001(25-27,4),480050                                  1932
      INITIAL    MX001(25,5),800100                                     1933
      INITIAL    MX001(26,5),800175                                     1934
      INITIAL    MX001(27,5),800150                                     1935
      INITIAL    MX001(28,5),800175                                     1936
      INITIAL    MX001(28,4),480100                                     1937
      INITIAL    MX001(28,3),540125                                     1938
      INITIAL    MX001(28,1),620100                                     1939
      INITIAL    MH133(1,1),2                                           1940
      INITIAL    MH133(1,2),4  Initializes the matrixes needed for      1941
      INITIAL    MH133(2,1),4  determining the facilities required      1942
      INITIAL    MH133(2,2),7  for various approaches to Logan.         1943
      INITIAL    MH133(3-4,1),15                                        1944
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(continued)

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INITIAL    MH133(3,2),10  }                                                1945
INITIAL    MH133(3,3),7                                                    1946
INITIAL    MH133(3,5),19                                                   1947
INITIAL    MH133(3,6),23                                                   1948
INITIAL    MH133(3-5,7),56                                                 1949
INITIAL    MH133(3-4,8),43                                                 1950
INITIAL    MH133(4,2),7                                                    1951
INITIAL    MH133(5,1),35                                                   1952
INITIAL    MH133(5,5),19                                                   1953
INITIAL    MH133(6,1),15                                                   1954
INITIAL    MH133(6,2),7                                                    1955
INITIAL    MH133(6,3),35                                                   1956
INITIAL    MH133(7,1),37                                                   1957
INITIAL    MH134(1,1),2                                                    1958
INITIAL    MH134(1,2),4                                                    1959
INITIAL    MH134(2,1),4                                                    1960
INITIAL    MH134(2,2),7                                                    1961
INITIAL    MH134(3-4,1),15                                                 1962
INITIAL    MH134(3-4,2),2                                                  1963
INITIAL    MH134(3-4,3),3                                                  1964
INITIAL    MH134(3,5),19                                                   1965
INITIAL    MH134(3,6),23                                                   1966
INITIAL    MH134(3-5,7),56                                                 1967
INITIAL    MH134(3-4,8),43                                                 1968
INITIAL    MH134(4,4),10                                                   1969
INITIAL    MH134(5,1),35                                                   1970
INITIAL    MH134(5,5),19                                                   1971
INITIAL    MH134(6,1),15                                                   1972
INITIAL    MH134(6,2),2                                                    1973
INITIAL    MH134(6,3),3                                                    1974
INITIAL    MH134(7,1),37                                                   1975
INITIAL    MH135(1-2,1),4                                                  1976
INITIAL    MH135(1-2,2),7                                                  1977
INITIAL    MH135(1,8),48                                                   1978
INITIAL    MH135(3-4,1),16                                                 1979
INITIAL    MH135(3,2),11                                                   1980
INITIAL    MH135(3,3),2   } Initializes the matrixes needed for determining the  1981
INITIAL    MH135(3,4),3   } facilities required for various approaches to Logan. 1982
INITIAL    MH135(3,5),20                                                   1983
INITIAL    MH135(3,6),24                                                   1984
INITIAL    MH135(4,2),7                                                    1985
INITIAL    MH135(5,1),7                                                    1986
INITIAL    MH135(6,1),15                                                   1987
INITIAL    MH135(6,2),2                                                    1988
INITIAL    MH135(6,3),3                                                    1989
INITIAL    MH135(6,4),35                                                   1990
INITIAL    MH135(7,1),37                                                   1991
INITIAL    MH136(1-2,1),4                                                  1992
INITIAL    MH136(1,2),2                                                    1993
INITIAL    MH136(1,8),48                                                   1994
INITIAL    MH136(2,2),7                                                    1995
INITIAL    MH136(3-4,1),16                                                 1996
INITIAL    MH136(3,2),11                                                   1997
INITIAL    MH136(3,3),2                                                    1998
INITIAL    MH136(3,4),3                                                    1999
INITIAL    MH136(3,5),20                                                   2000
INITIAL    MH136(3,6),24                                                   2001
INITIAL    MH136(4,2),7                                                    2002
INITIAL    MH136(5,1),7                                                    2003
INITIAL    MH136(5,5),20                                                   2004
INITIAL    MH136(6,1),15                                                   2005
INITIAL    MH136(6,2),7                                                    2006
INITIAL    MH136(6,3),35                                                   2007
INITIAL    MH136(7,1),37                                                   2008
INITIAL    MH137(1-2,1),2                                                  2009
INITIAL    MH137(1-2,2),4                                                  2010
INITIAL    MH137(2-3,3),7                                                  2011
INITIAL    MH137(2,8),44                                                   2012
INITIAL    MH137(3-4,1),15                                                 2013
INITIAL    MH137(3,2),10                                                   2014
INITIAL    MH137(3,5),19                                                   2015
INITIAL    MH137(3,6),23                                                   2016
INITIAL    MH137(4,2),7                                                    2017
INITIAL    MH137(5-6,1),35                                                 2018
INITIAL    MH137(5,5),19                                                   2019
INITIAL    MH137(6,2),15                                                   2020
INITIAL    MH137(6,3),7                                                    2021
INITIAL    MH137(6,8),44                                                   2022
INITIAL    MH137(7,1),37                                                   2023
INITIAL    MH138(1-2,1),2                                                  2024
INITIAL    MH138(1-2,2),4                                                  2025
INITIAL    MH138(2,8),44                                                   2026
INITIAL    MH138(3-4,1),15                                                 2027
INITIAL    MH138(3-4,2),2                                                  2028
INITIAL    MH138(3-4,3),3                                                  2029
INITIAL    MH138(3,4),10  }                                                2030
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(continued)

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      INITIAL    MH138(3,5),19
      INITIAL    MH138(3,6),23
      INITIAL    MH138(5,1),35
      INITIAL    MH138(5,5),19
      INITIAL    MH138(6,1),15
      INITIAL    MH138(6,2),2
      INITIAL    MH138(6,3),3
      INITIAL    MH138(6,8),44
      INITIAL    MH138(7,1),37
      INITIAL    MH139(1-2,1),4
      INITIAL    MH139(1-2,2),7
      INITIAL    MH139(1,7),57
      INITIAL    MH139(1,8),46
      INITIAL    MH139(3-4,1),16
      INITIAL    MH139(3,2),11
      INITIAL    MH139(3,3),2
      INITIAL    MH139(3,4),3
      INITIAL    MH139(3,5),20
      INITIAL    MH139(3,6),24
      INITIAL    MH139(3,7),57
      INITIAL    MH139(4,2),7
      INITIAL    MH139(5,1),7
      INITIAL    MH139(5,5),20
      INITIAL    MH139(5,7),57
      INITIAL    MH139(6,1),15
      INITIAL    MH139(6,2),2
      INITIAL    MH139(6,3),3
      INITIAL    MH139(6,4),35
      INITIAL    MH139(7,1),37
      INITIAL    MH140(1,1),2
      INITIAL    MH140(1-2,2),4
      INITIAL    MH140(1,7),57
      INITIAL    MH140(1,8),46
      INITIAL    MH140(2-6,1),7
      INITIAL    MH140(3-4,2),16
      INITIAL    MH140(3,3),11
      INITIAL    MH140(3,5),20
      INITIAL    MH140(3,6),24
      INITIAL    MH140(3,7),57
      INITIAL    MH140(5,5),20
      INITIAL    MH140(5,7),57
      INITIAL    MH140(6,2),15
      INITIAL    MH140(6,3),35
      INITIAL    MH140(7,1),37
      INITIAL    MH141(1-2,1),4
      INITIAL    MH141(1-4,2),7
      INITIAL    MH141(2,8),45
      INITIAL    MH141(3-4,1),14
      INITIAL    MH141(3,3),9
      INITIAL    MH141(3,5),18
      INITIAL    MH141(3,6),22
      INITIAL    MH141(4,8),45
      INITIAL    MH141(6,1),15
      INITIAL    MH141(6,2),7
      INITIAL    MH141(6,3),35
      INITIAL    MH141(7,1),37
      INITIAL    MH142(1-2,1),4
      INITIAL    MH142(1,2),2
      INITIAL    MH142(2,2),7
      INITIAL    MH142(2,8),45
      INITIAL    MH142(3-4,1),14
      INITIAL    MH142(3-4,2),2
      INITIAL    MH142(3-4,3),1
      INITIAL    MH142(3,4),9
      INITIAL    MH142(3,5),18
      INITIAL    MH142(3,6),22
      INITIAL    MH142(4,8),45
      INITIAL    MH142(6,1),1
      INITIAL    MH142(6,2),2
      INITIAL    MH142(6,3),1
      INITIAL    MH142(6,4),35
      INITIAL    MH142(7,1),37
* BEDFORD
      INITIAL    MH106(1-2,1),6
      INITIAL    MH106(1,2),7
      INITIAL    MH106(1-2,3),24
      INITIAL    MH106(1,4),133
      INITIAL    MH106(2,4),5
      INITIAL    MH106(3,1),1
      INITIAL    MH106(3,2),110
      INITIAL    MH106(3,3),143
      INITIAL    MH106(4-6,3),156
      INITIAL    MH106(3-6,4),2
      INITIAL    MH106(4,1),2
      INITIAL    MH106(4,2),290
      INITIAL    MH106(5,2),230
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Initializes the matrixes needed for determining the facilities required for various approaches to Logan.

Initializes matrixes, as in Logan, to define the Bedford airport, weather minimums, and approach facilities required.

(continued)

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        INITIAL     MH106(5,1),3                                                    2117
        INITIAL     MH106(6,2),50                                                   2118
        INITIAL     MH106(6,1),4                                                    2119
        INITIAL     MH143(1,1),53                                                   2120
        INITIAL     MH143(1-4,5),17                                                 2121
        INITIAL     MH143(2-3,1),12                                                 2122
        INITIAL     MH143(2,2),8                                                    2123
        INITIAL     MH143(2,3),1                                                    2124
        INITIAL     MH143(2,6),21                                                   2125
        INITIAL     MH143(2,8),64                                                   2126
        INITIAL     MH143(3,2),1                                                    2127
        INITIAL     MH143(4,1),4                                                    2128
        INITIAL     MH143(4,2),53                                                   2129
        INITIAL     MH143(5,1),1                                                    2130
        INITIAL     MH143(5,2),4                                                    2131
        INITIAL     MX002(1-2,1-4),700100                                           2132
        INITIAL     MX002(3,1),700100                                               2133
        INITIAL     MX002(3,2-4),720150                                             2134
        INITIAL     MX002(4,1),700125                                               2135
        INITIAL     MX002(4,2-4),760200                                             2136
        INITIAL     MX002(5-8,1),383100                                             2137
        INITIAL     MX002(9-11,1),660100                                            2138
        INITIAL     MX002(9-10,2-4),680100                                          2139
        INITIAL     MX002(11,2-4),720150                                            2140
        INITIAL     MX002(12,1),660125                                              2141
        INITIAL     MX002(12,2-4),760200                                            2142
        INITIAL     MX002(13-14,1-4),800100   } Bedford continued                   2143
        INITIAL     MX002(15,1-4),800150                                            2144
        INITIAL     MX002(15,2),800125                                              2145
        INITIAL     MX002(16,1-4),800200                                            2146
        INITIAL     MX002(16,2),800150                                              2147
        INITIAL     MX002(17-18,1-4),680100                                         2148
        INITIAL     MX002(19,1-4),720150                                            2149
        INITIAL     MX002(19,2-3),680100                                            2150
        INITIAL     MX002(20,1-4),760200                                            2151
        INITIAL     MX002(20,3),680125                                              2152
        INITIAL     MH156(1,1),53                                                   2153
        INITIAL     MH156(1-4,5),53                                                 2154
        INITIAL     MH156(1-4,5),17                                                 2155
        INITIAL     MH156(2-3,1),1                                                  2156
        INITIAL     MH156(2-3,2),12                                                 2157
        INITIAL     MH156(2,3),8                                                    2158
        INITIAL     MH156(4-5,1),4                                                  2159
        INITIAL     MH156(4,2),53                                                   2160
        INITIAL     MH156(5,2),1                                                    2161
* BEVERLY                                                                          2162
        INITIAL     MH107(1-2,1),6                                                  2163
        INITIAL     MH107(1,2),8                                                    2164
        INITIAL     MH107(1,3),18                                                   2165
        INITIAL     MH107(1,4),108                                                  2166
        INITIAL     MH107(2,3),24                                                   2167
        INITIAL     MH107(2,4),4                                                    2168
        INITIAL     MH107(3,1),1                                                    2169
        INITIAL     MH107(3,2),160    } Initializes matrixes, as in Logan, to define the Beverly 2170
        INITIAL     MH107(3-6,3),144  } airport, weather minimums, and approach facilities 2171
        INITIAL     MH107(3-6,4),3    } required.                                   2172
        INITIAL     MH107(4,1),2                                                    2173
        INITIAL     MH107(4,2),340                                                  2174
        INITIAL     MH107(5,1),3                                                    2175
        INITIAL     MH107(5,2),90                                                   2176
        INITIAL     MH107(6,1),4                                                    2177
        INITIAL     MH107(6,2),270                                                  2178
        INITIAL     MH144(1,1),25                                                   2179
        INITIAL     MH144(2-4,1),4                                                  2180
        INITIAL     MH144(2,2),3                                                    2181
        INITIAL     MH144(2,3),6                                                    2182
        INITIAL     MH144(3-4,2),33                                                 2183
        INITIAL     MH144(3-4,3),1                                                  2184
        INITIAL     MH144(4,4),1                                                    2185
        INITIAL     MX003(1-2,1-4),600100                                           2186
        INITIAL     MX003(3,1-4),600150                                             2187
        INITIAL     MX003(4,1-4),700200                                             2188
        INITIAL     MX003(5-7,1-4),640100                                           2189
        INITIAL     MX003(7,2-4),640150                                             2190
        INITIAL     MX003(8,1),640125                                               2191
        INITIAL     MX003(8,2-4),700200                                             2192
        INITIAL     MX003(9-12,1),580100                                            2193
        INITIAL     MX003(9-10,2-4),600100                                          2194
        INITIAL     MX003(11,2-4),600150                                            2195
        INITIAL     MX003(12,2-4),700200                                            2196
        INITIAL     MX003(13-16,1),500100                                           2197
        INITIAL     MX003(13-14,2-4),600100                                         2198
        INITIAL     MX003(15,2-4),600150                                            2199
        INITIAL     MX003(16,2-4),700200                                            2200
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(continued)

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* FITCHBURG
      INITIAL    MH108(1-2,1),5
      INITIAL    MH108(1,2),8
      INITIAL    MH108(1,3),18
      INITIAL    MH108(1,4),350
      INITIAL    MH108(2,3),24
      INITIAL    MH108(2,4),1
      INITIAL    MH108(3,1),1
      INITIAL    MH108(3,2),140
      INITIAL    MH108(3-5,3),145
      INITIAL    MH108(3-5,4),4
      INITIAL    MH108(4,1),2
      INITIAL    MH108(4,2),320
      INITIAL    MH108(5,1),3
      INITIAL    MH108(5,2),200
      INITIAL    MX004(1,1-4),1140100
      INITIAL    MX004(2,1-4),1400175
      INITIAL    MX004(3,1-4),1420200
      INITIAL    MX004(4,1-4),1600200
      INITIAL    MH145(1,1),32
* FT DEVENS
      INITIAL    MH109(1-2,1),6
      INITIAL    MH109(1-2,3),24
      INITIAL    MH109(1,4),268
      INITIAL    MH109(2,4),1
      INITIAL    MH109(3,1),1
      INITIAL    MH109(3,2),140
      INITIAL    MH109(3-6,3),146
      INITIAL    MH109(3-6,4),5
      INITIAL    MH109(4,1),2
      INITIAL    MH109(4,2),320
      INITIAL    MH109(5,1),3
      INITIAL    MH109(5,2),20
      INITIAL    MH109(6,1),4
      INITIAL    MH109(6,2),200
      INITIAL    MX005(1-2,1-4),940100
      INITIAL    MX005(3,1),940125
      INITIAL    MX005(3,2-4),940150
      INITIAL    MX005(4,1),940150
      INITIAL    MX005(4,2-4),940200
      INITIAL    MH146(1,1),26
* LAWRENCE
      INITIAL    MH110(1-2,1),6
      INITIAL    MH110(1,2),8
      INITIAL    MH110(1,3),21
      INITIAL    MH110(1,4),147
      INITIAL    MH110(2,3),24
      INITIAL    MH110(2,4),2
      INITIAL    MH110(3,1),1
      INITIAL    MH110(3,2),230
      INITIAL    MH110(3,3),147
      INITIAL    MH110(4,3),157
      INITIAL    MH110(5-6,3),158
      INITIAL    MH110(3-6,4),6
      INITIAL    MH110(4,1),2
      INITIAL    MH110(4,2),50
      INITIAL    MH110(5,1),3
      INITIAL    MH110(5,2),140
      INITIAL    MH110(6,2),320
      INITIAL    MH110(6,1),4
      INITIAL    MX006(1-3,1),700100
      INITIAL    MX006(1-2,2-4),780100
      INITIAL    MX006(3,2-4),780150
      INITIAL    MX006(4,1),700125
      INITIAL    MX006(4,2-4),780200
      INITIAL    MX006(5-6,1),780100
      INITIAL    MX006(5-7,2),760100
      INITIAL    MX006(5-6,3-4),780100
      INITIAL    MX006(7,1),780150
      INITIAL    MX006(7,3-4),780125
      INITIAL    MX006(8,1),780200
      INITIAL    MX006(8,2),760125
      INITIAL    MX006(8,3-4),780200
      INITIAL    MH158(1,1),1
      INITIAL    MH158(1,2),3
      INITIAL    MH158(2,1),13
      INITIAL    MH158(2,2),26
      INITIAL    MH157(1,1),1
      INITIAL    MH157(1,2),3
      INITIAL    MH157(2,1),13
      INITIAL    MH157(2,2),28
      INITIAL    MH157(2,8),41
      INITIAL    MH147(1,1),1
      INITIAL    MH147(1,2),3
      INITIAL    MH147(1,8),41
      INITIAL    MH147(2,1),13
      INITIAL    MH147(2,2),28
```

Initializes matrixes, as in Logan, to define the Fitchburg airport, weather minimums, and approach facilities required

Initializes matrixes, as in Logan, to define the Ft. Devens airport, weather minimums, and approach facilities required.

Initializes matrixes, as in Logan, to define the Lawrence airport, weather minimums, and approach facilities required.

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* MANSFIELD                                                                    2288
      INITIAL   MH111(1-2,1),4                                                 2289
      INITIAL   MH111(1,2),8                                                   2290
      INITIAL   MH111(1,3),18                                                  2291
      INITIAL   MH111(1,4),124                                                 2292
      INITIAL   MH111(2,3),24                                                  2293
      INITIAL   MH111(2,4),2                                                   2294
      INITIAL   MH111(3,1),1                                                   2295
      INITIAL   MH111(3,2),140                                                 2296
      INITIAL   MH111(3-4,3),148                                               2297
      INITIAL   MH111(3-4,4),7                                                 2298
      INITIAL   MH111(4,2),320                                                 2299
      INITIAL   MH111(4,1),2                                                   2300
      INITIAL   MX007(1-2,1-2),860100   } Initializes matrixes, as in Logan,  2301
      INITIAL   MX007(3,1-2),860150     } to define the Mansfield airport,     2302
      INITIAL   MX007(4,1-2),860200     } weather minimums, and approach       2303
      INITIAL   MX007(5-6,1-2),780100   } facilities required.                 2304
      INITIAL   MX007(7,1-2),780150                                            2305
      INITIAL   MX007(8,1-2),800200                                            2306
      INITIAL   MH148(1-2,1),2                                                 2307
      INITIAL   MH148(2,2),5                                                   2308
* MARSHFIELD                                                                   2309
      INITIAL   MH112(1-2,1),4                                                 2310
      INITIAL   MH112(1,2),8                                                   2311
      INITIAL   MH112(1,3),18                                                  2312
      INITIAL   MH112(1,4),9                                                   2313
      INITIAL   MH112(2,3),24                                                  2314
      INITIAL   MH112(2,4),1                                                   2315
      INITIAL   MH112(3,1),1                                                   2316
      INITIAL   MH112(3,2),60           } Initializes matrixes, as in Logan,   2317
      INITIAL   MH112(3-4,3),149        } to define the Marshfield airport,    2318
      INITIAL   MH112(3-4,4),8          } weather minimums, and approach       2319
      INITIAL   MH112(4,1),2            } facilities required.                 2320
      INITIAL   MH112(4,2),240                                                 2321
      INITIAL   MX008(1-2,1-2),600100                                          2322
      INITIAL   MX008(3,1-2),600150                                            2323
      INITIAL   MX008(4,1-2),640200                                            2324
      INITIAL   MH149(1,1),2                                                   2325
      INITIAL   MH149(1,2),5                                                   2326
* NEW BURYPORT                                                                2327
      INITIAL   MH113(1-2,1),4                                                 2328
      INITIAL   MH113(1,2),8                                                   2329
      INITIAL   MH113(1,3),18                                                  2330
      INITIAL   MH113(1,4),11                                                  2331
      INITIAL   MH113(2,3),24                                                  2332
      INITIAL   MH113(2,4),1                                                   2333
      INITIAL   MH113(3,1),1            } Initializes matrixes, as in Logan,   2334
      INITIAL   MH113(3,2),100          } to define the Newburyport            2335
      INITIAL   MH113(3-4,3),150        } airport, weather minimums, and       2336
      INITIAL   MH113(3-4,4),9          } approach facilities required.        2337
      INITIAL   MH113(4,1),2                                                   2338
      INITIAL   MH113(4,2),280                                                 2339
      INITIAL   MX009(1,1-2),740100                                            2340
      INITIAL   MX009(2-4,1-2),1500500                                         2341
      INITIAL   MH150(1,1),13                                                  2342
      INITIAL   MH150(1,2),17                                                  2343
* NORWOOD                                                                     2344
      INITIAL   MH114(1-2,1),6                                                 2345
      INITIAL   MH114(1,2),7                                                   2346
      INITIAL   MH114(1,3),23                                                  2347
      INITIAL   MH114(1,4),49           } Initializes matrixes, as in Logan,   2348
      INITIAL   MH114(2,3),24           } to define the Norwood airport,       2349
      INITIAL   MH114(2,4),4            } weather minimums, and approach       2350
      INITIAL   MH114(3,1),1            } facilities required.                 2351
      INITIAL   MH114(3,2),350                                                 2352
      INITIAL   MH114(3-6,3),151                                               2353
      INITIAL   MH114(3-6,4),10                                                2354
      INITIAL   MH114(4,1),2                                                   2355
      INITIAL   MH114(4,2),170                                                 2356
      INITIAL   MH114(5,1),3                                                   2357
      INITIAL   MH114(5,2),100                                                 2358
      INITIAL   MH114(6,1),4                                                   2359
      INITIAL   MH114(6,2),280                                                 2360
      INITIAL   MX010(1-3,1-4),640100                                          2361
      INITIAL   MX010(3,2-4),640150                                            2362
      INITIAL   MX010(4,1),640125                                              2363
      INITIAL   MX010(4,2-4),740200                                            2364
      INITIAL   MX010(5-7,1),580100                                            2365
      INITIAL   MX010(5-6,2-4),640100                                          2366
      INITIAL   MX010(7,2-4),640150                                            2367
      INITIAL   MX010(8,1),580125                                              2368
      INITIAL   MX010(8,2-4),740200                                            2369
      INITIAL   MX010(9,1-4),840100                                            2370
      INITIAL   MX010(10,1-4),840125                                           2371
      INITIAL   MX010(11,1-4),840150                                           2372
      INITIAL   MX010(12,1-4),840175                                           2373
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(continued)

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      INITIAL    MX010(13-15,1),580100
      INITIAL    MX010(16,1),580125
      INITIAL    MH151(1-2,1),31
      INITIAL    MH151(2,2),34
      INITIAL    MH151(2,4),52
      INITIAL    MH151(3-4,1),2
      INITIAL    MH151(4,2),5
* PLYMOUTH
      INITIAL    MH115(1-2,1),6
      INITIAL    MH115(1,2),8
      INITIAL    MH115(1,3),18
      INITIAL    MH115(1,4),149
      INITIAL    MH115(2,3),24
      INITIAL    MH115(2,4),1
      INITIAL    MH115(3,1),1
      INITIAL    MH115(3,2),60
      INITIAL    MH115(3-6,3),152
      INITIAL    MH115(3-6,4),11
      INITIAL    MH115(4,1),2
      INITIAL    MH115(4,2),330
      INITIAL    MH115(5,1),3
      INITIAL    MH115(5,2),240
      INITIAL    MH115(6,1),4
      INITIAL    MH115(6,2),150
      INITIAL    MH152(1,1),30
      INITIAL    MX011(1-3,1-4),600100
      INITIAL    MX011(3,2-4),600150
      INITIAL    MX011(4,1-4),1500500
* S. WEYMOUTH
      INITIAL    MH116(1-2,1),6
      INITIAL    MH116(1-2,3),24
      INITIAL    MH116(1,4),161
      INITIAL    MH116(2,4),3
      INITIAL    MH116(3,1),1
      INITIAL    MH116(3,2),350
      INITIAL    MH116(3,3),153
      INITIAL    MH116(3-6,4),12
      INITIAL    MH116(4,1),2
      INITIAL    MH116(4,2),80
      INITIAL    MH116(5,1),3
      INITIAL    MH116(5,2),260
      INITIAL    MH116(6,1),4
      INITIAL    MH116(6,2),170
      INITIAL    MH116(4,3),159
      INITIAL    MH116(5,3),160
      INITIAL    MH116(6,3),161
      INITIAL    MX012(1-4,1),620100
      INITIAL    MX012(1-2,2-4),640100
      INITIAL    MX012(3,2-4),640150
      INITIAL    MX012(4,2-4),720200
      INITIAL    MX012(5-6,1-4),640100
      INITIAL    MX012(7,1-4),640150
      INITIAL    MX012(8,1-4),720200
      INITIAL    MX012(9-12,1),520100
      INITIAL    MX012(9-12,2),540100
      INITIAL    MX012(9-12,3),560100
      INITIAL    MX012(9-10,4),640100
      INITIAL    MX012(11,4),640150
      INITIAL    MX012(12,4),720200
      INITIAL    MH153(1-2,1),2
      INITIAL    MH153(1-2,2),5
      INITIAL    MH153(1,3),36
      INITIAL    MH153(3,1),27
      INITIAL    MH153(1,1),27
      INITIAL    MH153(3,1),2
      INITIAL    MH153(3,2),5
      INITIAL    MH153(3,3),36
      INITIAL    MH153(3,8),61
      INITIAL    MH153(1,2-3),0
      INITIAL    MH159(1,1),27
      INITIAL    MH159(2-3,1),2
      INITIAL    MH159(2-3,2),5
      INITIAL    MH159(3,3),36
      INITIAL    MH159(3,8),58
      INITIAL    MH160(1,1),27
      INITIAL    MH160(2-3,1),2
      INITIAL    MH160(2-3,2),5
      INITIAL    MH160(3,3),36
      INITIAL    MH160(3,7),62
      INITIAL    MH160(3,8),59
      INITIAL    MH161(1,1),27
      INITIAL    MH161(2-3,1),2
      INITIAL    MH161(2-3,2),5
      INITIAL    MH161(3,3),36
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Norwood continued

Initializes matrixes, as in Logan, to define the Plymouth airport, weather minimums, and approach facilities required.

Initializes matrixes, as in Logan, to define the S. Weymouth airport, weather minimums, and approach facilities required.

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* TAUNTON                                                                    2458
      INITIAL    MH117(1-2,1),4                                             2459
      INITIAL    MH117(1,2),8                                               2460
      INITIAL    MH117(1,3),18                                              2461
      INITIAL    MH117(1,4),92                                              2462
      INITIAL    MH117(2,3),24                                              2463
      INITIAL    MH117(2,4),3                                               2464
      INITIAL    MH117(3,1),1                                               2465
      INITIAL    MH117(3,2),300                                             2466
      INITIAL    MH117(3-4,3),154                                           2467
      INITIAL    MH117(3-4,4),13                                            2468
      INITIAL    MH117(4,1),2                                               2469
      INITIAL    MH117(4,2),120                                             2470
      INITIAL    MH154(1,1),29                                              2471
      INITIAL    MH154(2-3,1),2                                             2472
      INITIAL    MH154(3,2),5          } Initializes matrixes, as in Logan, to define the Taunton   2473
      INITIAL    MX013(1-3,1-2),660100 } airport, weather minimums, and approach facilities required. 2474
      INITIAL    MX013(3,2),660150                                          2475
      INITIAL    MX013(4,1),660125                                          2476
      INITIAL    MX013(4,2),660200                                          2477
      INITIAL    MX013(5-7,1-2),760150                                      2478
      INITIAL    MX013(8,1-2),760200                                        2479
      INITIAL    MX013(9,1-2),580150                                        2480
      INITIAL    MX013(10-11,1-2),620150                                    2481
      INITIAL    MX013(12,1-2),620200                                       2482
* TEW-MAL                                                                   2483
      INITIAL    MH118(1-2,1),6                                             2484
      INITIAL    MH118(1,2),8                                               2485
      INITIAL    MH118(1,3),18                                              2486
      INITIAL    MH118(1,4),92                                              2487
      INITIAL    MH118(2,3),24                                              2488
      INITIAL    MH118(2,4),2                                               2489
      INITIAL    MH118(3,1),1                                               2490
      INITIAL    MH118(3,2),210                                             2491
      INITIAL    MH118(3-6,3),155                                           2492
      INITIAL    MH118(3-6,4),14                                            2493
      INITIAL    MH118(4,1),2          } Initializes matrixes, as in Logan, to define the Tew-Mac   2494
      INITIAL    MH118(4,2),30         } airport, weather minimums, and approach facilities required. 2495
      INITIAL    MH118(5,1),3                                               2496
      INITIAL    MH118(5,2),180                                             2497
      INITIAL    MH118(6,1),4                                               2498
      INITIAL    MH118(6,2),360                                             2499
      INITIAL    MH155(1,1),1                                               2500
      INITIAL    MH155(1,2),3                                               2501
      INITIAL    MH155(2,1),28                                              2502
      INITIAL    MX014(1-3,1-4),640100                                      2503
      INITIAL    MX014(3,2-4),640150                                        2504
      INITIAL    MX014(4,2-4),920200                                        2505
      INITIAL    MX014(4,1),640175                                          2506
      INITIAL    MX014(5-6,1-4),760100                                      2507
      INITIAL    MX014(7,1-4),760150                                        2508
      INITIAL    MX014(8,1-4),920200                                        2509
      INITIAL    XH$FACIL,63                                                2510
      INITIAL    XH$ARSEP,1                                                 2511
      INITIAL    XH$WTCHG,180                                               2512
      INITIAL    XH$WTVAR,15                                                2513
      INITIAL    XH$DAYST,8                                                 2514
      INITIAL    XH$DAYEN,18                                                2515
      INITIAL    XH$RUNWY,5                                                 2516
      INITIAL    XH$DIVRT,500                                               2517
      INITIAL    XH$AIRPT,18                                                2518
      INITIAL    XH$HOLD,5                                                  2519
      INITIAL    XH$NORAD,15                                                2520
      INITIAL    XH$RADDW,16                                                2521
      INITIAL    XH$TOF,10                                                  2522
      INITIAL    XH$WNMAX,15                                                2523
      INITIAL    XH$MAXTM,30                                                2524
      INITIAL    XH$TAKQU,3                                                 2525
      INITIAL    XH$LNDST,5                                                 2526
      INITIAL    XH$MNONE,-1                                                2527
      INITIAL    XH$LNDSP,2                                                 2528
      INITIAL    XH$TAKVS,100                                               2529
      INITIAL    XH$TAKCL,375                                               2530
      INITIAL    XH$CALM,5                                                  2531

 PMFTY FUNCTION   RN2,C2                                                    2532
0,50/.999,150                                                               2533
 WNVEL FUNCTION   P1,D10                                                    2534
4,3/5,3/6,7/7,7/8,12/9,12/10,22/11,22/12,30/13,30                           2535
 CEIL  FUNCTION   P3,D7                                                     2536
1,1000/2,750/3,500/4,400/5,300/6,200/7,50                                   2537
 VISAB FUNCTION   P1,D7                                                     2538
1,25/2,50/3,80/4,100/5,150/6,200/7,300                                      2539
 PMOFY FUNCTION   RN2,C2                                                    2540
0,150/.999,450                                                              2541
 MODSP FUNCTION   P1,D4                                                     2542
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(continued)

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1,1005/2,18060/3,2015/4,24060                                                    2543
 LOGRN FUNCTION   P1,C13                                                         2544
0,100/1,7/10,4.6/100,2.3/200,1.61/300,1.2/400,.92/500,.69/600,.51/              2545
700,.36/800,.22/900,.11/999,.001                                                 2546
 1     FUNCTION   RN1,C2                                                        2547
0,71/1,92                                                                        2548
 2     FUNCTION   RN1,C2                                                        2549
0,91/1,122                                                                       2550
 3     FUNCTION   RN1,C2                                                        2551
0,121/1,142                                                                      2552
 4     FUNCTION   RN1,C2                                                        2553
0,141/1,167                                                                      2554
 CLOCK VARIABLE   (C1/60)*24+1                                                   2555
 CEILO FVARIABLE  FN$CEIL+FN$PMOFY-300                                           2556
 MTBF  FVARIABLE  FN$LOGRN*P3                                                    2557
 MTTR  FVARIABLE  FN$LOGRN*P4                                                    2558
 VISAB FVARIABLE  FN$VISAB+(FN$PMFTY-100)/2                                      2559
 WTVAR FVARIABLE  FN$LOGRN*XH$WTVAR                                              2560
 CEIL  FVARIABLE  FN$CEIL+FN$PMFTY-100                                           2561
 WTCHG FVARIABLE  FN$LOGRN*XH$WTCHG                                              2562
 TYPEA FVARIABLE  XH$VFRWT*MH$VFRPT(P2,XH$TYPCT)+V$TYPED                         2563
 TYPED FVARIABLE  XH$IFRWT*MH$IFRPT(P2,XH$TYPCT)                                 2564
 DESTN FVARIABLE  XH$VFRWT*MH$VFRAC(V$CLOCK,XH$TYPCT)+V$DEST1                    2565
 DEST1 FVARIABLE  XH$IFRWT*MH$IFRAC(V$CLOCK,XH$TYPCT)                            2566
 DELTM FVARIABLE  60*V$DELT2                                                     2567
 DELT2 FVARIABLE  FN$LOGRN/(XH$VFRWT*MH$VFRAC(V$CLOCK,18)+V$DELT1)               2568
 DELT1 FVARIABLE  XH$IFRWT*MH$IFRAC(V$CLOCK,18)                                  2569
 TOF   FVARIABLE  (600*(MH$DSTN(P15,P2)/P3)+5)/10                                2570
 TOFNR FVARIABLE  (600*(MH$DSTNR(P15,P2)/P3)+5)/10                               2571
 TAKOY VARIABLE   M1-1                                                           2572
 DELAY VARIABLE   M1-P7                                                          2573
 DIRWN VARIABLE   XH$DIRWN*XH$DIRWN                                              2574
 MOD   FVARIABLE  FN$MODSP/100+RN7*V$SPRED/1000                                  2575
 SPRED VARIABLE   FN$MODSP*100                                                   2576
 LNDSP FVARIABLE  (10*(X$LNDTM*XH$LNDVL/60)+5)/10                                2577
 CLRD  BVARIABLE  X$TMCTR*L*P6                                                   2578
 TRLAC BVARIABLE  X$TMCTR*L*P6                                                   2579
 LEDAC BVARIABLE  X$TMCTR*GE*P6                                                  2580
 APSEP FVARIABLE  (600*P1/P3+5)/10                                               2581
 SEPAR FVARIABLE  (600*P1/XH$TRLVL+5)/10                                         2582
 MDRWN FVARIABLE  XH$MNONE*XH$DIRWN                                              2583
 WEATH BVARIABLE  XH$CEILT*GE*V$CEILT*XH$VISAT*GE*V$VISAT                        2584
 APPCT FVARIABLE  4*(P16-1)+P14                                                  2585
 CEILT VARIABLE   X$TESS/1000                                                    2586
 VISAT VARIABLE   X$TESS*1000                                                    2587
*                                                                                2588
* WEATHER MODULE                                                                2589
* WEATHER PARAMETERS                                                            2590
*  P1-COUNTER                                                                   2591
*  P2-RANDOM NUMBER COUNTER                                                     2592
*  P3-COUNTER                                                                   2593
*  P4-CEILING MATRIX NUMBER                                                     2594
*  P5/VISABILITY MATRIX NUMBER                                                  2595
*  P6-DAY/NIGHT COUNTER                                                         2596
*                                                                               2597

1               GENERATE    ,,,1,,6          CREATE WEATHER TRANSACT          2598
2               SPLIT       1,WTCL           SEND TWIN TO CEIL CALC           2599
3               SPLIT       1,WTVS           SEND TWIN TO VIS CALC            2600
4       WTA     ASSIGN      1,2              INITIAL NIGHT TIME               2601
5               ASSIGN      6,0              INITIAL PARAMETER 6              2602
6               ASSIGN      3,0              INITIAL PARAMETER 3              2603
7               TEST GE     V$CLOCK,XH$DAYST,WTE  IS IT DAYTIME               2604
8               TEST L      V$CLOCK,XH$DAYEN,WTB  IS IT DAYTIME               2605
9               ASSIGN      1,3              INITIAL DAY TIME                 2606
10              ASSIGN      6,1              DAY COUNTER                      2607
11      WTB     ASSIGN      2,RN2            GET RANDOM NUMBER                2608
12      WTC     ASSIGN      3+,1             INCREMENT COUNTER                2609
13              TEST LE     P2,MH1(P3,P1),WTC  IS WIND FROM THIS DIREC       2610
14              SAVEVALUE   WNDIR,MH1(P3,1),H  STORE WIND DIRECTION          2611
15              ASSIGN      2,RN2            GET RANDOM NUMBER                2612
16      WTD     ASSIGN      1+,2             INCREMENT COUNTER                2613
17              TEST LE     P1,11,WTE        IS VELOCITY DEFAULTED            2614
18              TEST LE     P2,MH1(P3,P1),WTD  IS IT THIS VELOCITY           2615
19      WTE     SAVEVALUE   WNVEL,FN$WNVEL,H STORE WIND VELOCITY             2616
20              ASSIGN      1-,3             ASSIGN CEILING COUNTER           2617
21              ASSIGN      2,RN2            GET RANDOM NUMBER                2618
22              ASSIGN      4,MH1(P3,12)     STORE CEILING MATRIX             2619
23              ASSIGN      5,MH1(P3,13)     STORE VISIBILITY MATRIX          2620
24              ASSIGN      3,0              INITIAL COUNTER                  2621
25      WTF     ASSIGN      3+,1             INCREMENT COUNTER                2622
26              TEST LE     P3,6,WTG         IS CEILING DEFAULTED             2623
27              TEST LE     P2,MH#4(P3,P1),WTF  IS THIS THE CEILING          2624
28      WTG     SAVEVALUE   CEILP,P3,H       STORE CEILING                    2625
29              TEST E      P3,1,WTGG        IS IT VFR                        2626
30              SAVEVALUE   CEIL,FN$CEIL,H   SET CEIL TC MAX                 2627
31              TRANSFER    ,WTGGG           GO TO VISAB CALC                 2628
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(continued)

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32        WTGG  TEST  NE   P3,2,WTGGA                IS CEILING 750                    2629
33              SAVEVALUE  CEIL,V$CEIL,H             STORE CEILING                     2630
34              TRANSFER   ,WTGGG                    GO TO VISAB CALC                  2631
35        WTGGA SAVEVALUE  CEIL,V$CEILO,H            STORE CEILING                     2632
36        WTGGG ASSIGN     3+,P3                     CALC VISIBILITY COUNTER           2633
37              ASSIGN     3+,P6                     ACOUNT FOR DAYTIME                2634
38              ASSIGN     3-,1                      MICKEY MOUSE                      2635
39              ASSIGN     1,0                       INITIAL COUNTER                   2636
40              ASSIGN     2,RN2                     GET RANDOM NUMBER                 2637
41        WTH   ASSIGN     1+,1                      INCREMENT COUNTER                 2638
42              TEST LE    P1,6,WTI                  IS VISIBILITY DEFAULTED           2639
43              TEST LE    P2,MH*5(P1,P3),WTH        IS THIS THE VISIBILITY            2640
44        WTI   SAVEVALUE  VISAP,P1,H                STORE VISIBILITY                  2641
45              TEST E     P1,7,WTJ                  IS IT VFR                         2642
46              SAVEVALUE  VISAB,FN$VISAB,H          SET VISAB TO MAX                  2643
47              TRANSFER   ,WTJJ                     GO TO VFR CHECK                   2644
48        WTJ   SAVEVALUE  VISAB,V$VISAB,H           STORE VISAB                       2645
49        WTJJ  SAVEVALUE  IFRWT,1,H                 INITIAL IFR CONDITIONS            2646
50              SAVEVALUE  VFRWT,0,H                 INITIAL IFR CONDITIONS            2647
51              TEST E     XH$VISAP,7,WTK            IS VISAB AT MAX                   2648
52              TEST E     XH$CEILP,1,WTK            IS CEIL AT MAX                    2649
53              SAVEVALUE  IFRWT,0,H                 INITIAL VFR CONDITIONS            2650
54              SAVEVALUE  VFRWT,1,H                 INITIAL VFR CONDITIONS            2651
55        WTK   ASSIGN     1,RN2                     GET RANDOM NUMBER                 2652
56              LOGIC S    CHANG                     WEATHER CHANGE                    2653
57              ADVANCE    V$WTCHG                   WAIT FOR WEATHER TO CHA           2654
58              TRANSFER   ,WTA                      GO TO WEATHER CALC                2655
59        WTCL  ASSIGN     3,XH$CEILP                STORE CEILING PARAMETER           2656
60              TEST NE    P3,1,WTCLL                IS CEIL AT MAX                    2657
61              TEST NE    P3,2,WTCLA                IS CEILING 750                    2658
62              SAVEVALUE  CEIL,V$CEIL,H             STORE CEILING                     2659
63              TRANSFER   ,WTCLB                    GO TO WEATHER CHANGE              2660
64        WTCLA SAVEVALUE  CEIL,V$CEILO,H            STORE CEILING                     2661
65        WTCLB LOGIC S    CHANG                     WEATHER CHANGE                    2662
66        WTCLL ASSIGN     1,RN2                     GET RANDOM NUMBER                 2663
67              ADVANCE    V$WTVAR                   WAIT FOR WEATHER CHANGE           2664
68              TRANSFER   ,WTCL                     GO CALC CEILING                   2665
69        WTVS  ASSIGN     1,XH$VISAP                STORE VIS PARAMETER               2666
70              TEST NE    P1,7,WTVSS                IS VISAB AT MAX                   2667
71              SAVEVALUE  VISAB,V$VISAB,H           STORE VISIBILITY                  2668
72        WTVSS ASSIGN     1,RN2                     GET RANDOM NUMBER                 2669
73              LOGIC S    CHANG                     WEATHER CHANGE                    2670
74              ADVANCE    V$WTVAR                   WAIT FOR WEATHER CHANGE           2671
75              TRANSFER   ,WTVS                     GO CALC VISSIBILITY               2672
          *                                                                            2673
          * CONTROL A/C'S LEAVING HOLD AREA ENTERING AIR CONTROLLED APPROACH           2674
          *                                                                            2675
76              GENERATE   ,,,1,,1                   CREATE TRANSACTION                2676
77              SPLIT      1,ADI                     SEND TWIN TO RUNWAY MOD           2677
78              GATE LS    FINI6                     WAIT FOR FACILITIES               2678
79        AABF  LOGIC R    ENTER                     RESET A/C IN HOLD SWITC           2679
80              GATE LS    ENTER                     WAIT FOR A/C TO ENTER H           2680
81        AABG  GATE  LR   ARCGO                     WAIT FOR AIR CONTROLLER           2681
          * AIR CONTROLLER TAKES CONTROL OF A/C                                       2682
82              UNLINK     HOARC,AAA,1,13,0,AABF     RELEASE A/C FROM HOLD             2683
83              GATE LS    FINI5                     WAIT FOR A/C IN TEST              2684
84              LOGIC R    FINI5                     A/C IN TEST                       2685
85              TRANSFER   ,AABG                     CHECK FOR NEXT A/C                2686
          *                                                                            2687
          * CREATE A/C AND LOAD INTO HOLD AREAS                                        2688
          *                                                                            2689
86              GENERATE   ,,,,,16                   CREATE A/C'S                      2690
87              GATE LR    FINI2                     WAIT FOR PREV A/C                 2691
88              LOGIC S    FINI2                     A/C IN CREATION                   2692
89              ASSIGN     1,RN1                     GET RANDOM NUMBER                 2693
90              ADVANCE    V$DELTM                   WAIT FOR A/C IN HOLD              2694
91              LOGIC R    FINI2                     A/C CREATED                       2695
          * ASSIGN A/C TAIL NUMBER                                                    2696
92              SAVEVALUE  ACNUM+,1,H                INCREMENT A/C TAIL NUM            2697
93              ASSIGN     5,XH$ACNUM                ASSIGN A/C TAIL NUM               2698
          * ASSIGN A/C DESTINATION                                                    2699
94              ASSIGN     1,RN1                     CHOOSE RANDOM NUMBER              2700
95              SAVEVALUE  TYPCT,0,H                 INITIAL AIRPORT COUNTER           2701
96        ACC   SAVEVALUE  TYPCT+,1,H                INCREMENT AIRPORT                 2702
97              TEST NE    XH$TYPCT,XH$AIRPT,ACD     CHECK ALL AIRPORTS                2703
98              TEST G     P1,V$DESTN,ACD            IS THIS THE AIRPORT               2704
99              TRANSFER   ,ACC                      GO CHECK AGAIN                    2705
100       ACD   ASSIGN     2,XH$TYPCT                ASSIGN DESTINATION                2706
          * ASSIGN A/C TYPE                                                          2707
101             SAVEVALUE  TYPCT,0,H                 INITIAL COUNTER                   2708
102             ASSIGN     1,RN1                     GET RANDOM NUMBER                 2709
103       AAD   SAVEVALUE  TYPCT+,1,H                INCREMENT TYPE COUNTER            2710
104             TEST G     P1,V$TYPEA,AAG            IS THIS THE TYPE                  2711
105             TEST E     XH$TYPCT,3,AAD            IS IT TYPE 4                      2712
106             SAVEVALUE  TYPCT,4,H                 TYPE 4 A/C                        2713
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107      AAG   ASSIGN      4,XH$TYPCT                    ASSIGN A/C TYPE                          2714
          * ASSIGN A/C WEIGHT CLASS AND CATAGORY                                                 2715
108           ASSIGN      1,RN1                         GET RANDOM NUMBER                        2716
109           ASSIGN      8,0                           INITIAL PARAMETER 8                      2717
110      ABA  ASSIGN      8+,1                          INCREMENT COUNTER                        2718
111           TEST LE     P1,MH$CATWT(P4,P8),ABA        FIND CATAGORY OF A/C                     2719
112           ASSIGN      14,P8                         STORE CATAGORY                           2720
113           ASSIGN      8,4                           INITIAL COUNTER                          2721
114           ASSIGN      1,RN1                         GET RANDOM NUMBER                        2722
115      ABB  ASSIGN      8+,1                          INCREMENT COUNTER                        2723
116           TEST LE     P1,MH$CATWT(P4,P8),ABB        FIND WEIGHT CLASS                        2724
117           ASSIGN      9,P8                          STORE WEIGHT CLASS                       2725
118           ASSIGN      9-,4                          CALC WEIGHT CLASS                        2726
          * ASSIGN A/C SPEED                                                                     2727
119           ASSIGN      3,FN*14                       CALC A/C SPEED                           2728
          * LOAD DISPLAY MATRIX                                                                  2729
120           MSAVEVALUE  DELAY+,1,P4,1,H               STORE NUM A/C CREATED                    2730
121           TEST LE     P2,XH$HOLC,AEA                IS DESTINATION SECONDAR                  2731
122      ABC  SAVEVALUE   ACCTR+,1,H                    INCREMENT DISPLAY COUNT                  2732
123           MSAVEVALUE  DELAY+,2,P4,1,H               STORE NUM PRI A/C                        2733
124           ASSIGN      15,1                          A/C DESTINATION CHANGED                  2734
125           ASSIGN      10,P5                         LOAD A/C TAIL NUMBER                     2735
126           ASSIGN      5,XH$ACCTR                    ASSIGN DISPLAY COUNTER                   2736
127           ASSIGN      8,0                           INITIAL PARAMETER 8                      2737
128           ASSIGN      1,0                           INITIAL PARAMETER 1                      2738
129           LOGIC S     ENTER                         A/C IN HOLD AREA                         2739
130           MARK                                       A/C MARK TIME                            2740
131           LINK        HDARC,P10                     LOAD A/C INTO HOLD AREA                  2741
          *                                                                                      2742
          * UNLOAD HOLD AREAS AND LAND A/C                                                       2743
          *                                                                                      2744
132      AAB  ADVANCE     P7                            LAND A/C                                 2745
133           GATE LR     FINI1                         ENSURE ALL A/C'S IN SCH                  2746
134           UNLINK      P11,TERM,1,5,P5,ERR           A/C OFF LAND SCHEDULE                    2747
135           TEST NE     V$DELAY,0,NDLY                TEST FOR DELAY                           2748
136           MSAVEVALUE  DELAY+,5,P4,1,H               STORE NUM A/C DELAYED                    2749
137           MSAVEVALUE  DELAY+,6,P4,V$DELAY,H         STORE DELAY TIME                         2750
138      NDLY SAVEVALUE   ARCGO-,1,H                    A/C NOT IN CONTROL                       2751
139           TEST L      XH$ARCGO,MH$ARSEP(XH$ARSEP,11),TERM1 CAN AIR CONTROL N                 2752
140           LOGIC R     ARCGO                         ALLOW NEXT A/C                           2753
141      TERM1 ASSIGN     1,P4                          STORE A/C TYPE                           2754
142           MSAVEVALUE  DELAY+,9,P4,1,H               STORE NUM A/C LANDED                     2755
143           SPLIT       1,TAA,,3                      REDUCE XACT SIZE                         2756
144           LOGIC S     LNDSP                         NO SAME RUNWAY TAKEOFFS                  2757
145           ADVANCE     1                             WAIT ONE MINUTE                          2758
146           TEST GE     XH$ARSEP,XH$NORAD,AABA        IS IT RADAR CONTROL                      2759
147           ADVANCE     2                             WAIT ADDITIONAL 2 MINUT                  2760
148      AABA LOGIC R     LNDSP                         A/C CLEARED FOR TAKEOFF                  2761
149           TERMINATE                                  TERMINATE A/C                            2762
          *                                                                                      2763
          * TAKE OFF A/C                                                                         2764
          *                                                                                      2765
150      TAA  ADVANCE     V$MOD                         WAIT FOR TURN AROUND                     2766
151           PRIORITY    0                             DECREASE PRIORITY                        2767
152           MSAVEVALUE  DELAY+,13,P1,1,H                                                       2768
153           MARK                                       A/C MARK TIME                            2769
154           ASSIGN      2,C1                          STORE CLOCK                              2770
155           SAVEVALUE   TAKOF+,1,H                    INCREMENT A/C COUNTER                    2771
156           ASSIGN      3,XH$TAKOF                    STORE A/C NUMBER                         2772
157           SPLIT       1,TAB                         SEND TWIN TO SCH CHECK                   2773
158           LINK        TAKOF,P2                      A/C IN QUEUE                             2774
159      TAB  GATE  LR    TAKOF                         IS A/C READY                             2775
160           LOGIC S     TAKOF                         NO MORE A/C'S                            2776
161      TACC GATE  LR    FINI1                         IS CHECK CLEARED                         2777
162           LOGIC S     FINI1                         A/C IN CHECK                             2778
163           SAVEVALUE   TMCTR,P2                      STORE ETA                                2779
164           UNLINK      1,TAD,1,BV$CLRD,,TBKOF        FIND NEXT LANDING A/C                    2780
165           GATE LS     CLRD                          WAIT FOR A/C FOUND                       2781
166           LOGIC R     FINI1                         TEST COMPLETED                           2782
167           LOGIC R     CLRD                          A/C RETURNED TO CHAIN                    2783
168           SAVEVALUE   LNDTM-,C1                     MINUTES TO LAND TIME                     2784
169      TACD TEST  G     XH$WNVEL,XH$WNMAX,TACA        IS WIND ABOVE MAX                        2785
170           GATE LR     LNDSP                         WAIT FOR TAKEOFF                         2786
171      TACA TEST  NE    V$LNDSP,0,TAKOF               ANY LANDING A/C                          2787
172           TEST L      V$LNDSP,XH$LNDSP,TAKOF        ARE SEPAR OBSERVED                       2788
173           MSAVEVALUE  DELAY+,12,P1,X$LNDTM,H        STORE DELAY TIME                         2789
174           ADVANCE     X$LNDTM                       WAIT FOR A/C TO LAND                     2790
175           TRANSFER    ,TACC                         GO TRY NEXT A/C                          2791
176      TAD  SAVEVALUE   LNDTM,P6                      STORE LANDING TIME                       2792
177           SAVEVALUE   LNDVL,P3,H                    STORE LANDING VELOCITY                   2793
178           LOGIC S     CLRD                          A/C RECORDED                             2794
179           LINK        P11,P6                        RETURN A/C TO CHAIN                      2795
180      TBKOF LOGIC R    FINI1                         TEST COMPLETED                           2796
181           LOGIC R     CLRD                          A/C RETURNED TO CHAIN                    2797
182           SAVEVALUE   LNDTM,0                       ZERO LAND TIME                           2798
183           SAVEVALUE   LNDVL,0,H                     ZERO LAND SPEED                          2799
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184             TRANSFER    ,TACO                       GO TO TAKE OFF CHECK                    2800
185     TAKOF   TEST  LE    XH$TAKVS,XH$VISAB,NOTAK     CHECK VISIBILITY                        2801
186             TEST  LE    XH$TAKCL,XH$CEIL,NOTAK      CHECK CEILING                           2802
187             UNLINK      TAKOF,TERM,1,3,,ERR         TAKE OFF A/C                            2803
188             ADVANCE     1                           WAIT 1 MINUTE                           2804
189             TEST  GE    XH$ARSEP,XH$NORAD,TAE       IS IT RADAR ENVIRONMENT                 2805
190             ADVANCE     2                           WAIT ANOTHER 2 MINUTES                  2806
191     TAE     LOGIC R     TAKOF                       NEXT A/C INTO CHECK                     2807
192             TEST  NE    V$TAKDY,0,TAF               ANY DELAYS                              2808
193             MSAVEVALUE  DELAY+,10,P1,1,H            STORE NUM A/C DELAYED                   2809
194             MSAVEVALUE  DELAY+,11,P1,V$TAKDY,H      STORE DELAY TIME                        2810
195     TAF     TERMINATE                               TERMINATE A/C                           2811
196     NOTAK   GATE  LS    CHANG                       WAIT FOR WEATHER TO CHA                 2812
197             TRANSFER    ,TACC                       GO CHECK TAKE OFF                       2813
198     TERM    TERMINATE                               TERMINATE TWIN                          2814
199     ERR     ASSIGN      XH$ERROR,101                THIS STATE BOMBS MODEL                  2815
                *                                                                               2816
                * TEST AND LOAD LANDING SCHEDULE                                                2817
                *                                                                               2818
200     AAA     LOGIC S     FINI5                       A/C IN TEST                             2819
201             TEST  LE    M1,XH$MAXTM,AEDH            HAS A/C WAITED TOO LONG                 2820
202             SAVEVALUE   ARCGO+,1,H                  A/C IN CONTROL                          2821
203             TEST  GE    XH$ARCGO,MH$ARSEP(XH$ARSEP,11),AEA  CAN CONTROL HANDLE             2822
204             LOGIC S     ARCGO                       DO NOT LET IN NEXT A/C                  2823
205             TRANSFER    ,AEA                        GO TO RUNWAY CHECK                      2824
206     ADI     GATE  LS    CHANG                       WAIT FOR WEATHER CHANGE                 2825
207             LOGIC R     CHANG                       RESET WEATHER CHANGE                    2826
208             UNLINK      HDARC,AEA,ALL,13,1          CHECK ALL A/C WAITING                   2827
209             TRANSFER    ,ADI                        GO TO WAIT FOR CHANGE                   2828
                * DETERMINE LANDING RUNWAY                                                      2829
210     AEA     ASSIGN      1,XH$RUNWY                  STORE RUNWAYS                           2830
211             PRIORITY    0                           DECREASE PRIORITY                       2831
212             ASSIGN      8,0                         INITIAL PARAMETER 8                     2832
213             ASSIGN      1+,1                        INCREMENT RUNWAYS BY 1                  2833
214             ASSIGN      1,MH$DSTN(P1,P2)            STORE ARPRT MATRIX NUMB                 2834
215             TEST  NE    P15,0,AEAA                  IS ARPRT PRIMARY                        2835
216             TEST  G     P2,XH$HOLD,AEAA             HAS ORIGIN CHANGED                      2836
217             ASSIGN      1,XH$RUNWY                  STORE RUNWAYS                           2837
218             ASSIGN      1+,1                        INCREMENT RUNWAYS BY 1                  2838
219             ASSIGN      1,MH$DSTN(P1,1)             STORE HOLD AREA 1                       2839
220     AEAA    TEST  GE    V$CLOCK,MH*1(1,2),AEDD      IS ARPRT OPEN                           2840
221             TEST  LE    V$CLOCK,MH*1(1,3),AEDD      IS ARPRT OPEN                           2841
222             ASSIGN      6,3                         STORE DAY TIME ROW                      2842
223             ASSIGN      7,MH*1(2,1)                 STORE MAX ROW                           2843
224             TEST  GE    V$CLOCK,MH*1(2,2),AEB       IS IT DAY TIME                          2844
225             TEST  G     V$CLOCK,MH*1(2,3),AED       IS IT DAY TIME                          2845
226     AEB     ASSIGN      6,MH*1(2,1)                 STORE NIGHT ROW                         2846
227             ASSIGN      7,MH*1(1,1)                 STORE MAX ROW                           2847
228             ASSIGN      7+,1                        INCREMENT MAX ROW                       2848
229     AED     TEST  G     XH$WNVEL,XH$CALM,AEF        IS WIND ABOVE MAX                       2849
230     AEDB-   SAVEVALUE   DIRWN,XH$WNDIR,H            STORE WIND DIRECTION                    2850
231             SAVEVALUE   DIRWN-,MH*1(P6,2),H         SUBTRACT RUNWAY HEADING                 2851
232             TEST  L     XH$DIRWN,0,AEDBB            IS IT NEGATIVE                          2852
233             SAVEVALUE   DIRWN,V$MORWN,H             MAKE IT POSITIVE                        2853
234     AEDBB   TEST  GE    XH$DIRWN,180,AEDBC          IS IT GREATER THAN 180                  2854
235             SAVEVALUE   DIRWN-,360,H                SUBTRACRT 360                           2855
236     AEDBC   TEST  G     V$DIRWN,6400,AEF            IS RUNWAY IN 80 DEGREES                 2856
237     AEDA    ASSIGN      6+,1                        INCREMENT ROW COUNTER                   2857
238             TEST  GE    P6,P7,AEDB                  IS ROW COUNTER AT MAX                   2858
239             TEST  NE    P8,0,AEDD                   ANY OTHER RUNWY SELECTI                 2859
240             ASSIGN      15,MH*1(P8,1)               STORE LANDING RUNWAY                    2860
241             TRANSFER    ,ADDC                       GO TO CHECK                             2861
242     AEDD    TEST  E     P15,0,AEDE                  IS A/C DESTINATION PRIM                 2862
243             PRIORITY    2                           INCREASE PRIORITY                       2863
244             ASSIGN      15,RN5                      CHOOSE RANDOM NUMBER                    2864
245             TEST  LE    P15,XH$DIVRT,AEDDD          DIVERT A/C TO PRI ARPRT                 2865
246             TERMINATE                               TERMINATE REMAINDER                     2866
247     AEDDD   MSAVEVALUE  DELAY+,3,P4,1,H             STORE NUM DIVERTED                      2867
248             TRANSFER    ,ABC                        GO TO PRI ARPRT                         2868
249     AEDE    TEST  E     P13,0,AEDF                  IS A/C WAITING                          2869
250             SAVEVALUE   ARCGO-,1,H                  REMOVE A/C FM CONTROL                   2870
251             TEST  LE    XH$ARCGO,MH$ARSEP(XH$ARSEP,11),AEDEE CAN A/C ENTER                  2871
252             LOGIC R     ARCGO                       CLEAR NEXT A/C                          2872
253     AEDEE   GATE  LR    FINI1                       ALLOW 1 A/C IN TEST                     2873
254             UNLINK      1,TERM,1,10                 REMOVE TWIN FM LAND SCH                 2874
255             UNLINK      2,TERM,1,10                 REMOVE TWIN FM LAND SCH                 2875
256             SPLIT       1,AEDG                      CREATE TWIN                             2876
257             ASSIGN      13,1                        A/C IS WAITING                          2877
258     AEDF    LINK        HDARC,P10                   PUT BACK INTO HOLD                      2878
259     AEDG    ADVANCE     XH$MAXTM                    WAIT MAX TIME                           2879
260             UNLINK      HDARC,TERM,1,10,,AEDH       REMOVE A/C FM HOLD AREA                 2880
261             MSAVEVALUE  DELAY+,8,P4,1,H             STORE NUM A/C CAN'T LAN                 2881
262             TERMINATE                               TERMINATE A/C                           2882
263     AEDH    PRIORITY    0,BUFFER                    DECREASE PRIORITY                       2883
264             UNLINK      HDARC,TERM,1,10             REMOVE A/C FM HOLD AREA                 2884
265             MSAVEVALUE  DELAY+,8,P4,1,H             STORE NUM A/C CAN'T LAN                 2885
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                TERMINATE                                    TERMINATE A/C
AEF     TEST  NE  P8,0,AEFF                                  WAS RUNWAY SELECTED
                SAVEVALUE TESS,V$DIRWN                       STORE WIND DIRECTION
                SAVEVALUE DIRWN,XH$WNDIR,H                   STORE WIND DIRECTION
                SAVEVALUE DIRWN-,MH*1(P8,2),H                SUBTRACT RUNWAY DIRECTI
                TEST L    XH$DIRWN,0,AEFD                    IS IT NEGATIVE
                SAVEVALUE DIRWN,V$MDRWN,H                    MAKE IT POSITIVE
AEFD    TEST  GE  XH$DIRWN,180,AEFB                          IS IT GREATER THAN 180
                SAVEVALUE DIRWN-,360,H                       SUBTRACT 360
AEFB    SAVEVALUE TESS-,V$DIRWN                              SUBTRACT WIND DIFFERENT
                TEST L    X$TESS,0,AEDA                      IS THIS RUNWAY CLOSER
AEFF    TEST  NE  XH$VFRWT,1,ADD                             IS IT VFR
                ASSIGN    16,0                               INITIAL PARAMATER 16
                ASSIGN    12,MH*1(P6,3)                      STORE FACILITY MATRIX
AEG     ASSIGN    16+,1                                      INCREMENT PARAMETER 16
                TEST LE   P16,MH*1(2,4),AEDA                 CHECK ALL APPROACHES
                ASSIGN    11,0                               INITIAL COUNTER
AEH     ASSIGN    11+,1                                      INCREMENT COUNTER
                TEST LE   P11,4,AEK                          TEST ALL FACILITIES
                TEST NE   MH*12(P16,P11),0,AEH               IS FACILITY ZERO
                SAVEVALUE DUMMY,MH*12(P16,P11),H             DUMMY STORE
                TEST NE   MX$FACIL(XH$DUMMY,1),1,AEH         IS FACILITY DOWN
                TRANSFER  ,AEG                               CHECK NEXT APPROACH
AEK     SAVEVALUE CEILT,XH$CEIL,H                            STORE CEILING
                SAVEVALUE VISAT,XH$VISAB,H                   STORE VISIBILITY
                SAVEVALUE CEILT-,MH*11(1,4),H                SUBTRACT APPRT ELEVATIO
                TEST NE   MH*12(P16,5),0,AEL                 IS OM REQUIRED
                SAVEVALUE DUMMY,MH*12(P16,5),H               DUMMY STORER
                TEST NE   MX$FACIL(XH$DUMMY,1),1,AEL         IS OM UP
                SAVEVALUE VISAT-,25,H                        UPDATE VISAB
                SAVEVALUE CEILT-,50,H                        UPDATE CEILING
AEL     TEST  NE  MH*12(P16,6),0,AEM                         IS MM REQUIRED
                SAVEVALUE DUMMY,MH*12(P16,6),H               DUMMY STORER
                TEST NE   MX$FACIL(XH$DUMMY,1),1,AEM         IS MM UP
                SAVEVALUE VISAT-,25,H                        UPDATE VISAB
                SAVEVALUE CEILT-,50,H                        UPDATE CEIL
AEM     TEST  NE  MH*12(P16,7),0,AEO                         IS ALS REQUIRED
                SAVEVALUE DUMMY,MH*12(P16,7),H               DUMMY STORER
                TEST NE   MX$FACIL(XH$DUMMY,1),1,AEO         IS ALS UP
                SAVEVALUE CEILT-,50,H                        UPDATE CEIL
                SAVEVALUE VISAT-,50,H                        UPDATE VISAB
AEO     TEST  NE  MH*12(P16,8),0,AEP                         IS HIRL REQUIRED
                SAVEVALUE DUMMY,MH*12(P16,8),H               DUMMY STORER
                TEST NE   MX$FACIL(XH$DUMMY,1),1,AEP          IS HIRL UP
                SAVEVALUE VISAT-,50,H                        UPDATE VISAB
AEP     ASSIGN    12,MH*1(P6,4)                              STORE MINMA TABLE
                SAVEVALUE DUMMY,MH*1(P6,1),H                 DUMMY STORER
                SAVEVALUE TESS,MX*12(V$APPCT,XH$DUMMY)       DUMMY STORER
                TEST NE   BV$WEATH,1,ADD                     IS WEATHER CK
                ASSIGN    12,MH*1(P6,3)                      STORE RUNWAY SELECTED
                TRANSFER  ,AEG                               CHECK NEXT APPROACH
ADD     ASSIGN    12,0                                       INITIAL PARAMETER 12
                TEST E    P15,0,ADDA                         IS A/C DESTINATION PRIM
                TERMINATE                                     TERMINATE SECONDARY AC
ADDA    ASSIGN    15,MH*1(P6,1)                              STORE RUNWAY SELECTED
                TEST G    XH$WNVEL,XH$WNMAX,ADDC             IS WIND MAXIMUM
                ASSIGN    8,P6                               STORE RUNWAY SELECTED
                TRANSFER  ,AEDA                              GO CHECK FOR CLOSER RUN
ADDC    ASSIGN    1,0                                        INITIAL PARAMETER 1
                TEST E    P13,1,ADDB                         IS A/C IN HOLD
                ASSIGN    13,0                               A/C CLEARED TO LAND
                PRIORITY  2                                  INCREASE PRIORITY
                LOGIC S   ENTER                              A/C IN HOLD AREA
                LINK      HOARC,P10                          PUT A/C INTO HOLD
ADDB    TEST  E   P9,1,ADE                                   IS AIR WEIGHT CLASS 1
                TEST E    XH$VFRWT,1,ADE                     IS IT VFR
                ASSIGN    11,2                               USE SECONDARY RUNWAY
                ASSIGN    7,XH$TOF                           STORE AVERAGE TOF
                TRANSFER  ,ADF                               GO TO CALC ETA
ADE     ASSIGN    11,1                                       USE PRIMARY RUNWAY
                MSAVEVALUE VFRAC,V$CLOCK,19,P15,H
                TEST GE   XH$ARSEP,XH$NORAD,ADEE             IS RADAR UP
                ASSIGN    7,V$TOFNR                          CALC TOF NON RADAR
                TRANSFER  ,ADF                               GO TO CALC ETA
ADEE    ASSIGN    7,V$TOF                                    ASSIGN TIME OF FLIGHT
* CALCULATE ETA AND CONFLICTS
ADF     ASSIGN    6,P7                                       RECORD TIME OF FLIGHT
                ASSIGN    8,0
                TEST G    P2,XH$HOLE,ADG                     IS A/C DIVERTED
                MSAVEVALUE DELAY+,4,P4,P7,H                  STORE TOF FM SEC ARPRT
ADG     ASSIGN    6+,C1                                      ASSIGN EST TIME OF ARIV
BBB     GATE  LR  FINI1                                      ALLOW 1 A/C IN TEST
                LOGIC S   FINI1                              A/C IN TEST
                UNLINK    1,TERM,1,10                        REMOVE A/C FM LAND SCHE
                UNLINK    2,TERM,1,10                        REMOVE A/C FM LAND SCHE
                SAVEVALUE TMCTR,P6                           STORE ETA
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351      8888  UNLINK    P11,88D,ALL,BV$LEDAC,,88I      FETCH LEAD A/C'S                2972
352            GATE LS   FINI4                          WAIT FOR CALC COMPLETE          2973
353      88A   LOGIC R   FINI4                          RESET SWITCH                    2974
354            UNLINK    P11,88C,1,BV$TRLAC,,88J        FETCH TRAIL A/C                 2975
355      88AA  GATE  LS  FINI3                          WAIT FOR CALC COMPLETE          2976
356            LOGIC R   FINI3                          RESET SWITCH                    2977
357            LOGIC R   FINI1                          A/C OUT OF TEST                 2978
358            TEST E    X$TRLTM,0,CCC                  DOES TRAIL A/C EXIST            2979
       * TRAILING A/C DOES NOT EXIST                                                    2980
359            TEST NE   X$LEDTM,0,88F                  DOES LEAD A/C EXIST             2981
       * LEAD A/C EXISTS                                                               2982
360      88AD  ASSIGN    1,0                            INITIAL PARAMETER 1             2983
361            TEST LE   P9,XH$LEDWT,88AC               IS LEAD A/C SMALLER             2984
362            TEST E    XH$LEDWT,3,88AB                IS LEAD A/C WEIGHT 3            2985
363            ASSIGN    1,6                            ASSIGN 6 TC PARAMETER 1         2986
364            ASSIGN    1+,XH$LEDWT                    ADD LEAD A/C WEIGHT             2987
365            ASSIGN    1-,P9                          SUBTRACT A/C WEIGHT             2988
366            ASSIGN    1,MH$ARSEP(XH$ARSEP,P1)        DETERMINE ADD SEPARTION         2989
367            TRANSFER  ,88AC                          GO TO CALC TOTAL SEPARA         2990
368      88AB  TEST  E   XH$LEDWT,2,88AC                IS LEAD A/C WEIGHT 2            2991
369            ASSIGN    1,9                            ASSIGN 9 TC PARAMETER 1         2992
370            ASSIGN    1+,XH$LEDWT                    ADD LEAD A/C WEIGHT             2993
371            ASSIGN    1-,P9                          SUBTRACT A/C WEIGHT             2994
372            ASSIGN    1,MH$ARSEP(XH$ARSEP,P1)        DETERMINE ADD SEPARATIO         2995
373      88AC  ASSIGN    1+,MH$ARSEP(XH$ARSEP,5)        DETERMINE TOTAL SEPARAT         2996
374            TEST L    P1,XH$LNDST,88AE               IS LAND SEPAR OK                2997
375            TEST G    CH$TAKOF,XH$TAKQU,88AE         IS TAKE OFF QUEUE FULL          2998
376            ASSIGN    1,XH$LNDST                     INCREASE SEPARATION             2999
377      88AE  ASSIGN    1,V$ARSEP                      CONVERT SEPAR TO TIME           3000
378            ASSIGN    1+,X$LEDTM                     ADD SEPAR TO LEAD A/C           3001
379            TEST NE   P12,1,CDE                      DOES TRAILING A/C EXIST         3002
380            TEST G    P1,P6,88F                      IS PROPER SEPAR OBSERVE         3003
       * CALCULATE WAIT TIME                                                           3004
381            ASSIGN    1-,P6                          ASSIGN WAIT TIME                3005
382            ASSIGN    6+,P1                          CALCULATE TA                    3006
383            ASSIGN    8+,P1                          STORE WAIT TIME                 3007
384      88F   SPLIT     1,88E                          SEND TWIN TO LAND SCHED         3008
385            LINK      P11,P6                         A/C IN LAND SCHEDULE            3009
386      88E   TEST  G   P8,0,AAB                       ANY WAIT TIME                   3010
387            TEST G    P8,XH$MAXTM,88EE               WILL A/C WAIT TOO LONG          3011
388            GATE LR   FINI1                          WAIT FOR TRANSACTIONS           3012
389            UNLINK    P11,TERM,1,5,,ERR              REMOVE TWIN FM LAND SCH         3013
390            SAVEVALUE ARCGO-,1,H                     REMOVE A/C FM CONTROL           3014
391            TRANSFER  ,AEDM                          RECORD A/C                      3015
392      88EE  ADVANCE   P8                             WAIT WAIT TIME                  3016
393            MSAVEVALUE DELAY+,7,P4,P8,H              STORE WAIT TIME                 3017
394            PRIORITY  2                              INCREASE PRIORITY               3018
395            ASSIGN    8,0                            ZERO WAIT TIME                  3019
396            TEST G    XH$ARCGO,MH$ARSEP(XH$ARSEP,11),AEA  CAN AIR CONTROL           3020
397            SAVEVALUE ARCGO-,1,H                     A/C NOT IN AIR CONTROL          3021
398            GATE LR   FINI1                          WAIT FOR TRANSACTIONS           3022
399            UNLINK    P11,TERM,1,5,,ERR              REMOVE A/C FM LAND SCH          3023
400            LINK      HDARC,P10                      LOAD A/C INTO HOLD AREA         3024
401      88C   SAVEVALUE TRLTM,P6                       STORE TRAIL A/C TA              3025
402            SAVEVALUE TRLWT,P9,H                     STORE TRAIL A/C WEIGHT          3026
403            SAVEVALUE TRLVL,P3,H                     STORE TRL A/C SPEED             3027
404            LOGIC S   FINI3                          CALCULATIONS COMPLETED          3028
405            LINK      P11,P6                         A/C IN LAND SCHEDULE            3029
406      88J   SAVEVALUE TRLTM,0                        ZERO TRAIL A/C TA               3030
407            SAVEVALUE TRLWT,0,H                      ZERO TRAIL A/C WEIGHT           3031
408            SAVEVALUE TRLVL,0,H                      ZERO TRAIL A/C SPEED            3032
409            LOGIC S   FINI3                          CALCULATIONS COMPLETE           3033
410            TRANSFER  ,88AA                          GO TO CONTINUE TEST             3034
411      88D   SAVEVALUE LEDTM,P6                       STORE LEAD A/C TA               3035
412            SAVEVALUE LEDWT,P9,H                     STORE LEAD A/C WEIGHT           3036
413            TEST E    W$8888,1,88DD                  RETURN ALL A/C INTO HOL         3037
414            LOGIC S   FINI4                          CALCULATIONS COMPLETE           3038
415      88DD  LINK      P11,P6                         A/C IN LANDING SCHEDULE         3039
416      88I   SAVEVALUE LEDTM,0                        ZERO LEAD A/C TA                3040
417            SAVEVALUE LEDWT,0,H                      ZERO LEAD A/C WEIGHT            3041
418            TRANSFER  ,88A                           GO TO TRAIL A/C CALC            3042
       *                                                                              3043
       * TRAILING A/C EXISTS                                                          3044
       *                                                                              3045
419      CCC   TEST  E   X$LEDTM,0,CDD                  DOES LEAD A/C EXIST             3046
       * TEST TRAILING A/C                                                           3047
420      CCD   ASSIGN    1,0                            INITIAL PARAMETER 1             3048
421            TEST L    P6,X$TRLTM,88B                IS TLR TIME VALID               3049
422            TEST LE   XH$TRLWT,P9,CCF                IS TRAILING A/C SMALLER         3050
423            TEST E    P9,3,CCE                       IS LEAD A/C WEIGHT 3            3051
424            ASSIGN    1,6                            ASSIGN 6 TC PARAMETER 1         3052
425            ASSIGN    1+,P9                          ADD LEAD A/C WEIGHT             3053
426            ASSIGN    1-,XH$TRLWT                    SUB TRAIL A/C WEIGHT            3054
427            ASSIGN    1,MH$ARSEP(XH$ARSEP,P1)        DETERMINE ADD SEPARATIO         3055
428            TRANSFER  ,CCF                           GO TO CALC TOTAL SEPARA         3056
429      CCE   TEST  E   P9,2,CCF                       IS LEAD A/C WEIGHT 2            3057
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(continued)

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430             ASSIGN      1,9                         ASSIGN 9 TO PARAMETER 1                 3058
431             ASSIGN      1+,P9                       ADD LEAD A/C WEIGHT                     3059
432             ASSIGN      1-,XH$TRLWT                 SUBTRACT TRAIL A/C WEIG                 3060
433             ASSIGN      1,MH$ARSEP(XH$ARSEP,P1)     DETERMINE ADD SEPARATIO                 3061
434     CCF     ASSIGN      1+,MH$ARSEP(XH$ARSEP,5)     DETERMINE TOTAL SEPARAT                 3062
435             TEST L      P1,XH$LNDST,CCG             IS LAND SEPAR OK                        3063
436             TEST G      CH$TAKOF,XH$TAKQU,CCG       IS TAKE OFF QUEUE FULL                  3064
437             ASSIGN      1,XH$LNDST                  INCREASE SEPARATION                     3065
438     CCG     ASSIGN      1,V$SEPAR                   CONVERT SEPAR TO TIME                   3066
439             ASSIGN      1+,P6                       ADD SEPAR TO ETA                        3067
440             TEST G      P1,X$TRLTM,BBF              IS SEPAR OBSERVED                       3068
        * CALCULATE WAIT TIME                                                                   3069
441             ASSIGN      8+,X$TRLTM                  ADD TRAIL A/C TA                        3070
442             ASSIGN      8-,P6                       SUB ETA                                 3071
443             ASSIGN      6,X$TRLTM                   REINTIALIZE ETA                         3072
444             TRANSFER    ,BBB                        GO TO TEST                              3073
        * LEAD A/C EXISTS                                                                       3074
445     CDD     ASSIGN      12,1                        LOAD DUMMY COUNTER                      3075
446             TRANSFER    ,BBAD                       GO TO DETERMINE SEPARAT                 3076
447     CDE     ASSIGN      12,0                        REINITIALIZE PARAMETER                  3077
448             SAVEVALUE   LEDWT,0,H                   ZERO LEAD A/C WEIGHT                    3078
449             SAVEVALUE   LEDTM,0                     ZERO LEAD A/C TA                        3079
450             TEST G      P1,P6,CCD                   IS SEPAR OBSERVED                       3080
        * CALCULATE WAIT TIME                                                                   3081
451             ASSIGN      1-,P6                       ASSIGN WAIT TIME                        3082
452             ASSIGN      6+,P1                       CALCULATE TA                            3083
453             ASSIGN      8+,P1                       STORE WAIT TIME                         3084
454             TRANSFER    ,CCD                        GO TO TRAIL A/C TEST                    3085
        *                                                                                       3086
        * FACILITIES OUTAGE MODULE                                                              3087
        *                                                                                       3088
455             GENERATE    ,,,1,,4,F                   CREATE FACIL XACT                       3089
456     DAA     ASSIGN      2+,1                        INCREMENT COUNTER                       3090
457             TEST G      P2,XH$FACIL,DAB             ARE ALL FACIL CREATED                   3091
458             LOGIC S     FINI6                       ALL FACIL CREATED                       3092
459             SAVEVALUE   ARSEP,1,H                   RADAR ENVIRONMENT                       3093
460     DAAA    GATE  LS    FCHAN                       WAIT FOR FACIL DOWN                     3094
461             LOGIC R     FCHAN                       RESET SWITCH                            3095
462             SAVEVALUE   ARSEP,0,H                   INITIAL POINTER                         3096
463     DAAB    SAVEVALUE   ARSEP+,1,H                  INCREMENT POINTER                       3097
464             TEST L      XH$ARSEP,XH$RADDW,DAAA      CHECK ALL FACILITIES                    3098
465             ASSIGN      1,0                         INITIAL PARAMETER 1                     3099
466     DAAC    ASSIGN      1+,1                        INCREMENT PARAMETER 1                   3100
467             TEST LE     P1,4,DAAA                   CHECK ALL FACILITIES                    3101
468             ASSIGN      2,MH$ARSEP(XH$ARSEP,P1)     STORE FACILITY NUMBER                   3102
469             TEST NE     P2,0,DAAC                   IS FACILITY REQUIRED                    3103
470             TEST E      MX$FACIL(P2,1),0,DAAC       IS FACILITY UP                          3104
471             TRANSFER    ,DAAB                       CHECK NEXT CONDITION                    3105
472     DAB     SPLIT       1,DAA                       CREATE NEXT FACILITY                    3106
473             ASSIGN      3,MX$FACIL(P2,2)            STORE MTBF                              3107
474             ASSIGN      4,MX$FACIL(P2,3)            STORE MTTR                              3108
475     DAC     MSAVEVALUE  FACIL,P2,1,1                FACIL IS UP                             3109
476             ASSIGN      1,RN4                       GET RANDOM NUMBER                       3110
477             ADVANCE     V$MTBF                      WAIT FOR FACILITY DOWN                  3111
478             LOGIC S     FCHAN                       FACILITY HAS CHANGED                    3112
479             MSAVEVALUE  FACIL,P2,1,0                RECORD FACIL DOWN                       3113
480             ASSIGN      1,RN4                       GET RANDOM NUMBER                       3114
481             ADVANCE     V$MTTR                      REPAIR FACIL                            3115
482             LOGIC S     CHANG                       FACILITY DOWN                           3116
483             LOGIC S     FCHAN                       FACILITY DOWN                           3117
484             TRANSFER    ,DAC                        GO TO MTBF CALC                         3118
        *                                                                                       3119
        * MODEL RUN CONSTRAINTS                                                                 3120
        *                                                                                       3121
485             GENERATE    1440,,,,,1                  SIMULATE 1440 MINUTES                   3122
486             TERMINATE   1                                                                   3123
                START       1,,,1                                                               3124
                END                                                                             3125
```

BLOCK NUMBER	SYMBOL	REFERENCES BY CARD NUMBER				
200	AAA	2683				
132	AAB	3010				
148	AABA	2759				
79	AABF	2683				
81	AABG	2686				
103	AAD	2712				
107	AAG	2711				
110	ABA	2719				
115	ABB	2724				
122	ABC	2868				
96	ACC	2705				
100	ACD	2703	2704			
317	ADD	2897	2934			
320	ADDA	2938				
330	ADDB	2945				
324	ADDC	2861	2951			
335	ADE	2950	29[illegible]			
340	ADEE	2957				
341	ADF	2954	2959			
345	ADG	2964				
206	ADI	2677	2828			
210	AEA	2731	2822	824	2827	3020
220	AEAA	2835	2836			
226	AEB	2844				
229	AED	2845				
237	AEDA	2896	2901	2943		
230	AEDB	2858				
234	AEDBB	2852				
236	AEDBC	2854				
242	AEDD	2840	2841	2859		
247	AEDDD	2865				
249	AEDE	2862				
253	AEDEE	2871				
258	AEDF	2869				
259	AEDG	2876				
263	AEDH	2820	2880	3015		
267	AEF	2849	2856			
275	AEFB	2893				
273	AEFD	2891				
277	AEFF	2887				
280	AEG	2908	2936			
283	AEH	2905	2907			
289	AEK	2904				
297	AEL	2912	2914			
302	AEM	2917	2919			
307	AEO	2922	2924			
311	AEP	2927	2929			
353	BBA	3042				
355	BBAA	3034				
368	BBAB	2985				
373	BBAC	2984	2990	2991		
360	BBAD	3076				
377	BBAE	2997	2998			
346	BBB	3049	3073			
351	BBBB	3037				
401	BBC	2975				
411	BBD	2972				
415	BBDD	3037				
386	BBE	3008				
392	BBEE	3011				
384	BBF	2981	3003	3068		
416	BBI	2972				
406	BBJ	2975				
419	CCC	2979				
420	CCD	3080	3085			
429	CCE	3051				
434	CCF	3050	3056	3057		
438	CCG	3063	3064			
445	CDD	3046				
447	CDE	3002				
456	DAA	3106				
460	DAAA	3098	3101			
463	DAAB	3105				
466	DAAC	3103	3104			
472	DAB	3091				
475	DAC	3118				
199	ERR	2747	2803	3013	3023	
138	NDLY	2748				
196	NOTAK	2801	2802			
150	TAA	2756				
159	TAB	2773				
171	TACA	2785				

(continued)

161	TACC	2791	2813					
169	TACD	2800						
176	TAD	2780						
191	TAE	2805						
195	TAF	2808						
185	TAKOF	2787	2788					
180	TBKOF	2780						
198	TERM	2747	2803	2874	2875	2880	2884	2969
		2970	3013	3023				
141	TERM1	2752						
4	WTA	2655						
11	WTB	2604	2605					
12	WTC	2610						
59	WTCL	2599	2665					
64	WTCLA	2658						
65	WTCLB	2660						
66	WTCLL	2657						
16	WTD	2615						
19	WTE	2614						
25	WTF	2624						
28	WTG	2623						
32	WTGG	2626						
35	WTGGA	2629						
36	WTGGG	2628	2631					
41	WTH	2640						
44	WTI	2639						
48	WTJ	2642						
49	WTJJ	2644						
55	WTK	2648	2649					
69	WTVS	2600	2672					
72	WTVSS	2667						

SAVEVALUE SYMBOLS

5	LEDTM	- Dummy counter used to store lead aircraft landing time
1	LNDTM	- Dummy counter used to store approach aircraft landing time
3	TESS	- Dummy counter used to store wind direction
2	TMCTR	- Dummy counter used to store aircraft landing time
4	TRLTM	- Dummy counter used to store trailing aircraft landing time

VARIABLE SYMBOLS

29	APPCT	- Dummy variable used to store row number of minima matrix based on aircraft category
24	ARSEP	- Variable used to calculate separation between lead aircraft and aircraft of interest
7	CEIL	- Variable used to modify ceiling ±50 feet
2	CEILO	- Variable used to modify ceiling ±150 feet
27	CEILT	- Variable used to convert minima matrix entry into feet of ceiling
1	CLOCK	- Variable which converts the computer clock time into simulated hour in the day
19	DELAY	- Variable used to determine if an aircraft has experienced any delay
13	DELTM	
15	DELT1	- Variables used to determine elapsed time between aircraft arrivals
14	DELT2	
11	DESTN	- Variables used to determine aircraft destination
12	DEST1	
20	DIRWN	- Dummy variable used to square difference between wind direction and runway direction
23	LNDSP	- Variable used to calculate the approaching aircraft distance from touch down
26	MDRWN	- Dummy variable used to change the sign of the wind direction off the runway direction
21	MOD	- Variable used to calculate the turnaround time of a landing aircraft
3	MTBF	- Variable used to determine the minutes until next failure for a facility
4	MTTR	- Variable used to determine the minutes required to repair a downed facility
25	SEPAR	- Variable used to calculate separation between aircraft of interest and trailing aircraft
22	SPRED	- Variable used to put a spread on the variable MOD
18	TAKDY	- Variable used to determine if an aircraft experienced any delay during takeoff
16	TOF	- Variable used to calculate the time of flight of an aircraft in a radar environment
17	TOFNR	- Variable used to calculate the time of flight of an aircraft in a non-radar environment
9	TYPEA	
10	TYPED	- Variables used to assign an aircraft type based on the aircraft destination
5	VISAB	- Variable used to vary the visibility ±.25 mile
28	VISAT	- Variable used to convert minima matrix entry into miles of visibility
8	WTCHG	- Variable used to determine the number of minutes until the next major weather change
6	WTVAR	- Variable used to determine the number of minutes until the next minor weather variation

LOGIC SWITCH SYMBOLS

ARCGO - Logic switch is set when air control can accept aircraft
CHANG - Logic switch is set when there is a change in facility status or weather
CLRD - Logic switch is set when aircraft is allowed to take off
ENTER - Logic switch is set when an aircraft is in the hold area
FCHAN - Logic switch is set when there is a change in facility status
FINI1 - Logic switch which allows only one transaction to examine the landing schedule at a time
FINI2 - Logic switch prevents next generated aircraft into the system until previous aircraft is in the system
FINI3 - Logic switch used to hold an aircraft transaction until trail aircraft statistics are gathered
FINI4 - Logic switch used to hold an aircraft transaction until lead aircraft statistics are gathered
FINI5 - Logic switch used to allow aircraft into the landing schedule before air control checks next aircraft
FINI6 - Logic switch prevents generation of aircraft until all facilities are created
LNDSP - Logic switch prevents aircraft takeoff on land runway until landing aircraft has cleared
TAKOF - Logic switch is set when proper separation is experienced between taking off aircraft

CHAIN SYMBOLS AND CORRESPONDING NUMBERS

3	HOARC	- Hold area chain
1	LDSCD	- Landing schedule chain (1 - primary runway, 2 - secondary runway)
4	TAKOF	- Departure chain

FUNCTION SYMBOLS AND CORRESPONDING NUMBERS

7	CEIL	- Function converts column number to ceiling in feet
11	LOGRN	- Function converts random number into a logarithm of the random number
10	MODSP	- Function defines the modifier and spread of aircraft turnaround time
5	PMFTY	- Function randomly chooses between 50 and 150
9	PMOFY	- Function randomly chooses between 150 and 300
1	SPEED	- Function defines speed of aircraft based on aircraft type
8	VISAB	- Function converts column number to visibility in miles
6	WNVEL	- Function converts column number to wind velocity

MATRIX SAVEVALUE SYMBOLS AND CORRESPONDING NUMBERS

15	FACIL	- Facility matrix
1	MINMA	- Minimum matrixes for each airport (1-14)

HALF WORD MATRIX SAVEVALUE SYMBOLS AND CORRESPONDING NUMBERS

101	AIR01	
106	AIR02	- Matrixes used to define airports, facilities required, and approaches
133	AIR03	
43	ARSEP	- Separation matrix
40	CATWT	- Matrix used to determine category and weight of created aircraft
44	DELAY	- Matrix used to total delays
1	DIRVL	- Matrix used to determine weather conditions
36	DSTN	- Matrix used to determine the distances from secondary airports and hold areas to Logan runways
37	DSTNR	- Same as above except in a non-radar environment
39	IFRAC	- Matrix used to determine aircraft generated and destination under IFR conditions
42	IFRPT	- Matrix used to determine aircraft type based on destination under IFR conditions
38	VFRAC	
41	VFRPT	- Same as above except under VFR conditions

BOOLEAN VARIABLE SYMBOLS AND CORRESPONDING NUMBERS

1 CLRD - Boolean variable used to find approaching aircraft
3 LEDAC - Boolean variable used to find lead aircraft
2 TRLAC - Boolean variable used to find trailing aircraft
4 WEATH - Boolean variable used to determine if weather is below minimum for approach in question

**** ASSEMBLY TIME = 14.35 MINUTES ****

HALF WORD SAVEVALUE SYMBOLS

ACCTR - Accumulator used to count aircraft going to Logan
ACNUM - Counts aircraft created
AIRPT - Number of holding fixes and secondary airports
ARCGO - Counter used to count number of aircraft under air control
ARSEP - Pointer used to determine which row of the separation matrix is in use
CALM - Maximum wind speed for calm
CEIL - Present ceiling in feet
CEILP - Present ceiling column number
CEILT - Dummy counter used to manipulate the ceiling
DAYEN - End of day, time, for weather determination
DAYST - Start of day, time, for weather determination
DIRWN - Dummy counter used to manipulate the wind direction and runway direction
DIVRT - Number, out of 1000 aircraft, that divert to Logan from secondary airport
ERROR - Dummy counter used to bomb model if an impossible situation exists
FACIL - Number of facilities modeled
HOLD - Number of Logan holding fixes
IFRWT - Dummy counter is equal to zero in VFR and one in IFR conditions
LEDWT - Dummy counter used to store the lead aircraft's weight
LNDSP - Separation in miles between landing and taking off aircraft
LNDST - Separation increase if takeoff queue is greater than TAKQU
LNDVL - Dummy counter used to store the approach aircraft's landing velocity
MAXTM - Maximum holding time
MNONE - Dummy input
NORAD - Row number in the separation matrix where no radar condition exists
RADDW - Last row in separation matrix
RUNWY - the number of runways at Logan
TAKCL - Maximum takoff ceiling
TAKOF - Departing aircraft counter
TAKQU - Maximum number of aircraft in takeoff queue before landing separation increases
TAKVS - Minimum takeoff visibility
TOF - Time flight from holding fix or secondary airport to Logan
TRLVL - Dummy counter used to store trailing aircraft velocity
TRLWT - Dummy counter used to store trailing aircraft weight
TYPCT - Dummy counter used in the generation of aircraft
VFRWT - Dummy counter is equal to zero in IFR and one in VFR conditions
VISAB - Present visibility in miles
VISAP - Present visibility in column number
VISAT - Dummy counter used to manipulate the visibility
WNDIR - Present wind direction in degrees
WNMAX - Wind speed above which aircraft land on runway closest to the wind.
WNVEL - Present wind velocity
WTCHG - Mean time between major weather change
WTVAR - Mean time between minor weather change

Assembly of Program

```
        SIMULATE   30
1       MATRIX     H      18     13
2       MATRIX     H      6      10
4       MATRIX     H      6      10
6       MATRIX     H      6      10
8       MATRIX     H      6      10
10      MATRIX     H      6      10
12      MATRIX     H      6      10
14      MATRIX     H      6      10
16      MATRIX     H      6      10
18      MATRIX     H      6      10
20      MATRIX     H      6      10
22      MATRIX     H      6      10
24      MATRIX     H      6      10
26      MATRIX     H      6      10
28      MATRIX     H      6      10
30      MATRIX     H      6      10
32      MATRIX     H      6      10
34      MATRIX     H      6      10
3       MATRIX     H      6      14
5       MATRIX     H      6      14
7       MATRIX     H      6      14
9       MATRIX     H      6      14
11      MATRIX     H      6      14
13      MATRIX     H      6      14
15      MATRIX     H      6      14
17      MATRIX     H      6      14
19      MATRIX     H      6      14
21      MATRIX     H      6      14
23      MATRIX     H      6      14
25      MATRIX     H      6      14
27      MATRIX     H      6      14
29      MATRIX     H      6      14
31      MATRIX     H      6      14
33      MATRIX     H      6      14
35      MATRIX     H      6      14
158     MATRIX     H      2      8
157     MATRIX     H      2      8
111     MATRIX     H      4      4
112     MATRIX     H      4      4
113     MATRIX     H      4      4
117     MATRIX     H      4      4
118     MATRIX     H      6      4
106     MATRIX     H      6      4
107     MATRIX     H      6      4
109     MATRIX     H      6      4
110     MATRIX     H      6      4
114     MATRIX     H      6      4
115     MATRIX     H      6      4
116     MATRIX     H      6      4
108     MATRIX     H      5      4
101     MATRIX     H      18     4
148     MATRIX     H      2      8
149     MATRIX     H      1      8
150     MATRIX     H      1      8
151     MATRIX     H      4      8
152     MATRIX     H      1      8
153     MATRIX     H      3      8
159     MATRIX     H      3      8
160     MATRIX     H      3      8
161     MATRIX     H      3      8
154     MATRIX     H      3      8
155     MATRIX     H      2      8
133     MATRIX     H      7      8
134     MATRIX     H      7      8
135     MATRIX     H      7      8
136     MATRIX     H      7      8
137     MATRIX     H      7      8
138     MATRIX     H      7      8
139     MATRIX     H      7      8
140     MATRIX     H      7      8
141     MATRIX     H      7      8
142     MATRIX     H      7      8
143     MATRIX     H      5      8
156     MATRIX     H      5      8
144     MATRIX     H      4      8
145     MATRIX     H      1      8
146     MATRIX     H      1      8
147     MATRIX     H      2      8
36      MATRIX     H      6      18
37      MATRIX     H      5      18
38      MATRIX     H      24     19
39      MATRIX     H      24     18
40      MATRIX     H      4      7
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41    MATRIX    H     18    3
42    MATRIX    H     18    3
43    MATRIX    H     16    11
44    MATRIX    H     13    4
15    MATRIX    X     63    3
1     MATRIX    X     28    5
2     MATRIX    X     20    4
3     MATRIX    X     16    4
4     MATRIX    X     4     4
5     MATRIX    X     4     4
6     MATRIX    X     8     4
7     MATRIX    X     8     2
8     MATRIX    X     4     2
9     MATRIX    X     4     2
10    MATRIX    X     16    4
11    MATRIX    X     4     4
12    MATRIX    X     12    4
13    MATRIX    X     12    2
14    MATRIX    X     8     4
      INITIAL   MX15(1-4,2),60300
      INITIAL   MX15(1-4,3),318
      INITIAL   MX15(5,2),72300
      INITIAL   MX15(5,3),402
      INITIAL   MX15(6-7,2),24600
      INITIAL   MX15(6-7,3),534
      INITIAL   MX15(8-11,2),28500
      INITIAL   MX15(8-11,3),1260
      INITIAL   MX15(12-16,2),23400
      INITIAL   MX15(12-16,3),900
      INITIAL   MX15(17-20,2),111900
      INITIAL   MX15(17-20,3),1920
      INITIAL   MX15(21-24,2),130500
      INITIAL   MX15(21-24,3),2580
      INITIAL   MX15(25-35,2),2100000
      INITIAL   MX15(25-35,3),660
      INITIAL   MX15(36,2),24600
      INITIAL   MX15(36,3),534
      INITIAL   MX15(37,2),36300
      INITIAL   MX15(37,3),96
      INITIAL   MX15(38,2),5160
      INITIAL   MX15(38,3),180
      INITIAL   MX15(39,2),29100
      INITIAL   MX15(39,3),120
      INITIAL   MX15(40,2),20100
      INITIAL   MX15(40,3),114
      INITIAL   MX15(41-48,2),25200
      INITIAL   MX15(49-50,2),2100000
      INITIAL   MX15(54-55,2),25200
      INITIAL   MX15(58-61,2),25200
      INITIAL   MX15(63,2),25200
      INITIAL   MX15(41-48,3),780
      INITIAL   MX15(49-50,3),616
      INITIAL   MX15(54-55,3),780
      INITIAL   MX15(58-61,3),780
      INITIAL   MX15(63,3),780
      INITIAL   MX15(51-53,2),2100000
      INITIAL   MX15(51-53,3),660
      INITIAL   MX15(56-57,2),25200
      INITIAL   MX15(56-57,3),780
      INITIAL   MX15(62,2),25200
      INITIAL   MX15(62,3),780
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      INITIAL   MH36(1,2),25
      INITIAL   MH36(1,3),19
      INITIAL   MH36(1,4),31
      INITIAL   MH36(1,5),49
      INITIAL   MH36(1,6),27
      INITIAL   MH36(1,7),36
      INITIAL   MH36(1,8),46
      INITIAL   MH36(1,9),39
      INITIAL   MH36(1,10),46
      INITIAL   MH36(1,11),22
      INITIAL   MH36(1,12),29
      INITIAL   MH36(1,13),55
      INITIAL   MH36(1,14),12
      INITIAL   MH36(1,15),33
      INITIAL   MH36(1,16),14
      INITIAL   MH36(1,17),30
      INITIAL   MH36(1,18),38
      INITIAL   MH36(2,1),39
      INITIAL   MH36(2,2),45
      INITIAL   MH36(2,3),41
      INITIAL   MH36(2,4),18
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      INITIAL   MH36(2,7),22
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INITIAL    MM36(2,16),14
INITIAL    MM36(2,17),30
INITIAL    MM36(2,18),38
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INITIAL    MM36(4,4),20
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INITIAL    MM36(4,7),35
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INITIAL    MM36(4,18),49
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INITIAL    MM36(5,2),32
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INITIAL    MM36(5,4),41
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INITIAL    MM36(5,6),16
INITIAL    MM36(5,7),22
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INITIAL    MM36(5,9),31
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INITIAL    MM36(5,14),34
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INITIAL    MM36(5,16),35
INITIAL    MM36(5,17),52
INITIAL    MM36(5,18),17
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INITIAL    MM36(6,6),106
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INITIAL    MM36(6,9),109
INITIAL    MM36(6,10),110
INITIAL    MM36(6,11),111
INITIAL    MM36(6,12),112
INITIAL    MM36(6,13),113
INITIAL    MM36(6,14),114
INITIAL    MM36(6,15),115
INITIAL    MM36(6,16),116
INITIAL    MM36(6,17),117
INITIAL    MM36(6,18),118
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INITIAL    MM37(1,2),49
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INITIAL    MM37(1,6),15
INITIAL    MM37(1,7),14
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INITIAL    MH37(1,15),31
INITIAL    MH37(1,16),28
INITIAL    MH37(1,17),45
INITIAL    MH37(1,18),24
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INITIAL    MH37(2,5),36
INITIAL    MH37(2,6),38
INITIAL    MH37(2,7),21
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INITIAL    MH37(2,13),35
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INITIAL    MH37(2,17),45
INITIAL    MH37(2,18),35
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INITIAL    MH37(3,2),38
INITIAL    MH37(3,3),46
INITIAL    MH37(3,4),26
INITIAL    MH37(3,5),43
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INITIAL    MH37(3,9),45
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INITIAL    MH37(3,17),55
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INITIAL    MH37(4,9),62
INITIAL    MH37(4,10),51
INITIAL    MH37(4,11),34
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INITIAL    MH37(4,13),48
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INITIAL    MH37(5,10),28
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INITIAL    MH37(5,17),52
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INITIAL    MH41(1-5,2),897
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INITIAL    MH41(18,2),235
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INITIAL    MH41(7,3),816
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INITIAL    MH41(9,3),38
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INITIAL    MH41(15,3),1000
INITIAL    MH41(16,3),174
INITIAL    MH41(17-18,3),1000
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INITIAL    MH42(1-5,2),897
INITIAL    MH42(1-5,3),996
INITIAL    MH42(6,1),30
INITIAL    MH42(14,1),2
INITIAL    MH42(6,2),111
INITIAL    MH42(7,2),2
INITIAL    MH42(10,2),190
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INITIAL    MH42(18,2),235
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INITIAL    MH39(1-7,5-8),996
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INITIAL    MH39(2-7,2),598
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INITIAL    MH39(9-18,8),947
INITIAL    MH39(9-18,9),948
INITIAL    MH39(9,10),954
INITIAL    MH39(10-18,10),954
INITIAL    MH39(9-18,11-13),955
INITIAL    MH39(9,11),954
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INITIAL    MH39(9-18,15),997
INITIAL    MH39(9-18,16),998
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INITIAL    MH39(19-23,5),860
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INITIAL   MH39(24,5),897
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INITIAL   MH38(1,2),597
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INITIAL   MH38(1-7,4),897
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INITIAL   MH38(2-7,2),598
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INITIAL   MH38(9,10),954
INITIAL   MH38(10-18,10),954
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INITIAL   MH38(9,11),954
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INITIAL   MH38(24,4),807
INITIAL   MH38(24,5),897
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INITIAL   MH38(12,18),40
INITIAL   MH38(13,18),46
INITIAL   MH38(14,18),46
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INITIAL   MH38(17,18),60
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INITIAL   MH38(19,18),53
INITIAL   MH38(20,18),46
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INITIAL   MH38(22,18),26
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INITIAL   MH43(13,4),38
INITIAL   MH43(14,4),38
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INITIAL   MH43(11-14,5),5
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INITIAL   MH43(16,5),12
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INITIAL   MH43(9-10,6),1
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INITIAL   MH01(2,13),5
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INITIAL    MH01(3,9),753
INITIAL    MH01(3,10),996
INITIAL    MH01(3,11),995
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INITIAL    MH01(3,13),7
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INITIAL    MH01(4,3),118
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INITIAL    MH01(5,4),82
INITIAL    MH01(5,5),41
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INITIAL    MH01(10,6),757
INITIAL    MH01(10,7),456
INITIAL    MH01(10,8),949
INITIAL    MH01(10,9),803
INITIAL    MH01(10,10).1000
INITIAL    MH01(10,11),985
INITIAL    MH01(10,12),20
INITIAL    MH01(10,13),21
INITIAL    MH01(11,1),202
INITIAL    MH01(11,2),424
INITIAL    MH01(11,3),550
INITIAL    MH01(11,4),58
INITIAL    MH01(11,5),20
INITIAL    MH01(11,6),569
INITIAL    MH01(11,7),211
INITIAL    MH01(11,8),845
INITIAL    MH01(11,9),602
INITIAL    MH01(11,10).1000
INITIAL    MH01(11,11),998
INITIAL    MH01(11,12),22
INITIAL    MH01(11,13),23
INITIAL    MH01(12,1),225
INITIAL    MH01(12,2),496
INITIAL    MH01(12,3),591
INITIAL    MH01(12,4),48
INITIAL    MH01(12,5),17
INITIAL    MH01(12,6),479
INITIAL    MH01(12,7),195
INITIAL    MH01(12,8),779
INITIAL    MH01(12,9),510
INITIAL    MH01(12,10),998
INITIAL    MH01(12,11),1000
INITIAL    MH01(12,12),24
INITIAL    MH01(12,13),25
INITIAL    MH01(13,1),247
INITIAL    MH01(13,2),616
INITIAL    MH01(13,3),663
INITIAL    MH01(13,4),19
INITIAL    MH01(13,5),15
INITIAL    MH01(13,6),439
INITIAL    MH01(13,7),302
INITIAL    MH01(13,8),827
INITIAL    MH01(13,9),645
INITIAL    MH01(13,10),999
INITIAL    MH01(13,11),992
INITIAL    MH01(13,12),26
INITIAL    MH01(13,13),27
INITIAL    MH01(14,1),270
INITIAL    MH01(14,2),776
INITIAL    MH01(14,3),777
INITIAL    MH01(14,4),69
INITIAL    MH01(14,5),14
INITIAL    MH01(14,6),312
INITIAL    MH01(14,7),211
INITIAL    MH01(14,8),651
INITIAL    MH01(14,9),498
INITIAL    MH01(14,10),990
INITIAL    MH01(14,11),966
INITIAL    MH01(14,12),28
INITIAL    MH01(14,13),29
INITIAL    MH01(15,1),292
INITIAL    MH01(15,2),836
INITIAL    MH01(15,3),874
INITIAL    MH01(15,4),33
INITIAL    MH01(15,5),101
INITIAL    MH01(15,6),295
INITIAL    MH01(15,7),184
INITIAL    MH01(15,8),649
INITIAL    MH01(15,9),439
INITIAL    MH01(15,10),974
INITIAL    MH01(15,11),977
INITIAL    MH01(15,12),30
INITIAL    MH01(15,13),31
INITIAL    MH01(16,1),315
INITIAL    MH01(16,2),937
INITIAL    MH01(16,3),958
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INITIAL    MH01(16,7),225
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INITIAL    MH01(16,9),554
INITIAL    MH01(16,10),996
INITIAL    MH01(16,11),993
INITIAL    MH01(16,12),32
INITIAL    MH01(16,13),33
INITIAL    MH01(17,1),337
INITIAL    MH01(17,2),1000
INITIAL    MH01(17,3),1000
INITIAL    MH01(17,4),30
INITIAL    MH01(17,5),13
INITIAL    MH01(17,6),413
INITIAL    MH01(17,7),835
INITIAL    MH01(17,8),835
INITIAL    MH01(17,9),658
INITIAL    MH01(17,10),1000
INITIAL    MH01(17,11),1000
INITIAL    MH01(17,12),34
INITIAL    MH01(17,13),35
INITIAL    MH2(1,1-2),857
INITIAL    MH2(2,1-2),877
INITIAL    MH2(3,1-2),918
INITIAL    MH2(4,1-2),938
INITIAL    MH2(5-6,1-2),979
INITIAL    MH3(1,1-2),24
INITIAL    MH3(2,1-2),48
INITIAL    MH3(3,1-2),48
INITIAL    MH3(4,1-2),72
INITIAL    MH3(5,1-2),119
INITIAL    MH3(6,1-2),143
INITIAL    MH3(6,5-10),1000
INITIAL    MH3(4-5,7-10),1000
INITIAL    MH3(1-3,9-10),500
INITIAL    MH3(1-6,13-14),1000
INITIAL    MH4(1,1),825
INITIAL    MH4(1,2),733
INITIAL    MH4(1,3),798
INITIAL    MH4(1,4),841
INITIAL    MH4(1,5),762
INITIAL    MH4(1,6),752
INITIAL    MH4(1,7),714
INITIAL    MH4(1,8),640
INITIAL    MH4(1-6,9),1000
INITIAL    MH4(2,1),850
INITIAL    MH4(2,2),800
INITIAL    MH4(2,3),857
INITIAL    MH4(2,4),911
INITIAL    MH4(2,5),878
INITIAL    MH4(2,6),883
INITIAL    MH4(2,7),876
INITIAL    MH4(2,8),820
INITIAL    MH4(2-3,10),750
INITIAL    MH4(3,1),850
INITIAL    MH4(3,2),833
INITIAL    MH4(3,3),881
INITIAL    MH4(3,4),943
INITIAL    MH4(3,5),901
INITIAL    MH4(3,6),905
INITIAL    MH4(3,7),933
INITIAL    MH4(3,8),910
INITIAL    MH4(4,1),850
INITIAL    MH4(4,2),866
INITIAL    MH4(4,3),914
INITIAL    MH4(4,4),956
INITIAL    MH4(4,5),948
INITIAL    MH4(4,6),956
INITIAL    MH4(4,7),962
INITIAL    MH4(4,8),944
INITIAL    MH4(4-6,10),1000
INITIAL    MH4(5,1),875
INITIAL    MH4(5,2),900
INITIAL    MH4(5,3),950
INITIAL    MH4(5,4),981
INITIAL    MH4(5,5),977
INITIAL    MH4(5,6),992
INITIAL    MH4(5,7),991
INITIAL    MH4(5,8),989
INITIAL    MH4(6,1),950
INITIAL    MH4(6,2),967
INITIAL    MH4(6,3),977
INITIAL    MH4(6,4),981
INITIAL    MH4(6,5),994
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INITIAL   MH5(1,13),455
INITIAL   MH5(1,14),400
INITIAL   MH5(2,1),2
INITIAL   MH5(2,4),60
INITIAL   MH5(2,6),59
INITIAL   MH5(2,8),143
INITIAL   MH5(2,11),313
INITIAL   MH5(2,12),933
INITIAL   MH5(2,13),728
INITIAL   MH5(2,14),600
INITIAL   MH5(3,1),2
INITIAL   MH5(3,3),17
INITIAL   MH5(3,4),80
INITIAL   MH5(3,5),56
INITIAL   MH5(3,6),118
INITIAL   MH5(3,7),91
INITIAL   MH5(3,8),143
INITIAL   MH5(3,9),48
INITIAL   MH5(3,10),71
INITIAL   MH5(3,11),501
INITIAL   MH5(3,12),333
INITIAL   MH5(3,13),819
INITIAL   MH5(3,14),800
INITIAL   MH5(4,1),6
INITIAL   MH5(4,2),6
INITIAL   MH5(4,3),51
INITIAL   MH5(4,4),120
INITIAL   MH5(4,5),111
INITIAL   MH5(4,6),176
INITIAL   MH5(4,7),136
INITIAL   MH5(4,8),143
INITIAL   MH5(4,9),238
INITIAL   MH5(4,10),286
INITIAL   MH5(4,11),564
INITIAL   MH5(4,12),333
INITIAL   MH5(4,13),910
INITIAL   MH5(4-6,14),1000
INITIAL   MH5(5,1),6
INITIAL   MH5(5,2),13
INITIAL   MH5(5,3),85
INITIAL   MH5(5,4),200
INITIAL   MH5(5,5),222
INITIAL   MH5(5,6),294
INITIAL   MH5(5,7),227
INITIAL   MH5(5,8),214
INITIAL   MH5(5,9),381
INITIAL   MH5(5,10),500
INITIAL   MH5(5,11),814
INITIAL   MH5(5,12),667
INITIAL   MH5(5,13),910
INITIAL   MH5(6,1),12
INITIAL   MH5(6,2),16
INITIAL   MH5(6,3),171
INITIAL   MH5(6,4),260
INITIAL   MH5(6,5),389
INITIAL   MH5(6,6),412
INITIAL   MH5(6,7),485
INITIAL   MH5(6,8),429
INITIAL   MH5(6,9),810
INITIAL   MH5(6,10),500
INITIAL   MH5(6,11),877
INITIAL   MH5(6,12-13),1000
INITIAL   MH06(1-2,1),771
INITIAL   MH06(1,2),867
INITIAL   MH06(1,3),638
INITIAL   MH06(1,4),744
INITIAL   MH06(1,5),628
INITIAL   MH06(1,6),553
INITIAL   MH06(1,7),625
INITIAL   MH06(1,8),813
INITIAL   MH06(1-6,9-10),1000
INITIAL   MH06(2-3,2),933
INITIAL   MH06(2,3),732
INITIAL   MH06(2,4),849
INITIAL   MH06(2,5),857
INITIAL   MH06(2,6),766
INITIAL   MH06(2,7),750
INITIAL   MH06(2,8),983
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INITIAL   MH06(3,4),860
INITIAL   MH06(3,5),884
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INITIAL    MH06(3,8),938
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INITIAL    MH06(4,4),884
INITIAL    MH06(4,5),907
INITIAL    MH06(4,6),894
INITIAL    MH06(4,7),875
INITIAL    MH06(4,8),979
INITIAL    MH06(5,1),829
INITIAL    MH06(5,3),874
INITIAL    MH06(5,4),953
INITIAL    MH06(5,5),977
INITIAL    MH06(5,6),979
INITIAL    MH06(5,7),958
INITIAL    MH06(5-6,8),1000
INITIAL    MH06(6,1),914
INITIAL    MH06(6,3),939
INITIAL    MH06(6,4),977
INITIAL    MH06(6,5-7),1000
INITIAL    MH07(1,8),250
INITIAL    MH07(1,11),231
INITIAL    MH07(1,13),545
INITIAL    MH07(1,14),500
INITIAL    MH07(2-5,2),7
INITIAL    MH07(2,8),375
INITIAL    MH07(2,11),385
INITIAL    MH07(2,12),333
INITIAL    MH07(2,13),818
INITIAL    MH07(2-6,14),1000
INITIAL    MH07(3-5,6),167
INITIAL    MH07(3-4,8),500
INITIAL    MH07(3-4,9),63
INITIAL    MH07(3-4,11),462
INITIAL    MH07(3,12),667
INITIAL    MH07(3,13),818
INITIAL    MH07(4-5,10),273
INITIAL    MH07(4-6,12),1000
INITIAL    MH07(4-5,13),909
INITIAL    MH07(5,1),13
INITIAL    MH07(5,3),40
INITIAL    MH07(5,4),37
INITIAL    MH07(5,5),125
INITIAL    MH07(5,8),625
INITIAL    MH07(5,9),188
INITIAL    MH07(5,11),846
INITIAL    MH07(6,1),20
INITIAL    MH07(6,2),14
INITIAL    MH07(6,3),120
INITIAL    MH07(6,4),74
INITIAL    MH07(6,5-6),500
INITIAL    MH07(6,8),750
INITIAL    MH07(6,9),688
INITIAL    MH07(6,10),909
INITIAL    MH07(6,11-13),1000
INITIAL    MH08(1,1),793
INITIAL    MH08(1-4,2),857
INITIAL    MH08(1,3),549
INITIAL    MH08(1,4),629
INITIAL    MH08(1,5),492
INITIAL    MH08(1,6),547
INITIAL    MH08(1,7),586
INITIAL    MH08(1,8),593
INITIAL    MH08(1,9-10),200
INITIAL    MH08(2-3,1),862
INITIAL    MH08(2,3),637
INITIAL    MH08(2,4),743
INITIAL    MH08(2,5),651
INITIAL    MH08(2,6),693
INITIAL    MH08(2,7),776
INITIAL    MH08(2,8),765
INITIAL    MH08(2,9-10),800
INITIAL    MH08(3,3),725
INITIAL    MH08(3,4),757
INITIAL    MH08(3,5),762
INITIAL    MH08(3,6),747
INITIAL    MH08(3,7),810
INITIAL    MH08(3,8),852
INITIAL    MH08(3-5,9),800
INITIAL    MH08(3-6,10),1000
INITIAL    MH08(4,1),897
INITIAL    MH08(4,3),775
INITIAL    MH08(4,4),814
INITIAL    MH08(4,5),794
INITIAL    MH08(4,6),800
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INITIAL    MH08(5,3),804
INITIAL    MH08(5,4),857
INITIAL    MH08(5,5),873
INITIAL    MH08(5,6),893
INITIAL    MH08(5,7),914
INITIAL    MH08(5,8),975
INITIAL    MH08(6,3),902
INITIAL    MH08(6,4),943
INITIAL    MH08(6,5),1000
INITIAL    MH08(6,6),960
INITIAL    MH08(6,7),966
INITIAL    MH08(6,8-9),1000
INITIAL    MH09(1-4,2),7
INITIAL    MH09(1-5,5),56
INITIAL    MH09(1-5,9),91
INITIAL    MH09(1,11),182
INITIAL    MH09(1,13),357
INITIAL    MH09(1,14),714
INITIAL    MH09(2-5,3),57
INITIAL    MH09(2-3,8),59
INITIAL    MH09(2,11),273
INITIAL    MH09(2,12),154
INITIAL    MH09(2,13),643
INITIAL    MH09(2-5,14),857
INITIAL    MH09(3-5,1),7
INITIAL    MH09(3,10),83
INITIAL    MH09(3,11),409
INITIAL    MH09(3,12),385
INITIAL    MH09(3,13),714
INITIAL    MH09(4,4),54
INITIAL    MH09(4,6),83
INITIAL    MH09(4,7),167
INITIAL    MH09(4,8),176
INITIAL    MH09(4,10),167
INITIAL    MH09(4,11),500
INITIAL    MH09(4,12),538
INITIAL    MH09(4-6,13),929
INITIAL    MH09(5,2),29
INITIAL    MH09(5,4),81
INITIAL    MH09(5,6-7),250
INITIAL    MH09(5,8),294
INITIAL    MH09(5,10),417
INITIAL    MH09(5,11),545
INITIAL    MH09(5,12),769
INITIAL    MH09(6,1),21
INITIAL    MH09(6,2),36
INITIAL    MH09(6,3),200
INITIAL    MH09(6,4),270
INITIAL    MH09(6,5),222
INITIAL    MH09(6,6),583
INITIAL    MH09(6,7),333
INITIAL    MH09(6,8),647
INITIAL    MH09(6,9),455
INITIAL    MH09(6,10),750
INITIAL    MH09(6,11),773
INITIAL    MH09(6,12),846
INITIAL    MH09(6,14),1000
INITIAL    MH10(1,1),762
INITIAL    MH10(1-2,2),800
INITIAL    MH10(1,3),575
INITIAL    MH10(1,4),764
INITIAL    MH10(1,5),644
INITIAL    MH10(1,6),844
INITIAL    MH10(1,7),576
INITIAL    MH10(1,8),695
INITIAL    MH10(1,9),200
INITIAL    MH10(1,10),333
INITIAL    MH10(2,1),857
INITIAL    MH10(2,2),613
INITIAL    MH10(2,4),831
INITIAL    MH10(2,5),763
INITIAL    MH10(2,6),877
INITIAL    MH10(2,7),833
INITIAL    MH10(2,8),829
INITIAL    MH10(2,9),800
INITIAL    MH10(2,10),667
INITIAL    MH10(3-5,1),905
INITIAL    MH10(3-5,2),933
INITIAL    MH10(3,3),689
INITIAL    MH10(3,4),872
INITIAL    MH10(3,5),780
INITIAL    MH10(3,6),902
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INITIAL    MM10(4,5),831
INITIAL    MM10(4,6),918
INITIAL    MM10(4,7),924
INITIAL    MM10(4,8),951
INITIAL    MM10(5,3),783
INITIAL    MM10(5,4),939
INITIAL    MM10(5,5),898
INITIAL    MM10(5,6),959
INITIAL    MM10(5,7),955
INITIAL    MM10(5,8),988
INITIAL    MM10(6,1),952
INITIAL    MM10(6,2),1000
INITIAL    MM10(6,3),906
INITIAL    MM10(6,4),986
INITIAL    MM10(6,5),949
INITIAL    MM10(6,6),984
INITIAL    MM10(6,7),985
INITIAL    MM10(6,8),1000
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INITIAL    MM11(3-5,4),115
INITIAL    MM11(4-5,8),77
INITIAL    MM11(2-4,9),111
INITIAL    MM11(2-3,13),733
INITIAL    MM11(4-6,13),1000
INITIAL    MM11(1,2),3
INITIAL    MM11(1,7),77
INITIAL    MM11(1,10),154
INITIAL    MM11(1,11),105
INITIAL    MM11(1,12),83
INITIAL    MM11(1,13),667
INITIAL    MM11(2,2),10
INITIAL    MM11(2,4),77
INITIAL    MM11(2,7),154
INITIAL    MM11(2,10),308
INITIAL    MM11(2,11),263
INITIAL    MM11(2,12),250
INITIAL    MM11(3,2),17
INITIAL    MM11(3,7),231
INITIAL    MM11(3,10),385
INITIAL    MM11(3,11),526
INITIAL    MM11(3,12),417
INITIAL    MM11(4,2),24
INITIAL    MM11(4,3),61
INITIAL    MM11(4,6),63
INITIAL    MM11(4,7),308
INITIAL    MM11(4,10),538
INITIAL    MM11(4,11),632
INITIAL    MM11(4,12),500
INITIAL    MM11(5,1),19
INITIAL    MM11(5,2),31
INITIAL    MM11(5,3),182
INITIAL    MM11(5,6),125
INITIAL    MM11(5,7),385
INITIAL    MM11(5,9),444
INITIAL    MM11(5,10),769
INITIAL    MM11(5,11),789
INITIAL    MM11(5,12),750
INITIAL    MM11(6,1),39
INITIAL    MM11(6,2),49
INITIAL    MM11(6,3),303
INITIAL    MM11(6,4),221
INITIAL    MM11(6,5),71
INITIAL    MM11(6,6),500
INITIAL    MM11(6,7),462
INITIAL    MM11(6,8),692
INITIAL    MM11(6,9),667
INITIAL    MM11(6,10),846
INITIAL    MM11(6,11),947
INITIAL    MM11(6,12),833
INITIAL    MM12(3-4,1),854
INITIAL    MM12(3-4,2),882
INITIAL    MM12(2-3,4),916
INITIAL    MM12(4-5,6),959
INITIAL    MM12(5-6,7-10),1000
INITIAL    MM12(1-4,9),1000
INITIAL    MM12(1-3,10),333
INITIAL    MM12(1,1),756
INITIAL    MM12(1,2),676
INITIAL    MM12(1,3),650
INITIAL    MM12(1,4),885
INITIAL    MM12(1,5),394
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INITIAL    MH12(1,8),826
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INITIAL    MH12(2,3),744
INITIAL    MH12(2,5),606
INITIAL    MH12(2,6),925
INITIAL    MH12(2,7),796
INITIAL    MH12(2,8),926
INITIAL    MH12(2,9),167
INITIAL    MH12(3,3),786
INITIAL    MH12(3,5),667
INITIAL    MH12(3,6),944
INITIAL    MH12(3,7),837
INITIAL    MH12(3,8),942
INITIAL    MH12(4,3),829
INITIAL    MH12(4,4),939
INITIAL    MH12(4,5),758
INITIAL    MH12(4,7),918
INITIAL    MH12(4,8),975
INITIAL    MH12(4,10),667
INITIAL    MH12(5,1),878
INITIAL    MH12(5,2),941
INITIAL    MH12(5,3),880
INITIAL    MH12(5,4),943
INITIAL    MH12(5,5),788
INITIAL    MH12(6,1),976
INITIAL    MH12(6,2),971
INITIAL    MH12(6,3),949
INITIAL    MH12(6,4),966
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INITIAL    MH12(6,6),993
INITIAL    MH13(2-3,2),2
INITIAL    MH13(2-4,3),57
INITIAL    MH13(2-3,4),29
INITIAL    MH13(2-4,5),133
INITIAL    MH13(2-3,8),133
INITIAL    MH13(2-3,9),250
INITIAL    MH13(4-5,9),333
INITIAL    MH13(3-4,10),286
INITIAL    MH13(2-3,11),600
INITIAL    MH13(2-3,13),900
INITIAL    MH13(2-3,14),750
INITIAL    MH13(4-5,14),833
INITIAL    MH13(1,5),67
INITIAL    MH13(1,11),438
INITIAL    MH13(1,12),188
INITIAL    MH13(1,13),400
INITIAL    MH13(1,14),583
INITIAL    MH13(2,1),7
INITIAL    MH13(2,10),143
INITIAL    MH13(2,11),688
INITIAL    MH13(2,12),563
INITIAL    MH13(3,1),14
INITIAL    MH13(3,11),750
INITIAL    MH13(3,12),688
INITIAL    MH13(4,1),27
INITIAL    MH13(4,2),5
INITIAL    MH13(4,4),59
INITIAL    MH13(4,8),267
INITIAL    MH13(4,11),813
INITIAL    MH13(4,12),813
INITIAL    MH13(5,1),34
INITIAL    MH13(5,2),13
INITIAL    MH13(5,3),143
INITIAL    MH13(5,4),118
INITIAL    MH13(5,5),333
INITIAL    MH13(5,6),222
INITIAL    MH13(5,7),83
INITIAL    MH13(5,8),400
INITIAL    MH13(5,10),429
INITIAL    MH13(5,11-12),875
INITIAL    MH13(6,1),55
INITIAL    MH13(6,2),37
INITIAL    MH13(6,3),314
INITIAL    MH13(6,4),324
INITIAL    MH13(6,5),667
INITIAL    MH13(6,6),778
INITIAL    MH13(6,7),333
INITIAL    MH13(6,8),800
INITIAL    MH13(6,9),582
INITIAL    MH13(6,10),714
INITIAL    MH13(6,11-12),938
INITIAL    MH13(6,13-14),1000
INITIAL    MH14(2-3,1),788
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INITIAL    MH14(4-5,5),938
INITIAL    MH14(5-6,8-10),1000
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INITIAL    MH14(1,2),724
INITIAL    MH14(1,3),675
INITIAL    MH14(1,4),896
INITIAL    MH14(1,5),813
INITIAL    MH14(1,6),930
INITIAL    MH14(1,7),286
INITIAL    MH14(1,8),902
INITIAL    MH14(2,2),793
INITIAL    MH14(2,3),727
INITIAL    MH14(2,4),922
INITIAL    MH14(2,5),875
INITIAL    MH14(2,6),961
INITIAL    MH14(2,7),571
INITIAL    MH14(2,8),959
INITIAL    MH14(3,2),828
INITIAL    MH14(3,3),805
INITIAL    MH14(3,4),942
INITIAL    MH14(3,5),906
INITIAL    MH14(3,6),969
INITIAL    MH14(3,7),619
INITIAL    MH14(3,8),975
INITIAL    MH14(4,1),818
INITIAL    MH14(4,2),897
INITIAL    MH14(4,3),844
INITIAL    MH14(4,4),971
INITIAL    MH14(4,6),987
INITIAL    MH14(4,7),762
INITIAL    MH14(4,8),984
INITIAL    MH14(5,1),848
INITIAL    MH14(5,3),883
INITIAL    MH14(5,4),979
INITIAL    MH14(5,6),991
INITIAL    MH14(5,7),857
INITIAL    MH14(6,1),909
INITIAL    MH14(6,3),961
INITIAL    MH14(6,4),996
INITIAL    MH14(6,5),969
INITIAL    MH14(6,6),996
INITIAL    MH14(6,7),905
INITIAL    MH15(4-5,3),231
INITIAL    MH15(2-4,4),91
INITIAL    MH15(1-2,8),71
INITIAL    MH15(6,9-14),1000
INITIAL    MH15(2-4,10),167
INITIAL    MH15(5,11-14),1000
INITIAL    MH15(1,11-12),200
INITIAL    MH15(2,11-12),600
INITIAL    MH15(3,11-12),800
INITIAL    MH15(4,12-14),1000
INITIAL    MH15(1-3,13),1000
INITIAL    MH15(2-3,14),750
INITIAL    MH15(1,14),250
INITIAL    MH15(2,2),2
INITIAL    MH15(2,9),167
INITIAL    MH15(3,2),5
INITIAL    MH15(3,8),214
INITIAL    MH15(3,9),333
INITIAL    MH15(4,2),12
INITIAL    MH15(4,7),250
INITIAL    MH15(4,8),286
INITIAL    MH15(4,9),500
INITIAL    MH15(4,11),900
INITIAL    MH15(5,2),18
INITIAL    MH15(5,4),182
INITIAL    MH15(5,5),125
INITIAL    MH15(5,7),500
INITIAL    MH15(5,8),643
INITIAL    MH15(5,9),667
INITIAL    MH15(5,10),333
INITIAL    MH15(6,1),18
INITIAL    MH15(6,2),29
INITIAL    MH15(6,3),308
INITIAL    MH15(6,4),500
INITIAL    MH15(6,5),250
INITIAL    MH15(6,7),750
INITIAL    MH15(6,8),929
INITIAL    MH16(1-2,1),879
INITIAL    MH16(1-2),2),958
INITIAL    MH16(5-6,1-2),1000
INITIAL    MH16(3-4,2),1000
INITIAL    MH16(2-5,4),996
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(continued)

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INITIAL    MH16(3-5,5),1000
INITIAL    MH16(2-3,6),981
INITIAL    MH16(4-6,6),990
INITIAL    MH16(1-3,7),875
INITIAL    MH16(4-6,7-10),1000
INITIAL    MH16(4,10),500
INITIAL    MH16(1-3,9),1000
INITIAL    MH16(1,3),720
INITIAL    MH16(1,4),964
INITIAL    MH16(1,5),773
INITIAL    MH16(1,6),942
INITIAL    MH16(1,8),667
INITIAL    MH16(2,3),853
INITIAL    MH16(2,5),909
INITIAL    MH16(2,8),917
INITIAL    MH16(3,1),909
INITIAL    MH16(3,3),893
INITIAL    MH16(3,8),1000
INITIAL    MH16(4,1),970
INITIAL    MH16(4,3),907
INITIAL    MH16(5,3),933
INITIAL    MH16(6,3),973
INITIAL    MH17(1-3,1),9
INITIAL    MH17(3-5,2),6
INITIAL    MH17(4-6,5),667
INITIAL    MH17(5-6,7),250
INITIAL    MH17(1-5,9),333
INITIAL    MH17(1-3,11),333
INITIAL    MH17(4-6,11-14),1000
INITIAL    MH17(1-3,12-14),1000
INITIAL    MH17(1,5),167
INITIAL    MH17(2,5),333
INITIAL    MH17(3,5),500
INITIAL    MH17(4,1),18
INITIAL    MH17(4,4),71
INITIAL    MH17(5,1),27
INITIAL    MH17(5,4),143
INITIAL    MH17(6,1),106
INITIAL    MH17(6,2),35
INITIAL    MH17(6,3),143
INITIAL    MH17(6,4),214
INITIAL    MH17(6,6),500
INITIAL    MH17(6,8),500
INITIAL    MH17(6,9),1000
INITIAL    MH18(6,1-10),1000
INITIAL    MH18(6,2),989
INITIAL    MH18(1-5,2),1000
INITIAL    MH18(2-3,4),981
INITIAL    MH18(4-5,4),991
INITIAL    MH18(2-3,5),938
INITIAL    MH18(4-5,5),969
INITIAL    MH18(2-3,6),964
INITIAL    MH18(4-5,6),1000
INITIAL    MH18(2-5,7),900
INITIAL    MH18(3-5,8-10),1000
INITIAL    MH18(1-2,9-10),1000
INITIAL    MH18(1,3),817
INITIAL    MH18(1,4),935
INITIAL    MH18(1,5),781
INITIAL    MH18(1,6),893
INITIAL    MH18(1,7),800
INITIAL    MH18(1,8),643
INITIAL    MH18(2,1),750
INITIAL    MH18(2,3),946
INITIAL    MH18(2,8),929
INITIAL    MH18(3,1),857
INITIAL    MH18(3,3),957
INITIAL    MH18(4,1),893
INITIAL    MH18(4,3),968
INITIAL    MH18(5,1),929
INITIAL    MH18(5,3),978
INITIAL    MH19(4-5,2),11
INITIAL    MH19(1-2,3),56
INITIAL    MH19(3-5,3),111
INITIAL    MH19(4-5,7),333
INITIAL    MH19(5-6,8-14),1000
INITIAL    MH19(1-4,10),1000
INITIAL    MH19(1-4,12-14),1000
INITIAL    MH19(2,11),400
INITIAL    MH19(3,2),6
INITIAL    MH19(3,11),600
INITIAL    MH19(4,4),385
INITIAL    MH19(4,8),667
INITIAL    MH19(4,11),800
INITIAL    MH19(5,4),692
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(continued)

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INITIAL    MH19(6,1),1000
INITIAL    MH19(6,2),28
INITIAL    MH19(6,3),278
INITIAL    MH19(6,4),1000
INITIAL    MH19(6,5),250
INITIAL    MH19(6,7),667
INITIAL    MH20(6,1-10),1000
INITIAL    MH20(5-6,4),995
INITIAL    MH20(3-5,2),1000
INITIAL    MH20(5,5-10),1000
INITIAL    MH20(2-3,6),981
INITIAL    MH20(1-4,7-10),1000
INITIAL    MH20(1,8),965
INITIAL    MH20(1,1),800
INITIAL    MH20(1,2),828
INITIAL    MH20(1,3),987
INITIAL    MH20(1,4),947
INITIAL    MH20(1,5),825
INITIAL    MH20(1,6),957
INITIAL    MH20(2,1),891
INITIAL    MH20(2,2),862
INITIAL    MH20(2,3),948
INITIAL    MH20(2,4),979
INITIAL    MH20(2,5),918
INITIAL    MH20(3,1),927
INITIAL    MH20(3,3),960
INITIAL    MH20(3,4),984
INITIAL    MH20(3,5),959
INITIAL    MH20(4,1),945
INITIAL    MH20(4,3),979
INITIAL    MH20(4,4),989
INITIAL    MH20(4,5),990
INITIAL    MH20(4,6),994
INITIAL    MH20(5,1),964
INITIAL    MH20(5,3),988
INITIAL    MH21(4-5,8),667
INITIAL    MH21(4-5,10-11),500
INITIAL    MH21(1-6,12-14),1000
INITIAL    MH21(2,1),2
INITIAL    MH21(2,11),167
INITIAL    MH21(3,1),5
INITIAL    MH21(3,8),333
INITIAL    MH21(3,11),333
INITIAL    MH21(4,1),7
INITIAL    MH21(5,1),11
INITIAL    MH21(5,3),29
INITIAL    MH21(5,4),727
INITIAL    MH21(5,9),200
INITIAL    MH21(6,1),20
INITIAL    MH21(6,2),11
INITIAL    MH21(6,3),88
INITIAL    MH21(6,4),909
INITIAL    MH21(6,5),100
INITIAL    MH21(6,6),600
INITIAL    MH21(6,7),500
INITIAL    MH21(6,8),1000
INITIAL    MH21(6,9),600
INITIAL    MH21(6,10),1000
INITIAL    MH21(6,11),667
INITIAL    MH22(1-5,1),960
INITIAL    MH22(6,1-2),1000
INITIAL    MH22(2-5,2),1000
INITIAL    MH22(6,4-5),1000
INITIAL    MH22(4-5,4),1000
INITIAL    MH22(4-6,6-10),1000
INITIAL    MH22(1-3,9-10),1000
INITIAL    MH22(1,2),889
INITIAL    MH22(1,3),891
INITIAL    MH22(1,4),940
INITIAL    MH22(1,5),866
INITIAL    MH22(1,6),959
INITIAL    MH22(1,7),955
INITIAL    MH22(1,8),971
INITIAL    MH22(2,3),950
INITIAL    MH22(2,4),952
INITIAL    MH22(2,5),975
INITIAL    MH22(2,6),994
INITIAL    MH22(2,7),985
INITIAL    MH22(2,8),989
INITIAL    MH22(3,3),968
INITIAL    MH22(3,4),976
INITIAL    MH22(3,5),983
INITIAL    MH22(3,6),1000
INITIAL    MH22(3,7),985
INITIAL    MH22(3,8),1000
INITIAL    MH22(4,3),982
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(continued)

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INITIAL    MH22(4,5),983
INITIAL    MH22(5,3),991
INITIAL    MH22(5,5),992
INITIAL    MH22(6,3),995
INITIAL    MH23(2-5,1),3
INITIAL    MH23(1-6,10-14),1000
INITIAL    MH23(1-5,11),333
INITIAL    MH23(1-3,13),0
INITIAL    MH23(5,3),71
INITIAL    MH23(5,5),200
INITIAL    MH23(5,9),333
INITIAL    MH23(6,1),5
INITIAL    MH23(6,2),7
INITIAL    MH23(6,3),107
INITIAL    MH23(6,4),1000
INITIAL    MH23(6,5),400
INITIAL    MH23(6,6),200
INITIAL    MH23(6,7),250
INITIAL    MH23(6,9),667
INITIAL    MH24(1-6,1-2),1000
INITIAL    MH24(2-6,4),1000
INITIAL    MH24(4-6,5),994
INITIAL    MH24(2-3,6),989
INITIAL    MH24(4-6,6),1000
INITIAL    MH24(3-4,7),991
INITIAL    MH24(5-6,7),1000
INITIAL    MH24(1-6,8-10),1000
INITIAL    MH24(1-2,8),986
INITIAL    MH24(1,3),930
INITIAL    MH24(1,4),981
INITIAL    MH24(1,5),930
INITIAL    MH24(1,6),958
INITIAL    MH24(1,7),965
INITIAL    MH24(2,3),965
INITIAL    MH24(2,5),975
INITIAL    MH24(2,7),983
INITIAL    MH24(3,3),974
INITIAL    MH24(3,5),981
INITIAL    MH24(4,3),982
INITIAL    MH24(5,3),987
INITIAL    MH24(6,3),991
INITIAL    MH25(1-5,1),2
INITIAL    MH25(5-6,5),250
INITIAL    MH25(1-6,6-14),1000
INITIAL    MH25(1-4,7),0
INITIAL    MH25(1-4,9),0
INITIAL    MH25(1,11),667
INITIAL    MH25(6,1),14
INITIAL    MH25(6,3),118
INITIAL    MH25(6,4),167
INITIAL    MH26(1-6,1),944
INITIAL    MH26(1-6,2),1000
INITIAL    MH26(5-6,3),995
INITIAL    MH26(3-4,4),987
INITIAL    MH26(5-6,4),993
INITIAL    MH26(6,5-10),1000
INITIAL    MH26(2-5,6-10),1000
INITIAL    MH26(2,7),993
INITIAL    MH26(1-3,8),995
INITIAL    MH26(1,9-10),1000
INITIAL    MH26(1,3),935
INITIAL    MH26(1,4),947
INITIAL    MH26(1,5),953
INITIAL    MH26(1,6),967
INITIAL    MH26(1,7),980
INITIAL    MH26(2,3),973
INITIAL    MH26(2,4),980
INITIAL    MH26(2,5),974
INITIAL    MH26(3,3),976
INITIAL    MH26(3,5),985
INITIAL    MH26(4,3),984
INITIAL    MH26(4,5),988
INITIAL    MH26(5,5),997
INITIAL    MH27(3-5,2),2
INITIAL    MH27(3-4,3),43
INITIAL    MH27(5-6,5),500
INITIAL    MH27(4-5,7),286
INITIAL    MH27(2-6,8-14),1000
INITIAL    MH27(2-4,9),0
INITIAL    MH27(1,12),1000
INITIAL    MH27(5,1),1
INITIAL    MH27(5,3),130
INITIAL    MH27(6,1),5
INITIAL    MH27(6,2),8
INITIAL    MH27(6,3),174
INITIAL    MH27(6,4),182
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(continued)

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INITIAL    MH27(6,7),857
INITIAL    MH28(4-6,1),1000
INITIAL    MH28(1-6,2),1000
INITIAL    MH28(2-3,3),985
INITIAL    MH28(5-6,3),995
INITIAL    MH28(2-4,4),994
INITIAL    MH28(5-6,4-10),1000
INITIAL    MH28(2-4,5-10),1000
INITIAL    MH28(1-3,6),996
INITIAL    MH28(2-3,8),997
INITIAL    MH28(1-2,10),996
INITIAL    MH28(4,3),990
INITIAL    MH28(3,1),946
INITIAL    MH28(2,1),973
INITIAL    MH28(1,1),892
INITIAL    MH28(1,3),964
INITIAL    MH28(1,4),982
INITIAL    MH28(1,5),989
INITIAL    MH28(1,7),997
INITIAL    MH28(1,8),995
INITIAL    MH28(1,9),875
INITIAL    MH29(4-5,3),91
INITIAL    MH29(5-6,4),333
INITIAL    MH29(5-6,5),1000
INITIAL    MH29(5-6,8),1000
INITIAL    MH29(1-6,11-14),1000
INITIAL    MH29(1,13),0
INITIAL    MH29(4,1),1
INITIAL    MH29(5,1),1
INITIAL    MH29(5,2),2
INITIAL    MH29(6,1),5
INITIAL    MH29(6,2),7
INITIAL    MH29(6,3),182
INITIAL    MH29(6,7),500
INITIAL    MH30(1-6,1-2),1000
INITIAL    MH30(1,1),626
INITIAL    MH30(1,2),963
INITIAL    MH30(1-2,4),968
INITIAL    MH30(2-3,5),986
INITIAL    MH30(5-6,6-10),1000
INITIAL    MH30(1-4,7-10),1000
INITIAL    MH30(1,7),996
INITIAL    MH30(1,8),995
INITIAL    MH30(1,3),953
INITIAL    MH30(1,5),976
INITIAL    MH30(1,6),967
INITIAL    MH30(2,3),967
INITIAL    MH30(2,6),978
INITIAL    MH30(3,3),972
INITIAL    MH30(3,4),976
INITIAL    MH30(3,6),983
INITIAL    MH30(4,3),981
INITIAL    MH30(4,4),984
INITIAL    MH30(4,5),990
INITIAL    MH30(4,6),989
INITIAL    MH30(5,3),991
INITIAL    MH30(5,4),992
INITIAL    MH30(5,5),993
INITIAL    MH30(6,3),1000
INITIAL    MH30(6,4),992
INITIAL    MH30(6,5),997
INITIAL    MH31(3-5,2),1
INITIAL    MH31(5-6,3),222
INITIAL    MH31(6,4-5),500
INITIAL    MH31(6,6-14),1000
INITIAL    MH31(5-6,10),667
INITIAL    MH31(1-5,12-14),1000
INITIAL    MH31(3-4,7),333
INITIAL    MH31(3-4,8),500
INITIAL    MH31(3-4,9-11),333
INITIAL    MH31(4,11),667
INITIAL    MH31(1-2,11),333
INITIAL    MH31(4,3),111
INITIAL    MH31(5,4),250
INITIAL    MH31(5,7),667
INITIAL    MH31(5,8),1000
INITIAL    MH31(5,9),667
INITIAL    MH31(5,11),1000
INITIAL    MH31(6,1),5
INITIAL    MH31(6,2),7
INITIAL    MH32(1-6,1),947
INITIAL    MH32(2-3,2),917
INITIAL    MH32(4-6,2),1000
INITIAL    MH32(5-6,4),992
INITIAL    MH32(6,5-10),1000
INITIAL    MH32(4-5,5),1000
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(continued)

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INITIAL    MH32(3-4,6),985
INITIAL    MH32(4-5,7),1000
INITIAL    MH32(3-4,8),996
INITIAL    MH32(1-5,9-10),1000
INITIAL    MH32(1,2),833
INITIAL    MH32(1,3),937
INITIAL    MH32(1,4),888
INITIAL    MH32(1,5),960
INITIAL    MH32(1,6),965
INITIAL    MH32(1,7),969
INITIAL    MH32(1,8),974
INITIAL    MH32(2,3),952
INITIAL    MH32(2,4),944
INITIAL    MH32(2,5),988
INITIAL    MH32(2,6),980
INITIAL    MH32(2,7),990
INITIAL    MH32(2,8),989
INITIAL    MH32(3,3),956
INITIAL    MH32(3,4),976
INITIAL    MH32(3,5),992
INITIAL    MH32(3,7),995
INITIAL    MH32(4,3),967
INITIAL    MH32(4,4),984
INITIAL    MH32(5,3),993
INITIAL    MH32(5,6),995
INITIAL    MH32(6,3),996
INITIAL    MH33(3-4,1),1
INITIAL    MH33(2-4,2),3
INITIAL    MH33(2-3,4),67
INITIAL    MH33(4-6,5),333
INITIAL    MH33(1-2,7),167
INITIAL    MH33(4-6,7),500
INITIAL    MH33(2-5,8),500
INITIAL    MH33(2-3,9),125
INITIAL    MH33(4-5,10),500
INITIAL    MH33(5-6,11-14),1000
INITIAL    MH33(5,12),0
INITIAL    MH33(1-4,13-14),1000
INITIAL    MH33(1-2,13),500
INITIAL    MH33(1,2),2
INITIAL    MH33(3,7),333
INITIAL    MH33(3,10),250
INITIAL    MH33(4,4),133
INITIAL    MH33(4,6),143
INITIAL    MH33(4,9),375
INITIAL    MH33(5,1),6
INITIAL    MH33(5,2),5
INITIAL    MH33(5,3),67
INITIAL    MH33(5,4),200
INITIAL    MH33(5,6),286
INITIAL    MH33(5,9),500
INITIAL    MH33(6,1),10
INITIAL    MH33(6,2),12
INITIAL    MH33(6,3),200
INITIAL    MH33(6,4),267
INITIAL    MH33(6,6),571
INITIAL    MH33(6,8),1000
INITIAL    MH33(6,9),750
INITIAL    MH33(6,10),750
INITIAL    MH34(1-5,1),786
INITIAL    MH34(6,1-3),1000
INITIAL    MH34(1-5,2),1000
INITIAL    MH34(5-6,4),989
INITIAL    MH34(6,5-10),1000
INITIAL    MH34(5,6-10),1000
INITIAL    MH34(4,7-10),1000
INITIAL    MH34(1-3,8-10),1000
INITIAL    MH34(1,3),903
INITIAL    MH34(1,4),828
INITIAL    MH34(1,5),918
INITIAL    MH34(1,6),879
INITIAL    MH34(1,7),934
INITIAL    MH34(1,8),962
INITIAL    MH34(2,3),938
INITIAL    MH34(2,4),892
INITIAL    MH34(2,5),964
INITIAL    MH34(2,6),935
INITIAL    MH34(2,7),974
INITIAL    MH34(3,3),955
INITIAL    MH34(3,4),946
INITIAL    MH34(3,5),969
INITIAL    MH34(3,6),972
INITIAL    MH34(3,7),987
INITIAL    MH34(4,3),983
INITIAL    MH34(4,4),968
INITIAL    MH34(4,5),974
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(continued)

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      INITIAL    MH34(5,3),994
      INITIAL    MH34(5,5),990
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      INITIAL    MH35(4-5,3),125
      INITIAL    MH35(5-6,5),400
      INITIAL    MH35(1-2,6),111
      INITIAL    MH35(4-5,6),333
      INITIAL    MH35(4-5,7),143
      INITIAL    MH35(2-4,8),250
      INITIAL    MH35(5-6,8),500
      INITIAL    MH35(3-6,10),667
      INITIAL    MH35(3-4,11),333
      INITIAL    MH35(1-6,12-14),1000
      INITIAL    MH35(1,14),0
      INITIAL    MH35(2,10),333
      INITIAL    MH35(2,11),167
      INITIAL    MH35(3,6),222
      INITIAL    MH35(4,5),200
      INITIAL    MH35(5,1),10
      INITIAL    MH35(5,2),14
      INITIAL    MH35(5,9),200
      INITIAL    MH35(5,11),500
      INITIAL    MH35(6,1),14
      INITIAL    MH35(6,2),25
      INITIAL    MH35(6,3),56
      INITIAL    MH35(6,4),188
      INITIAL    MH35(6,6),556
      INITIAL    MH35(6,7),429
      INITIAL    MH35(6,9),400
      INITIAL    MH35(6,11),833
* LOGAN
      INITIAL    MH101(1,1),18
      INITIAL    MH101(2,1),13
      INITIAL    MH101(1,3),24
      INITIAL    MH101(1,4),19
      INITIAL    MH101(2,2),7
      INITIAL    MH101(2,3),23
      INITIAL    MH101(2,4),7
      INITIAL    MH101(3-4,1),1
      INITIAL    MH101(3-4,2),40
      INITIAL    MH101(3,3),133
      INITIAL    MH101(3-18,4),1
      INITIAL    MH101(4,3),134
      INITIAL    MH101(5-6,1),2
      INITIAL    MH101(5-6,2),270
      INITIAL    MH101(5,3),135
      INITIAL    MH101(6,3),136
      INITIAL    MH101(7-8,1),3
      INITIAL    MH101(7-8,2),220
      INITIAL    MH101(7,3),137
      INITIAL    MH101(8,3),138
      INITIAL    MH101(9-10,1),4
      INITIAL    MH101(9,3),139
      INITIAL    MH101(9-10,2),330
      INITIAL    MH101(10,3),140
      INITIAL    MH101(11-12,1),5
      INITIAL    MH101(11-12,2),150
      INITIAL    MH101(11,3),141
      INITIAL    MH101(12,3),142
      INITIAL    MH101(13-14,1),4
      INITIAL    MH101(13,3),139
      INITIAL    MH101(13-14,2),330
      INITIAL    MH101(14,3),140
      INITIAL    MH101(15-16,1),1
      INITIAL    MH101(15-16,2),40
      INITIAL    MH101(15,3),133
      INITIAL    MH101(16,3),134
      INITIAL    MH101(17-18,1),3
      INITIAL    MH101(17-18,2),220
      INITIAL    MH101(17,3),137
      INITIAL    MH101(18,3),138
      INITIAL    MX001(1-22,1-5),680100
      INITIAL    MX001(3,1-5),820150
      INITIAL    MX001(4,1-5),820200
      INITIAL    MX001(1-4,2),460100
      INITIAL    MX001(5-7,3),560100
      INITIAL    MX001(5,5),780100
      INITIAL    MX001(6,5),780125
      INITIAL    MX001(7,1-2),820150
      INITIAL    MX001(7,4),820150
      INITIAL    MX001(7,5),780150
      INITIAL    MX001(8,1-2),820200
      INITIAL    MX001(8,3),560125
      INITIAL    MX001(8,4),820200
      INITIAL    MX001(8,5),780175
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INITIAL    MX001(9-12,1),216050
INITIAL    MX001(9-12,5),268075
INITIAL    MX001(11,2-4),820150
INITIAL    MX001(12,2-4),820200
INITIAL    MX001(13-16,1),460075
INITIAL    MX001(13-15,5),580100
INITIAL    MX001(13-15,5),580100
INITIAL    MX001(15,2-4),820150
INITIAL    MX001(16,2-4),820200
INITIAL    MX001(16,5),580125
INITIAL    MX001(19,1-5),820150
INITIAL    MX001(20,1-5),820200
INITIAL    MX001(23,1-5),820150
INITIAL    MX001(24,1-5),820200
INITIAL    MX001(21-24,3),420100
INITIAL    MX001(25-27,1),620050
INITIAL    MX001(25-28,2),460100
INITIAL    MX001(25-27,3),540100
INITIAL    MX001(25-27,4),480050
INITIAL    MX001(25,5),800100
INITIAL    MX001(26,5),800175
INITIAL    MX001(27,5),800150
INITIAL    MX001(28,5),800175
INITIAL    MX001(28,4),480100
INITIAL    MX001(28,3),540125
INITIAL    MX001(28,1),620100
INITIAL    MH133(1,1),2
INITIAL    MH133(1,2),4
INITIAL    MH133(2,1),4
INITIAL    MH133(2,2),7
INITIAL    MH133(3-4,1),15
INITIAL    MH133(3,2),10
INITIAL    MH133(3,3),7
INITIAL    MH133(3,5),19
INITIAL    MH133(3,6),23
INITIAL    MH133(3-5,7),56
INITIAL    MH133(3-4,8),43
INITIAL    MH133(4,2),7
INITIAL    MH133(5,1),35
INITIAL    MH133(5,5),19
INITIAL    MH133(6,1),15
INITIAL    MH133(6,2),7
INITIAL    MH133(6,3),35
INITIAL    MH133(7,1),37
INITIAL    MH134(1,1),2
INITIAL    MH134(1,2),4
INITIAL    MH134(2,1),4
INITIAL    MH134(2,2),7
INITIAL    MH134(3-4,1),15
INITIAL    MH134(3-4,2),2
INITIAL    MH134(3-4,3),3
INITIAL    MH134(3,5),19
INITIAL    MH134(3,6),23
INITIAL    MH134(3-5,7),56
INITIAL    MH134(3-4,8),43
INITIAL    MH134(4,4),10
INITIAL    MH134(5,1),35
INITIAL    MH134(5,5),19
INITIAL    MH134(6,1),15
INITIAL    MH134(6,2),2
INITIAL    MH134(6,3),3
INITIAL    MH134(7,1),37
INITIAL    MH135(1-2,1),4
INITIAL    MH135(1-2,2),7
INITIAL    MH135(1,8),48
INITIAL    MH135(3-4,1),16
INITIAL    MH135(3,2),11
INITIAL    MH135(3,3),2
INITIAL    MH135(3,4),3
INITIAL    MH135(3,5),20
INITIAL    MH135(3,6),24
INITIAL    MH135(4,2),7
INITIAL    MH135(5,1),7
INITIAL    MH135(6,1),15
INITIAL    MH135(6,2),2
INITIAL    MH135(6,3),3
INITIAL    MH135(6,4),35
INITIAL    MH135(7,1),37
INITIAL    MH136(1-2,1),4
INITIAL    MH136(1,2),2
INITIAL    MH136(1,8),48
INITIAL    MH136(2,2),7
INITIAL    MH136(3-4,1),16
INITIAL    MH136(3,2),11
INITIAL    MH136(3,3),2
INITIAL    MH136(3,4),3
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INITIAL    MM136(3,5),20
INITIAL    MM136(3,6),24
INITIAL    MM136(4,2),7
INITIAL    MM136(5,1),7
INITIAL    MM136(5,5),20
INITIAL    MM136(6,1),15
INITIAL    MM136(6,2),7
INITIAL    MM136(6,3),35
INITIAL    MM136(7,1),37
INITIAL    MM137(1-2,1),2
INITIAL    MM137(1-2,2),4
INITIAL    MM137(2-3,3),7
INITIAL    MM137(2,8),44
INITIAL    MM137(3-4,1),15
INITIAL    MM137(3,2),10
INITIAL    MM137(3,5),19
INITIAL    MM137(3,6),23
INITIAL    MM137(4,2),7
INITIAL    MM137(5-6,1),35
INITIAL    MM137(5,5),19
INITIAL    MM137(6,2),15
INITIAL    MM137(6,3),7
INITIAL    MM137(6,8),44
INITIAL    MM137(7,1),37
INITIAL    MM138(1-2,1),2
INITIAL    MM138(1-2,2),4
INITIAL    MM138(2,8),44
INITIAL    MM138(3-4,1),15
INITIAL    MM138(3-4,2),2
INITIAL    MM138(3-4,3),3
INITIAL    MM138(3,4),10
INITIAL    MM138(3,5),19
INITIAL    MM138(3,6),23
INITIAL    MM138(5,1),35
INITIAL    MM138(5,5),19
INITIAL    MM138(6,1),15
INITIAL    MM138(6,2),2
INITIAL    MM138(6,3),3
INITIAL    MM138(6,8),44
INITIAL    MM138(7,1),37
INITIAL    MM139(1-2,1),4
INITIAL    MM139(1-2,2),7
INITIAL    MM139(1,7),57
INITIAL    MM139(1,8),46
INITIAL    MM139(3-4,1),16
INITIAL    MM139(3,2),11
INITIAL    MM139(3,3),2
INITIAL    MM139(3,4),3
INITIAL    MM139(3,5),20
INITIAL    MM139(3,6),24
INITIAL    MM139(3,7),57
INITIAL    MM139(4,2),7
INITIAL    MM139(5,1),7
INITIAL    MM139(5,5),20
INITIAL    MM139(5,7),57
INITIAL    MM139(6,1),15
INITIAL    MM139(6,2),2
INITIAL    MM139(6,3),3
INITIAL    MM139(6,4),35
INITIAL    MM139(7,1),37
INITIAL    MM140(1,1),2
INITIAL    MM140(1-2,2),4
INITIAL    MM140(1,7),57
INITIAL    MM140(1,8),46
INITIAL    MM140(2-6,1),7
INITIAL    MM140(3-4,2),16
INITIAL    MM140(3,3),11
INITIAL    MM140(3,5),20
INITIAL    MM140(3,6),24
INITIAL    MM140(3,7),57
INITIAL    MM140(5,5),20
INITIAL    MM140(5,7),57
INITIAL    MM140(6,2),15
INITIAL    MM140(6,3),35
INITIAL    MM140(7,1),37
INITIAL    MM141(1-2,1),4
INITIAL    MM141(1-4,2),7
INITIAL    MM141(2,8),45
INITIAL    MM141(3-4,1),14
INITIAL    MM141(3,3),9
INITIAL    MM141(3,5),18
INITIAL    MM141(3,6),22
INITIAL    MM141(4,8),45
INITIAL    MM141(6,1),15
INITIAL    MM141(6,2),7
INITIAL    MM141(6,3),35
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        INITIAL     MH141(7,1),37
        INITIAL     MH142(1-2,1),4
        INITIAL     MH142(1,2),2
        INITIAL     MH142(2,2),7
        INITIAL     MH142(2,8),45
        INITIAL     MH142(3-4,1),14
        INITIAL     MH142(3-4,2),2
        INITIAL     MH142(3-4,3),1
        INITIAL     MH142(3,4),9
        INITIAL     MH142(3,5),18
        INITIAL     MH142(3,6),22
        INITIAL     MH142(4,8),45
        INITIAL     MH142(6,1),15
        INITIAL     MH142(6,2),2
        INITIAL     MH142(6,3),1
        INITIAL     MH142(6,4),35
        INITIAL     MH142(7,1),37
* BEDFORD
        INITIAL     MH106(1-2,1),6
        INITIAL     MH106(1,2),7
        INITIAL     MH106(1-2,3),24
        INITIAL     MH106(1,4),133
        INITIAL     MH106(2,4),5
        INITIAL     MH106(3,1),1
        INITIAL     MH106(3,2),110
        INITIAL     MH106(3,3),143
        INITIAL     MH106(4-6,3),156
        INITIAL     MH106(3-6,4),2
        INITIAL     MH106(4,1),2
        INITIAL     MH106(4,2),290
        INITIAL     MH106(5,2),230
        INITIAL     MH106(5,1),3
        INITIAL     MH106(6,2),50
        INITIAL     MH106(6,1),4
        INITIAL     MH143(1,1),53
        INITIAL     MH143(1-4,5),17
        INITIAL     MH143(2-3,1),12
        INITIAL     MH143(2,2),8
        INITIAL     MH143(2,3),1
        INITIAL     MH143(2,6),21
        INITIAL     MH143(2,8),64
        INITIAL     MH143(3,2),1
        INITIAL     MH143(4,1),4
        INITIAL     MH143(4,2),53
        INITIAL     MH143(5,1),1
        INITIAL     MH143(5,2),4
        INITIAL     MX002(1-2,1-4),700100
        INITIAL     MX002(3,1),700100
        INITIAL     MX002(3,2-4),720150
        INITIAL     MX002(4,1),700125
        INITIAL     MX002(4,2-4),760200
        INITIAL     MX002(5-8,1),383100
        INITIAL     MX002(9-11,1),660100
        INITIAL     MX002(9-10,2-4),680100
        INITIAL     MX002(11,2-4),720150
        INITIAL     MX002(12,1),660125
        INITIAL     MX002(12,2-4),760200
        INITIAL     MX002(13-14,1-4),800100
        INITIAL     MX002(15,1-4),800150
        INITIAL     MX002(15,2),800125
        INITIAL     MX002(16,1-4),800200
        INITIAL     MX002(16,2),800150
        INITIAL     MX002(17-18,1-4),680100
        INITIAL     MX002(19,1-4),720150
        INITIAL     MX002(19,2-3),680100
        INITIAL     MX002(20,1-4),760200
        INITIAL     MX002(20,3),680125
        INITIAL     MH156(1,1),53
        INITIAL     MH156(1-4,5),53
        INITIAL     MH156(1-4,5),17
        INITIAL     MH156(2-3,1),1
        INITIAL     MH156(2-3,2),12
        INITIAL     MH156(2,3),8
        INITIAL     MH156(4-5,1),4
        INITIAL     MH156(4,2),53
        INITIAL     MH156(5,2),1
* BEVERLY
        INITIAL     MH107(1-2,1),6
        INITIAL     MH107(1,2),8
        INITIAL     MH107(1,3),18
        INITIAL     MH107(1,4),108
        INITIAL     MH107(2,3),24
        INITIAL     MH107(2,4),4
        INITIAL     MH107(3,1),1
        INITIAL     MH107(3,2),160
        INITIAL     MH107(3-6,3),144
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        INITIAL    MH107(3-6,4),3
        INITIAL    MH107(4,1),2
        INITIAL    MH107(4,2),340
        INITIAL    MH107(5,1),3
        INITIAL    MH107(5,2),90
        INITIAL    MH107(6,1),4
        INITIAL    MH107(6,2),270
        INITIAL    MH144(1,1),25
        INITIAL    MH144(2-4,1),4
        INITIAL    MH144(2,2),3
        INITIAL    MH144(2,3),6
        INITIAL    MH144(3-4,2),33
        INITIAL    MH144(3-4,3),1
        INITIAL    MH144(4,4),1
        INITIAL    MX003(1-2,1-4),600100
        INITIAL    MX003(3,1-4),600150
        INITIAL    MX003(4,1-4),700200
        INITIAL    MX003(5-7,1-4),640100
        INITIAL    MX003(7,2-4),640150
        INITIAL    MX003(8,1),640125
        INITIAL    MX003(8,2-4),700200
        INITIAL    MX003(9-12,1),580100
        INITIAL    MX003(9-10,2-4),600100
        INITIAL    MX003(11,2-4),600150
        INITIAL    MX003(12,2-4),700200
        INITIAL    MX003(13-16,1),500100
        INITIAL    MX003(13-14,2-4),600100
        INITIAL    MX003(15,2-4),600150
        INITIAL    MX003(16,2-4),700200
* FITCHBURG
        INITIAL    MH108(1-2,1),5
        INITIAL    MH108(1,2),8
        INITIAL    MH108(1,3),18
        INITIAL    MH108(1,4),350
        INITIAL    MH108(2,3),24
        INITIAL    MH108(2,4),1
        INITIAL    MH108(3,1),1
        INITIAL    MH108(3,2),140
        INITIAL    MH108(3-5,3),145
        INITIAL    MH108(3-5,4),4
        INITIAL    MH108(4,1),2
        INITIAL    MH108(4,2),320
        INITIAL    MH108(5,1),3
        INITIAL    MH108(5,2),200
        INITIAL    MX004(1,1-4),1140100
        INITIAL    MX004(2,1-4),1400175
        INITIAL    MX004(3,1-4),1420200
        INITIAL    MX004(4,1-4),1600200
        INITIAL    MH145(1,1),32
* FT DEVENS
        INITIAL    MH109(1-2,1),6
        INITIAL    MH109(1-2,3),24
        INITIAL    MH109(1,4),268
        INITIAL    MH109(2,4),1
        INITIAL    MH109(3,1),1
        INITIAL    MH109(3,2),140
        INITIAL    MH109(3-6,3),146
        INITIAL    MH109(3-6,4),5
        INITIAL    MH109(4,1),2
        INITIAL    MH109(4,2),320
        INITIAL    MH109(5,1),3
        INITIAL    MH109(5,2),20
        INITIAL    MH109(6,1),4
        INITIAL    MH109(6,2),200
        INITIAL    MX005(1-2,1-4),940100
        INITIAL    MX005(3,1),940125
        INITIAL    MX005(3,2-4),940150
        INITIAL    MX005(4,1),940150
        INITIAL    MX005(4,2-4),940200
        INITIAL    MH146(1,1),26
* LAWRENCE
        INITIAL    MH110(1-2,1),6
        INITIAL    MH110(1,2),8
        INITIAL    MH110(1,3),21
        INITIAL    MH110(1,4),147
        INITIAL    MH110(2,3),24
        INITIAL    MH110(2,4),2
        INITIAL    MH110(3,1),1
        INITIAL    MH110(3,2),230
        INITIAL    MH110(3,3),147
        INITIAL    MH110(4,3),157
        INITIAL    MH110(5-6,3),158
        INITIAL    MH110(3-6,4),6
        INITIAL    MH110(4,1),2
        INITIAL    MH110(4,2),50
        INITIAL    MH110(5,1),3
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* NORWOOD
        INITIAL     MH114(1-2,1),6
        INITIAL     MH114(1,2),7
        INITIAL     MH114(1,3),23
        INITIAL     MH114(1,4),49
        INITIAL     MH114(2,3),24
        INITIAL     MH114(2,4),4
        INITIAL     MH114(3,1),1
        INITIAL     MH114(3,2),350
        INITIAL     MH114(3-6,3),151
        INITIAL     MH114(3-6,4),10
        INITIAL     MH114(4,1),2
        INITIAL     MH114(4,2),170
        INITIAL     MH114(5,1),3
        INITIAL     MH114(5,2),100
        INITIAL     MH114(6,1),4
        INITIAL     MH114(6,2),280
        INITIAL     MX010(1-3,1-4),640100
        INITIAL     MX010(3,2-4),640150
        INITIAL     MX010(4,1),640125
        INITIAL     MX010(4,2-4),740200
        INITIAL     MX010(5-7,1),580100
        INITIAL     MX010(5-6,2-4),640100
        INITIAL     MX010(7,2-4),640150
        INITIAL     MX010(8,1),580125
        INITIAL     MX010(8,2-4),740200
        INITIAL     MX010(9,1-4),840100
        INITIAL     MX010(10,1-4),840125
        INITIAL     MX010(11,1-4),840150
        INITIAL     MX010(12,1-4),840175
        INITIAL     MX010(13-15,1),580100
        INITIAL     MX010(16,1),580125
        INITIAL     MH151(1-2,1),31
        INITIAL     MH151(2,2),34
        INITIAL     MH151(2,4),52
        INITIAL     MH151(3-4,1),2
        INITIAL     MH151(4,2),5
* PLYMOUTH
        INITIAL     MH115(1-2,1),6
        INITIAL     MH115(1,2),8
        INITIAL     MH115(1,3),18
        INITIAL     MH115(1,4),149
        INITIAL     MH115(2,3),24
        INITIAL     MH115(2,4),1
        INITIAL     MH115(3,1),1
        INITIAL     MH115(3,2),60
        INITIAL     MH115(3-6,3),152
        INITIAL     MH115(3-6,4),11
        INITIAL     MH115(4,1),2
        INITIAL     MH115(4,2),330
        INITIAL     MH115(5,1),3
        INITIAL     MH115(5,2),240
        INITIAL     MH115(6,1),4
        INITIAL     MH115(6,2),150
        INITIAL     MH152(1,1),30
        INITIAL     MX011(1-3,1-4),600100
        INITIAL     MX011(3,2-4),600150
        INITIAL     MX011(4,1-4),1500500
* S. WEYMOUTH
        INITIAL     MH116(1-2,1),6
        INITIAL     MH116(1-2,3),24
        INITIAL     MH116(1,4),161
        INITIAL     MH116(2,4),3
        INITIAL     MH116(3,1),1
        INITIAL     MH116(3,2),350
        INITIAL     MH116(3,3),153
        INITIAL     MH116(3-6,4),12
        INITIAL     MH116(4,1),2
        INITIAL     MH116(4,2),80
        INITIAL     MH116(5,1),3
        INITIAL     MH116(5,2),260
        INITIAL     MH116(6,1),4
        INITIAL     MH116(6,2),170
        INITIAL     MH116(4,3),159
        INITIAL     MH116(5,3),160
        INITIAL     MH116(6,3),161
        INITIAL     MX012(1-4,1),620100
        INITIAL     MX012(1-2,2-4),640100
        INITIAL     MX012(3,2-4),640150
        INITIAL     MX012(4,2-4),720200
        INITIAL     MX012(5-6,1-4),640100
        INITIAL     MX012(7,1-4),640150
        INITIAL     MX012(8,1-4),720200
        INITIAL     MX012(9-12,1),520100
        INITIAL     MX012(9-12,2),540100
        INITIAL     MX012(9-12,3),560100
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        INITIAL     MX012(9-10,4),640100
        INITIAL     MX012(11,4),640150
        INITIAL     MX012(12,4),720200
        INITIAL     MH153(1-2,1),2
        INITIAL     MH153(1-2,2),5
        INITIAL     MH153(1,3),36
        INITIAL     MH153(3,1),27
        INITIAL     MH153(1,1),27
        INITIAL     MH153(3,1),2
        INITIAL     MH153(3,2),5
        INITIAL     MH153(3,3),36
        INITIAL     MH153(3,8),61
        INITIAL     MH153(1,2-3),0
        INITIAL     MH159(1,1),27
        INITIAL     MH159(2-3,1),2
        INITIAL     MH159(2-3,2),5
        INITIAL     MH159(3,3),36
        INITIAL     MH159(3,8),58
        INITIAL     MH160(1,1),27
        INITIAL     MH160(2-3,1),2
        INITIAL     MH160(2-3,2),5
        INITIAL     MH160(3,3),36
        INITIAL     MH160(3,7),62
        INITIAL     MH160(3,8),59
        INITIAL     MH161(1,1),27
        INITIAL     MH161(2-3,1),2
        INITIAL     MH161(2-3,2),5
        INITIAL     MH161(3,3),36
* TAUNTON
        INITIAL     MH117(1-2,1),4
        INITIAL     MH117(1,2),8
        INITIAL     MH117(1,3),18
        INITIAL     MH117(1,4),92
        INITIAL     MH117(2,3),24
        INITIAL     MH117(2,4),3
        INITIAL     MH117(3,1),1
        INITIAL     MH117(3,2),300
        INITIAL     MH117(3-4,3),154
        INITIAL     MH117(3-4,4),13
        INITIAL     MH117(4,1),2
        INITIAL     MH117(4,2),120
        INITIAL     MH154(1,1),29
        INITIAL     MH154(2-3,1),2
        INITIAL     MH154(3,2),5
        INITIAL     MX013(1-3,1-2),660100
        INITIAL     MX013(3,2),660150
        INITIAL     MX013(4,1),660125
        INITIAL     MX013(4,2),660200
        INITIAL     MX013(5-7,1-2),760150
        INITIAL     MX013(8,1-2),760200
        INITIAL     MX013(9,1-2),580150
        INITIAL     MX013(10-11,1-2),620150
        INITIAL     MX013(12,1-2),620200
* TEW-MAL
        INITIAL     MH118(1-2,1),6
        INITIAL     MH118(1,2),8
        INITIAL     MH118(1,3),18
        INITIAL     MH118(1,4),92
        INITIAL     MH118(2,3),24
        INITIAL     MH118(2,4),2
        INITIAL     MH118(3,1),1
        INITIAL     MH118(3,2),210
        INITIAL     MH118(3-6,3),155
        INITIAL     MH118(3-6,4),14
        INITIAL     MH118(4,1),2
        INITIAL     MH118(4,2),30
        INITIAL     MH118(5,1),3
        INITIAL     MH118(5,2),180
        INITIAL     MH118(6,1),4
        INITIAL     MH118(6,2),360
        INITIAL     MH155(1,1),1
        INITIAL     MH155(1,2),3
        INITIAL     MH155(2,1),28
        INITIAL     MX014(1-3,1-4),640100
        INITIAL     MX014(3,2-4),640150
        INITIAL     MX014(4,2-4),920200
        INITIAL     MX014(4,1),640175
        INITIAL     MX014(5-6,1-4),760100
        INITIAL     MX014(7,1-4),760150
        INITIAL     MX014(8,1-4),920200
        INITIAL     XH1,63
        INITIAL     XH2,1
        INITIAL     XH3,180
        INITIAL     XH4,15
        INITIAL     XH5,8
        INITIAL     XH6,18
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          INITIAL    XH7,5
          INITIAL    XH8,500
          INITIAL    XH9,18
          INITIAL    XH10,5
          INITIAL    XH11,15
          INITIAL    XH12,16
          INITIAL    XH13,10
          INITIAL    XH14,15
          INITIAL    XH15,30
          INITIAL    XH16,3
          INITIAL    XH17,5
          INITIAL    XH18,-1
          INITIAL    XH19,2
          INITIAL    XH20,100
          INITIAL    XH21,375
          INITIAL    XH22,5
 5        FUNCTION   RN2   C2
.0           50         .999        150
 6        FUNCTION   P1    D10
4            3          5           3           6           7
7            7          8           12          9           12
10           22         11          22          12          30
13           30
 7        FUNCTION   P3    D7
1            1000       2           750         3           500
4            400        5           300         6           200
7            50
 8        FUNCTION   P1    D7
1            25         2           50          3           80
4            100        5           150         6           200
7            300
 9        FUNCTION   RN2   C2
0            150        .999        450
 10       FUNCTION   P1    D4
1            1005       2           18060       3           2015
4            24060
 11       FUNCTION   P1    C13
0            100        1           7           10          4.6
100          2.3        200         1.61        300         1.2
400          .92        500         .69         600         .51
700          .36        800         .22         900         .11
999          .001
 1        FUNCTION   RN1   C2
0            71         1           92
 2        FUNCTION   RN1   C2
0            91         1           122
 3        FUNCTION   RN1   C2
0            121        1           142
 4        FUNCTION   RN1   C2
0            141        1           167
 1        VARIABLE   (C1/60)*24+1
 2        FVARIABLE  FN7+FN9-300
 3        FVARIABLE  FN11*P3
 4        FVARIABLE  FN11*P4
 5        FVARIABLE  FN8+(FN5-100)/2
 6        FVARIABLE  FN11*XH4
 7        FVARIABLE  FN7+FN5-100
 8        FVARIABLE  FN11*XH3
 9        FVARIABLE  XH23*MH41(P2,XH24)+V10
 10       FVARIABLE  XH25*MH42(P2,XH24)
 11       FVARIABLE  XH23*MH36(V1,XH24)+V12
 12       FVARIABLE  XH25*MH39(V1,XH24)
 13       FVARIABLE  60*V14
 14       FVARIABLE  FN11/(XH23*MH38(V1,18)+V15)
 15       FVARIABLE  XH25*MH39(V1,18)
 16       FVARIABLE  (600*(MH36(P15,P2)/P3)+5)/10
 17       FVARIABLE  (600*(MH37(P15,P2)/P3)+5)/10
 18       VARIABLE   M1-1
 19       VARIABLE   M1-P7
 20       VARIABLE   XH26*XH26
 21       FVARIABLE  FN10/100+RN7*V22/1000
 22       VARIABLE   FN10*100
 23       FVARIABLE  (10*(X1*XH27/60)+5)/10
 1        BVARIABLE  X2'L'P6
 2        BVARIABLE  X2'L'P6
 3        BVARIABLE  X2'GE'P6
 24       FVARIABLE  (600*P1/P3+5)/10
 25       FVARIABLE  (600*P1/XH28+5)/10
 26       FVARIABLE  XH18*XH26
 4        BVARIABLE  XH29'GE'V27*XH30'GE'V28
 29       FVARIABLE  4*(P16-1)+P14
 27       VARIABLE   X3/1000
 28       VARIABLE   X3*1000
*
* WEATHER MODULE
* WEATHER PARAMETERS
```

(continued)

```
*  P1-COUNTER
*  P2-RANDOM NUMBER COUNTER
*  P3-COUNTER
*  P4-CEILING MATRIX NUMBER
*  P5/VISABILITY MATRIX NUMBER
*  P6-DAY/NIGHT COUNTER
*
 1     GENERATE                        1          6
 2     SPLIT      1      59
 3     SPLIT      1      69
 4     ASSIGN     1      2
 5     ASSIGN     6      0
 6     ASSIGN     3      0
 7     TEST GE    V1     XH5    11
 8     TEST L     V1     XH6    11
 9     ASSIGN     1      3
 10    ASSIGN     6      1
 11    ASSIGN     2      RN2
 12    ASSIGN     3+     1
 13    TEST LE    P2,MH1(P3,P1),12
 14    SAVEVALUE  31,MH1(P3,1),H
 15    ASSIGN     2      RN2
 16    ASSIGN     1+     2
 17    TEST LE    P1     11     19
 18    TEST LE    P2,MH1(P3,P1),16
 19    SAVEVALUE  32     FN6    H
 20    ASSIGN     1-     3
 21    ASSIGN     2      RN2
 22    ASSIGN     4,MH1(P3,12)
 23    ASSIGN     5,MH1(P3,13)
 24    ASSIGN     3      0
 25    ASSIGN     3+     1
 26    TEST LE    P3     6      28
 27    TEST LE    P2,MH*4(P3,P1),25
 28    SAVEVALUE  33     P3     H
 29    TEST E     P3     1      32
 30    SAVEVALUE  34     FN7    H
 31    TRANSFER          36
 32    TEST NE    P3     2      35
 33    SAVEVALUE  34     V7     H
 34    TRANSFER          36
 35    SAVEVALUE  34     V2     H
 36    ASSIGN     3+     P3
 37    ASSIGN     3+     P6
 38    ASSIGN     3-     1
 39    ASSIGN     1      0
 40    ASSIGN     2      RN2
 41    ASSIGN     1+     1
 42    TEST LE    P1     6      44
 43    TEST LE    P2,MH*5(P1,P3),41
 44    SAVEVALUE  35     P1     H
 45    TEST E     P1     7      48
 46    SAVEVALUE  36     FN8    H
 47    TRANSFER          49
 48    SAVEVALUE  36     V5     H
 49    SAVEVALUE  25     1      H
 50    SAVEVALUE  23     0      H
 51    TEST E     XH35   7      55
 52    TEST E     XH33   1      55
 53    SAVEVALUE  25     0      H
 54    SAVEVALUE  23     1      H
 55    ASSIGN     1      RN2
 56    LOGICS     1
 57    ADVANCE    V8
 58    TRANSFER          4
 59    ASSIGN     3      XH33
 60    TEST NE    P3     1      66
 61    TEST NE    P3     2      64
 62    SAVEVALUE  34     V7     H
 63    TRANSFER          65
 64    SAVEVALUE  34     V2     H
 65    LOGICS     1
 66    ASSIGN     1      RN2
 67    ADVANCE    V6
 68    TRANSFER          59
 69    ASSIGN     1      XH35
 70    TEST NE    P1     7      72
 71    SAVEVALUE  36     V5     H
 72    ASSIGN     1      RN2
 73    LOGICS     1
 74    ADVANCE    V6
 75    TRANSFER          69
*
* CONTROL A/C'S LEAVING HOLD AREA ENTERING AIR CONTROLLED APPROACH
*
 76    GENERATE                        1          1
```

(continued)

```
 77    SPLIT      1      206
 78    GATE LS    2
 79    LOGICR     3
 80    GATE LS    3
 81    GATE LR    4
* AIR CONTROLLER TAKES CONTROL OF A/C
 82    UNLINK     3      200   1     13    0     79
 83    GATE LS    5
 84    LOGICR     5
 85    TRANSFER          81
*
* CREATE A/C AND LOAD INTO HOLD AREAS
*
 86    GENERATE                                   16
 87    GATE LR    6
 88    LOGICS     6
 89    ASSIGN     1      RN1
 90    ADVANCE    V13
 91    LOGICR     6
* ASSIGN A/C TAIL NUMBER
 92    SAVEVALUE  37+    1     H
 93    ASSIGN     5      XH37
* ASSIGN A/C DESTINATION
 94    ASSIGN     1      RN1
 95    SAVEVALUE  24     0     H
 96    SAVEVALUE  24+    1     H
 97    TEST NE    XH24   XH9   100
 98    TEST G     P1     V11   100
 99    TRANSFER          96
100    ASSIGN     2      XH24
* ASSIGN A/C TYPE
101    SAVEVALUE  24     0     H
102    ASSIGN     1      RN1
103    SAVEVALUE  24+    1     H
104    TEST G     P1     V9    107
105    TEST E     XH24   3     103
106    SAVEVALUE  24     4     H
107    ASSIGN     4      XH24
* ASSIGN A/C WEIGHT CLASS AND CATAGORY
108    ASSIGN     1      RN1
109    ASSIGN     8      0
110    ASSIGN     8+     1
111    TEST LE    P1,MH40(P4,P8),110
112    ASSIGN     14     P8
113    ASSIGN     8      4
114    ASSIGN     1      RN1
115    ASSIGN     8+     1
116    TEST LE    P1,MH40(P4,P8),115
117    ASSIGN     9      P8
118    ASSIGN     9-     4
* ASSIGN A/C SPEED
119    ASSIGN     3      FN*14
* LOAD DISPLAY MATRIX
120    MSAVEVALUE 44+    1     P4    1     H
121    TEST LE    P2     XH10  210
122    SAVEVALUE  38+    1     H
123    MSAVEVALUE 44+    2     P4    1     H
124    ASSIGN     15     1
125    ASSIGN     10     P5
126    ASSIGN     5      XH38
127    ASSIGN     8      0
128    ASSIGN     1      0
129    LOGICS     3
130    MARK
131    LINK       3      P10
*
* UNLOAD HOLD AREAS AND LAND A/C
*
132    ADVANCE    P7
133    GATE LR    7
134    UNLINK     P11    198   1     5     P5    199
135    TEST NE    V19    0     138
136    MSAVEVALUE 44+    5     P4    1     H
137    MSAVEVALUE 44+    6     P4    V19   H
138    SAVEVALUE  39-    1     H
139    TEST L     XH39,MH43(XH2,11),141
140    LOGICR     4
141    ASSIGN     1      P4
142    MSAVEVALUE 44+    9     P4    1     H
143    SPLIT      1      150         3
144    LOGICS     8
145    ADVANCE    1
146    TEST GE    XH2    XH11  148
147    ADVANCE    2
148    LOGICR     8
149    TERMINATE
```

(continued)

```
* TAKE OFF A/C
*
 150   ADVANCE     V21
 151   PRIORITY    0
 152   MSAVEVALUE  44+    13     P1     1      H
 153   MARK
 154   ASSIGN      2      C1
 155   SAVEVALUE   40+    1      H
 156   ASSIGN      3      XH40
 157   SPLIT       1      159
 158   LINK        4      P2
 159   GATE LR     9
 160   LOGICS      9
 161   GATE LR     7
 162   LOGICS      7
 163   SAVEVALUE   2      P2
 164   UNLINK      1      176    1      BV1           180
 165   GATE LS     10
 166   LOGICR      7
 167   LOGICR      10
 168   SAVEVALUE   1-     C1
 169   TEST G      XH32   XH14   171
 170   GATE LR     8
 171   TEST NE     V23    0      185
 172   TEST L      V23    XH19   185
 173   MSAVEVALUE  44+    12     P1     X1     H
 174   ADVANCE     X1
 175   TRANSFER           161
 176   SAVEVALUE   1      P6
 177   SAVEVALUE   27     P3     H
 178   LOGICS      10
 179   LINK        P11    P6
 180   LOGICR      7
 181   LOGICR      10
 182   SAVEVALUE   1      0
 183   SAVEVALUE   27     0      H
 184   TRANSFER           169
 185   TEST LE     XH20   XH36   196
 186   TEST LE     XH21   XH34   196
 187   UNLINK      4      198    1      3             199
 188   ADVANCE     1
 189   TEST GE     XH2    XH11   191
 190   ADVANCE     2
 191   LOGICR      9
 192   TEST NE     V18    0      195
 193   MSAVEVALUE  44+    10     P1     1      H
 194   MSAVEVALUE  44+    11     P1     V18    H
 195   TERMINATE
 196   GATE LS     1
 197   TRANSFER           161
 198   TERMINATE
 199   ASSIGN      XH41   101
*
* TEST AND LOAD LANDING SCHEDULE
*
 200   LOGICS      5
 201   TEST LE     M1     XH15   263
 202   SAVEVALUE   39+    1      H
 203   TEST GE     XH39,MH43(XH2,11),210
 204   LOGICS      4
 205   TRANSFER           210
 206   GATE LS     1
 207   LOGICR      1
 208   UNLINK      3      210    ALL    13     1
 209   TRANSFER           206
* DETERMINE LANDING RUNWAY
 210   ASSIGN      1      XH7
 211   PRIORITY    0
 212   ASSIGN      8      0
 213   ASSIGN      1+     1
 214   ASSIGN      1,MH36(P1,P2)
 215   TEST NE     P15    0      220
 216   TEST G      P2     XH10   220
 217   ASSIGN      1      XH7
 218   ASSIGN      1+     1
 219   ASSIGN      1,MH36(P1,1)
 220   TEST GE     V1,MH*1(1,2),242
 221   TEST LE     V1,MH*1(1,3),242
 222   ASSIGN      6      3
 223   ASSIGN      7,MH*1(2,1)
 224   TEST GE     V1,MH*1(2,2),226
 225   TEST G      V1,MH*1(2,3),229
 226   ASSIGN      6,MH*1(2,1)
 227   ASSIGN      7,MH*1(1,1)
 228   ASSIGN      7+     1
 229   TEST G      XH32   XH22   267
```

(continued)

```
230   SAVEVALUE  26     XH31   H
231   SAVEVALUE  26-,MH*1(P6,2),H
232   TEST L     XH26   0      234
233   SAVEVALUE  26     V26    H
234   TEST GE    XH26   180    236
235   SAVEVALUE  26-    360    H
236   TEST G     V20    6400   267
237   ASSIGN     6+     1
238   TEST GE    P6     P7     230
239   TEST NE    P8     0      242
240   ASSIGN     15,MH*1(P8,1)
241   TRANSFER          324
242   TEST E     P15    0      249
243   PRIORITY   2
244   ASSIGN     15     RN5
245   TEST LE    P15    XH8    247
246   TERMINATE
247   MSAVEVALUE 44+    3      P4     1      H
248   TRANSFER          122
249   TEST E     P13    0      258
250   SAVEVALUE  39-    1      H
251   TEST LE    XH39,MH43(XH2,11),253
252   LOGICR     4
253   GATE LR    7
254   UNLINK     1      198    1      10
255   UNLINK     2      198    1      10
256   SPLIT      1      255
257   ASSIGN     13     1
258   LINK       3      P10
259   ADVANCE    XH15
260   UNLINK     3      198    1      10
261   MSAVEVALUE 44+    6      P4     1      H
262   TERMINATE
263   PRIORITY   0      BUFFER
264   UNLINK     3      198    1      10
265   MSAVEVALUE 44+    8      P4     1      H
266   TERMINATE
267   TEST NE    P8     0      277
268   SAVEVALUE  3      V20
269   SAVEVALUE  26     XH31   H
270   SAVEVALUE  26-,MH*1(P8,2),H
271   TEST L     XH26   0      273
272   SAVEVALUE  26     V26    H
273   TEST GE    XH26   180    275
274   SAVEVALUE  26-    360    H
275   SAVEVALUE  3-     V20
276   TEST L     X3     0      237
277   TEST NE    XH23   1      317
278   ASSIGN     16     0
279   ASSIGN     12,MH*1(P6,3)
280   ASSIGN     16+    1
281   TEST LE    P16,MH*1(2,4),237
282   ASSIGN     11     0
283   ASSIGN     11+    1
284   TEST LE    P11    4      289
285   TEST NE    MH*12(P16,P11),0,283
286   SAVEVALUE  42,MH*12(P16,P11),H
287   TEST NE    MX15(XH42,1),1,283
288   TRANSFER          280
289   SAVEVALUE  29     XH34   H
290   SAVEVALUE  30     XH36   H
291   SAVEVALUE  29-,MH*1(1,4),H
292   TEST NE    MH*12(P16,5),0,297
293   SAVEVALUE  42,MH*12(P16,5),H
294   TEST NE    MX15(XH42,1),1,297
295   SAVEVALUE  30-    25     H
296   SAVEVALUE  29-    50     H
297   TEST NE    MH*12(P16,6),0,302
298   SAVEVALUE  42,MH*12(P16,6),H
299   TEST NE    MX15(XH42,1),1,302
300   SAVEVALUE  30-    25     H
301   SAVEVALUE  29-    50     H
302   TEST NE    MH*12(P16,7),0,307
303   SAVEVALUE  42,MH*12(P16,7),H
304   TEST NE    MX15(XH42,1),1,307
305   SAVEVALUE  29-    50     H
306   SAVEVALUE  30-    50     H
307   TEST NE    MH*12(P16,8),0,311
308   SAVEVALUE  42,MH*12(P16,8),H
309   TEST NE    MX15(XH42,1),1,311
310   SAVEVALUE  30-    50     H
311   ASSIGN     12,MH*1(P6,4)
312   SAVEVALUE  42,MH*1(P6,1),H
313   SAVEVALUE  3,MX*12(V29,XH42)
314   TEST NE    BV4    1      317
315   ASSIGN     12,MH*1(P6,3)
```

(continued)

```
316   TRANSFER        280
317   ASSIGN    12    0
318   TEST E    P15   0     320
319   TERMINATE
320   ASSIGN    15,MH*1(P6,1)
321   TEST G    XH32  XH14  324
322   ASSIGN    8     P6
323   TRANSFER        237
324   ASSIGN    1     0
325   TEST E    P13   1     330
326   ASSIGN    13    0
327   PRIORITY  2
328   LOGICS    3
329   LINK      3     P10
330   TEST E    P9    1     335
331   TEST E    XH23  1     335
332   ASSIGN    11    2
333   ASSIGN    7     XH13
334   TRANSFER        341
335   ASSIGN    11    1
336   MSAVEVALUE 38   V1    19    P15   H
337   TEST GE   XH2   XH11  340
338   ASSIGN    7     V17
339   TRANSFER        341
340   ASSIGN    7     V16
* CALCULATE ETA AND CONFLICTS
341   ASSIGN    6     P7
342   ASSIGN    8     0
343   TEST G    P2    XH10  345
344   MSAVEVALUE 44+  4     P4    P7    H
345   ASSIGN    6+    C1
346   GATE LR   7
347   LOGICS    7
348   UNLINK    1     198   1     10
349   UNLINK    2     198   1     10
350   SAVEVALUE 2     P6
351   UNLINK    P11   411   ALL   BV3         416
352   GATE LS   11
353   LOGICR    11
354   UNLINK    P11   401   1     BV2         406
355   GATE LS   12
356   LOGICR    12
357   LOGICR    7
358   TEST E    X4    0     419
* TRAILING A/C DOES NOT EXIST
359   TEST NE   X5    0     384
* LEAD A/C EXISTS
360   ASSIGN    1     0
361   TEST LE   P9    XH43  373
362   TEST E    XH43  3     368
363   ASSIGN    1     6
364   ASSIGN    1+    XH43
365   ASSIGN    1-    P9
366   ASSIGN    1,MH43(XH2,P1)
367   TRANSFER        373
368   TEST E    XH43  2     373
369   ASSIGN    1     9
370   ASSIGN    1+    XH43
371   ASSIGN    1-    P9
372   ASSIGN    1,MH43(XH2,P1)
373   ASSIGN    1+,MH43(XH2,5)
374   TEST L    P1    XH17  377
375   TEST G    CH4   XH16  377
376   ASSIGN    1     XH17
377   ASSIGN    1     V24
378   ASSIGN    1+    X5
379   TEST NE   P12   1     447
380   TEST G    P1    P6    384
* CALCULATE WAIT TIME
381   ASSIGN    1-    P6
382   ASSIGN    6+    P1
383   ASSIGN    8+    P1
384   SPLIT     1     386
385   LINK      P11   P6
386   TEST G    P8    0     132
387   TEST G    P8    XH15  392
388   GATE LR   7
389   UNLINK    P11   198   1     5           199
390   SAVEVALUE 39-   1     H
391   TRANSFER        263
392   ADVANCE   P8
393   MSAVEVALUE 44+  7     P4    P8    H
394   PRIORITY  2
395   ASSIGN    8     0
396   TEST G    XH39,MH43(XH2,11),210
397   SAVEVALUE 39-   1     H
```

(continued)

```
398   GATE LR     7
399   UNLINK      P11   198   1     5          199
400   LINK        3     P10
401   SAVEVALUE   4     P6
402   SAVEVALUE   44    P9    H
403   SAVEVALUE   28    P3    H
404   LOGICS      12
405   LINK        P11   P6
406   SAVEVALUE   4     0
407   SAVEVALUE   44    0     H
408   SAVEVALUE   28    0     H
409   LOGICS      12
410   TRANSFER          355
411   SAVEVALUE   5     P6
412   SAVEVALUE   43    P9    H
413   TEST E      W351  1     415
414   LOGICS      11
415   LINK        P11   P6
416   SAVEVALUE   5     0
417   SAVEVALUE   43    0     H
418   TRANSFER          353
*
* TRAILING A/C EXISTS
*
419   TEST E      X5    0     445
* TEST TRAILING A/C
420   ASSIGN      1     0
421   TEST L      P6    X4    346
422   TEST LE     XH44  P9    434
423   TEST E      P9    3     429
424   ASSIGN      1     6
425   ASSIGN      1+    P9
426   ASSIGN      1-    XH44
427   ASSIGN      1,MH43(XH2,P1)
428   TRANSFER          434
429   TEST E      P9    2     434
430   ASSIGN      1     9
431   ASSIGN      1+    P9
432   ASSIGN      1-    XH44
433   ASSIGN      1,MH43(XH2,P1)
434   ASSIGN      1+,MH43(XH2,5)
435   TEST L      P1    XH17  438
436   TEST G      CH4   XH16  438
437   ASSIGN      1     XH17
438   ASSIGN      1     V25
439   ASSIGN      1+    P6
440   TEST G      P1    X4    384
* CALCULATE WAIT TIME
441   ASSIGN      8+    X4
442   ASSIGN      8-    P6
443   ASSIGN      6     X4
444   TRANSFER          346
* LEAD A/C EXISTS
445   ASSIGN      12    1
446   TRANSFER          360
447   ASSIGN      12    0
448   SAVEVALUE   43    0     H
449   SAVEVALUE   5     0
450   TEST G      P1    P6    420
* CALCULATE WAIT TIME
451   ASSIGN      1-    P6
452   ASSIGN      6+    P1
453   ASSIGN      8+    P1
454   TRANSFER          420
*
* FACILITIES OUTAGE MODULE
*
455   GENERATE                      1          4     F
456   ASSIGN      2+    1
457   TEST G      P2    XH1   472
458   LOGICS      2
459   SAVEVALUE   2     1     H
460   GATE LS     13
461   LOGICR      13
462   SAVEVALUE   2     0     H
463   SAVEVALUE   2+    1     H
464   TEST L      XH2   XH12  460
465   ASSIGN      1     0
466   ASSIGN      1+    1
467   TEST LE     P1    4     460
468   ASSIGN      2,MH43(XH2,P1)
469   TEST NE     P2    0     466
470   TEST E      MX15(P2,1),0,466
471   TRANSFER          463
472   SPLIT       1     456
473   ASSIGN      3,MX15(P2,2)
```

(continued)

```
474   ASSIGN      4,MX15(P2,3)
475   MSAVEVALUE  15     P2     1      1
476   ASSIGN      1      #N4
477   ADVANCE     V3
478   LOGICS      13
479   MSAVEVALUE  15     P2     1      0
480   ASSIGN      1      #N4
481   ADVANCE     V4
482   LOGICS      1
483   LOGICS      13
484   TRANSFER           475
*
* MODEL RUN CONSTRAINTS
*
485   GENERATE    1440                                    1
486   TERMINATE   1
      START       1                  1
```

Core Requirements Exceeded

Block printout prints, for each GPSS statement number, the number of transactions currently at each block, and the total number of transactions passing through that block.

ERROR NO. 595
TRANS 16 FROM 457 TO 472 CLOCK 1 TERMINATIONS TO GO 1

BLOCK COUNTS

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
1	0	1	11	0	1	21	0	1	31	0	1	41	0	7
2	0	2	12	0	6	22	0	1	32	0	0	42	0	7
3	0	2	13	0	6	23	0	1	33	0	0	43	0	6
4	0	1	14	0	1	24	0	1	34	0	0	44	0	1
5	0	1	15	0	1	25	0	1	35	0	0	45	0	1
6	0	1	16	0	2	26	0	1	36	0	1	46	0	1
7	0	1	17	0	2	27	0	1	37	0	1	47	0	1
8	0	0	18	0	2	28	0	1	38	0	1	48	0	0
9	0	0	19	0	1	29	0	1	39	0	1	49	0	1
10	0	0	20	0	1	30	0	1	40	0	1	50	0	1
51	0	1	61	0	0	71	0	0	81	0	0	91	0	0
52	0	1	62	0	0	72	0	1	82	0	0	92	0	0
53	0	1	63	0	0	73	0	1	83	0	0	93	0	0
54	0	1	64	0	0	74	1	1	84	0	0	94	0	0
55	0	1	65	0	0	75	0	0	85	1	2	95	0	0
56	0	1	66	0	1	76	0	1	86	0	1	96	0	0
57	1	1	67	1	1	77	0	2	87	1	1	97	0	0
58	0	0	68	0	0	78	1	1	88	0	0	98	0	0
59	0	1	69	0	1	79	0	0	89	0	0	99	0	0
60	0	1	70	0	1	80	0	0	90	0	0	100	0	0
101	0	0	111	0	0	121	0	0	131	0	0	141	0	0
102	0	0	112	0	0	122	0	0	132	0	0	142	0	0
103	0	0	113	0	0	123	0	0	133	0	0	143	0	0
104	0	0	114	0	0	124	0	0	134	0	0	144	0	0
105	0	0	115	0	0	125	0	0	135	0	0	145	0	0
106	0	0	116	0	0	126	0	0	136	0	0	146	0	0
107	0	0	117	0	0	127	0	0	137	0	0	147	0	0
108	0	0	118	0	0	128	0	0	138	0	0	148	0	0
109	0	0	119	0	0	129	0	0	139	0	0	149	0	0
110	0	0	120	0	0	130	0	0	140	0	0	150	0	0
151	0	0	161	0	0	171	0	0	181	0	0	191	0	0
152	0	0	162	0	0	172	0	0	182	0	0	192	0	0
153	0	0	163	0	0	173	0	0	183	0	0	193	0	0
154	0	0	164	0	0	174	0	0	184	0	0	194	0	0
155	0	0	165	0	0	175	0	0	185	0	0	195	0	0
156	0	0	166	0	0	176	0	0	186	0	0	196	0	0
157	0	0	167	0	0	177	0	0	187	0	0	197	0	0
158	0	0	168	0	0	178	0	0	188	0	0	198	0	0
159	0	0	169	0	0	179	0	0	189	0	0	199	0	0
160	0	0	170	0	0	180	0	0	190	0	0	200	0	0

(continued)

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
201	0	0	211	0	0	221	0	0	231	0	0	241	0	0
202	0	0	212	0	0	222	0	0	232	0	0	242	0	0
203	0	0	213	0	0	223	0	0	233	0	0	243	0	0
204	0	0	214	0	0	224	0	0	234	0	0	244	0	0
205	0	1	215	0	0	225	0	0	235	0	0	245	0	0
206	0	1	216	0	0	226	0	0	236	0	0	246	0	0
207	0	1	217	0	0	227	0	0	237	0	0	247	0	0
208	1	1	218	0	0	228	0	0	238	0	0	248	0	0
209	0	0	219	0	0	229	0	0	239	0	0	249	0	0
210	0	0	220	0	0	230	0	0	240	0	0	250	0	0

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
251	0	0	261	0	0	271	0	0	281	0	0	291	0	0
252	0	0	262	0	0	272	0	0	282	0	0	292	0	0
253	0	0	263	0	0	273	0	0	283	0	0	293	0	0
254	0	0	264	0	0	274	0	0	284	0	0	294	0	0
255	0	0	265	0	0	275	0	0	285	0	0	295	0	0
256	0	0	266	0	0	276	0	0	286	0	0	296	0	0
257	0	0	267	0	0	277	0	0	287	0	0	297	0	0
258	0	0	268	0	0	278	0	0	288	0	0	298	0	0
259	0	0	269	0	0	279	0	0	289	0	0	299	0	0
260	0	0	270	0	0	280	0	0	290	0	0	300	0	0

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
301	0	0	311	0	0	321	0	0	331	0	0	341	0	0
302	0	0	312	0	0	322	0	0	332	0	0	342	0	0
303	0	0	313	0	0	323	0	0	333	0	0	343	0	0
304	0	0	314	0	0	324	0	0	334	0	0	344	0	0
305	0	0	315	0	0	325	0	0	335	0	0	345	0	0
306	0	0	316	0	0	326	0	0	336	0	0	346	0	0
307	0	0	317	0	0	327	0	0	337	0	0	347	0	0
308	0	0	318	0	0	328	0	0	338	0	0	348	0	0
309	0	0	319	0	0	329	0	0	339	0	0	349	0	0
310	0	0	320	0	0	330	0	0	340	0	0	350	0	0

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
351	0	0	361	0	0	371	0	0	381	0	0	391	0	0
352	0	0	362	0	0	372	0	0	382	0	0	392	0	0
353	0	0	363	0	0	373	0	0	383	0	0	393	0	0
354	0	0	364	0	0	374	0	0	384	0	0	394	0	0
355	0	0	365	0	0	375	0	0	385	0	0	395	0	0
356	0	0	366	0	0	376	0	0	386	0	0	396	0	0
357	0	0	367	0	0	377	0	0	387	0	0	397	0	0
358	0	0	368	0	0	378	0	0	388	0	0	398	0	0
359	0	0	369	0	0	379	0	0	389	0	0	399	0	0
360	0	0	370	0	0	380	0	0	390	0	0	400	0	0

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
401	0	0	411	0	0	421	0	0	431	0	0	441	0	0
402	0	0	412	0	0	422	0	0	432	0	0	442	0	0
403	0	0	413	0	0	423	0	0	433	0	0	443	0	0
404	0	0	414	0	0	424	0	0	434	0	0	444	0	0
405	0	0	415	0	0	425	0	0	435	0	0	445	0	0
406	0	0	416	0	0	426	0	0	436	0	0	446	0	0
407	0	0	417	0	0	427	0	0	437	0	0	447	0	0
408	0	0	418	0	0	428	0	0	438	0	0	448	0	0
409	0	0	419	0	0	429	0	0	439	0	0	449	0	0
410	0	0	420	0	0	430	0	0	440	0	0	450	0	0

(continued)

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
451	0	0	461	0	0	471	0	0	481	0	0			
452	0	0	462	0	0	472	0	14	482	0	0			
453	0	0	463	0	0	473	0	7	483	0	0			
454	0	0	464	0	0	474	0	7	484	0	0			
455	0	1	465	0	0	475	0	7	485	0	0			
456	0	8	466	0	0	476	0	7	486	0	0			
457	0	8	467	0	0	477	7	7						
458	0	0	468	0	0	478	0	0						
459	0	0	469	0	0	479	0	0						
460	0	0	470	0	0	480	0	0						

CURRENT EVENTS CHAIN

TRANS	BDT	BLOCK	PR	SF	NBA	SET	MARK-TIME	P1	P2	P3	P4	SI	TI	DI	CI	MC	PC	PF
2	1	77			78	8	1	0				1		1	2			
8		209			206	2	1	0				1		1	2			
9	1	86			87	9	-2	0	0	0	0	1		1	2			
								0	0	0	0							
								0	0	0	0							
								0	0	0	0							
16		472			456	4	1	0	8	0	0				2			

Lists the transactions that are to be processed at the time the printout was presented.
Detailed explanation of this printout is presented in the GPSS user's manual.

FUTURE EVENTS CHAIN

TRANS	BDT	BLOCK	PR	SF	NBA	SET	MARK-TIME	P1	P2	P3	P4	SI	TI	DI	CI	MC	PC	PF
7	9	74			75	6	1	585	0	0	0	--			4			
								0	0									
6	10	67			68	1	1	537	0	1	0				4			
								0	0									
3	14	90			91	3	1	219	0	0	0				4			
								0	0	0	0							
								0	0	0	0							
								0	0	0	0							
1	796	57			58	7	1	17	436	1	12				4			
								13	0									
5	1440				485	5		0							4			
15	13211	477			478	16	1	585	7	24600	534				4			
14	15336	477			478	15	1	537	6	24600	534				4			
10	34335	477			478	11	1	567	2	60300	318				4			
11	41390	477			478	12	1	502	3	60300	318				4			
12	50484	477			478	13	1	436	4	60300	318				4			
4	92386	477			478	10	1	219	1	60300	318				4			
13	319647	477			478	14	1	17	5	72300	402				4			

Lists the transactions that are to be processed at a future time.
Details of this printout are presented in the GPSS user's manual.

(continued)

LOGIC SWITCH - SET (ON) STATUS

SWITCH NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
FINI2														

Lists of logic switchs that are in the set position at present time.

CONTENTS OF HALFWORD SAVEVALUES (NON-ZERO)

SAVEVALUE	NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE		NR, VALUE
FACIL	63	ARSEP	1	WTCHG	180	WTVAR	15	DAYST	8	DAYEN	18	RUNWY	5	DIVRT	500
AIRPT	18	HOLD	5	NORAD	15	RADDW	16	TOF	10	WNMAX	15	MAXTM	30	TAKOU	3
LNDST	5	MNONE	-1	LNDSP	2	TAKVS	100	TAKCL	375	CALM	5	VFRWT	1	WNDIR	90
WNVEL	7	CEILP	1	CEIL	1000	VISAP	7	VISAB	300						

List of savevalues that are not zero and their values.

MATRIX HALFWORD SAVEVALUECIRVL

	COL. 1	NT 2	DY 3	NT 4	DY 5	NT 6	DY 7	NT 8	DY 9	NT 10	DY 11	12	13
						Wind Direction in Degrees							
Calm 1	360	7	1	1000	1000	1000	1000	1000	1000	1000	1000	2	3
N 2	0	96	58	61	7	576	448	839	777	1000	990	4	5
NNE 3	22	128	85	152	76	704	510	891	753	956	995	6	7
NE 4	45	163	118	113	29	510	324	755	639	981	979	8	9
ENE 5	67	198	169	82	441	494	0	724	770	981	992	10	11
E 6	90	232	263	167	49	642	437	776	820	976	996	12	13
ESE 7	112	254	348	207	47	671	0	866	804	994	1000	14	15
SE 8	135	272	398	237	66	777	680	935	962	993	995	16	17
SSE 9	157	296	425	153	101	736	641	939	924	1000	995	18	19
S 10	180	365	489	109	53	757	456	949	803	1000	985	20	21
SSW 11	202	424	550	58	20	569	211	845	602	1000	998	22	23
SW 12	225	496	591	48	17	479	195	779	510	998	1000	24	25
WSW 13	247	616	663	19	15	439	302	827	645	999	992	26	27
W 14	270	776	777	69	14	312	211	651	498	990	966	28	29
WNW 15	292	836	874	33	101	295	184	649	439	974	977	30	31
NW 16	315	937	958	26	20	396	225	734	554	996	993	32	33
NNW 17	337	1000	1000	30	13	413	835	835	658	1000	1000	34	35
18	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wind direction in degrees	Number of cumulative occurrences, out of 1000, of wind direction in Day/Night		3 Knots		7 Knots		12 Knots		22 Knots		Default = 30 Knots	
						Wind Velocity							

Ceiling Matrix

Visibility Matrix

(continued)

MATRIX HALFWORD SAVEVALUE 2

Ceiling	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10
1000'	1	857	857	0	0	0	0	0	0	0	0
750'	2	877	877	0	0	0	0	0	0	0	0
500'	3	918	918	0	0	0	0	0	0	0	0
400'	4	938	938	0	0	0	0	0	0	0	0
300'	5	979	979	0	0	0	0	0	0	0	0
200'	6	979	979	0	0	0	0	0	0	0	0
Default = 50'											
Wind Velocity		3 Knots		2 Knots		12 Knots		22 Knots		30 Knots	

Ceiling Matrix for Wind Calm

MATRIX HALFWORD SAVEVALUE 3

Visibility in Miles	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10	NT 11	DY 12	NT 13	DY 14
.25	1	24	24	0	0	0	0	0	0	500	500	0	0	1000	1000
.50	2	48	48	0	0	0	0	0	0	500	500	0	0	1000	1000
.80	3	48	48	0	0	0	0	0	0	500	500	0	0	1000	1000
1.00	4	72	72	0	0	0	0	1000	1000	1000	1000	0	0	1000	1000
1.50	5	119	119	0	0	0	0	1000	1000	1000	1000	0	0	1000	1000
2.00	6	143	143	0	0	1000	1000	1000	1000	1000	1000	0	0	1000	1000
Default = 3.00															
Ceiling		1000'		750'		500'		400'		300'		200'		50'	

Visibility Matrix for Wind Calm

MATRIX HALFWORD SAVEVALUE 4

Ceiling	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10
1000'	1	825	733	798	841	762	752	714	640	1000	0
750'	2	850	800	857	911	878	883	876	820	1000	750
500'	3	850	833	881	943	901	905	933	910	1000	750
400'	4	850	866	914	956	948	956	962	944	1000	1000
300'	5	875	900	950	981	977	992	991	989	1000	1000
200'	6	950	967	977	981	994	1000	1000	989	1000	1000
Default = 50'											
Wind Velocity		3 Knots		7 Knots		12 Knots		22 Knots		30 Knots	

Ceiling matrix for wind N

MATRIX HALFWORD SAVEVALUE 5

Visibility in Miles	COL.	NT 1	DY 2	NT 3	DY 4	NT 5	DY 6	NT 7	DY 8	NT 9	DY 10	NT 11	DY 12	NT 13	DY 14
.25	1	0	0	0	0	0	0	0	71	0	0	63	0	455	400
.50	2	2	0	0	60	0	59	0	143	0	0	313	333	728	600
.80	3	2	0	17	80	56	118	91	143	48	71	501	333	819	800
1.00	4	6	6	51	120	111	176	136	143	238	286	564	333	910	1000
1.50	5	6	13	85	200	222	294	227	214	381	500	814	667	910	1000
2.00	6	12	16	171	260	389	412	485	429	810	500	877	1000	1000	1000
Default = 3.00															
Ceiling		1000'		750'		500'		400'		300'		200'		50'	

Visibility matrix for wind N

(continued)

MATRIX HALFWORD SAVEVALUE 6

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	771	867	638	744	628	553	625	813	1000	1000
2	771	933	732	849	857	766	750	983	1000	1000
3	800	933	764	860	884	809	72	938	1000	1000
4	800	1000	795	884	907	894	875	979	1000	1000
5	829	1000	874	953	977	979	958	1000	1000	1000
6	914	1000	939	977	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind NNE

MATRIX HALFWORD SAVEVALUE 7

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	250	0	0	231	0	545	500
2	0	7	0	0	0	0	0	375	0	0	385	333	818	1000
3	0	7	0	0	0	167	0	500	63	0	462	667	818	1000
4	0	7	0	0	0	167	0	500	63	273	462	1000	909	1000
5	13	7	40	37	125	167	0	625	188	273	846	1000	909	1000
6	20	14	120	74	500	500	0	750	688	909	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind NNE

MATRIX HALFWORD SAVEVALUE 8

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	793	857	549	629	492	547	586	593	200	200
2	862	857	637	743	651	693	776	765	800	800
3	862	857	725	757	762	747	810	852	800	1000
4	897	857	775	814	794	800	879	963	800	1000
5	931	1000	804	857	873	893	914	975	800	1000
6	931	1000	902	943	1000	960	966	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind NE

MATRIX HALFWORD SAVEVALUE 9

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	7	0	0	56	0	0	0	91	0	182	0	357	714
2	0	7	57	0	56	0	0	59	91	0	273	154	643	857
3	7	7	57	0	56	0	0	59	91	83	409	385	714	857
4	7	7	57	54	56	83	167	176	91	167	500	538	929	857
5	7	29	57	81	56	250	250	294	91	417	545	769	929	857
6	21	36	200	270	222	583	333	647	455	750	773	846	929	1000

Same as matrix 3

Visibility matrix for wind NE

(continued)

MATRIX HALFWORD SAVEVALUE 10

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	762	800	575	764	644	844	576	695	200	333
2	857	613	0	831	763	877	833	829	800	667
3	905	933	689	872	780	902	879	878	1000	1000
4	905	933	755	905	831	918	924	951	1000	1000
5	905	933	783	939	898	959	965	988	1000	1000
6	952	1000	906	986	949	984	985	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind ENE

MATRIX HALFWORD SAVEVALUE 11

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	3	0	0	0	0	77	0	0	154	105	83	667	0
2	0	10	30	77	0	0	154	0	111	308	263	250	733	0
3	0	17	30	115	0	0	231	0	111	385	526	417	733	0
4	0	24	61	115	0	63	308	77	111	538	632	500	1000	0
5	19	31	182	115	0	125	385	77	444	769	789	750	1000	0
6	39	49	303	221	71	500	462	692	667	846	947	833	1000	0

Same as matrix 3

Visibility matrix for wind ENE

MATRIX HALFWORD SAVEVALUE 12

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	756	676	650	885	394	891	531	826	1000	333
2	829	824	744	916	606	925	796	926	167	333
3	854	882	786	916	667	944	837	942	1000	333
4	854	882	829	939	758	959	918	975	1000	667
5	878	941	880	943	788	959	1000	1000	1000	1000
6	976	971	949	966	909	993	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind E

MATRIX HALFWORD SAVEVALUE 13

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	67	0	0	0	0	0	438	188	400	583
2	7	2	57	29	133	0	0	133	250	143	688	563	900	750
3	14	2	57	29	133	0	0	133	250	286	750	688	900	750
4	27	5	57	59	133	0	0	267	333	286	813	813	0	833
5	34	13	143	118	333	222	83	400	333	429	875	875	0	833
6	55	37	314	324	667	778	333	800	582	714	938	938	1000	1000

Same as matrix 3

Visibility matrix for wind E

(continued)

MATRIX HALFWORD SAVEVALUE 14

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	758	724	675	896	813	930	286	902	1000	1000
2	788	793	727	922	675	961	571	959	1000	1000
3	788	828	805	942	906	969	619	975	1000	1000
4	818	897	844	971	938	987	762	984	1000	1000
5	848	931	883	979	938	991	857	1000	1000	1000
6	909	931	961	996	969	996	905	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind ESE

MATRIX HALFWORD SAVEVALUE 15

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	71	0	0	200	200	1000	250
2	0	2	0	91	0	0	0	71	167	167	600	600	1000	750
3	0	5	0	91	0	0	0	214	333	167	800	800	1000	750
4	0	12	231	91	0	0	250	286	500	167	900	1000	1000	1000
5	0	18	231	182	125	0	500	643	667	333	1000	1000	1000	1000
6	18	29	308	500	250	0	750	929	1000	1000	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind ESE

MATRIX HALFWORD SAVEVALUE 16

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	879	958	720	964	773	942	875	667	1000	0
2	879	958	853	996	909	981	875	917	1000	0
3	909	1000	893	996	1000	981	875	1000	1000	0
4	970	1000	907	996	1000	990	1000	1000	1000	500
5	1000	1000	933	996	1000	990	1000	1000	1000	1000
6	1000	1000	973	1000	1000	990	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind SE

MATRIX HALFWORD SAVEVALUE 17

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	9	0	0	0	167	0	0	0	333	0	333	1000	1000	1000
2	9	0	0	0	333	0	0	0	333	0	333	1000	1000	1000
3	9	6	0	0	500	0	0	0	333	0	333	1000	1000	1000
4	18	6	0	71	667	0	0	0	333	0	1000	1000	1000	1000
5	27	6	0	143	667	0	250	0	333	0	1000	1000	1000	1000
6	106	35	143	214	667	500	250	500	1000	0	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind SE

(continued)

MATRIX HALFWORD SAVEVALUE 18

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	0	1000	817	935	781	893	800	643	1000	1000
2	750	1000	946	981	938	964	900	929	1000	1000
3	857	1000	957	981	938	964	900	1000	1000	1000
4	893	1000	968	991	969	1000	900	1000	1000	1000
5	929	1000	978	991	969	1000	900	1000	1000	1000
6	1000	989	1000	1000	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind SSE

MATRIX HALFWORD SAVEVALUE 19

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	56	0	0	0	0	0	0	1000	0	1000	1000	1000
2	0	0	56	0	0	0	0	0	0	1000	400	1000	1000	1000
3	0	6	111	0	0	0	0	0	0	1000	600	1000	1000	1000
4	0	11	111	385	0	0	333	667	0	1000	800	1000	1000	1000
5	0	11	111	692	0	0	333	1000	1000	1000	1000	1000	1000	1000
6	1000	28	278	1000	250	0	667	1000	1000	1000	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind SSE

MATRIX HALFWORD SAVEVALUE 20

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	800	828	987	947	825	957	1000	965	1000	1000
2	891	862	948	979	918	981	1000	1000	1000	1000
3	927	1000	960	984	959	981	1000	1000	1000	1000
4	945	1000	979	989	990	994	1000	1000	1000	1000
5	964	1000	988	995	1000	1000	1000	1000	1000	1000
6	1000	1000	1000	995	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind S

MATRIX HALFWORD SAVEVALUE 21

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	0	0	0	0	1000	1000	1000
2	2	0	0	0	0	0	0	0	0	0	167	1000	1000	1000
3	5	0	0	0	0	0	0	333	0	0	333	1000	1000	1000
4	7	0	0	0	0	0	0	667	0	500	500	1000	1000	1000
5	11	0	29	727	0	0	0	667	200	500	500	1000	1000	1000
6	20	11	88	909	100	600	500	1000	600	1000	667	1000	1000	1000

Same as matrix 3

Visibility matrix for wind S

(continued)

MATRIX HALFWORD SAVEVALUE 22

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	960	889	891	940	866	959	955	971	1000	1000
2	960	1000	950	952	975	994	985	989	1000	1000
3	960	1000	968	976	983	1000	985	1000	1000	1000
4	960	1000	982	1000	983	1000	1000	1000	1000	1000
5	960	1000	991	1000	992	1000	1000	1000	1000	1000
6	1000	1000	995	1000	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind SSW

MATRIX HALFWORD SAVEVALUE 23

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	0	0	1000	333	1000	0	1000
2	3	0	0	0	0	0	0	0	0	1000	333	1000	0	1000
3	3	0	0	0	0	0	0	0	0	1000	333	1000	0	1000
4	3	0	0	0	0	0	0	0	0	1000	333	1000	1000	1000
5	3	0	71	0	200	0	0	0	333	1000	333	1000	1000	1000
6	5	7	107	1000	400	200	250	0	667	1000	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind SSW

MATRIX HALFWORD SAVEVALUE 24

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	1000	1000	930	981	930	958	965	986	1000	1000
2	1000	1000	965	1000	975	989	983	986	1000	1000
3	1000	1000	974	1000	981	989	991	1000	1000	1000
4	1000	1000	982	1000	994	1000	991	1000	1000	1000
5	1000	1000	987	1000	994	1000	1000	1000	1000	1000
6	1000	1000	991	1000	994	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind SW

MATRIX HALFWORD SAVEVALUE 25

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	2	0	0	0	0	1000	0	1000	0	1000	667	1000	1000	1000
2	2	0	0	0	0	1000	0	1000	0	1000	1000	1000	1000	1000
3	2	0	0	0	0	1000	0	1000	0	1000	1000	1000	1000	1000
4	2	0	0	0	0	1000	0	1000	0	1000	1000	1000	1000	1000
5	2	0	0	0	250	1000	1000	1000	1000	1000	1000	1000	1000	1000
6	14	0	118	167	250	1000	1000	1000	1000	1000	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind SW

(continued)

MATRIX HALFWORD SAVEVALUE 26

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	944	1000	935	947	953	967	980	995	1000	1000
2	944	1000	973	980	974	1000	993	995	1000	1000
3	944	1000	976	987	985	1000	1000	995	1000	1000
4	944	1000	984	987	988	1000	1000	1000	1000	1000
5	944	1000	995	993	997	1000	1000	1000	1000	1000
6	944	1000	995	993	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind WSW

MATRIX HALFWORD SAVEVALUE 27

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	0	0	0	0	1000	0	0
2	0	0	0	0	0	0	0	1000	0	1000	1000	1000	1000	1000
3	0	2	43	0	0	0	0	1000	0	1000	1000	1000	1000	1000
4	0	2	43	0	0	0	286	1000	0	1000	1000	1000	1000	1000
5	1	2	130	0	500	0	286	1000	1000	1000	1000	1000	1000	1000
6	5	8	174	182	500	0	857	1000	1000	1000	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind WSW

MATRIX HALFWORD SAVEVALUE 28

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	892	1000	964	982	989	996	997	995	875	996
2	973	1000	985	994	1000	996	1000	997	1000	996
3	946	1000	985	994	1000	996	1000	997	1000	1000
4	1000	1000	990	994	1000	1000	1000	1000	1000	1000
5	1000	1000	995	1000	1000	1000	1000	1000	1000	1000
6	1000	1000	995	1000	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind W

MATRIX HALFWORD SAVEVALUE 29

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	0	0	0	1000	1000	0	1000
2	0	0	0	0	0	0	0	0	0	0	1000	1000	1000	1000
3	0	0	0	0	0	0	0	0	0	0	1000	1000	1000	1000
4	1	0	91	0	0	0	0	0	0	0	1000	1000	1000	1000
5	1	2	91	333	1000	0	0	1000	0	0	1000	1000	1000	1000
6	5	7	182	333	1000	0	500	1000	0	0	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind W

(continued)

MATRIX HALFWORD SAVEVALUE 30

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	626	963	953	968	976	967	996	995	1000	1000
2	1000	1000	967	968	986	978	1000	1000	1000	1000
3	1000	1000	972	976	986	983	1000	1000	1000	1000
4	1000	1000	981	984	990	989	1000	1000	1000	1000
5	1000	1000	991	992	993	1000	1000	1000	1000	1000
6	1000	1000	1000	992	997	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind WNW

MATRIX HALFWORD SAVEVALUE 31

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	0	0	0	0	0	0	0	0	0	333	1000	1000	1000
2	0	0	0	0	0	0	0	0	0	0	333	1000	1000	1000
3	0	1	0	0	0	0	333	500	333	333	333	1000	1000	1000
4	0	1	111	0	0	0	333	500	333	333	667	1000	1000	1000
5	0	1	222	250	0	0	667	1000	667	667	1000	1000	1000	1000
6	5	7	222	500	500	1000	1000	1000	1000	667	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind WNW

MATRIX HALFWORD SAVEVALUE 32

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	947	833	937	888	960	965	969	974	1000	1000
2	947	917	952	944	988	980	990	989	1000	1000
3	947	917	956	976	992	985	995	996	1000	1000
4	947	1000	967	984	1000	985	1000	996	1000	1000
5	947	1000	993	992	1000	995	1000	0	1000	1000
6	947	1000	996	992	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind NW

MATRIX HALFWORD SAVEVALUE 33

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	2	0	0	0	0	167	0	0	0	0	0	500	1000
2	0	3	0	67	0	0	167	500	125	0	0	0	500	1000
3	1	3	0	67	0	0	333	500	125	250	0	0	1000	1000
4	1	3	0	133	333	143	500	500	375	500	0	0	1000	1000
5	6	5	67	200	333	286	500	500	500	500	1000	0	1000	1000
6	10	12	200	267	333	571	500	1000	750	750	1000	1000	1000	1000

Same as matrix 3

Visibility matrix for wind NW

(continued

MATRIX HALFWORD SAVEVALUE 34

	COL. 1	2	3	4	5	6	7	8	9	10
ROW 1	786	1000	903	828	918	879	934	962	1000	1000
2	786	1000	938	892	964	935	974	1000	1000	1000
3	786	1000	955	946	969	972	987	1000	1000	1000
4	786	1000	983	968	974	991	1000	1000	1000	1000
5	786	1000	994	989	990	1000	1000	1000	1000	1000
6	1000	1000	1000	989	1000	1000	1000	1000	1000	1000

Same as matrix 2

Ceiling matrix for wind NNW

MATRIX HALFWORD SAVEVALUE 35

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ROW 1	0	4	0	0	0	111	0	0	0	0	0	1000	1000	0
2	0	4	0	0	0	111	0	250	0	333	167	1000	1000	1000
3	0	4	0	0	0	222	0	250	0	667	333	1000	1000	1000
4	0	4	125	0	200	333	143	250	0	667	333	1000	1000	1000
5	10	14	125	0	400	333	143	500	200	667	500	1000	1000	1000
6	14	25	50	188	400	556	429	500	400	667	833	1000	1000	1000

Same as matrix 3

Visibility matrix for wind NNW

MATRIX HALFWORD SAVEVALUE DSTN

		COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Hold Areas					Secondary Airport												
ROW	1 (4)	34	25	19	31	49	27	36	46	39	46	22	29	55	12	33	14	30	38
Logan Runways	2 (27)	39	45	41	18	33	16	22	37	31	25	22	29	34	12	33	14	30	38
	3 (22)	33	45	41	20	26	26	16	38	43	23	47	36	28	43	45	35	49	24
	4 (33)	50	29	25	20	44	43	35	68	63	43	29	20	40	26	29	30	32	49
	5 (15)	25	32	47	41	26	16	22	37	31	25	36	51	34	34	55	35	52	17
	6	101	101	101	101	101	106	107	108	109	110	111	112	113	114	115	116	117	118

Airport definition matrix number (Row)

Distance from hold area/secondary airport to Logan in a radar environment

Column Headings

1	Manjo	10	Lawrence
2	Millis	11	Mansfield
3	Bridgewater	12	Marshfield
4	Skipper	13	Newburyport
5	LWM	14	Norwood
6	Bedford	15	Plymouth
7	Beverly	16	S. Weymouth
8	Fitchburg	17	Taunton
9	Ft. Devens	18	Tew-Mac

(continued)

MATRIX HALFWORD SAVEVALUEDSTNR

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ROW 1	26	49	39	55	26	15	14	38	49	27	34	31	27	28	31	28	45	24
2	38	39	39	38	36	38	21	62	55	38	45	31	35	38	42	28	45	35
3	26	38	46	26	43	28	14	49	45	27	55	41	27	48	52	38	55	24
4	19	18	29	25	39	45	35	66	62	51	34	21	48	28	31	17	34	45
5	27	38	29	44	27	15	24	38	48	28	42	55	38	28	58	38	52	17

Same as DSTN matrix

Distance from hold area/secondary airport to Logan in a non-radar environment

MATRIX HALFWORD SAVEVALUEVFRAC

		COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Hold Areas					Secondary Airports												Default to Tew Mac
ROW	1	297	597	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	7
	2	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	6
	3	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	6
	4	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	8
	5	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	11
	6	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	17
	7	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	25
	8	260	522	740	784	871	871	871	954	955	955	955	955	955	998	998	1000	1000	30
	9	251	502	711	752	836	929	946	947	948	954	954	955	955	996	997	998	999	41
	10	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
	11	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	39
Time of	12	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
Day	13	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	46
	14	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	46
	15	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	40
	16	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	53
	17	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	60
	18	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	43
	19	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	53
	20	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	46
	21	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	33
	22	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	26
	23	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	7
	24	269	538	763	807	897	997	997	997	998	998	998	998	998	998	998	1000	1000	12

Number of aircraft created in VFR conditions

(continued)

MATRIX HALFWORD SAVEVALUEIFRAC

	COL. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ROW 1	297	597	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	3
2	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	5
3	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	5
4	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	7
5	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	9
6	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	14
7	299	598	847	897	996	996	996	996	997	997	997	997	997	997	997	1000	1000	20
8	260	522	740	784	871	871	871	954	955	955	955	955	955	998	998	1000	1000	24
9	251	502	711	752	836	929	946	947	948	954	954	955	955	996	997	998	999	33
10	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	32
11	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	30
12	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	32
13	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	37
14	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	37
15	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	31
16	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	43
17	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	48
18	251	502	710	752	836	928	946	947	948	954	955	955	955	996	997	998	999	35
19	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	43
20	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	37
21	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	27
22	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	20
23	258	516	731	774	860	955	955	955	956	956	956	956	956	998	998	1000	1000	6
24	269	538	763	807	897	997	997	997	998	998	998	998	998	998	998	1000	1000	10

Same as VFRAC matrix, but in IFR conditions

MATRIX HALFWORD SAVEVALUECATWT

	COL. 1	2	3	4	5	6	7	
ROW 1	0	0	787	1000	0	787	1000	Air Carrier
2	0	1000	1000	1000	0	1000	1000	Air Taxi
A/C 3	1000	1000	1000	1000	1000	1000	1000	General Aviation
Type 4	300	500	1000	1000	500	1000	1000	Military
	Approach Category				Weight Class			

Matrix is used to define aircraft category and weight, once type has been determined

(continued)

MATRIX HALFWORD SAVEVALUEVFRPT

ROW	COL. 1	2	3
1	782	897	996
2	782	897	996
3	782	897	996
4	782	897	996
5	782	897	996
6	30	111	947
7	0	2	816
8	0	0	1000
9	0	0	38
10	0	190	1000
11	0	0	1000
12	0	0	1000
13	0	0	1000
14	2	11	869
15	0	0	1000
16	0	0	174
17	0	0	1000
18	0	235	1000

A/C Destinations

A/C Type (Default = type 4)

Matrix is used to determine aircraft type once destination is known in VFR conditions
(Entries signify occurrences out of 1000)

MATRIX HALFWORD SAVEVALUEIFRPT

ROW	COL. 1	2	3
1	782	897	996
2	782	897	996
3	782	897	996
4	782	897	996
5	782	897	996
6	30	111	947
7	0	2	816
8	0	0	1000
9	0	0	38
10	0	190	1000
11	0	0	1000
12	0	0	1000
13	0	0	1000
14	2	11	869
15	0	0	1000
16	0	0	174
17	0	0	1000
18	0	235	1000

Same as VFRPT matrix, but in IFR conditions

MATRIX HALFWORD SAVEVALUEARSEP

ROW	COL. 1	2	3	4	5	6	7	8	9	10	11
1	37	39	40	38	3	1	2	3	0	1	20
2	37	39	40	0	3	1	2	3	0	1	20
3	37	39	0	38	3	1	2	3	0	1	16
4	37	39	0	0	3	1	2	3	0	1	16
5	37	0	40	38	4	0	1	2	0	0	10
6	37	0	40	0	4	0	1	2	0	0	10
7	37	0	0	38	4	0	1	2	0	0	12
8	37	0	0	0	4	0	1	2	0	0	12
9	0	39	40	38	3	1	2	3	0	1	20
10	0	39	40	0	3	1	2	3	0	1	20
11	0	39	0	38	5	0	0	1	0	0	16
12	0	39	0	0	5	0	0	1	0	0	16
13	0	0	40	38	5	0	0	1	0	0	10
14	0	0	0	38	5	0	0	1	0	0	8
15	0	0	40	0	12	0	0	1	0	0	10
16	0	0	0	0	12	0	0	1	0	0	8

Radar Conditions

Non-Radar Conditions

Equipment required up to determine which separation criteria to use (row number)

Required separation in miles

Additional separation in miles for various weights of aircraft

Number of aircraft air control can handle at one time

(continued)

MATRIX HALFWORD SAVEVALUEDELAY

ROW	COL. 1	2	3	4
1	515	64	160	12
2	514	56	87	8
3	0	0	21	4
4	0	0	462	83
5	356	33	60	4
6	7419	801	1418	91
7	4694	629	968	49
8	51	9	6	2
9	462	47	81	6
10	346	29	56	2
11	1252	80	153	2
12	39	2	4	0
13	461	44	81	2

See accompanying explanation of rows

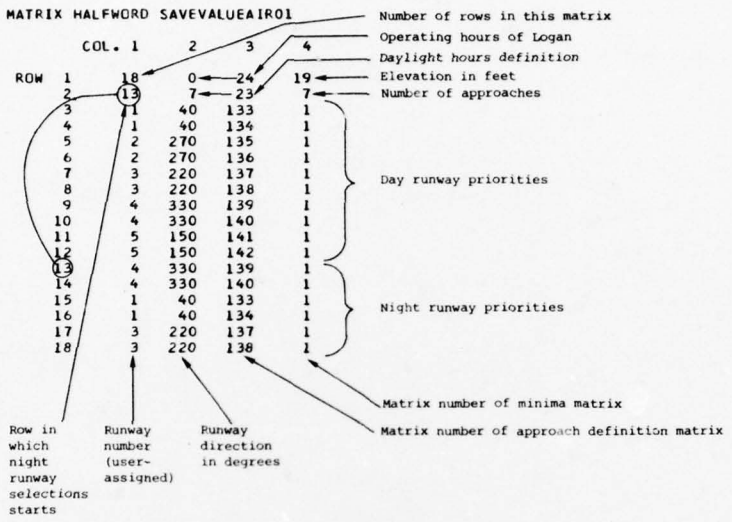
Aircraft Type

1. Number of aircraft created at holding fixes and secondary airports
2. Number of aircraft originally scheduled to the primary airport through the holding fixes
3. Number of aircraft diverted from secondary airport to primary airport
4. Time of flight accumulated by secondary-airport aircraft diverted to the primary airport
5. Number of aircraft landing at primary airport that experienced delay
6. Total delay of landing aircraft
7. Total delay accumulated, for both landing and diverting aircraft, due to separation criteria
8. Number of aircraft not able to land at primary airport and diverted
9. Number of aircraft that landed at primary airport
10. Number of aircraft that experienced takeoff delay at primary airport
11. Total takeoff delay time
12. Total takeoff delay time experienced by aircraft at head of takeoff queue waiting to achieve separation on aircraft taking off ahead
13. Number of aircraft entering the takeoff queue

Figure 3-6. OUTPUT DELAY MATRIX

(continued)

Logan Definition Matrix



Airport Definition Matrix (General Case)

Row \ Column	1	2	3	4
1	Number of Rows (n)	Opening Time	Closing Time	Elevation (in feet)
2	Night Runways (M)	Day Start	Night Start	Number of Approaches
3	Runway Number (Consecutive)	Runway Direction (Degrees)	Approach Matrix Number	Minima Matrix Number
.	↓	↓	↓	↓
.				
.				
M-1				
M				
.				
.				
.				
n				

Day matrix

Night matrix

(continued)

MATRIX HALFWORD SAVEVALUEAIR02

	COL. 1	2	3	4
ROW 1	6	7	24	133
2	6	0	24	5
3	1	110	143	2
4	2	290	156	2
5	3	230	156	2
6	4	50	156	2

Same as matrix AIR01

Bedford definition matrix

MATRIX HALFWORD SAVEVALUE 107

	COL. 1	2	3	4
ROW 1	6	8	18	108
2	6	0	24	4
3	1	160	144	3
4	2	340	144	3
5	3	90	144	3
6	4	270	144	3

Same as matrix AIR01

Beverly definition matrix

MATRIX HALFWORD SAVEVALUE 108

	COL. 1	2	3	4
ROW 1	5	8	18	350
2	5	0	24	1
3	1	140	145	4
4	2	320	145	4
5	3	200	145	4

Same as matrix AIR01

Fitchburg definition matrix

MATRIX HALFWORD SAVEVALUE 109

	COL. 1	2	3	4
ROW 1	6	0	24	268
2	6	0	24	1
3	1	140	146	5
4	2	320	146	5
5	3	20	146	5
6	4	200	146	5

Same as matrix AIR01

Ft. Devens definition matrix

(continued)

MATRIX HALFWORD SAVEVALUE 110

	COL. 1	2	3	4
ROW 1	6	8	21	147
2	6	0	24	2
3	1	230	147	6
4	2	50	157	6
5	3	140	158	6
6	4	320	158	6

Same as matrix AIR01

Lawrence definition matrix

MATRIX HALFWORD SAVEVALUE 111

	COL. 1	2	3	4
ROW 1	4	8	18	124
2	4	0	24	2
3	1	140	148	7
4	2	320	148	7

Same as matrix AIR01

Mansfield definition matrix

MATRIX HALFWORD SAVEVALUE 112

	COL. 1	2	3	4
ROW 1	4	8	18	9
2	4	0	24	1
3	1	60	149	8
4	2	240	149	8

Same as matrix AIR01

Marshfield definition matrix

MATRIX HALFWORD SAVEVALUE 113

	COL. 1	2	3	4
ROW 1	4	8	18	11
2	4	0	24	1
3	1	100	150	9
4	2	280	150	9

Same as matrix AIR01

Newburyport definition matrix

(continued)

MATRIX HALFWORD SAVEVALUE 114

	COL.	1	2	3	4
ROW	1	6	7	23	49
	2	6	0	24	4
	3	1	350	151	10
	4	2	170	151	10
	5	3	100	151	10
	6	4	280	151	10

Same as matrix AIR01

Norwood definition matrix

MATRIX HALFWORD SAVEVALUE 115

	COL.	1	2	3	4
ROW	1	6	8	18	149
	2	6	0	24	1
	3	1	60	152	11
	4	2	330	152	11
	5	3	240	152	11
	6	4	150	152	11

Same as matrix AIR01

Plymouth definition matrix

MATRIX HALFWORD SAVEVALUE 116

	COL.	1	2	3	4
ROW	1	6	0	24	161
	2	6	0	24	3
	3	1	350	153	12
	4	2	80	159	12
	5	3	260	160	12
	6	4	170	161	12

Same as matrix AIR01

S. Weymouth definition matrix

MATRIX HALFWORD SAVEVALUE 117

	COL.	1	2	3	4
ROW	1	4	8	18	92
	2	4	0	24	3
	3	1	300	154	13
	4	2	120	154	13

Same as matrix AIR01

Taunton definition matrix

MATRIX HALFWORD SAVEVALUE 118

	COL.	1	2	3	4
ROW	1	6	8	18	92
	2	6	0	24	2
	3	1	210	155	14
	4	2	30	155	14
	5	3	180	155	14
	6	4	360	155	14

Same as matrix AIR01

Tew-Mac definition matrix

(continued)

MATRIX HALFWORD SAVEVALUEAIR03

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	0	0
2	4	7	0	0	0	0	0	0
3	15	10	7	0	19	23	56	43
4	15	7	0	0	0	0	56	43
5	35	0	0	0	15	0	56	0
6	15	7	35	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Approaches

Facility number required up for approach to be used

HIRL facility number (if required by approach)

ALS facility number (if required by approach)

Middle marker facility number (if required by approach)

Outer marker facility number (if required by approach)

Approach Definition Matrixes
(matrix AIR03 to matrix 161)

MATRIX HALFWORD SAVEVALUE 134

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	0	0
2	4	7	0	0	0	0	0	0
3	15	2	3	0	19	23	56	43
4	15	2	3	10	0	0	56	43
5	35	0	0	0	19	0	56	0
6	15	2	3	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 135

	COL. 1	2	3	4	5	6	7	8
ROW 1	4	7	0	0	0	0	0	48
2	4	7	0	0	0	0	0	0
3	16	11	2	3	20	24	0	0
4	16	7	0	0	0	0	0	0
5	7	0	0	0	0	0	0	0
6	15	2	3	35	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 136

	COL. 1	2	3	4	5	6	7	8
ROW 1	4	2	0	0	0	0	0	48
2	4	7	0	0	0	0	0	0
3	16	11	2	3	20	24	0	0
4	16	7	0	0	0	0	0	0
5	7	0	0	0	20	0	0	0
6	15	7	35	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

(continued)

MATRIX HALFWORD SAVEVALUE 137

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	0	0
2	2	4	7	0	0	0	0	44
3	15	10	7	0	19	23	0	0
4	15	7	0	0	0	0	0	0
5	35	0	0	0	19	0	0	0
6	35	15	7	0	0	0	0	44
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 138

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	0	0
2	2	4	0	0	0	0	0	44
3	15	2	3	10	19	23	0	0
4	15	2	3	0	0	0	0	0
5	35	0	0	0	19	0	0	0
6	15	2	3	0	0	0	0	44
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 139

	COL. 1	2	3	4	5	6	7	8
ROW 1	4	7	0	0	0	0	57	46
2	4	7	0	0	0	0	0	0
3	16	11	2	3	20	24	57	0
4	16	7	0	0	0	0	0	0
5	7	0	0	0	20	0	57	0
6	15	2	3	35	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 140

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	4	0	0	0	0	57	46
2	7	4	0	0	0	0	0	0
3	7	16	11	0	20	24	57	0
4	7	16	0	0	0	0	0	0
5	7	0	0	0	20	0	57	0
6	7	15	35	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 141

	COL. 1	2	3	4	5	6	7	8
ROW 1	4	7	0	0	0	0	0	0
2	4	7	0	0	0	0	0	45
3	14	7	9	0	18	22	0	0
4	14	7	0	0	0	0	0	45
5	0	0	0	0	0	0	0	0
6	15	7	35	0	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

(continued)

MATRIX HALFWORD SAVEVALUE 142

	COL. 1	2	3	4	5	6	7	8
ROW 1	4	2	0	0	0	0	0	0
2	4	7	0	0	0	0	0	45
3	14	2	1	9	18	22	0	0
4	14	2	1	0	0	0	0	45
5	0	0	0	0	0	0	0	0
6	15	2	1	35	0	0	0	0
7	37	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 143

	COL. 1	2	3	4	5	6	7	8
ROW 1	53	0	0	0	17	0	0	0
2	12	8	1	0	17	21	0	64
3	12	1	0	0	17	0	0	0
4	4	53	0	0	17	0	0	0
5	1	4	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 144

	COL. 1	2	3	4	5	6	7	8
ROW 1	25	0	0	0	0	0	0	0
2	4	3	6	0	0	0	0	0
3	4	33	1	0	0	0	0	0
4	4	33	1	1	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 145

	COL. 1	2	3	4	5	6	7	8
ROW 1	32	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 146

	COL. 1	2	3	4	5	6	7	8
ROW 1	26	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 147

	COL. 1	2	3	4	5	6	7	8
ROW 1	1	3	0	0	0	0	0	41
2	13	28	0	0	0	0	0	0

Same as matrix AIR03

(continued)

MATRIX HALFWORD SAVEVALUE 148

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	0	0	0	0	0	0	0
2	2	5	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 149

	COL. 1	2	3	4	5	6	7	8
ROW 1	2	5	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 150

	COL. 1	2	3	4	5	6	7	8
ROW 1	13	17	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 151

	COL. 1	2	3	4	5	6	7	8
ROW 1	31	0	0	0	0	0	0	0
2	31	34	0	52	0	0	0	0
3	2	0	0	0	0	0	0	0
4	2	5	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 152

	COL. 1	2	3	4	5	6	7	8
ROW 1	30	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 153

	COL. 1	2	3	4	5	6	7	8
ROW 1	27	0	0	0	0	0	0	0
2	2	5	0	0	0	0	0	0
3	2	5	36	0	0	0	0	61

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 154

	COL. 1	2	3	4	5	6	7	8
ROW 1	29	0	0	0	0	0	0	0
2	2	0	0	0	0	0	0	0
3	2	5	0	0	0	0	0	0

Same as matrix AIR03

(continued)

MATRIX HALFWORD SAVEVALUE 155

	COL. 1	2	3	4	5	6	7	8
ROW 1	1	3	0	0	0	0	0	0
2	28	0	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 156

	COL. 1	2	3	4	5	6	7	8
ROW 1	53	0	0	0	17	0	0	0
2	1	12	8	0	17	0	0	0
3	1	12	0	0	17	0	0	0
4	4	53	0	0	17	0	0	0
5	4	1	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 157

	COL. 1	2	3	4	5	6	7	8
ROW 1	1	3	0	0	0	0	0	0
2	13	28	0	0	0	0	0	41

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 158

	COL. 1	2	3	4	5	6	7	8
ROW 1	1	3	0	0	0	0	0	0
2	13	28	0	0	0	0	0	0

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 159

	COL. 1	2	3	4	5	6	7	8
ROW 1	27	0	0	0	0	0	0	0
2	2	5	0	0	0	0	0	0
3	2	5	36	0	0	0	0	58

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 160

	COL. 1	2	3	4	5	6	7	8
ROW 1	27	0	0	0	0	0	0	0
2	2	5	0	0	0	0	0	0
3	2	5	36	0	0	0	62	59

Same as matrix AIR03

MATRIX HALFWORD SAVEVALUE 161

	COL. 1	2	3	4	5	6	7	8
ROW 1	27	0	0	0	0	0	0	0
2	2	5	0	0	0	0	0	0
3	2	5	36	0	0	0	0	0

Same as matrix AIR03

(continued)

MATRIX FULLWORD SAVEVALUE MINMA

			(4R)	(27)	(22L)	(33L)	(15R)
		COLUMN	1	2	3	4	5
					Runway Number		
ROW							
VOR 1	1	1	680100	460100	680100	680100	680100
	2	2	680100	460100	680100	680100	680100
	3	3	820150	460100	820150	820150	820150
	4	4	820200	460100	820200	820200	820200
VOR DME 2	5	1	680100	680100	560100	680100	780100
	6	2	680100	680100	560100	680100	780125
	7	3	820150	820150	560100	820150	780150
	8	4	820200	820200	560125	820200	780175
ILS 3	9	1	216050	680100	680100	680100	268075
	10	2	216050	680100	680100	680100	268075
	11	3	216050	820150	820150	820150	268075
	12	4	216050	820200	820200	820200	268075
LOC 4	13	1	460075	680100	680100	680100	580100
	14	2	460075	680100	680100	680100	580100
	15	3	460075	820150	820150	820150	580100
	16	4	460075	820200	820200	820200	580125
NDB 5	17	1	680100	680100	680100	680100	680100
	18	2	680100	680100	680100	680100	680100
	19	3	820150	820150	820150	820150	820150
	20	4	820200	820200	820200	820200	820200
LOC BC 6	21	1	680100	680100	420100	680100	680100
	22	2	680100	680100	420100	680100	680100
	23	3	820150	820150	420100	820150	820150
	24	4	820200	820200	420100	820200	820200
ASR 7	25	1	620050	460100	540100	480050	800100
	26	2	620050	460100	540100	480050	800175
	27	3	620050	460100	540100	480050	800150
	28	4	620100	460100	540125	480100	800175

Mirimum visibility requirement (in 100ths of a mile)

Approach Type

A/C Category

Minimum ceiling requirement (in feet)

Logan Minima Matrix

MATRIX FULLWORD SAVEVALUE 2

	COLUMN	1	2	3	4
ROW	1	700100	700100	700100	700100
	2	700100	700100	700100	700100
	3	700100	720150	720150	720150
	4	700125	760200	760200	760200
	5	383100	0	0	0
	6	383100	0	0	0
	7	383100	0	0	0
	8	383100	0	0	0
	9	660100	680100	680100	680100
	10	660100	680100	680100	680100
	11	660100	720150	720150	720150
	12	660125	760200	760200	760200
	13	800100	800100	800100	800100
	14	800100	800100	800100	800100
	15	800150	800125	800150	800150
	16	800200	800150	800200	800200
	17	680100	680100	680100	680100
	18	680100	680100	680100	680100
	19	720150	680100	680100	720150
	20	760200	760200	680125	760200

Same as matrix MINMA

Bedford Minima Matrix

(continued)

MATRIX FULLWORD SAVEVALUE 3

	COLUMN 1	2	3	4
ROW 1	600100	600100	600100	600100
2	600100	600100	600100	600100
3	600150	600150	600150	600150
4	700200	700200	700200	700200
5	640100	640100	640100	640100
6	640100	640100	640100	640100
7	640100	640150	640150	640150
8	640125	700200	700200	700200
9	580100	600100	600100	600100
10	580100	600100	600100	600100
11	580100	600150	600150	600150
12	580100	700200	700200	700200
13	500100	600100	600100	600100
14	500100	600100	600100	600100
15	500100	600150	600150	600150
16	500100	700200	700200	700200

Same as matrix MINMA

Beverly Minima Matrix

MATRIX FULLWORD SAVEVALUE 4

	COLUMN 1	2	3	4
ROW 1	1140100	1140100	1140100	1140100
2	1400175	1400175	1400175	1400175
3	1420200	1420200	1420200	1420200
4	1600200	1600200	1600200	1600200

Same as matrix MINMA

Fitchburg Minima Matrix

MATRIX FULLWORD SAVEVALUE 5

	COLUMN 1	2	3	4
ROW 1	940100	940100	940100	940100
2	940100	940100	940100	940100
3	940125	940150	940150	940150
4	940150	940200	940200	940200

Same as matrix MINMA

Ft. Devens Minima Matrix

MATRIX FULLWORD SAVEVALUE 6

	COLUMN 1	2	3	4
ROW 1	700100	780100	780100	780100
2	700100	780100	780100	780100
3	700100	780150	780150	780150
4	700125	780200	780200	780200
5	780100	760100	780100	780100
6	780100	760100	780100	780100
7	780150	760100	780125	780125
8	780200	760125	780200	780200

Same as matrix MINMA

Lawrence Minima Matrix

(continued)

MATRIX FULLWORD SAVEVALUE 7

	COLUMN	1	2
ROW	1	860100	860100
	2	860100	860100
	3	860150	860150
	4	860200	860200
	5	780100	780100
	6	780100	780100
	7	780150	780150
	8	800200	800200

Same as matrix MINMA

Mansfield Minima Matrix

MATRIX FULLWORD SAVEVALUE 8

	COLUMN	1	2
ROW	1	600100	600100
	2	600100	600100
	3	600150	600150
	4	640200	640200

Same as matrix MINMA

Marshfield Minima Matrix

MATRIX FULLWORD SAVEVALUE 9

	COLUMN	1	2
ROW	1	740100	740100
	2	1500500	1500500
	3	1500500	1500500
	4	1500500	1500500

Same as matrix MINMA

Newburyport Minima Matrix

MATRIX FULLWORD SAVEVALUE 10

	COLUMN	1	2	3	4
ROW	1	640100	640100	640100	640100
	2	640100	640100	640100	640100
	3	640100	640150	640150	640150
	4	640125	740200	740200	740200
	5	580100	640100	640100	640100
	6	580100	640100	640100	640100
	7	580100	640150	640150	640150
	8	580125	740200	740200	740200
	9	840100	840100	840100	840100
	10	840125	840125	840125	840125
	11	840150	840150	840150	840150
	12	840175	840175	840175	840175
	13	580100	0	0	0
	14	580100	0	0	0
	15	580100	0	0	0
	16	580125	0	0	0

Same as matrix MINMA

Norwood Minima Matrix

(continued)

MATRIX FULLWORD SAVEVALUE 11

	COLUMN	1	2	3	4
ROW	1	600100	600100	600100	600100
	2	600100	600100	600100	600100
	3	600100	600150	600150	600150
	4	1500500	1500500	1500500	1500500

Same as matrix MINMA

Plymouth Minima Matrix

MATRIX FULLWORD SAVEVALUE 12

	COLUMN	1	2	3	4
ROW	1	620100	640100	640100	640100
	2	620100	640100	640100	640100
	3	620100	640150	640150	640150
	4	620100	720200	720200	720200
	5	640100	640100	640100	640100
	6	640100	640100	640100	640100
	7	640150	640150	640150	640150
	8	720200	720200	720200	720200
	9	520100	540100	560100	640100
	10	520100	540100	560100	640100
	11	520100	540100	560100	640150
	12	520100	540100	560100	720200

Same as matrix MINMA

S. Weymouth Minima Matrix

MATRIX FULLWORD SAVEVALUE 13

	COLUMN	1	2
ROW	1	660100	660100
	2	660100	660100
	3	660100	660150
	4	660125	660200
	5	760150	760150
	6	760150	760150
	7	760150	760150
	8	760200	760200
	9	580150	580150
	10	620150	620150
	11	620150	620150
	12	620200	620200

Same as matrix MINMA

Taunton Minima Matrix

MATRIX FULLWORD SAVEVALUE 14

	COLUMN	1	2	3	4
ROW	1	640100	640100	640100	640100
	2	640100	640100	640100	640100
	3	640100	640150	640150	640150
	4	640175	920200	920200	920200
	5	760100	760100	760100	760100
	6	760100	760100	760100	760100
	7	760150	760150	760150	760150
	8	920200	920200	920200	920200

Same as matrix MINMA

Tew-Mac Minima Matrix

(continued)

AD-A058 984 ARINC RESEARCH CORP ANNAPOLIS MD F/G 1/5
USER DELAY COST MODEL AND FACILITIES MAINTENANCE COST MODEL FOR--ETC(U)
MAY 78 L B GREENE, J WITT
UNCLASSIFIED DOT-TSC-1173-2
FAA-AAF-220-78-01-2 NL

3 OF 3
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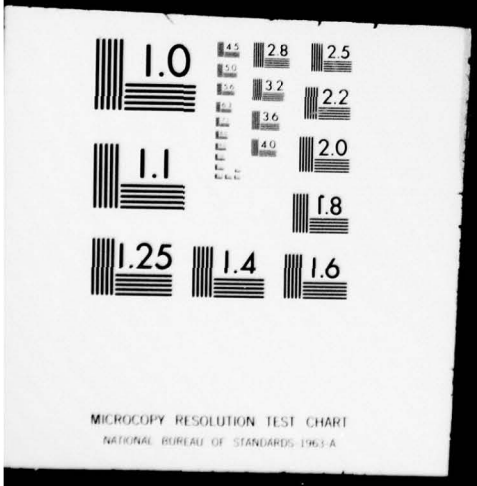
1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

GRD SAVEVALUE FACIL

MTBF in minutes

MTTR in minutes

CCLUMN	1	2	3
	1	60300	318
	1	60300	318
	1	60300	318
	1	60300	318
	1	72300	402
	1	24600	534
	1	24600	534
	0	28500	1260
	0	28500	1260
	0	28500	1260
	0	28500	1260
	0	23400	900
	0	23400	900
	0	23400	900
	0	23400	900
	0	23400	900
	0	111900	1920
	0	111900	1920
	0	111900	1920
	0	111900	1920
	0	130500	2580
	0	130500	2580
	0	130500	2580
	0	130500	2580
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	24600	534
	0	36300	96
	0	5160	180
	0	29100	120
	0	20100	114
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	2100000	616
	0	2100000	616
	0	2100000	660
	0	2100000	660
	0	2100000	660
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780
	0	25200	780

Facility Status: 1-facility up; 0-facility down

Facility Status Matrix

***** TOTAL RUN TIME (INCLUDING ASSEMBLY) = 19.13 MINUTES *****

DATE 11/01/76,CLOCK 02/20/35,DURATION 00/19/19

APPENDIX B

LIST OF REFERENCES

1. "Special Ceiling-Visibility Wind Tabulation" for Boston, for the period January 1970 to December 1974, National Climatic Center, Asheville, North Carolina.
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3. "Duration of High Surface Wind Speeds" at Oscoda, Michigan AFB, for the period November 1950 to December 1970, National Climatic Center, Asheville, North Carolina.
4. "FAA Air Traffic Activity, Calendar Year 1975", March 1976, U.S. Department of Transportation, FAA, Office of Management Systems, Information and Statistics Division, Washington, D.C. 20591.
5. *Air Traffic Control*, 7110.65, 1 January 1976, U.S. Department of Transportation, FAA, Air Traffic Service, Washington, D.C. 20591.
6. "Instrument Approach Procedures", National Ocean Survey.
7. "Standard Operating Procedures", March 15, 1976, (BOS TWR 7110.35), Boston Tower, Logan International Airport, East Boston, Massachusetts.
8. "60-Nautical-Mile Video Map", ASR-7, National Ocean Survey, revised 4 February 1976, Boston (Logan International), Massachusetts.
9. "Performance Measurement System for Major Airports", November 1975, U.S. Department of Transportation, FAA, Air Traffic Service, Operation Research Branch, Washington, D.C. 20591.
10. "Air Navigation and Air Traffic Control Facility Performance and Availability" (RIS: SM 6040-20), Calendar Year 1975, FAA, Airway Facilities Service, Washington, D.C. 20591.

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