U.S. Department
of Transportation
Federal **Aviation**
Administration

Airport Capacity and Delay

Portions of this AC are under review for update. Please contact the appropriate Regional Office or Airports District Office for assistance.

REPRINT INCORPORATES
CHANGE 1 AND 2

AC: 150/5060-5
Date: 9-23-83

Advisory Circular

U.S. Department
of Transportation
Federal Aviation
Administration

REPRINT INCORPORATES
Change 1 and 2

Advisory Circular

Subject: AIRPORT CAPACITY AND DELAY

Date: 9/23/83
Initiated by: AAS-100

AC No: 150/5060-5
Change:

1. PURPOSE. This advisory circular (AC) explains how to compute airport capacity and aircraft delay for airport planning and design.

2. CANCELLATIONS. This publication cancels the following Federal Aviation Administration (FAA) Advisory Circulars (ACs):

a. AC 150/5060-1A, Airport Capacity Criteria Used in Preparing the National Airport Plan, dated July 8, 1968, and

b. AC 150/5060-3A, Airport Capacity Criteria Used in Long Range Planning, dated December 24, 1969.

3. BACKGROUND. Changes in the composition of the nation's aircraft fleet together with improvements in air traffic control (ATC) practices have outdated capacity calculations contained the cancelled ACs. An FAA contractor reexamined the procedures for determining airport capacity and suggested improvements to update them. This AC implements these improvements. In addition, this AC refines definitions of capacity and delay. CAPACITY is the throughput rate, i.e. the maximum number of operations that can take place in an hour. DELAY is the difference in time between a constrained and an unconstrained aircraft operation. These definitions take into account that delays occur because of simultaneous demands on the facility. The acceptable level of delay will vary from airport to airport.

4. APPLICATION TO AIRPORT DESIGN. To apply these procedures, a reasonable understanding of the aeronautical activities being conducted at, or projected for, the airport is required. Care should be exercised in using available data so as to avoid data which represents a level of activity occurring sporadically during the year--unless it is intended to examine that specific condition. Since few airports operate at "peak demand" levels for more than two or three consecutive, hours in any one day and demand fluctuates throughout a period even as short as one hour, some delay will occur during a typical hours operations. It is suggested that airport design-be based on an hourly demand which can be expected to occur at least on a weekly basis.

6. <u>REFERENCE</u>. Report No. FAA-RD-74-124, Techniques for Determining Airport Airside Capacity and Delay, dated June 1976 is available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161, telephone (703) 557-4650. The NTIS reference number is AD-A032 475.

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CHAPTERI.. AIRPORT CAPACITY AND AIRCRAFT DELAY

1-l. **GENERAL. Hourly** airport capacities and annual aircraft delay canputations are needed to design and evaluate airport **development** and **improvement** projects. The method for computing airport capacity and aircraft delay is the **throughput** method provided in this AC.

a. Background. The throughput **method** for calculating airport capacity and average delay per aircraft is derived from computer models used by the **Federal** Aviation Administration (FAA) to analyze airport capacity and reduce aircraft delay. Calculations of hourly capacity are needed to determine average delay. Since airport and airport component hourly capacities vary throughout the day due to variations in runway use, aircraft mix, ATC rules, **etc.,** a number of calculations **may** be **needed.**

b. AC Organization.

(1) Chapter 1 provides an overview of airport capacity and aircraft delay analyses.

(2) Chapter 2 contains calculations for computing airport capacity, annual service volume **(ASV),** and aircraft delay for long range evaluations.

(3) Chapter 3 contains more detailed computations suitable for a wide range of airport design and planning applications.

(4) Chapter 4 contains special computations of capacity relating to:

(i) Periods of poor visibility and ceiling conditions.

(ii) Airports without radar coverage and/or an instrument landing system **(ILS).**

(iii) Airports with parallel runways when one runway **is** limited to use by small aircraft.

(5) Chapter 5 identifies **computer** models which may be used to further refine runway capacity and aircraft delay analyses.

(6) The appendices contain examples applying chapter 2, 3, and 4 calculations.

c. Units. Since FM operational standards for spacing aircraft taking-off and **landing are in** customary units (feet, knots, etc.), it is expedient to perform capacity and delay computations in the same units.

1-2. AIRPORT COMPONENTS.

a. Runway. The term runway includes the landing surface, plus those portions of the approach and departure paths used in common by all aircraft.

b. Taxiway. The term **taxiway** includes the parallel taxiways, **entrance-exit taxiways,** and crossing taxiways, recognizing that a capacity limiting condition may exist where an arriving or departing stream of aircraft must cross an active runway.

c. Gate Group. The term gate group identifies the number of gates located in the terminal complex which are used by an airline, or shared by two or more airlines, or other aircraft operating at the airport on a regularly scheduled basis. In most cases the terminal gates are not used by general aviation aircraft.

1-3. CAPACITY TERMS. The following subpargraphs define terms used herein. Symbols used in this AC are defined in Appendix 4, Glossary of Symbols/Terms.

a. Aircraft Mix. Aircraft mix is the relative percentage of operations conducted by each of the four classes of aircraft (A, B, C, and D). Table 1-1 identifies physical aspects of the four aircraft classes and their relationship to terms used in the wake turbulence standards.

Table 1-1. Aircraft classifications

Aircraft class	Max. Cert. T.O. might (lbs)	Number Engines	Wake Turbulence Classification
A	12,500 or less	Single	Small (S)
B		Multi	
C	12,500 - 300,000	Multi	Large (L)
D	over 300,000	Multi	Heavy (H)

b. Annual Service Volume (ASV) ASV is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time.

c. Capacity. Capacity (throughput capacity) is a measure of the maximum number of aircraft operations which can be accommodated on the airport or airport component in an hour. Since the capacity of an airport component is independent of the capacity of other airport components, it can be calculated separately.

d. Ceiling and Visibility. For purposes of this AC, the terms VFR, IFR, and PVC are used as measures relating to the following ceilings and visibilities.

(1) Visual flight rule (VFR) conditions occur whenever the cloud ceiling is at least 1,000 feet above ground level and the visibility is at least three statute miles.

(2) Instrument flight rule (IFR) conditions occur whenever the reported cloud ceiling is at least 500 feet but less than 1,000 feet and/or Visibility is at least one statute mile but less than three statute miles.

(3) Poor visibility and ceiling (PVC) conditions exist whenever the cloud ceiling is less than 500 feet and/or the visibility is less than one statute mile.

e. Delay. Delay is the difference between constrained and unconstrained operating time.

f. Demand. Demand is the magnitude of aircraft operations to be accamnodated in a specified time period.

g. Gate. A gate is an aircraft parking position used by a single aircraft loading or unloading passengers, mail, cargo, etc. A parking position which is regularly used by two aircraft at the same time is two gates for capacity calculations.

(1) Gate type is the size of the gate. A Type 1 gate is capable of accommodating all aircraft, including widebodies such as the A-300, B-747, B-767, DC-10, L-1011. A Type 2 gate will accommodate only non-widebodied aircraft.

(2) Gate mix is the percent of non-widebodied aircraft accommodated by the gate group.

(3) Gate occupancy time is the length of time required to cycle an aircraft through the gate.

h Mix Index. Mix index is a mathematical expression. It is the percent of Class C'aircraft plus 3 times the percent of Class D aircraft, and is written: %(C+3D).

i Percent Arrivals (PA). The percent of arrivals is the ratio of arrivals to total operations and is computed as follows:

$$\text{Percent arrival8} = \frac{A+\frac{1}{2}(T\&G)}{A+DA+(T\&G)} \times 100, \text{ where}$$

A = number of arriving aircraft in the hour
DA = number of departing aircraft in the hour
T&G = number of touch and go's in the hour

j. Percent Touch and Go's. The percent touch and go's is the ratio of landings with an immediate takeoff to total operations and is cauputed as folluws:

$$\text{Percent touch and go'8} = \frac{(T\&G)}{A+DA+(T\&G)} \times 100, \text{ where}$$

A = number of arriving aircraft in the hour
DA = number of departing aircraft in the hour
T&G = number of touch and go's in the haur

Touch and go operations are normally associated with flight training. The number of these operations usually decreases as the number of air carrier operations increase, as demand for service approaches runway capacity, or as weather conditions deteriorate.

k. Runway-use Configuration. Runway-use configuration is the number, location, and orientation of the active runway(s), the type and direction of operations, and the flight rules in effect at a particular time.

1-4. CAPACITY, DEMAND, DELAY RELATIONSHIPS, As demand approaches capacity, individual aircraft de&y is increased. Successive hourly demands exceeding the hourly capacity result in unacceptable delays. When the hourly demand is less than the hourly capacity, aircraft delays will still occur if the demand within a portion of the time interval exceeds the capacity during that interval, Because the magnitude and scheduling of user demand is relatively unconstrained, reductions in aircraft delay can best be achieved through airport improvements which increase capacity.

CHAPTER 2. CAPACITY AND DELAY CALCULATIONS FOR LONG RANGE PLANNING

2-1. GENERAL. This chapter contains calculations for determining hourly airport capacity, ASV, and aircraft delay for long-range airport planning. Appendix 1 contains examples of these calculations. When more precise results are required, or if the conditions differ significantly from the assumptions described in the following paragraphs, apply the calculations found in subsequent chapters.

2-2. CAPACITY ASSUMPTIONS. Hourly VFR and IFR values in figure 2-1 are based on runway utilizations which produce the highest sustainable capacity consistent with current ATC ties and practices. These values are representative of typical U.S. airports having similar runway-use configurations. VFR and IFR hourly airport capacities in figure 2-l are based on the following assumptions:

a. Runway-use Configuration. Any runway layout can be approximated by one of the 19 depicted runway-use configurations. Multiple arrival streams are only to parallel runway configurations.

b. Percent Arrivals. Arrivals equal departures.

c. Percent Touch and Go's. The percent of touch and go's is within the ranges in table 2-1.

d. Taxiways. a full-length parallel taxiway, ample runway entrance/exit taxiways, and no taxiway crossing problems.

e. Airspace Limitations There are no airspace limitations which would adversely impact flight operations or otherwise restrict aircraft which could operate at the airport. Missed approach protection is assured for all converging operations in IFR weather conditions.

f. Runway Instrumentation The airport has at least one runway equipped with an ILS and has the necessary ATC facilities and services to carry but operations in a radar environment. For independent operations, 3,400 feet separation requires Precision Runway Monitor (PRM) equipment with high update radar. If PRM equipment is not available, independent operations will require 4,300 feet separation.

Table 2-1. Assumptions incorporated in figure 2-l

Mix Index %(C+3D)	Percent Arrivals	Percent Touch & Go	Demand Ratios: Annual Demand / Av. Daily Demand*	Demand Ratios: Av. Daily Demand* / Av. Peak Hour Demand*
O-20	50	O-50	290	9
2 l-50	"	0-40	300	10
5 l-80	"	O-20	310	11
81-120	"	0	320	12
121-180	"	0	350	14

* In the peak month

2-3. ASV ASSUMPTIONS. The ASV values in figure 2-l are based on the assumptions of paragraph 2-2, table 2-1, and the following:

a. Weather. IFR weather conditions occur roughly 10 percent of the time.

b. Runway-use Configuration. Roughly 80 percent of the time the airport is operated with the runway-use configuration which produces the greatest hourly capacity.

2-4. AIRPORT CAPACITY AND ANNUAL SERVICE VOLUME. Calculate the approximate hourly capacities and the ASV as follows:

a. Determine the percentage of aircraft classes C and D using, or expected to use, the airport.

b. Select the runway-use configuration from figure 2-1 that best represents the airport. Runway-use configurations 9 through 19 show by means of arrows the predominant direction of runway operations. When no direction is specified, the direction of operation is not critical. Runway-use configurations 14 through 19 indicate by dashed lines the limit of the range of runway orientation. For airports having three or more runway orientations (consider parallel runways as one runway orientation), identify the two-runway orientation that is operated most frequently. To adjust for staggered thresholds see paragraph 4-6.

c. Calculate the mix index.

d. Read the approximate VFR and IFR hourly capacities and the ASV directly from figure 2-1.

2-5. AIRCRAFT DELAY. Calculate the aircraft delay as follows:

a. Estimate annual demand using current or historical information or projections of future traffic.

b. Calculate the ratio of annual demand to ASV.

c. Obtain average delay per aircraft from figure 2-2. The upper portion of the band applies to airports where air carrier operations dominate. The full width of the band applies to airports where general aviation operations dominate. Delays 5 to 10 times average could be experienced by individual aircraft.

d. Calculate total annual aircraft delay as the average delay multiplied by the annual demand.

2-6. AIRPORT DESIGN COMPUTER MODEL. The Airport Design Computer Model capacity and delay outputs are the same as those obtained from this chapter. The computer model covers the same runway-use configurations and traffic mixes as figure 2-1.

a. Entry Data. The computer model requires the following:

(1) The percentage of operations by aircraft weighing more than 12,500 pounds but less than 300,000 pounds with respect to the total number of aircraft operations.

(2) The Percentage of operations by aircraft weighing more than 300,000 pounds with respect to the total number of aircraft operations.

(3) The targeted level of annual operations (the demand).

(4) The predominate operations (either air carrier or general aviation).

b. Output. The Airport Design model lists the runway-use configurations in rank order of capacity and least delay. Other considerations (project costs and/or land availability) may preclude the selection and development of the highest ranking runway-use configuration (normally configuration No. 8). Table 2-2 illustrates a typical airport capacity and delay printout. Figure A5-13 illustrates a printout of the runway-use configuration sketches.

Table 2-2. Typical airport capacity and delay printout

AIRPORT CAPACITY AND DELAY DATA

C = Percent of airplanes over 12,500 lbs but not over 300,000 lbs . . . 55
D = Percent of airplanes over 300,000 lbs 4
Mix Index (C+3D) 67
Annual demand 220,000
Air carrier operations dominate

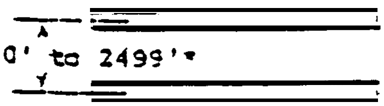
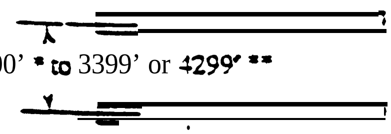
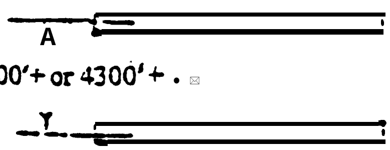
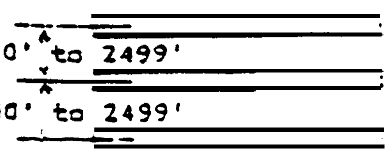
AIRPORT CAPACITY AND DELAY FOR LONG RANGE PLANNING

Runway-use Configuration (Sketch) No.	Capacity (Ops/Hour) VFR	Capacity (Ops/Hour) IFR	ASV	Ratio of Annual Demand to Asv Ratio	Average Delay per Aircraft (Minutes) Low	Average Delay per Aircraft (Minutes) High	Minutes of Annual Delay (000) Low	Minutes of Annual Delay (000) High
8	242	111	515,000	0.43	0.3	0.4	66	88
7	184	111	455,000	0.48	0.3	0.5	66	110
4	126	111	305,000	0.72	0.7	1.1	154	242
12	126	111	305,000	0.72	0.7	1.1	154	242
6	184	65	290,000	0.76	0.8	1.2	176	264
5	171	65	285,000	0.77	0.9	1.3	198	286
3	126	65	275,000	0.80	1.0	1.5	220	330
11	126	65	275,000	0.80	1.0	1.5	220	330
16	164	56	275,000	0.80	1.0	1.5	220	330
18	164	56	275,000	0.80	1.0	1.5	220	330
19	158	56	275,000	0.80	1.0	1.5	220	330
13	145	56	270,000	0.81	1.0	1.5	220	330
2	121	56	260,000	0.85	1.1	1.7	242	374
10	121	S6	260,000	0.85	1.1	1.7	242	374
17	121	56	260,000	0.85	1.1	1.7	242	374
14	85	56	220,000	1.00	2.3	3.5	506	770
15	82	56	215,000	1.02	2.6	4.0	572	880
9	77	56	215,000	1.02	2.6	4.0	572	880
1	63	56	205,000	1.07	3.6	5.7	792	1254

2-7. COST OF AIRCRAFT DELAYS A major factor which influences a decision to proceed with a project is the benefit versus the cost of the improvement: The airport capacity and aircraft delay computations operate on the premise that individual aircraft within the broad aircraft classes A, B, C, and D (See table l-1) have comparable service times. A cost computation however requires a more refined breakdown of aircraft types and usages.

a. Delay Costs. The per minute costs of figure A5-12 are conservative estimates and are based on the best data currently available. The costs represent a reasonable estimate of crew, fuel and maintenance costs for operators of air carrier and air taxi aircraft, and fuel and maintenance costs for operators of general aviation aircraft. Other data sources may be used in the calculation of savings. When other data sources are used, document the data source as well as the rationale used to allocate delay savings among the cost classes being identified.

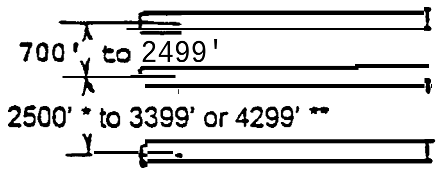
b. Estimating Savings. Appendix 1 contains an example for calculating the savings associated with the reduced aircraft delays based on the figure A5-12 aircraft groupings and estimates of delay costs. Figure A5- 12 is the form used in this calculation.

NO.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
1.		0 to 20	98	59	230,000
		21 to 50	74	57	195,000
		51 to 80	63	56	205,000
		81 to 120	55	53	210,000
		121 to 180	51	50	240,000
2.		0 to 20	197	59	355,000
		21 to 50	145	57	275,000
		51 to 80	121	56	260,000
		81 to 120	105	59	285,000
		121 to 180	94	60	340,000
3.		0 to 20	197	62	355,000
		21 to 50	149	63	285,000
		51 to 80	126	65	275,000
		81 to 120	111	70	300,000
		121 to 180	103	75	365,000
4.		0 to 20	197	119	370,000
		21 to 50	149	113	320,000
		51 to 80	126	111	305,000
		81 to 120	111	105	315,000
		121 to 180	103	99	370,000
5.		0 to 20	295	62	385,000
		21 to 50	213	63	305,000
		51 to 80	171	65	285,000
		81 to 120	149	70	310,000
		121 to 180	129	75	375,000

* **Staggered** threshold adjustments may apply, see paragraph 4-6.
** Refer to paragraph 2-2.f.

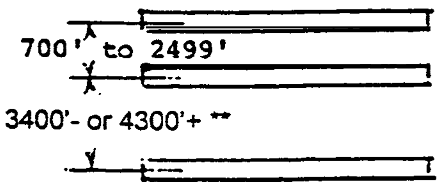
Figure 2-1. Capacity and ASV for long range planning

6.



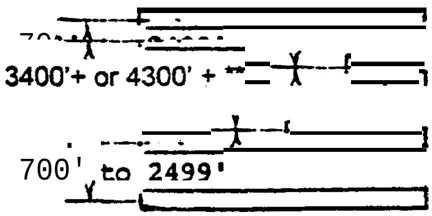
Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
0 to 20	295	62	385,000
21 to 50	219	63	310,000
51 to 80	184	65	290,000
81 to 120	161	70	315,000
121 to 180	146	75	385,000

7.



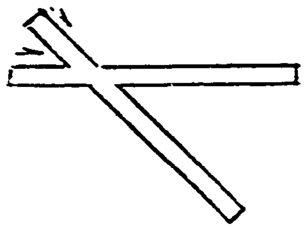
Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
0 to 20	29s	119	625,000
21 to 50	219	114	475,000
51 to 80	184	111	455,000
81 to 120	161	117	510,000
121 to 180	146	120	645,000

8.



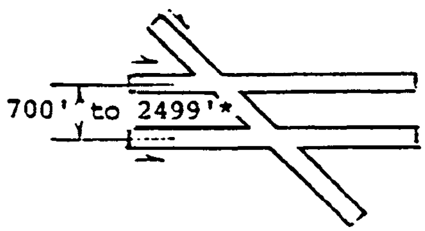
Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
0 to 20	394	119	715,000
21 51 to to 50	290	114	550,000
	242	111	515,000
81 to 120	210	117	565,000
121 to 180	189	120	675,000

9.



Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
Oto 20	98	59	230,000
21 to 50	77	57	200,000
51 to 80	77	56	215,000
81 to 120	76	59	225,000
121 to 180	72	60	265,000

10.



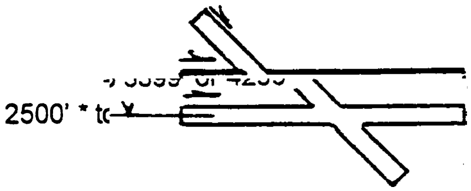
Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
0 to 20	197	59	355,000
21 to so	14s	57	275,000
51 to 80	121	56	260,000
81 to 120	105	59	285,000
121 to 180	94	60	340,000

* Staggered threshold adjustments may apply, see paragraph 4-6.
** Refer to paragraph 2-2.f.

Figure 2-1 .Capacity and ASV for long range planning (cont.)

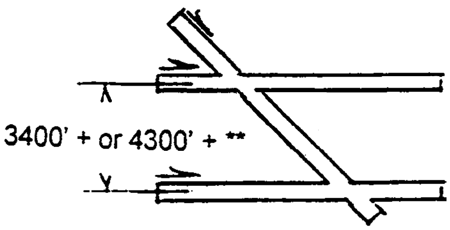
No.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr

11.



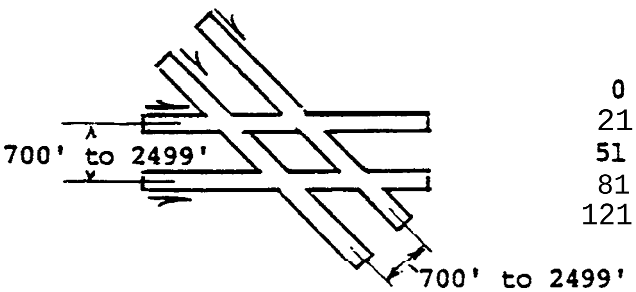
Mix Index %(C+3D)	VFR	IFR	Annual Service Volume Ops/Yr
0 to 20	197	62	355,000
21 to so	149	63	285,0C0
51 to 80	126	65	275,000
	111	70	300,000
121 81 to to 120 180	103	75	365,000

12.



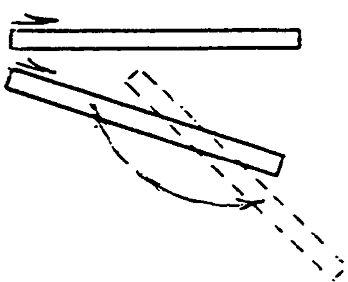
Mix Index %(C+3D)	VFR	IFR	Annual Service Volume Ops/Yr
0 to 20	197	119	370,000
21 to so	149	114	320,000
51 to 80	126	111	305,000
81 to 120	111	105	315,000
121 to 180	103	99	370,000

13.



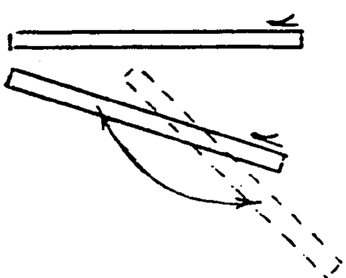
Mix Index %(C+3D)	VFR	IFR	Annual Service Volume Ops/Yr
0 to 20	197	59	355,000
21 to 50	147	57	275,000
51 to 80	145	56	270,000
81 to 120	138	59	295,000
121 to 180	125	60	350,000

14.



Mix Index %(C+3D)	VFR	IFR	Annual Service Volume Ops/Yr
0 to 20	150	59	270,000
21 to 50	108	57	225,000
51 to 80	85	56	220,000
81 to 120	77	59	225,000
121 to 180	73	60	265,000

15.



Mix Index %(C+3D)	VFR	IFR	Annual Service Volume Ops/Yr
0 to 20	132	59	260,000
21 to so	99	57	220,000
51 to 80	82	56	215,000
81 to 120	77	59	225,000
121 to 180	73	60	265,000

* Staggered threshold adjustments may apply, see paragraph 4-6.
** Refer to paragraph 2-2.f.

Figure 2-I. Capacity and ASV for long range planning (cont.)

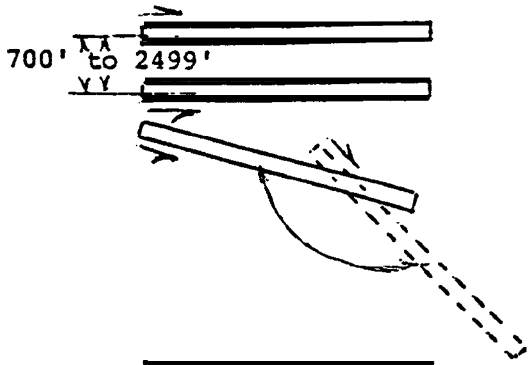
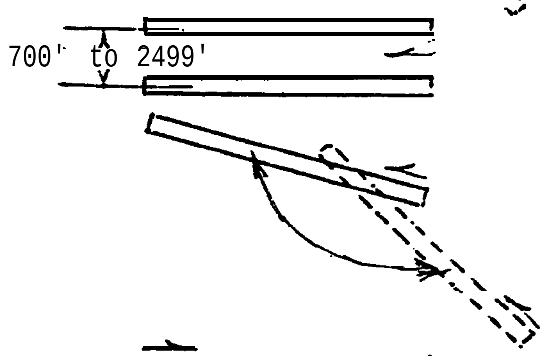
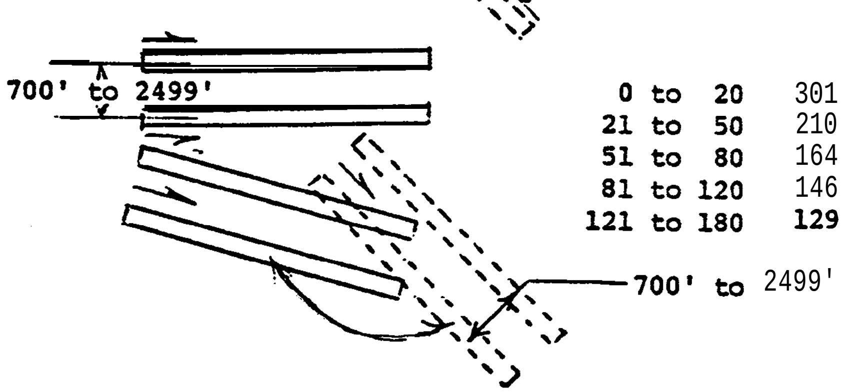
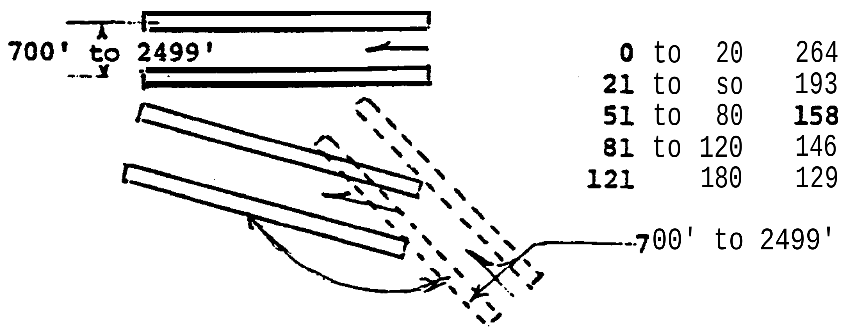
No.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
16.		Oto 20	295	59	**385,000**
		21 to so	**210**	**57**	305,000
		51 to 80	164	**56**	275,000
		81 to **120**	**146**	**59**	300,000
		121 to 180	129	60	**355,000**
17.		0 to 20	197	**59**	**355,000**
		21 to so	14s	57	275,000
		51 to 80	**121**	**56**	260,000
		81 to 120	10s	**59**	285,000
		121 to 180	94	60	340,000
18.		**0 to 20**	301	59	385,000
		21 to 50	210	57	305,000
		51 to 80	164	56	275,000
		81 to 120	146	59	300,000
		121 to 180	**129**	60	**355,000**
19.		**0** to 20	264	59	375,000
		21 to so	193	57	295,000
		51 to 80	**158**	56	275,000
		81 to 120	146	**59**	300,000
		121 180	129	60	**355,000**

Figure **2-1.** Capacity and **ASV** for long range planning (cont.)

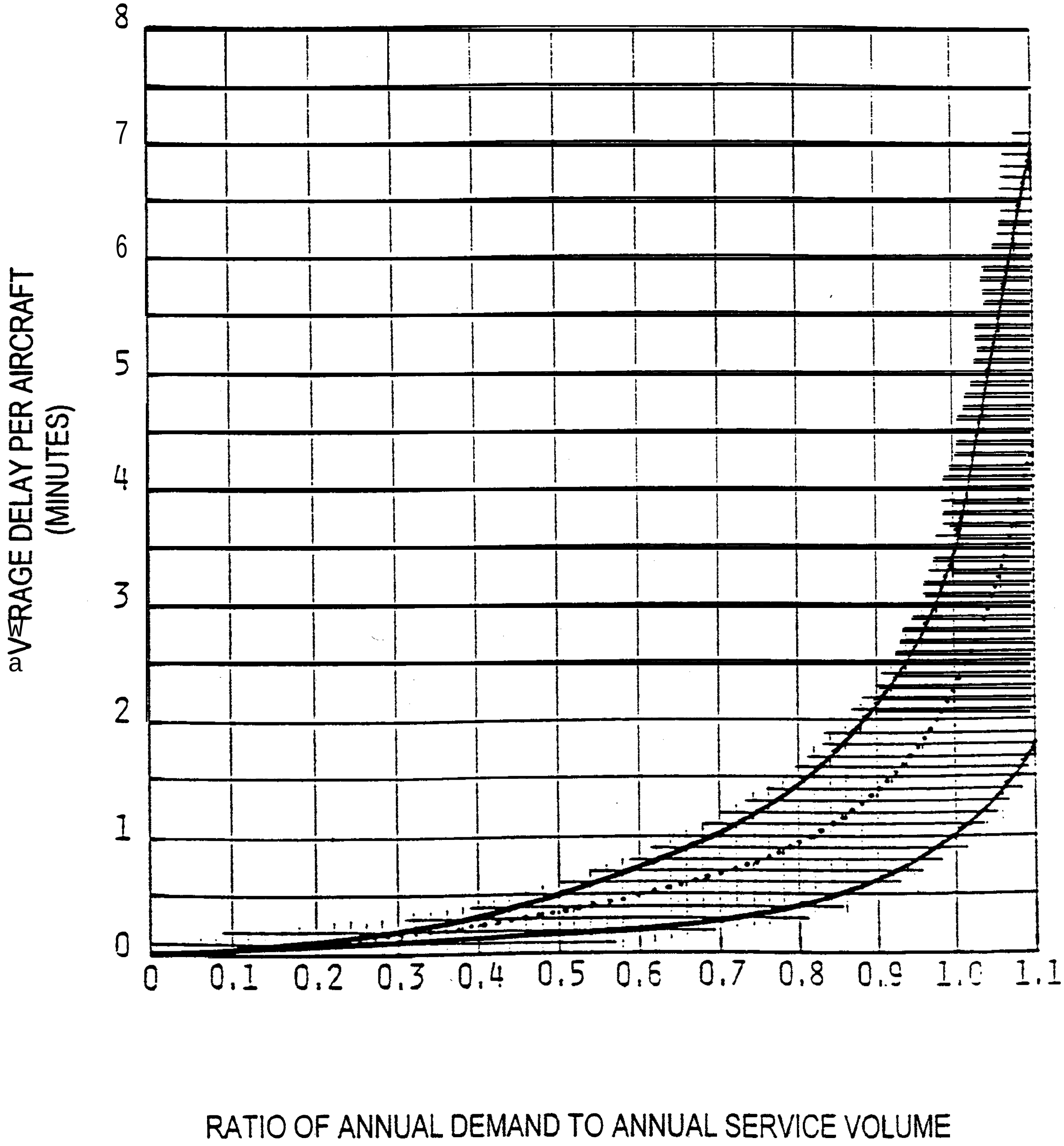


Figure 2-2. Average aircraft delay for long range planning

CHAPTER 3. AIRPORT CAPACITY AND AIRCRAFT DELAY CALCULATIONS

3-1. **GENERAL.** This chapter contains instructions for calculating hourly capacity, ASV, and aircraft delay for a wide range of runway-use configurations and operational alternatives.

a. Capacity Calculations.

(1) Hourly capacity of the runway component.
(2) Hourly capacity of the taxiway canponent.
(3) Hourly capacity of gate group components.
(4) Airport hourly capacity.
(5) ASV.

b. Delay Calculations.

(1) Hourly delay.
(2) Daily delay.
(3) Annual delay.

Figure 3-l provides a checklist of the data required for these calculations. Appendix 2 contains examples of these calculations.

3-2. **HOURLY CAPACITY OF THE RUNWAY COMPONENT.** Except for situations involving PVC conditions, an absence of radar coverage or ILS, and airports with parallel runways when one runway is limited to use by small aircraft (all of which are covered in chapter 4), calculate the runway component hourly capacity as follows:

a. Select the runway-use configuration in figure 3-2 which best represents the use of the airport during the hour of interest. To adjust for staggered thresholds, see paragraph 4-6.

b. Identify fraa figure 3-2 the figure number for capacity (for C^*, T, and E).

c. Determine the percentage of Class C and D aircraft operating on the runway component and calculate the mix index.

d. Determine percent arrivals (PA).

e. Determine haurly capacity base (C^*).

f. Determine the percentage of touch and go operations during VFR operations and determine the touch and go factor (T). During IFR operations, T will be 1.00.

g. Determine the location of exit taxiways (measured from the threshold at the approach end of the runway) and determine the exit factor (E).

h. Calculate the hourly capacity of the runway component by the following equation:

$$\text{Hourly capacity of the runway component} = C^* \cdot T \cdot E$$

OUTPUT	INPUT NEEDED
1. Hourly capacity of runway component See: paragraph 3-2 appendix 2 (figure A2-1)	a. Ceiling and visibility (VFR, IFR, or PVC) b. Runway-use configuration c. Aircraft mix d. Percent arrivals e. Percent touch and go f. Exit taxiway locations
2. Hourly capacity of taxiway component See: paragraph 3-3 appendix 2 (figure A2-2)	a. Intersecting taxiway location b. Runway operations rate c. Aircraft mix on runway being crossed
3. Hourly capacity of gate group components See: paragraph 3-4 appendix 2 (figure A2-3)	a. Number and type of gates in each gate group b. Gate mix c. Gate occupancy times
4. Airport hourly capacity See: paragraph 3-5 appendix 2 (figure A2-4)	Capacity outputs from 1, 2, and 3 above
5. Annual service volume See: paragraph 3-6 appendix 2 (figure A2-5)	a. Hourly capacities of runway component b. Occurence of operating conditions
6. Hourly delay to aircraft on rummy component See: paragraph 3-7 appendix 2 (figure A2-6)	a. Hourly demand b. Hourly capacity of the runway component c. Demand profile factor
7. Daily delay to aircraft on rummy component See: paragraphs 3-8 and 3-9 appendix 2 (figure8 A2-7, and A2-8)	a. Hourly delay b. Hourly demand c. Hourly capacity
8. Annual delay to aircraft on runway component See: paragraph 3-10 appendix 2 (figure A2-9)	a. Annual demand b. Daily delay c. Hourly demand d. Hourly capacities e. Percent VFR/IFR conditions f. Runway-use configuration

Data Sources:
National Climatic Center, Asheville, North Carolina
Air Traffic Control Tower records
Offical Airline Guides
Airport Management
Observations

Figure 3-1. Information required for capacity and delay calculations

3-3. HOURLY CAPACITY OF THE TAXIWAY COMPONENT. Calculate the hourly capacity of a taxiway component as follows:

a. Determine the distance from the runway end (start of takeoff roll) to the taxiway crossing.

b. Determine the runway operations rate, i.e., the demand being accommodated on the runway being crossed.

c. Calculate the mix index of the runway being crossed.

d. Determine the hourly capacity of the taxiway crossing.

(1) Use figure 3-66 when the crossed runway accommodates arrivals or mixed operations.

(2) Use figure 3-67 when the crossed runway accommodates only departures and touch and go's.

3-4. HOURLY CAPACITY OF GATE GROUP COMPONENTS. Calculate the hourly gate group capacities as follows:

a. Determine the number of gate groups and the number of gates in each gate group.

b Determine the gate mix, i.e., the percent of non-widebadied aircraft using each gate group.

c. Determine the percentage of gates in each gate group that can accommodate widebodied aircraft.

d. Determine for each gate group the average gate occupancy time for wide-bodied and non-widebodied aircraft.

e. When widebodied aircraft are served, calculate the gate occupancy ratio (R) by the following equation:

$$R = \frac{\text{Average gate occupancy time for widebodied aircraft}}{\text{Average gate occupancy time for non-widebodied aircraft}}$$

When widebodied aircraft are not served, R equals 1.00.

f. Calculate the hourly capacity of each gate group by use of figure 3-68.

3-5. AIRPORT HOURLY CAPACITY. Calculate the airport hourly capacity as follows:

a. Calculate the hourly capacities of the runway, taxiway, and gate groups components and determine the hourly demands on each.

b. Calculate the demand ratio for each cauponent by dividing the component demand by the runway component demand.

c. Calculate the component quotients by dividing each **components** capacity by its demand ratio.

d Identify the airport hourly capacity, **i.e.,** the lowest quotient calculated in c above.

3-6. <u>ANNUAL SERVICE VOLUME (ASV)</u>. Calculate the ASV as follows:

a. Calculate the. weighted hourly capacity (C_w) for the runway **component** as follows:

(1) Identify the different runway-use configurations used over the course of a year.

(2) Determine the percent of **time** each runway-use configuration is in **use** (P_1 through P_n). Include those times when the hourly capacity is zero, i.e., the weather conditions are below airport minimums or the airport is closed for other reasons. If a runway-use configuration is used less than 2 percent of the time, that time **may** be credited to another runway-use configuration.

(3) Calculate the hourly capacity for each runway-use configuration (C_1 through C_n).

(4) Identify the runway-use configuration that provides the maximum capacity. Generally, this configuration is also the configuration most frequently used.

(5) Divide the hourly capacity of each runway-use configuration by the hourly capacity of the runway-use configuration that provides the **maximum** capacity.

(6) Determine the **ASV** weighting factor (W_1 **through** W_n) for each **runway-**use configuration from Table 3-l.

Table 3-l. ASV **Weighting** Factors

Percent of Maximum capacity	Weighting Factors			
	VFR	**IFR**		
		Mix Index (0-20)	**Mix Index (21-50)**	**Mix Index (51-180)**
91+	**1**	**1**	**1**	**1**
El-90	**5**	1	3	**5**
66-80	15	2	8	15
51-65	**20**	**3**	**12**	**20**
0-50	25	**4**	16	25

(7) Calculate the weighted hourly capacity (C_w) of the runway component by the following equation:

$$C_w = \frac{(P_1 \cdot C_1 \cdot W_1)+(P_2 \cdot C_2 \cdot W_2)+\ldots+(P_n \cdot C_n \cdot W_n)}{(P_1 \cdot W_1)+(P_2 \cdot W_2)+\ldots+(P_n \cdot W_n)}$$

b. Calculate the ratio of annual demand to average daily demand during the peak month (D). Typical annual demand to average daily demand ratios are provided in table 3-2.

c. Calculate the ratio of average daily demand to average peak hour demand during the peak month (H). Typical average daily to average peak hour demand ratios are provided in table 3-2.

Table 3-2. Typical Demand Ratios

Mix Index	Daily (D)	Hourly (H)
0-20	280-310	7-11
21-50	300-320	10-13
51-180	310-350	11-15

d. Calculate ASV by the following equation:

$$ASV = C_w \cdot D \cdot H$$

3-7. **HOURLY DELAY TO AIRCRAFT ON THE RUNWAY COMPONENT.** Hourly delay calculations described in this paragraph apply to those hours when the hourly demand does not exceed the hourly capacity of the runway component. For those hours when the hourly demand exceeds the hourly capacity of the runway component, paragraph 3-9 calculations apply. Calculate hourly delay as follows:

a. Calculate the hourly capacity of the runway component for the specific hour of interest.

b. Identify from figure 3-2 the figure number for delay (for the arrival delay index (ADI) and the departure delay index (DDI)).

c. Identify the hourly demand (HD) and the peak 15 minute demand (Q) on the runway component.

d. Calculate the ratio of hourly demand to hourly capacity (D/C).

e. Determine the arrival delay index (ADI) and departure delay index (DDI).

f Calculate the arrival delay factor (ADF) and departure delay factor (DDF) by the f&owing equations:

$$ADF = ADI \cdot (D/C)$$

$$DDF = DDI \cdot (D/C)$$

g. Calculate the demand profile factor (DPF) by the following equation:

$$DPF = \frac{100\ Q}{HD}$$

NOTE: Airports with a high percentage of air carrier activity normally have a DPF of 50 percent. Airports with a high percentage of general aviation activity normally have a DPF in the 30 to 35 percent range.

h Calculate the average delay for arriving aircraft (DAHA) and departing aircraft. (DAHD) figure 3-69.

i. Calculate hourly delay (DTH) by the following equation:

$$DTH = HD(PA \cdot DAHA+(100-PA) \cdot DAHD)/100$$

3-8. DAILY DELAY TO AIRCRAFT ON THE RUNWAY COMPONENT WHEN THE D/C RATIO IS 1.0 OR LESS FOR EACH HOUR. Calculate the daily delay as follows:

a. For each hour, calculate the hourly delay to aircraft on the runway component.

b. Calculate the delay for the time period in question by summing the delay for each of the hours.

3-9. DAILY DELAY TO AIRCRAET ON THE RUNWAY COMPONENT WHEN THE D/C RATIO IS GREATER THAN 1.0 FOR ONE OR MORE HOURS. Calculate the daily delay as follows:

a. Identify the saturated time periods. A saturated period consists of the consecutive hours when demand exceeds capacity (termed the overload phase) plus the subsequent hour(s) required to accommodate the residual demand (termed the recovery phase).

b. For each saturated period (overload plus recovery phase), calculate the delay to aircraft as follows:

(1) Determine the duration of the overload phase.

(2) Calculate the hourly AD/C ratio during the overload phase, i.e., the sum of the hourly demands during the overload phase divided by the sum of the hourly capacities during the overload phase.

(3) Determine the percent of arrivals (PAS) for the saturated (overload plus recovery) period.

(4) Determine the ADI and the DDI for the saturated (overload plus recovery) period.

(5) Calculate the arrival delay factor **(ADF)** and departure delay factor **(DDF)** using the following equations:

$$ADF = ADI \cdot (AD/C)$$

$$DDF = DDI \cdot (AD/C)$$

(6) Determine the average delay per arrival (DASA) and per departure (DASD) during the saturated (overload plus recovery) period from figure 3-70.

(7) Calculate the delay in the saturated period **(DTS)** by the **following** equation:

$$DTS = (HD_1+HD_2+...+HD_n) \cdot (PAS \cdot DASA + (100-PAS)DASD)/100,$$ where

HD_1 through HD_n = Hourly demand during hours 1 through n of the saturated period.

c. Determine for each unsaturated hour the delay in accordance with the procedures in paragraph **3-8.**

d Calculate the total daily delay by summing the saturated and unsaturated delay;.

3-10. <u>ANNUAL DELAY TO AIRCRAFT ON THE RUNWAY COMPONENT.</u> The following procedure uses 24 representative days, one VFR and one IFR for each **calander** month. Other increments of time may be selected. If the airport has considerable fluctuation in **operations** during the week, or if a more precise delay determination is needed, one representative VFR and one representative **IFR** day should be used for each day of the week. Variation in seasonal traffic will require repetition of these computations for each season. Airports which have consistent patterns of **operations** throughout the week and year require fewer computations.

a. Convert annual demand to average day demand for each month.

(1) Distribute the annual demand to the 12 calendar months to account for seasonal variations in traffic.

(2) **Develop** average day demand by dividing the monthly demands by the number of days in the respective month.

b Adjust the average day demand to account for differences in VFR and **IFR** demand..

(1) Determine from **weather** records the percent of the time that **IFR** and PVC operating conditions prevail **(%IFR).**

(2) Determine **from** traffic records the percent IFR (and PVC) demand to VFR demand **(%IFR** demand).

(3) Calculate the representative VFR day demand (VFR demand) and representative IFR day demand (IFR demand) by the following equations:

$$\text{VFR demand} = \frac{(\text{Average day demand})}{1-\%\text{IFR}(1-\%\text{IFR demand}/100)/100}$$

$$\text{IFR demand} = \text{VFR demand} \cdot \%\text{IFR demand}/100$$

c. From historical data, develop a breakdown of hourly demand for the representative day(s).

d. Calculate the representative daily delays.

e. Determine monthly delay by multiplying the representative daily delays by the number of days it represents and summing these quotients.

f. Sum the monthly delays.

3-11. **HOURLY DEMAND CORRESPONDING TO A SPECIFIED LEVEL OF AVERAGE HOURLY DELAY.** Determine the hourly demand which corresponds to a stipulated average level of delay by trial and error, i.e., using a graphical plotting of delay versus demand.

Runway-use Diagram	Diag. No.	Runway Spacing in Feet (s)	Figure No. For Capacity VFR	For Capacity IFR	For Delay VFR	For Delay IFR
	1	NA	3-3	3-43	3-71	3-90
	2	700 or more	3-4	3-44	3-72	3-91
	3	700 to 2499	3-5	3-44	3-73	3-91
	4	2500 or more	3-6	3-45	3-74	3-92
	5	700 to 2499	3-7	3-46	3-75	3-91
	7	2500 to 3399	3-8	3-47	3-75	3-93
	8	3400 or more*	3-8	3-48	3-75	3-94
	9	700 to 2499	3-9	3-44	3-71	3-91
	11	2500 to 3399	3-10	3-50	3-71	3-95
	12	3400 or more*	3-10	3-51	3-71	3-96
	13	700 to 2499	3-11	3-52	3-76	3-97
	15	2500 or more*	3-11	3-54	3-76	3-98
	16	700 to 2499	3-12	3-52	3-77	3-97
	18	2500 or more*	3-13	3-55	3-78	3-99
	19	700 to 2499	3-14	3-56	3-78	3-100
	21	2500 to 3399	3-13	3-53	3-78	3-95
	22	3400 or more*	3-15	3-55	3-78	3-99
	23	700 or more	3-14	3-56	3-78	3-100
	24	700 to 2499	3-15	3-52	3-79	3-97
	26	2500 or more*	3-16	3-55	3-80	3-99
	27	700 to 2499	3-15	3-52	3-79	3-97
	28	3000 or more	3-17	3-54	3-80	3-91
	29	700 to 2499	3-18	3-49	3-81	3-95
	31	2500 or more*	3-19	3-55	3-71	3-99
	32	3000 or more	3-20	3-58	3-72	3-91
	33	3000 or more	3-20	3-58	3-72	3-91
	34	3000 or more	3-21	3-58	3-82	3-91
	35	3000 or more	-21	3-58	3-82	3-91
	36	3000 to 4299*	3-22	3-53	3-83	3-99
	37	4300 or more	3-22	3-58	3-83	3-91
	38	3000 or more	3-22	3-58	3-83	3-91
	39	3000 or more	3-23	3-58	3-24	3-91
	40	3000 or more	3-24	3-58	3-84	3-91
	41	3000 or more	3-25	3-58	3-80	3-91
	42	3000 or more	3-26	3-58	3-71	3-91

LEGEND

- (arrival symbols) IDENTIFIES THAT THE RUNWAY IS USED FOR ARRIVALS
- (departure symbols) IDENTIFIES THAT THE RUNWAY IS USED FOR DEPARTURES
- S IDENTIFIES A VARIABLE RUNWAY SPACING
- C IDENTIFIES A RUNWAY SPACING OF 700 TO 2499 FEET
- X,Y IDENTIFIES INTERSECTION DISTANCES
- ◆ IDENTIFIES THE ANGLE BETWEEN NONPARALLEL RUNWAYS
- N.A. MEANS NOT APPLICABLE
- < INDICATES "LESS THAN"
- ≥ INDICATES "GREATER THAN OR EQUAL TO"
- * SEE NOTES ITEM NO. 3

SEE CHAPTER 4 FOR CASES WHEN AIRCRAFT ARE RESTRICTED FROM USING ONE, OR MORE, OF THE RUNWAYS.

Runway-use Diagram	Diag. No.	Angle ◆	Figure No. For Capacity VFR	For Capacity IFR	For Delay VFR	For Delay IFR
	74	0° to 14°	3-5	3-44	3-74	3-91
	75	15° to 90°	3-6	3-45	3-74	3-92
	76	NA	3-8	3-44	3-75	3-9
	77*	0° to 14°	3-14	3-ul	3-78	s-9
	78*	15° to 90°	3-14	3-57	3-78	3-1
	79	NA	3-12	3-44	3-77	3-91
	80*	0° to 14°	3-40	3-44	3-88	3-91
	81*	15° to 90°	3-40	3-57	3-88	3-10
	82*	NA	3-17	Y-4	3-80	3-91
	If'	NA	-41	3-44	3-99	3-91
	84	NA	3-41	3-44	3-89	3-91
	85	0° to 14°	3-42	3-44	3-74	3-91
	86	15° to 90°	3-42	3-57	3-74	3-101
	87	NA	3-4	3-44	3-72	3-91
	88	NA	3-4	3-44	3-72	3-91
	89	0° to 14°	3-5	3-44	3-74	3-91
	90	15° to 90°	3-6	3-45	3-74	3-92
	91	NA	3-8	3-44	3-75	3-91
	92	0° to 14°	3-14	3-44	3-78	3-91
	93	15° to 90°	3-14	3-57	3-78	3-101
	94	NA	3-12	3-44	3-77	3-91
	95	0° to 14°	3-40	3-44	3-88	3-91
	96	15° to 90° C ≥ 2000	3-40	3-57	3-88	3-121
	97	NA	3-17	3-44	3-88	3-91
	98	NA	3-41	3-44	3-89	3-91
	99	NA	3-41	3-44	3-89	3-91
	100	0° to 14°	3-42	3-44	3-74	3-91
	101	15° to 90°	3-42	3-57	3-74	3-121
	102	NA	3-41	3-44	3-89	3-91

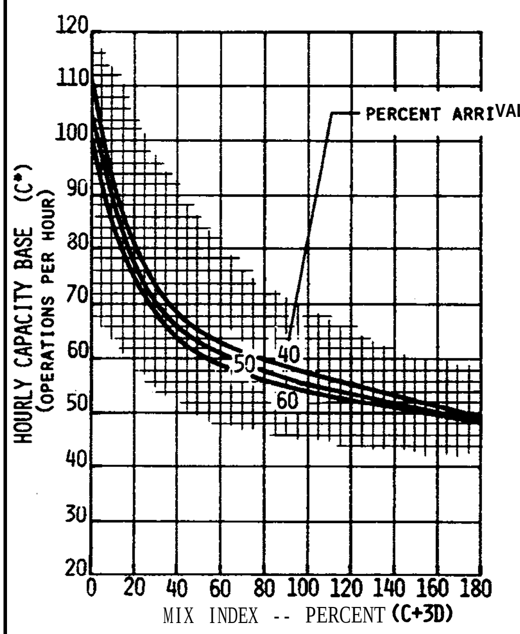
NOTES:

1. THE MINIMUM CENTERLINE SPACING OF PARALLEL RUNWAYS USED FOR SIMULTANEOUS OPERATIONS IS:
   A. 700 FEET IF USED BY ALL AIRCRAFT CLASSES A,B,C, AND D
   B. 500 FEET IF USED ONLY BY AIRCRAFT CLASS A AND B
   C. 300 FEET IF USED EXCLUSIVELY BY AIRCRAFT CLASS A
   *D. EXCEPTION: AT A POSITIVE CONTROLLED AIRPORT, IFR FLIGHT PLAN TRAFFIC PREDOMINATING, THE CENTERLINE-TO-CENTERLINE SPACING TO ACCOMMODATE SIMULTANEOUS ARRIVAL STREAMS IS 2,500 FEET EVEN IN VFR CONDITIONS. THE CAPACITY LIMITING FACTOR ON CLOSELY SPACED PARALLEL RUNWAYS AT POSITIVE CONTROLLED AIRPORTS NEEDING CAREFUL EVALUATION IS THE COMMUNICATIONS
2. INVESTIGATE THE THRESHOLD STAGGER CORRECTION DISCUSSED IN PARAGRAPH 4-4 OF CHAPTER 4 FOR ARRIVAL STREAMS TO PARALLEL RUNWAY CONFIGURATIONS WITH CENTERLINES SPACED LESS THAN 2,500 FEET APART.
3. WITH PRECISION RUNWAY MONITORING (PRM), AIRPORTS MAY HAVE SIMULTANEOUS INDEPENDENT ILS/MLS PRECISION APPROACHES TO PARALLEL RUNWAYS WITH CENTERLINES SEPARATED BY 3,400 TO 4,300 FEET.
4. GIVEN 700 ≤ C ≤ 2499, ASSUME THE FOLLOWING RELATIONSHIP WHEN THERE ARE THREE, OR MORE, PARALLEL RUNWAYS USED BY ALL AIRCRAFT.

WHEN	ASSUME
700 ≤ S ≤ 2499	2500 ≤ C+S ≤ 2999
2500 ≤ S ≤ 3499	3000 ≤ C+S ≤ 4299
S ≥ 3500	C+S ≥ 4300

Figure 3-2. Runway-use diagrams

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Nix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	o to 70	1.04
11 to 20	o to 70	1.10
21 to 30	o to 40	1.20
31 to 40	o to 10	1.31
41 to 50	o to 10	1.40

C* x T x E = Hourly Capacity

EXIT FACTOR E

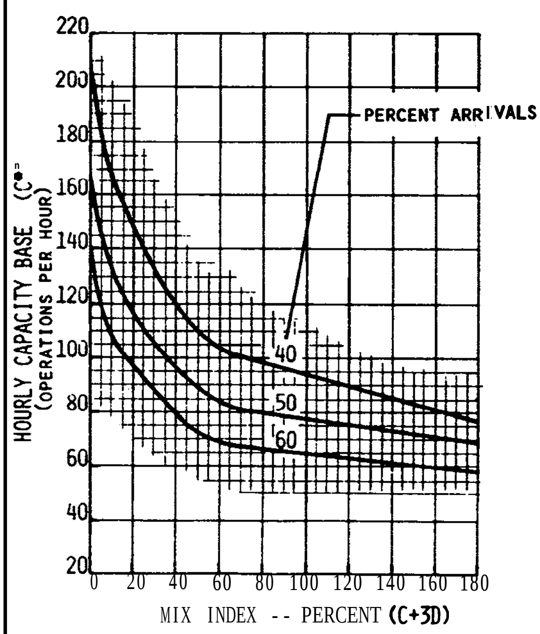
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for ● ppropriate mix index and percent arrivals

Nix In&x-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			50% Arrivals			608 Arrivals		
		N-O	N=1	N-2 or 3	N-O	N=1	N-2 or 3	N-O	N=1	N-2 or 3
0 to 20	2000 to 4000	0.72	0.87	0.94	0.70	0.86	0.94	0.67	0.84	0.92
21 to so	3000 to 5500	0.79	0.86	0.94	0.76	0.84	0.93	0.72	0.81	0.90
51 to 80	3500 to 6500	0.79	0.86	0.92	0.76	0.83	0.91	0.73	0.81	0.90
81 to 120	5000 to 7000	0.82	0.89	0.93	0.80	0.88	0.94	C.77	0.86	0.93
121 to 180	5500 to 7500	0.86	0.94	0.98	0.82	0.91	0.96	0.79	0.91	0.97

FIGURE 3-3, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 1,54 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

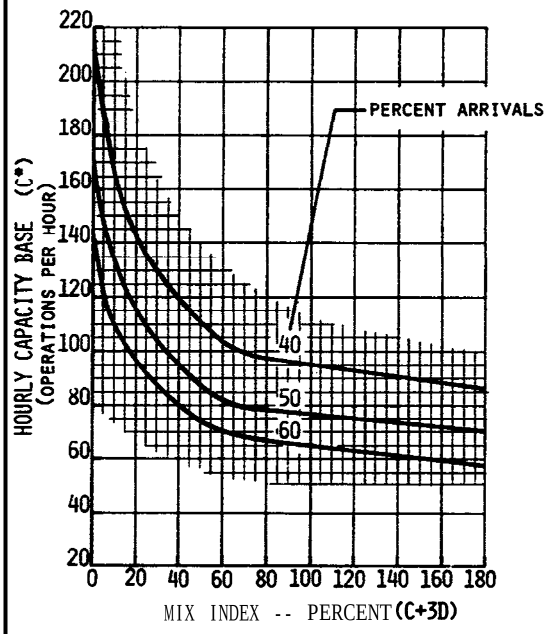
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runweye, determine the average number Of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for ● pproprlate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			508 Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.83	0.93	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.75	0.84	C.92	3.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to iooo	0.80	0.87	0.94	0.80	0.87	0.94	0.80	0.87	0.34
121 to 180	5500 to 7500	0.94	1.00	1.00	0.83	0.93	0.97	0.83	0.93	0.97

FIGURE 3-4. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 2,72,75,87,88 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.09
31 to 40	0 to 10	1.15
41 to so	0 to 10	1.20

C* x T x E = Hourly Capacity

EXIT FACTOR E

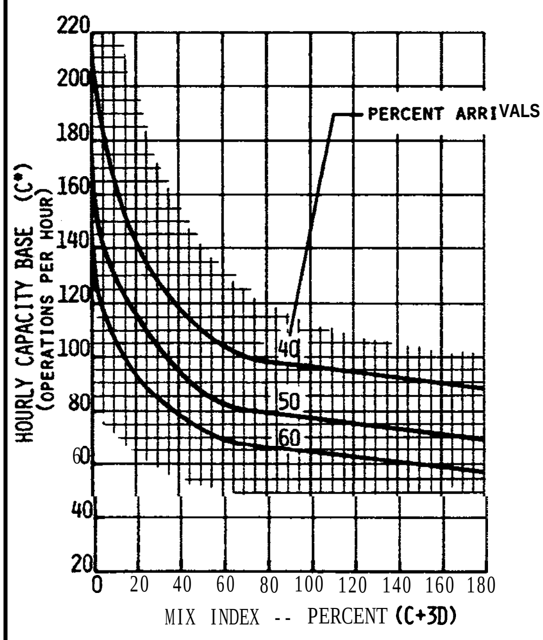
To determine Exit Factor E:

1. Determine exit range for appropriate mix Index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet .
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate nix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-0	N=1	N-2 or 3	N-0	N=1	N-2 or 3	N-0	N-1	N-2 or 3
OtO 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.83	0.93	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.75	0.84	0.92	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.80	0.87	0.94	0.80	0.87	0.94	0.80	0.87	0.94
121 to 180	5500 to 7500	0.85	0.96	0.98	0.83	0.93	0.97	0.83	0.93	0.97

FIGURE 3-5. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 3 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.02
11 to 20	0 to 70	1.04
21 to 30	0 to 40	1.08
31 to 40	0 to 10	1.13
41 to 50	0 to 10	1.17

C* x T x E = Hourly Capacity

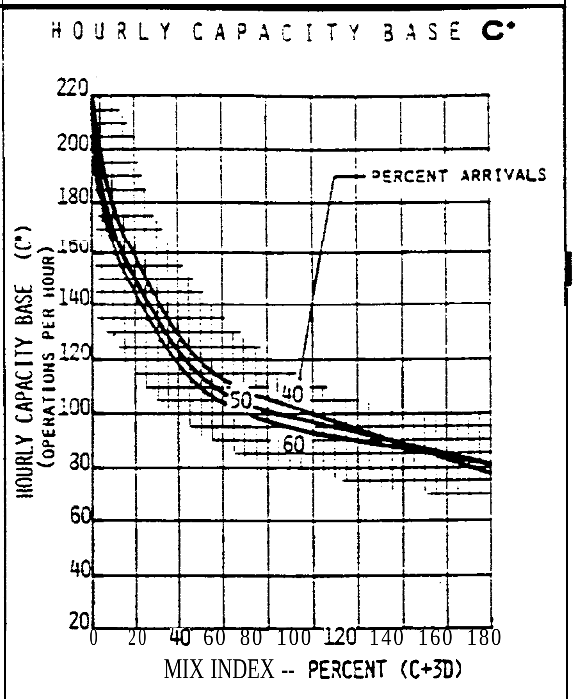
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate nix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.83	0.93	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.75	0.84	0.92	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.80	0.87	0.94	0.80	0.87	0.94	0.80	0.87	0.94
121 to 180	5500 to 7500	0.83	0.93	0.97	0.83	0.93	0.97	0.83	0.93	0.97

FIGURE 3-6. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 4, 37, 74, 75, 89, 90 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.02
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.08
31 to 40	0 to 10	1.11
41 to 50	0 to 10	1.14

C* x T x E = Hourly Capacity

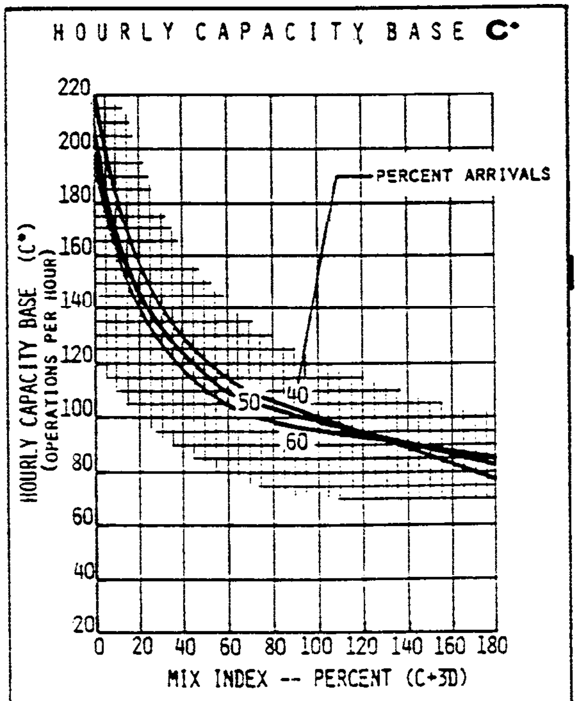
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.75	0.88	0.94	0.72	0.86	0.94	0.69	0.84	0.93
21 to 50	3000 to 5500	0.83	0.91	0.97	0.80	0.89	0.96	0.77	0.86	0.94
51 to 80	3500 to 6500	0.85	0.92	0.96	0.82	0.89	0.95	0.79	0.87	0.93
81 to 120	5000 to 7000	0.89	0.93	0.97	0.87	0.91	0.96	0.84	0.89	0.95
121 to 180	5500 to 7500	0.97	1.00	1.00	0.91	0.97	0.99	0.90	0.96	0.98

FIGURE 3-7. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 5 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.02
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.08
31 to 40	0 to 10	1.11
41 to 50	0 to 10	1.14

C* x T x E = Hourly Capacity

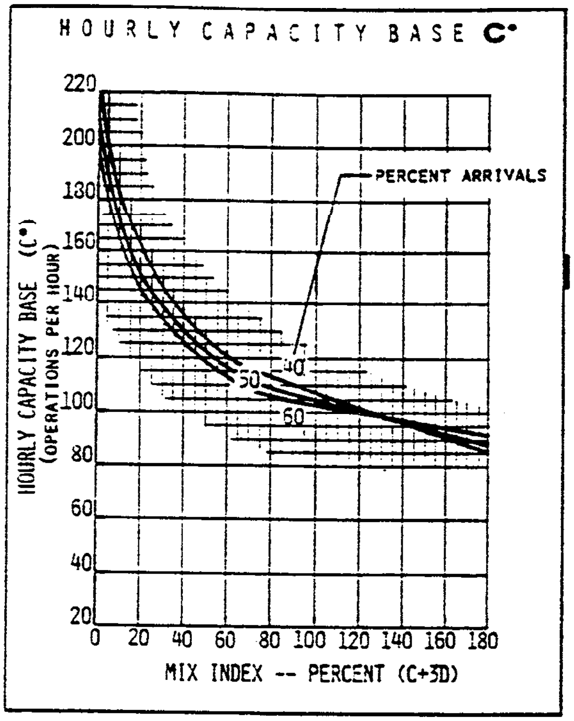
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.75	0.88	0.94	0.72	0.86	0.94	0.69	0.84	0.93
21 to 50	3000 to 5500	0.83	0.91	0.97	0.81	0.89	0.96	0.78	0.87	0.95
51 to 80	3500 to 5500	0.85	0.91	0.95	0.82	0.89	0.94	0.80	0.88	0.94
81 to 120	5000 to 7000	0.89	0.93	0.96	0.87	0.91	0.96	0.84	0.90	0.95
121 to 180	5500 to 7500	0.97	1.00	1.00	0.90	0.96	0.98	0.98	0.95	0.98

FIGURE 3-8. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 7, 8, 76, 91 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.04
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.20
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

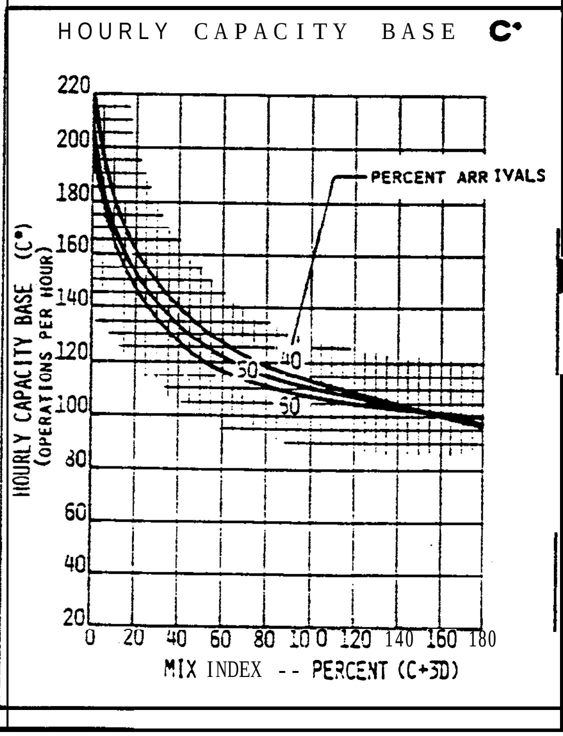
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.37	0.34
21 to 50	3000 to 5500	0.79	0.36	0.94	0.76	0.34	0.33	0.73	0.31	0.30
51 to 80	3500 to 6500	0.79	[illegible]	0.32	[illegible]	0.33	[illegible]	0.73	0.31	0.33
81 to 120	5000 to 7000	0.83	0.19	0.33	0.80	0.27	0.34	0.77	0.36	[illegible]
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	0.70	0.36	0.94	0.67	0.34	0.32

FIGURE 3-9. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 9, 66, 68 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.04
11 to 20	0 to 70	1.10
21 to 30	0 to 60	1.20
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

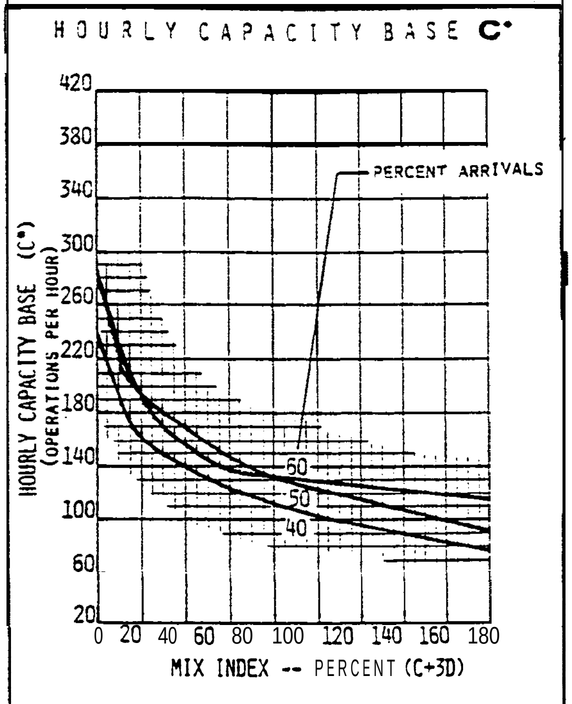
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.72	0.37	0.34	0.70	0.36	0.34	0.67	0.34	0.32
21 to 50	3000 to 5500	0.79	0.36	0.94	0.76	0.34	0.33	0.72	0.31	0.30
51 to 80	3500 to 6500	0.79	0.36	0.92	0.76	0.33	0.31	0.73	0.31	0.30
81 to 120	5000 to 7000	0.82	0.39	0.93	0.80	0.38	0.34	0.77	0.36	0.33
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-10. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 12, 70, 71 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

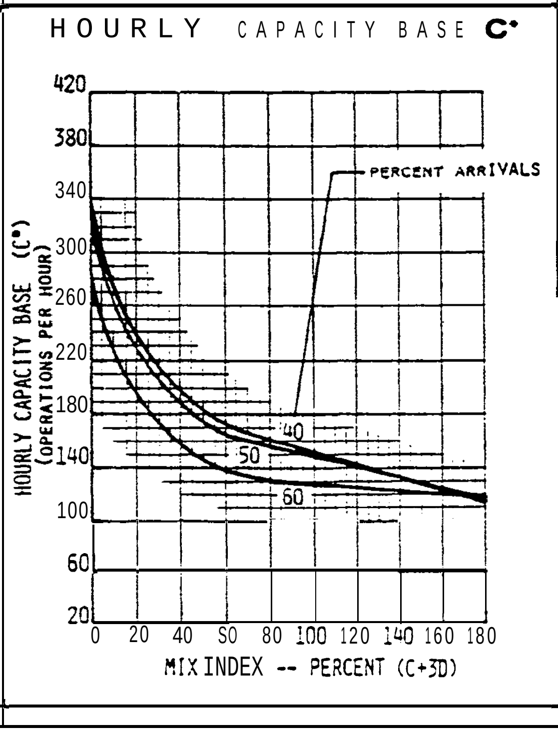
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	1.00	1.00	1.00	0.73	0.93	1.00	0.62	0.79	0.90
21 to 50	3000 to 5500	1.00	1.00	1.00	0.82	0.95	1.00	0.72	0.83	0.93
51 to 80	3500 to 6500	1.00	1.00	1.00	0.84	0.94	1.00	0.75	0.84	0.92
81 to 120	5000 to 7000	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.87	0.94
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.93	0.98

FIGURE 3-11. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 13, 15 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.33
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.11
31 to 40	0 to 10	1.20
41 to 50	0 to 10	1.26

C* x T x E = Hourly Capacity

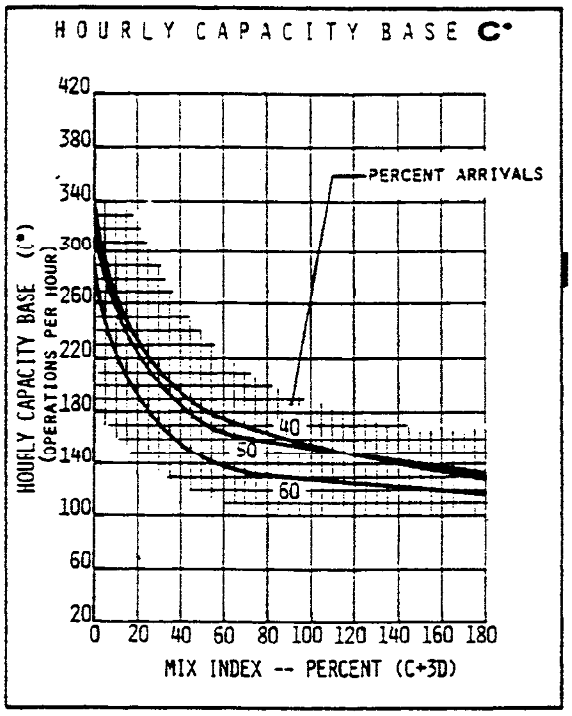
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.76	0.88	0.94	0.65	0.81	0.93	0.62	0.79	0.90
21 to 50	3000 to 5500	0.83	0.90	0.96	0.72	0.83	0.94	0.72	0.83	0.93
51 to 80	3500 to 6500	0.85	0.91	0.96	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.90	0.94	0.97	0.82	0.88	0.95	0.80	0.87	0.94
121 to 180	5500 to 7500	0.93	0.98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-12. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 16, 79, 94 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.11
31 to 40	0 to 10	1.20
41 to 50	0 to 10	1.26

C* x T x E = Hourly Capacity

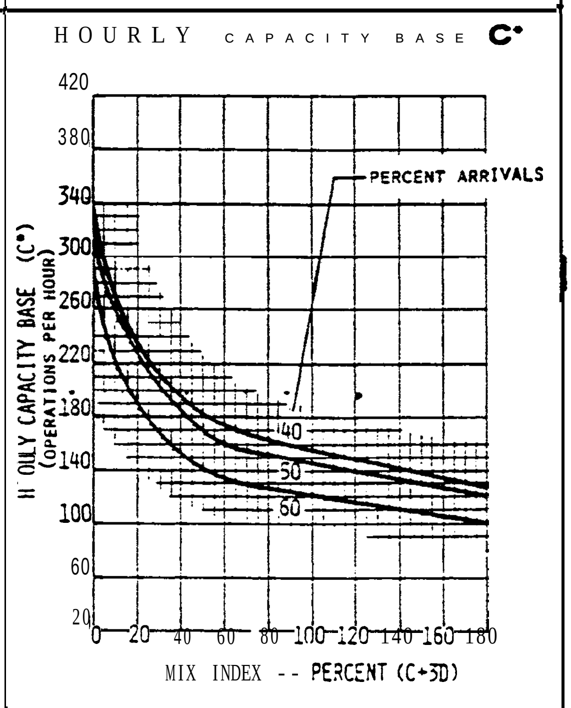
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	40% Arrivals N=1	40% Arrivals N=2 or 3	50% Arrivals N=0	50% Arrivals N=1	50% Arrivals N=2 or 3	60% Arrivals N=0	60% Arrivals N=1	60% Arrivals N=2 or 3
0 to 20	2000 to 4000	0.76	0.88	0.94	0.65	0.83	0.93	0.62	0.79	0.90
21 to 50	3000 to 5500	0.83	0.90	0.96	0.72	0.83	0.94	0.72	0.83	0.93
51 to 80	3500 to 6500	0.85	0.91	0.96	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.90	0.94	0.97	0.82	0.88	0.95	0.80	0.87	0.94
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.35	0.39

FIGURE 3-13. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 18, 21, 22 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.11
31 to 40	0 to 10	1.20
41 to 50	0 to 10	1.26

C* x T x E = Hourly Capacity

EXIT FACTOR E

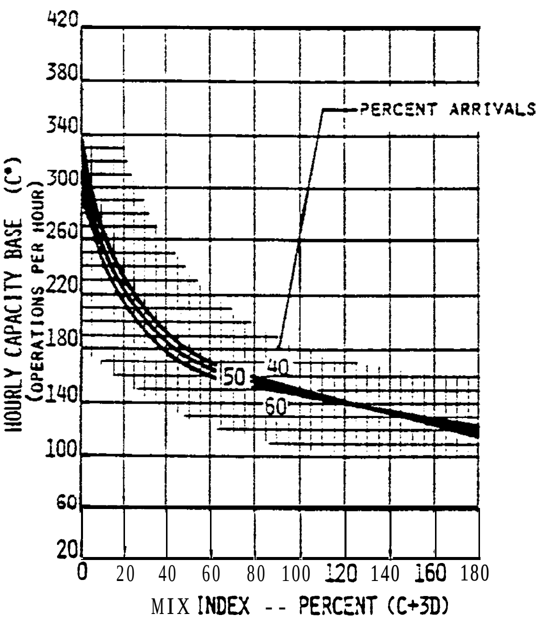
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	40% Arrivals N=1	40% Arrivals N=2 or 3	50% Arrivals N=0	50% Arrivals N=1	50% Arrivals N=2 or 3	60% Arrivals N=0	60% Arrivals N=1	60% Arrivals N=2 or 3
0 to 20	2000 to 4000	0.76	0.88	0.94	0.65	0.83	0.93	0.62	0.79	0.90
21 to 50	3000 to 5500	0.83	0.90	0.96	0.72	0.83	0.94	0.72	0.83	0.93
51 to 80	3500 to 6500	0.85	0.91	0.96	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.90	0.94	0.97	0.82	0.88	0.95	0.80	0.87	0.94
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.39

FIGURE 3-14. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 19, 23, 77, 78, 92, 93 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent(C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.01
11 to 20	0 to 70	1.02
21 to 30	0 to 40	1.03
31 to 40	0 to 10	1.04
41 to 50	0 to 10	1.05

C* x T x E = Hourly Capacity

EXIT FACTOR E

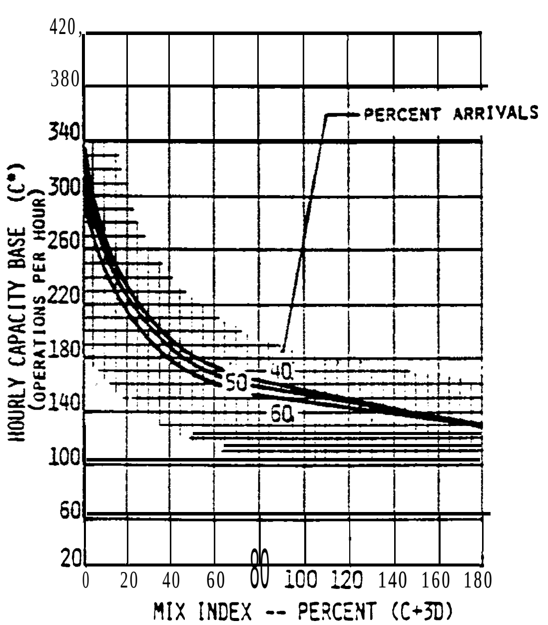
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.75	0.38	0.34	0.72	0.86	0.33	0.69	0.34	0.33
21 to 50	3000 to 5500	3.32	0.39	0.96	0.79	0.37	0.95	0.76	0.36	0.35
51 to 80	3500 to 6500	0.33	0.90	0.35	0.31	0.99	0.35	0.78	0.36	0.33
81 to 120	5000 to 7000	0.38	0.92	0.37	0.36	0.30	0.95	0.33	0.39	0.35
121 to 180	5500 to 7500	0.31	0.97	0.39	0.38	0.95	a.30	0.35	0.94	0.37

FIGURE 3-15. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 24, 27 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent(C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.01
11 to 20	0 to 70	1.02
21 to 30	0 to 40	1.03
31 to 40	0 to 10	1.04
41 to 50	0 to 10	1.05

C* x T x E = Hourly Capacity

EXIT FACTOR E

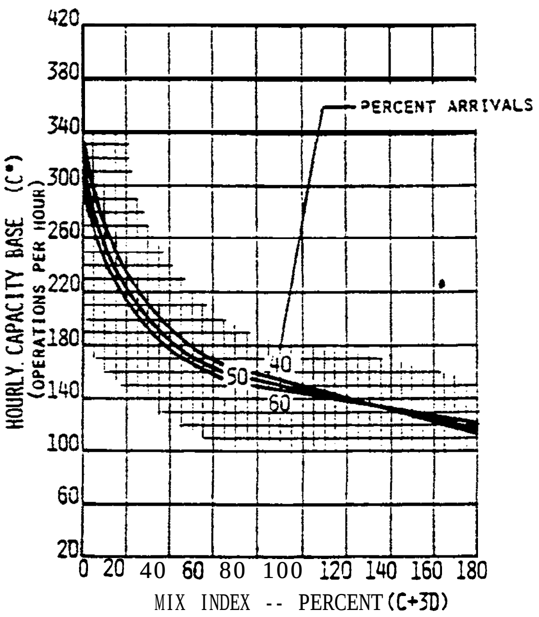
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.75	0.38	0.34	0.72	0.86	0.93	0.69	0.34	0.33
21 to 50	3000 to 5500	0.32	0.39	0.36	0.79	0.37	0.95	0.76	0.36	0.35
51 to 80	3500 to 6500	0.33	0.30	0.95	0.31	0.89	0.95	0.78	0.36	0.33
81 to 120	5000 to 7000	0.38	0.92	0.37	0.85	0.90	0.95	0.83	0.89	0.35
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-16. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 26 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
a	0 to 180	1.30
1 to 10	0 to 70	1.31
11 to 20	0 to 70	1.92
21 to 30	0 to 40	1.33
31 to 40	0 to 10	1.34
41 to 50	0 to 10	1.35

C* x T x E = Hourly Capacity

EXIT FACTOR E

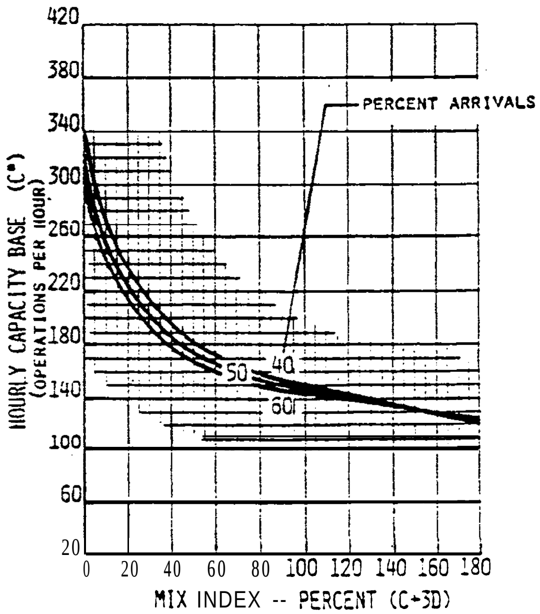
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
3 to 20	2000 to 4000	0.75	0.38	0.34	0.72	0.36	0.33	0.69	0.34	0.33
21 to 50	3000 to 5500	0.82	0.39	0.36	0.79	0.37	0.35	0.76	0.36	0.35
51 to 80	3500 to 6500	0.83	0.90	0.95	0.81	0.89	0.95	0.79	0.86	0.83
81 to 120	5000 to 7000	0.88	0.92	0.97	0.85	0.90	0.95	0.83	0.89	0.95
121 to 180	5500 to 7500	0.91	0.97	0.99	0.88	0.95	0.98	0.85	0.94	0.97

FIGURE 3-17. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 28, 82, 97 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
3	0 to 180	1.30
1 to 10	0 to 70	1.04
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.20
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

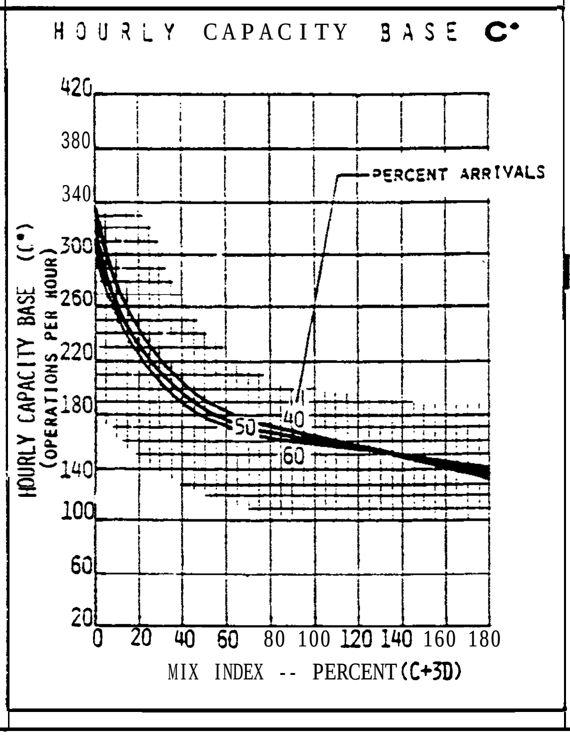
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
3 to 20	2000 to 4000	0.72	0.37	0.34	0.70	0.36	0.34	0.67	0.34	0.32
21 to 50	3000 to 5500	0.79	0.36	0.34	0.76	0.34	0.33	0.72	0.31	0.30
51 to 80	3500 to 6500	0.79	0.36	0.32	0.75	0.33	0.31	0.73	0.31	0.30
81 to 120	5000 to 7000	0.82	0.39	0.33	0.80	0.38	0.34	0.77	0.36	0.33
121 to 180	5500 to 7500	0.86	0.34	0.38	0.82	0.91	0.86	0.79	0.31	0.37

FIGURE 3-18. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 29 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	[illegible]
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.20
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

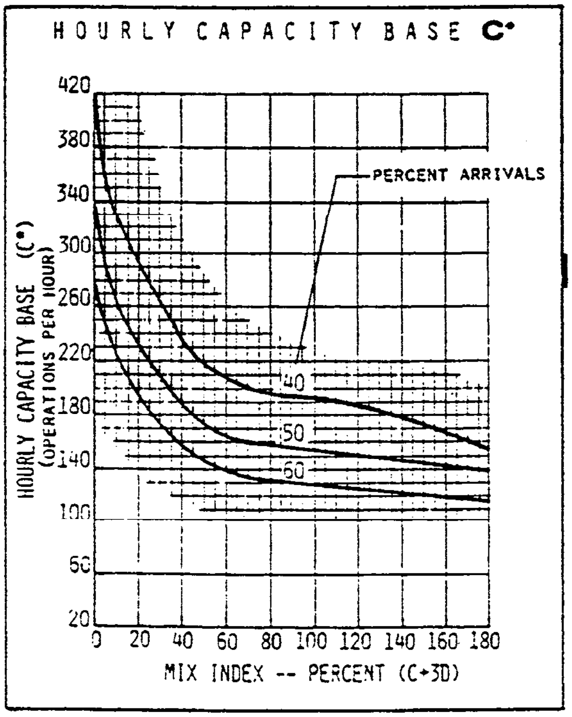
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.72	0.37	0.94	0.70	0.36	0.94	0.57	0.34	0.92
21 to 50	3000 to 5500	0.79	0.36	0.94	0.76	0.34	0.93	0.72	0.81	0.90
51 to 30	3500 to 6500	0.79	0.36	0.92	0.76	0.33	0.91	0.73	0.31	0.90
[illegible]1 to 120	[illegible] to [illegible]	0.32	0.39	0.93	0.30	0.38	0.94	0.77	0.36	0.93
121 to 180	5500 to 7500	0.36	0.34	0.98	0.32	0.31	0.36	0.73	0.31	0.37

FIGURE 3-19. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 31 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

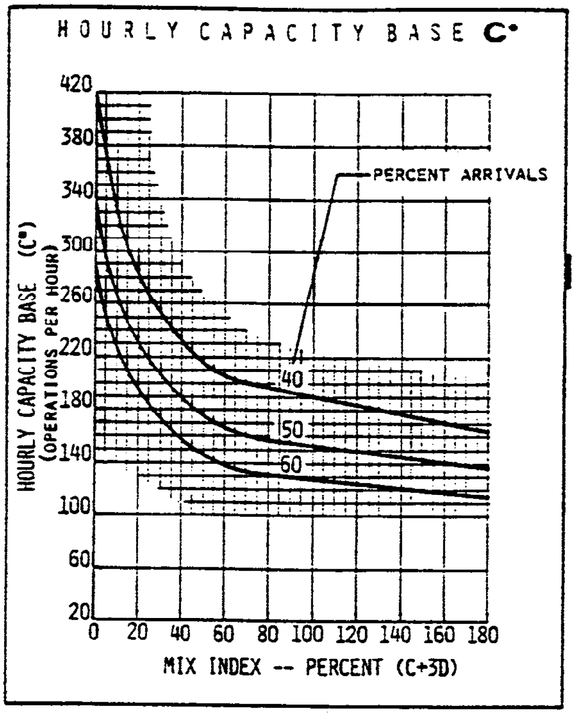
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.93	0.93	0.72	0.93	0.93	0.72	0.93	0.93
51 to 80	3500 to 6500	0.75	0.94	0.92	0.75	0.94	0.92	0.75	0.94	0.92
81 to 120	5000 to 7000	0.80	0.97	0.94	0.80	0.97	0.94	0.80	0.97	0.94
121 to 180	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-20. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 32, 33 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent(C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.02
11 to 20	0 to 70	1.05
21 to 30	0 to 40	1.09

C* x T x E = Hourly Capacity

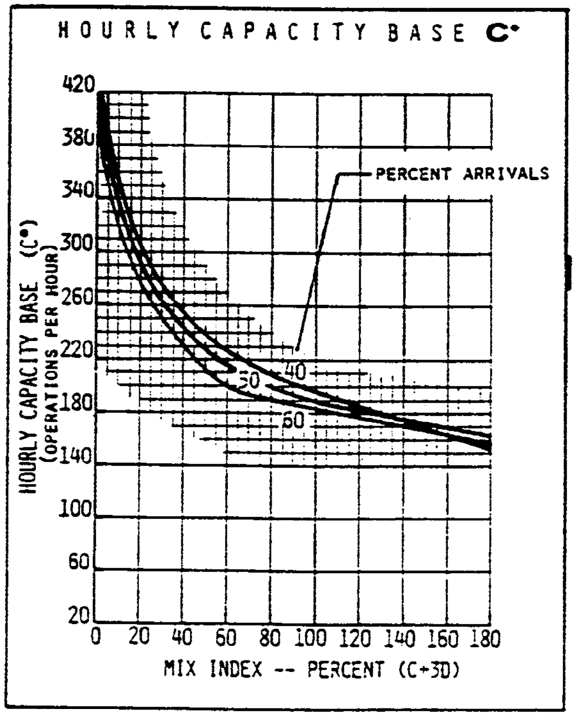
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.52	0.79	0.30	0.62	0.73	0.30	0.52	0.79	0.30
21 to 50	3000 to 5500	0.72	0.33	0.93	0.72	0.53	0.93	0.72	0.33	0.93
51 to 80	3500 to 6500	0.75	0.34	0.92	0.75	0.34	0.92	0.75	0.34	0.92
81 to 120	5000 to 7000	0.30	0.37	0.94	0.30	0.37	0.94	0.30	0.37	0.94
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-21. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 34, 35 FOR VFR CONDITIONS.



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent(C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.39
21 to 30	0 to 40	1.14

C* x T x E = Hourly Capacity

EXIT FACTOR E

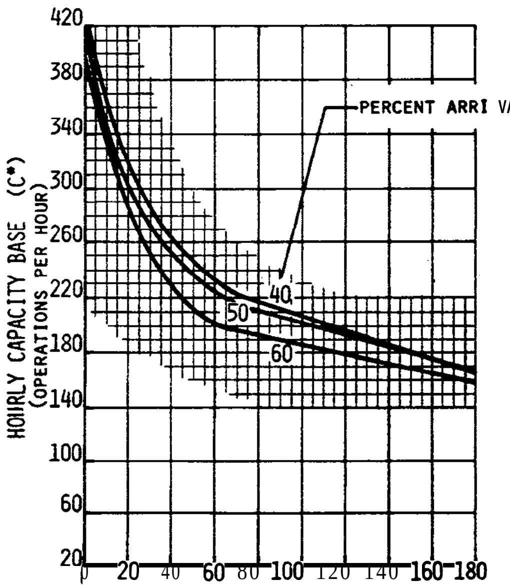
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.76	0.38	0.94	0.72	0.36	0.94	0.64	0.32	0.93
21 to 50	3000 to 5500	0.83	0.90	0.96	0.80	0.38	0.95	0.72	0.33	0.93
51 to 80	3500 to 6500	0.95	0.91	0.95	0.82	0.39	0.95	0.75	0.84	0.92
81 to 120	5000 to 7000	0.99	0.93	0.97	0.87	0.91	0.96	0.81	0.87	0.94
121 to 180	5500 to 7500	0.94	0.98	0.99	0.92	0.97	0.99	0.89	0.96	0.98

FIGURE 3-22. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 36 - 38 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.18

C* x T x E = Hourly Capacity

EXIT FACTOR E

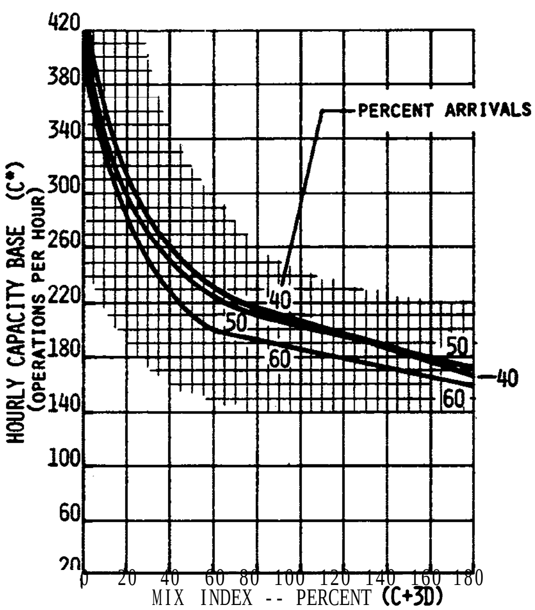
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N-1	N-2 or 3	N-0	N=1	N-2 or 3	N-0	N-1	N-2 or 3
0 to 20	2000 to 4000	0.76	0.88	0.94	0.72	0.86	0.94	0.64	0.82	0.93
21 to 50	3000 to 5500	0.83	0.90	0.96	0.80	0.88	0.95	0.72	0.83	0.93
51 to 80	3500 to 6500	0.85	0.91	0.95	0.82	0.89	0.95	0.75	0.84	0.92
81 to 120	5000 to 7000	0.89	0.93	0.97	0.87	0.91	0.96	0.81	0.87	0.94
121 to 180	5500 to 7500	0.94	0.98	0.99	0.92	0.97	0.99	0.89	0.96	0.98

FIGURE 3-23. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 39 FOR VFR CONDITIONS,

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.18

C* x T x E = Hourly Capacity

EXIT FACTOR-E

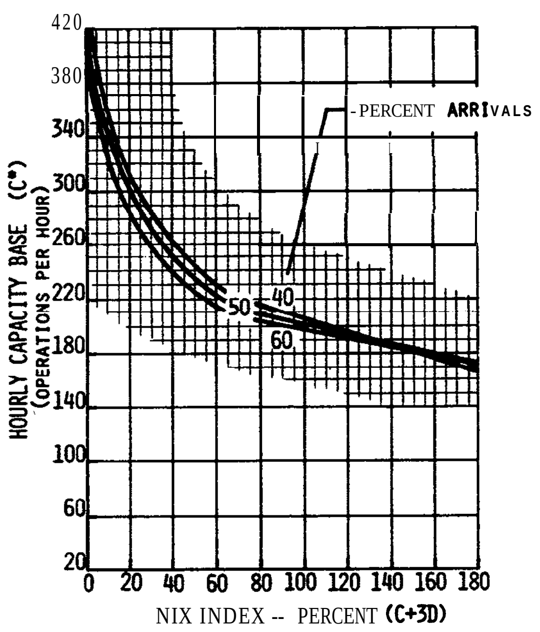
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-0	N-1	N-2 or 3	N-0	N=1	N-2 or 3	N-0	N-1	N-2 or 3
0 to 20	2000 to 4000	0.76	0.88	0.94	0.72	0.86	0.94	0.64	0.82	0.93
21 to 50	3000 to 5500	0.83	0.90	0.96	0.80	0.88	0.95	0.72	0.83	0.93
51 to 80	3500 to 6500	0.85	0.91	0.95	0.82	0.89	0.95	0.75	0.84	0.92
81 to 120	5000 to 7000	0.89	0.93	0.97	0.87	0.91	0.96	0.81	0.87	0.94
121 to 180	5500 to 7500	0.94	0.98	0.99	0.92	0.97	0.99	0.89	0.96	0.98

FIGURE 3-24. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 40 FOR VFR CONDITIONS,

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix In&x-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	oto to	1.03
11 to 20	oto 70	1.10
21 to 30	oto 40	1.18

C* x T x E = Hourly Capacity

EXIT FACTOR E

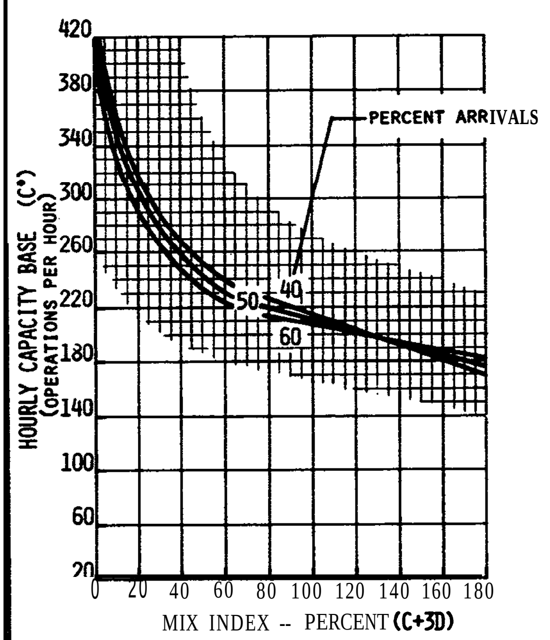
To determine Exit FactorE:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrival8

nix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		408 Arrivals			50% Arrivals			60% Arrivals		
		N-0	N-1	N-2 or 3	N=0	N-1	N-2 or 3	N-0	N=1	N-2 or 3
0 to 20	2000 to 4000	0.75	0.88	0.94	0.72	0.86	0.93	0.69	0.84	0.92
21 to so	3000 to 5500	0.82	0.89	0.96	0.79	0.87	0.95	0.77	0.86	0.95
51 to 80	3500 to 6500	0.84	0.90	0.95	0.81	0.88	0.94	0.79	0.87	0.94
81 to 120	5000 to 7000	0.88	0.92	0.96	0.86	0.90	0.95	0.85	0.90	0.96
121 to 180	5500 to 7500	0.92	0.96	0.97	0.89	0.94	0.96	0.90	0.96	0.98

FIGURE 3-25, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO, 41 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix In&x-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	oto 70	1.04
11 to 20	oto 70	1.10
21 to 30	0 to 40	1.20
31 to 40	oto 10	1.31.
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

EXIT FACTOR E

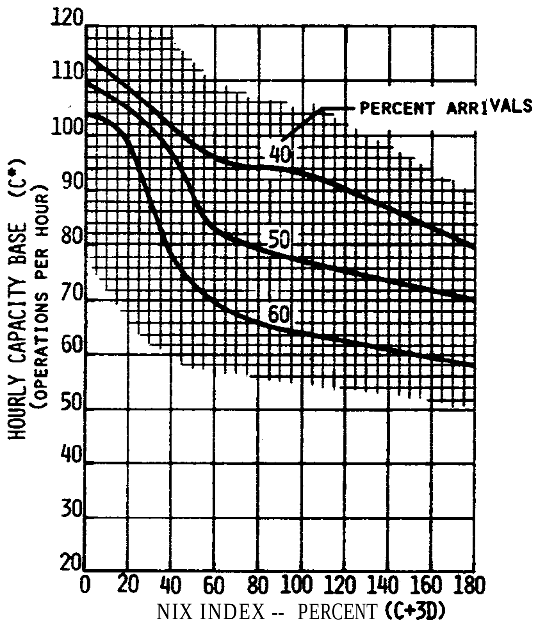
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine txit Factor from table below for appropriate mix in&x and percent arrivals

nix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-O	N=1	N-2 or 3	N-O	N=1	N-2 or 3	N=0	N=1	N=2 or 3
oto 20	2000 to 4000	0.72	0.87	0.94	0.70	0.86	0.94	0.67	0.84	0.92
21 to 50	3000 to 5500	0.79	0.86	0.94	0.76	0.84	0.93	0.72	0.81	0.90
51 to 80	3500 to 6S00	0.79	0.86	0.92	0.76	0.83	0.91	0.73	0.81	0.90
81 to 120	5000 to 7000	0.83	0.89	0.93	0.80	0.87	0.94	0.77	0.86	0.93
121 to 180	SS00 to 7500	0.85	0.93	0.98	0.81	0.91	0.97	0.78	0.89	0.97

FIGURE 3-26. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO, 42 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & CO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.06
21 to 30	0 to 40	1.13
31 to 40	0 to 10	1.26
41 to 50	0 to 10	1.33

C* x T x E = Hourly Capacity

EXIT FACTOR E

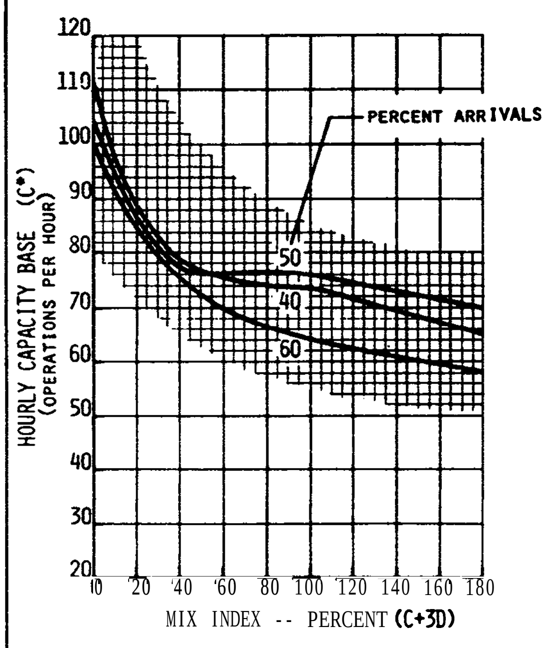
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix In&x-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			SOB Arrival8			60% Arrivals		
		N-O	N-l	N-2 or 3	N=0	N-1	N=2 or3	N-O	N-L	N-2 or3
0 to 20	2000 to 4000	0.86	0.88	0.94	0.80	0.85	0.93	0.71	0.83	0.93
21 to 50	3000 to 5500	0.84	0.91	0.98	0.71	0.85	0.92	0.71	0.85	0.92
51 to 80	3S00 to 6500	0.81	0.91	0.97	0.76	0.85	0.91	0.75	0.84	0.91
81 to 120	5000 to 7000	0.83	0.90	0.95	0.80	0.86	0.92	0.80	0.87	0.92
121 to 180	5500 to 7500	0.93	0.99	1.00	0.84	0.94	0.98	0.85	0.94	0.98

FIGURE 3-27, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 43,49 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.17
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

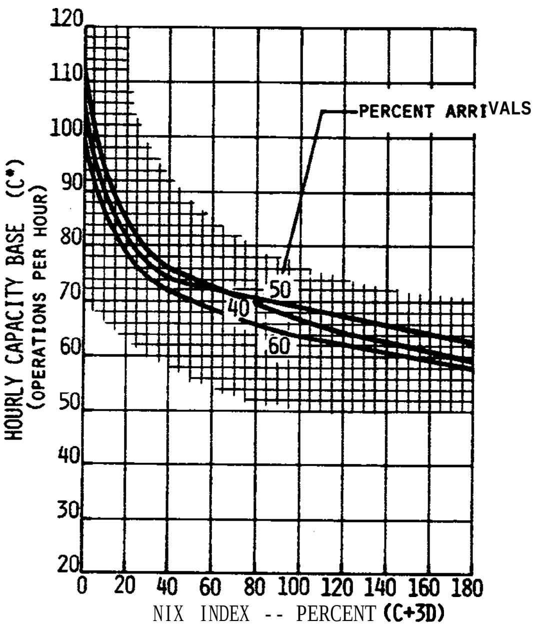
To determine Exit Factor E:

1. Determine exit tango for appropriate mix Index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within [illegible] range, and (b) separated by at least 7so feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			50% Arrivals			60% Arrivals		
		N-O	N=1	N-2 or 3	N-O	N=1	N-2 or 3	N-O	N-1	N-2 or 3
0 to 20	2000 to 4000	0.81	0.88	0.95	0.78	0.86	0.94	0.74	0.85	0.93
21 to so	3000 to 5500	0.91	0.92	0.97	0.87	0.92	0.99	0.75	0.87	0.98
51 to 80	3S00 to 6500	0.94	0.96	1.00	0.77	0.89	0.97	0.72	0.82	0.91
81 to 120	5000 to 7000	0.96	0.97	1.00	0.81	0.88	0.93	0.80	0.87	0.92
121 to 180	5500 to 7500	0.99	1.00	1.00	0.84	0.94	0.97	0.85	0.94	0.97

FIGURE 3-28. HOURLY CAPACITY OF HUNWAY-USE DIAGRAM NOS.: 44,50 FOR VFR CONDITIONS,

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.17
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

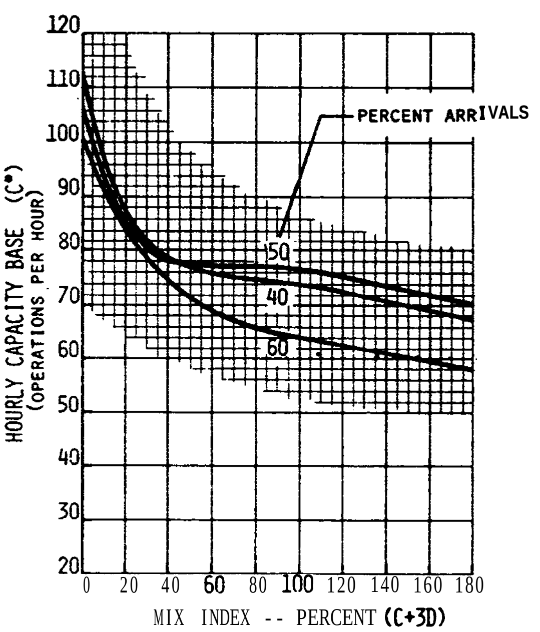
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.81	0.88	0.94	0.78	0.86	0.93	0.74	0.84	0.92
21 to 50	3000 to 5500	0.94	0.97	0.99	0.91	0.97	0.99	0.80	0.94	0.98
51 to 80	3500 to 6500	0.95	0.97	1.00	0.83	0.93	1.00	0.74	0.82	0.91
81 to 120	5000 to 7000	0.90	0.99	1.00	0.89	0.97	1.00	0.80	0.97	0.92
121 to 180	5500 to 7500	1.00	1.00	1.00	0.95	1.00	1.00	0.86	0.94	0.97

FIGURE 3-29. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 45,51 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.19
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

EXIT FACTOR E

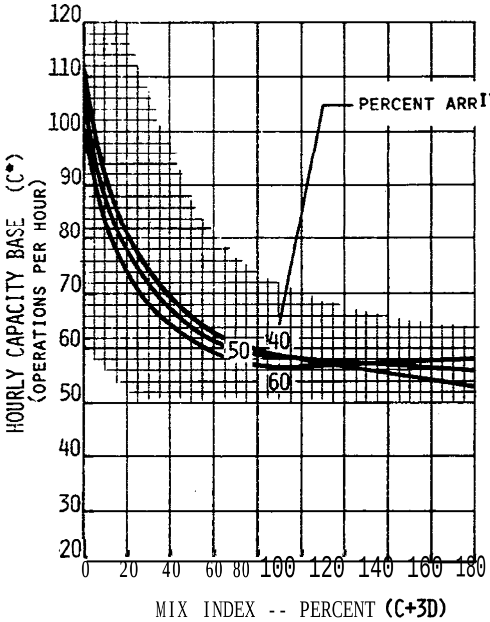
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.74	0.86	0.92	0.70	0.84	0.92	0.67	0.82	0.91
21 to 50	3000 to 5500	0.86	0.88	0.92	0.83	0.86	0.91	0.74	0.84	0.90
51 to 80	3500 to 6500	0.90	0.91	0.96	0.79	0.88	0.97	0.72	0.84	0.91
81 to 120	5000 to 7000	0.94	0.95	0.98	0.80	0.86	0.92	0.80	0.87	0.92
121 to 180	5500 to 7500	0.98	0.99	1.00	0.84	0.94	0.97	0.85	0.94	0.97

FIGURE 3-30. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 46,52 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.19
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

EXIT FACTOR E

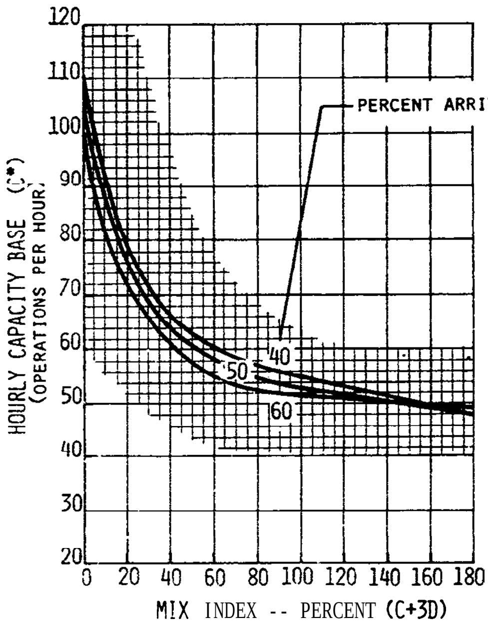
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.73	0.88	0.95	0.71	0.87	0.94	0.68	0.85	0.93
21 to 50	3000 to 5500	0.89	0.92	0.95	0.87	0.90	0.94	0.84	0.89	0.94
51 to 80	3500 to 6500	0.96	0.97	0.99	0.95	0.96	0.98	0.89	0.94	0.97
81 to 120	5000 to 7000	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.97	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	0.84	0.94	0.98

FIGURE 3-31. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 47,53 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT-FACTOR E

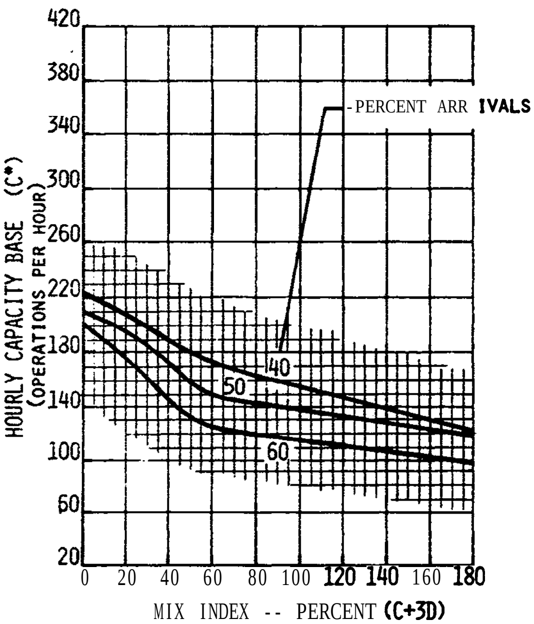
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number Of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.74	0.88	0.95	0.72	0.87	0.94	0.69	0.85	0.93
21 to 50	3000 to 5500	0.90	0.93	0.97	0.88	0.91	0.95	0.86	0.90	0.95
51 to 80	3500 to 6500	0.97	0.98	1.00	0.95	0.96	0.98	0.92	0.97	0.99
81 to 120	5000 to 7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

FIGURE 3-32. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 48 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.04
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.20
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

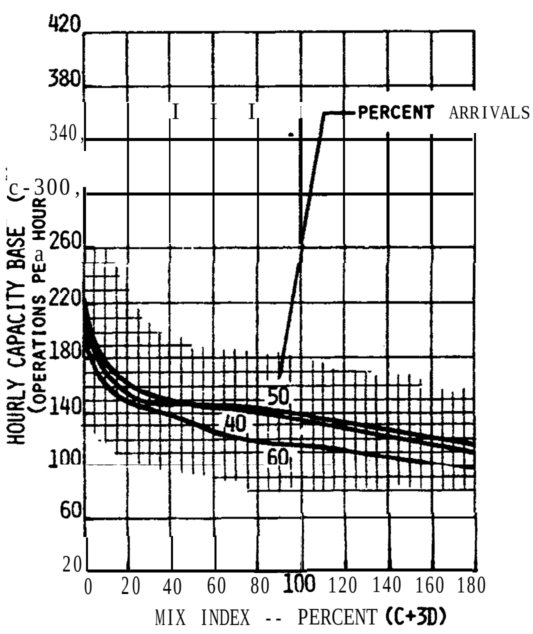
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-0	N-1	N-2 or 3	N-0	N=1	N-2 or 3	N-0	N-1	N-2 or 3
0 to 20	2000 to 4000	0.86	0.87	0.94	0.82	0.85	0.93	0.77	0.84	0.92
21 to 50	3000 to 5500	0.88	0.91	0.96	0.73	0.86	0.94	0.73	C.86	0.94
51 to 80	3500 to 6500	0.84	0.87	0.93	0.78	0.87	0.93	0.78	0.87	0.93
81 to 120	5000 to 7000	0.83	0.90	0.96	0.83	0.90	0.96	0.83	0.90	0.96
121 to 180	5500 to 75	1.00	1.00	0.92	0.97		1.00	0.92	0.97	1.00

FIGURE 3-33, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 55,61 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

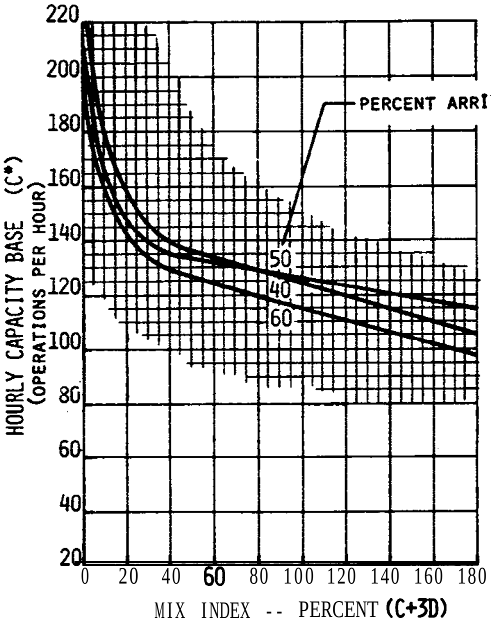
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-0	N=1	N-2 or 3	N-0	N=1	N-2 or 3	N=0	N-1	N=2 or 3
0 to 20	2000 to 4000	0.79	0.89	0.95	0.76	0.88	0.95	0.74	0.86	0.94
21 to 50	3000 to 5500	0.96	1.00	1.00	0.91	1.00	1.00	0.78	0.92	0.97
51 to 80	3500 to 6500	0.93	0.96	1.00	0.80	0.90	0.97	0.78	0.87	0.93
81 to 120	5000 to 7000	0.93	0.96	1.00	0.83	0.90	0.96	0.83	0.90	0.96
121 to 180	5500 to 7500	0.97	0.99	1.00	0.93	0.97	1.00	0.92	0.97	1.00

FIGURE 3-34. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 56 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Xix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.17
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

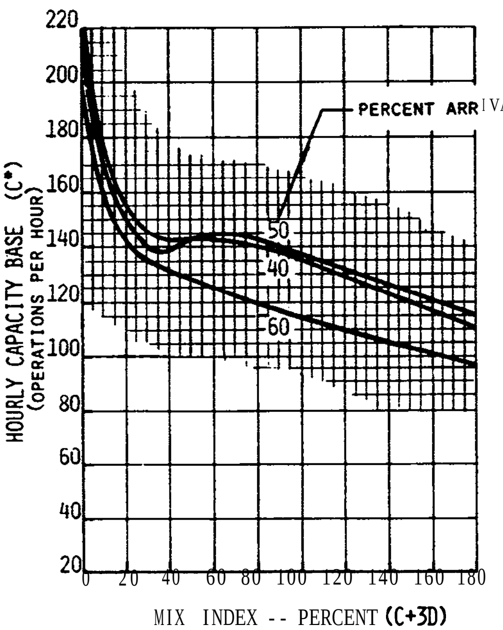
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	40% Arrivals N=0	40% Arrivals N=1	40% Arrivals N=2 or 3	50% Arrivals N=0	50% Arrivals N=1	50% Arrivals N=2 or 3	60% Arrivals N=0	60% Arrivals N=1	60% Arrivals N=2 or 3
0 to 20	2000 to 4000	0.83	0.89	0.95	0.81	0.88	0.95	0.79	0.86	0.94
21 to 50	3000 to 5500	1.00	1.00	1.00	0.98	1.00	1.00	0.85	1.00	1.00
51 to 80	3500 to 6500	0.95	0.98	1.00	0.87	0.97	1.00	0.78	0.87	0.93
81 to 120	5000 to 7000	0.95	0.98	1.00	0.90	0.97	1.00	0.83	0.90	0.96
121 to 180	5500 to 7500	0.97	1.00	1.00	0.95	1.00	1.00	0.92	0.97	1.00

FIGURE 3-35, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 57, 63 FOR VFR CONDITIONS,

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.17
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

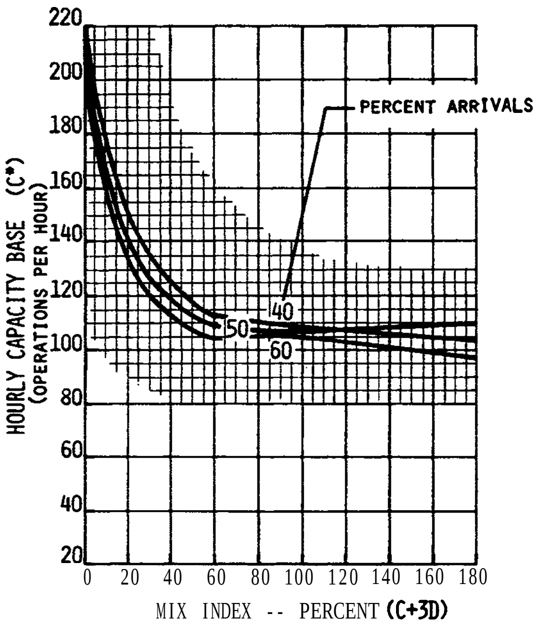
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	40% Arrivals N=0	40% Arrivals N=1	40% Arrivals N=2 or 3	50% Arrivals N=0	50% Arrivals N=1	50% Arrivals N=2 or 3	60% Arrivals N=0	60% Arrivals N=1	60% Arrivals N=2 or 3
0 to 20	2000 to 4000	0.78	0.89	0.95	0.75	0.88	0.95	0.72	0.86	0.94
21 to 50	3000 to 5500	0.96	0.96	0.98	0.95	0.95	0.98	0.83	0.94	0.98
51 to 80	3500 to 6500	0.90	0.93	0.97	0.81	0.90	0.96	0.78	0.87	0.94
81 to 120	5000 to 7000	0.92	0.95	0.98	0.83	0.90	0.96	0.83	0.90	0.96
121 to 180	5500 to 7500	0.98	1.00	1.00	0.92	0.97	1.00	0.92	0.97	1.00

FIGURE 3-36. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 58, 64 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to-10	oto 70	1.04
11 to 20	oto 70	1.10
21 to 30	oto 40	1.20
31 to 40	oto 10	1.28
41 to so	oto 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

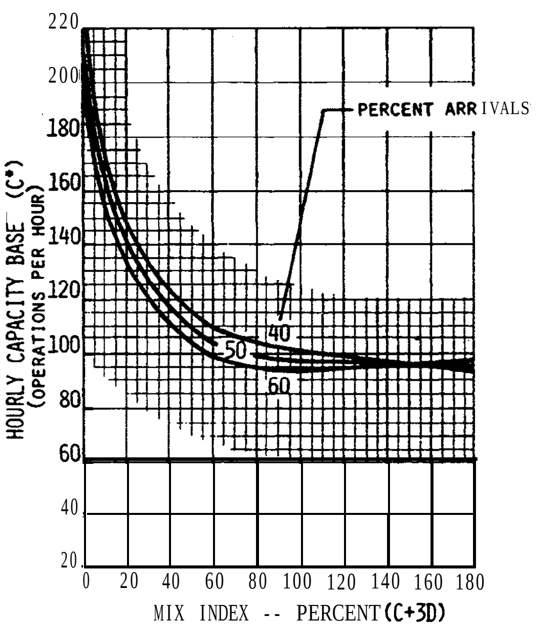
To determine Exit Factor E:

1. *Determine* exit range for appropriate mix index **from** table below
2. For arrival **runways,** determine *the average* number of **exits(N)** which are: *(a)* within appropriate exit range, and **(b) separated** by *at* **least** 750 **feet**
3. If N **is** 4 or more, Exit Factor = 1.00
4. If N **is less** than 4, *determine* **Exit** Factor **from** table below *for* appropriate **mix** index and percent arrival8

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			508 Arrival8			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.78	0.89	0.95	0.75	0.88	0.95	0.72	0.86	0.94
21 to so	3000 to 5500	0.89	0.92	0.97	0.87	0.91	0.96	0.86	0.90	0.95
51 to 80	3500 to 6500	1.00	1.00	1.00	1.00	1.00	1.30	0.92	0.99	1.00
81 to 120	5000 to 7000	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.97	1.00
121 to 180	5500 to 7500	0.98	1.00	1.00	0.98	1.00	1.00	0.92	0.97	1.00

FIGURE 3-37, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 59,65 FOR VFR CONDITIONS,

HOURL'Y CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

To **determine** Exit Factor E:

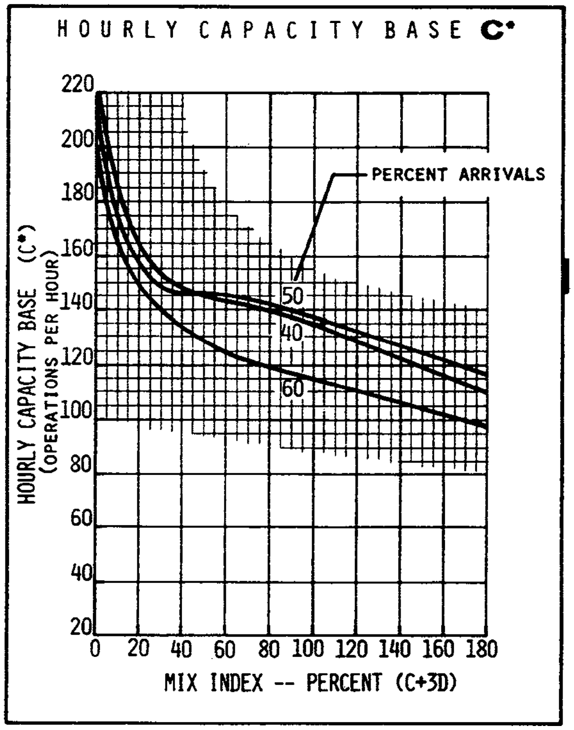
1. **Determine exit range** for appropriate **mix** index from table **below**
2. For arrival runways, determine the average **number** of **exits(N)** which are: (a) **within** appropriate exit range, and **(b)** 8eparatcd by *at* **least** 750 feet
3. **If** N **is** 4 or more, Exit Factor = 1.00
4. If N **is** la85 than **4,** determine Exit Factor **from** table below **for** appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		408 Arrival5			50% Arrival8			60% Arrival5		
		N-O	N=1	N=2 or 3	N-O	N=1	N=2 or 3	N-O	N-l	N-2 or 3
0 to 20	2000 to 4000	0.78	0.89	0.95	0.75	0.88	0.95	0.72	0.86	0.94
21 to 50	3000 to 5500	0.87	0.92	0.97	0.85	0.91	0.96	0.83	0.90	0.95
51 to 80	3500 to 6500	0.98	0.99	1.00	0.99	0.99	1.00	0.97	0.98	1.00
81 to 120	5000 to 7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	[illegible]	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	0.92	0.97	1.00	[illegible]

1.00 1.00 1.00 0.92 0.37 1.00

FIGURE 3-38. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 60 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.04
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.20
31 to 40	0 to 10	1.31
41 to 50	0 to 10	1.40

C* x T x E = Hourly Capacity

EXIT FACTOR E

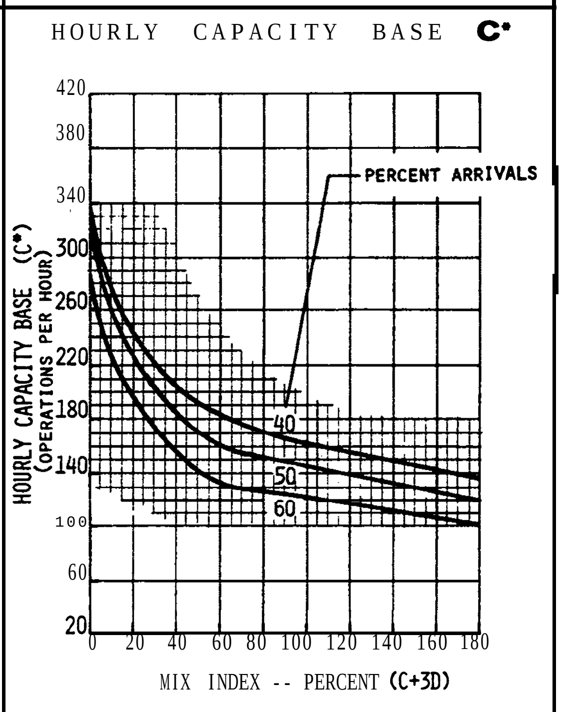
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N-0	40% Arrivals N-1	40% Arrivals N-2 or 3	50% Arrivals N-0	50% Arrivals N-1	50% Arrivals N-2 or 3	60% Arrivals N-0	60% Arrivals N-1	60% Arrivals N-2 or 3
0 to 20	2000 to 4000	0.70	0.86	0.93	0.67	0.85	0.92	0.64	0.83	0.91
21 to 50	3000 to 5500	0.96	1.00	1.00	0.91	1.00	1.00	0.78	0.92	0.97
51 to 80	3500 to 6500	0.93	0.96	1.00	0.80	0.90	0.97	0.78	0.87	0.93
81 to 120	5000 to 7000	0.93	0.96	1.00	0.83	0.90	0.96	0.83	0.90	0.96
121 to 180	5500 to 7500	0.97	0.99	1.00	0.93	0.97	1.00	0.92	0.97	1.00

FIGURE 3-39. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 62 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.18

C* x T x E = Hourly Capacity

EXIT FACTOR E

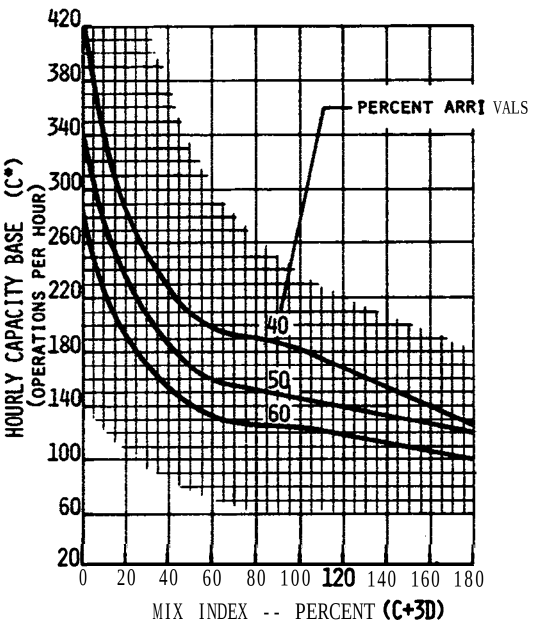
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N-0	40% Arrivals N-1	40% Arrivals N-2 or 3	50% Arrivals N-0	50% Arrivals N-1	50% Arrivals N-2 or 3	60% Arrivals N-0	60% Arrivals N-1	60% Arrivals N-2 or 3
0 to 20	2000 to 4000	0.75	0.87	0.94	0.64	0.82	0.93	0.62	0.79	0.90
21 to 50	3000 to 5500	0.81	0.89	0.96	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.81	0.90	0.95	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.88	0.92	0.97	0.81	0.87	0.94	0.81	0.87	0.94
121 to 180	5500 to 7500	0.93	0.97	0.98	0.89	0.96	0.98	0.89	0.96	0.98

FIGURE 3-40. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 80,81,95,96 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	oto 70	1.03
11 to 20	oto 70	1.05
21 to 30	oto 40	1.09
31 to 40	oto 10	1.15
41 to 50	oto 10	1.20

C* x T x E = Hourly Capacity

EXIT FACTOR E

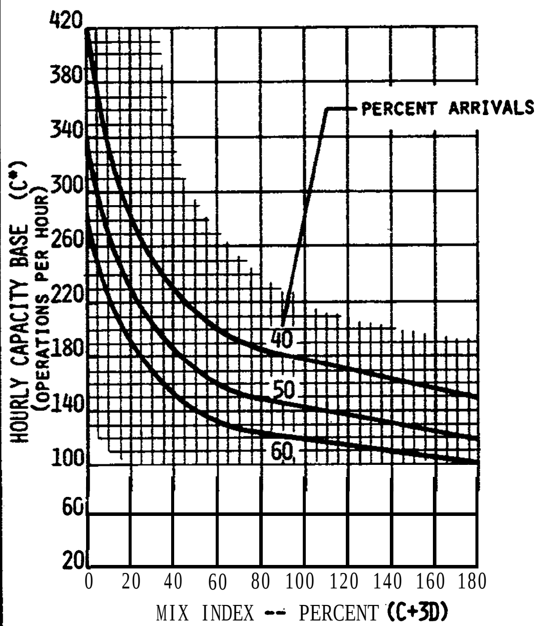
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N-2 or 3	50% Arrivals N=0	N=1	N-2 or 3	60% Arrivals N-O	N=1	N-2 or 3
0 to 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.83	0.93	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.75	0.84	0.92	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.81	0.87	0.94	0.81	0.87	0.94	0.81	0.87	0.94
121 to 180	5500 to 7500	1.00	1.00	1.00	0.89	0.96	0.98	0.89	0.96	0.98

FIGURE 3-41. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 83,84,98,99,102 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index-- Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	oto 70	1.03
11 to 20	oto 70	1.05
21 to 30	oto 40	1.09
31 to 40	oto 10	1.15
41 to SO	oto 10	1.20

C* x T x E = Hourly Capacity

EXIT FACTOR E

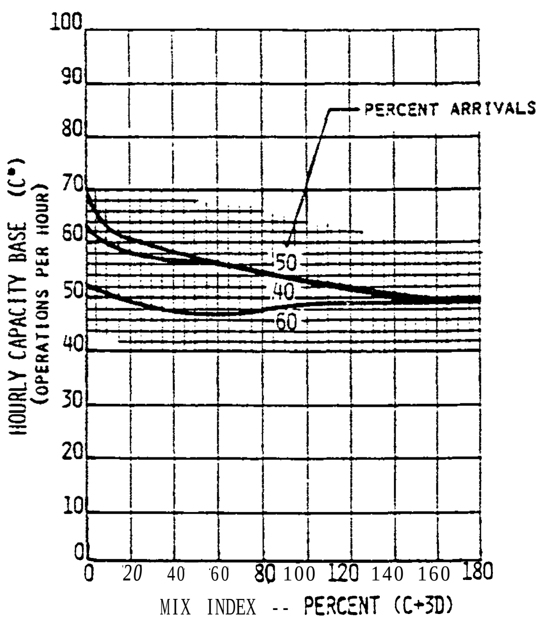
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (8) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.62	0.79	0.90	0.62	0.79	0.90	0.62	0.79	0.90
21 to 50	3000 to 5500	0.72	0.83	0.93	0.72	0.83	0.93	0.72	0.83	0.93
51 to 80	3500 to 6500	0.75	0.84	0.92	0.75	0.84	0.92	0.75	0.84	0.92
81 to 120	5000 to 7000	0.81	0.87	0.94	0.81	0.87	0.94	0.81	0.87	0.94
121 to 180	5500 to 7500	0.89	0.96	0.98	0.89	0.96	0.98	0.89	0.96	0.98

FIGURE 3-42, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 85,86,100,101 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

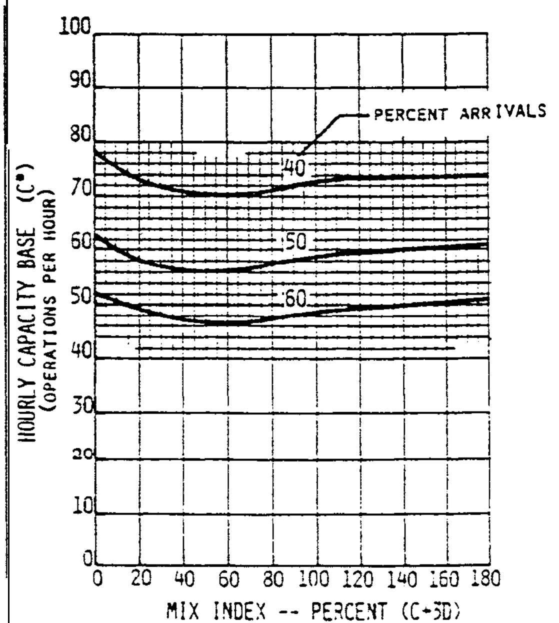
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. tot arrival runways, determine the average number of exits(N) which are: (a) within ● ppproprirte exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D) 2-43,2-50	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.81	0.91	0.96	0.83	0.95	0.99	0.92	1.00	1.00
21 to 50	3000 to 5500	0.79	0.86	0.92	0.77	0.85	0.92	0.89	0.98	1.00
51 to 80	3500 to 6500	0.81	0.87	0.93	0.77	0.83	0.91	0.90	0.98	1.00
81 to 120	5000 to 7000	0.83	0.89	0.94	0.80	0.86	0.92	0.83	0.91	0.97
121 to 180	5500 to 7500	0.86	0.94	0.98	0.83	0.91	0.96	0.79	0.89	0.95

FIGURE 3-43. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 1, 54 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

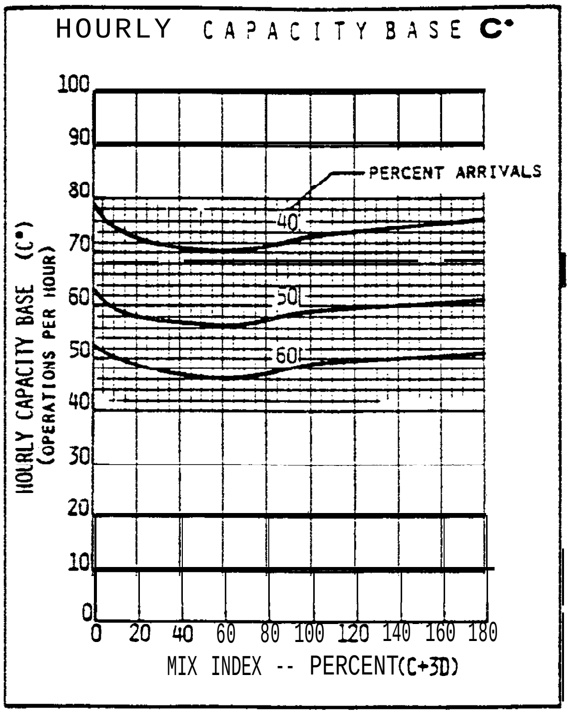
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. for arrival runways, determine the average number of ● xlts(r-4) which are: (a) within ● ppropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more. Exit Factor = 1.00
4. If N is less than 4, determine Exit factor from table below for ● ppropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.99	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.91	0.97	1.00	0.91	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.91	0.98	1.00	0.91	0.98	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	0.92	0.97	1.00	0.90	0.97	1.00	0.90	0.97	1.00

FIGURE 3-44. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 2, 3, 9, 61-68, 72-74, 76, 77, 79, 80, 82-85, 87-89, 91, 92, 94, 95, 97-100, 102 FOR IFR CONDITIONS.



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

To determine Exit Factor E:

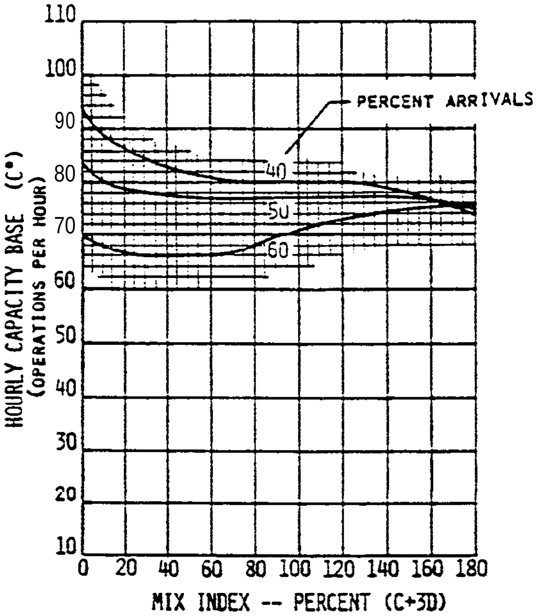
1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index -- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.91	0.97	1.00	0.91	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.91	0.98	1.00	0.91	0.98	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIGURE 3-45. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 4, 5, 75, 90 FOR IFR CONDITIONS.

FIGURE 3-46. DELETED

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

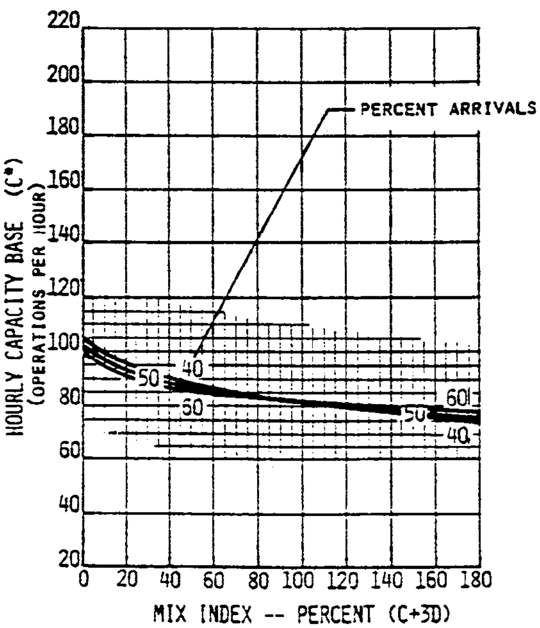
to determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 3500	0.95	0.98	1.00	0.95	0.99	1.00	1.00	1.00	1.00
21 to 40	2000 to 5000	0.92	0.97	1.00	0.90	0.95	1.00	0.99	1.00	1.00
41 to 70	3500 to 6500	0.93	0.97	1.00	0.90	0.95	1.00	0.98	1.00	1.00
71 to 120	5000 to 7000	0.94	0.98	1.00	0.92	0.96	1.00	0.94	0.99	1.00
121 to 180	5500 to 7500	0.96	1.00	1.00	0.93	0.98	1.00	0.90	0.97	1.00

FIGURE 3-47. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 7 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

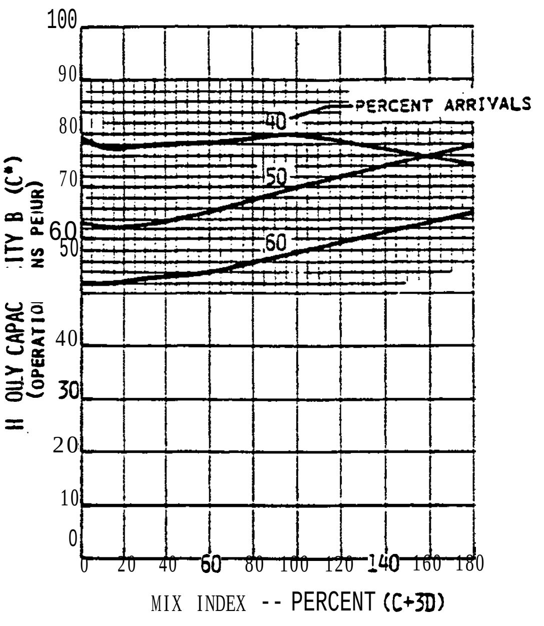
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.39	1.00	0.99	0.39	1.00	1.00	0.98	0.99	1.00
21 to 50	1000 to 5500	0.95	0.38	0.99	0.93	0.38	0.99	0.31	0.97	0.99
51 to 80	3500 to 5500	0.95	0.38	1.00	0.94	0.39	1.00	0.92	0.98	1.00
81 to 120	5000 to 7000	0.36	0.99	1.00	0.34	0.39	1.00	0.33	0.99	1.00
121 to 180	5500 to 7500	0.30 1.00	1.00	0.95	0.35	1.00	1.00	0.94	0.99	1.00

FIGURE 3-48. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 8 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

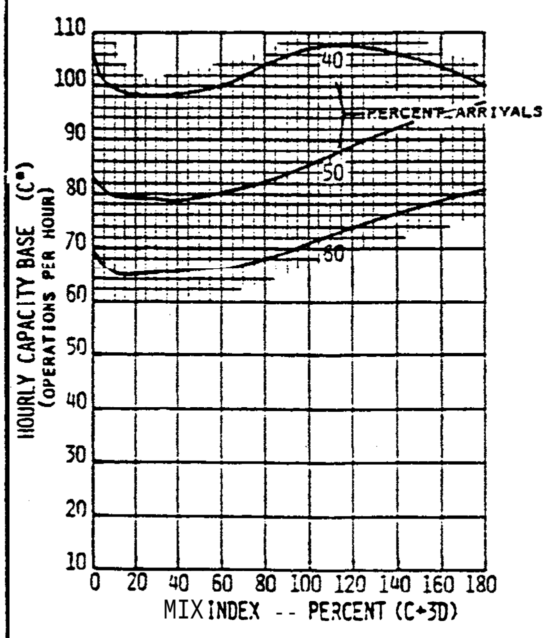
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E
0 to 20	2000 to 4000	E = 1.00
21 to 50	3000 to 5500	
51 to 80	3500 to 6500	
81 to 120	5000 to 7000	
121 to 180	5500 to 7500	

FIGURE 3-49. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 29 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

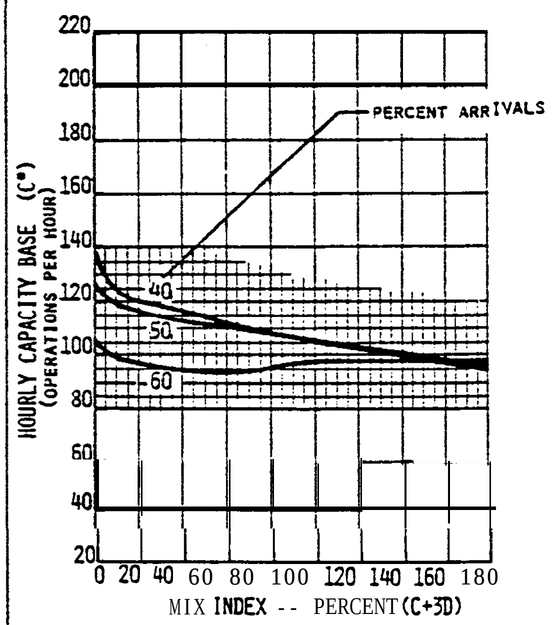
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	40% Arrivals N=1	40% Arrivals N=2 or 3	50% Arrivals N=0	50% Arrivals N=1	50% Arrivals N=2 or 3	60% Arrivals N=0	60% Arrivals N=1	60% Arrivals N=2 or 3
0 to 20	2000 to 3500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
21 to 40	2000 to 5000	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
41 to 70	3500 to 6500	0.90	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
71 to 120	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.00	1.00	1.00	1.00	1.00
121 to 180	5500 to 7500	0.84	0.95	1.00	0.86	1.00	1.00	1.00	1.00	1.00

FIGURE 3-50. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 11, 70 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

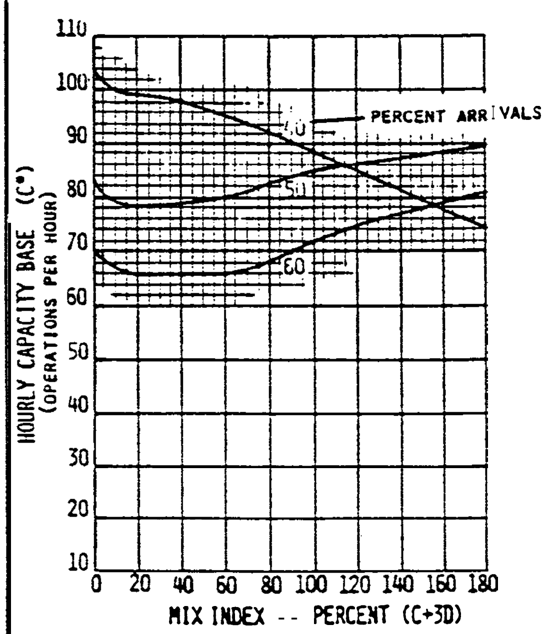
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2	N=0	N=1	N=2	N=0	N=1	N=2
0 to 20	2000 to 4000	0.51	0.31	0.36	0.33	0.35	0.39	0.32	1.00	1.00
21 to 50	3000 to 5500	0.79	0.36	0.92	0.77	0.85	0.92	0.89	0.98	1.00
51 to 80	3500 to 6500	0.81	0.37	0.93	0.77	0.33	0.31	0.30	0.38	1.00
81 to 120	5000 to 7000	0.83	0.39	0.94	0.30	0.36	0.92	0.93	0.91	3.97
121 to 180	5500 to 7500	0.36	0.94	0.98	0.33	0.91	0.96	0.79	0.39	0.95

FIGURE 3-51. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 12, 71 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

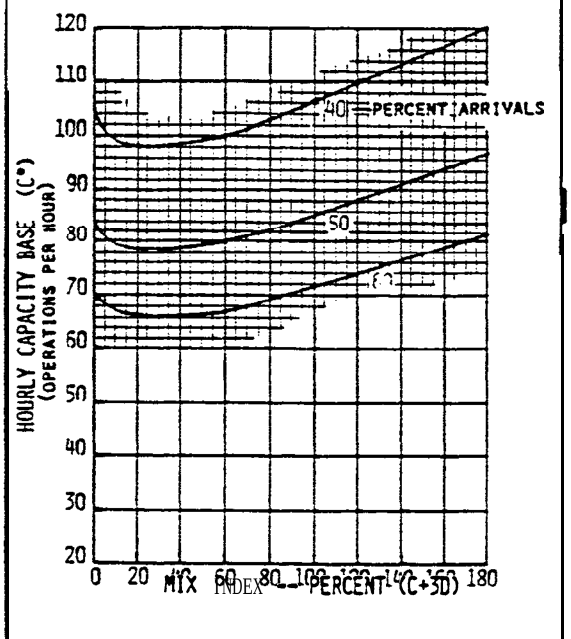
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E
0 to 20	2000 to 3500	E=1.00
21 to 40	2000 to 5000	
41 to 70	3500 to 6000	
71 to 110	5000 to 7000	
121 to 180	5500 to 7500	

FIGURE 3-52. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 13, 16, 24, 27 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

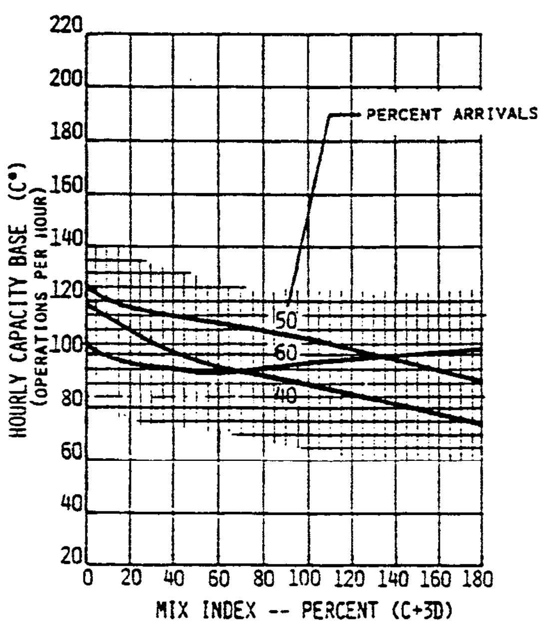
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 3500	[illegible]	[illegible].30	.00	1 00	1.30	1.00	130	.30	1.30
21 to 40	2000 to 5000	1 00	1.00	1 .00	1 00	1 .00	1 .70	1.00	1 00	.00
41 to 70	3500 to 6500	1 00	1.00	1 00	1 .00	1	.00	[illegible]	[illegible]	1.00
121 to 280	5500 to 7500	1.00	1.00	on	on	00	1.00	! 00	1 00	1.00
			0 98	1 00	00	1 00	00	1.00	1 00	1.00

FIGURE 3-53. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 21 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

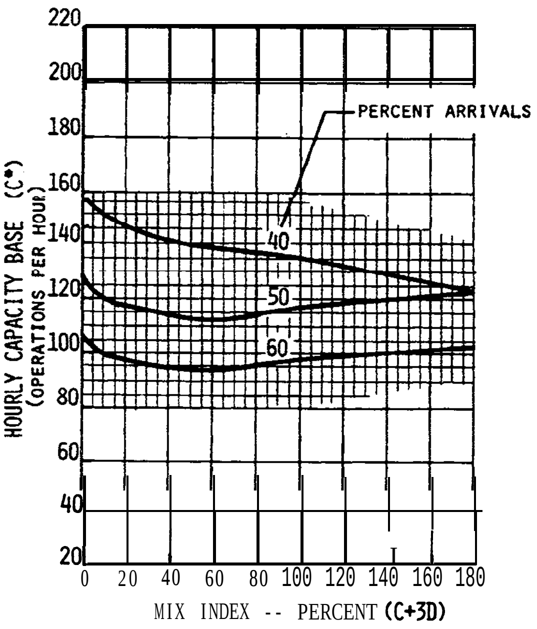
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 2.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent(C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	1.30	1.30	1.00	0.98	1.00	1.30	0.90	1.30	1.30
21 to 50	3000 to 5500	1.30	1.30	1.00	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	1.30	1.30	1.00	0.31	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	1.30	1.30	1.30	1.00	1.30	1.30	0.91	0.98	1.30
121 to 180	5500 to 7500	1.30	1.30	1.30	1.30	1.30	1.30	0.90	0.97	1.30

FIGURE 3-54. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 15, 28 FOR IFR CONDITIONS:

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

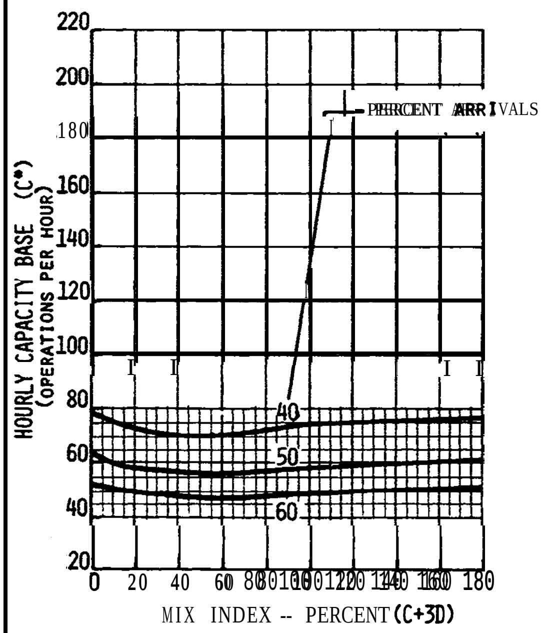
To determine Exit Factor E:

1. Determine exit range for appropriate *mix index* **from** table **below**
2. For arrival runways, determine the average number of **exits (N)** which are: (a) within appropriate exit range, and (b) separated by at ***least* 750 feet**
3. *If N* **is** *4 or* more, *Exit* **Factor** = 1.00
4. *If* N **is** less than 4, determine Exit Factor from table below **for** appropriate mix index and *percent* arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-O	N=1	N=2 or 3	N-O	N-1	N-2 or 3	N=0	N=1	N-2 or 3
0 to 20	2000 to 4000	0.98	0.99	1.00	0.98	0.99	1.00	0.98	0.99	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.92	0.98	1.00	0.92	0.98	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.95	0.99	1.00	0.92	0.99	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	0.95	0.99	1.00	0.90	0.97	1.00	0.90	0.97	1.00

FIGURE 3-55, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 18,22,26,31,36 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

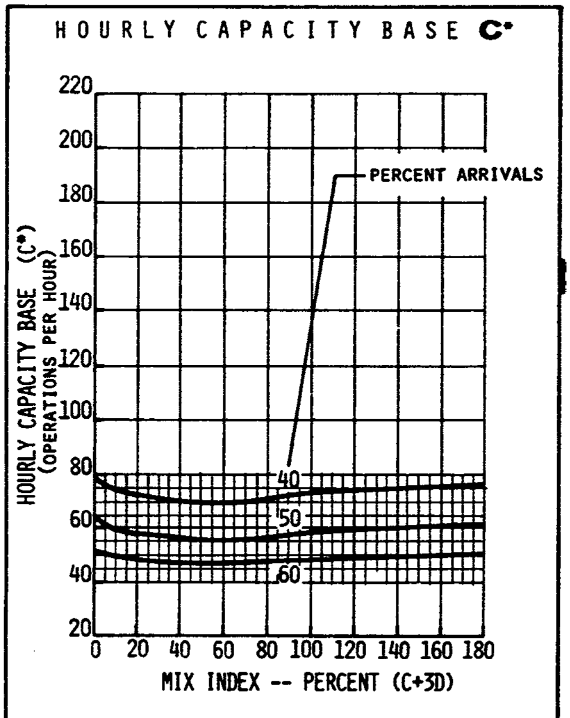
EXIT FACTO'R E

To **determine Exit** Factor E:

1. Determine exit range for appropriate **mix** index **from** table below
2. **For** arrival **runways, determine** *the* **average** number **of** exits (N) which are: (a) within appropriate exit **range,** and **(b) separated** by at least 750 feet
3. **If** N is 4 or more, Exit Factor = 1.00
4. If N is **less** than **4,** determine Exit Factor **from** table below **for** appropriate **mix** index and percent arrivals .

Mix Index-- Percent (C+3D)	Exit Range (Feet *from* threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-O	*N-1*	N-2 or 3	*N-O*	N=1	N-2 or 3	*N-O*	N-1	N=2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.91	0.97	1.00	0.91	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.91	0.98	1.00	0.91	0.98	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	0.92	0.97	1.00	0.90	0.97	1.00	0.90	0.97	1.00

FIGURE 3-56. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 19,25 FOR IFR CONDITIONS,



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

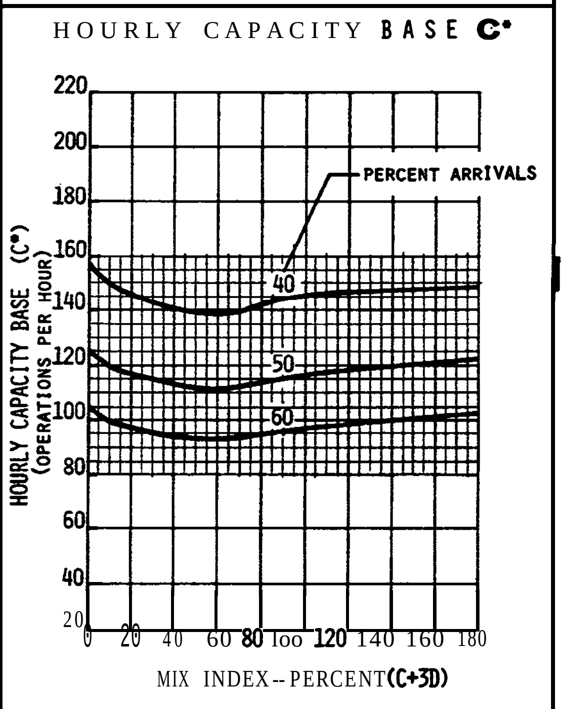
EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runway*, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.91	0.97	1.00	0.91	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.91	0.98	1.00	0.91	0.98	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	0.92	0.97	1.00	0.90	0.97	1.00	0.90	0.97	1.00

FIGURE 3-57, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 78,81,86,93,96,101 FOR IFR CONDITIONS,



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

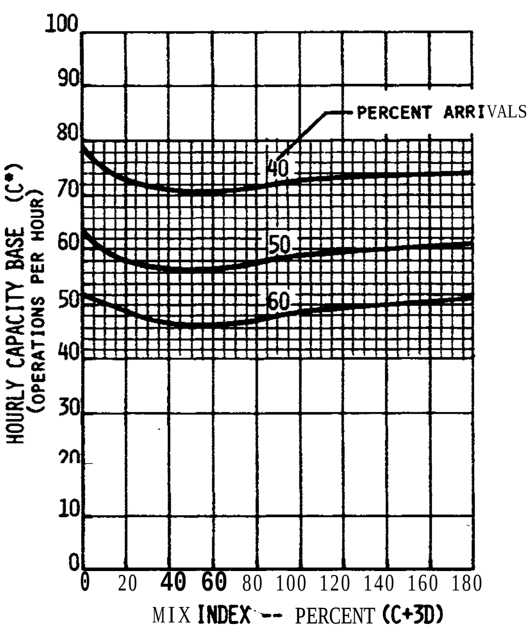
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine [illegible] number of [illegible] are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.90	0.96	0.98	0.90	0.96	0.98	0.90	0.96	0.98
51 to 80	3500 to 6500	0.91	0.97	1.00	0.91	0.97	1.00	0.91	0.97	1.00
81 to 120	5000 to 7000	0.91	0.98	1.00	0.91	0.98	1.00	0.91	0.98	1.00
121 to 180	5500 to 7500	0.92	0.97	1.00	0.90	0.97	1.00	0.90	0.97	1.00

FIGURE 3-58. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 32-35,37-42 FOR IFR CONDITIONS,

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

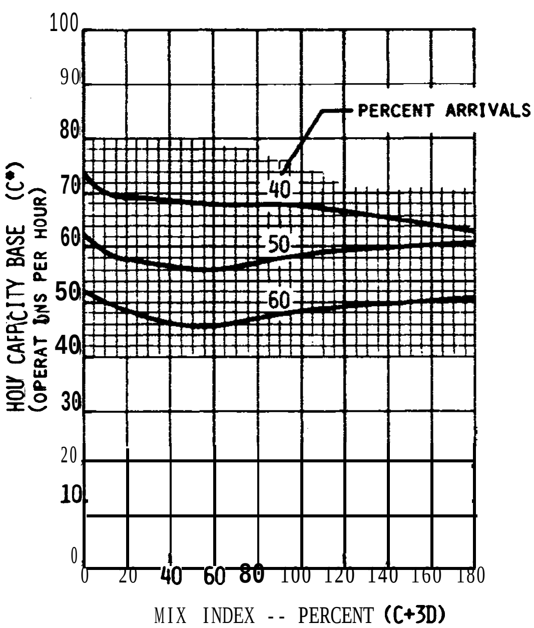
To determine Exit Factor E:

1. Determine exit range for ● pproprlate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within ● pproprlate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate nix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from thremhold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N-O	N=1	N-2 or 3	N-O	N-1	N-2 or 3	N-O	N-1	N-2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.92	0.99	1.00	0.91	0.99	1.00	0.92	1.00	1.00
51 to 80	3500 to 6500	0.91	0.98	1.00	0.90	0.97	1.00	0.92	0.99	1.00
81 to 120	5000 to 7000	0.94	0.98	1.00	0.91	0.97	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	0.95	1.00	1.00	0.92	0.99	1.00	0.91	0.99	1.00

FIGURE 3-59. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 43,49,55 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

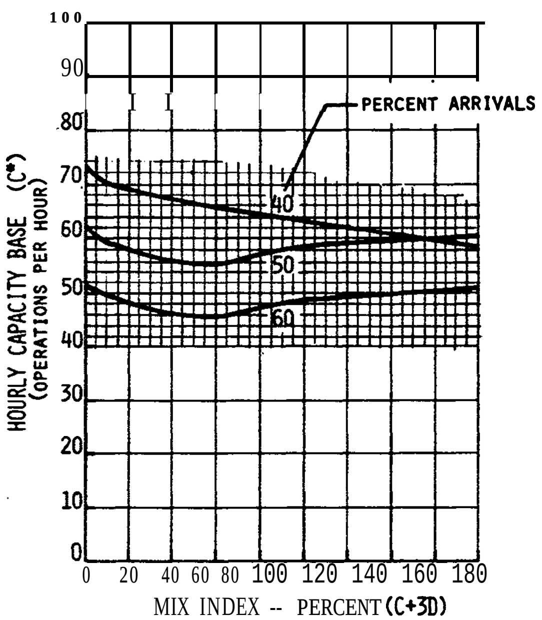
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runvaya, determine the average number of exits(N) which are: (a) within appropriate exit ranqt, and (b) separated by at
3. least If N is 750 more feet Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrival8			50% Arrival8			60% Arrivals		
		N=0	N=1	N-2 or 3	N-O	N=1	N-2 or 3	N-0	N=1	N-2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00
21 to so	3000 to 5500	0.92	0.99	1.00	0.91	0.99	1.00	0.92	1.00	1.00
51 to 80	3500 to 6500	0.91	0.98	1.00	0.90	0.97	1.00	0.92	0.99	1.00
81 to 120	5000 to 7000	0.94	0.98	1.00	0.91	0.97	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	0.95	1.00	1.00	0.92	0.99	1.00	0.9:	0.99	1.00

FIGURE 3-60. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 44,50,56 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

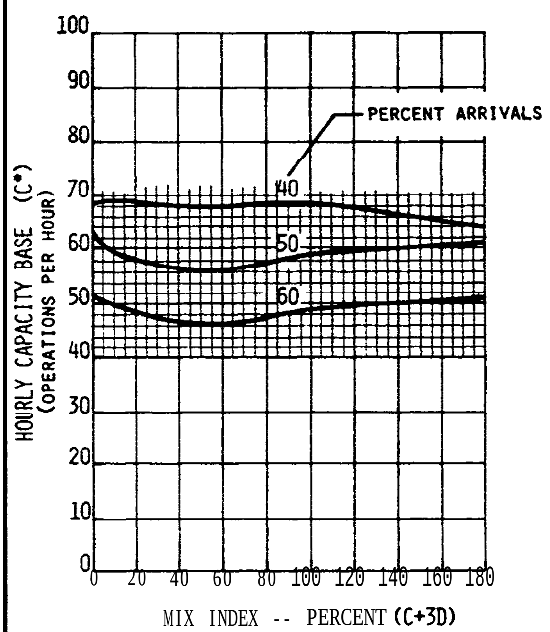
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.96	1.00	1.00	0.92	0.99	1.00	0.93	1.00	1.00
51 to 80	3500 to 6500	0.93	1.00	1.00	0.90	0.97	1.00	0.90	0.98	1.00
81 to 120	5000 to 7000	0.99	1.00	1.00	0.91	0.97	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	0.92	0.99	1.00	0.92	0.99	1.00

FIGURE. 3-61, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 45,51,57 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

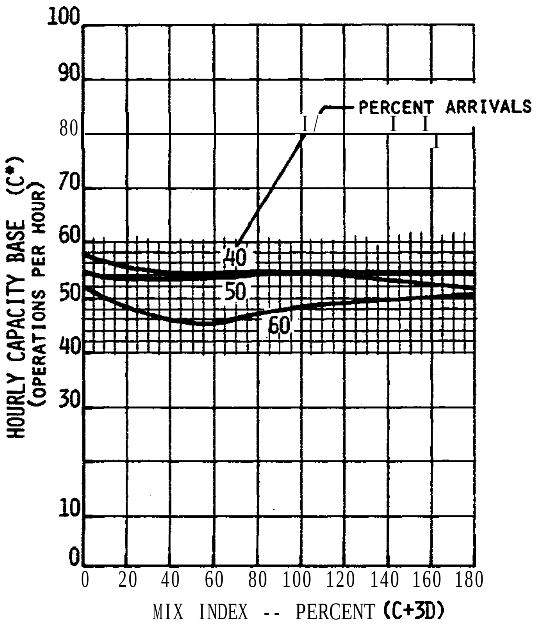
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.94	0.95	1.00	0.99	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.95	0.98	1.00	0.93	0.99	1.00	0.93	1.00	1.00
51 to 80	3500 to 6500	0.92	0.97	1.00	0.90	0.97	1.00	0.90	0.98	1.00
81 to 120	5000 to 7000	0.96	0.98	1.00	0.91	0.97	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	0.98	1.00	1.00	0.92	0.99	1.00	0.92	0.99	1.00

FIGURE 3-62. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 46,52,58 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

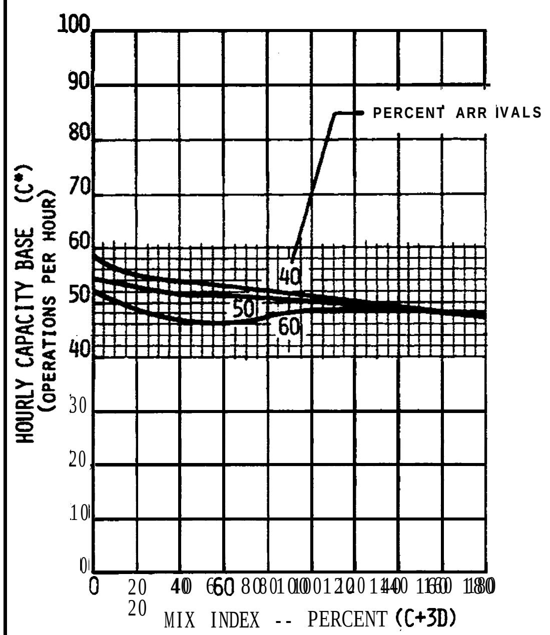
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	1.00	1.00	1.00	0.97	1.00	1.00	0.91	1.00	1.00
51 to 80	3500 to 6500	1.00	1.00	1.00	0.94	1.00	1.00	0.92	0.99	1.00
81 to 120	5000 to 7000	1.00	1.00	1.00	0.98	1.00	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.99	1.00

FIGURE 3-63. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 47,59 FOR IFR CONDITIONS.

HOURLY-CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

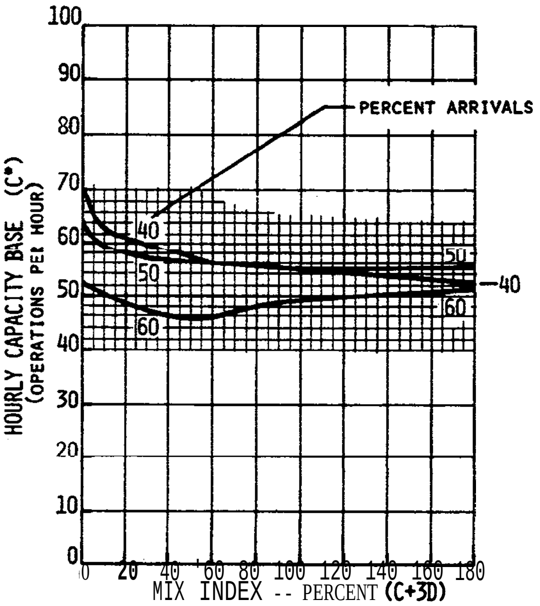
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index-- Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E: 40% Arrivals N=0	N=1	N=2 or 3	50% Arrivals N=0	N=1	N=2 or 3	60% Arrivals N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	1.00	1.00	1.00	0.97	1.00	1.00	0.91	1.00	1.00
51 to 80	3500 to 6500	1.00	1.00	1.00	0.94	1.00	1.00	0.92	0.99	1.00
81 to 120	5000 to 7000	1.00	1.00	1.00	0.98	1.00	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.99	1.00

FIGURE 3-64. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 48,60 FOR IFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.81	0.91	0.96	0.83	0.95	0.99	0.92	1.00	1.00
21 to 50	3000 to 5500	0.79	0.86	0.92	0.77	0.85	0.92	0.89	0.98	1.00
51 to 80	3500 to 6500	0.81	0.87	0.93	0.77	0.83	0.91	0.90	0.98	1.00
81 to 120	5000 to 7000	1.00	1.00	1.00	0.98	1.00	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.99	1.00

FIGURE 3-55. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 53 FOR IFR CONDITIONS.

FIGURE 3-56A RUNWAY OPERATIONS RATE
0 TO 35 OPERATIONS PER HOUR

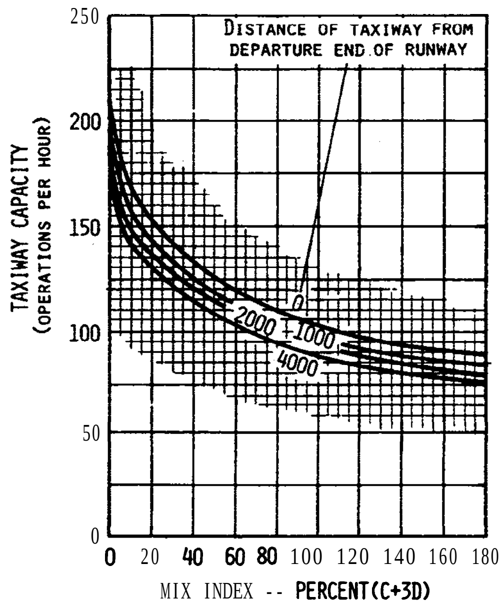


FIGURE 3-56B RUNWAY OPERATIONS RATE
36 TO 55 OPERATIONS PER HOUR

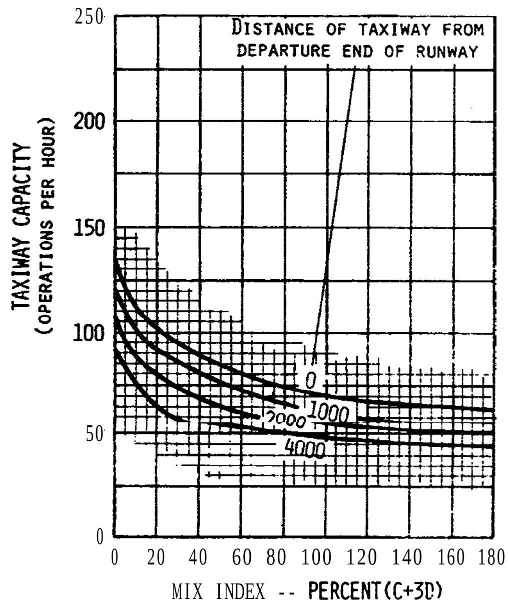


FIGURE 3-56C RUNWAY OPERATIONS RATE
56 TO 75 OPERATIONS PER HOUR

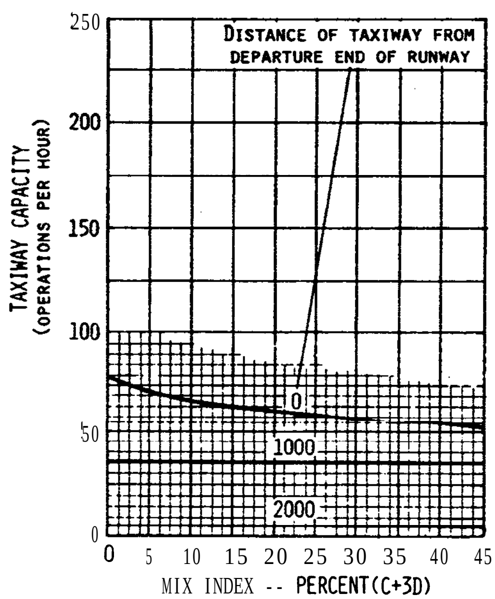


FIGURE 3-56D RUNWAY OPERATIONS RATE
76 TO 95 OPERATIONS PER HOUR

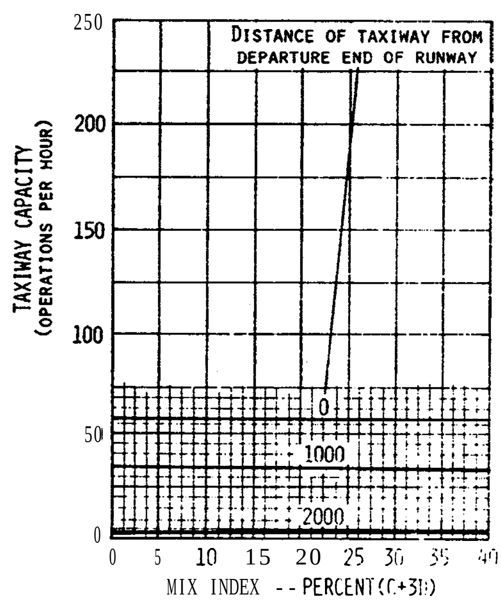


FIGURE 3-56. HOURLY CAPACITY OF A TAXIWAY CROSSING AN ACTIVE RUNWAY WITH ARRIVALS ONLY OR WITH MIXED OPERATIONS

FIGURE 3-57A RUNWAY OPERATIONS RATE
0 TO 35 OPERATIONS PER HOUR

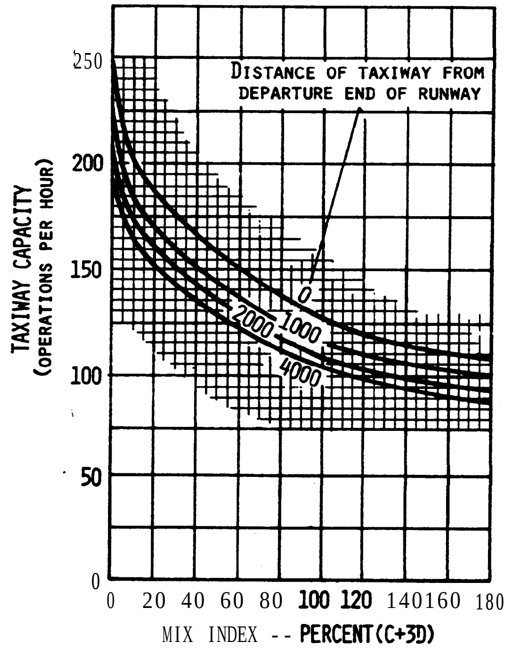


FIGURE 3-57B RUNWAY OPERATIONS RATE
36 TO 55 OPERATIONS PER HOUR

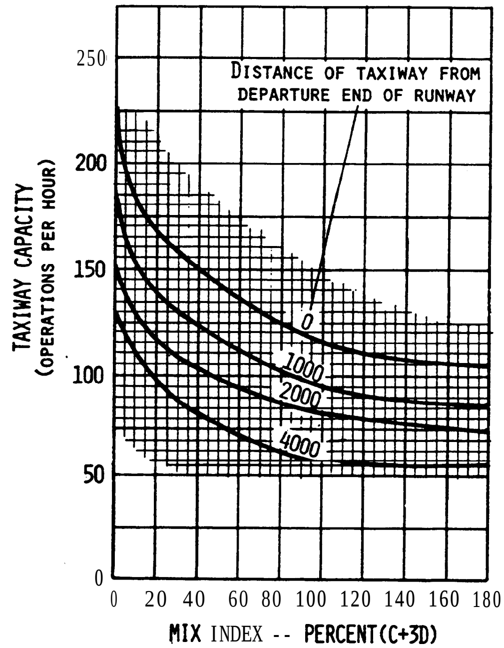


FIGURE 3-57C RUNWAY OPERATIONS RATE
56 TO 75 OPERATIONS PER HOUR

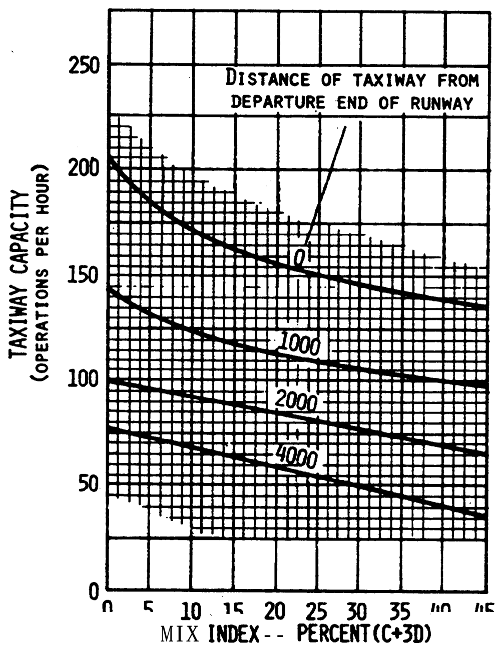


FIGURE 3-57D RUNWAY OPERATIONS RATE
76 TO 95 OPERATIONS PER HOUR

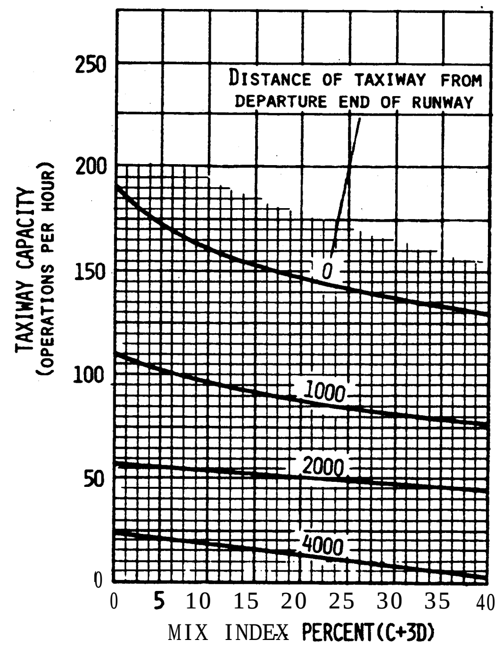


FIGURE 3-57. HOURLY CAPACITY OF A TAXIWAY CROSSING AN ACTIVE RUNWAY WITHOUT ARRIVALS.

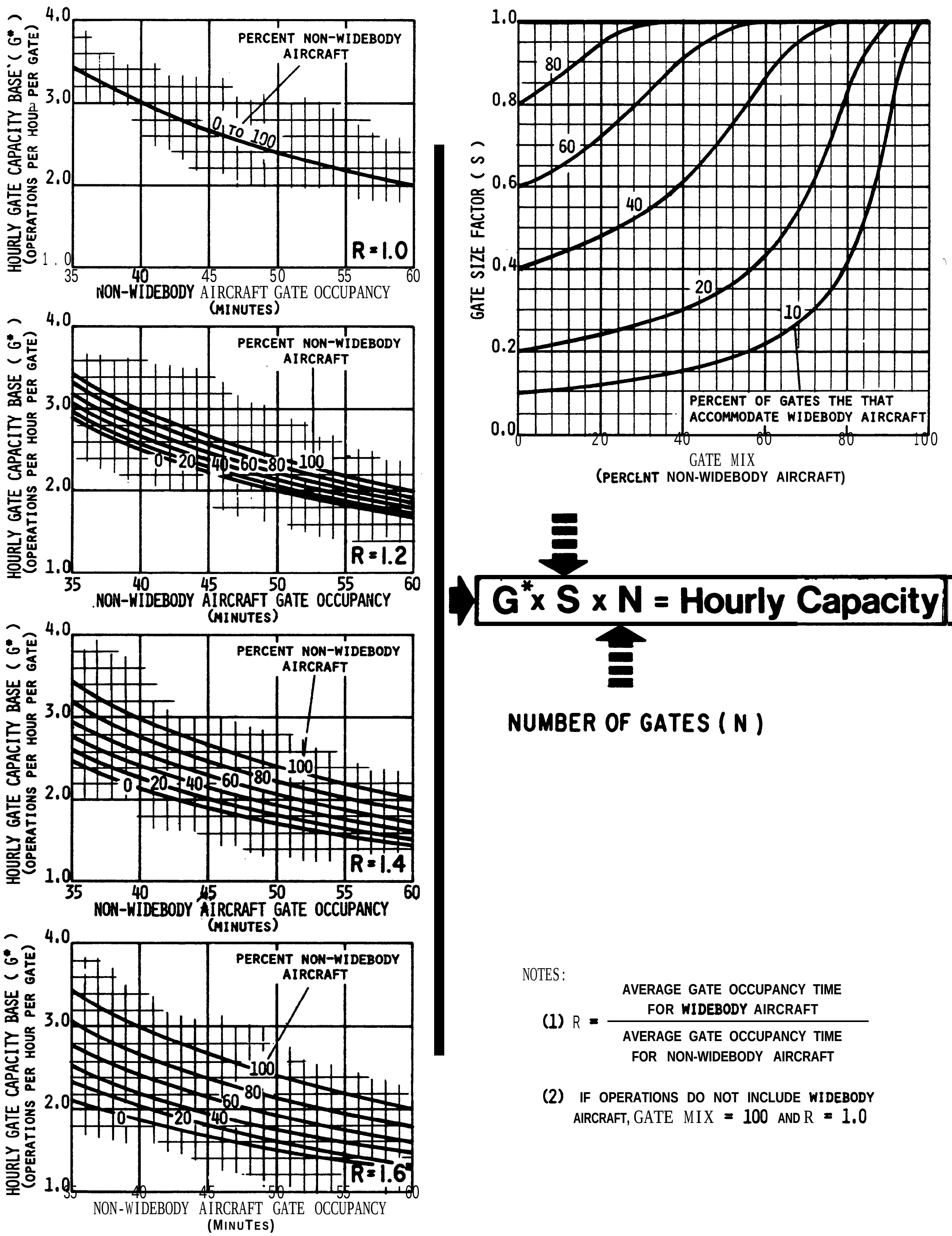


FIGURE 3-58. HOURLY CAPACITY OF GATES.

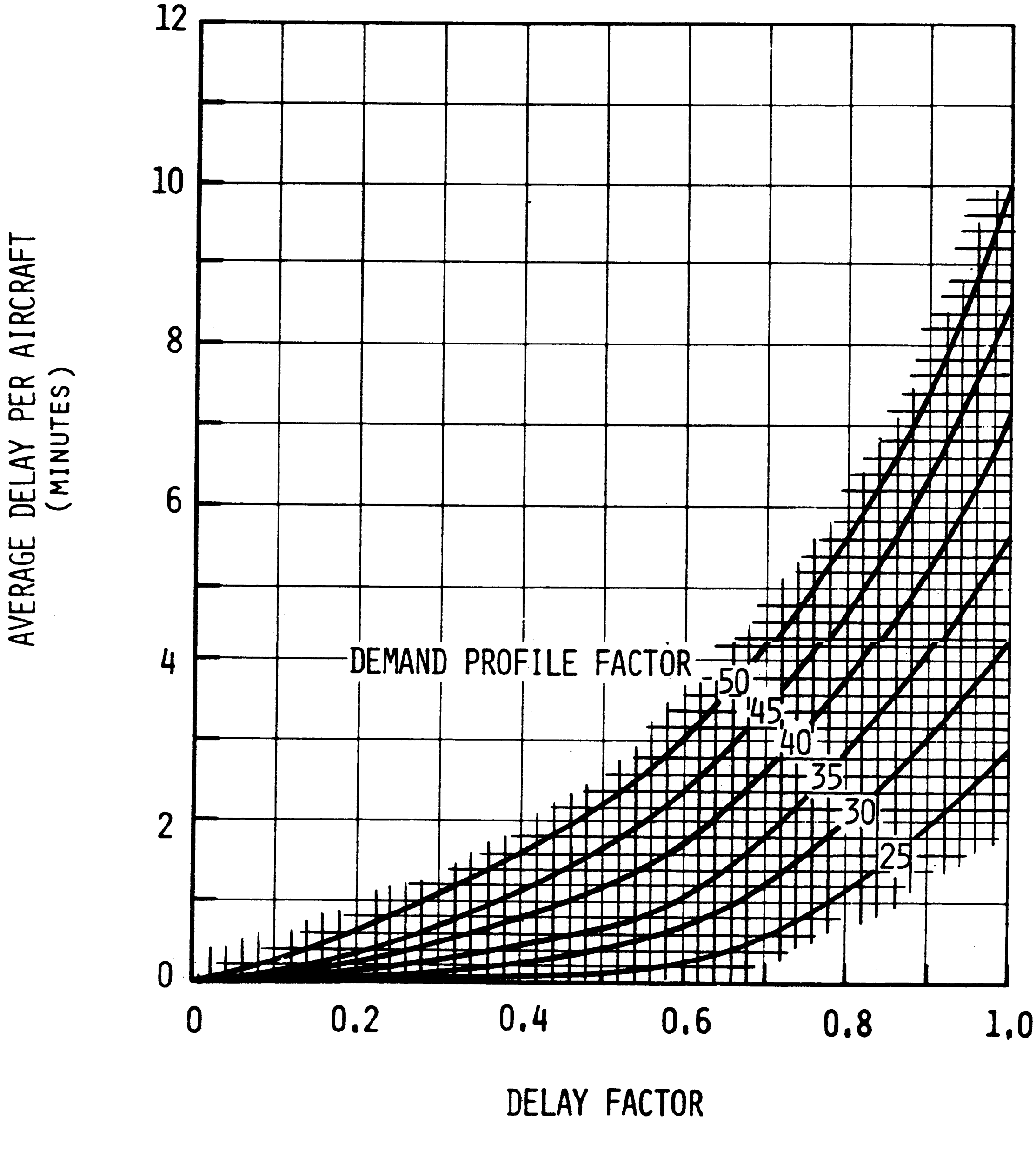
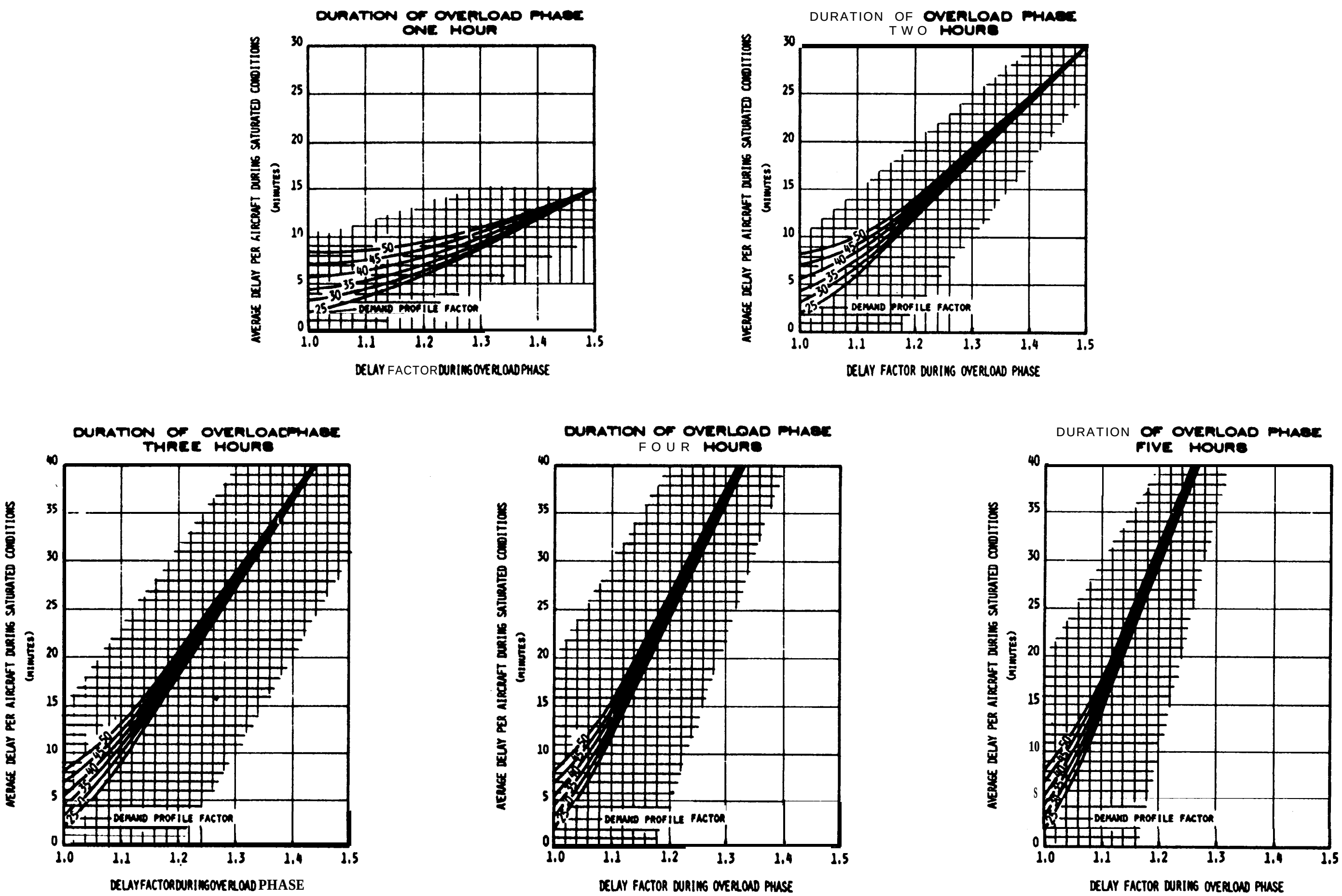


FIGURE 3-69. AVERAGE AIRCRAFT DELAY IN AN HOUR.



(NOTE: FOR DISCUSSION AND EXAMPLES OF THE TERMS "OVERLOAD PHASE" AND "SATURATED PERIODS", SEE PARAGRAPH 28.C ON PAGE 59.)

FIGURE 3-70. AVERAGE AIRCRAFT DELAY DURING SATURATED CONDITIONS.

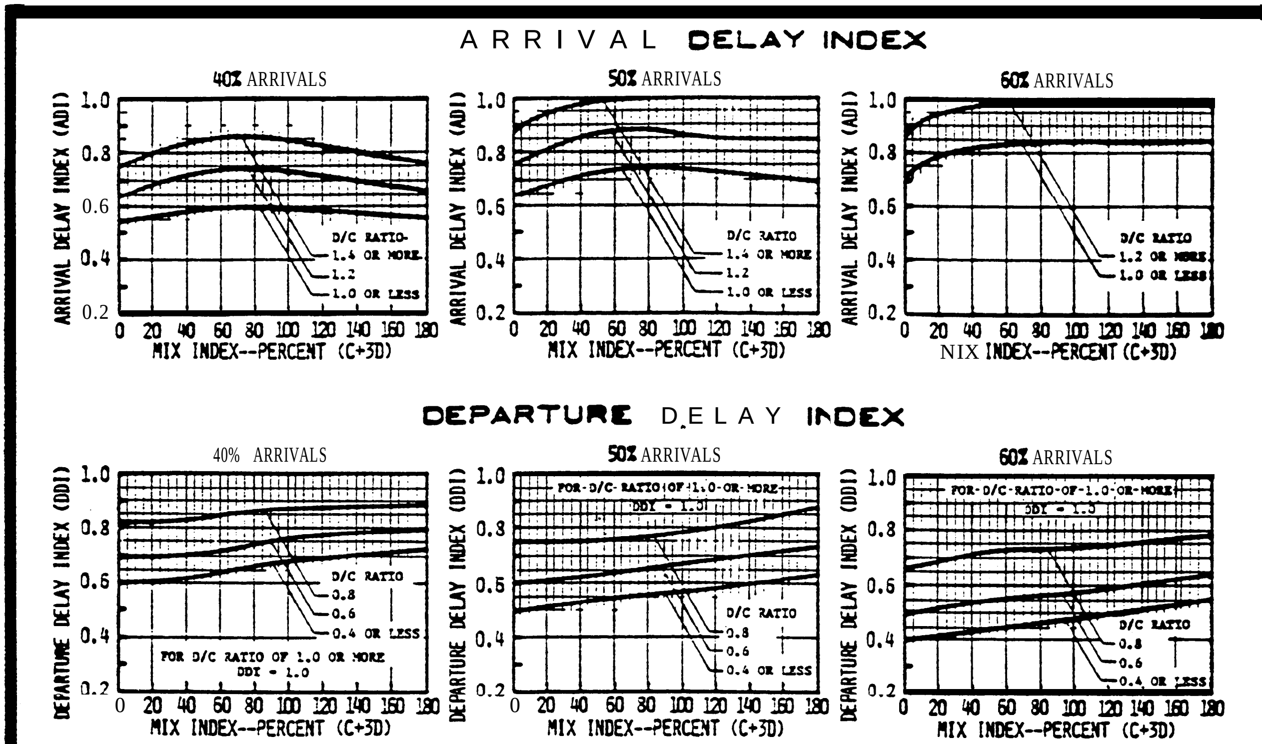


FIGURE 3-71. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 1, 9, 11, 12, 31, 42, 47, 48, 53, 54, 66, 68.70.71 FOR VFR CONDITIONS.

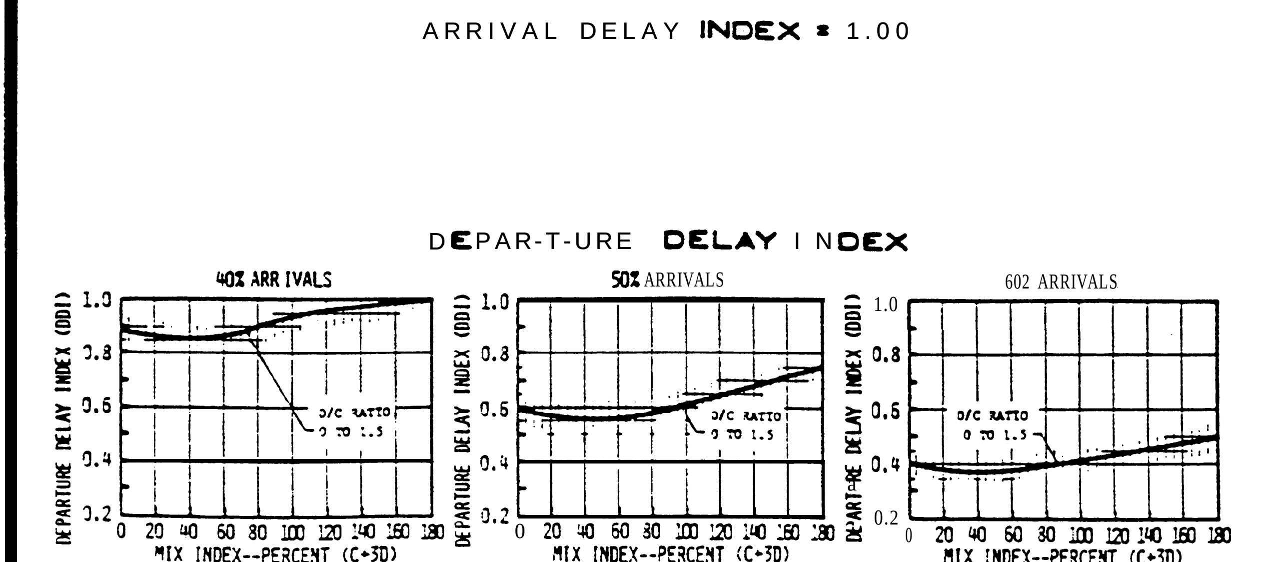


FIGURE 3-72. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 2, 32, 33, 67, 72, 73, 87, 88 FOR VFR CONDITIONS.

ARRIVAL DELAY INDEX = 1.00

DEPARTURE DELAY INDEX

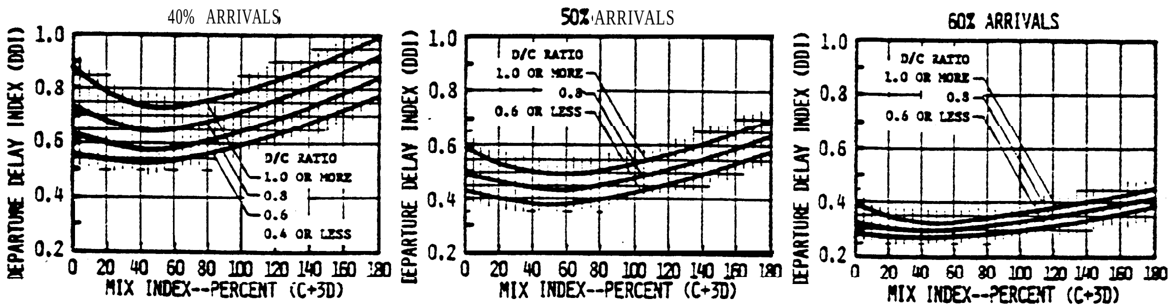


FIGURE 3-73. DELAY INDICES FOR RUNWAY-USE DIAGRAM NO. 3 FOR VFR CONDITIONS.

ARRIVAL DELAY INDEX = 1.00

DEPARTURE DELAY INDEX

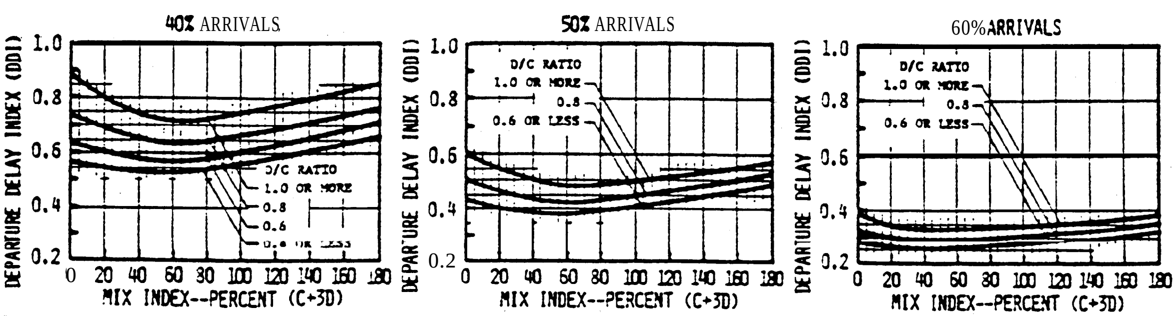


FIGURE 3-74. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 4, 74, 75, 85, 86, 89, 90, 100, 101 FOR VFR CONDITIONS.

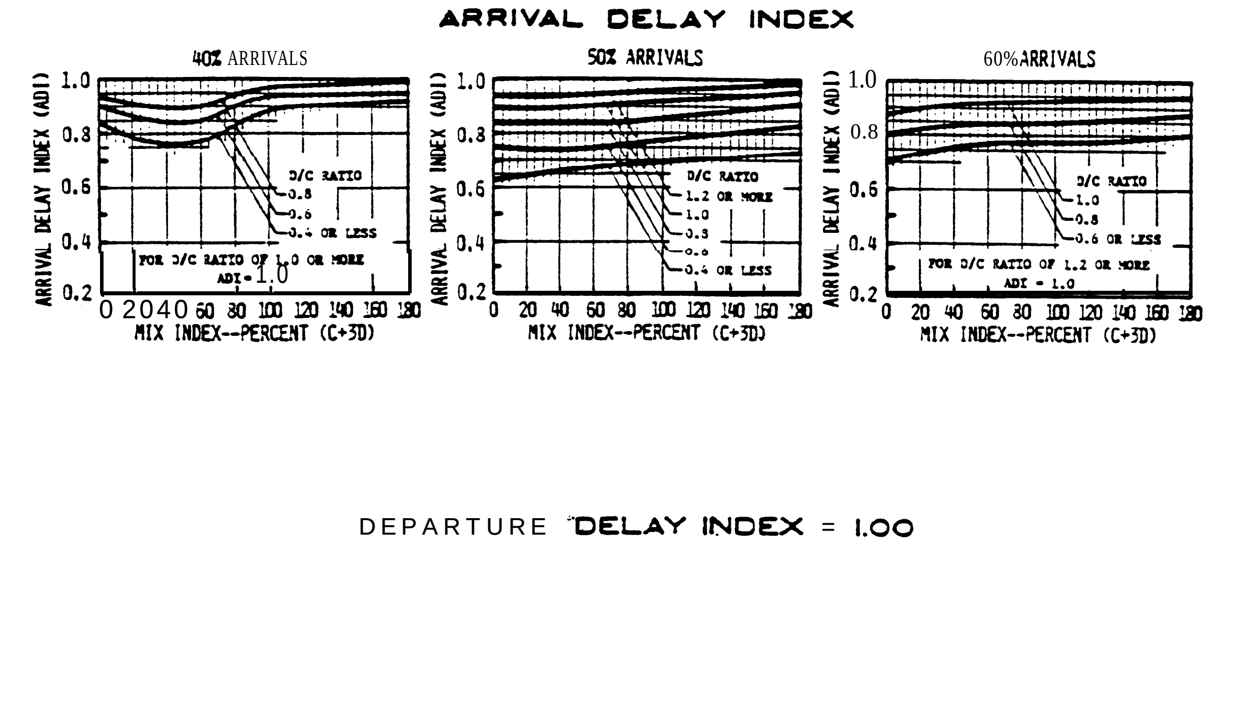


FIGURE 3-75. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 5, 7, 76, 91 FOR VFR CONDITIONS.

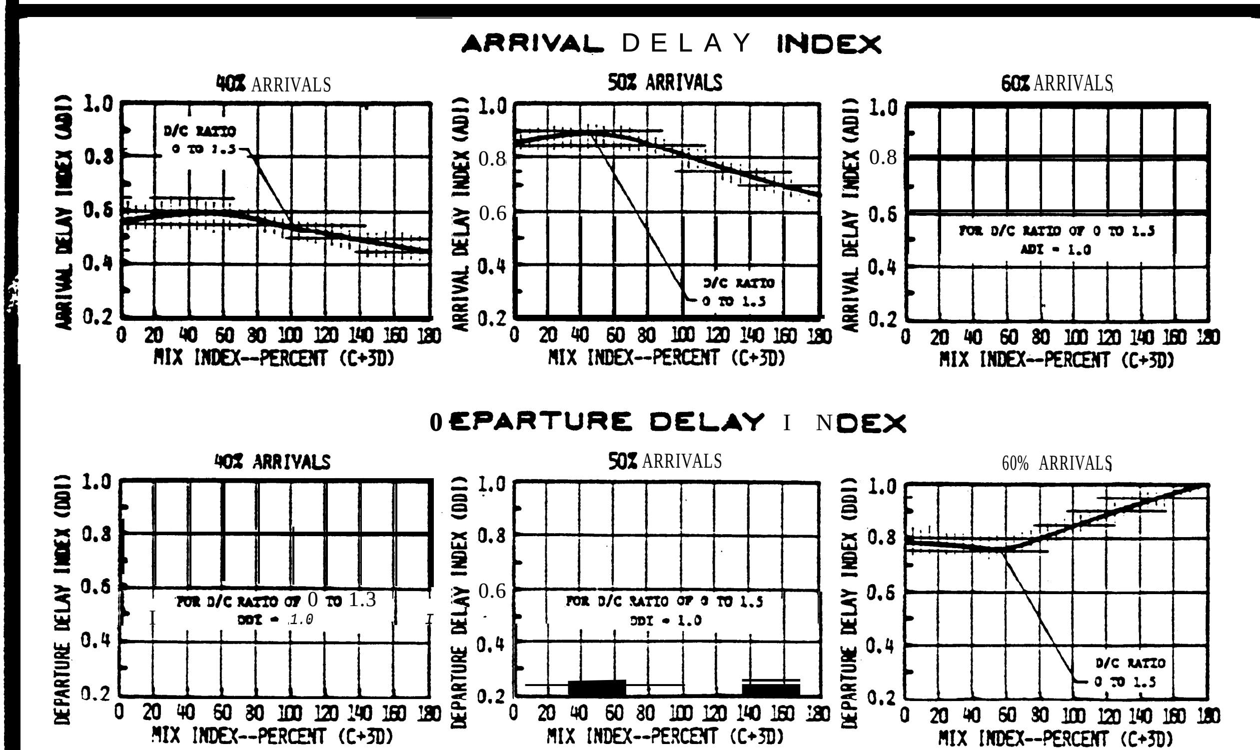


FIGURE 3-76. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 13, 15 FOR VFR CONDITIONS.

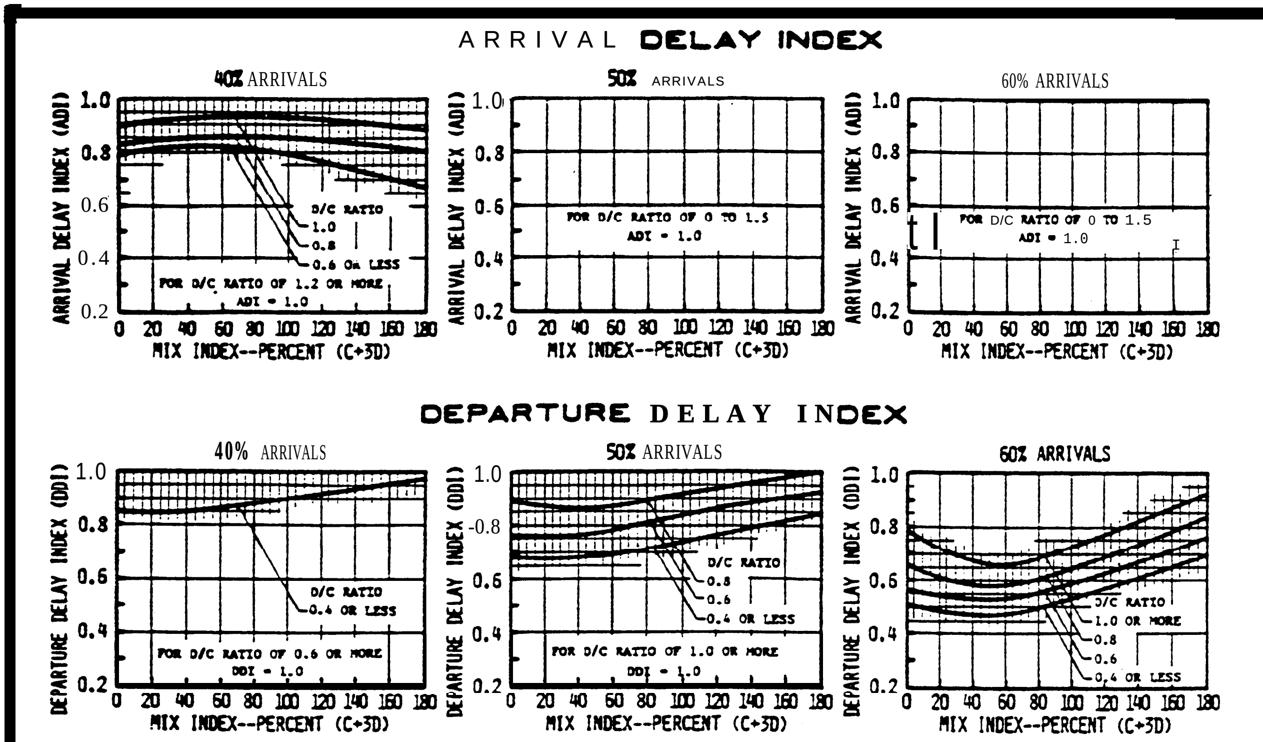


FIGURE 3-77. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 16, 79, 94 FOR VFR CONDITIONS.

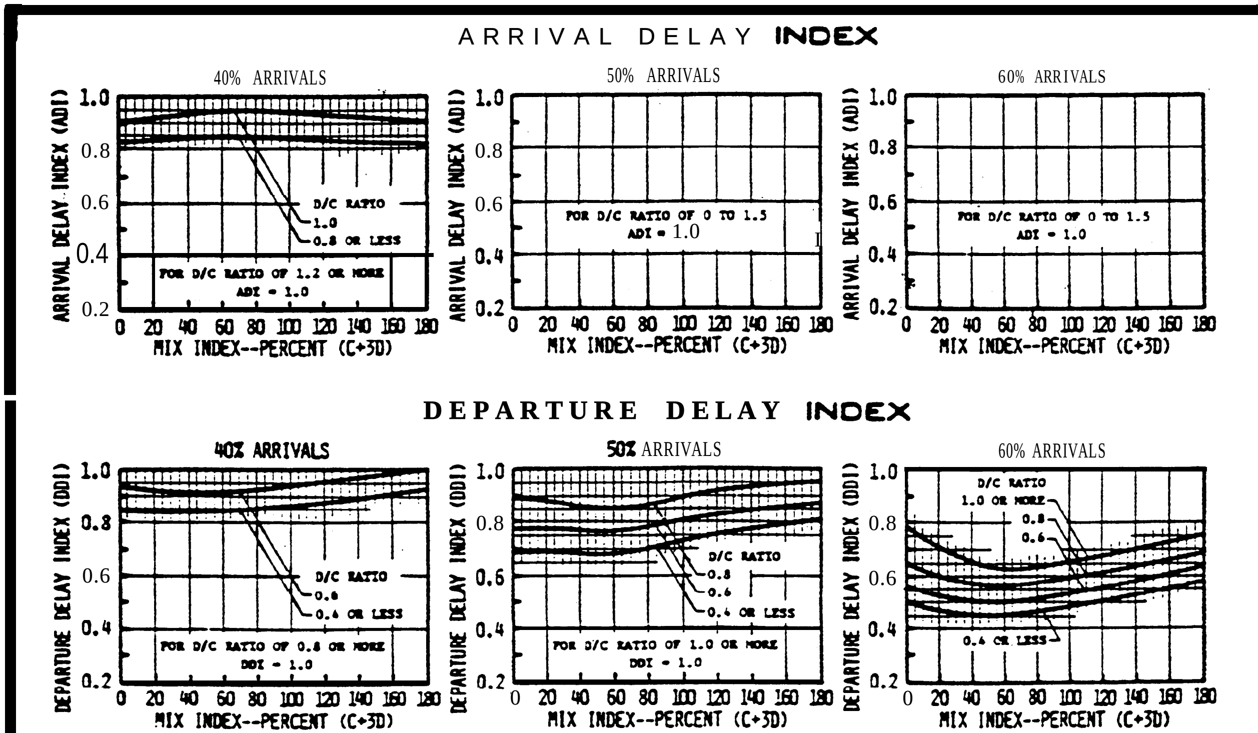


FIGURE 3-78. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 18, 19, 21, 22, 23, 77, 78, 92, 93 FOR VFR CONDITIONS.

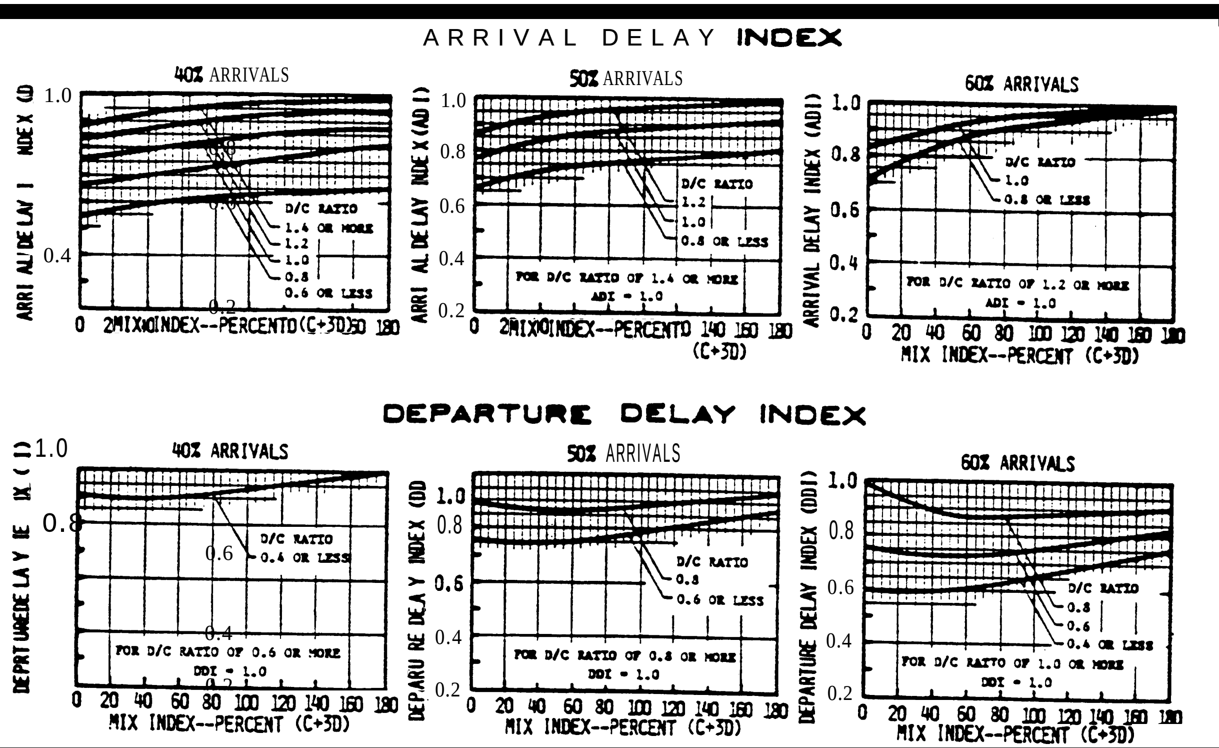


FIGURE 3-79. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 24, 27 FOR VFR CONDITIONS.

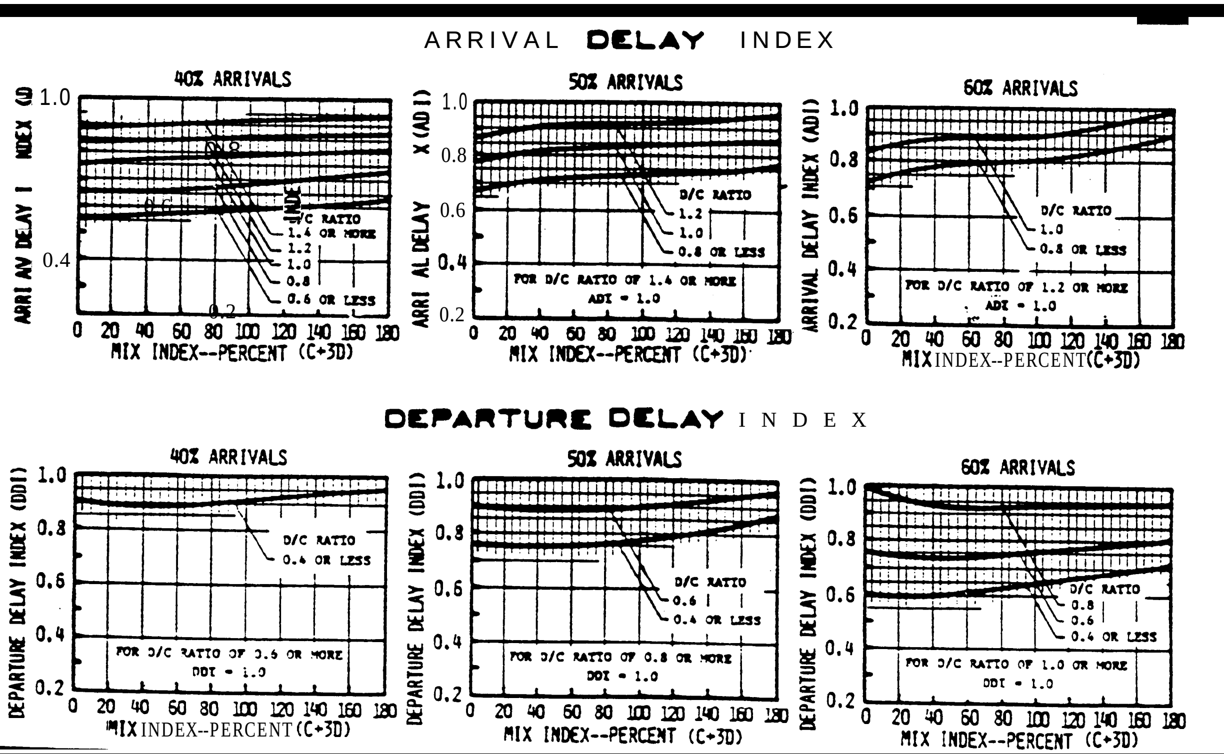


FIGURE 3-80. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 26, 28, 41, 82, 97 FOR VFR CONDITIONS.

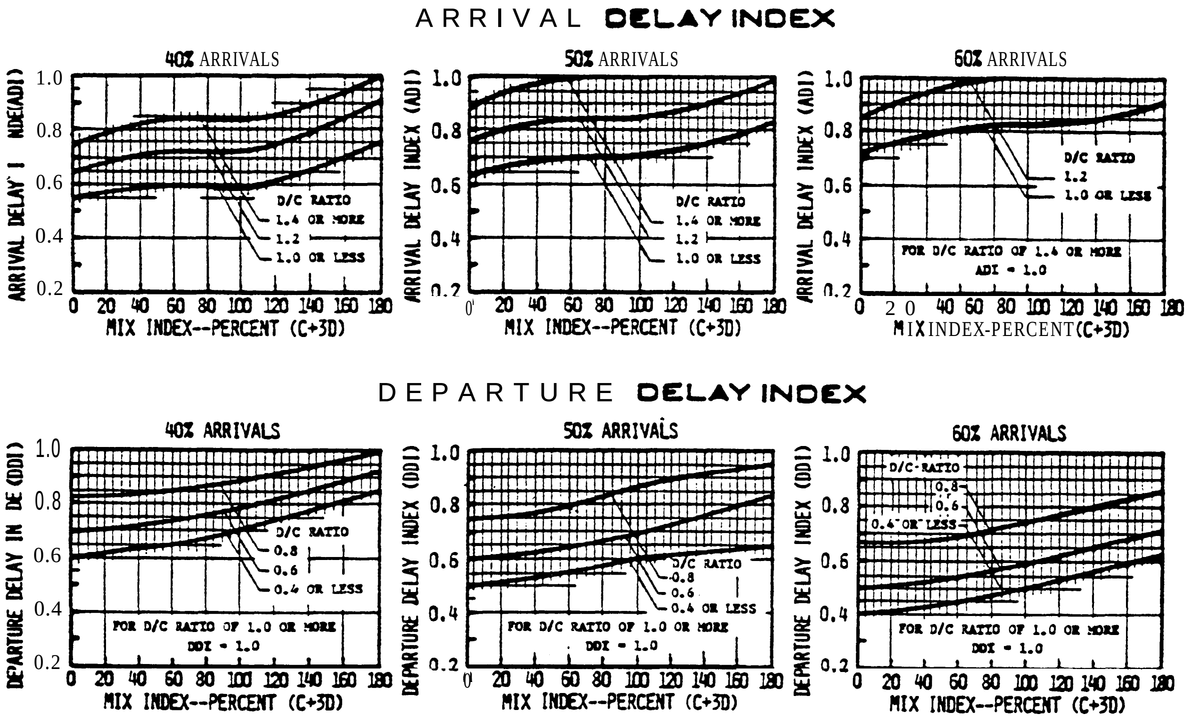


FIGURE 3-81. DELAY INDICES FOR RUNWAY-USE DIAGRAM NO. 29 FOR VFR CONDITIONS.

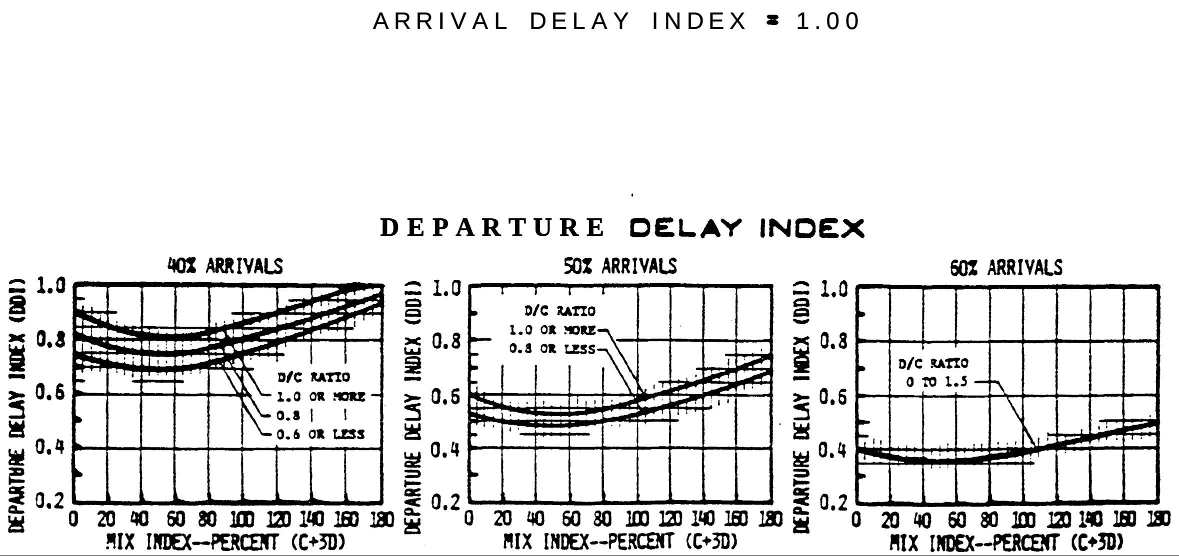


FIGURE 3-82. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 34, 35 FOR VFR CONDITIONS.

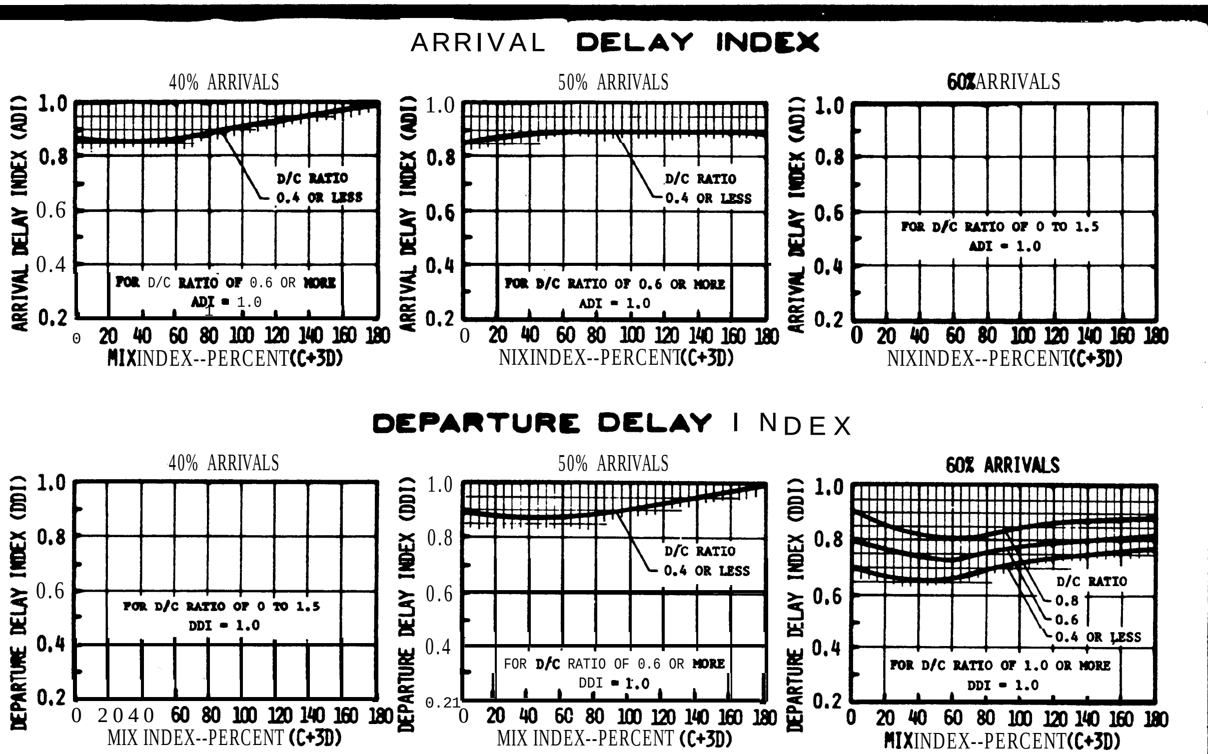


FIGURE 3-83, DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 36-38 FOR VFR CONDITIONS.

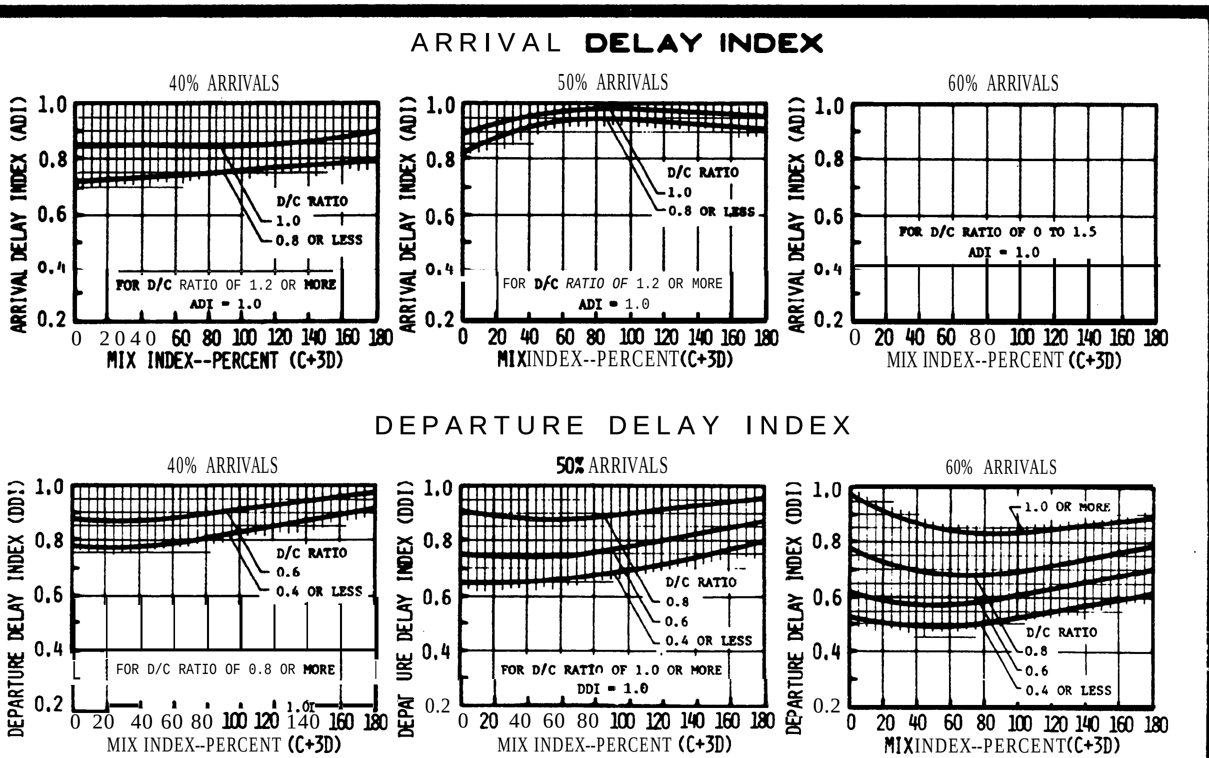


FIGURE 3-84, DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 39,40 FOR VFK CONDITIONS,

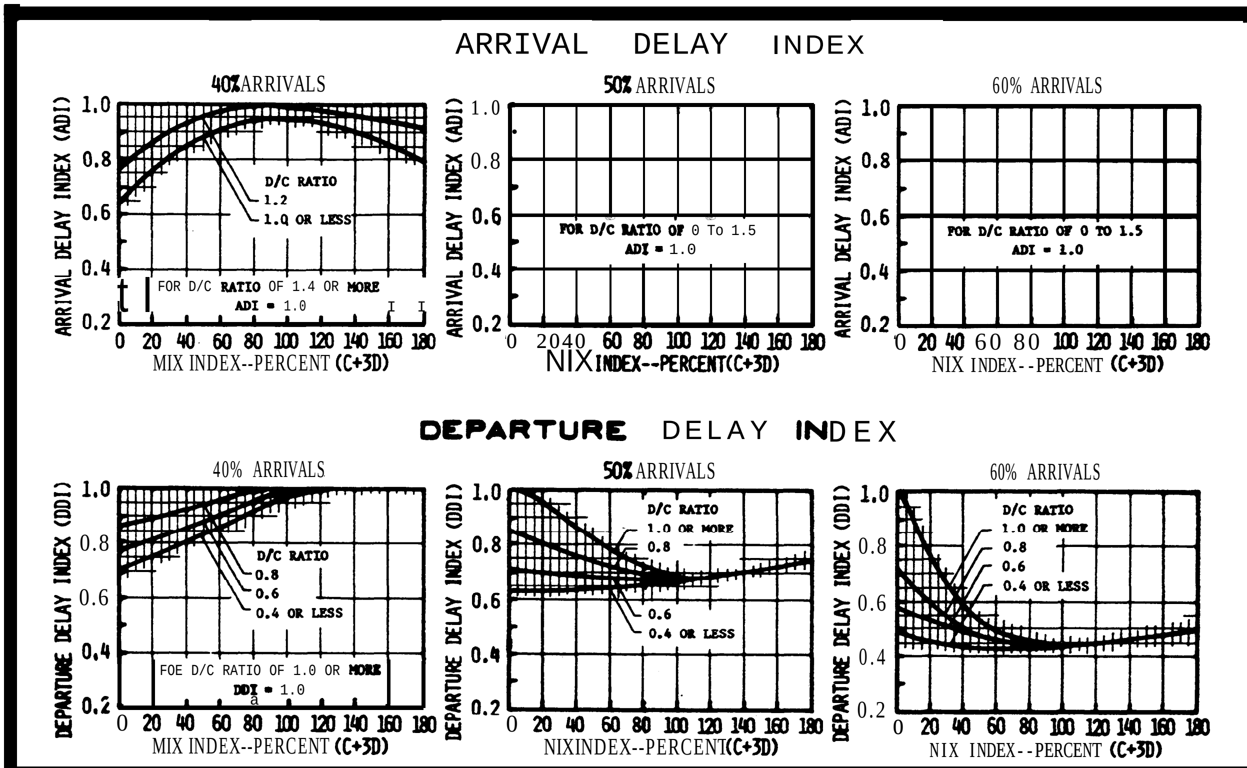


FIGURE 3-85. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 43,49,55,61 FOR VFR CONDITIONS.

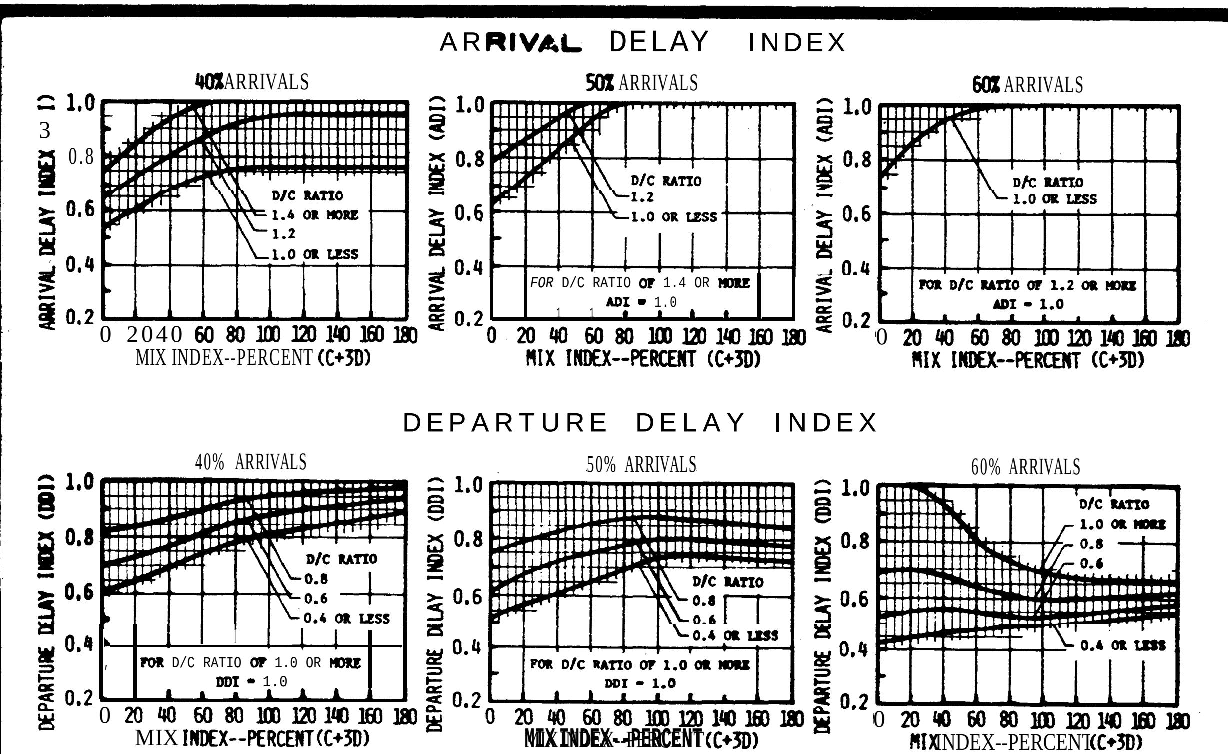


FIGURE 3-86. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 44-46,50-52,56-58,62-64 FOR VFR CONDITIONS.

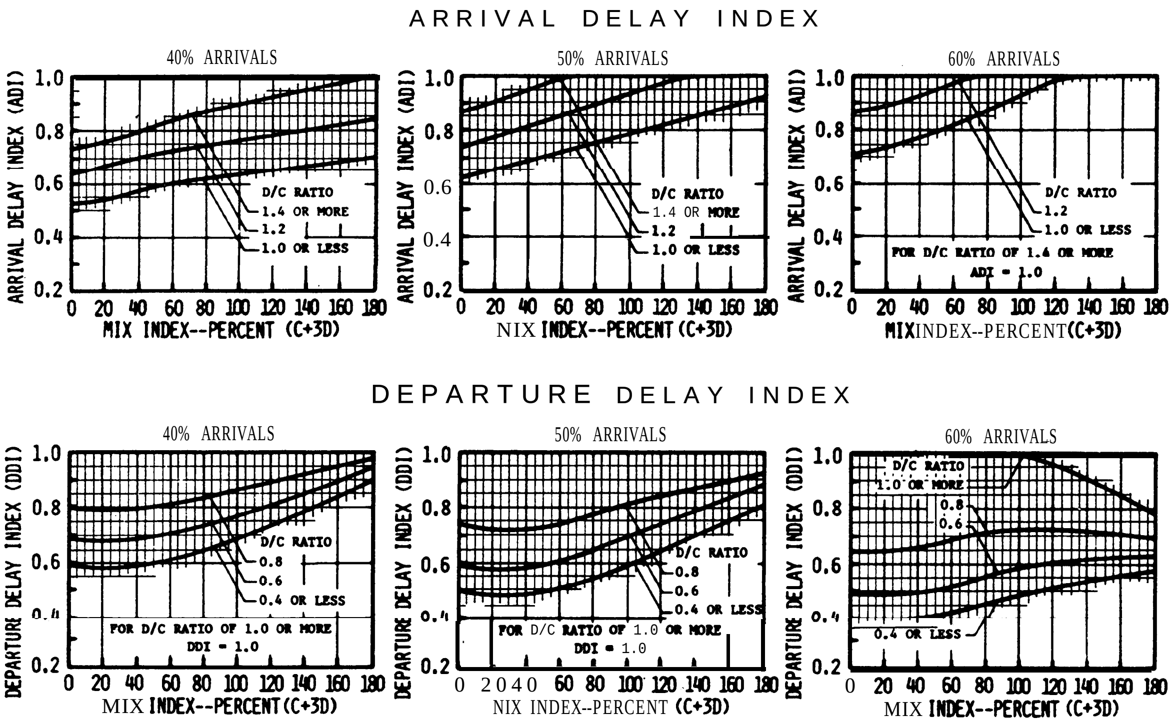


FIGURE 3-87, DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 59,60,65 FOR VFR CONDITIONS,

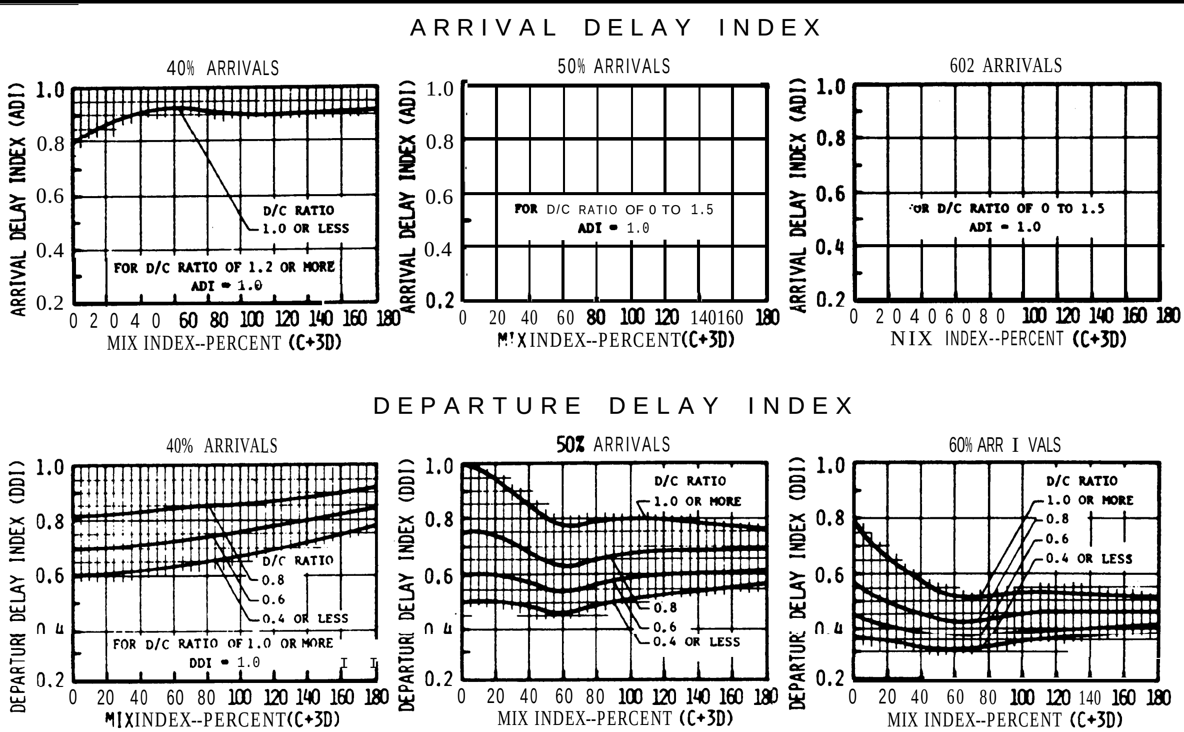


FIGURE 3-88. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 80,81,95, FOR VFR CONDITIONS,

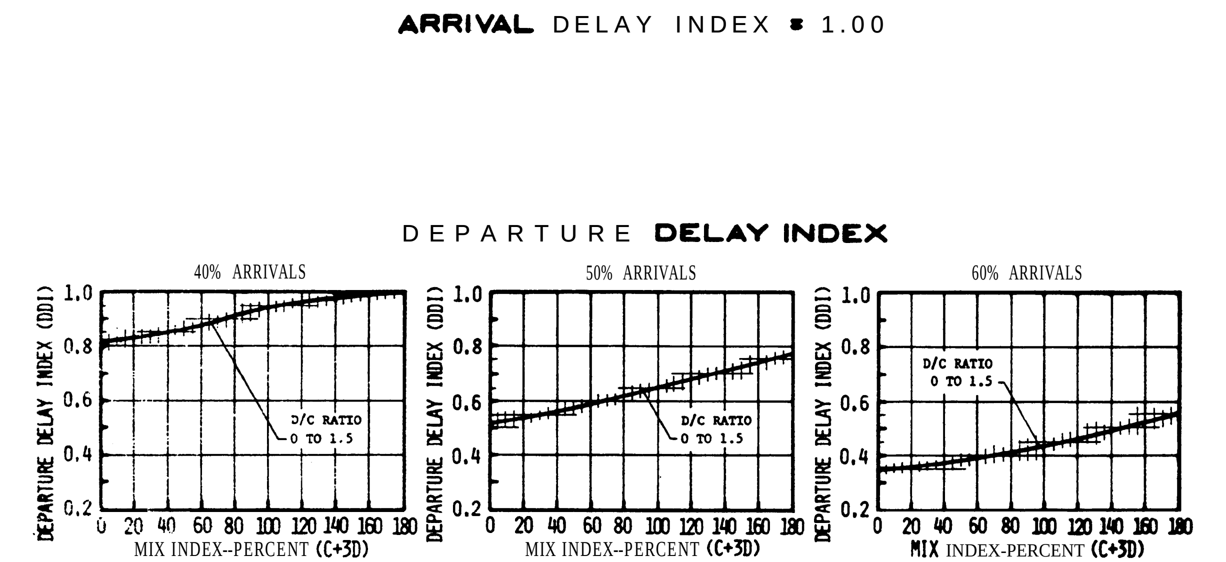


FIGURE 3-89. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 83,84,98,99,102 FOR VFR CONDITIONS.

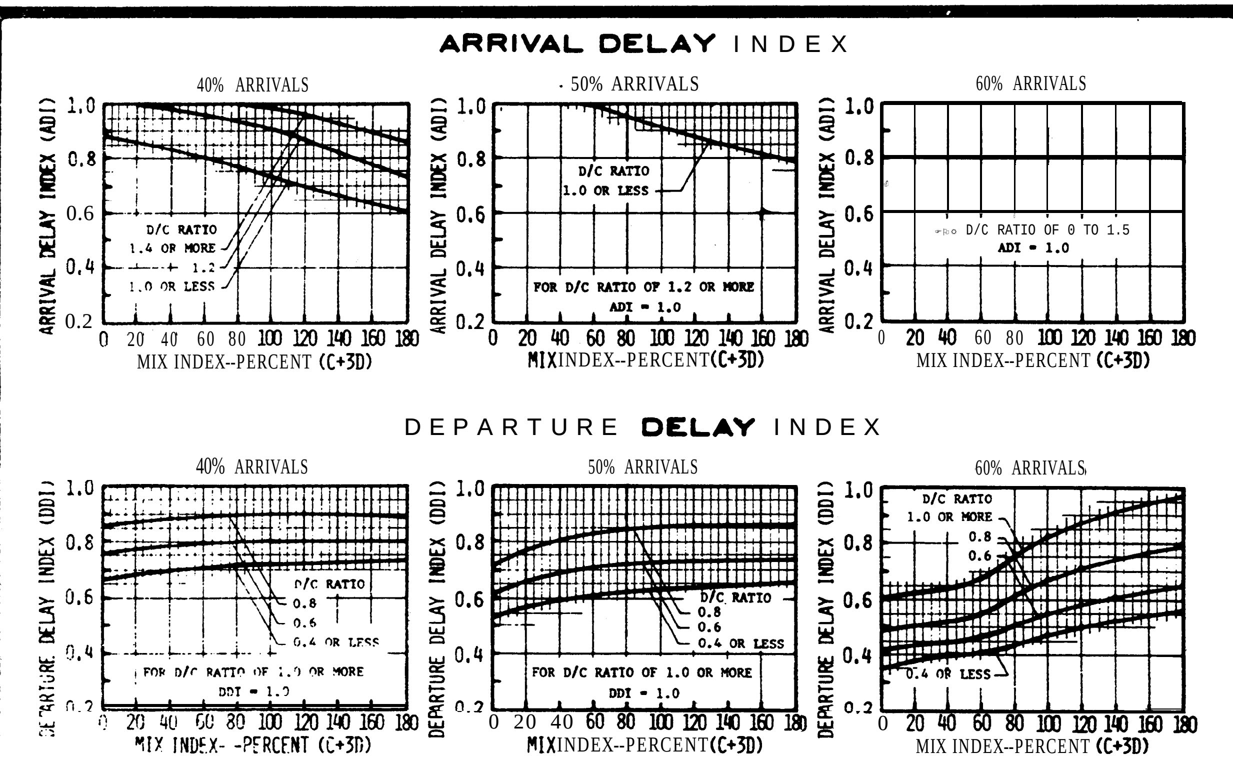


FIGURE 3-90. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 1,53,54 FOR IFR CONDITIONS.

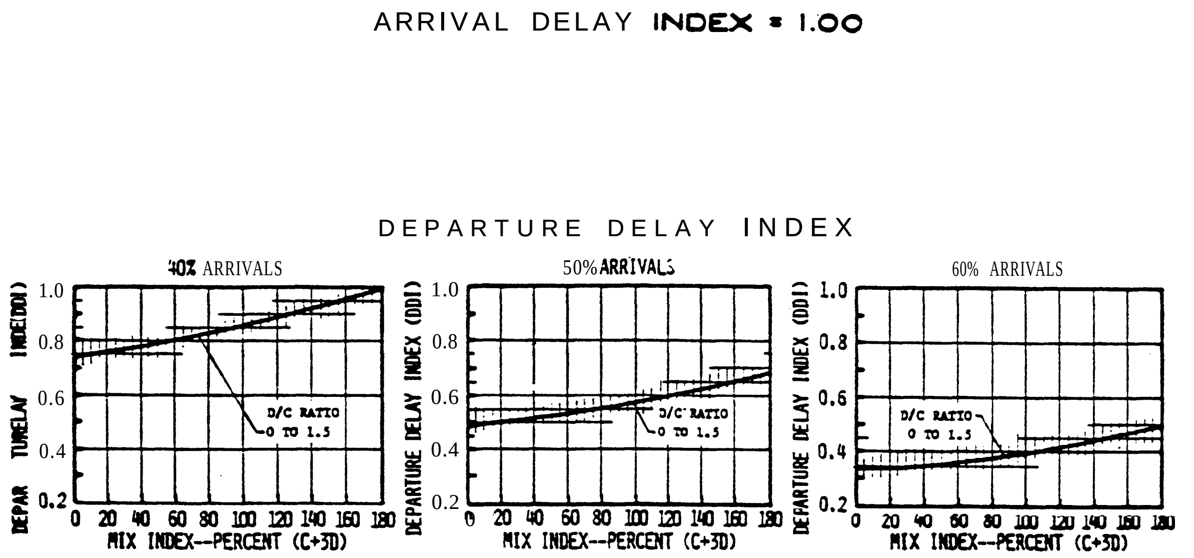


FIGURE 3-91. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 2, 3, 5, 9, 32 - 3537 - 43, 49, 55, 61 - 68, 72 - 74, 76, 77, 79, 80, 82 - 85, 87 - 89, 91, 92, 94, 95, 97 - 100, 102 FOR IFR CONDITIONS.

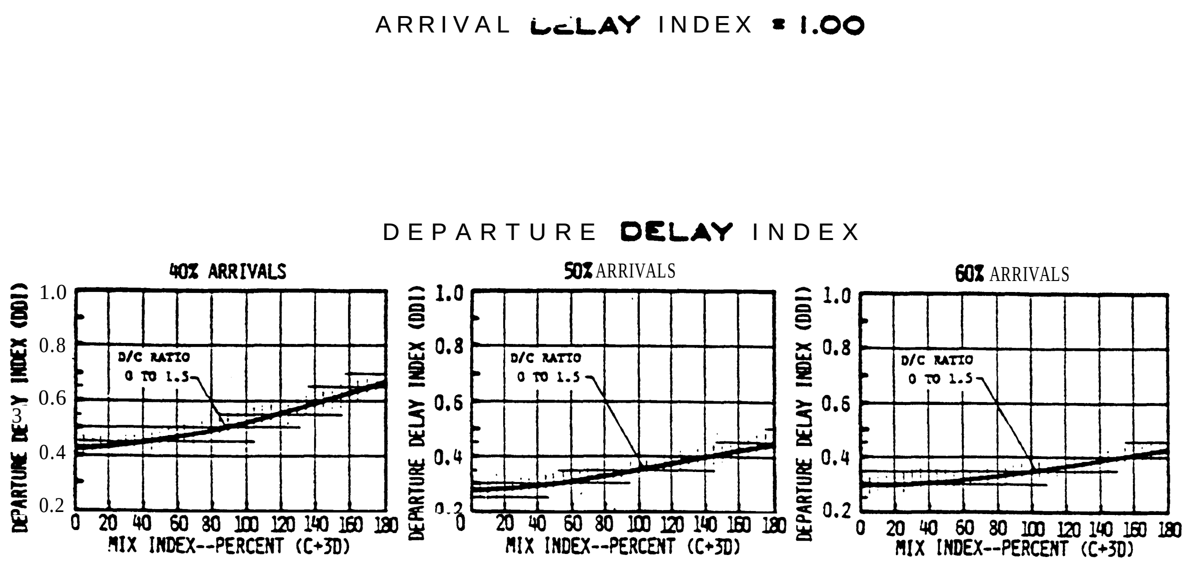


FIGURE 3-92. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 4, 75, 90 FOR IFR CONDITIONS.

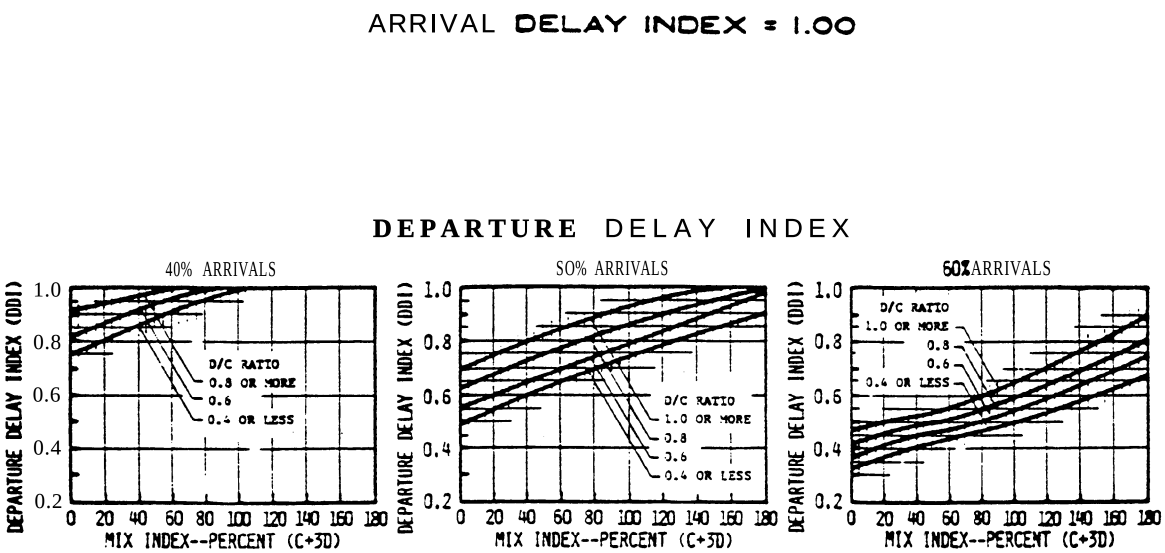


FIGURE 3-93. DELAY INDICES FOR RUNWAY-USE DIAGRAM NO. 7 FOR IFR CONDITIONS.

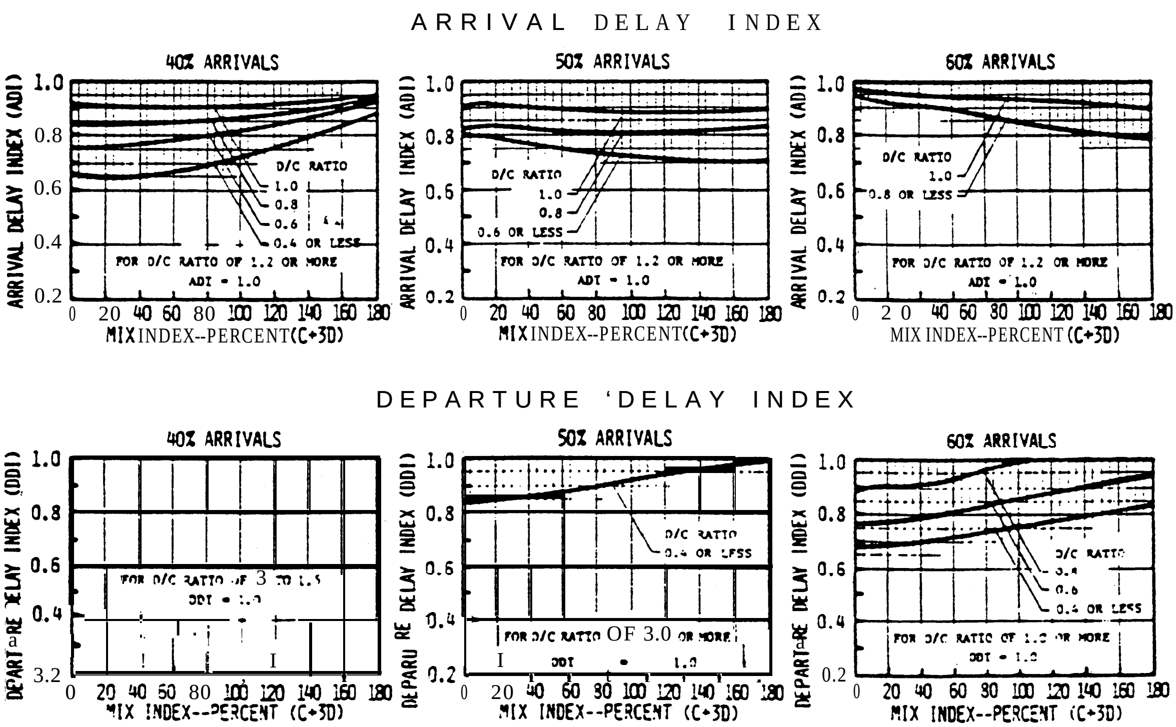


FIGURE 3-94. DELAY INDICES FOR RUNWAY&SE DIAGRAM NO. 8 FOR IFR CONDITIONS.

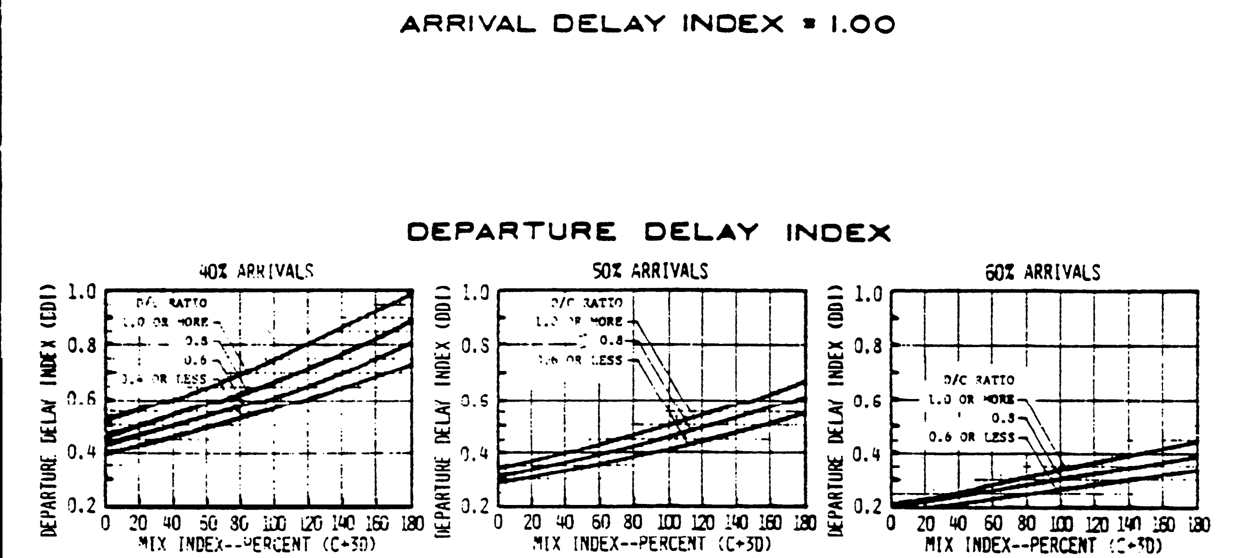


FIGURE 3-95. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS. 11, 21, 29, 70, 71 FOR IFR CONDITIONS.

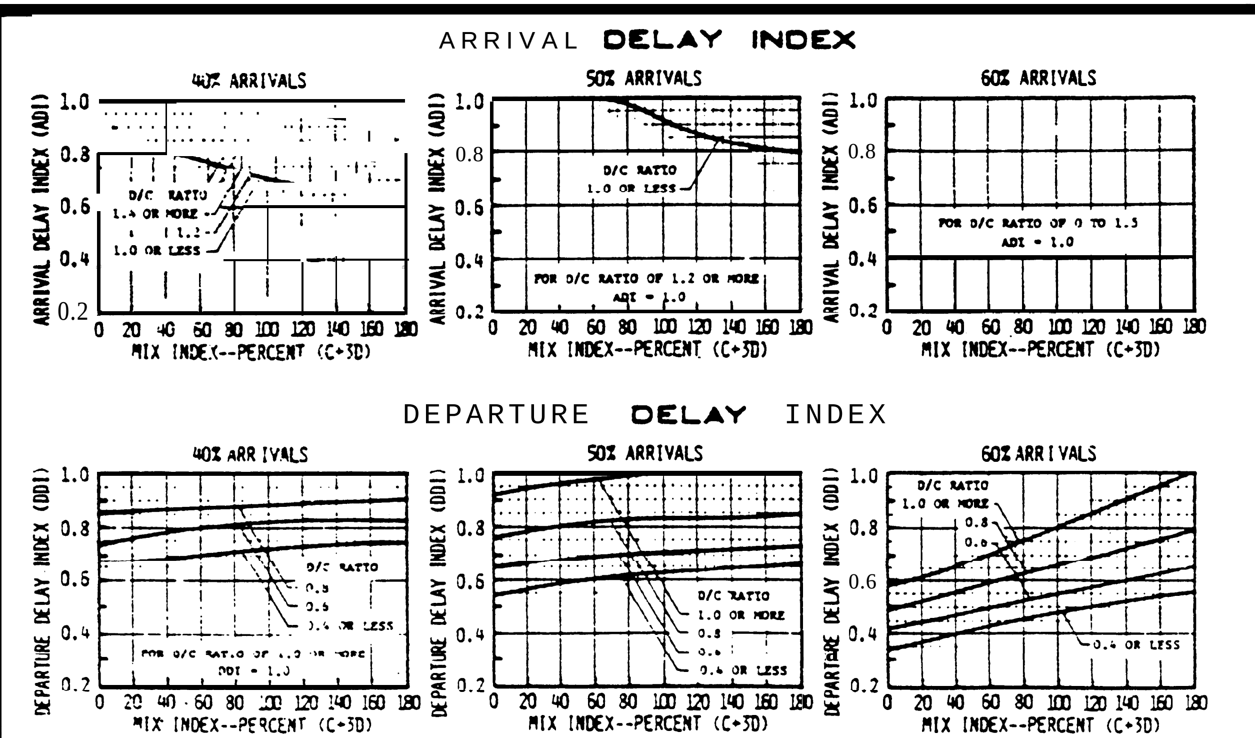


FIGURE 3-96. DELAY INDICES FOR RUNWAY-USE DIAGRAM NO. 12 FOR IFR CONDITIONS.

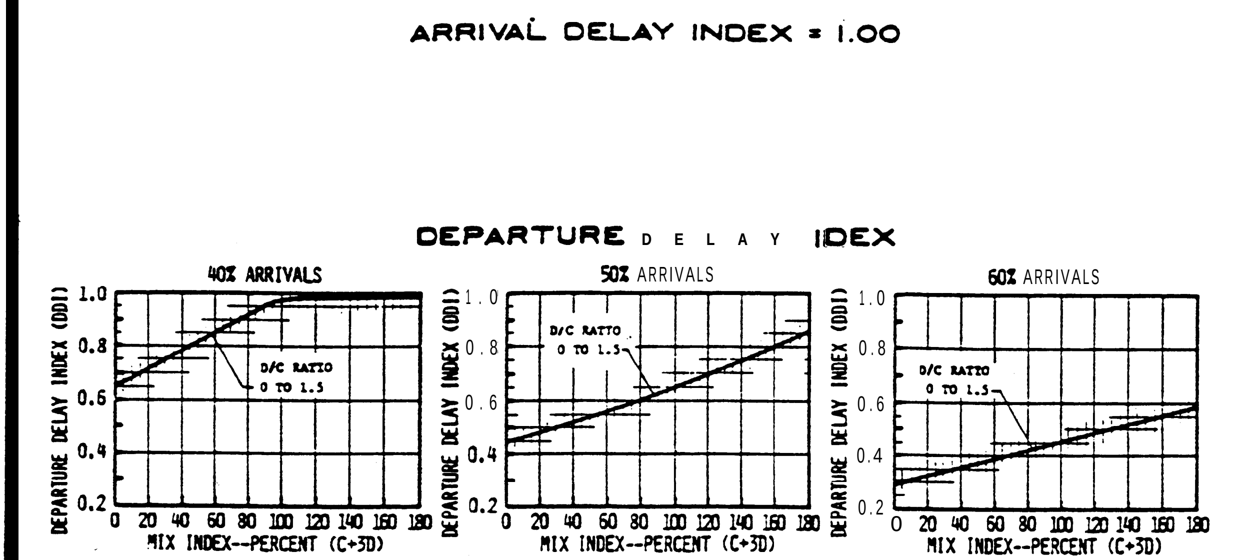


FIGURE 3-97. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 13, 16, 24, 27 FOR IFR CONDITIONS

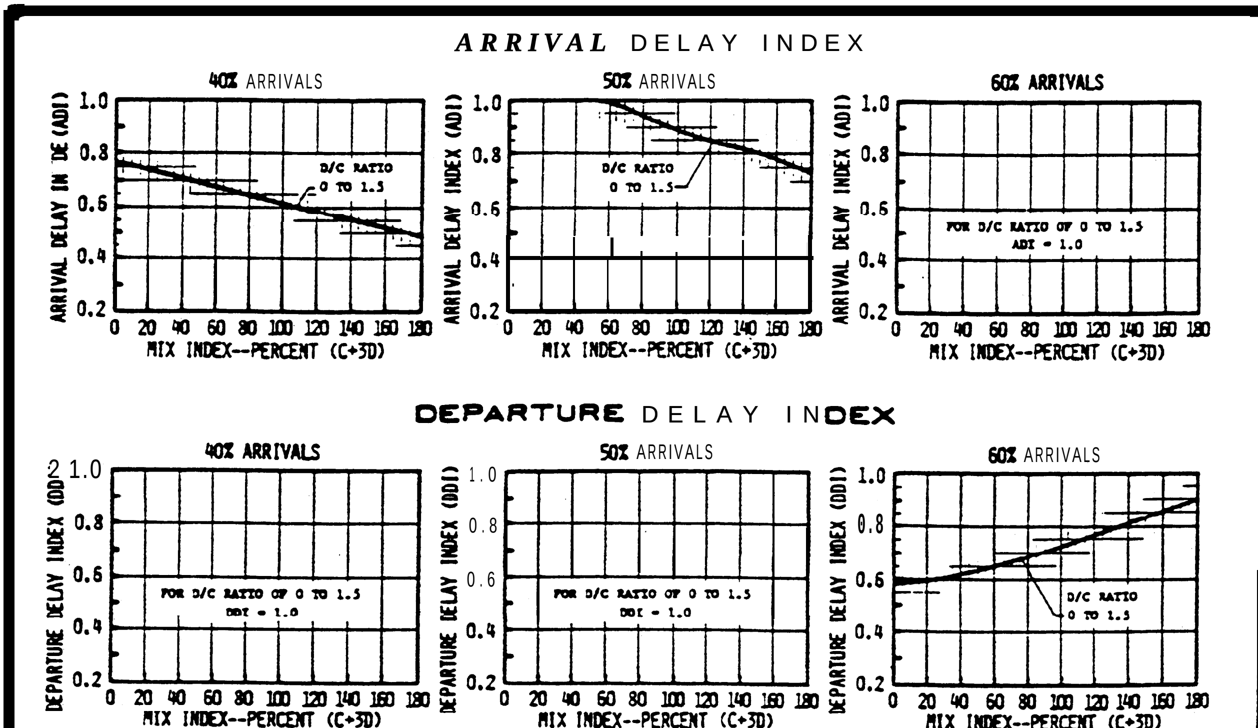


FIGURE 3-98. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 15, 28 FOR IFR CONDITIONS

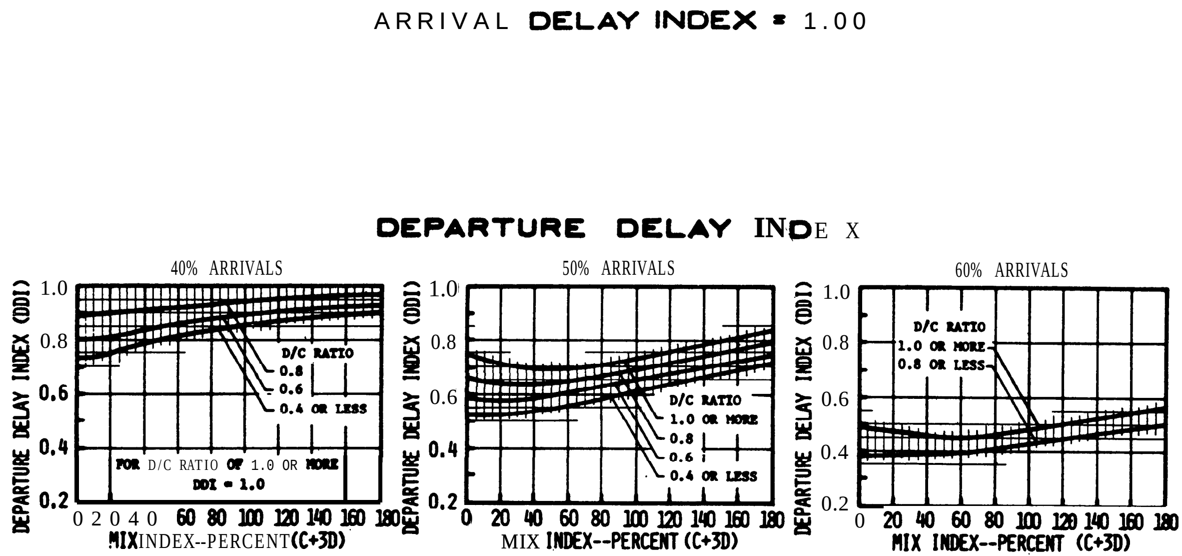


FIGURE 3-99, DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 18,22,26,31,36,44-46,50-52,56-58 FOR IFR CONDITIONS,

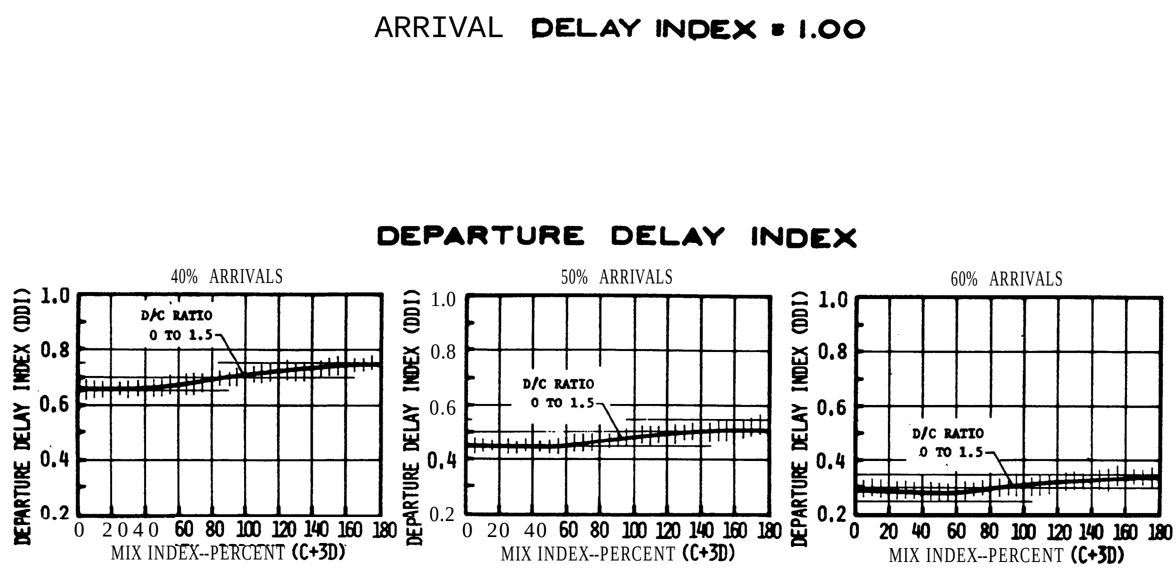


FIGURE 3-100, DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 19,23 FOR IFK CONDITIONS.

ARRIVAL DELAY INDEX = 1.00

DEPARTURE DELAY INDEX

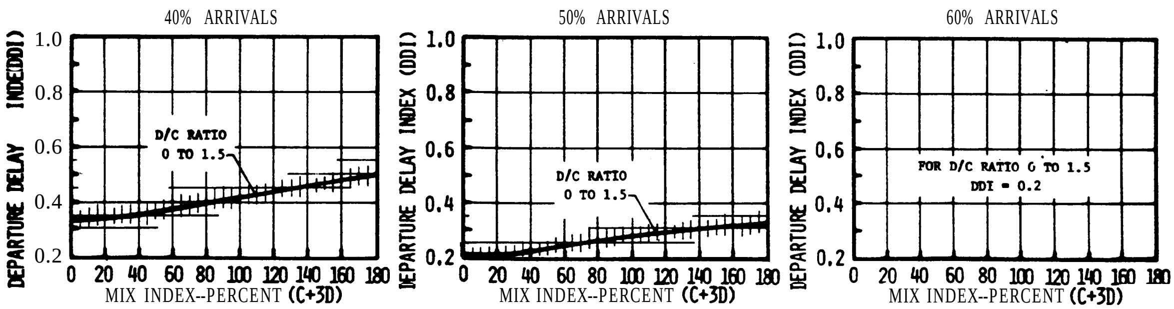
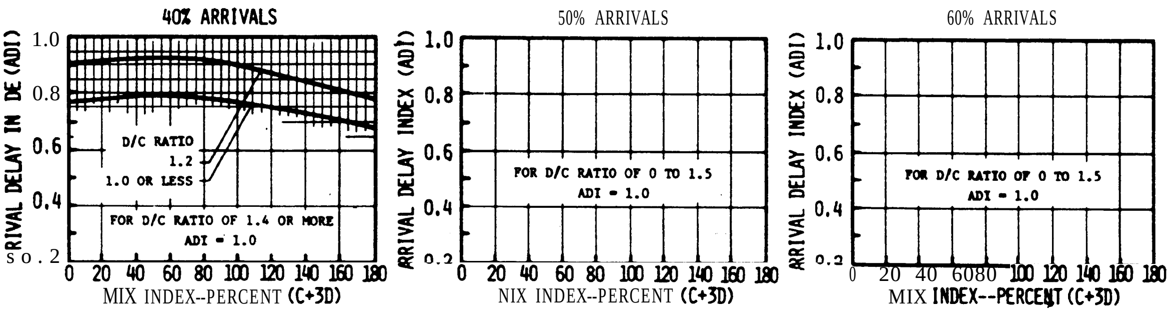


FIGURE 3-101. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 78,81,86,93,96,101 FOR IFR CONDITIONS.

ARRIVAL DELAY INDEX



DEPARTURE DELAY INDEX

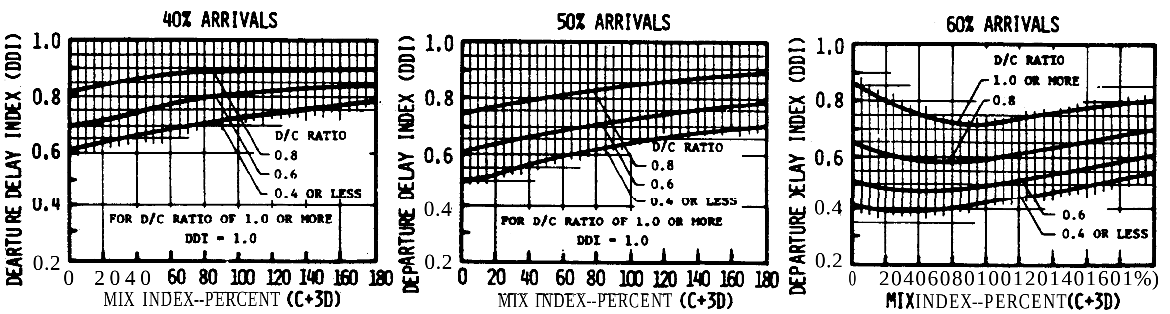


FIGURE 3-102. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 47,48,59,60 FOR IFR CONDITIONS.

CHAPTER 4. SPECIAL APPLICATIONS

4-1. GENERAL. This chapter provides calculations of runway capacity for situations involving PVC conditions, the absence of radar coverage and/or ILS, and airports with one runway or a runway restricted to small aircraft. Appendix 3 contains examples of these calculations.

4-2. PVC CONDITIONS. Runway hourly capacity in PVC conditions is reduced by increased in-trail separations of approaches and departures and increased runway occupancy times. Calculate PVC runway component hourly capacity as follows:

a. Select the runway-use configuration in figure 4-1 which best represents the airport and identify the figure number for determining capacity in PVC conditions. To adjust for staggered thresholds, see paragraph 4-6.

b. Determine the percent of class C and D aircraft and calculate the mix index.

c. Determine the percent arrivals.

d. Determine the runway hourly capacity from the figure identified in paragraph b above.

4-3. ABSENCE OF RADAR COVERAGE OR ILS. Except for single runway airports used almost exclusively by class A and B aircraft (which are covered in paragraph 4-5), calculate the hourly capacity of the runway component in the absence of radar coverage or ILS as follows:

a. Select the runway-use configuration in figure 4-1 which best represents the airport and identify the figure number for determining capacity with an inoperative navaid.

b. Determine whether the radar or the ILS is operative and determine whether a straight-in or a circling approach is authorized.

c. Determine the percent of class C and D aircraft and calculate the mix index.

d Determine the runway hourly capacity from the figure identified in paragraph b above.

4-4. PARALLEL RUNWAY AIRPORTS WITH ONE RUNWAY RESTRICTED TO USE BY SMALL AIRCRAFT. Calculate the hourly capacity of a parallel runway configuration when one of the runways is unable to accommodate class C and D aircraft as follows:

a. Select the runway-use configuration in figure 4-1 which best represents the airport and identify the figure number for determining capacity in restricted runway use. To adjust for staggered thresholds, see paragraph 4-6.

b. Determine the percent of class C and D aircraft and calculate the mix index.

c. Determine the percent arrivals.

e. Determine the runway hourly capacity from the figure identified in paragraph b above.

4-5. SINGLE RUNWAY **AIRPORT--SMALL** AIRCRAFT ONLY. Calculate the capacity of a **small** airport **used** almost exclusively **by** Class A and B aircraft without radar coverage or ILS as follows:

a. Conditions.

(1) The airport is used almost exclusively by Class A and B aircraft.

(2) The airport does not have radar coverge or an ILS, but it has an approved approach procedure.

(3) Arrivals equal departures.

(4) There are no airspace limitations affecting runway use.

b. **Capacity** Calculations.

(1) Select the airport configuration **from** figure 4-26 that best represents the airport.

(2) Determine the percent of touch-and-go **operations.**

(3) **Read** the range of hourly VFR and IFR capacities **from** figure 4-26.

4-6. THRESHOLD STAGGER. FM ATC procedures permit **simultaneous** departures and **simultaneous** departure--arrival operations on parallel runways spaced 2,500 feet **apart with even** thresholds and at lesser/greater separations if the thresholds are staggered. When thresholds are staggered , the equivalent unstaggered separation is **calculated** increasing or decreasing the actual separation depending upon whether the arriving aircraft is approaching the near' or **far** threshold. 'Stagger adjustments are only applicable when the parallel runway separations that are at least 1000 feet apart and less than 4300 feet apart.

a. Calculation.

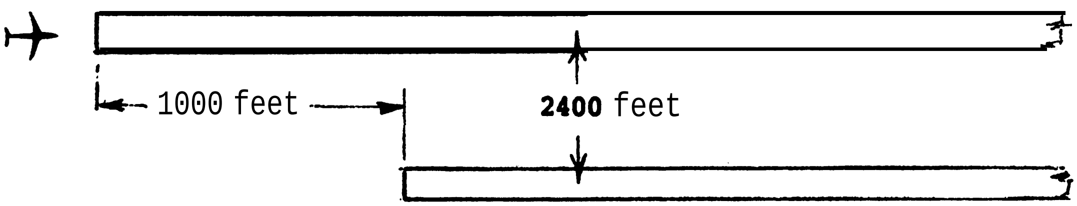
(1) If the approaches are to the near threshold and the separation is less than 4299 **feet,** the equivalent separation is the actual separation increased by 100 feet for each 500 feet of threshold stagger up to a maximum of 4299 feet.

(2) If the approaches are to the far threshold and the **separation** is greater than 1000 feet, the equivalent separation **is** the **actual separartion** decreased by 100 feet for each 500 feet of threshold stagger down to a minimum of 703 **feet.**

b. Application. Apply the equivalent **separation to determine which parallel runway-use** configuration to use. **Note: the** calculation for equivalency **need only** determine whether the equivalent runway separation **is** 2500 **feet or greater or 2499** feet **or** less.

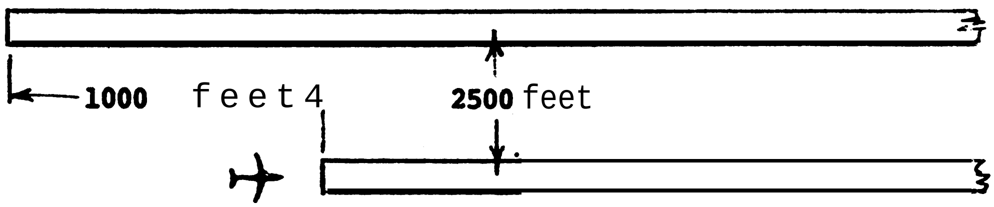
c. Examples.

case 1. Staggered thresholds, approaches to near threshold,

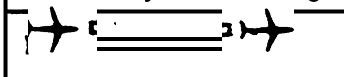
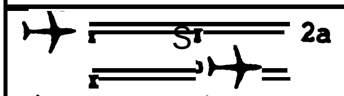
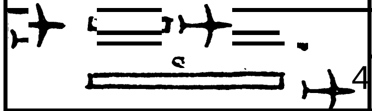
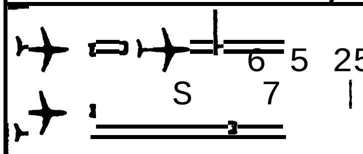
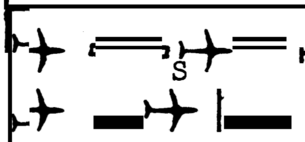
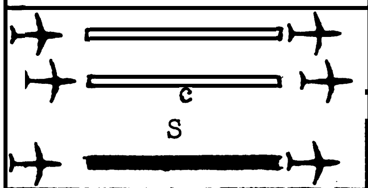
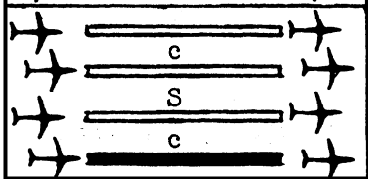
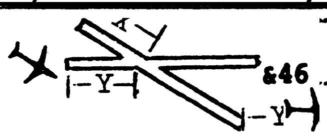
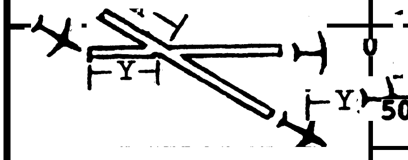


$(1000/500) \cdot 2 = 200$
Separation for equivalency is increased by 200 feet
2400 + 200 = 2600 feet

Case 2. Staggered thresholds, approaches to far threshold.



$(-1000/500) \cdot 2 = -200$
Separation for equivalency is decreased by 200 feet
2500 - 200 = 2300 feet

Runway-use Diagram	Diag. No.	Runway Spacing (S) in feet	Figure No. for Capacity: Poor Visibility Conditions	Inoperative Navaids	Restricted Runway-use: VFR	Restricted Runway-use: IFR
	1	NA	4-2	4-15	-	-
	2a	700 to 2499	4-3	4-16	-	-
	2b	2500 or more	4-4			
	3	700 to 2499	4-3	4-16	-	-
	4	2500 or more	4-5			
	5	700 to 2499	4-3	4-16	-	-
	6	2500 to 2999	4-6			
	7	3000 to 4299	4-7			
	8	4300 or more	4-8			
	9	700 to 2499	4-9	4-16	4-17	4-21
	10	2500 to 2999	4-9			
	11	3000 to 4299	4-10		4-18	
	12	4300 or more	4-11			4-22
	28	2500 to 3499	-	-	4-19	4-23
	29	3500 or more				4-24
	40	3500 or more	-	-	4-20	4-25
	44&47, 45&48, 44&46	X(ft): 0 to 1999; 2000 to 5000	Y(ft): 0; 2800 to 8000	4-12; 4999 [illegible] 4-13 4-14	4-15	-	-
	50&51&52	0 to 1999; 2000 to 5000	0; 800 to 8000	4-12; 4-14 4-13	4-15	-	-

c = 700' to 2499'

(aircraft symbol) = Type of operation that can occur.

(heavy bar) = Runway used only by A and B aircraft.

Figure 4-1. Special applications

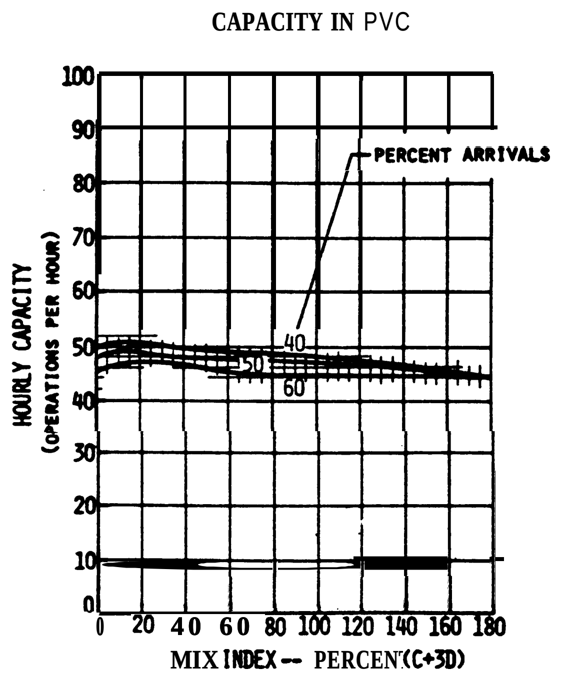


FIGURE 4-2. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 1.

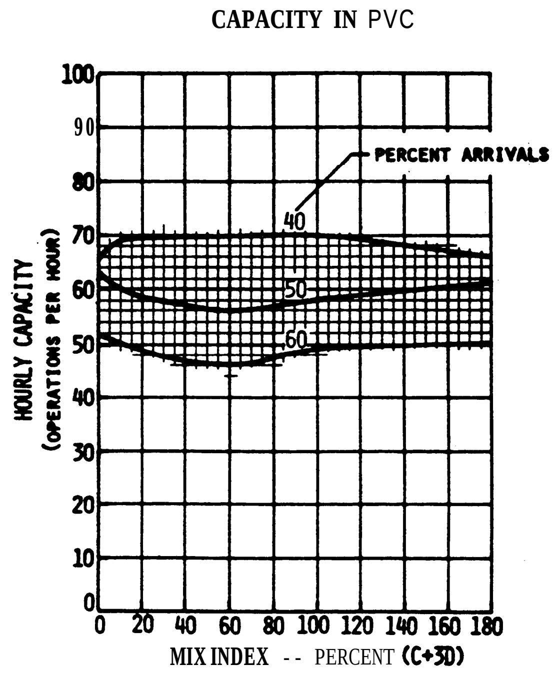


FIGURE 4-3, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 2A, 3, 5, 9.

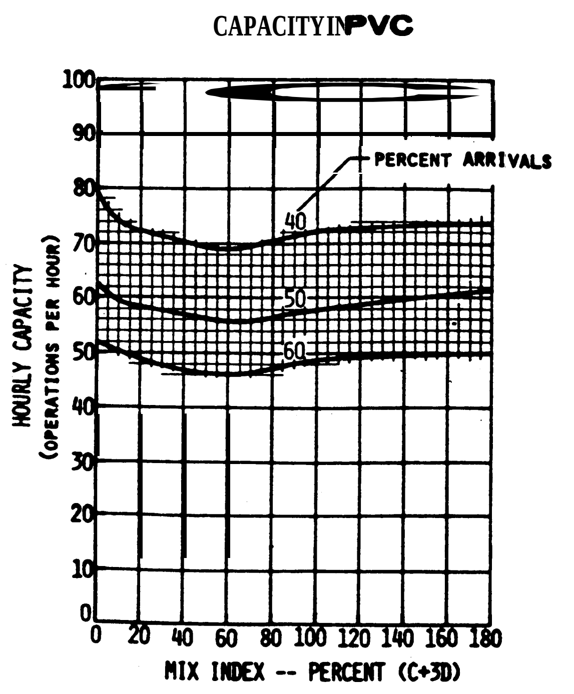


FIGURE 4-4. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO, 2B.

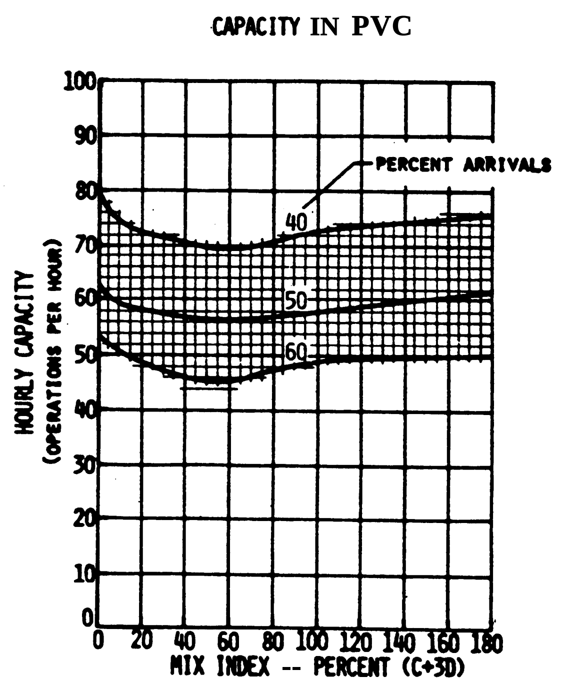


FIGURE 4-5. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 4.

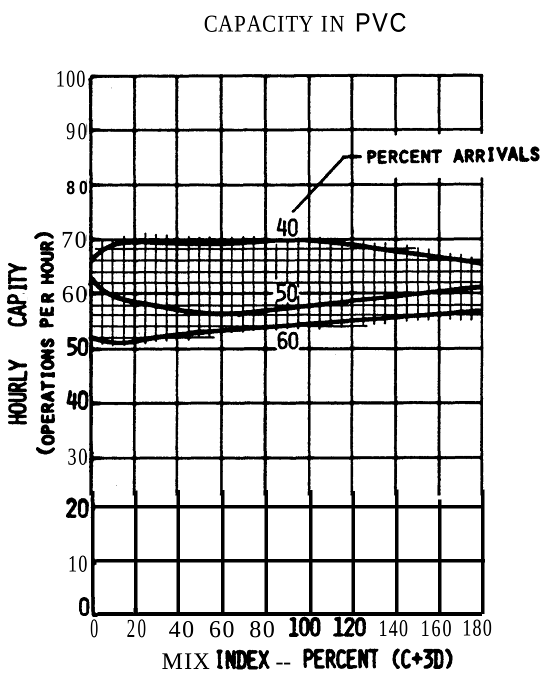


FIGURE 4-6. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 6.

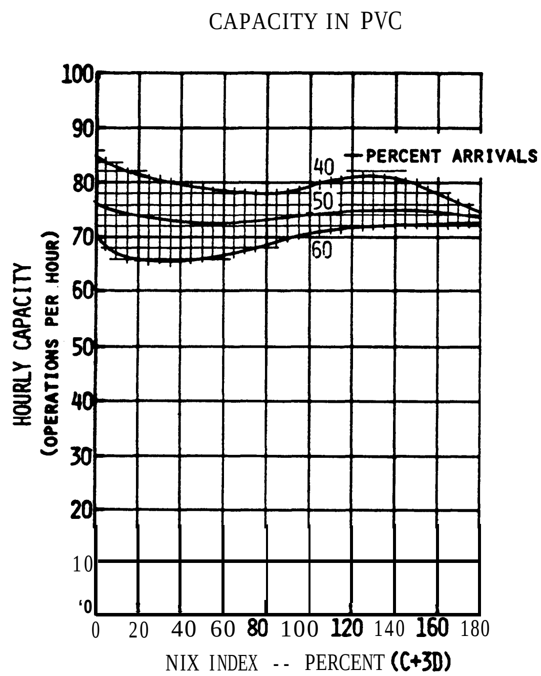


FIGURE 4-7. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 7.

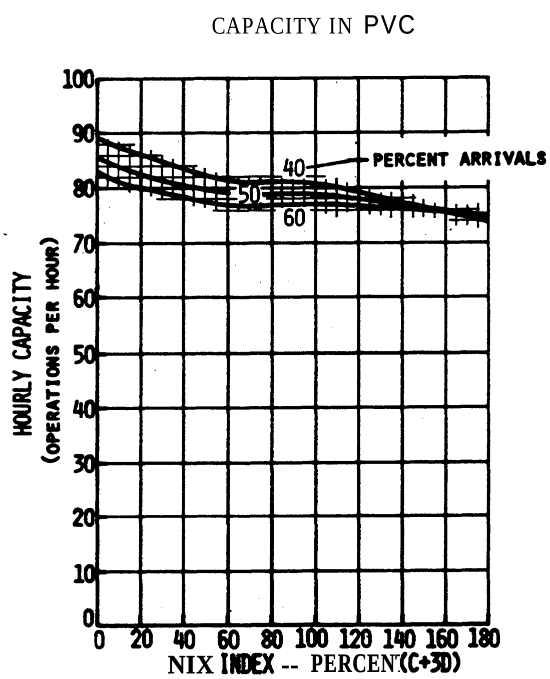


FIGURE 4-8. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 8.

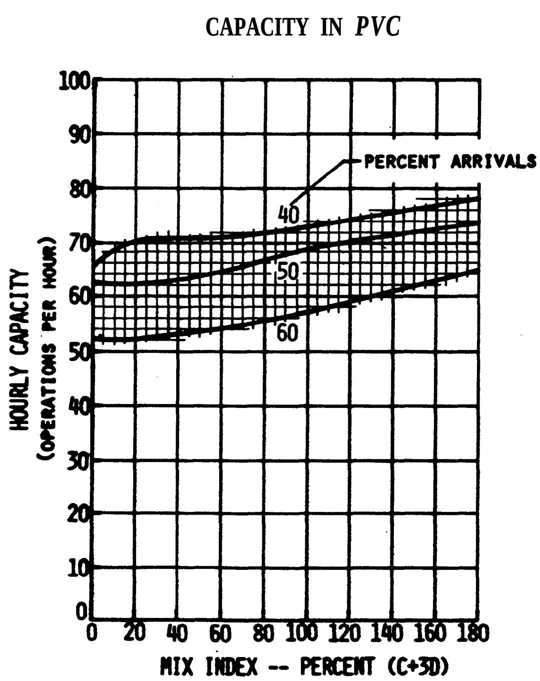


FIGURE 4-9. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 10.

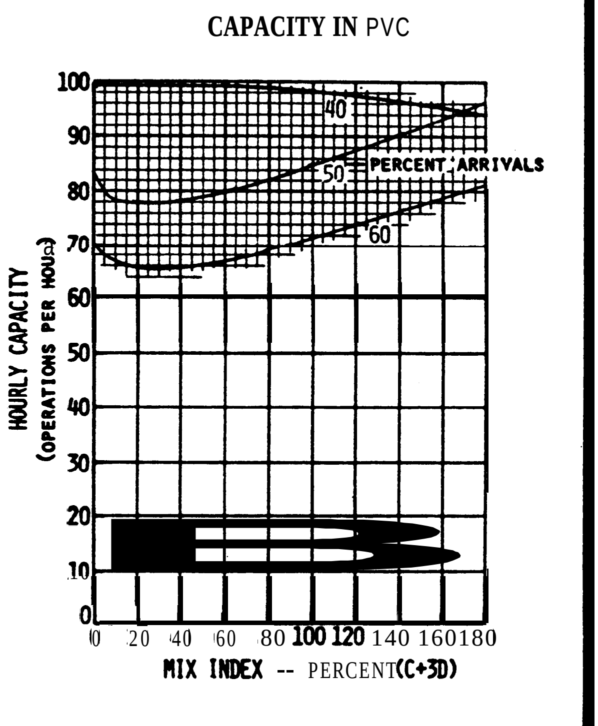


FIGURE 4-10. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM No. 11.

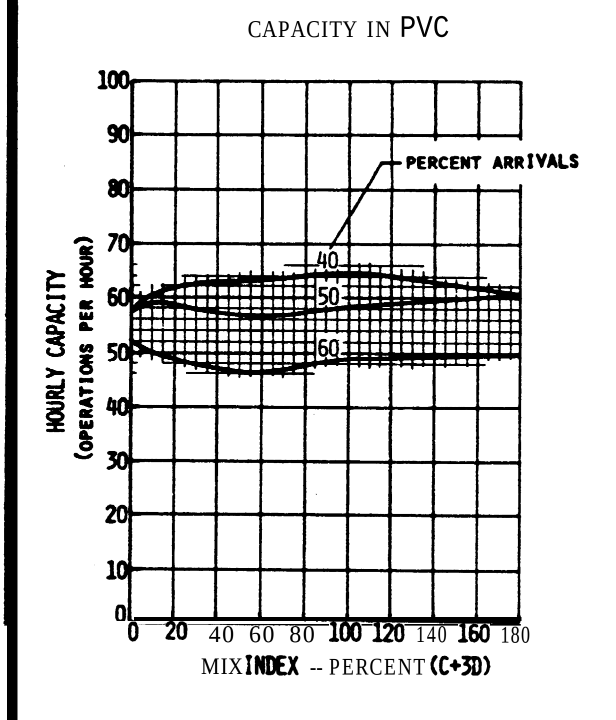


FIGURE 4-12. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 43, 45, 49, 52,

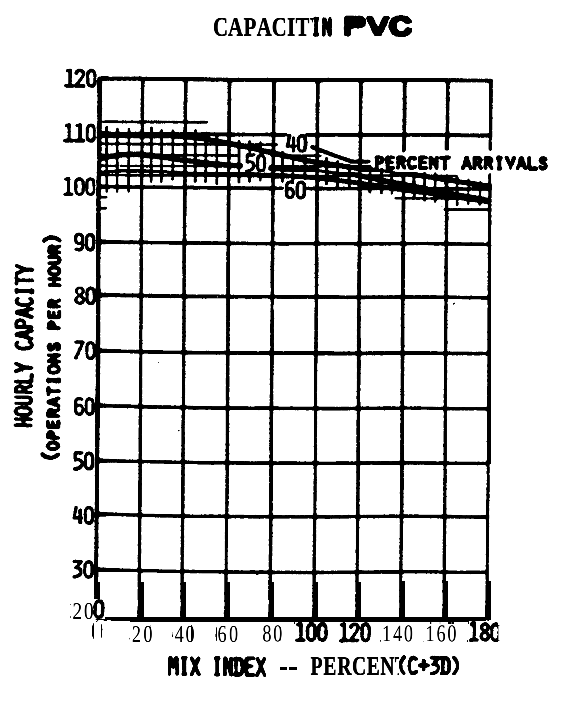


FIGURE 4-11. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 12.

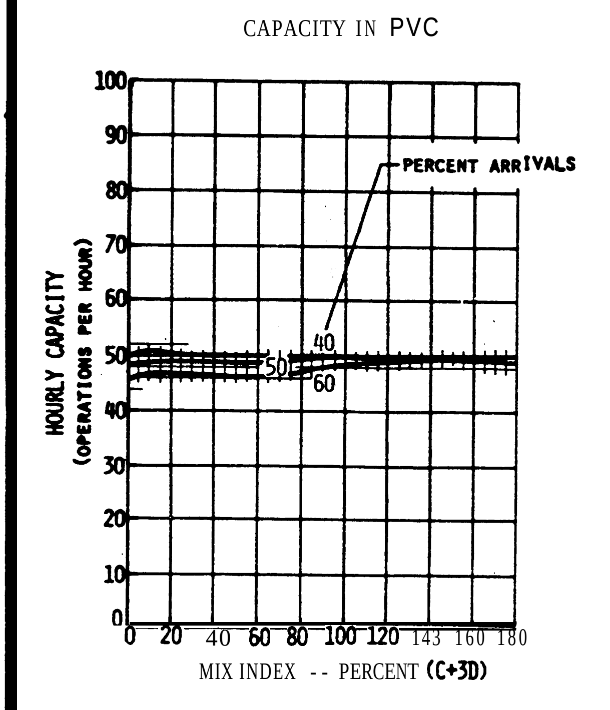


FIGURE 4-13. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 44, 47, 50, 53.

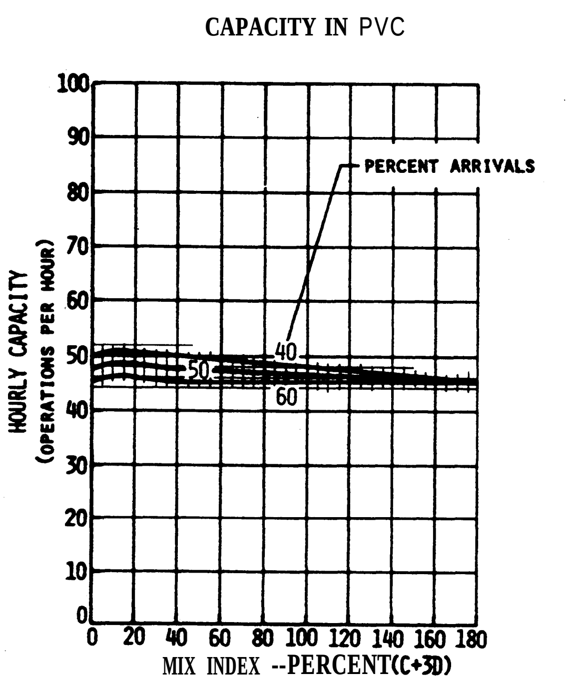


FIGURE 4-14. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 45, 48, 51, 54.

FIGURE A3-2A.
HOURLY CAPACITY IN RADAR ENVIRONMENT

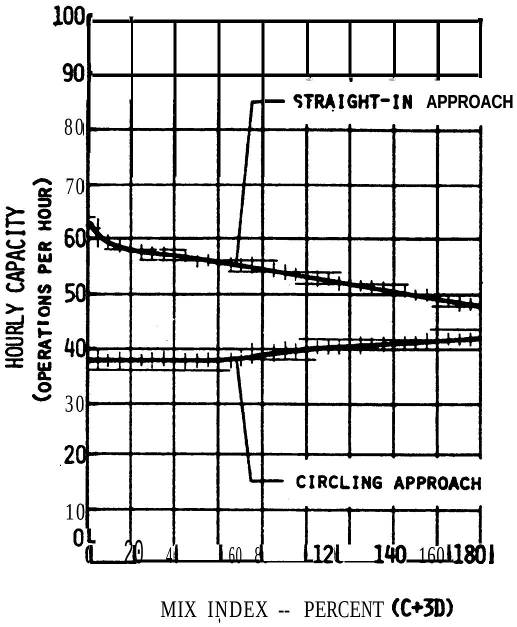


FIGURE A3-2B.
HOURLY CAPACITY IN NONRADAR ENVIRONMENT

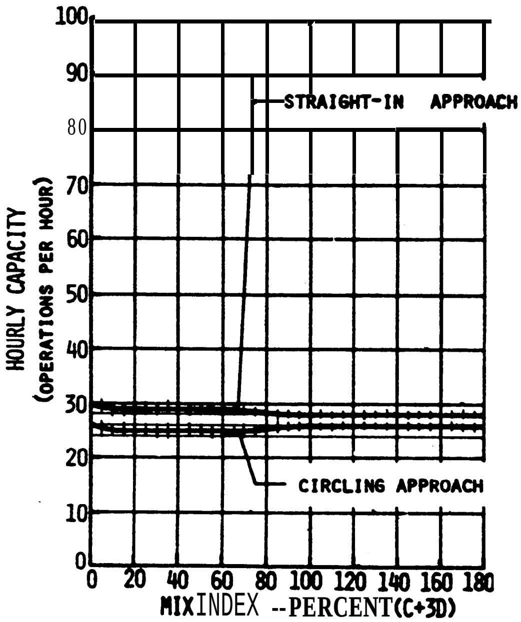


FIGURE 4-15. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 1, 43-54,

FIGURE A3-3A.
HOURLY CAPACITY IN RADAR ENVIRONMENT

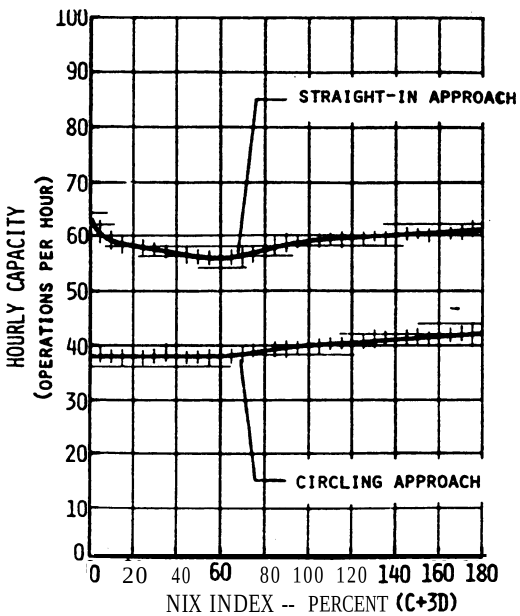


FIGURE A3-3B.
HOURLY CAPACITY IN NONRADAR ENVIRONMENT

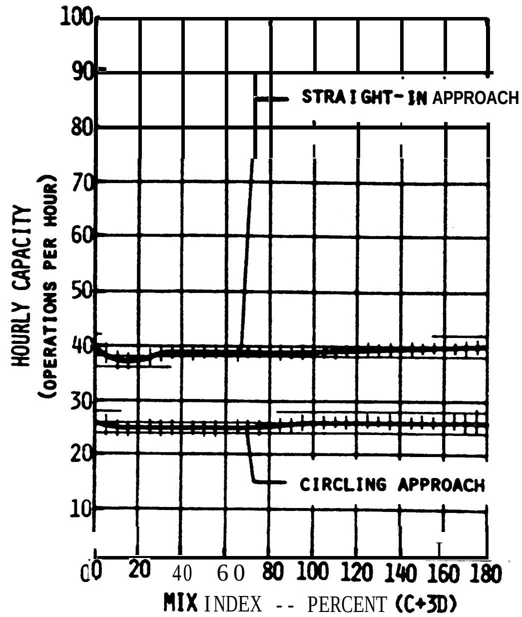


FIGURE 4-16. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 2A, 2B, 3-12,

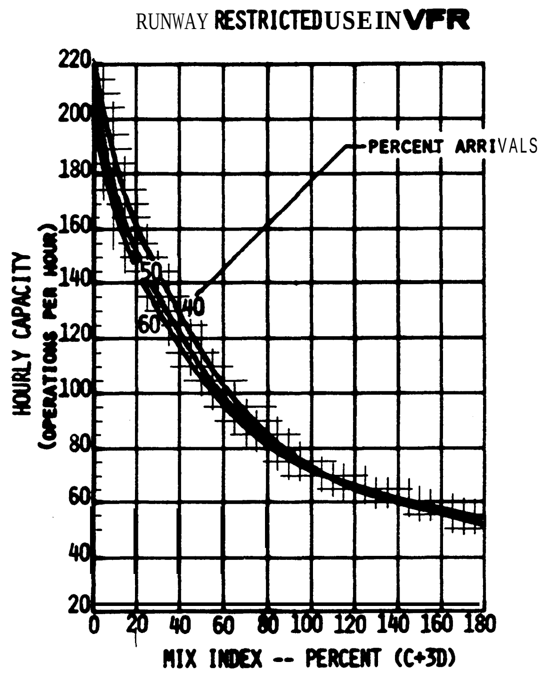


FIGURE 4-17, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 9.

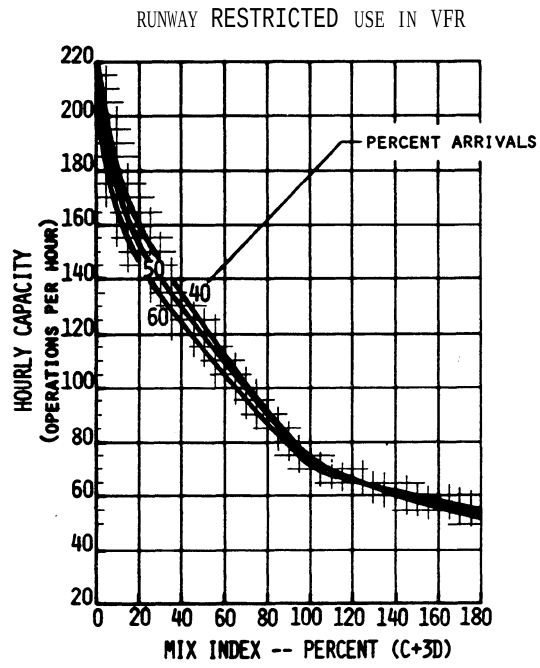


FIGURE 4-18. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 10, 11, 12.

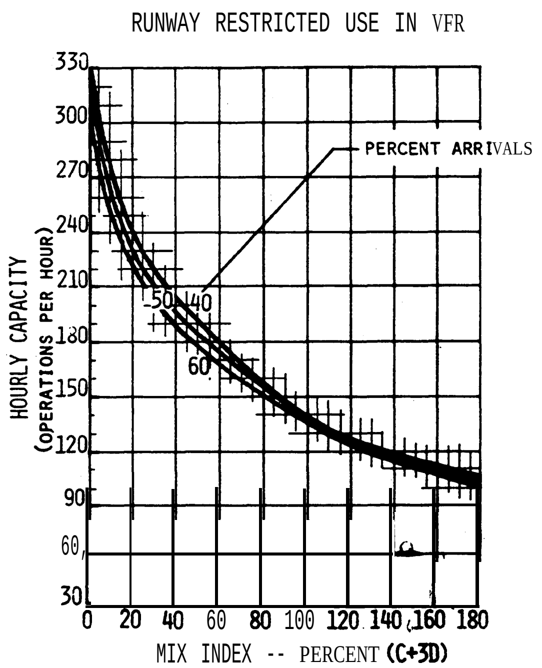


FIGURE 4-19. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 28, 29.

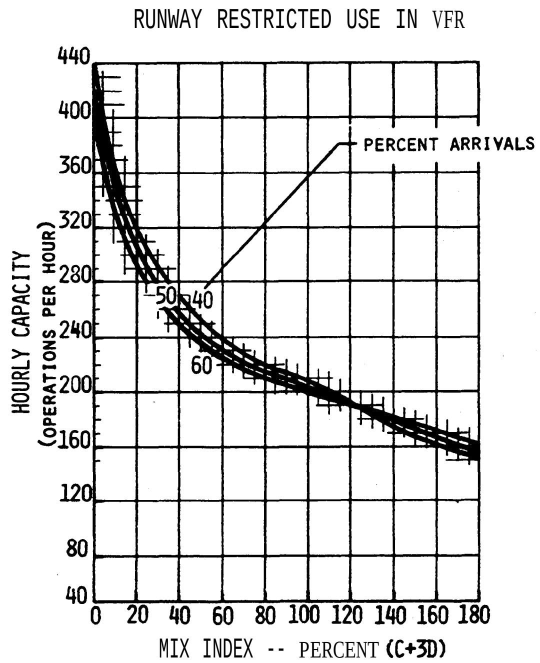


FIGURE 4-20. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 40.

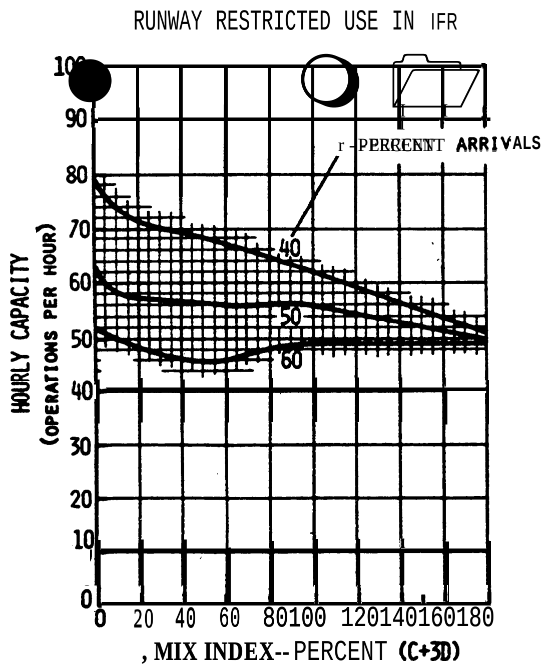


FIGURE 4-21, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 9, 10, 11.

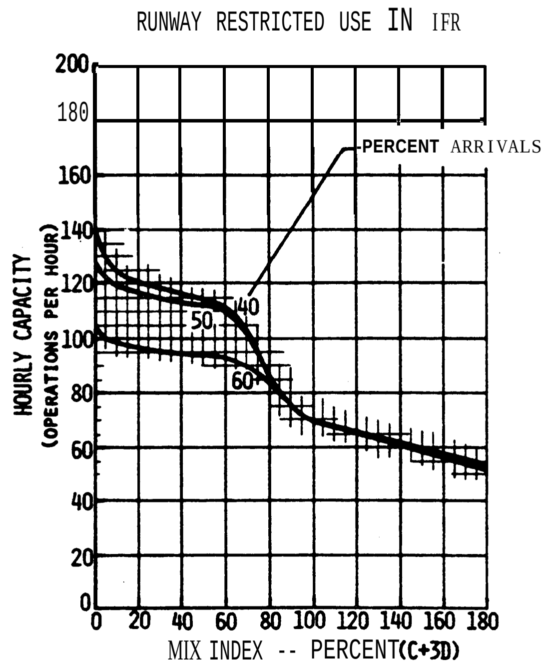


FIGURE 4-22. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 12.

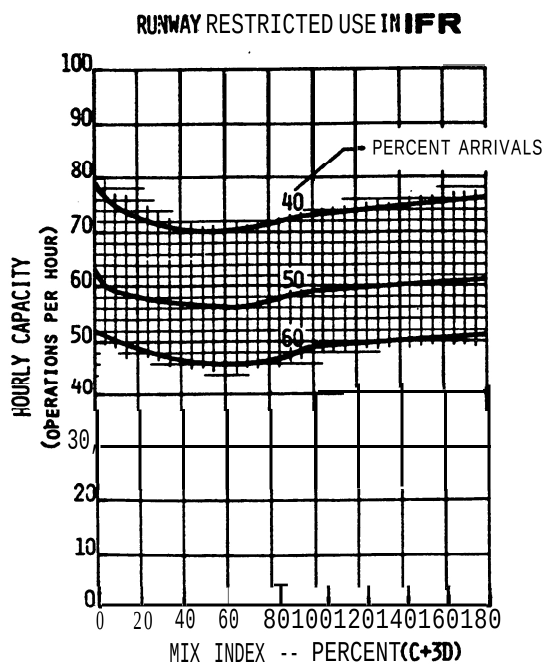


FIGURE 4-23, HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 28,

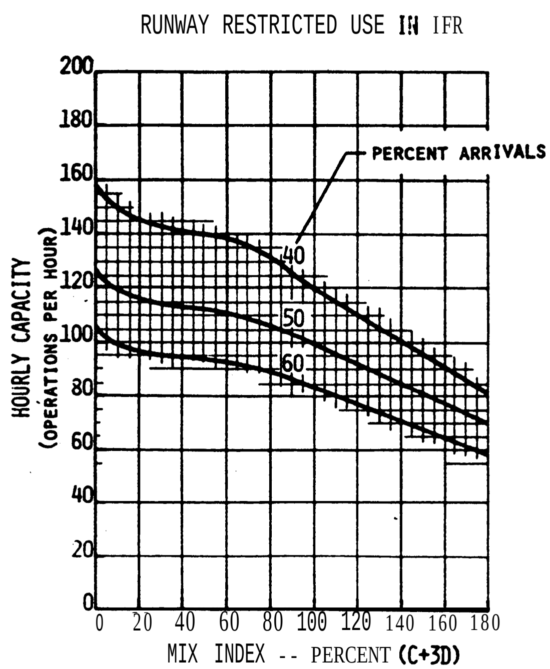


FIGURE 4-24. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 29.

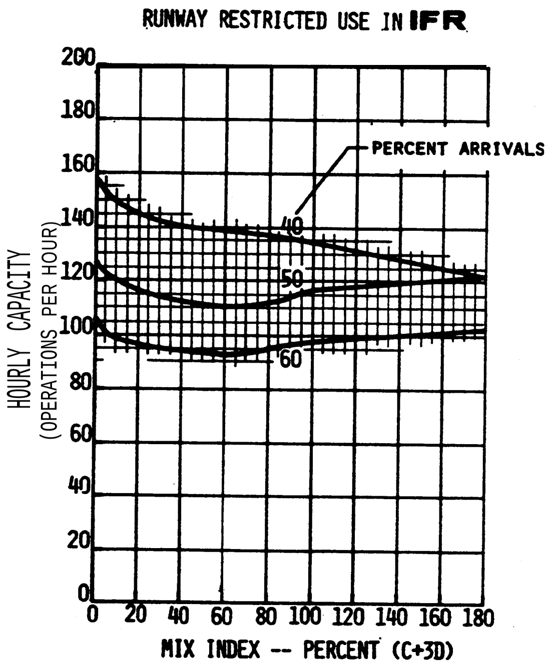
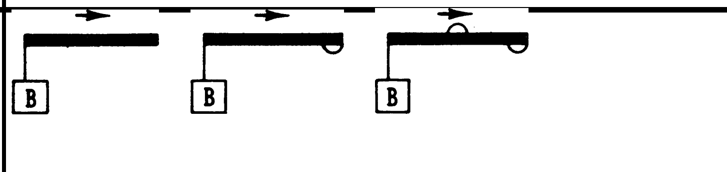
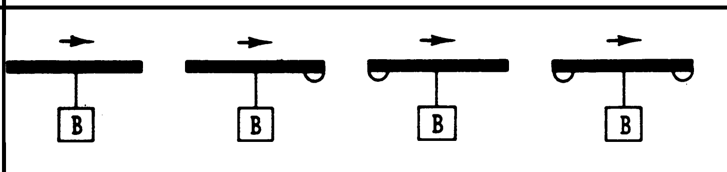
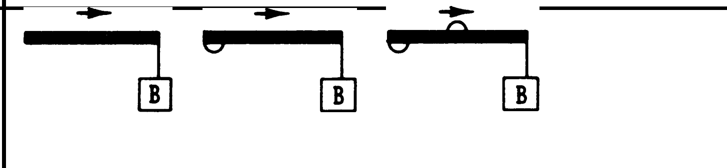
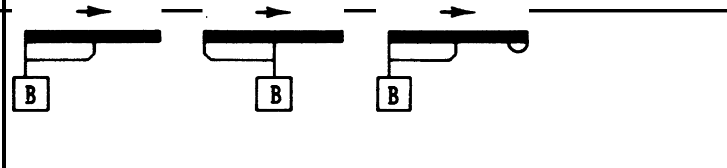
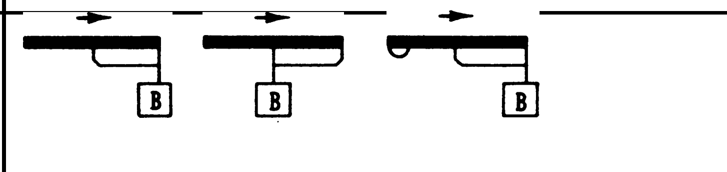
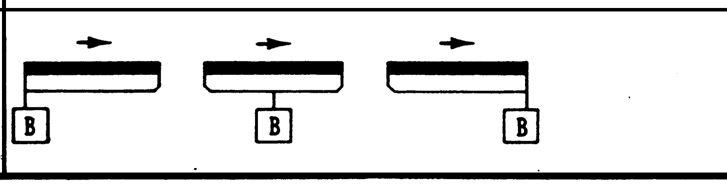


FIGURE 4-25. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 40.

CONFIG. No.	AIRFIELD CONFIGURATION	HOURLY CAPACITY IN VFR PERCENT TOUCH-AND-GO 0 TO 25	HOURLY CAPACITY IN VFR PERCENT TOUCH-AND-GO 26 TO 50	HOURLY CAPACITY IN IFR
		(OPERATIONS PER HOUR)		
1		54 TO 66	66 TO 85	20 TO 24
2		59 TO 72	72 TO 92	20 TO 24
3		40 TO 50	50 TO 67	20 TO 24
4		82 TO 97	97 TO 117	20 TO 24
5		71 TO 85	85 TO 106	20 TO 24
6		60 TO 72	72 TO 92	20 TO 24
7		SEE CHAPTER 3		

LEGEND:

- RUNWAY
- TAXIWAY
- BASING AREA
- DIRECTION OF OPERATION
- TURNAROUND

Figure 4-26. **Hourly** capacity of single runway airports, **without** radar coverage **or ILS, serving** small aircraft only.

CHAPTER 5. COMPUTER PROGRAMS FOR AIRPORT CAPACITY AND AIRCRAFT DELAY

5-1. GENERAL. This chapter identifies computer models for determining airport capacity, aircraft delay, and the sensitivity of a proposed physical/operational change to an airport or air traffic procedure.

5-2. SIMULATION MODEL (SIMMOD). SIMMOD is a simulation model used by the FAA, airlines, airports, architects, and engineers to design airport improvements, calculate travel times and flow rates for an airport or an airport component, and/or develop procedural alternatives for domestic and international air traffic management, including the adjacent airspace. Specific applications of the **SIMMOD** model range from studies of a single runway airport with its network of taxiway and gates, to studies of terminal areas having multiple airports with complex airspace routings.

a. SIMMOD addresses both the physical design and procedural aspects of all air traffic operations, allowing decision-makers to determine projected benefits and impacts in terms of airport capacity and in aircraft travel time, delay, and fuel consumption. The model incorporates **the** FAA's **Integrated Noise Model (INM)** as a post-processing function, allowing users to determine the impact of aircraft noise in the-planning process. SIMMOD is available in two versions which include magnetic media, manuals, and all required software licenses and libraries. The Summagraphics MG-3648 36"x 48" or Summagraphics Professional 12"x 18" digitizer, and CAD/CAM (Autocad) are recommended for data input and optional display.

(1) SIMMOD **Version 1.2** for 386/25 IBM compatible microcomputers with 80387 math coprocessors, 4 MB RAM, 80 MB hard disk, 1.2 MB (5.25") or 1.44 MB (3.5") floppy disk drive, VGA graphics system (board and monitor), Mouse (Microsoft-compatible), and a Epson/HP Laserjet or compatible printer. DOS 3. 1 or higher (DOS 4.0 is not recommended) or OS/2.

(2) SIMMOD Version 2.1 operates on SUN Sparc and HP9000/700 series computers. Parts of this version operate on IBM RS6000 machines having 32 MB RAM and 1.2 GB Hard drives.

b. Model Source. The SIMMOD model and information on the model may be obtained from:

FAA, Program Analysis and Operations Research (ASD-400)
800 Independence Avenue SW
Washington, D.C. 20591.
Telephone number (202) 358-5225
Internet Address: http://www .orlab. faa.gov/homepage.html

5-3. AIRPORT MODEL This model is a general purpose airport simulation that can be used for any airport. It requires a DOS platform and-can produce animated graphic output. The input data include physical airfield layout, ATC rules and procedures, and aircraft performance characteristics. The input can also be modified in a user interface mode. Either actual or randomly-generated flight schedules can be used to drive the model. Among the unique features of the Airport Machine are detailed landing deceleration modeling, deceleration and exit selection, spacing of arrivals to allow runway crossing, controlled departure queuing, and user interface to allow optimization of outcomes. Information on this model may be obtained from:

FAA Technical Center, Atm: Mr. John Vander Veer
Aviation System Analysis and Modeling Branch (ACT-520A)
Atlantic City International Airport, N. J. 08405
Telephone number (609) 485-5645

5-4. AIRFIELD DELAY SIMULATION MODEL (ADSIM). ADSIM is a discrete-event simulation model that calculates travel time, delay and flow rate. It may also be used to analyze the components of an airport, airport operations, and operations in the adjacent airspace. The model implements the Monte Carlo sampling techniques. The procedural logic and physical network are used to simulate traffic using a series of probabilistic parameters such as gate service time, arrival runway separation time and may others. The output enables users to generate performance data based on hourly flow rates, delays encountered on different routes, travei time, and others.

5-5. AIRFIELD CAPACITY MODEL. This upgraded FAA Airfield Capacity Model is a computer program which analytically calculates the maximum operational capacity of a runway system under a wide range of conditions. The mode1 user has considerable freedom to vary the parameters of the computation, such as number and usage of runways, aircraft mix and speeds, and the characteristics of the ATC system.

5-6. MODEL AVAILABILITY. Tapes of the ADSIM and Airfield Capacity model are available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161. The NTIS accession code number for ADSIM (Model Simulation) is PB84-171560, for ADSIM User's Guide is PB84-171552. The NTIS accession code number for Upgrade FAA Airfield Capacity Model Supplemental User's Guide is AD-A104 154/0. Telephone orders (703) 487-4650 (TDD for the hearing impaired (703) 487-4639), or FAX orders (703) 321-8547.

5-7. AIRPORT DESIGN COMPUTER MODEL. This computer model requires minimal input and provides output which can be computed as specified in chapter 2. Refer to *AC* 150/5300-13, Airport Design, Appendix 14, Computer Program, for details on this computer model.

a. Computer Requirements. Airport Design runs on the IBM PC family of computers and all true IBM compatibles. It requires DOS of 3.1 or higher and at least 640K of RAM.

b. Software Source. Design is available for downloading from the Office of Airport Safety and Standards Electronic Bulletin Board System.

Telephone number:	(202) 267-5205
Data bits:	8
Parity:	(N)one
Stop bits:	1
Baud rate:	300/1200/2400/9600/14400

5-8. PROPRIETARY MODELS. Consultants doing airport engineering and planning as well as individual airport engineering/planning departments have developed or purchased proprietary models to carry out airport capacity and delay studies. Information on computer requirements and licensing costs for a proprietary model must be obtained from the respective model owner.

APPENDIX 1. EXAMPLE APPLYING CHAPTER 2 CALCULATIONS

1. GENERAL. The examples in this appendix illustrate applications of chapter 2 capacity and delay calculations with portions of the appropriate tables and figures of chapter 2 reproduced in the examples. The work sheers provided in appendix 5 are used to record data.

2. EXAMPLES. The following four examples illustrate the progressive calculations of chapter 2.

a. Examples.

(1) Calculate existing runway capacity (figure Al-l).

(2) Identify airport improvements to accommodate demand (figure A1-2).

(3) Determine annual delay (figure Al-3).

(4) Calculate potential savings associated with reduced delay (figure A1-4).

b. Data. The following data is given for the four examples.

(1) The airport has a single runway with a full length parallel taxiway and entrance-exit taxiways. All required navigational and air traffic aids exists, or will exist, and there are no foreseeable airspace limitations.

(2) The airport has a forecast demand of 220,000 annual operations by the year 2000. The demand consists of 41 percent small aircraft (one half of these are single engine), 55 percent large aircraft, and 4 percent heavy aircraft. Air carrier operations predominate and touch-and-go operations are nominal.

EXAMPLE 1. Determine whether the runway capacity is adequate to accommodate the forecasted demand.

SOLUTION:

1. Aircraft Mix. Enter the mix of the forecasted demand (41% small, 53% large, 4% heavy) in columns 1 through 4 of the work sheet.

Table 1-1. Aircraft classifications

Aircraft Class	Max. Cert. T.O. Weight (lbs)	Number Engines	Wake Turbulence Classification
A	12,500 or less	Single	Small (S)
B		Multi	
C	12,500 - 300,000	Multi	Large (L)
D	over 300,000	Multi	Heavy (H)

2. Runway-use. Select the runway-use configuration from figure 2-1 that best represents the airport. Enter the diagram number (1) in column 6 and a line sketch of the configuration in column 7.

No.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	Hourly Capacity Ops/Hr IFR	Annual Service Volume Ops/Yr
1.	═══	0 to 20	98	59	230,000
		21 to 50	74	57	195,000
		51 to 80	63	56	205,000
		81 to 120	55	53	210,000
		121 to 180	51	50	240,000

3. Mix Index. Calculate the mix index, 55+3(4) = 67, and enter in column 5.

4. Hourly Capacity. Enter the hourly VFR and IFR capacities and the ASV, obtained from diagram 1, figure 2-1, in columns 8, 9, and 10.

Aircraft Mix %A	Aircraft Mix %B	Aircraft Mix %C	Aircraft Mix %D	Mix Index %(C+3D)	Configuration No.	Configuration Sketch	Capacity (Ops/Hour) VFR	Capacity (Ops/Hour) IFR	ASV (000)	Annual Demand (000)	Annual Demand / ASV	Average Delay per Aircraft (Minutes) Low	Average Delay per Aircraft (Minutes) High	Minutes of Annual Delay (000) Low	Minutes of Annual Delay (000) High
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
21	20	55	4	67	1	───	63	56	205						

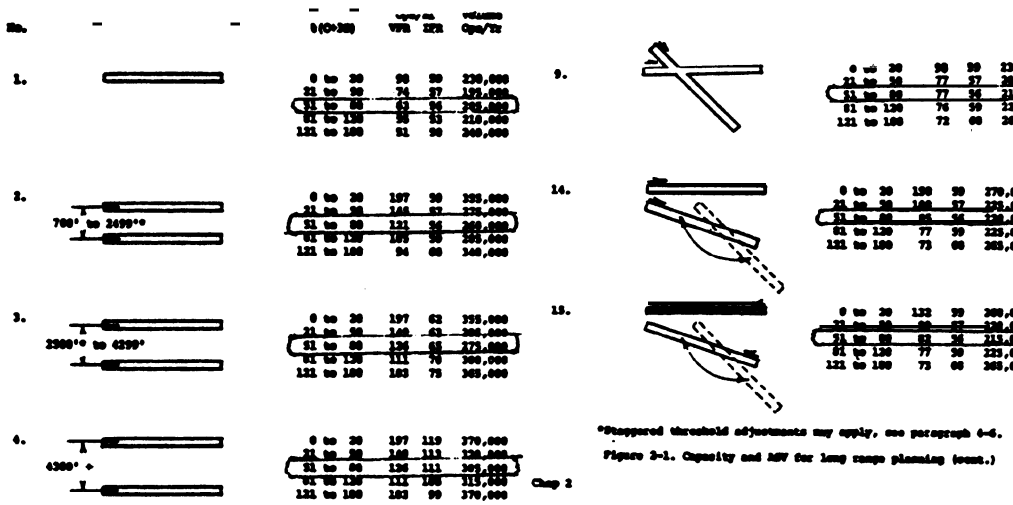
5. Conclusion. The ASV of 205,000 operations is less than the forecasted demand of 220,000 annual operations. Unless additional capacity is provided, delays will become costly.

Figure A1-1. Investigate runway capability

EXAMPLE 2. **Example** 1 **concluded** that the **ASV** of 205,000 **operations** is less than the forecasted 220,000 operational demand. Identify alternative. two-runway **configurations** that will **accommodate** the demand,

SOLUTION:

1. Capacity of Alternatives. **Repeat** each of the calculations of example 1 for **each** of the two-runway configurations.



Aircraft Mix %A	%B	%C	%D	Mix Index %(C+3D)	Configuration No.	Sketch	Capacity (Ops/Hour) VFR	IFR	ASV (000)	Annual Demand (000)	Annual Demand / ASV	Average Delay per Aircraft (Minutes) Low	High	Minutes of Annual Delay (000) Low	High
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
21	20	55	4	67	1		63	56	205						
"	"	"	"	"	2		121	56	260						
"	"	"	"	"	3		126	65	275						
"	"	"	"	"	4		126	111	305						
"	"	"	"	"	9		77	56	215						
"	"	"	"	"	14		85	56	220						
"	"	"	"	"	15		82	56	215						

2. **Conclusion.** The parallel runway-use configuration **(4),** which meets the separation **requirements** for **simultaneous** instrument approaches, provides the best **VFR** and **IFR** hourly capacities and **ASV.** Any of the parallel runway-use configurations as **well** au **the** diverging runway-use configuration **meet** the **forecasted demand. The crossing** and **converging** runway-use configurations have less capacity than the **forecasted** demand.

Figure **A1-2.** Identify two-runway configurations

EXAMPLE 3. What annual delay is anticipated **for** the **existing and each of** the alternative runway-use **configurations?**

SOLUTION: The following calculations **are** for the **existing single** rummy-use configuration are repeated for each **of the** alternative **runway-use configurations.**

1. Annual Demand. Enter 220,000 **(operations)** in column **11.**

2. **Demand-ASV** Ratios. Divide **the annual demand** by the **ASV and enter** in **column 12.**

220/205 = 1.07

3. **Average** Aircraft **Delay.** Obtain the high and law average &lays pet aircraft from **figure 2-2** and **enter** in **columns 13 and 14.**

4. Annual Delay. **Calculate** annual delay and entet results in columns **15** and 16.

3.5 x 220,000 = 770,000 minutes
5.8 x 220,000 = 1,276,000 minutes

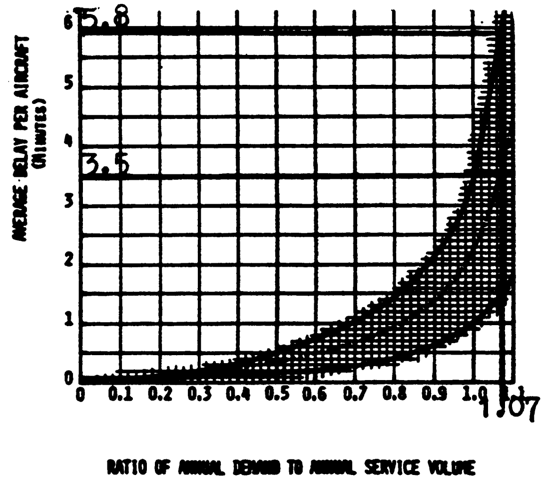


Figure 2-2. Average aircraft delay for long range planning

Aircraft Mix				Mix Index	Configuration		Capacity (Ops/Hour)		ASV	Annual Demand	Annual Demand / ASV	Average Delay per Aircraft (Minutes)		Minutes of Annual Delay (000)	
%A	%B	%C	%D	%(C+3D)	No.	Sketch	VFR	IFR	(000)	(000)		Low	High	Low	High
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
21	20	55	4	67	1		63	56	205	220	1.07	3.5	5.8	770	1276
"	"	"	"	"	2		121	56	260	"	.85	1.15	1.8	253	396
"	"	"	"	"	3		126	65	275	"	.80	.95	1.45	209	319
"	"	"	"	"	4		126	111	305	"	.72	.7	1.1	154	242
"	"	"	"	"	9		77	56	215	"	1.02	2.6	4.0	572	880
"	"	"	"	"	14		85	56	220	"	1.0	2.3	3.4	506	748
"	"	"	"	"	15		82	56	215	"	1.02	2.6	4.0	572	880

5. Conclusions. Average delay per aircraft and annual delay with parallel runway-use configurations are **significantly less than with any** of **the other runway-use configurations.**

Figure A1-3. Determine annual delay

EXAMPLE 4. What savings can be realized from the reduced delay anticipated in example 3 when going from runway-use configuration 1 to 3.

SOLUTION:

1. Allocate Usage. Distribute aircraft classes used for the capacity calculations (21% A, 20% B, 55% C, and 4% D) among the airport's different types of aircraft and users.

For this example the 21% A is distributed as follows:
6% small aircraft having 1-3 seats (GA),
12% small aircraft having 4+ seats (GA), and
3% small aircraft having 4+ seats (AT)

Comparable distributions are made for the other aircraft classifications.

2. Calculate Average Cost Per Minute. Using the delay costs provided in figure A5-12, calculate the average delay cost attributed to each type of aircraft.

NOTE: Other delay costs may be used. When other delay costs are used, identify the source of their delay costs or explain the rationale for the costs used.

Class A	1-3 seats	0.06 x 0.50 = 0.036
	4+ seats (GA)	0.12 x 1.00 = 0.120
	4+ seats. (AT)	0.03 x 1.80 = 0.054

NOTE: Similar calculations are made for the other aircraft classes and users.

3. Identify Time Savings. Subtract projected minutes of future delay from current estimates of delay to establish the potential savings. Use both the low and high range from figure AL3.

Current Delay (000 Minutes)	770	Low	1,276	High
Projected Delay (000 Minutes)	209	"	319	"
Potential Savings (000 Minutes)	561	"	957	"

4. Savings xample, the projected benefit of reduced delay is calculated to range from a low of $7,610,000 to a high of $12,982,000.

NOTE: Savings in this example do not include purchase or replacement costs of the airplane, airport fees, and other incidental costs incurred by an airline or by an airplane owner. Nor does the example attempt to include the benefits to passengers of reductions in flight delays.

Figure A1-4. Savings associated with reduced delay

Aircraft		Percent of Aircraft	Dollars Minute	Average cost
Class A 12,500 Pounds or less Single Engine	1-3 Seats	6	0.60	0.036
	4 + Seats (GA)	12	1.00	0.120
	4 + Seats (AT)	3	1.80	0.054
Class B 12,500 Pounds or less Multi Engine	Piston Twin (GA)	8	2.50	0.200
	Piston Twin (AT)	4	3.70	0.148
	Turbine Twin (GA)		5.20	
	Turbine Twin (AT)	8	6.80	0.544
Class C 12,500 to 300,000 Pounds	Piston Engine (GA)		2.80	-
	Piston Engine (AT)	2	4.00	0.080
	Piston Engine (AC)		2.90	
	Turbine Twin (GA)	2	5.60	0.112
	Turbine Twin (AT)	5	7.30	0.365
	Turbine Twin (AC)	6	6.60	0.396
	Turbine Four (AC)		15.10	
	2 Engine Jet (GA)	-	13.60	-
	2 Engine Jet (AT)	5	16.80	0.840
	2 Engine Jet (AC)	20	22.00	4.400
	3 Engine Jet (AC)	15	31.40	4.710
	4 Engine Jet (AC)	-	35.50	-
Class D Over 300,000 Pounds	2 Engine Jet (AC)	4	39.00	1.560
	3 Engine Jet (AC)	-	57.60	
	4 Engine Jet (AC)		79.30	
Helicopters	Piston (GA)		1.40	
	Piston (AT)		2.30	
	Turbine (GA)	-	3.30	
	Turbine (AT)	-	4.40	-
	Totals	100		13.565

(GA) General Aviation (AT) Air Taxi (AC) Air Carrier

	Low	High
Current Delay (000 Minutes)	770	1,276
Projected Delay (000 Minutes)	209	319
Potential Savings (000 Minutes)	561	957
Average Cost Per Minute	13.565	13.565
Projected Benefit Per Year (000 Dollars)	7,610	12,982

Figure A1-4. Savings associated with reduced delay (cont.)

APPENDIX 2. EXAMPLES APPLYING CHAPTER 3 CALCULATIONS

1. GENERAL. The examples in this appendix illustrate applications of chapter 3 capacity and delay calculations with portions of the appropriate tables and figures of chapter 3 reproduced in the examples. The work sheets provided in appendix 5 are used to record data.

2. EXAMPLES. Ten examples, figures A2-1 through A2-10, illustrate the progressive calculations of chapter 3.

a. Examples.

(1) Hourly capacity of the runway component (figure A2-1).

(2) Hourly capacity of the taxiway component (figure A2-2).

(3) Hourly capacity of gate group components (figure A2-3).

(4) Airport hourly capacity (figure A2-4).

(5) Annual service volume (figure A2-5).

(6) Hourly delay to aircraft on the runway component (figure A2-6).

(7) Daily de&y to aircraft an the runway component when the D/C ratio is 1.0 or less for each hour (figure A2-7).

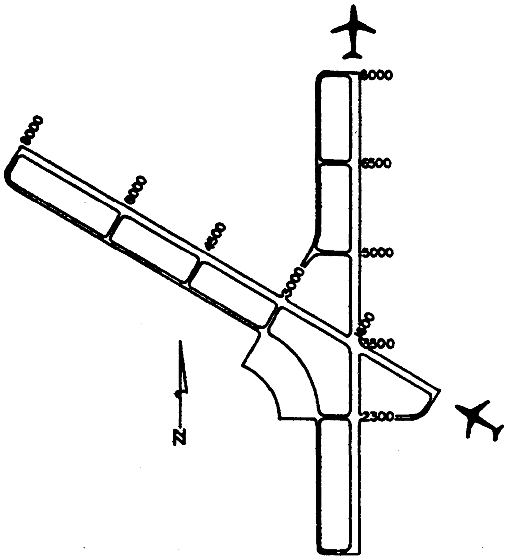
(8) Daily delay to aircraft on the runway component when the D/C ratio is greater than 1.0 for one or more hours (figure A2-8).

(9) Annual delay to aircraft on the rummy component (figure A2-9).

(10) Hourly demand corresponding to a specified level of average hourly delay (figure A2-10).

b. Data. Data necessary to solve each example is provided in the introductory statement. Tb the extent practical, results from one example are used in subsequent examples.

EXAMPLE 1. Determine **VFR** and **IFR** hourly capacities of the depicted **airport.** In the typical busy **hour,** it has 13 single-engine, 10 light twin-engine , 25 'transport **type,** and two **widebody** operations. During **VFR** conditions**,** arrivals constitute **45 percent** of the operations and there are three touch and **go's.** During IFR conditions, the busy **hour** count of small aircraft **operations** drops to two single-engine and five light twin-engine aircraft and arrivals constitute 55 percent of the **operations.** There are no touch and **go's** during IFR conditions. The airport typically operates with arrivals on one runway and departures on the other.



SOLUTION: **The** work sheet on page 5 illustrates one method of recording data.

1. Weather. Enter the weather condition(s) applicable to the **capacity determination** in column 1.

2. Runway-use. From figure 3-2 (illustrated) , the runway-use configuration **diagram** is No. **43.** Enter this diagram number in column 3**,** and a line sketch of the configuration in column **2.**

3. Capacity Figure **(s)** The appropriate figures for determining capacity are No. **3-27** for **VFR** conditions'and No. 3-59 for IFR conditions. **These** VFR and IFR references are entered on the line in column 4 corresponding to the weather condition.

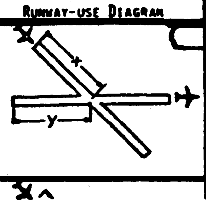
Runway-use Diagram	Diag. No.	Runway Intersection Distance in Feet		Figure No.			
				For Capacity		For Delay	
		(x)	(y)	VFR	IFR	VFR	IFR
	43	0 to 1999	- 4000	3-27	3-59	3-85	3-91
	44	2000 to 4999	- 4000	3-28	3-60	3-86	3-99
	45	5000 to 8000	- 4000	3-29	3-61	3-86	3-99
	46	0 to 1999	• 4000	3-30	3-62	3-86	3-99
	47	2000 to 4999	• 4000	3-31	3-63	3-71	3-102
	48	5000 to 8000	• 4000	3-32	3-64	3-71	3-102
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure **A2-1. Hourly** capacity of the runway **component**

4. Mix Index. This input is calculated using data provided in the example statement. Table 1-1 (illustrated) is used to make the conversion.

Table l-l. Aircraft classifications

Aircraft Class	Max. Cert. T.O. Weight (lbs)	Number Engines	Wake Turbulence Classification
A	12,500 or less	Single	Small (S)
B		Multi	
C	12,500 - 300,000	Multi	Large (L)
D	wet 300,000	Multi	Heavy (H)

The computation of aircraft mix is carried out by setting up a table in the following format. The percent of operations by each aircraft class is recorded in columns 5 through 8.

Aircraft		VFR Mix		IFR Mix	
Description	Class	No. ops.	% ops.	No. ops.	% Ops.
Single-engined	A	13	26	2	6
Light-twins	B	10	20	5	15
Transport-type	C	25	50	25	73
Widebodied	D	2	4	2	6
Totals (No. Ops. & % Ops.)		50	100	34	100

The mix indices are calculated and entered in column 9.

$$VFR = 50+3(4) = 62$$

$$IFR = 73+3(6) = 91$$

5. Percent Arrivals. The percent arrivals is given as 45 for VFR conditions and 55 for IFR conditions. Enter in column 10.

6. Hourly Capacity Base (C*). Obtain C* from figure 3-27 for VFR and 3-59 for IFR, and enter in column 14.

7. Touch and Go Factor (T). The statement specified 3 touch and gos during VFR and none in IFR. Since a touch and go is a landing and a takeoff (2 operations), the percent of touch and go operations in VFR conditions is6/50 or 12 percent. Obtain the touch and go factor T from figure 3-27 for VFR and 3-59 for IFR and enter in column 15.

Figure A2-1. Hourly capacity of the runway canponent (cont.)

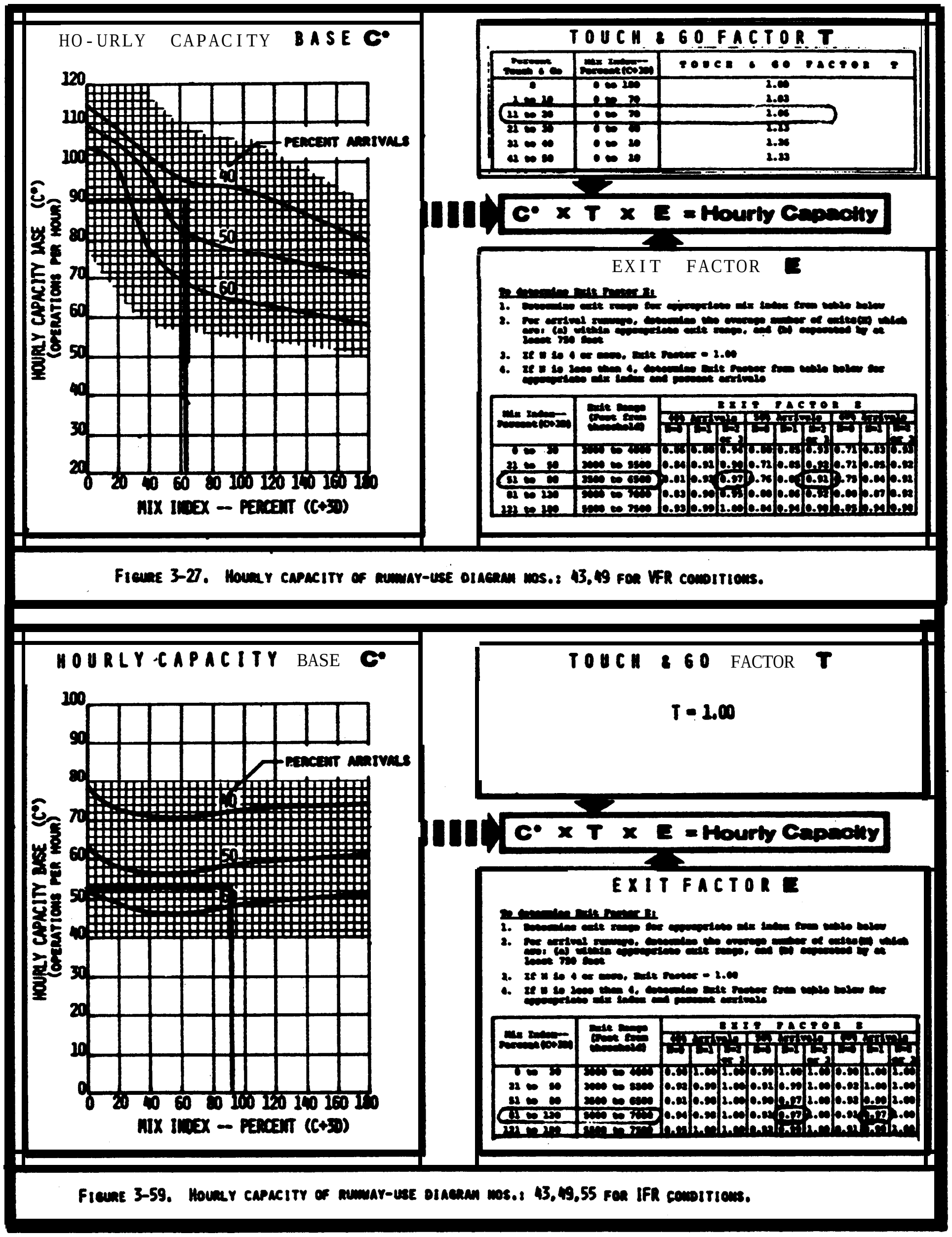


FIGURE 3-27. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 43,49 FOR VFR CONDITIONS.

FIGURE 3-59. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 43,49,55 FOR IFR CONDITIONS.

8. **Exit** Factor **E.** A landing aircraft might exit at the runway intersection (1600 **feet)** or at one of the three right-angled exits located 3000, 4500, and 6000 feet **from** the threshold. **From** figures **3-27** for **VFR** and **3-59** for IFR, determine the exit range and the exit factor E. In this **example,** only two exits are within the range between 3500 to 7000 feet. Enter the exit locations in columns 12 and the number of usable exits in column 13. The exit **factors E** are entered in column 16.

Figure **A2-1. Hourly** capacity of the **runway component (cont.)**

9. Calculate Capacity. Compute the hourly capacity of the runway-use configuration and enter in column 17.

VFR Capacity = 89·1.06·0.94 = 88.68 or 89 operations per hour

IFR capacity = 53·1.00·0.97 = 51.41 or 51 operations per hour

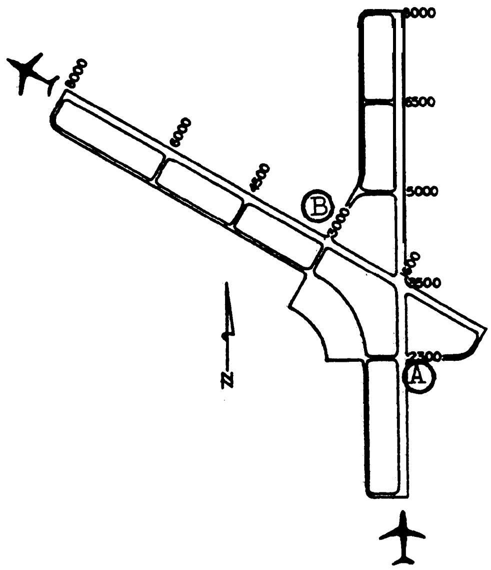
Weather	Runway-use Diagram	Runway-use No.	Capacity Figure No.	%A	%B	%C	%D	Mix Index %(C+3D)	Percent Arrivals	Percent Touch & Go	Runway Exits (00 feet) Location			Runway Exits No.	Hourly Capac. Base C*	T & G Factor T	Exit Factor E	Hourly Capacity C*·T·E
1	2	3	4	5	6	7	8	9	10	11	12			13	14	15	16	17
VFR IFR		43	3-27 3-59	26 6	20 15	50 73	4 6	62 91	45 55	12 0	45 60	60		2 1	89 53	1.06 1.00	.94 .97	89 51

Work sheet for runway hourly capacity.

10. Conclusion. The calculated hourly capacities of the runway-use configuration of 89 operations per hour in VFR conditions and 51 operations per hour in IFR conditions exceeds the aeronautical demands of 50 VFR operations and 34 IFR operations specified in the statement.

Figure A2-1. Hourly capacity of the runway component (cont.)

EXAMPLE 2, Determine the VFR and IFR capacity of taxiway crossings (A and B) for the airport of example 1 when operated as shown. Use the traffic data from example 1. NOTE: Runway usage is reversed from that used in example 1 to permit illustation of the crossing effect on both arrivals and departures.



SOLUTION: The work sheet on page 7 illustrates one method of recording data.

1. Weather. Enter type of weather in column 1.

2. Crossing Location. Identify and enter crossing locations in columns 2 and 3. Taxiway crossing (A) is 2300 feet from the arrival threshold and taxiway crossing (B) is 3000 feet from the departure threshold.

3. Runway Operations Rate. Determine operations rate and enter in column 4. The airport has a VFR demand of 50 operations per hour with 45 percent arrivals, i.e., 23 arrivals and 27 departures. The touch-and-go adjustment reduces the departure demand to 24 operations. In IFR there are 19 arrivals and 15 departures.

4. Mix Index. Calculate the mix index and enter in column 5. VFR mix index is 62 and IFR mix index is 91.

5. Taxiway Crossing Capacities, Obtain crossing capacities from figure 3-66A (illustrated) for the arrival crossing (A) and figure 3-67A (illustrated) for the departure crossing (B) and enter in columns 6 and 7.

Crossing A (arrivals) VFR capacity = 107, and IFR capacity = 92

Crossing B (departures) VFR capacity = 125, and IFR capacity = 112

Figure A2-2. Hourly capacity of the taxiway component

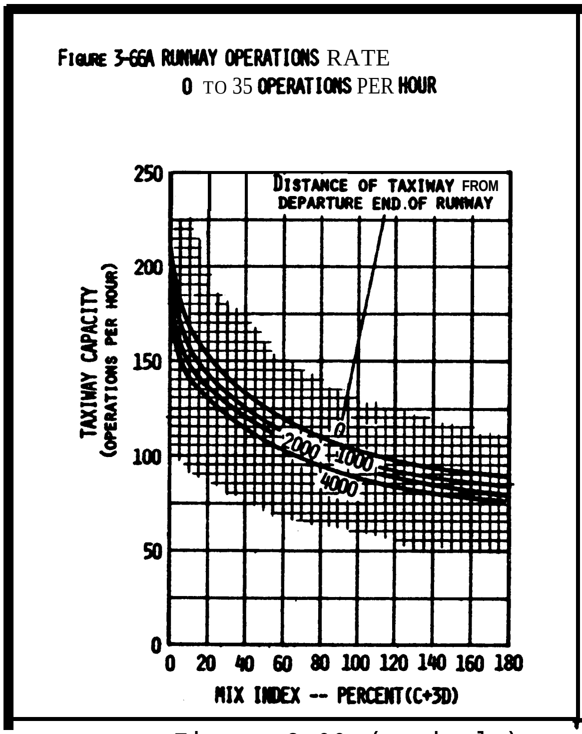


Figure 3-66 (arrivals).

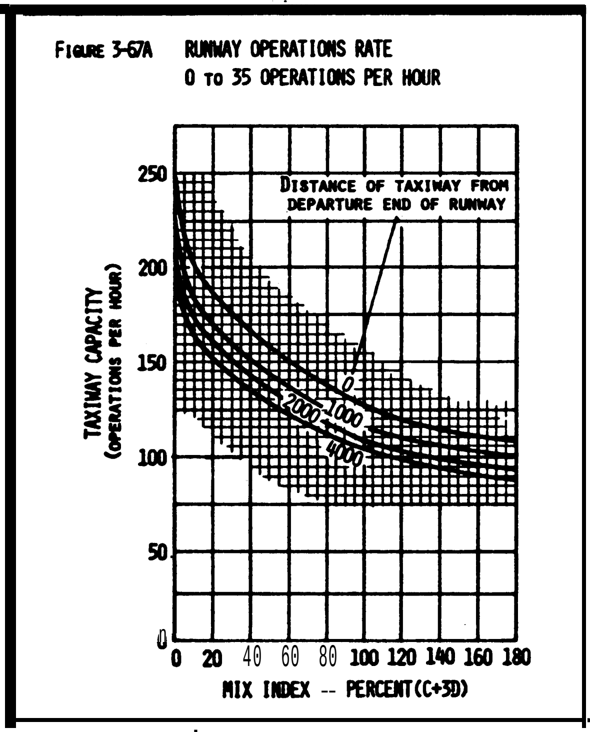


Figure 3-67 (departures).

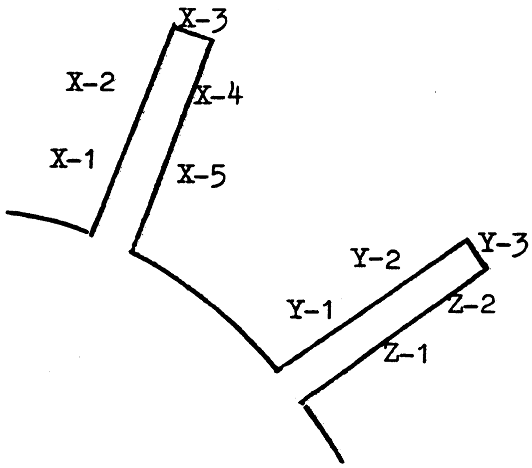
Weather	Taxiway Crossing	Distance from Threshold	Runway Ops. Rate	Runway Mix Index	Taxiway Crossing Capacities (Operations per Hour) Arrivals and Mixed Operations	Taxiway Crossing Capacities (Operations per Hour) Departures Plus T & G
1	2	3	4	5	6	7
VFR	A	2300'	24	62	107	-
"	B	3000'	20	62	-	125
IFR	A	2300'	15	91	92	-
"	B	3000'	19	91	-	112

Work sheet for taxiway crossing capacities.

6. Conclusion. The taxiway crossing capacities for the stipulated operational conditions would not be capacity limiting since the demand is less than one-fourth of the theoretical capacity.

Figure A2-2. Hourly capacity of the taxiway component (cont.)

EXAMPLE 3. **Determine** the hourly capacity of the terminal gate **complex** at the airport of example 1. It has 10 gates allocated to three airlines **X, Y,** and Z. Only the end gates X-3 and Y-3 are capable of **accommodating** widebodied aircraft. During an **hour,** airline **X** schedules 13 non-widebodies with an average gate time of 45 minutes and two widebodies with an average gate time of 55 minutes. Airline Y schedules eight **non-widebodies** with an average gate time of 40 minutes and airline **Z** schedules four non-widebodies with an average gate time of 35 minutes.



SOLUTION: The work sheet on page 9 illustrates one method of recording data.

1. Gates Groups. The gate groups **(airlines** identification) and type of gates **are** entered in columns 1, 4, 5, and **13.**

2. Gate **Mix.** Operational demands are entered in columns 2 and 3. The gate mix **obtained** by dividing the number of non-widebodied operations by the total number of **operations** is entered in column 6.

3. Gate Percentage. Calculate the percentage 'of widebodied gates in each gate group and enter in column 7.

4. Gate Occupancy **Time.** Gate times are entered in columns 8 and **9.** Since gate **times** vary by airline and location**,** it is presumed that the **example average** gate occupancy times **were** obtained by on-site surveys.

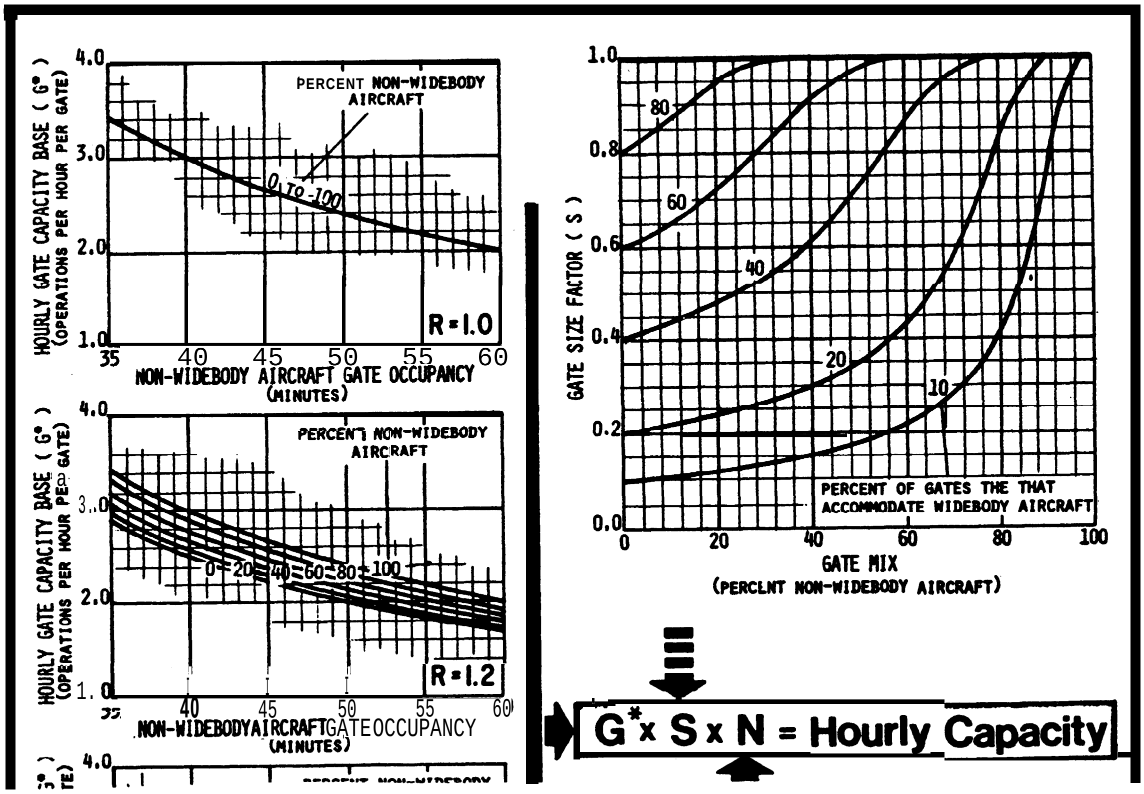
5. Gate Occupancy Ratio. Gate occupancy ratio (R) **,** entered in column 10, is **determined** by dividing the average gate occupancy time of the widebodied aircraft by that of the non-widebodied aircraft.

Airline X, R **= 55/45 =** 1.22

When no widebodied aircraft are **accomodated,** R **equals** 1.00

Figure **A2-3. Hourly capacity** of gate group **component**

6. Gate Capacity. Calculate the hourly capacity for each gate group from the equation G*•S•N where N equals the number of gates in the group. Obtain values for G* and S from figure 3-68 (illustrated) and entered in columns 11 and 12. Do not interpolate, use the chart with the lower R value.



Non-widebody (N) **Widebody (W)**

Gate Group	Demand		No. Gates		Gate Mix		Average Gate Time (Min.)		Gate Occupancy Ratio	Hourly Capac. Base	Gate Size	No. Gates	Hourly capacity
	(N)	(W)	(N)	(W)	(N) (%)	(W) (%)	(N) (T_n)	(W) (T_w)	(T_w/T_n) (R)	(G*)	(S)	(N)	(G*•S•N)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
X	13	2	4	1	87	20	45	55	1.22	2.6	.97	5	13
Y	8	0	2	1	100	33	40	0	1.00	3.0	1.00	3	9
Z	4	0	2	0	100	0	35	0	1.00	3.4	1.00	2	7
Capacity of the Terminal													29

Work sheet for gate capacity.

7. Conclusion. The gate group capacity of airline X is two operations short of its demand, whereas the calculated gate group capacities of airlines Y and Z exceed their demand by one and three operations respectively. The terminal capacity exceeds the combined airline demand by two operations per hour.

Figure A2-3. Hourly capacity of gate group components (cont.)

EXAMPLE 4. Identify the constraining component under VFR conditions of the example airport. Use previously calculated data.

SOLUTION: The work sheet below illustrates one method of recording data.

1. Capacity and Demand. The airport components, hourly capacities and demands obtained from examples 1, 2, and 3 are entered in columns 2 and 3 of the work sheet.

2 Demand Ratio. Divide each component demand by the runway demand and enter in column 4.

3. Component Quotients. Divide each components hourly capacity by its demand ratio and enter in column 5.

4. Constraining Component. Identify the lowest component quotient in column 5 (i.e. 54).

Component	Hourly Capacity	Hourly Demand	Demand Ratio' Componet Demand Runway Demand	Component Quotient Component Capacity Demand Ratio
1	2	3	4	5
Runway	89	50	50/50 = 1.00	89/1.00 = 89
Twy Xing A	107	20	20/50 = .40	107/.40 = 267
Twy Xing B	125	24	24/50 = .48	125/.48 = 260
Gates	29	27	27/50 = .54	29/.54 = 54

Work sheet for identifying the constraining component.

5. Conclusion. The constraining component is the terminal gate complex which limits the airports hourly capacity to 54 operations per hour.

Figure A2-4. Airport hourly capacity

EXAMPLE 5. Determine the ASV of the example airport assuming there are 219,750 annual operations, 690 average day operations and 50 peak hour operations.

SOLUTION: The work sheet on page 12 illustrates one method of recording data.

1. Calculate C_w.

a. Runway-use Configuration. Identify the different runway-use conditions used over the course of a year and the mix index for each use. Enter in columns 1 through 4.

b. Percent of Use (P). Identify the percent of the time each configuration is used and enter in column 5. The figures shown on the work sheet in column 5 are hypothetical.

c. Runway Hourly Capacity (C). Calculate the hourly capacities of operating conditions as in example 1 and enter in column 6. Example 1 data are used for operating conditions 1 and 2.

d Maximum Capacity Configuration. Identify the runway-use configuration that provides the maximum capacity.

e. Percent of Maximum Capacity. Divide the hourly capacity of each runway-use configuration by the capacity of the configuration that provides the maximum capacity and enter in column 7.

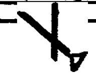
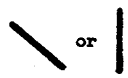
Operating condition 1 89/89 = 100
" " 2 51/89 = 57
" " 3 62/89 = 70
" " 4 52/89 = 58
" " 5 59/89 = 66
" " 6 46/89 = 52

f. ASV Weighting Factor (W) From Table 3-1, identify the weighting factor (W) for each operating condition and enter in column 8.

Table 3-1. ASV Weighting Factors

Percent of Maximum Capacity	Weighting Factors			
	VFR	IFR		
		Mix Index (0-20)	Mix Index (21-50)	Mix Index (51-180)
91+	1	1	1	1
81-90	5	1	3	5
66-80	15	2	8	15
51-65	20	3	12	20
0-50	25	4	16	25

Figure A2-5. Annual service volume

Operating Condition			Mix Index	Percent of Year (P)	Hourly Capacity (C)	Percent Maximum Capacity	Weighting Factor (W)
No.	Weather	Rwy-use Diagram					
1	2		4	4	6	7	8
1	VFR		91	74.5	51	100 57	20
2	IFR						
3	VFR		62	5	62	70	15
4	IFR		91	5	52	58	20
5	VFR		62	4	59	66	15
6	IFR		91	4	46	52	20
7	IFR	Below Minimums		3			25

Work sheet for ASV factors.

g. Weighted Hourly Capacity (C_w). Calculate the weighted hourly capacity using the **following** equation:

$$C_w = \frac{(P_1C_1W_1) + (P_2C_2W_2) + \ldots (P_nC_nW_n)}{(P_1W_1) + (P_2W_2) + \cdots (P_nW_n)}$$

$$C_w = \frac{(.74\cdot89\cdot1) + (.05\cdot51\cdot20) + (.05\cdot62\cdot15) + (.05\cdot52\cdot20) + (.04\cdot59\cdot15) +}{(.74\cdot1) + (.05\cdot20) + (.05\cdot15) + (.05\cdot20) + (.04\cdot15) +}$$

$$\frac{(.04\cdot46\cdot20) + (.03\cdot0\cdot25)}{(.04\cdot29) + (.03\cdot25)}$$

$$C_w = \frac{287.56}{5.64} \text{ or } 51 \text{ operations per hour.}$$

2. **Daily Demand Ratio (D).** Calculate D using the equation:

$$D = \frac{\text{Annual}}{\text{Average Day-peak month}} = \frac{219,750}{690} = 318$$

3. **Hourly Demand** Ratio (H). Calculate H **from** the equation:

$$H = \frac{\text{Average Day--peak month}}{\text{Avetage Peak Hour--peak month}} = \frac{690}{50} = 14$$

4. **Calculate ASV.** ASV is calculated from the **equation** $ASV = C_w \cdot D \cdot H$

$$ASV = 51\cdot318\cdot14 = 227,052 \text{ operations per year.}$$

5. **Conclusion. ASV** is **an** indicator of the annual operational capability of an airport adjusted for differences in hourly capacities **which** occur **over** the **course** of **a year. In** this example, the airport theoretically could. have **accommodated** and **additional** 7,302 operation8 **during the year.**

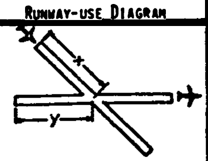
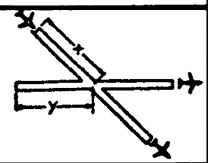
Figure A2-5. Annual service volume (cont.)

EXAMPLE 6. Determine the hourly delay in **VFR** and IFR weather conditions for the example airport in its predominate mode of operation. The peak 15 minute demand in **VFR** is 20 operations and in IFR it is 15 operations. Extract necessary data from examples 1 through **5.**

SOLUTION: The work sheet on page 16 illustrates one method of recording data.

1. Hourly Capacity. Enter the hourly'capacities calculated in example 1 (89 **VFR,** 51 IFR) in column 5.

2. Identify Delay Figure **Nos.** From figure 3-2 (illustrated), identify the **runway-use** configuration as **No.** 43 and figures 3-85 and 3-91 for determining **VFR** and IFR **delay.** Enter in **columns** 2, **3,** and 4,

Runway-use Diagram	Diag. No.	Runway Intersection Distance in Feet (x)	(y)	Figure No. For Capacity VFR	IFR	For Delay VFR	IFR
	43	0 to 1999	< 4000	3-27	3-59	3-85	3-91
	44	2000 to 4999	< 4000	3-28	3-60	3-86	3-99
	45	sow to 8000	< 4000	3-29	3-61	3-86	3-99
	46	0 to 1999	> 4000	3-30	3-62	3-86	3-99
	47	2000 to 4999	> 4000	3-31	3-63	3-71	3-102
	48	5000 to 8000	> 4000	3-32	3-64	3-71	3-102
	49	0 to 1999	< 4000	3-27	3-59	3-85	3-91
	S0	2000 to 4999	< 4000	3-28	3-60	3-86	3-99
	51	5000 to 8000	< 4000	349	3-61	3-86	3-99
	S2	0 to 1999	> 4000	3-30	3-62	3-86	3-99
	S3	2000 to 4999	> 4000	3-31	3-65	3-71	3-90
	54	5000 to 8000	> 4000	3- 3	3-43	3-71	3-90
	[illegible]	0 to 1999	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

3. **Demands.** Enter the hourly demand **from** example 1 (50 **VFR,** 34 **IFR)** in **column 6,** and the 15 minute **demands** of 20 **VFR** and 15 IFR in column **7.**

4. **Demand/Capacity Ratio.** Calculate the D/C ratios and enter in column **8.**

D/C ratio **VFR = 50/89 =** 0.56

D/C ratio **IFR = 34/51 =** 0e67

5. **Delay Indices. From** figure **3-85 and 3-91** (illustrated), obtain arrival delay **index (ADI)** and **departure** delay index (DDI) and enter in columns 11 and **13.** Enter **example** 1 **mix** indices in column 10 (62 **VFR,** 91 IFR) and percent **arrivals** in **column** 9 (459 **VFR,** 559 **IFR).**

Figure **A2-6. Hourly** delay

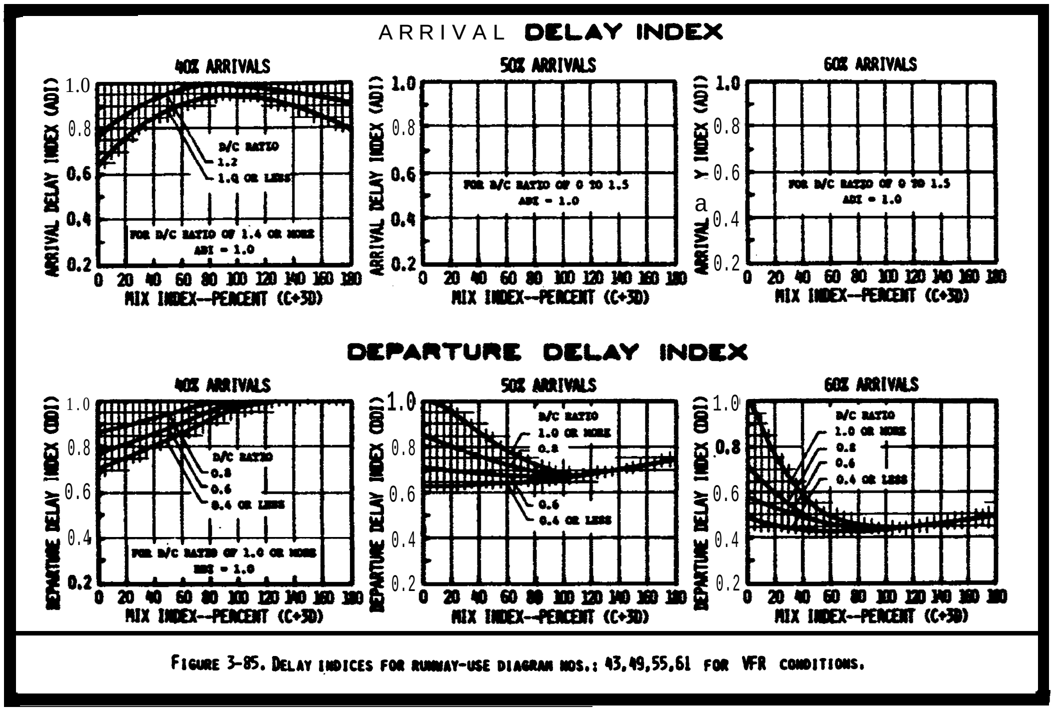


FIGURE 3-85. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 43,49,55,61 FOR VFR CONDITIONS.

VFR ADI at 40% = 0.90
" " 50% = 1.00
" 45% = 0.95

VFR DDI at 40% = 0.90
" " 50% = 0.67
" " 45% = 0.78

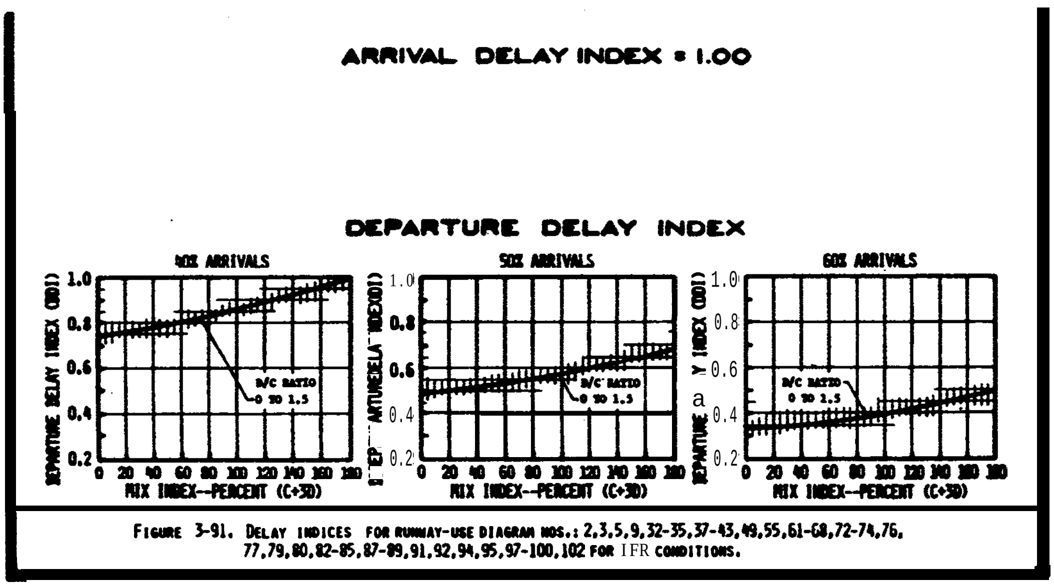


FIGURE 3-91. DELAY INDICES FOR RUNWAY-USE DIAGRAM NOS.: 2,3,5,9,32-35,37-43,49,55,61-68,72-74,76, 77,79,80,82-85,87-89,91,92,94,95,97-100,102 FOR IFR CONDITIONS.

IFR ADI at 50% = 1.00
" " 60% = 1.00
" " 55% = 1.00

IFR ADI at 50% = 0.57
" " 60% = 0.38
" " 55% = 0.47

Figure **A2-6. Hourly delav** (cont.)

6. Delay Factors. Calculate the arrival and departure delay factors (ADF and DDF) using the equation ADF = ADI·(D/C) and DDF = DDI·(D/C). Enter results in columns 12 and 14.

ADF for VFR = 0.95·0.56 = 0.53 DDF for VFR = 0.78·0.56 = 0.44

ADF for IFR = 1.00·0.67 = 0.67 DDF for IFR = 0.47·0.67 = 0.31

7. Demand Profile Factor (DPF). Divide the 15 minute demand (column 7) by the hourly demand (column 5) and multiply the result by 100. Enter results in column 15.

DPF for VFR = (20/50)·100 = 40%

DPF for IFR = (15/34)·100 = 44%

8. Determine Average Delay. Using figure 3-69 (illustrated), the delay factors (columns 12 and 14), and the demand profile factors (column 15), determine the average delay to an arriving and a departing aircraft for VFR and IFR conditions and enter in column 16 and 17.

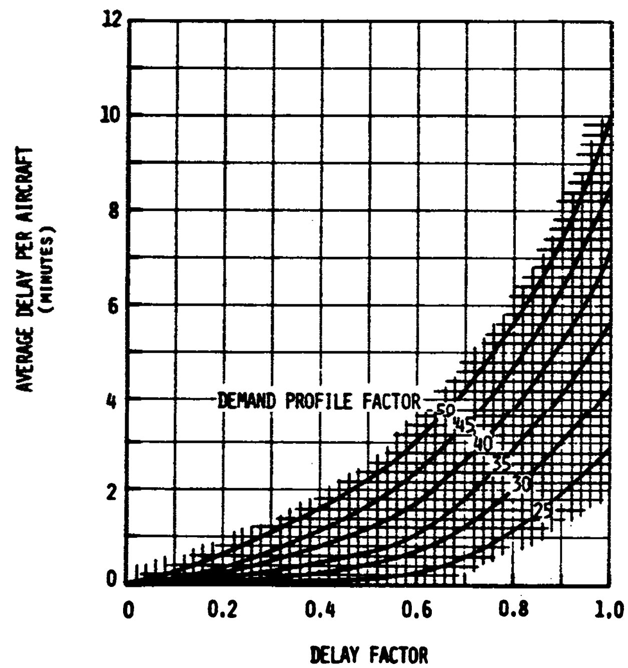


FIGURE 3-69. AVERAGE AIRCRAFT DELAY IN AN HOUR.

Figure A2-6 Hourly delay (cont.)

9. **Hourly Delay.** Calculate the hourly delay using the following equation and enter in column 18.

Hourly delay = Hourly demand [(% arrivals·average arrival delay) + (% departures·average departure delay)]

Delay in VFR = 50 [(0.45·1.3)+(0.55·0.95)] = 55 minutes

Delay in IFR = 34 [(0.55·2.8)+(0.45·0.06)] = 53 minutes

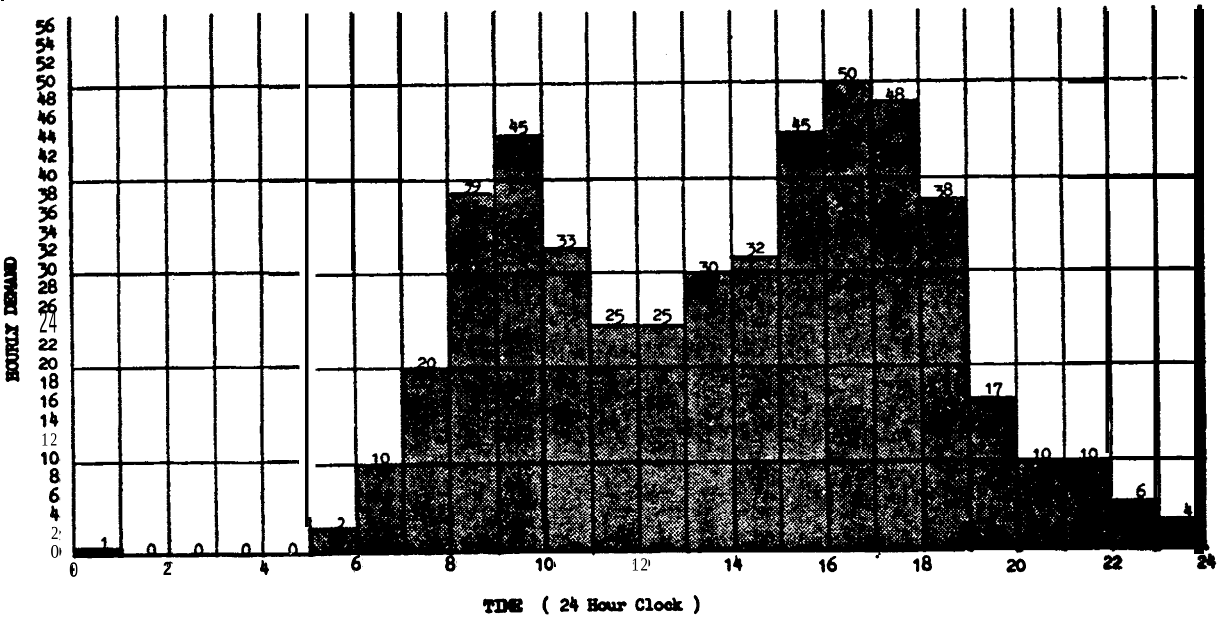
Runway-use Configuration		Delay Fig. No.			Demand		D/C Ratio	Percent Arrivals	Mix Index	Arrival Delay		Depart. Delay		Demand Profile Factor	Aver. Delay (Minutes)		Hourly Delay (Minutes)
Sketch	No.	VFR	IFR	Capacity	Hourly	15 Min.				Index ADI	Factor ADF	Index DDI	Factor DDF	DPF	Arr.	Dep.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	43	85		89	50	20	.56	45	62	.95	.53	.78	.44	40	1.3	.95	55
	43		91	51	34	15	.67	55	91	1.00	.67	.47	.31	44	2.9	.60	53

Work sheet for hourly delay.

10. **Conclusion.** Because the **demand** is significantly less than capacity, and the scheduled **airline operations** are reasonably constant in **VFR** or IFR weather conditions, there is little **difference** in the minutes of delay experienced **in** the typical **VFR** or **IFR hour.**

Figure A2-6. Hourly delay (cont.)

EXAMPLE 7. **Determine** the daily delay in **VFR** conditions for the example **airport.** The **hourly demand** for a typical **VFR** day is as plotted. **Demand is always less** than capacity. For **demands** of 11 to 44 operations per hour**,** arrivals equal **departures.** For demands aver **44 operations** per **hour,** the arrival rate drops to 45 percent. **Noise** abatement practices limit the airport to the use of one runway **from 10:00 pm to 7:00** am.



Histograph of daily demand

SOLUTION: **The** work sheet on page 18 illustrates one **method** of **recording** data.

1. Calculate Capacities. Calculated runway capacities for the different operating conditions are illustrated **below.** Assumptions **were** made for demand, aircraft mix, and percent of touch and go's for the first four operating **conditions.** **Data from** example 1 are used for the fifth aperating condition.

Demand	Runway-use Diagram	Runway-use No.	Capacity Figure No. VFR	Capacity Figure No. IFR	Aircraft Mix %A	%B	%C	%D	Mix Index %(C+3D)	Arrivals %	Touch and Go %	Runway Exits Location				Runway Exits No.	Hrly. Cap. Base C*	T & G Factor T	Exit Factor E	Hourly Capacity C*·T·E
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18
11-19		1	3		23	75	2	0	2	50	5	30	45	60		1	103	1.04	.86	92
11-19		43	27		40	55	5	0	5	"	20	"	"	"		1	108	1.08	.85	97
20-35		"	"		35	35	30	0	30	"	10	"	"	"		2	102	1.03	.92	97
36-44		"	"		30	27	42	1	45	50	8	"	"	"		"	94	1.03	.92	89
45+		43	27		26	20	50	4	62	45	12	30	45	60		2	88	1.06	.94	89

Work sheet for hourly capacity.

Figure A2-7. Daily delay, D/C ratio equal or less than **1.00**

2. **Calculate Hourly** Delay. The hourly runway delay calculations of example 6 are repeated 24 times to develop average arrival and departure delays per aircraft and the minutes of delay for each **hour.** Assume the demand is fairly uniform so that the **DPF** (column 11) is 25 when the demand is less than 10 operations per hour. When the demand is 10 or **more,** the DPF is **40.** Forty percent of the operations occur in a 15 minute period whenever the demand is 10 or **more.**

Hour	Misc.	Hourly Demand	Hourly Capacity	D/C Ratio	Mix Index	Arrival Delay Index ADI	Arrival Delay Factor ADF	Depart. Delay Index DDI	Depart. Delay Factor DDF	Delay Factor DPF	Aver. Delay (Minutes) Arr.	Aver. Delay (Minutes) Dep.	Hourly Delay (Minutes)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
24:00-01:00		1	92	.01	0	0	0	0	0	0	0	0	0
01:00-02:00		0	-	-	-	-	-	-	-	-	-	-	-
02:00-03:00		"	-	-	-	-	-	-	-	-	-	-	-
03:00-04:00		"	-	-	-	-	-	-	-	-	-	-	-
04:00-05:00		"	-	-	-	-	-	-	-	-	-	-	-
05:00-06:00		3	92	.03	0	.64	.02	.50	.01	25	0	0	0
06:00-07:00		10	92	.11	2	.64	.07	.50	.06	40	.05	.05	1
07:00-08:00		20	97	.21	30	1.00	.21	.63	.13	"	.30	.15	4
08:00-09:00		39	89	.44	45	1.00	.44	.65	.29	"	.95	.50	28
09:00-10:00		45	"	.51	62	.95	.48	.78	.37	"	1.10	.80	42
10:00-11:00		33	89	.37	30	1.00	.37	.63	.23	"	.70	.35	17
11:00-12:00		25	97	.26	"	"	.26	"	.16	"	.40	.20	7
12:00-13:00		25	97	.26	"	"	.26	"	.16	"	.40	.20	7
13:00-14:00		30	89	.34	"	"	.34	"	.21	"	.60	.30	14
14:00-15:00		32	"	.36	30	1.00	.36	.63	.23	"	.65	.35	16
15:00-16:00		45	"	.51	62	.95	.48	.78	.39	"	1.10	.80	42
16:00-17:00		50	"	.56	"	"	.53	"	.44	"	1.30	.95	55
17:00-18:00		48	"	.54	62	.95	.51	.78	.43	"	1.20	.90	50
18:00-19:00		38	89	.43	45	1.00	.43	.65	.28	"	.90	.40	25
19:00-20:00		17	97	.18	5	"	.18	.63	.11	"	.25	.15	4
20:00-21:00		10	"	.10	"	"	.10	"	.06	"	.05	.05	1
21:00-22:00		10	97	.10	5	1.00	.10	.63	.06	40	.05	.05	1
22:00-23:00		6	92	.07	2	.64	.04	.50	.04	25	0	0	0
23:00-24:00		4	92	.04	0	.64	.03	.50	.02	25	0	0	0
											Daily Delay		295

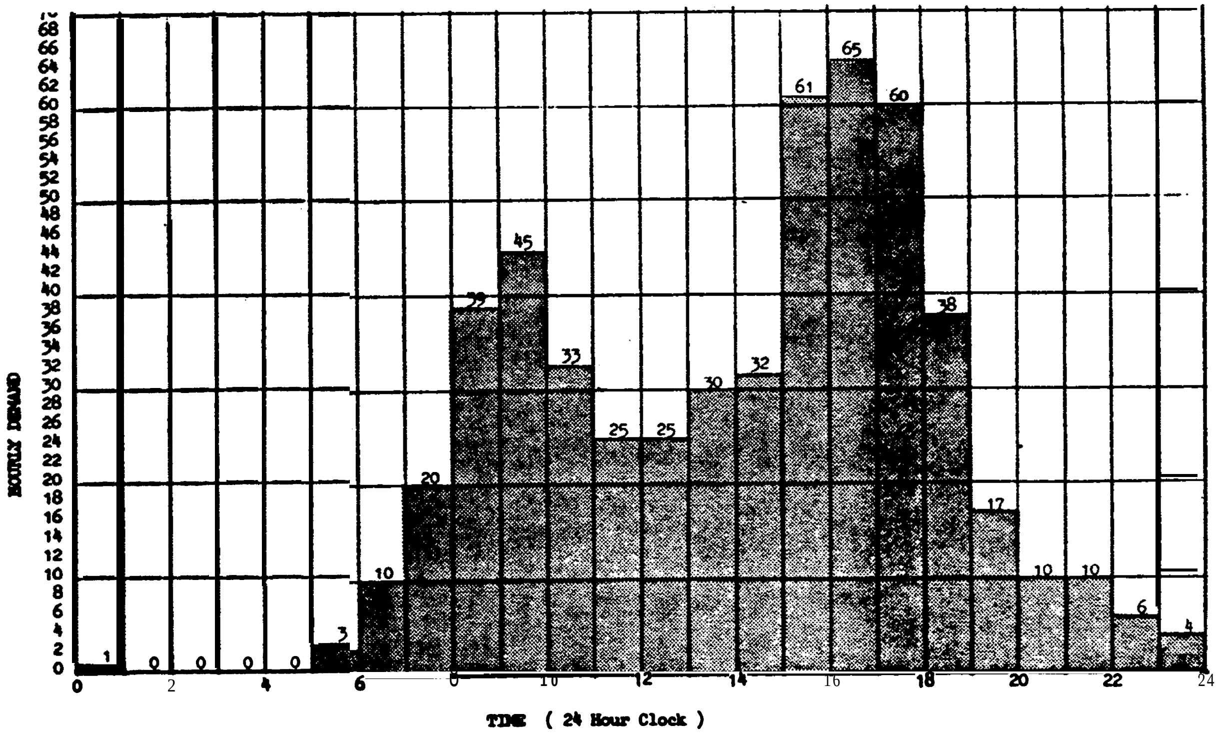
Work sheet for daily **runway** delay.

3. Total Delay. **Sum** the hourly delays, i.e. 295 minutes.

4. **Conclusion. The** 295 minutes of &lay for the day is influenced by **scheduling practices** within the **hour.**

Figure **A2-7.** Daily delay, D/C **ratio** equal or less than 1.00 (cont.)

EXAMPLE 8. Determine the daily delay in **VFR conditions** if the example airport closes the **north-south runway** and the demand during the 3:00 **PM to** 6:00 **PM time** period is increased to exceed the runways capacity.



Histograph of daily **demand.**

SOLUTIONS **The work** sheet cm page 21 illustrate one method of recording data.

1. Identify Saturated **Time Periods:**

a. Calculate Capacities. Calculated runway capacities for the single runway condition are illustrated **below. Since operations** are **limited to a single** runway, capacity values will differ **from** those of **example 7.** Enter data **from below** and **from** example 7 in **columns 3, 4, 6, and 11.**

Demand 1	Runway-use Diagram 2	Runway-use No. 3	Capacity Figure No. VFR 4	Capacity Figure No. IFR 5	Aircraft Mix %A 6	%B 7	%C 8	%D 9	Mix Index %(C+3D) 10	Arrivals % 11	Touch and Go a 12	Runway Exits Location 13				Runway Exits No. 14	Hrly. Cap. Base C* 15	T & G Factor T 16	Exit Factor E 17	Hourly Capacity C*·T·E 18
11-19		1	3		40	55	5	0	5	50	20	30	45	60		1	97	1.10	.86	92
20-35		"	"		35	35	30	0	30	50	10	"	"	"		2	71	1.04	.93	69
36-44		"	"		30	27	42	1	45	45	8	"	"	"		"	65	1.04	.93	63
45-50		"	"		26	20	50	4	62	"	12	"	"	"		"	62	1.10	.91	62
51-59		"	"		21	17	59	3	68	"	10	"	"	"		"	61	1.04	.91	58
60+		1	3		20	15	62	3	71	45	9	30	45	60		2	58	1.04	.91	55

Work sheet **for capacity.**

Figure **A2-8. Daily** delay when D/C ratio is greater than **1.00**

b. Identify Saturated Period. Compare calculated capacities to the demand histograph. The time period from initial overload through recovery (15:00 to20:00) is the saturated period,

Time Period	Demand	Capacity	Overload (Recovery)	Cummulative Overload
14:00-15:00	32	69	0	0
15:00-16:00	61	55	6	6
16:00-17:00	65	55	10	16
17:00-18:00	60	55	5	21
18:00-19:00	38	55	(17)	4
19:00-20:00	17	55	(4)	0
20:00-21:00	10	92	0	0

2. Saturated Period Delay. Calculate the delay for the saturated period as follows:

a. Duration of Overload Phase. Identified as 15:00 to 18:00 hours.

b. AD/C Ratio. Calculate the AD/C ratio for the overload period and enter in column 5.

$$AD/C = \frac{61+65+60}{55+55+55} = \frac{186}{165} = 1.13$$

c. Percent Arrivals. Given as 45%.

d. Delay Indices. Obtain ADI and DDI from figure 3-71 and enter in columns 7 and 9.

AD1 at	40% = 0.74	DDI at	40% = 1.00
"	50% = 0.83	"	50% = 1.00
"	45% = 0.78	a	45% = 1.00

e. Arrival and Departure Delay Factors. Calculate ADF and DDF for the saturated period by multiplying AD1 and DDI by the AD/C ratio and enter in columns 8 and 10.

$$ADF = 0.78 \cdot 1.13 = 0.88$$

$$DDF = 1.00 \cdot 1.13 = 1.13$$

f. Average Delays. Determine average delay from figure 3-70 for a 3-hour overload phase and entered in columns 12 and 13.

Figure A2-8. Daily delay when D/C ratio is greater than 1.00 (cont.)

g. Saturated **Period** Delay. Calculate **the saturated period (DTS)** de&y **and** enter in column 14.

DTS = (61+65+60+38+17)(45·4.9+(100-45)·13.7)/100
= 241(974.0)/100
= 2,347 minutes of delay

3. Hourly Delays Unsaturated Periods. **Calculate hourly delays for the unsaturated** periods (24:00 to 15:00 and 20:00 to 24:00) **as in example 6.**

Hour 1	Misc. 2	Hourly Demand 3	Hourly Capacity 4	D/C Ratio 5	Mix Index 6	Arrival Delay Index ADI 7	Arrival Delay Factor ADF 8	Depart. Delay Index DDI 9	Depart. Delay Factor DDF 10	Delay Factor DPF 11	Aver. Delay (Minutes) Arr. 12	Aver. Delay (Minutes) Dep. 13	Hourly Delay (Minutes) 14
24:00-01:00		1	92		–		–	-I-I-I-		–	–	–	–
01:00-02:00		0	"			–							
02:00-03:00		0	"		–			–		–	–		
03:00-04:00		0	"			–		–				–	
04:00-05:00		0	"	–			–	–			–	–	–
05:00-06:00		3	"	.03	5	.65	.02	.50	.02	40	0.0	0.0	0
06:00-07:00		10	92	.11	5	.65	.07	.50	.06	"	0.1	0.0	1
07:00-08:00		20	69	.29	30	.70	.20	.52	.15	"	0.2	0.2	4
08:00-09:00		39	63	.62	45	.72	.45	.64	.40	"	1.0	0.8	35
09:00-10:00		45	62	.73	62	.67	.49	.74	1.54	"	1.1	1.4	57
10:00-11:00		33	69	[illegible]	30	.70	.34	.56	.27	"	0.6	0.4	17
11:00-12:00		25	"	.36	"	"	[illegible]	[illegible]	19	"	0.4	0.2	8
12:00-13:00		25	"	.36	"	"	[illegible]	[illegible]	[illegible]	"	0.4	0.2	8
13:00-14:00		30	"	.43	"	"	[illegible]	.53	[illegible]	"	0.5	0.3	12
14:00-15:00		32	60	.46	30	.70	.32	.56	.26	40	0.6	0.4	16
15:00-16:00		61	55										
16:00-17:00		65	"	1.13	71	[illegible]	[illegible]	1.00	1.13	40	4.9	13.7	2347
17:00-18:00		60	"										
18:00-19:00		38	"										
19:00-20:00		17	55										
20:00-21:00		10	92	[illegible]	5	[illegible]	.07	[illegible]	[illegible]	40	Oel	0.0	1
21:00-22:00		10	"	1 1	"	"	.07	"	[illegible]	"	0.1	0.0	[illegible]
22:00-23:00		6	"	07	"	"	[illegible]	"	.04	"	0.0	0.0	0
23:00-24:00		4	92	[illegible]	5	[illegible]	[illegible]	.50	.02	40	0.0	0.0	0
											Daily Delay		2507

Work sheet for daily delay **when D/C** ratio is greater than 1.00.

4. Daily Delay. Sum the hourly delays for the saturated and unsaturated **periods,** i.e. 2,507 minutes.

5. Conclusion. When **demand exceeds capacity for several consecutive hours,** daily delays increase significantly.

Figure **A2-8.** Daily delay when D/C ratio **is greater** than 1.00 (cont.)

EXAMPLE 9. Determine the annual runway delay for the example airport, assuming that the airport has an annual demand of 153,000 operations, a demand profile factor of 40, no runway closures, and relatively uniform daily demand throughout each month.

SOLUTION: The work sheet on page 25 illustrates one **method** of recording **data.**

NOTE: Use procedures illustrated in examples 7 and 8 to determine the delays for **VFR** and **IFR** days. To allow for seasonal variations of demand, 24 representative days are used, i.e., a **VFR** and an IFR day for each calender month.

1. Distribute Demands. Distribute the annual demand **of** 153,000 **operations** to **representative** daily demands as follows:

a. Distribute to Months. Distribute annual demand to the 12 calendar months and enter in **column 3.** Use historical data when available.

b. Distribute to Days. **Monthly demand** is uniformly distributed **over** the days of **the** month and entered in column **4.**

$$\text{January: } \frac{11{,}631 \text{ operations}}{31 \text{ days}} = 375 \text{ operations/average day}$$

2. Develop **Representative** Days Demands. Adjust average day demand to representative day demands to account for **differences in** VFR and IFR operations, as follows:

a. **Percent** IFR Weather. From historical records, determine the percent of the time that IFR (and PVC) weather conditions prevail in each of the months and enter in column **6.**

January: 18% IFR weather .
82% VFR weather

b Number **of** Representative **Days. Convert** percentages of **VFR** and **IFR weather** to days and enter results in column **7.**

January: 31 **days·82% VFR weather** = 25.4 **VFR** days

31 **days·18%** IFR weather = **5.6** IFR **days**

c. Percent IFR Demand. The IFR demand is 68% of VFR demand.

d. Representative **Day** Demands. Calculate daily demand as follows and enter in **column 8.**

$$\text{January: } \frac{100 \cdot 375}{100-18(1-68/100)} = \frac{37500}{94.24} = 398 \text{ VFR ops/day}$$

$$398 \cdot 68/100 = 271 \text{ IFR ops/day}$$

Figure **A2-9. Annual delay**

3 **Develop Hourly Demand for Representative Days.** Fran historical data, deter&e the percentage of daily **operations occuring** in each **hour** of the day. The percentage of demand for each **hour** is assumed to be the same for each representative day whether it is an IFR or VFR **day. A** work sheet, similar to that on page 24, is useful for keeping track of **hourly** demands.

4. **Representative Daily Delay.** Calculated delay for a VFR day in January is **illustrated below** using the procedures of examples 7 and **8. Enter** calculated delays in column **9.**

Hour	Misc.	Hourly Demand	Hourly Capacity	D/C Ratio	Mix Index	Arrival Delay Index ADI	Arrival Delay Factor ADF	Depart. Delay Index DDI	Depart. Delay Factor DDF	Delay Factor DPF	Aver. Delay (Minutes) Arr.	Aver. Delay (Minutes) Dep.	Hourly Delay (Minutes)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
24:00-01:00		1	-	-	-	-	-	-	-	-	-	-	-
01:00-02:00		0	-	-	-	-	-	-	-	-	-	-	-
02:00-03:00		0	-	-	-	-	-	-	-	-	-	-	-
03:00-04:00		0	-	-	-	-	-	-	-	-	-	-	-
04:00-05:00		0	-	-	-	-	-	-	-	-	-	-	-
05:00-06:00		2	-	-	-	-	-	-	-	-	-	-	-
06:00-07:00		8	-	-	-	-	-	-	-	-	-	-	1
07:00-08:00		16	97	.16	5	1.00	.16	.62	.10	40	[illegible]	[illegible]	2
08:00-09:00		31	97	.32	30	"	.32	.63	.20	"	.55	[illegible]	12
0988040880		37	89	.42	45	"	[illegible]	.65	.27	"	.85	.40	23
10:00-11:00		27	97	.28	30	"	.28	.63	.18	"	.40	[illegible]	8
11:00-12:00		20	"	.21	"	"	[illegible]	"	[illegible]	.13"	[illegible]	[illegible]	104
12:00-13:00		20	"	.21	"	"	.21	"	.13"	[illegible]	[illegible]	[illegible]	4
13:00-14:00		24	"	.25	"	"	.25	"	.16	"	.35	.15	6
14:00-15:00		26	97	.27	30	"	.27	.63	.17	"	.40	.15	7
15:00-16:00		37	89	.42	45	"	.42	.65	.27	"	.85	.40	23
16:00-17:00		41	"	.46	"	"	.46	"	.30	"	1.00	.50	31
17:00-18:00		39	89	[illegible]	45	"	[illegible]	.65	[illegible]	"	[illegible]	.45	26
18:00-19:00		31	97	[illegible]	30	"	[illegible]	[illegible] 63	[illegible] 20	"	.55	[illegible]	12
19:00-20:00		14	97	.14	5	1.00	[illegible]	[illegible]	[illegible]	40	.10	.10	1
20:00-21:00		8	-	-	-	-	-	-	-	-	-	-	1
21:00-22:00		8	-	-	-	-	-	-	-	-	-	-	1
22:00-23:00		5	-	-	-	-	-	-	-	-	-	-	1
23:00-24:00		3	-	-	-	-	-	-	-	-	-	-	-
											Daily Delay		163

Generally, **it** is not necessary to calculate delay for very low levels **of demand. In** this example, a one minute **delay was** assumed for demands between 5 to 10 operations per **hour.**

Figure **A2-9.** Annual runway delay (cont.)

TABULATION OF HOURLY DEMAND FOR REPRESENTATIVE DAYS

Clock	Daily	Jan		Feb		Mat		Apr.		Mav		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Time	Ops	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR
x:00	%	398	271	414	282	430	292	428	291	436	296	478	323	473	322	521	354	440	299	449	305	440	299	426	290
12-1	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-6	[illegible]	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2
6-7	2:x	8	s	8	6	9	6	9	6	9	6	10	6	9	6	10	7	9,	6	9,	6	9,	6	9	6
7-8	4.1	16	11	17	12	18	12	18	12	18	12	20	13	19	13	21	15	18	12	18	13	18	12	17	12
8-9	7.9	31	21	33	22	34	23	34	23	34	23	38	26	37	25	41	28	35	24	35	24	35	24	34,	23
9-10	9.2	37	25	- 38	26	40	27	39	27	40	27	44	30	44	30	48	33	40	28	41	28	40	28	39	27
10-11	6.7	27	18	28	19	29	20	29	19	29	20	32	22	32	22	35	24	29	20	30	20	29	20	29	19
11-12	5.1	20	14	21	14	22	15	22	. 15	22	15	24	17	24	16	27	18	22	15	23	16	22	15	22	15
12-13	5.1	20	14	21	14	22	15	22	15	22	15	24	17	24	161	27	18	22	15	23	16	22	15	22	15
13-14	6.1	24	17	25	17	26	18	26	18	27	18	29	20	29	20	32	22	27	18	27	19	27	18	26	18
14-15	6.5	26	18	27	18	28	19	28	19	28	19	31	21	31	21	34	23	29	19	29	20	29	19	28	19
15-16	9.2	37	25	40	26	40	27	39	27	40	27	44	30	44	30	48	33	40	28	41	28	40	28	39	27
16-17	10.2	41	28	42	29	44	30	44	30	44	30	49	33	48	33	53	36	45	30	46,	31	45	30	43	30
17-18	9.8	39	27	41	28	42	29	42	29	43	29	47	32	46	32	51	35	43	29	44	30	43	29	42	28
18-19	7.7	31	21	32	22	33	22	33	22	34	23	37	25	36	25	40	27	34	23	35	23	34	23	33 .	22
19-20	3.5	14	9	14	10	15	10	15	10	15	10	17	11	17	1 1	18	12	15	10	16	11	15	10	13	10
20-21	2.0	8	S	8	6	9	6	9	6	9	6	10	6	9	6	10	7	9	6	9	6	9	6	9	6
21-22	2.0	8	5	8	6	9	6	9	6	9	6	10	6	9	6	10	7	9	6	9	6	9	6	9	6
22-23	1.2	5	3	5	3	5	4	5	3	S	4	6	4	6	4	6	4	S	4	5					
23-24	0	3	2	3	2	3	2	3	2	3	2	4,	3.	4	3	4	3	4	2	4	4	5	4	5	2
																					2	4	2	3	2

Representative daily demand **VFR - IFR** calculationa.

January **12:00 to 13:00 hours.**
VFR = **0.051·398 =** 20
IFR = **0.051·271 = 14**

Figure A2-9. Annual delay (cont.)

5. Monthly Delay. The delay for each representative VFR and IFR day is multiplied by the number of representative days and entered in column 10. Total monthly delay is entered in column 11.

6. Annual Delay. Sum monthly delays to obtain annual delay.

Month	No. Days	Demand per Month	Awe. Daily Demand	Weather	Percent occur.	Representative Day(s) No. of Days	Representative Day(s) Demand	Representative Day(s) Delay	Monthly Delay (minutes) VFR/IFR	Monthly Delay (minutes) Total
1	2	3	4	5	6	7	8	9	10	11
Jan.	31	11,631	37s	VFR IFR	82 18	25.4 5.6	398 271	163 116	4,140 650	4,790
Feb	28	10,926	390	VFR IFR	80 20	22.4 S.6	414 282	185 130	4,144 728	4,872
Mar.	31	12,561	40s	VFR IFR	85 1s	26.4 4.6	430 292	199 146	5,254 146	5,926
Apr.	30	12,096	403	VFR IFR	87 13	26.1 3.9	428 291	193 14s	5,037 566	5,603
May	31	12,756	411	VFR IFR	90 10	27.9 3.1	436 296	201 148	5,608 459	6,067
June	30	13,508	450	VFR IFR	92 8	27.6 2.4	478 325	278 19s	7,673 468	8,141
July	31	13,832	446	VFR IFR	9s S	29.4 1.6.	473 322	270 190	7,938 304	8,242
Aug.	31	15,227	491	VFR IFR	98 2	30.4 0.6	521 354	355 251	10,792 151	10,943
Sep.	30	12,456	41s	VFR IFR	98 2	29.4 0.6	440 299	209 150	6,145 90	6,235
Oct.	31	13,119	423	VFR IFR	96 4	29.8 1.2	499 305	22s 162	6,705 194	6,899
Now.	30	12,456	41s	VFR IFR	90 10	27.0 3.0	440 299	209 150	5,643 450	6,093
Dec.	31	12,432	401	VFR IFR	85 1s	26.3 4.7	426 290	192 143	s,oso 672	5,722
							TOTALS:	VFR IFR	74,129 5,404	79,533

Work sheet for annual delay.

7. Conclusion. Variations in demand contribute more to the 79,533 minutes of delay than weather, as can be seen in the difference between VFR delays and IFR delays for any month.

Figure A2-9. Annual delay (cont.)

EXAMPLE 10. **Determine** the hourly demand that results in an average departure delay of 0.5 minutes in **VFR** conditions. The demand profile factor **is 40,** the runway capacity is 89, the mix index is 62, and the arrival rate is 45 percent.

SOLUTION: Use a trial demand and compute the associated de&y. Repeat for a refined demand closer to the target delay. Plotting the calculated demand--delay values on a graph will expedite the procedure,

1 Plot Known Point. **From** example 6, the average departure delay in **VFR** condition: is 0.95 minutes when the demand is 50 operations per **hour.** Plot this **point.**

2. Calculate and Plot a Second Demand--Delay. Select a **second demand,** calculate the delay, and plot the point.

a. A demand of 25 operations per hour is selected.

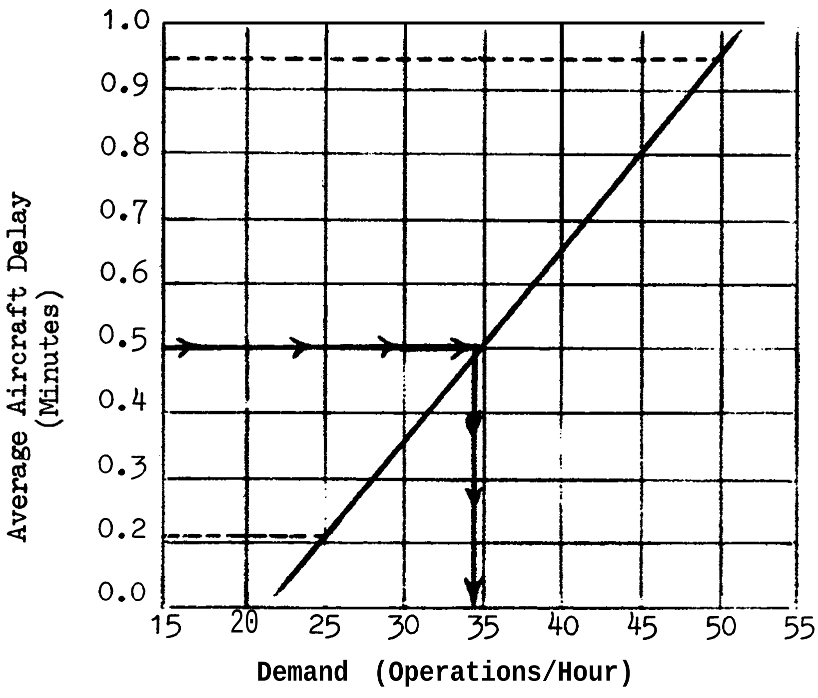
b. **The** demand to capacity ratio **is 25/89 or 0.28.**

c. **From** figure 3-85 , the departure delay index **is 0.75.**

d. **The** departure **delay** factor is **0.75•0.28** or **0.21.**

e. **From** figure **3-69,** the average delay to a departure is 0.22 minutes.

f. Plot the point and connect the two points.



Demand versus delay graph.

Figure **A2-10. Hourly demand** at **a specified level of delay**

3. Graphic Delay Demand. The 0.5 minute delay line intersects the plotted line at a demand of 34 operations per hour.

4 Check Graphic Derived Demand. Calculate and plot the graphically derived demand:

a. The demand is 34 operations per hour.

b. The demand to capacity ratio is34/89 or 0.38.

c. The departure delay index is 0.75.

d. The departure delay factor is 0.75·0.38 or 0.285; say 0.29.

e. From figure 3-69, average departure delay is 0.5 minutes.

5. Conclusion. Limiting the demand to 34 operations per hour meets the average delay of 0.5 minutes per departing aircraft.

Figure A2-10. Hourly demand at a specified level of delay (cont.)

APPENDIX 3. EXAMPLES APPLYING CHAPTER 4 CALCULATIONS

1. **GENERAL.** The examples in this appendix illustrate applications of chapter 4 capacity calculations with portions of the appropriate figures reproduced in the examples.

2. **EXAMPLES.** Fax examples, figures A3-1 through A3-4, follow:

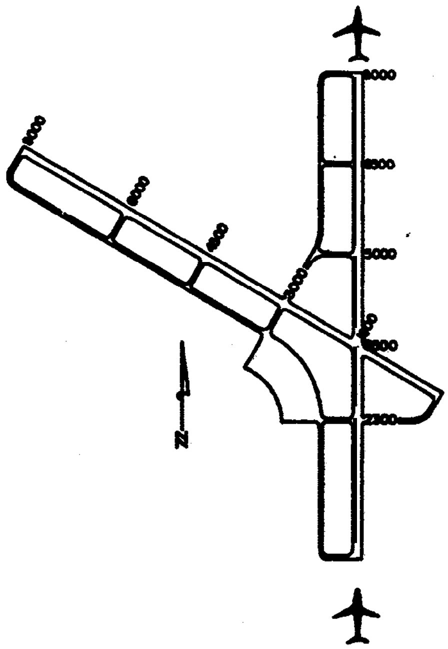
a. Hourly capacity in PVC condition (figure A3-1).

b. Hourly capacity in tine absence of radar coverage or ILS (figure A3-2).

c. Hourly capacity of parallel runway airport with one runway restricted to small aircraft (figure A3-3).

d. Hourly capacity of a single runway airport used exclusively by small aircraft that lacks radar or ILS (figure A3-4).

EXAMPLE 1. Determine the capacity of the example airport in PVC conditions. Operations are limited to the N-S runway. Hourly demand consists of 25 Class C and two Class D aircraft with a 55 percent arrival rate.



SOLUTION:

1. Capacity Figure. From figure 4-1 (illustrated), the runway-use configuration is diagram No. 1, and the figure for determining capacity is No. 4-2.

Runway-use Diagram	Diag. No.	Runway Spacing (S) in feet	Figure No. for Capacity: Poor Visibility Conditions	Figure No. for Capacity: Inoperative Navaids	Restricted Runway-use: VFR	Restricted Runway-use: IFR
	1	N A	4-2	4-15	-	-
S	2a	700 to 2499	4-3	4-16	-	-
	2b	2500 or more	4-4			

2. Mix Index. For 25 Class C aircraft and 2 by Class D aircraft, the mix index is:

$$(25/27) + 3(2/27) = 93 + 3(7) \text{ or } 114$$

3. Percent Arrivals. 55 percent.

Figure A3-1. Hourly capacity in PVC conditions

4. **Hourly** Capacity, Fran figure 4-2 (illustrated)@ the **airport** `**capacity is** 46 operations per **hour.**

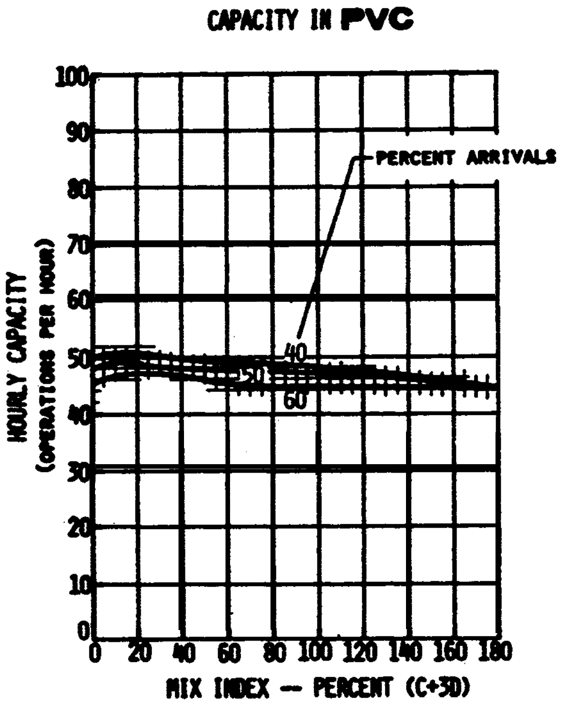
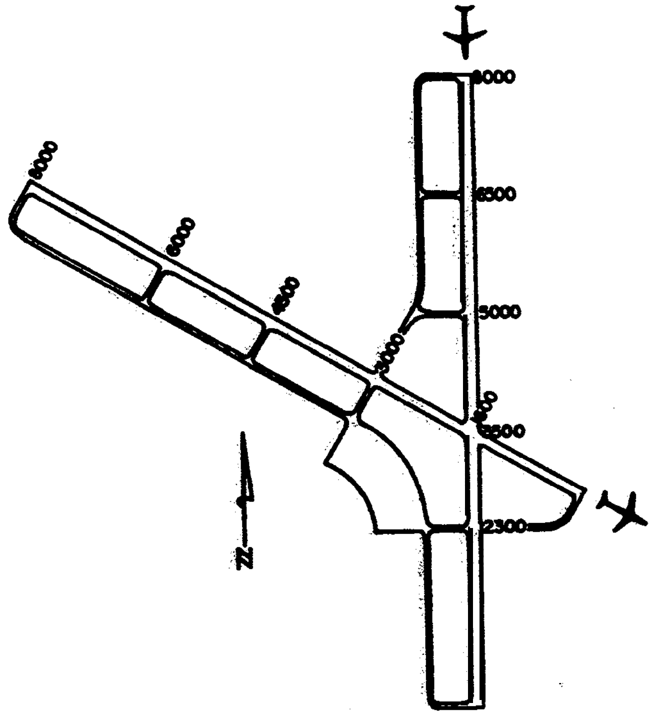


FIGURE 4-2. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NO. 1.

5. **Conclusion.** Under these conditions, the airport loses 10 percent of its capacity when the weather deteriorates **from IFR** to PVC conditions.

Figure **A3-1.** Hourly capacity in *WC* conditions (cont.)

EXAMPLE 2. Determine the IFR capacity of the example airport when the glide slope portion of the ILS is inoperative, radar coverage is out, and a circling approach is used. Demand consists of 25 Class C and 2 Class D aircraft.



SOLUTION:

1. **Capacity Figure.** From figure 4-1 (illustrated), the runway-use configuration is diagram No. 44 & 47 and the figure for determining capacity is No. 4-15.

Runway-use Diagram	Diag. No.	Runway Spacing (S) in feet	Figure No. for Capacity: Poor Visibility Conditions	Inoperative Navaids	Restricted Runway-use: VFR	IFR
(single runway)	1	N A	4- 2	4-15	-	-
(parallel runways, S)	2a	700 to 2499	4- 3	4-16	-	-
(intersecting runways, X, Y)	43&46	X(ft): 0 to 1999; Y(ft): 0 to 8000	4-12	4-15	-	-
	44&47	X(ft): 2000 to 4999; Y(ft): 0 to 8000	4-13	4-15	-	-
	45&48	X(ft): 5000 to 8000; Y(ft): 0 to 8000	4-14	4-15	-	-

2. Inoperative Aid. The radar and glide slope are art and a circling approach is used.

3. Mix Index. For 25 Class C and 2 Class D aircraft, the mix index is:

$$(25/27)+3(2/27) = 93+3(7) = 114$$

Figure A3-2. Hourly capacity in the absence of radar coverage or ILS

4. Hourly capacity. From figure 4-15 (illustrated), the airport capacity is 26 operations per hour.

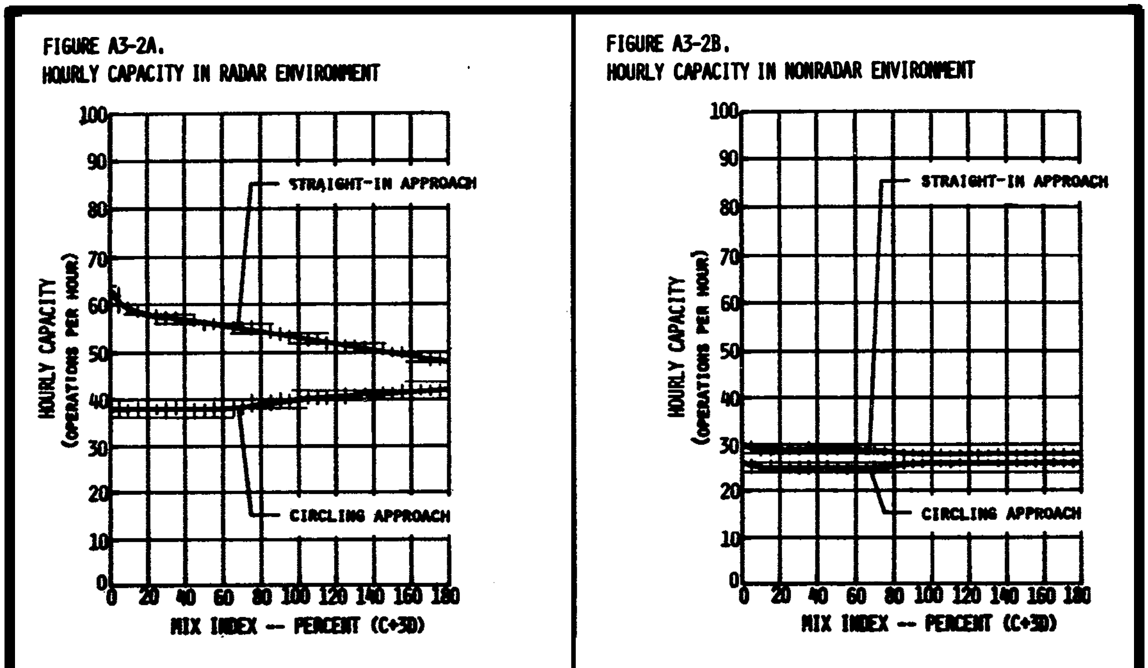
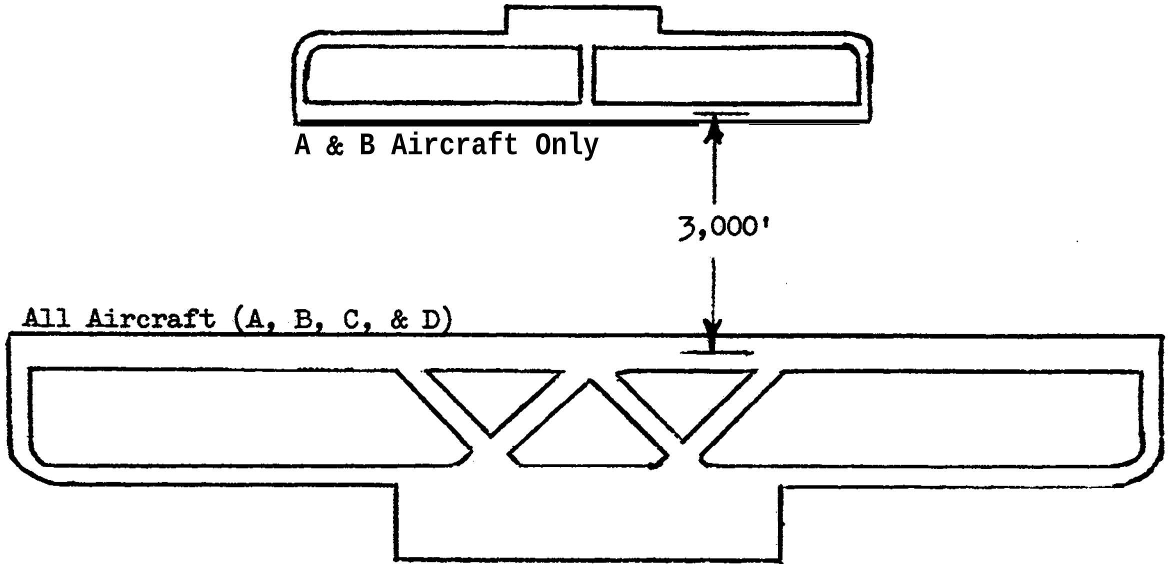


FIGURE 4-15. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 1, 43-54.

5. Conclusion. Airport capacity is limited to 26 operations per hour when the glide slope portion of the ILS or radar are inoperative and a circling approach is used. With radar coverage, the airport capacity is 40 operations per hour.

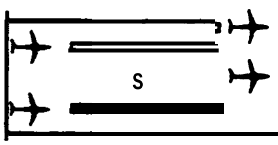
Figure A3-2. Hourly capacity in the absence of radar coverage or ILS (cont.)

EXAMPLE 3. Determine the VFR **hourly** capacity of the runway configuration depicted below When one runway is used only by Class A and **B** aircraft. **Hourly** demand consists of 20% Class A, 15% Class B, 55% Class C, and 10% Class D aircraft with a **50** percent arrival rate.



SOLUTION:

1. Capacity **Figure.** **From** figure 4-l (illustrated) **, the runway-use configuration is** diagram No. 11 and the figure for determining capacity **is No. 4-18.**

Runway-use Diagram	Diag. No.	Runway Spacing (S) in feet	Figure No. for Capacity: Poor Visibility Conditions	Inoperative Navaids	Restricted Runway-use: VFR	IFR
	9	700 to 2499	4- 3	4-16	4-17	4-21
	10	2500 to 2999	4- 9		4-18	
	11 12	4300 3000 or more 4299	4-11			
						4-22

2. Mix Index. For 55% Class C and 10% Class D aircraft, the mix **index** is:

$$55 + 3(10) = 85$$

3. Percent Arrivals. 50 percent.

Figure **A3-3.** **Hourly capacity** of parallel runway airport with one runway restricted to small aircraft

4. Hourly Capacity. From figure 4-18 (illustrated), the airport capacity is 83 operations per hour.

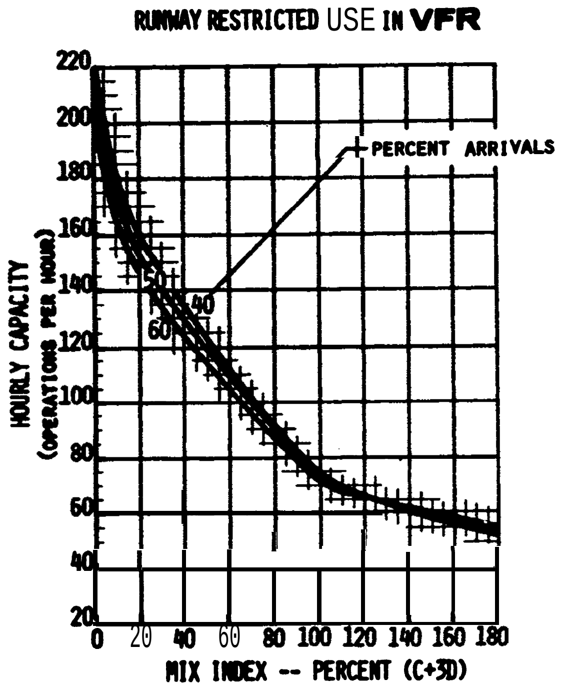
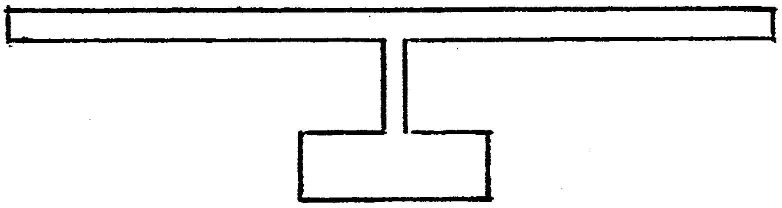


FIGURE 4-18. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS. 10, 11, 12.

5. Conclusion. The capacity of a single runway under these conditions is 57 operations per hour. The capacity of full-length, parallel, unrestricted runways is 115 operations per hour. The capacity of parallel runways when one is limited to use by small aircraft is 83 operations per hour.

Figure A3-3. Hourly capacity of parallel runway airport with one runway restricted to small aircraft (cont.)

EXAMPLE 4. Determine the hourly capacity in **VFR** and **IFR** conditions of the runway-**taxiway** configuration depicted below. The airport is used exclusively by small (Class A and **B)** aircraft and there is no radar coverage or ILS facility. Arrivals generally equal departures**,** and touch and **go's** approach the 20 percent level.

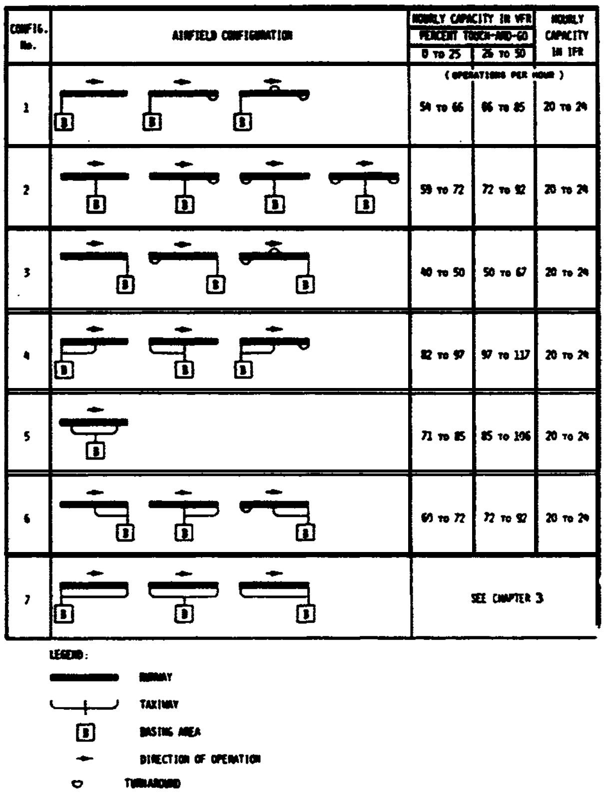


SOLUTION:

1. **Airport Configuration.** **From** figure 4-26 (illustrated), identify the **runway-taxiway** configuration that best represents **the airport.**

2. Percent **Touch-and-Go.** 20 percent.

3. . Hourly Capacity. **From** figure **4-26,** the range of **VFR and IFR** hourly capacity is 59 to 72 operations, and 20 to 24 operations, respectively.



CONFIG. No.	AIRFIELD CONFIGURATION	HOURLY CAPACITY IN VFR, PERCENT TOUCH-AND-GO: 0 TO 25	26 TO 50	HOURLY CAPACITY IN IFR
		(OPERATIONS PER HOUR)		
1		54 TO 66	66 TO 85	20 TO 24
2		59 TO 72	72 TO 92	20 TO 24
3		40 TO 50	50 TO 67	20 TO 24
4		82 TO 97	97 TO 117	20 TO 24
5		71 TO 85	85 TO 106	20 TO 24
6		60 TO 72	72 TO 92	20 TO 24
7		SEE CHAPTER 3		

4. **Conclusion. The airport is able to accomodate** 59 **to** 72 operations per **hour in VFR conditions and** 20 **to** 24 **operations per hour in IFR conditions.**

Figure A3-4. Hourly capacity **of a single runway airport used exclusively by small** aircraft that **lacks** radar or ILS.

APPENDIX 4. GLOSSARY OF SYMBOLS/TERMS

%(C+3D) = mix index = the percent of Class C aircraft plus 3 times the percent of Class D aircraft

%IFR = percent of the time that IFR and PVC operating conditions prevail

%IFR demand = 100·(IFR demand)/(VFR demand)

A = number of arriving aircraft in the hour

AD/C = average demand-capacity ratio = (the sum of the hourly demands during the overload phase)/(the sum of the hourly capacities during the overload phase)

ADF = arrival delay factor = ADI·(D/C) or ADI·(AD/C) [overload phase]

ADI = arrival delay index (figures 3-2 and 3-71 through 3-102)

Annual capacity = ASV

ASV = annual service volume = $C_w \cdot D \cdot H$ or (figure 2-1) [approximate]

C^* = hourly capacity base (figures 3-2 through 3-65)

C_i = hourly capacity for each runway-use configuration (Cl through C_n)

Class A aircraft = single-engined small aircraft (table l-l)

Class B aircraft = multi-engined small aircraft (table 1-l)

Class C aircraft = large aircraft (table l-1)

Class D aircraft = heavy aircraft (table 1-1)

C_w = weighted hourly capacity =
$(P_1 \cdot C_1 \cdot W_1 + P_2 \cdot C_2 \cdot W_2 + ... + P_n \cdot C_n \cdot W_n)/(P_1 \cdot W_1 + P_2 \cdot W_2 + ... + P_n \cdot W_n)$

D = demand ratio = (annual demand)/(average daily demand during the peak mouth) (table 3-2) [typical]

DA = number of departing aircraft in the hour

DAH = average delay per aircraft (figure 2-2) [approximate]

DAHA = average delay for arriving aircraft (figure 3-69)

DAHD = average delay for departing aircraft (figure 3-69)

DASA = average delay per arrival (figure 3-70) [saturated period]

DASD = average delay per departure (figure 3-70) [saturated period]

D/C = demand-capacity ratio = (hourly demand)/(hourly capacity)

DDF = departure delay factor = DDI·(D/C) or DDI·(AD/C) [overload phase]

DDI = departure delay index (figures 3-2 and 3-71 through 3-102)

DPF = demand profile factor = 100·Q/HD

DTH = hourly delay = HD·(PA·DAHA + (100-PA)·DAHD)/100 or HD·DAH [approximate]

DTS = delay in saturated period =
(HD1+HD2+.. .+HDn)·(PAS· DASA+100-PAS)· DASD)/100

E = exit factor (figure 3-2 through 3-65)

G* = hourly gate capacity base (figure 3-68)

H = demand ratio = (average daily demand)/(average peak hour demand during the peak month) or (table 3-2) [typical]

HD = hourly demand on the runway canponent

HD_i -hourly demand on the runway component during hours 1 through n of the saturated period

Hourly capacity of gates = G*·S·N (figure 3768)

Hourly capacity of runway canponent = C*·T·E or (figures 4-1 through 4-26) [special applications], or (figure 2-l) [approximate]

Hourly capacity of taxiway crossing an active runway (figures 3-66 and 3-67)

Hourly delay on runway canponent = DTH

IFR demand = VFR demand .%IFR demand/100

N = number of gates

PA = percent arrivals = 100·(A+½(T&G))/(A+DA+(T&G))

PAS = percent of arrivals in the saturated period

PT&G = Percent touch and gos = 100·(T&G)/(A+DA+(T&G))

P_i = percent of the time each runway-use configuration is in use (Pl through Pn)

PVC = poor visibility and ceiling = lower end of IFR conditions

Q = peak 15-minute demand on the runway component

R = gate occupancy ratio = (average gate occupancy time of widebodied aircraft)/(average gate occupancy time of non-widebodied aircraft)

S - factor for gate size (figure 3-68)

T = touch and go factor (figures 3-2 through.3065)

T&G = number of touch and go's in the hour

Type 1 gate = a gate that is capable of accamodating all aircraft

Type 2 gate = a gate that will accommodate only non-widebodied aircraft

VFR demand = (average day demand)/(1-%IFR(1-%IFR demand/100)/100)

W_i = ASV weighting factor for each runway-use configuration (W_1 through W_n) (table 3-1)

APPENDIX 5. BLANK FORMS

Aircraft Mix				Mix Index	Configuration		Capacity (Ops/Hour)		ASV	Annual Demand	Annual Demand / ASV	Average Delay per Aircraft (Minutes)		Minutes of Annual Delay (000)	
%A	%B	%C	%D	%(C+3D)	No.	Sketch	VFR	IFR	(000)	(000)		Low	High	Low	High
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Figure A5-1. Hourly capacity, ASV, delay for long range planning

Weather	Runway-use Diagram	Runway-use No.	Capacity Figure No.	Aircraft Mix %A	Aircraft Mix %B	Aircraft Mix %C	Aircraft Mix %D	Mix Index % (C+3D)	Percent Arrivals	Percent Touch & Go	Runway Exits (00 feet) Location	Runway Exits (00 feet) No.	Hourly Capac. Base C*	T & G Factor T	Exit Factor E	Hourly Capacity C*·T·E
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Figure AS-2. Hourly capacity runway component

Weather	Taxiway Crossing	Distance from Threshold	Runway		Taxiway Crossing Capacities (Operations per Hour)	
			Ops. Rate	Mix Index	Arrivals and Mixed Operations	Departures Plus T & G
1	2	3	4	5	6	7

Figure A5-3. Hourly capacity taxiway coponent

Non-widebody (N) **Widebody** (W)

Gate Group"	Demand		**No.** Gates		Gate Mix		Average Gate Time (Min.)		Gate **Occupancy** Ratio	Hourly **Capac.** Base	'Gate Size	No. Gates	**Hourly** Capacity
	(N)	**(W)**	**(N)**	**(W)**	**(N) (%)**	**(W) (%)**	**(N) (T_n)**	**(W) (T_w)**	**(T_w/T_n)** (R)	Base (G*)	**(S)**	(N)	**(G*•S•N)**
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Figure A5-4. Hourly capacity gate group component

Component	Hourly Capacity	Hourly Demand	Demand Ratio Componet Demand / Runway Demand	Component Quotient Component Capacity / Demand Ratio
1	2	3	4	5

Figure AS-S. Airport hourly capacity

Operating Condition			Mix	Percent of Year	Hourly Capacity	Percent Maximum	Weighting Factor
No.	Weather	Rwy-use Diagram	Index	(P)	(C)	Capacity	(W)
1	2	3	4	5	6	7	8

Figure A5-6 Annual service volume

Rwy-use Configuration		Delay Fig. No.		Capacity	Demand		D/C Ratio	Percent Arrivals	Mix Index	Arrival Delay		Depart. Delay		Demand Profile Factor DPF	Aver. Delay (Minutes)		Hourly Delay (Minutes)
Sketch	No.	VFR	IFR		Hourly	15 Min.				Index ADI	Factor ADF	Index DDI	Factor DDF		Arr.	Dep.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Figure A5-7. Hourly delay

Hour 1	Misc. 2	Hourly Demand 3	Hourly Capacity 4	D/C Ratio 5	Mix Index 6	Arrival Delay Index ADI 7	Arrival Delay Factor ADF 8	Depart. Delay Index DDI 9	Depart. Delay Factor DDF 10	Delay Factor DPF 11	Aver. Delay (Minutes) Arr. 12	Aver. Delay (Minutes) Dep. 13	Hourly Delay (Minutes) 14
24:00-01:00													
01:00-02:00													
02:00-03:00													
03:00-04:00													
04:00-05:00													
05:00-06:00													
06:00-07:00													
07:00-08:00													
08:00-09:00													
09:00-10:00													
10:00-11:00													
11:00-12:00													
12:00-13:00													
13:00-14:00													
14:00-15:00													
15:00-16:00													
16:00-17:00													
17:00-18:00													
18:00-19:00													
19:00-20:00													
20:00-21:00													
21:00-22:00													
22:00-23:00													
23:00-24:00													
											Daily Delay		

Figure A5-8. Daily delay

Clock	Daily	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Time	Ops	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR
x:00	%																								
12-1																									
1-2																									
2-3																									
3-4																									
4-5																									
5-6																									
6-7																									
7-8																									
8-9																									
9-10																									
10-11																									
11-12																									
12-13																									
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17-18																									
18-19																									
19-20																									
20-21																									
21-22																									
22-23																									
23-24																									

Demand	Runway-use		Capacity Figure No.		Aircraft Mix				Mix Index	Arrivals	Touch and Go	Runway Exits		Hrly. Cap. Base	T & G Factor	Exit Factor	Hourly Capacity
	Diagram	No.	VFR	IFR	%A	%B	%C	%D	%(C+3D)	%	%	Location	No.	C*	T	E	C*·T·E
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Figure A5-10. Hourly delay, different demands

Month	No. Days	Demand per Month	Av. Daily Demand	Weather	Percent Occur.	Representative Day(s)			Monthly Delay (minutes)	
						No. of Days	Demand	Delay	VFR/IFR	Total
1	2	3	4	5	6	7	8	9	10	11

Figure A5-11. Annual delay

Aircraft		Percent of Aircraft	Dollars Minute	Average cost
Class A 12,500 Pounds or less Single Engine	1-3 Seats		0.60	
	4 + Seats (GA)		1.00	
	4 + Seats (AT)		1.80	
Class B 12,500 Pounds or less Multi Engine	Piston Twin (GA)		2.50	
	Piston Twin (AT)		3.70	
	Turbine Twin (GA)		5.20	
	Turbine Twin (AT)		6.80	
Class C 12,500 to 300,000 Pounds	Piston Engine (GA)		2.80	
	Piston Engine (AT)		4.00	
	Piston Engine (AC)		2.90	
	Turbine Twin (GA)		5.60	
	Turbine Twin (AT)		7.30	
	Turbine Twin (AC)		6.60	
	Turbine Four (AC)		15.10	
	2 Engine Jet (GA)		13.60	
	2 Engine Jet (AT)		16.80	
	2 Engine Jet (AC)		22.00	
	3 Engine Jet (AC)		31.40	
	4 Engine Jet (AC)		35.50	
Class D Over 300,000 Pounds	2 Engine Jet (AC)		39.00	
	3 Engine Jet (AC)		57.60	
	4 Engine Jet (AC)		79.30	
Helicopters	Piston (GA)		1.40	
	Piston (AT)		2.30	
	Turbine (GA)		3.30	
	Turbine (AT)		4.40	
Totals		loo	cost	

(GA) General Aviation (AT) Air Taxi (AC) Air Carrier

	Low	High
Current Delay (000 Minutes)		
Projected Delay (000 Minutes)		
Potential Savings (000 Minutes)		
Average Cost Per Minute		
Projected Benefit Per Year (000 Dollars)		

Figure A5-12. Savings associated with reduced delay

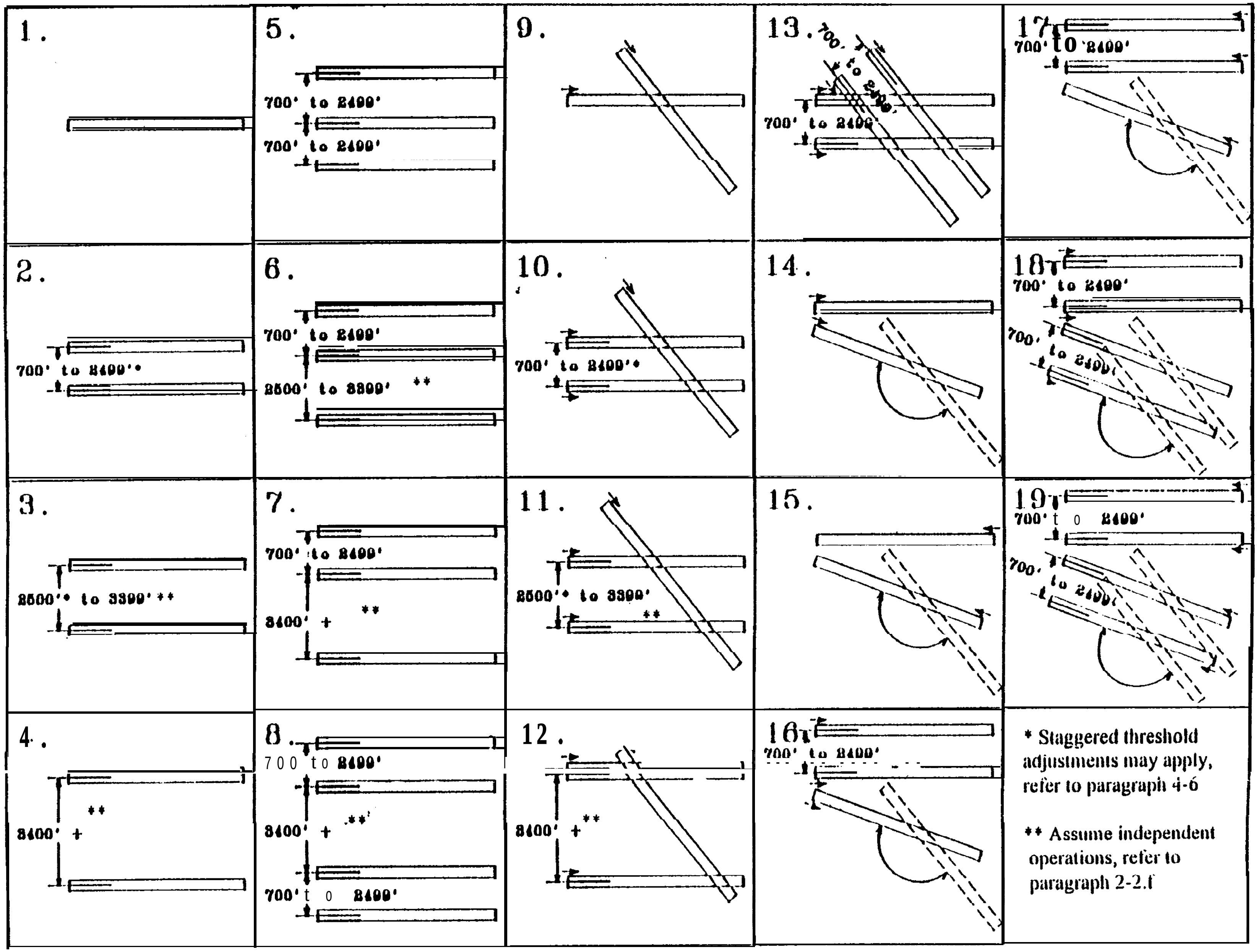

Figure A5-13 The runway-use configuration sketches printout

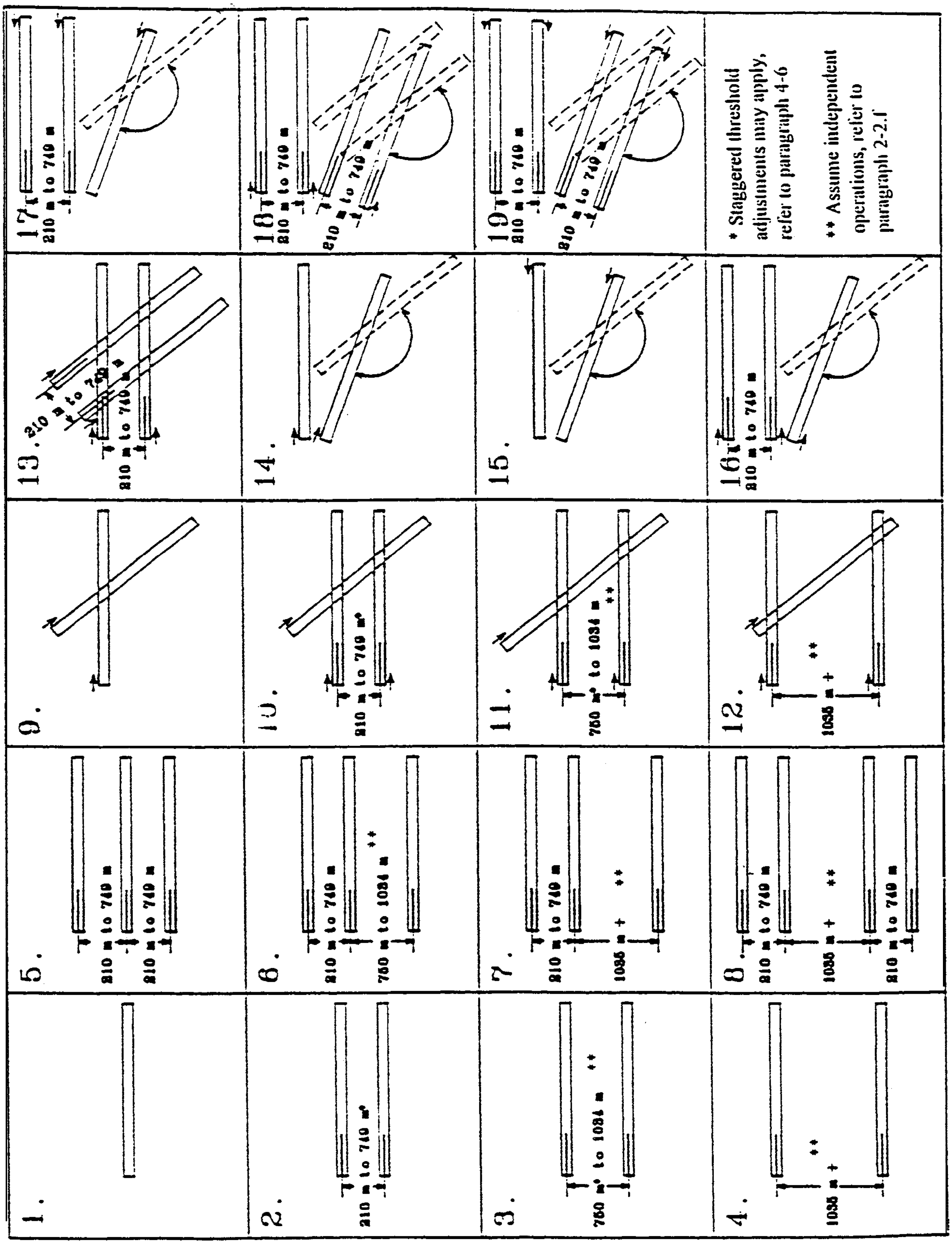

Figure A5-13. The runway-use configuration sketches printout

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