U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

ANNOUNCEMENT OF AVAILABILITY

Subject: AIRPORT LANDSIDE SIMULATION MODEL (ALSIM)

Date: 4/24/84
Initiated by: AAS-200

AC No: 150/5360-10
Change:

1. PURPOSE. This advisory circular (AC) announces the availability and describes some of the features of a dynamic simulation computer model for use by airport planners, designers, and operators in evaluating and comparing the effectiveness of alternative airport terminal and landside configurations and facilities.

2. BACKGROUND. In 1974, the Federal Aviation Administration (FAA) initiated a program to study various ways of minimizing the impact of increased congestion at airport terminal and landside facilities. As part of this program, a computer model was designed and tested at the Transportation Systems Center, Cambridge, Massachusetts, to simulate landside activities that normally take place at high volume airports. This model, called the Airport Landside Simulation Model (ALSIM), is now available for purchase through the National Technical Information Services (NTIS).

3. DESCRIPTION. ALSIM provides an effective evaluation tool for airport planners, designers, and operators in analyzing airport terminal and landside facilities. The model represents the flow of passengers and vehicles through the airport terminal from its boundary to the aircraft gates. It simulates queueing and servicing processes at all essential landside facilities. ALSIM uses an input flight schedule to generate transactions representing passenger groups and accompanying visitors in a time-dependent manner. These transactions are then directed to various terminal facilities where they undergo simulated servicing and processing. Figure 1 depicts the operation of the ALSIM program. Use of the model can provide information to airport planners and operators in answering pertinent design questions, such as:

a. Where are the bottlenecks?

b. Are the resources balanced?

c. Is the space plan efficient?

d. Is the design capable of handling surges?

e. How does the plan respond to the various levels of loading?

f. What are the wait times?

g. Is the service staff adequate?

h. Is the facility equipment well located and sized?

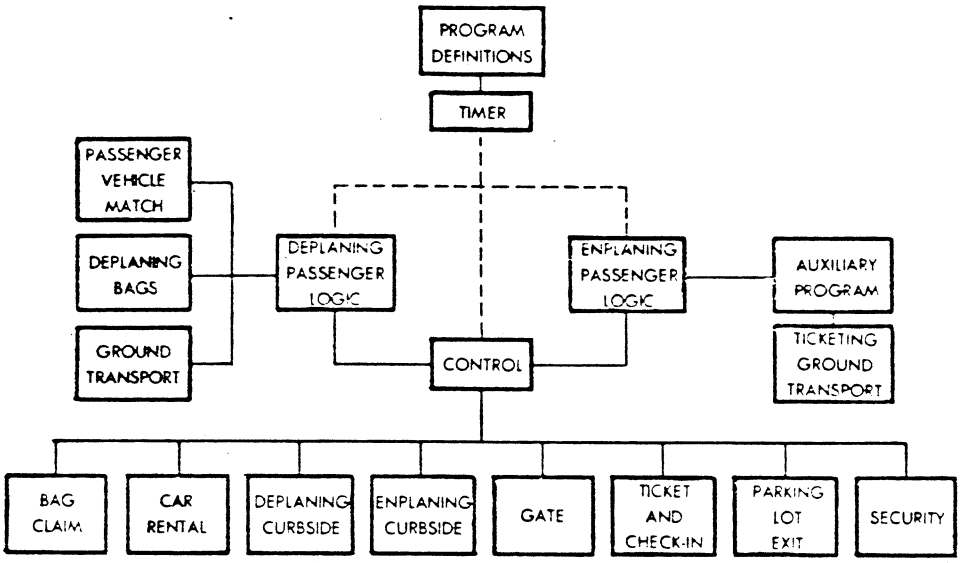

Figure 1. Flow Diagram of the Airport Landside Simulation Model Program

4. MODEL OUTPUTS. Outputs of the simulation include statistical data on congestion parameters such as waiting times, occupancy, flow volumes, queue lengths, etc., for each of the simulated landside facilities. These values are produced periodically as simulated time progresses and summary statistics are displayed at the end of a predetermined simulation time period.

5. SOFTWARE. ALSIM is written in GPSS-V with FORTRAN and SYSTEM/370 assembly language subprograms. A simulation of a 100-gate airport during a busy 5-hour period involving 20,000 passengers on 165 flights requires approximately 7 minutes of IBM 370 central processor time. Core size requirement is 570 K bytes. The software is compatible with IBM third generation computers such as the 360, 370, or 4341.

6. FORMAT. ALSIM is available as a computer tape together with a five volume report as described below. The reports can be obtained in both paper copy or microfiche formats.

a. PROGRAM TAPE (ALSTIS). The model program tape (NTIS version) contains 11 internal files and is operable on IBM systems with the IBM version of GPSS-V language. The source tape is in EBCDIC character set and can be prepared in seven or nine track modes for one-half inch tape. The model uses random number generation based upon input distributions to provide service times, routing changes, and transaction status assignments. A set of runs with altered random number streams are required to provide useable output statistics.

b. VOLUME I - PLANNING GUIDE. Discusses planning application of ALSIM. It describes how the model output may be applied to airport terminal and landside capacity analyses. It also discusses using the model for management of daily operations and airport design. A description of input data necessary for model operation is presented with examples.

c. VOLUME II - ALSIM DESCRIPTION AND USERS GUIDE. Provides a general description of the ALSIM. This Users Guide describes the program operational characteristics, including the model architecture. A listing of passenger and vehicular processes simulated and assumptions made in the formulation of the model are presented. Job control language instructions necessary to run the model and examples of program execution are included. A complete description of the input data required is furnished. Model outputs such as flow volumes, queue lengths, queueing times, and occupancy obtained from a sample simulation run are displayed.

d. VOLUME III - ALSIM CALIBRATION AND VALIDATION. Discusses calibration and validation procedures applied to the ALSIM, using data obtained at Miami, Denver, and LaGuardia Airports. Criteria used in selecting the testing methodology for calibrating the ALSIM is described and the validation results are summarized and discussed.

e. VOLUME IV - APPENDIX A, ALSIM AUXILIARY AND MAIN PROGRAMS. Describes the Program Logic of the ALSIM Auxiliary and Main Programs written in GPSS-V language. The Auxiliary Program is operated prior to the Main Program to create GPSS transactions representing enplaning passenger groups from the input flight schedule. The Main Program creates greeter and deplaning passenger transactions and enacts the movements of all passengers and visitors through simulated landside facilities. Program logic details, flow charts and listing of both programs are included in this volume.

f. VOLUME V - APPENDIX B, ALSIM SUBROUTINES. Describes the operation of 10 subroutines used to support the Auxiliary and Main Programs of the ALSIM. The major portion of this volume describes the first subroutine which is used to read, assign, and perform searches during the simulation model execution. The next six subroutines are used to link the first subroutine to the Main Program to provide in-core read and write capabilities. There are two additional assembly language subroutines and one to detect and print error messages. Detailed description, flow charts and listing are provided for each subroutine.

7. HOW TO ORDER. The program tape and five volumes are available for purchase through the National Technical Information Service located in Springfield, Virginia. Appendix 1 contains information on how to order and provides current pricing schedules. Below is additional information needed to identify the documents and to determine purchase costs when used in conjunction with the pricing schedules.

TITLE	FAA REPORT NO.	NTIS ORDERING NUMBER	NTIS PRICING & PRICING CODES *
ALSIM Program Tape (ALTIS) Plus 5-Volume Report	FAA-DF-82-001	ADA 119454	$540.00
Airport Landside, Vol. 1: Planning Guide	FAA-EM-80-8-I	ADA 117599	PCA05/MFA01
Volume II: Description and users Guide	FAA-EM-80-8-II	ADA 117600	PCA06/MFA01
Volume III: ALSIM Calibration and Validation	FAA-EM-80-8-III	ADA 117601	PCA10/MFA01
Volume IV: Appendix A, ALSIM Auxiliary and Main Programs	FAA-EM-80-8-IV	ADA 117602	PCA13/MFA01
Volume V: Appendix B, ALSIM Subroutines	FAA-EM-80-8-V	ADA 117603	PCA07/MFA01

* The label PC before the pricing code denotes paper copy; MF denotes microfiche.

Leonard E. Mudd

APPENDIX 1. ORDERING INFORMATION

1. HOW TO ORDER. All orders for reports and NTIS Searches should contain the NTIS order number and desired quantity. Order forms are available and can be obtained from NTIS upon request. Address orders to:

National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
Telephone: (703) 487-4650
TELEX: 89-9405

2. PAYMENT OPTIONS. For quick processing, it is recommended that a check for the total amount be included with the order. NTIS permits other payment options including an NTIS deposit account, an American Express or MasterCard/Visa charge, and a billing service. Contact NTIS concerning use of these options.

3. REPORT FORMATS.

a. Reports are available from NTIS in the following formats:

(1) Paper copies of original report or reprint.

(2) Microfiche sheet 105 mm x 148.75 mm (about 4" x 6").

b. In addition, certain reports may be available in the following formats.

(1) Microfilm in 35 or 16 mm size.

(2) Magnetic tape, seven track, 200, 556 or 800 bpi, odd or even parity; or nine track, 800 or 1,600 bpi, odd parity, with Bdc (Binary coded decimal) or Ebcdic (Extended binary coded decimal interchange code) coding.

4. FEE SCHEDULES. The following fee schedules are effective January 1, 1984. You are advised to consult the latest NTIS price schedules since all prices are subject to change. These schedules are applicable to the North American Continent only. For orders outside North America, price quotations from NTIS should be requested.

Schedule A - Standard Price Schedule

Code	Page Range	Price
A01	Microfiche	$ 4.50
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A05	076 - 100	11.50
A06	101 - 125	13.00
A07	126 - 150	14.50
A08	151 - 175	16.00
A09	176 - 200	17.50
A10	201 - 225	19.00
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A13	276 - 300	23.50
A14	301 - 325	25.00
A15	326 - 350	26.50
A16	351 - 375	28.00
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A19	426 - 450	32.50
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A23	526 - 550	38.50
A24	551 - 575	40.00
A25	576 - 600	41.50
A99	601 - up	*

* Add $1.50 for each 25-page increment, or portion thereof

Schedule N - Specialized Products

Code	Price
N01	$ 35.00
N02	40.00

Schedule T - Computer Products Schedule

Code	Price
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T04	320.00
T05	400.00
T06	465.00
T07	530.00
T08	595.00
T09	660.00
T10	725.00
T11	790.00
T12	855.00
T13	920.00
T14	985.00
T15	1,050.00
T16	1,115.00
T17	1,180.00
T18	1,245.00
T19	1,310.00
T99	Contact NTIS for Price Quote