). UMTA-MA-06-0100-79-13

SOFTWARE MAINTENANCE OF THE SUBWAY ENVIRONMENT SIMULATION COMPUTER PROGRAM

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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New York NY 10001

DECEMBER 1980
FINAL REPORT

DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
Office of Technology Development and Deployment
Washington DC 20590

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16. Abstract

This document summarizes the software maintenance activities performed to support the Subway Environment Simulation (SES) Computer Program.

The Subway Environmental Design Handbook (NTIS No. PB-254-789) was developed as a guide and reference for the planning, design, construction and operation of environmental control systems for underground rapid transit. The SES computer program was developed for use in conjunction with the Handbook as a designer-oriented tool to provide estimates of the air flow, temperature, and hunidity characteristics, as well as air conditioning requirements, for both operating and proposed multiple-track subway systems of any given design and operating characteristics.

The report summarizes the activities of the project and contains the procedural guidelines, and revisions to the SES Computer Program, User's Manual and Programmer's Manual (NTIS No. PB-254-790) which were issued during this contract.

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15. Supplementary Notes The Subway Environmental Design Handbook, Volume I: Principles and Applications (PB 254-788); Volume II: Subway Environmental Simulation (SES) Computer Program, Part 1: User's Manual (PB 254-789); and Volume II: Subway Environmental Simulation (SES) Computer Program, Part 2: Programmer's Manual (PB 254-790). Set of three volumes: PB 254-787.

16. Abstract

This document summarizes the software maintenance activities performed to support the Subway Environment Simulation (SES) Computer Program. The SES computer program is a design-oriented analytic tool developed during a recent five-year research project focusing on methods for environmental control in underground rapid transit systems. As discussed in The Subway Environmental Design Handbook, computer simulation was used to overcome the deficiencies of closed-form mathematical modeling, and was validated using scale models and field-testing. The Handbook was developed as a guide and reference for the planning, design, construction, and operation of environmental control systems for underground rapid transit. Shortly after the publication of the Handbook, SES was released to the rail transit community for the purpose of reducing the environmental problems of existing systems, and to help plan facilities and establish standard procedures for improved environmental control in new systems. This report is published in order to aid users of the program in realizing these goals. Software maintenance, as outlined in this report, will help update and correct the program. The SES computer program was developed for use in conjunction with the Handbook to provide estimates of the air flow, temperature, and humidity characteristics, as well as air conditioning requirements, for both operating and proposed multiple-track subway systems of any given design and operating characteristics. This report contains a chronological history of the SES project, a profile of the typical SES user, and a list of present users. The appendices contain the documents distributed to SES users during this project: "Software Maintenance Procedural Guidelines"; "SES Computer Program Revisions"; and "SES User's Manual and Programmer's Manual Revisions".

17. Key Words	18. Distribution Statement
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PREFACE

The Subway Environment Simulation (SES) Computer Program is a design-oriented analytic tool developed during a recent five-year research project focusing on methods for environmental control in underground rapid transit systems. As discussed in the comprehensive Subway Environmental Design Handbook (NTIS No. PB 254 788), which documents that effort, computer simulation was used to overcome the deficiencies of closed-form mathematical modeling, and was validated using scale models and field-testing. Shortly after the publication of the Handbook, SES was released to the rail transit community for the purpose of reducing the environmental problems of existing systems, and to help plan facilities and establish standard procedures for improved environmental control in new systems. This report is published in order to aid users of the program in realizing these goals; "Software maintenance," as outlined in this volume, will help update and correct the program.

The publication of this report marks the end of the second phase of the Subway Environmental Research Project, conducted from the U.S. Department of Transportation's Transportation Systems Center (TSC) under sponsorship by the Urban Mass Transportation Administration's Urban Rail Construction Technology Program. In addition to coordinating the software maintenance, TSC has directed modification of SES for enhanced use by the Research and Special Program Administration. Software maintenance activities for this task, however, are not included in this volume, but will instead be incorporated in SES Version 3 appearing at a later date.

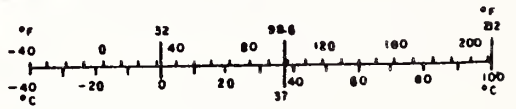
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.6	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

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



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1. PURPOSE

This report summarizes the activites performed under Contract DOT-TSC-1216, "Software Maintenance of the Subway Environment Simulation Computer Program." It contains a chronological history of the project, a profile of the typical SES user, and a list of present users. The appendixes contain the documents distributed to SES users during this project:

SOFTWARE MAINTENANCE PROCEDURAL GUIDELINES

SES COMPUTER PROGRAM REVISIONS

SES USER'S MANUAL AND PROGRAMMER'S MANUAL REVISIONS

2. PROJECT OBJECTIVES

The Subway Environment Simulation (SES) Computer Program, complete with user and programmer documentation, was an end product of the Subway Environment Research Project (SERP) sponsored by the Urban Mass Tranportation Administration (UMTA). The major objective of the SERP was to develop an ability to control and to predict such factors as air temperature, velocity, and humidity in the subway environment. An important result of the project has been the development of the SES Computer Program, an analytical tool which allows the environmental design engineer to calculate flows of air and heat in a complex subway network with vent shafts, stations, stairwells, multiple trains, etc.

The SES software maintenance project was designed to give technical assistance to SES users who encountered problems with either the software or documentation. A procedure was established whereby potential problems could be reported. If the existence of a problem was verified, a correction was issued to all registered users in the form of a software modification or documentation revision.

This service was provided to SES program users in an effort to foster the use of improved subway design techniques and for the benefit of the transit-using public.

3. PROJECT HISTORY

Contract Item 1 - Program Plan

July 1976

Development of the Procedural Guidelines which state the procedures required to document, to direct maintenance work, and to advise SES users of program modifications and updates was completed.

August 1976

The Procedural Guidelines were sent to all known users of SES Version 2, thus completing this contract item. (See Appendix A for the text of the Procedural Guidelines.)

Contract Item 2 - Maintenance Activities

Throughout the term of this contract, assistance was provided in the form of answering questions posed by SES users and potential users. These questions generally fall into the following categories:

Potential Users	-	Questions concerning the types of problems solved by SES, and ways to obtain the program and documentation.
New Users	-	Questions on making SES operational on their computer and preparation of input data.
Established Users	-	Questions on the effects that modeling decisions have on results, and questions on identification of problems in the SES program and problems in the input data.

During this contract 14 revisions to the SES User's Manual and one revision to the SES Programmer's Manual were issued. Appendix B contains the complete text of these revisions.

Fourteen modifications to the SES source code were also issued during the contract. A summary of these revisions is presented in Table 1, and the entire text of the modifications is presented in Appendix C.

July 1976

Four SES problems were discovered. After TSC approval was given to work on them, they were rectified. A package fully describing the revisions and their background was transmitted to the known users of SES Version 2. The program with these changes was designated SES Version 2.04 (SES Version 2, Modification Level 4). The four problems were

1) The rate of train power loss was computed incorrectly when a train was coasting downhill (Problem Category 1).

2) The average value for relative humidity was output incorrectly for subsegments other than the first subsegment in each line segment or ventilation shaft (Problem Category 1).

3) Under certain, rather complicated, circumstances, a floating point division by zero occurred in Subroutine TRAIN (Problem Category 2).

4) A FORTRAN variable was not properly initialized in Subroutine VSINS (Problem Category 1).

TABLE 1 SES SOURCE CODE MODIFICATIONS

Modification Number	Date	Routines Modified	Description
1	7/23/76	HEAT	Correct the computation of train power loss when coasting downhill.
2	7/23/76	SUMARY	Correct the computation of average relative humidity.
3	7/23/76	TRAIN	Correct runaway trains caused by incorrect computation of braking rate.
4	7/23/76	VSINS INPUT	Correct the initialization of variables.
5	11/18/76	ACEST2	Correct supplementary output.
6	11/18/76	INPUT	Correct title page.
7	11/18/76	DSES	Correct program reponse following fatal input error.
8	1/21/77	OMEGA2 INPUT	Correct calculation of air pressure change in a segment containing a train. Provide revised SAMPL5 output.
9	4/14/77	TRAIN LOCATE INPUT	Correct runaway trains caused by precision problem in computations.
10	8/12/77	GARAGE	Correct acceptable input range for Front of Train Drag Coefficient.
11	8/12/77	TRINS	Improve processing of erroneous input data.
12	8/12/77	LOCATE	Correct computation of train drag under certain circumstances.
13	8/12/77	VSINS	Correct time of fan activation.
14	8/12/77	ERROR INPUT	Revise severity category of two input errors.
-	1/24/78		Provide revised output for SAMPL5 test problem.

November 1976

Three SES problems were discovered. After TSC verbal approval was given, they were rectified. The program with these changes was designated SES Version 2.07 (SES Version 2, Modification Level 7). The three problems were:

1) Items to be printed as part of the optional supplementary output for the environmental control estimate did not print correctly (Problem Category 1).

2) A superannuated title appeared in the output. The program title was changed to indicate the program being under the sponsorship of the TSC (Problem Category 1).

3) The program response following the diagnosis of a fatal error in an input data set was occasionally wrong, causing the printing of erroneous input verification (Problem Category 1).

Thirteen minor problems were discovered and rectified in the SES User's Manual. These problems were eigher typographical errors or instructions that could be misunderstood.

One problem was discovered and rectified in the SES Programmer's Manual. Certain instructions for computing program array sizes had not been updated from SES Version 1 to SES Version 2.

A package fully describing the above revisions and their background was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.07 was supplied to the TSC.

December 1976

A problem in the SES aerodynamic subprogram was discovered. Subroutine OMEGA2 did not always correctly calculate the aerodynamic forcing function for the last region in the last line segment of a line section. The problem became apparent when the SES program computed infinite airflows from its first integration step, which for the problem under consideration was at simulation time equal to 0.1 seconds. The problem was traced by adding FORTRAN WRITE statements to key locations in the program. The problem was fixed by changing the order and numbering of five FORTRAN statements in Subroutine OMEGA2 (Problem Category 2).

January 1976

An update describing a correction to subroutine OMEGA2 of the SES aerodynamic subprogram was mailed to all known users of SES Version 2. The program problem was that the air pressure change in the line segment, which contributes to both the airflows and the train drag, was sometimes being computed incorrectly. The error occurred in line segments that were in line sections having more than one line segment. It did not occur in the first line segment of a line section. The problem could occur for a line segment only if trains were in its line section. For these possibilities, the problem consisted of the previous

value for the change in air pressure over the end of a train being added at the end of a line segment when a zero value should have been added.

This change updated SES to Version 2.08 (Version 2, Modification level 8).

April 1977

A problem was corrected in the SES train performance subprogram which monitors and controls the passage of a subway train through the system. A copy of the data set that uncovered the problem was obtained from the user (Kaiser Engineers) and was tested on PBQ&D's IBM 370/135. This simulation showed that for a rare situation, the train performance subroutines could not properly monitor the location of a train, and therefore, could not control it. The problem was traced to the precision with which Subroutine TRAIN computes the distance the train has traveled in a single program time-step, and the strategy that Subroutine LOCATE used to locate the trains with respect to the track sections, etc. This problem was eliminated by minor changes to Subroutines TRAIN and LOCATE (Problem Category 3).

A package fully describing the above problem and its corrections was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.09 was supplied to the TSC.

August 1977

The following minor problems in the SES Program were discovered and corrected

1) The checking of the input parameter, "Front of Train Drag Coefficient", was being done with a set of limits that were inconsistent with those in the User's Manual (Subroutine GARAGE) (Problem Category 1).

2) If an incorrect value was entered for the deep sink temperature, the program interpreted it as a fatal error. It should have been a non-fatal error (Subroutine ERROR) (Problem Category 1).

3) If a train was operating above grade, its drag coefficient had one value when any subway system was being simulated and another when only above-grade operations were being simulated. The error was minor, being about 8 percent for a typical train (Subroutine LOCATE) (Problem Category 1).

4) The input of a non-existent train type into the track section data (Input Forms 8) was supposed to be a fatal error with an immediate halt to the processing of the input data. This halt did not always occur (Subroutine TRINS) (Problem Category 1).

5) If a train route was input as passing through a certain line section and in fact it could not pass through this line section, the wrong section input was not written out. In addition, this error should have been a fatal error instead of a non-fatal error (Subroutine TRINS) (Problem Category 1).

6) The internal use of the "Fan Time On" parameter (time at which a fan is turned on) in the program was such that when a fan was defined as being fully operational at the beginning of simulation, there was an unnecessary opportunity for the solution of the aerodynamic equations to be unstable. This may have caused the use of a smaller than necessary time increment for the aerodynamic integration (Subroutine VSINS) (Problem Category 1).

The write-up describing the use of both the "Fan Time On" and the "Fan Time Off" input parameters in the User's Manual was added to and improved upon. This write-up constituted revision number 14 to the SES User's Manual (Problem Category 2).

A package fully describing the above revisions and their background was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.14 was supplied to the TSC.

April 1977

The contract completion date was extended to August 31, 1978.

August 1978

The contract completion date was extended to October 6, 1978.

4. SES USERS

As of October 6, 1978 the following organizations had obtained a copy of the SES source code:

Organization	Use*
Parsons Brinckerhoff Quade & Douglas, Inc.	Heavy
Kaiser Engineers	Heavy
Deleuw Cather	Heavy
Jet Propulsion Laboratory	Medium
Kotu Kikai Setubi Sekke Jimusho Ltd. (Japanese Consultant)	Medium
Washington Metropolitan Area Transit Authority	Medium
C.E. Maguire, Inc.	Medium
The City of Philadelphia	Light
The Port Authority of New York and New Jersey	Light
Consorcio Nacional de Engenheiros Consultores (Brazil)	Light
Sverdrup and Parcel and Associates	Light
Transportation Systems Center	Light
New York City Transit Authority	Light
Bechtel, Inc.	Light
Montreal Urban Community Transit Commission	Light
Snowy Mountains Engineering Corporation (Australia)	Light

* "Heavy" users have completed two or more projects, and have two or more underway; "Medium" users have completed one project, and have at least one underway; and "Light" users are beginning their first application.

APPENDIX A

SOFTWARE MAINTENANCE PROCEDURAL GUIDELINES

(Revised December 2, 1977)

These procedural guidelines were sent to SES users to inform them of the existence of the maintenance project and the procedure for reporting problems and obtaining technical assistance. The User Registration Form was used to obtain information on the SES Users.

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Subway Environment Simulation (SES) Computer Program

Software Maintenance Procedural Guidelines

I. OBJECTIVE

The Subway Environment Simulation (SES) Software Maintenance Plan is designed to give assistance to SES program users who encounter problems with either the software or documentation. Technical assistance will be provided by Parsons, Brinckerhoff, Quade & Douglas, Inc. (PBQ&D) through a contract with the Transportation Systems Center of the United States Department of Transportation (TSC). This contract will be in effect until about April, 1980.

This service is provided to the SES program users in an effort to foster the use of improved subway design techniques and for the benefit of transit-using public.

II. LIMITATIONS

Technical assistance is provided under these guidelines subject to the following limitations:

1. Maintenance will only be provided for the Subway Environment Simulation (SES) Program, Version 2, as updated to include all subsequent revisions or versions.

2. This assistance does not include problems related to computer hardware, operating system problems or limitations, or problems related to a particular computer installation.

3. Any user modifications to the SES, except array size adjustment, are not covered under these guidelines. However, assistance may be given for problems which are not related to user modifications.

4. These guidelines provide for technical assistance relating to software and documentation problems only. Only a very limited amount of application assistance can be provided.

5. All technical assistance is subject to the prior approval of the TSC.

III. REGISTRATION

SES program users are requested to complete the attached "User Registration Form" and send it to PBQ&D at the address given in Section VII below. Only registered users of the SES program will be provided with software or documentation revisions or may receive technical assistance under these guidelines.

IV. SES REVISIONS

When necessary, all registered users of the SES program will be notified of program revisions. These revisions will contain the following information:

Revision Number and Date
(for identification)

Problem (brief description of problem)

Symptoms (visible signs of problems)

Correction
(how to correct problem - usually program change)

Effect on Previous Results
(validity of results obtained prior to implementing this revision)

General Notes

The current version of the SES is:

Version 2, Revision No. 14 Date: August 12, 1977

V. USER'S RESPONSIBILITY

The SES user must perform the following tasks:

A. Provide himself with technical computer expertise to do the following:

   a. Make the SES program operational on his own or a vendor's computer.

   b. Prepare his own operating system control cards.

   c. Transcribe his data from input forms to machine readable form and submit problems for processing.

   d. Possess a reasonable understanding of the error messages generated by his computer's operating system.

   e. Understand Chapters 1 and 3 of the Programmers Manual which relate to the program software/hardware interface.

B. Run the SAMPL5 test problem to verify that the program is operating properly.

C. Be familiar with the information in the SES User's Manual.

D. Incorporate the SES Program Revisions as soon as possible.

VI. REQUIREMENTS TO RECEIVE ASSISTANCE

The user may be asked to provide the following information and/or items to assist in locating and correcting the problem:

A. A description of the problem, its nature and symptoms.

B. A copy of the computer output indicating the problem, and other outputs on which the same or a similar problem was observed.

C. A SES schematic diagram for the run(s) in B above, with node numbers, section numbers, line segment numbers, and ventilation shaft segment numbers indicated.

D. A listing and/or card deck of the input data for which the problem occurred.

E. FORTRAN compiler output showing:

1. A listing of the source statements ("SOURCE" option on IBM).

2. A table of variable names showing type and storage location ("MAP" option on IBM).

3. A table of statement labels showing the relative address assigned to the label ("MAP" option on IBM).

4. An object language listing in a psuedo assembler language format may be requested on an individual subroutine basis ("LIST" option on IBM).

F. Linkage Editor (or Allocator) output showing:

1. A list of the control statements ("LIST" option on IBM).

2. A map of the load module (or main memory) showing the relative location and length of the main program and subroutine ("XREF" option on IBM).

In cases where the problem is suspected to be machine dependent, or related to the operating environment of the machine on which it occurred, the user may be asked to make additional runs on his computer at his expense to help locate the problem. The user may choose not to make these additional runs, however this will probably cause efforts to correct the problem to cease.

It is expected that all items supplied to PBQ&D will be returned to the user, however, no responsibility is assumed for loss or damage to any items supplied.

The information provided by the user concerning his application on which the problem occurred (Items B, C and D) will be held in confidence by PBQ&D and the TSC if so requested.

VII. PROBLEM REPORTING PROCEDURE

If a problem occurs the user should first check to be sure that it is not caused by erroneous input data. If the user believes the problem is caused by a program malfunction, he can then obtain assistance under this plan.

To obtain assistance the user must first notify the TSC, at the address below, and receive their approval.

Mr. Neil Meltzer
Code 233
U.S. Department of Transportation
Transportation Systems Center
Kendall Square
Cambridge, Mass. 02142

Telephone: (617) 494-2192

After TSC approval is obtained, the user may communicate directly with PBQ&D at the address below:

Mr. William D. Kennedy
Parsons Brinckerhoff Quade & Douglas, Inc.
250 West 34th Street
New York, N.Y. 10001

Telephone: (212) 239-7945

or, in his absence

Mr. James W. Guinan
Parsons Brinckerhoff Quade & Douglas, Inc.
250 West 34th Street
New York, N.Y, 10001

Telephone: (212) 239-5159

VIII. RECORDKEEPING

Records will be kept of all work performed by PBQ&D under these guidelines. A file will be maintained for each registered SES user which will contain the following information:

1. User Registration Form

2. All written correspondence

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER REGISTRATION FORM

Part 1 of 2

Firm Name: _____

Address: _____

_____

_____

Representative		Alternate	
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
	_____		_____
Telephone:	_____	Telephone:	_____

Computer Configuration

Make: _____

Model: _____

Main Memory: _____ words / bytes

Vendor (if applicable): _____

_____

_____

_____

Operating System: _____

Disks (number and model): _____

_____

Drums (number and model): _____

_____

Tapes (number, model and tracks): _____

_____

Other Information: _____

_____

_____

_____

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER REGISTRATION FORM

Part 2 of 2

SES Program Information

Source: ☐ T.S.C. or PBQ&D Date: _____

☐ Other _____ Date: _____

Version: _____ Latest Modification Level: _____

User Modifications: _____

_____

_____

_____

_____

Application (optional): _____

_____

_____

Comments: _____

_____

_____

_____

Information Supplied By: _____ Date: _____

APPENDIX B

USER'S AND PROGRAMMER'S MANUAL REVISIONS

The revisions contained in this appendix were issued to all registered SES Users to update their User's Manual (Ref. 1) and Programmer's Manual (Ref. 2). Fourteen revisions to the User's Manual and one revision to the Programmer's Manual were issued during the project.

REFERENCES

1. Associated Engineers/A Joint Venture, Subway Environmental Design Handbook, Vol. II, Subway Environment Simulation Computer Program (SES), Part 1: User's Manual, prepared by Parsons Brinckerhoff Quade & Douglas, Inc., for U.S. Department of Transportation, National Technical Information Service Number PB 254 789, 1975.

2. Associated Engineers/A Joint Venture, Subway Environmental Design Handbook, Vol. II, Subway Environment Simulation Computer Program (SES), Part 2: User's Manual, prepared by Parsons Brinckerhoff Quade & Douglas, Inc., for U.S. Department of Transportation, National Technical Information Service Number PB 254 790, 1975.

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November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USERS MANUAL REVISIONS NUMBERS 1 THROUGH 13

1. Page 10-16. Corrected upper limit of NUMBER OF TRAIN ROUTES from 4 to 6.

2. Page 10-64. Corrected lower limit of FAN LOWER FLOW LIMIT from -50,000 to -100,000.

3. Page 10-84. Clarified explanation of TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR.

4. Page 10-94. Clarified explanation of RESISTANCES.

5. Appendix H, Brief Instructions for FORM 1E. Corrected upper limit of NUMBER OF TRAIN ROUTES from 4 to 6 (same correction as Page 10-16).

6. Appendix H, Brief Instructions for FORM 7A. Corrected lower limit of FAN LOWER FLOW LIMIT FROM -50,000 to -100,000 (same correction as Page 10-64).

7. Appendix H, Brief Instructions for FORM 9C. Clarified explanation of TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR (same correction as Page 10-84).

8. Appendix H, Brief Instructions for FORM 9H. Clarified explanation of RESISTANCES (same correction as Page 10-94).

9. Page 8-18, Chopper Input Instructions Clarified.

10. Page 8-32, Chopper Input Instructions Clarified.

11. Page 8-33, Chopper Input Instructions Clarified.

12. Page 8-35, Chopper Input Instructions Clarified.

13. Page 8-35a, Chopper Input Instructions Added.

NUMBER OF TRAIN ROUTES : This number corresponds to the total number of train routes in the system.
$0. \leq X \leq 6.$ Error type 73, 134, 135

NUMBER OF TRAIN TYPES : This number corresponds to the total number of train types in the system.
$0. \leq X \leq 3.$ Error type 73, 136, 137

NUMBER OF ENVIRONMENTAL CONTROL ZONES : This number corresponds to the total number of environmental control zones in the system.
$0. \leq X \leq 30.$ Error type 100

FAN STOPPING/WINDMILLING OPTION : If a fan either exceeds its upper or lower fan operating limits, the program provides two options:

1. The simulation will stop immediately.
2. The fan will be turned off, but the simulation will continue.

$1. \leq X \leq 2.$ Error type 11

NUMBER OF TRAINS IN OPERATION AT INITIALIZATION : Enter the total number of trains, regardless of their route, that have been dispatched and are operating within the system prior to the beginning of the simulation.
$0. \leq X \leq 30.$ Error type 141

FORM 7A - FAN DESCRIPTION

FAN IDENTIFICATION : Information identifying the fan being described will appear on the input verification printout. Up to 36 alphameric characters can be used.

AIR DENSITY AT WHICH THE FAN PERFORMANCE CURVE WAS MEASURED : Enter the air density at which the manufacturer measured the fan performance curve. The program will internally adjust the fan performance curve to adjust for the difference between this density and the system ambient density.

$0.040 \leq X \leq 0.085$ lb/Cu Ft Error type 187

TIME REQUIRED FOR FAN TO REACH FULL OPERATING SPEED : This number corresponds to the amount of time required of the fan to overcome the inertial effects of its blades and motor in reaching its full operating speed.

$X \leq 300$ Sec. Error type 176

FAN LOWER FLOW LIMIT : Enter the minimum volume flowrate that may be obtained by this fan. If this fan falls below this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$-100{,}000 \leq X \leq 0$ CFM Error type 193

FAN UPPER FLOW LIMIT : Enter the maximum volume flowrate that may be obtained by this fan. If this fan exceeds this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$1{,}000 \leq X \leq 2{,}000{,}000$ CFM Error type 194

FORM 9C - TRAIN DATA

Skip this form if the Train Performance Option is 0.

TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR : This value represents the weight of all the acceleration and/or deceleration resistor grid elements which actually resist current flow in a resistor grid arrangement for this train type. This value does not include any weight of the resistor grid supporting structure. A value of zero (0.) indicates an instantaneous heat release mechanism is to be used for that grid. If a 0. is entered for a grid, the remaining entries for the grid may be zero.
0. < X < 2,000. lbs Error type 101, 102

EFFECTIVE DIAMETER OF AN ELEMENT : This value represents a characteristic resistor grid element diameter for all the acceleration and/or deceleration grids in this train type.
0. < X < 24. In. Error type 103, 104

EFFECTIVE SURFACE AREA FOR CONVECTION PER CAR : This value represents the sum of the effective surface area for convection calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. This value is a function of the physical geometry of each element and the location of the resistor grid arrangement relative to the underside of the car.
0. < X < 500. Sq Ft Error type 105, 106

EFFECTIVE SURFACE AREA FOR RADIATION PER CAR : This value represents the sum of the effective surface area for radiation calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. The effective area is defined as the product of the actual surface area of an element and its shape factor with regard to the surroundings enclosing the resistor grid arrangement.
0. < X < 500. Sq Ft Error type 107, 108

EMISSIVITY OF THE RESISTANCE ELEMENT : This value represents the emissivity of a typical acceleration and/or deceleration resistor grid element surface evaluated at an average grid temperature for this train type.
0. < X < 1. Error type 109, 110

SPECIFIC HEAT OF THE RESISTANCE ELEMENT : This value represents the specific heat of an acceleration and/or deceleration resistor grid element evaluated at an effective grid temperature.
0. < X < 1. Btu/(lb - Deg F) Error type 111, 112

INITIAL GRID TEMPERATURES : The initial temperature of the acceleration and/or deceleration resistor grids corresponds to the temperature of the grids at the time the trains are dispatched onto their respective route. A blank entry or zero indicates that the resistor grid is to be initialized at ambient temperature.

FORM 9H - TRAIN DATA

Skip this form if the Train Performance Option is 0. or 3.

RESISTANCE SPEEDS : The two train speeds entered here are used in the definition of the external resistance versus train speed curve. The first entry is the speed at which transition occurs; the second is the speed at which field strength reduction begins. If a chopper controlled train is being simulated, 0.0 must be entered for the two resistance speeds.
0. < X < 100.MPH Error type 62

RESISTANCES : Three resistance values must be given to describe the motor circuit resistance. These are: first, the external plus internal resistance at zero train speed; second, the external plus internal resistance just after transition has occurred; and third, the internal resistance of the motor armature and field. If a chopper-controlled train is being simulated, 0.0 must be entered for the first two entries, but the third entry, the internal resistance of the motor armature and field must still be entered.
0.001 < X < 3. ohms Error type 61

FORM 1E - GENERAL DATA

NUMBER OF TRAIN ROUTES : This number corresponds to the total number of train routes in the system.
0. ≤ X ≤ 6. Error type 73, 134, 135

NUMBER OF TRAIN TYPES : This number corresponds to the total number of train types in the system.
0. ≤ X ≤ 3. Error type 73, 136, 137

NUMBER OF ENVIRONMENTAL CONTROL ZONES : This number corresponds to the total number of environmental control zones in the system.
0. ≤ X ≤ 30. Error type 100

FAN STOPPING/WINDMILLING OPTION : If a fan either exceeds its upper or lower fan operating limits, the program provides two options:

1. The simulation will stop immediately.
2. The fan will be turned off, but the simulation will continue.

1. ≤ X ≤ 2. Error type 11

NUMBER OF TRAINS IN OPERATION AT INITIALIZATION : Enter the total number of trains, regardless of their route, that have been dispatched and are operating within the system prior to the beginning of the simulation.
0. ≤ X ≤ 30. Error type 141

FAN IDENTIFICATION : Information identifying the fan being described will appear on the input verification printout. Up to 36 alphameric characters can be used.

AIR DENSITY AT WHICH THE FAN PERFORMANCE CURVE WAS MEASURED : Enter the air density at which the manufacturer measured the fan performance curve. The program will internally adjust the fan performance curve to adjust for the difference between this density and the system ambient density.

$0.040 \leq X \leq 0.085$ lb/Cu Ft Error type 187

TIME REQUIRED FOR FAN TO REACH FULL OPERATING SPEED : This number corresponds to the amount of time required of the fan to overcome the inertial effects of its blades and motor in reaching its full operating speed.

$X \leq 300$ Sec. Error type 176

FAN LOWER FLOW LIMIT : Enter the minimum volume flowrate that may be obtained by this fan. If this fan falls below this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$-100{,}000 \leq X \leq 0$ CFM Error type 193

FAN UPPER FLOW LIMIT : Enter the maximum volume flowrate that may be obtained by this fan. If this fan exceeds this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$1{,}000 \leq X \leq 2{,}000{,}000$ CFM Error type 194

FORM 9C - TRAIN DATA

Skip this form if the Train Performance Option is 0.

TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR : This value represents the weight of all the acceleration and/or deceleration resistor grid elements which actually resist current flow in a resistor grid arrangement for this train type. This value does not include any weight of the resistor grid supporting structure. A value of zero (0.) indicates an instantaneous heat release mechanism is to be used for that grid. If a 0. is entered for a grid, the remaining entries for the grid may be 0.
$0. \leq X \leq 2{,}000.$ lbs Error type 101, 102

EFFECTIVE DIAMETER OF AN ELEMENT : This value represents a characteristic resistor grid element diameter for all the acceleration and/or deceleration grids in this train type.
$0. \leq X \leq 24.$ In. Error type 103, 104

EFFECTIVE SURFACE AREA FOR CONVECTION PER CAR : This value represents the sum of the effective surface area for convection calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. This value is a function of the physical geometry of each element and the location of the resistor grid arrangement relative to the underside of the car.
$0. \leq X \leq 500.$ Sq Ft Error type 105, 106

EFFECTIVE SURFACE AREA FOR RADIATION PER CAR : This value represents the sum of the effective surface area for radiation calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. The effective area is defined as the product of the actual surface area of an element and its shape factor with regard to the surroundings enclosing the resistor grid arrangement.
$0. \leq X \leq 500.$ Sq Ft Error type 107, 108

EMISSIVITY OF THE RESISTANCE ELEMENT : This value represents the emissivity of a typical acceleration and/or deceleration resistor grid element surface evaluated at an average grid temperature for this train type.
$0. \leq X \leq 1.$ Error type 109, 110

SPECIFIC HEAT OF THE RESISTANCE ELEMENT : This value represents the specific heat of an acceleration and/or deceleration resistor grid element evaluated at an effective grid temperature.
$0. \leq X \leq 1.$ Btu/(lb - Deg F) Error type 111, 112

INITIAL GRID TEMPERATURES : The initial temperature of the acceleration and/or deceleration resistor grids corresponds to the temperature of the grids at the time the trains are dispatched onto their respective route. A blank entry or zero indicates that the resistor grid is to be initialized at ambient temperature.

FORM 9H - TRAIN DATA

Skip this form if the Train Performance Option is 0. or 3.

RESISTANCE SPEEDS : The two train speeds entered here are used in the definition of the external resistance versus train speed curve. The first entry is the speed at which transition occurs, the second is the speed at which field strength reduction begins. If a chopper-controlled train is being simulated, 0.0 must be entered for the two resistance speeds.
0. < X < 100.MPH Error type 62

RESISTANCES : Three resistance values must be given to describe the motor circuit resistance. These are: first, the external plus internal resistance at zero train speed; second, the external plus internal resistance just after transition has occurred; and third, the internal resistance of the motor armature and field. If a chopper controlled train is being simulated, 0.0 must be entered for the first two entries, but the third entry, the internal resistance of the motor armature and field, must still be entered.
0.001 < X < 3. ohms Error type 61

out of the motor circuit. By eliminating the need for external resistance, the chopper at once demonstrates a savings in traction power requirements and a reduction in heat input to the tunnel air.

At base speed, the full motor rated voltage is applied to the motors. For example, in the case of the Westinghouse chopper system used in the BART and Sao Paulo Metro cars, the chopper switches at a normal frequency of 218HZ with an "off" interval of about 6% of the total cycle time. To further extend the high-power portion of the accelerating cycle beyond base speed, motor field weakening is employed, as in the case of the cam-controlled train.

Cam Controller vs. Chopper Controller

Cam Controller -

Advantages

1. Thoroughly tested and refined through years of service.
2. Lower initial cost and also lighter.
3. Does not require separate blowers for equipment cooling.
4. Simplicity of the circuits makes trouble-shooting relatively easy and keeps maintenance skills to a minimum.

Disadvantages

1. More maintenance required for periodic replacement of switch contacts.
2. Ride quality may not be smooth, depending on the number and arrangement of resistance notches; and large step current changes may aggravate wheel spin and slip.
3. Acceleration resistor grids make the power consumption per car-mile higher than the chopper control and generate heat.
4. Only rheostatic braking is practical, and as a result, more heat is generated.

The line current varies linearly from zero speed up to base speed. (See Figure 8.8.) This is caused by the linear variation of the chopper duty cycle (duty cycle = $\frac{t_{on}}{t_{on} + t_{off}}$). The voltage imposed across the motors increases with increasing duty cycle and the back EMF from the motors increases linearly with speed. Therefore, to maintain a constant current through the motors the voltage imposed on the motors must be increased proportionally. The line current also increases because of the transformer action of the chopper (i.e., $E \times I = \frac{E_2 \times I_2}{\eta}$).

Tractive Effort versus Train Speed

This curve consists of three portions: a constant portion, and two hyperbolic portions. Tractive effort is constant from zero train speed through point 1 to point 2. Field strength reduction begins at point 2 and ends at point 3, and over this range the tractive effort is assumed to vary hyperbolically with respect to train speed. Points 3, 4 and 5 are on the minimum field strength motor curves, which are approximated by a 2nd order hyperbola. Point 3 is the point at which the minimum field strength curve intersects the design current. Point 5 should correspond to a high train speed which the train would not normally exceed, and point 4 would be an arbitrary point which is approximately equi-distant from points 3 and 5.

Motor Current versus Train Speed

This curve consists of two portions: a constant portion and a polynomial portion. The constant portion of the curve extends from zero train speed to the speed at which field strength reduction is completed (point 3). The actual current through the motors is constant at the design value from zero to point 2, but may fluctuate above and below the design value during the field strength reduction, from point 2 to point 3. If present, these fluctuations

are approximately equal above and below the design current so that the current may be considered constant through this phase of the train operation. Once the minimum field strength is reached the motor current begins to decrease with increasing train speed. Points 4 and 5 define this portion of the curve. In this case the points on the curve are used to define the motor current versus speed relationship. It should be understood that these points are at exactly the same speeds, and are actually the same points as those used in defining the tractive effort versus speed relationship.

Line Current Versus Train Speed

The line current versus train speed relationship for a chopper-controlled train is approximated by a curve which consists of three portions: a linear portion, a constant portion and a polynomial portion. The linear portion extends from zero train speed to the speed at which field strength reduction begins (point 2). The current is held at nearly a constant value until field reduction is completed (point 3). Once the minimum field strength is reached, the line current begins to decrease with increasing train speed. Points 4 and 5 define this portion of the curve.

8.5 Entering Motor Performance Characteristics (Input Form 9F)

The motor performance characteristics are described to the SES program by specifying the train speed, tractive effort and motor current which correspond to certain critical points on the motor characteristic curves. Each point consists of a set of three corresponding readings, one from each scale on the motor curves (see Figure 8.6). Four points must be specified on Input Form 9F:

First. The speed at which field strength reduction begins--this is the point where the starting current line intersects the maximum field strength train speed curve (point 2 on Figure 8.6).

R_M = the armature and motor field resistance, ohms

E_L = line voltage

η = chopper efficiency

The value of the line current for the remaining speeds is obtained by substituting the value of the corresponding motor current, entered on input form 9F, in the following equation:

$$I_L = \frac{2I_M \cdot \alpha_{MAX}}{\eta}$$

where: α_{MAX} = the limiting value of the chopper duty cycle, i.e., $\alpha = \frac{t_{on}}{t_{on} + t_{off}}$

I_M = the motor current, amps

In addition, the limiting value of the chopper duty cycle can be obtained from:

$$\alpha_{MAX} = \frac{2E_M}{E_L}$$

where:

E_M = the rated motor voltage

It should be noted that in general the limiting value of the duty cycle of the chopper, α_{MAX}, will not be equal to 1.0 (i.e., the chopper will not attain a full conducting mode). For example, if the line voltage is 750 volts and the rated voltage for each traction motor is 300 volts, α_{MAX} will be 0.8.

The user has the option of entering two values for the chopper efficiency. The first value entered will apply for train speeds ranging from zero to U1. The second value entered will apply for speeds greater than U1. The speed

U1 is entered as miles per hour. If the user wishes to specify only one efficiency, he must enter a number for U1 greater than the maximum speed reached by the train during the simulation.

The user must enter a value for the regenerative braking effectiveness. If dynamic (rheostatic) braking is called for, ZERO (0.0) must be entered for the regeneration effectiveness.

8.7 External Resistance versus Train Speed (Input Form 9H)

This curve consists of two portions, both of which are linear with respect to train speed but are separated by a discontinuity. The two portions may have different slopes. The initial value at zero train speed is the value of the acceleration grid resistance which is in the circuit when the train starts from rest. This external resistance is decreased in steps until its value is zero at the transition speed (point 1). For the purposes of the simulation, each individual step is ignored and this decrease in resistance is considered to be linear with respect to train speed.

At the transition speed (point 1), the motor circuit is switched from series to series-parallel connection. The acceleration resistor grids are

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER'S MANUAL REVISION NUMBER 14

Page 4-65 is revised. A user suggestion for preparing fan operating times was added.

the fan performance curve to account for the difference between the two densities. This given density is usually .075 Lbs/cu. ft.

Fan Type. Two fans are the same type only if they possess identical fan curve, run-up times, upper and lower operating flow limits, and air densities at which the fan performance curves were measured. Data describing each different fan type must be entered in Forms 7A and 7B. The fan type identification numbers are assigned to each fan type according to the order in which the fans are entered in the data. The first fan type entered is fan type 1, the second fan type entered is fan type 2, and so on until all the fan types have been entered in the data.

User Suggestion. A user may locate a fan in a ventilation shaft but not operate the fan during the simulation by entering a number greater than the Maximum Simulation Time for the Simulation Time After Which Fan Switches On.

In version 2 of SES,the fan run-up curve is applied to both fan run-up (after switching "on") and run-down (after switching "off"). This means that the fan remains active past the Simulation Time After Which Fan Switches Off (on Input Form 5C) for a time equal to the Time Required For Fan To Reach Full Operating Speed (on Input Form 7A). To prevent unwanted fan operation, it is suggested that the fan switch-on time and switch-off time be set to a time greater than the largest Maximum Simulation Time which is anticipated.

I. Revision No. 1

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

PROGRAMMERS MANUAL REVISION NUMBER 1

1. Appendix E, Page 3. The table used for Core Storage Computation has been corrected to be consistant with Version 2 of the SES. These corrections did not affect the following page, Page 4 of Appendix E.

Description	Limit Variable 1	Limit Variable 2	Array Size	No. of Arrays	Total
General Variables	------		1	112	112
Array Size Limits	------		1	29	29
Physical Constants	------		1	25	25
Section Variables	LMSECT		140	26	3640
Section +2	LMSECT+2		142	1	142
Sections times 3	LMLPLK		420	1	420
Section External I.D. Nos.	LMSCTX		400	1	400
Node Variables	LMNODE		130	5	650
Node +2	LMNODE+2		132	2	264
Nodes times No. of Sections attached to node	LMNODE	LMSCND	130*5	2	1300
Node External I.D. Nos.	LMNODX		400	1	400
Aerodynamic Node Table	LMTBL2		1500	1	1500
Aerodynamic Node Coefficients	LMCOND		950	1	950
Thermodynamic Node Variables	LMTHND		140	4	560
Thermo. Nodes times No. of Sections attached to node	LMTHND	LMSCND	140*5	3	2100
Flow Loops	LMNLOP		75	4	300
Aerodynamic Coefficient Matrix	LMBLP		1000	1	1000
Line Segment Variables	LMLSEG		90	45	4050
Line Segment times No. of Trains in Line Seg.	LMLSEG	LMTRSG	90*8	3	2160
Ventilation Shaft Section Variables	LMVSEG		60	32	1920
Total Subsegments (line and vent shaft)	LMSS		300	47	14100
Line Subsegments	LMLSS		250	10	2500
Line Subsegments times Train Route	LMLSS	LMTRRT	250*6	1	1500
Zone Cluster Variables	LMCLST		30	1	30
Train Type Variables	LMTRTP		3	65	195
Underplatform Exhaust Variables	------		1	4	4
Train Route Variables	LMTRRT		6	9	54
Dispatcher Group times Routes	LMTRGP	LMTRRT	15*6	3	270
Track Sections times Routes	LMTSRT	LMTRRT	260*6	7	10920
Exp. T.P. Profile Pts. times Routes	LMEXPD	LMTRRT	201*6	3	3618
Operational Train Variables	LMTRAN		30	33	990
Fan Type Variables	LMFNTP		4	11	44
Unsteady Heat Load Variables	LMUL		10	5	50
Patron Characteristics	------		1	1	1
Print Group Variables	LMPRGP		15	4	60
					56258

APPENDIX C

SOURCE CODE REVISIONS

The revisions contained in this appendix apply to Version 2 of SES. They were issued to all registered users. 14 revisions to the SES source code were issued during the project.

TABLE OF CONTENTS

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 1 TO VERSION 2

Problem

The rate of train Power Loss has been found to be incorrect when a train was coasting downhill.

Symptoms

An additional term, which is the rate of change of the train's potential energy, was being included in the calculation of train Power Loss when a train was coasting downhill. This resulted in an overestimation of the rate of train Power Loss, and subsequently the rate of train Heat Rejection.

Correction

See attached corrected listing of subroutine HEAT. Corrected lines are indicated by a "C."

Effect on Previous Results

Previous results would show an overestimation of the train Power Loss and Heat Rejection by an amount equal to the change in the train's potential energy while the train is coasting downhill.

```
        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE  HEAT( NUMV, ITYP, TE, AMPS, AMPL )                    00858000
                    C                                                                 00858100
                    C*****THIS SUBROUTINE COMPUTES THE RATE OF HEAT INPUT (IN BTU/SEC/ENTIRE00859200
                    C*****TRAIN) INTO BOTH THE ACCLERATION RESISTOR GRIDS (QACC OR QACCV)  00858300
                    C*****AND THE DECELERATION RESISTOR GRIDS (QDEC OR QDECV) FOR TRAIN    00858400
                    C*****PERFORMANCE OPTIONS 1 AND 2. IN ADDITION THE MOTOR CURRENT (AMPS  00859500
                    C*****OR AMPV) AND THE LINE CURRENT (AMPL OR AMPLV) ARE SET TO ZERO IF  00858600
                    C*****THE TRAIN MOTORS ARE NOT BEING USED                         00858700
                    C                                                                 00858800
                    C     INCLUDE  DSHARE                                             00858900
                    C                                                                 00859000
                    C ************************* INTEGER VARIABLES ************************* C00859100
                    C                                                                 00859200
                    C  GENERAL VARIABLES                                              00859300
ISN 0003                INTEGER   AFTIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, ESCFT  00859400
ISN 0004                INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      00859500
ISN 0005                INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 00859600
                    C  SECTION VARIABLES  (LMSECT)                                    00859700
ISN 0006                INTEGER   MTQPS(140)                                          00859800
ISN 0007                INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)   00859900
ISN 0008                INTEGER   TABL13(140), TABL20(140), TABL21(140)               00860000
                    C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00860100
ISN 0009                INTEGER   ND(140), NDS(141), NDSS(142)                        00860200
                    C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  00860300
ISN 0010                INTEGER   LKAN(420)                                           00860400
                    C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)             00860500
ISN 0011                INTEGER   TABL14(400)                                         00860600
                    C  NODE VARIABLES  (LMNODE)                                       00860700
ISN 0012                INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)   00860800
ISN 0013                INTEGER   TABL23(132), TABL45(130), TYPTND(130)               00860900
                    C  AERODYNAMIC NODE VARIABLES (LMTBL2)                            00861000
ISN 0014                INTEGER   TABL2(1500)                                         00861100
                    C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  00861200
ISN 0015                INTEGER   TABL17(130,5), TABL18(130,5)                        00861300
                    C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                00861400
ISN 0016                INTEGER   TABL19(400)                                         00861500
                    C  LOOP VARIABLES  (LMNLOP)                                       00861600
                    C  LINE SEGMENT VARIABLES  (LMLSEG)                               00861700
ISN 0017                INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  00861800
ISN 0018                INTEGER   TYPLS(90)                                           00861900
                    C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)  00862000
ISN 0019                INTEGER   TRNNLS(90,8)                                        00862100
                    C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )              00862200
ISN 0020                INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                   00862300
ISN 0021                INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 00862400
                    C  SUBSEGMENT VARIABLES  (LMSS)                                   00862500
ISN 0022                INTEGER   TABL7(300), TABL44(300)                             00862600
                    C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )             00862700
ISN 0023                INTEGER   EXOTOR(250,6)                                       00862800
                    C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )            00862900
ISN 0024                INTEGER   ITNLSS(250,6)                                       00863000
                    C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)            00863100
ISN 0025                INTEGER   TYPCL(30)                                           00863200
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```
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                                    00863300
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                          00863400
                C  UNDERPLATFORM EXHAUST VARIABLES                                         00863500
ISN 0027            INTEGER   OPTUX                                                        00863600
                C  ROUTE VARIABLES  (LMTRRT)                                               00863700
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                          00863800
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)                   00863900
ISN 0029            INTEGER   GPTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)                  00864000
ISN 0030            INTEGER   NTRGR(15,6)                                                  00864100
ISN 0031            INTEGER   GRHDWY(15,6)                                                 00864200
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                            00864300
ISN 0032            INTEGER   DWLTS(260,6)                                                 00864400
ISN 0033            INTEGER   NPETTS(260,6), NSEGTS(260,6)                                 00864500
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)               00864600
ISN 0034            INTEGER   NEXPDP(6)                                                    00864700
ISN 0035            INTEGER   TIMEV(201,6)                                                 00864800
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                                   00864900
ISN 0036            INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)         00865000
ISN 0037            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                               00865100
ISN 0038            INTEGER   TLPSV(30), TSTRTV(30)                                        00865200
                C  FAN TYPE VARIABLES  (LMFNTP)                                            00865300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                  00865400
ISN 0039            INTEGER   LSSUL(10)                                                    00865500
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                       00865600
ISN 0040            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)                 00865700
                C                                                                          00865800
                C ************************** REAL VARIABLES ************************** C00865900
                C                                                                          00866000
                C  GENERAL VARIABLES                                                       00866100
ISN 0041            REAL      NUAIR, MPHFPS                                            00866200
                C  SECTION VARIABLES                                                       00866300
                C  NODE VARIABLES                                                          00866400
                C  LOOP VARIABLES                                                          00866500
                C  LINE SEGMENT VARIABLES                                                  00866600
ISN 0042            REAL      LLS(90), LLSS(90)                                        00866700
                C  VENTILATION SHAFT SEGMENT VARIABLES                                     00866800
ISN 0043            REAL      LVS(60), LVSS(60)                                        00866900
                C  SUBSEGMENT VARIABLES                                                    00867000
ISN 0044            REAL      LHLTSS(300), LSUMSS(300)                                 00867100
                C  LINE SUBSEGMENT VARIABLES                                               00867200
ISN 0045            REAL      LACLSS(250), LHLSS(250)                                  00867300
                C  ZONE VARIABLES                                                          00867400
                C  SUBWAY VEHICLE TYPE VARIABLES                                           00867500
ISN 0046            REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)         00867600
ISN 0047            REAL      MOTORV(3)                                                00867700
                C  ROUTE VARIABLES                                                         00867800
                C    DISPATCHER VARIABLES                                                  00867900
                C    TRACK SECTION VARIABLES                                               00868000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                                  00868100
                C  OPERATIONAL TRAIN VARIABLES                                             00868200
                C  FAN TYPE VARIABLES                                                      00868300
                C  PRINT GROUP VARIABLES                                                   00868400
                C                                                                          00868500
                C ****************************** COMMON ****************************** C00868600
                C                                                                          00868700
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                C GENERAL VARIABLES                                                    00868800
ISN 0048            COMMON   AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH             C0868900
ISN 0049            COMMON   DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  C0869000
ISN 0050            COMMON   HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT      00869100
ISN 0051            COMMON   IEQUAT, IN, INODE, IPRGRP, ISITU, JPATAE, JRATTH, JRATTR 00869200
ISN 0052            COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KERNTH, KTSTEP, LIFE C0869300
ISN 0053            COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBP, NBRJCT, NCLUST, NDELT C0869400
ISN 0054            COMMON   NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE   00869500
ISN 0055            COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER      00869600
ISN 0056            COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC      C0869700
ISN 0057            COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                         C0869800
ISN 0058            COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB           C0869900
ISN 0059            COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00870000
ISN 0060            COMMON   TWAMBM, WNTSUM                                         C0870100
                C  ARRAY SIZE LIMITS                                                   C0870200
ISN 0061            COMMON   LMBLP,LMCLST,LMCOND,LMEQPM, LMEXPD, LMFNTP, LMLPK, LMLPLK00870300
ISN 0062            COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND   C0870400
ISN 0063            COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN    C0870500
ISN 0064            COMMON   LMTPGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG   C0870600
                C  PHYSICAL CONSTANTS                                                  00870700
ISN 0065            COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC 00870800
ISN 0066            COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOGP, RHOMAS    00870900
ISN 0067            COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR    00871000
ISN 0068            COMMON   WGCONS, WTBTUS                                         00871100
                C  SECTION VARIABLES  ( LMSECT )                                       C0871200
ISN 0069            COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)  C0871300
ISN 0070            COMMON   CENS(140), DOOTS(140), MNOS(140), MXOS(140), NTOPS     00871400
ISN 0071            COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140) 00871500
ISN 0072            COMMON   SUMONS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 00871600
ISN 0073            COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)        00871700
                C    SECTION + TWO  (LMSECT+2)                                      00871800
ISN 0074            COMMON   NOSS                                                   00871900
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 00872000
ISN 0075            COMMON   LKAN                                                   00872100
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                        00872200
ISN 0076            COMMON   TABL14                                                 00872300
                C  NODE VARIABLES  ( LMNODE )                                          00872400
ISN 0077            COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23  00872500
ISN 0078            COMMON   TABL45, TYPTND                                         00872600
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                           00872700
ISN 0079            COMMON   TABL19                                                 00872800
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                00872900
ISN 0080            COMMON   TABL2                                                  00873000
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                        00873100
ISN 0081            COMMON   COAEND(950)                                            00873200
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                            00873300
ISN 0082            COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)       C0873400
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE  00873500
                C    ( LMTHND X LMSCND )                                            00873600
ISN 0083            COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)            00873700
                C  LOOP VARIABLES  ( LMNLOP )                                          00873800
ISN 0084            COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)            00873900
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT        00874000
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                               00874100
ISN 0085            COMMON   BLP(1000)                                              00874200
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                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    00874300
ISN 0086            COMMON   ALS(90), CILS(90), CRNLS(90), CRPLS(90), CFNLS(90)         00874400
ISN 0087            COMMON   CFPLS(90), DBTLS(90), DTDFLS(90), DTDMLS(90), DTHELS(90)   00874500
ISN 0088            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90)   00874600
ISN 0089            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS            00874700
ISN 0090            COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)    00874800
ISN 0091            COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)              00874900
ISN 0092            COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)               00875000
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 00875100
ISN 0093            COMMON   TRNNLS                                                    00875200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       00875300
                C    (LMLSEG X 2*LMTRSG)                                               00875400
ISN 0094            COMMON   TRNDLS(90,16)                                             00875500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                     00875600
ISN 0095            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)         00875700
ISN 0096            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS             00875800
ISN 0097            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      00875900
ISN 0098            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    00876000
ISN 0099            COMMON   VOLVSS(60), VOMXVS(60)                                   00876100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)       00876200
ISN 0100            COMMON   DERHSS(300), DERTSS(300), EMTRSS(300), EMTFSS(300)        00876300
ISN 0101            COMMON   EMHPSS(300), EMHFSS(300), FRSS(300), FFSS(300)            00876400
ISN 0102            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)            00876500
ISN 0103            COMMON   HSU4SS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)        00876600
ISN 0104            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)        00876700
ISN 0105            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)            00876800
ISN 0106            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)       00876900
ISN 0107            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)        00877000
ISN 0108            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 00877100
ISN 0109            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)  00877200
ISN 0110            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VELSS(300)           00877300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                  00877400
ISN 0111            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)           00877500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                  00877600
ISN 0112            COMMON   ITNLSS                                                    00877700
                C  ZONE CLUSTER VARIABLES                                              00877800
ISN 0113            COMMON   TYPCL                                                     00877900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                           00878000
ISN 0114            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       00878100
ISN 0115            COMMON   AV(3), CDBVOV(3), CDEVOV(3), CHPR1V(3), CHPR2V(3)         00878200
ISN 0116            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)00878300
ISN 0117            COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)       00878400
ISN 0118            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV00878500
ISN 0119            COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      00878600
ISN 0120            COMMON   PERMV(3), REGENV(3)                                      00878700
ISN 0121            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 00878800
ISN 0122            COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            00878900
ISN 0123            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   00879000
                C   UNDERPLATFORM EXHAUST VARIABLES                                    00879100
ISN 0124            COMMON   EFSUX, EFMUX, OPTLX, UMAXUX                              00879200
                C  ROUTE VARIABLES  ( LMTPRT )                                         00879300
ISN 0125            COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                       00879400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )          00879500
ISN 0126            COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)          00879600
ISN 0127            COMMON   NTRGR, NUMBTR                                             00879700
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                C     TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                                    00879800
ISN 0128              COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                              00879900
ISN 0129              COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                                    00880000
                C     EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTPRT )                      00880100
ISN 0130              COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV                           00880200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                                           00880300
ISN 0131              COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDDV(30), DPV, DRAGV(30)             00880400
ISN 0132              COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV                          00880500
ISN 0133              COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)                   00880600
ISN 0134              COMMON   QTRPE(30), RGSUMV(30), RMRTV(30), RSISTV(30), TAAVGV(30)              00880700
ISN 0135              COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV                 00880800
ISN 0136              COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)                     00880900
                C  FAN TYPE VARIABLES  ( LMFNTP )                                                    00881000
ISN 0137              COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)                 00881100
ISN 0138              COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)                 00881200
ISN 0139              COMMON   TIMFT(4)                                                              00881300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                            00881400
ISN 0140              COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)                   00881500
                C  PATRON CHARACTERISTICS                                                            00881600
ISN 0141              COMMON   PATWHT                                                                00881700
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                                 00881800
ISN 0142              COMMON   GINTPR, GRABBP, GRSUM, NPRGR                                          00881900
                C                                                                                    00882000
ISN 0143              EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                                          00882100
                C                                                                                    00882200
                C                                                                                    00882300
ISN 0144              QACC=0.0                                                                       00882400
ISN 0145              QDEC=0.0                                                                       00882500
                C*****COMPUTE THE ENERGY INPUT (IN BTU/SEC/ENTIRE TRAIN) TO THE TRAIN                00882600
                C*****CAUSED BY FORCES ACTING UPON IT                                                00882700
ISN 0146              DELPE= -RSISTV(NUMV) * UV(NUMV) * FLBBTU                                       00882800
                C*****FIND THE CHOPPER LOSS COEFFICIENT - IF ANY                                     00882900
ISN 0147              IF ( UV(NUMV) - UCHPRV(ITYP) ) 12,12,11                                        00883000
ISN 0148        11    CHOPER = CHPR2V(ITYP)                                                          00883100
ISN 0149              GO TO 13                                                                       00883200
ISN 0150        12    CHOPER = CHPR1V(ITYP)                                                          00883300
ISN 0151        13    GO TO( 20, 600, 700 ), TPOPT                                                   00883400
                C                                                                                    00883500
                C*****IMPLICIT TRAIN PERFORMANCE                                                     00883600
                C                                                                                    00883700
ISN 0152           20 NUMY1=MODEV(NUMV)+1                                                            00883800
ISN 0153              GO TO (200,200,300,400,400,202,300,300),NUMY1                                  00883900
ISN 0154          200 IF(DELPE) 210,215,215                                                          00884000
ISN 0155          202 IF(DELPE) 225,204,204                                                          00884100
ISN 0156          204 IF( TE ) 220,225,225                                                           00884200  <-- C
ISN 0157          210 DELPE = 0.0                                                                    00884300
ISN 0158          215 IF( TE ) 220,220,300                                                           00884400
ISN 0159          220 QDEC = DELPE                                                                   00884500
ISN 0160          225 AMPS = 0.0                                                                     00884600
ISN 0161              AMPL = 0.0                                                                     00884700
ISN 0162              GO TO 680                                                                      00884800
                C*****TRAIN IS USING MOTORS - FIND MOTOR CIRCUIT RESISTANCE                          00884900
ISN 0163          300 CALL RESIST( UV(NUMV), ITYP, OHMS )                                            00885000
                C*****COMPUTE HEAT INPUT TO ACCELERATION RESISTOR GRIDS                              00885100
ISN 0164              QACC=(AMPS**2*OHMS*MOTORV(ITYP)+AMPL*CHOPER*NCARV(ITYP))*WTBTUS                00885200
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ISN 0165          GO TO 680                                                                  00885300
                C*****TRAIN IS BRAKING - FIND APPARENT MASS                                  00885400
ISN 0166        400 TMASS = WV(ITYP)*RRACC(ITYP) + WPATV(NUMV)/GRACC                        00885500
                C*****COMPUTE HEAT INPUT TO DECELERATION RESISTOR GRIDS                     00885600
ISN 0167          QDEC = -TMASS * UV(NUMV) * DUDTV(NUMV) * FLBBTU + DELPE                   00885700
ISN 0168          IF(QDEC) 420,680,680                                                      00885800
ISN 0169        420 QDEC = 0.0                                                              00885900
ISN 0170          GO TO 680                                                                 00886000
                C                                                                           00886100
                C*****EXPLICIT TRAIN PERFORMANCE                                            00886200
                C                                                                           00886300
ISN 0171        600 TMASS = WV(ITYP) * RRACC(ITYP) + WPATV(NUMV) /GRACC                     00886400
ISN 0172          QDEC = -TMASS *UV(NUMV) * DUDTV(NUMV) * FLBBTU + DELPE                    00886500
ISN 0173          IF( QDEC ) 610,620,620                                                    00886600
ISN 0174        610 QDEC = 0.0                                                              00886700
ISN 0175        620 IF( TE ) 640,640,630                                                    00886800
ISN 0176        630 CALL RESIST( UV(NUMV), ITYP, OHMS)                                      00886900
ISN 0177          QACC=(AMPS**2*OHMS*MOTORV(ITYP)+AMPL*CHOPER*NCARV(ITYP))*WTBTUS           00887000
ISN 0178          GO TO 680                                                                 00887100
ISN 0179        640 TE = 0.0                                                                00887200
ISN 0180          AMPS = 0.0                                                                00887300
ISN 0181          AMPL = 0.0                                                                00887400
                C*****INCORPORATE THE EFFECTS OF REGENERATIVE BRAKING                       00887500
ISN 0182        680 QACCV(NUMV) = QACC                                                      00887600
ISN 0183          QDECV(NUMV) = QDEC * REGENV(ITYP)                                         00887700
ISN 0184        700 RETURN                                                                  00887800
ISN 0185          END                                                                       00887900
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II. Revision No. 2

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 2 TO VERSION 2

Problem

The average value for relative humidity was being reported incorrectly for subsegments other than the first subsegment in each line segment or ventilation shaft.

Symptoms

In some cases, an unreasonable value for the average relative humidity was being reported. In addition, the columns of numbers were not aligned in the output.

Correction

See attached corrected listing of subroutine SUMARY. Corrected lines are indicated by a "C."

Effect on Previous Results

The correct value of average relative humidity may be calculated from the incorrect value which was reported for the second thru last subsegment in a line segment or ventilation shaft by multiplying the incorrect value by the following quantity:

$$\frac{100 \times \left(\begin{array}{c}\text{Time Interval Per} \\ \text{Cycle, in Seconds}\end{array}\right) \times \left(\begin{array}{c}\text{Number of Cycles Per} \\ \text{Thermodynamic Evaluation}\end{array}\right)}{\left(\begin{array}{c}\text{Time between Previous Summary and} \\ \text{This Summary, in Seconds}\end{array}\right)}$$

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE SUMARY (IOPT)                                        02385600
                C                                                                   02385700
                C                                                                   02385800
                C     IOPT = 0   NO SUMMARY, DON'T INITIALIZE                       02385900
                C            1   INITIALIZE ONLY                                    02386000
                C            2   PRINT SUMMARY ONLY                                 02386100
                C            3   PRINT SUMMARY AND INITIALIZE                        02386200
                C            4   PRINT SUMMARY,PERF. ENVIRON. LOAD ESTIMATE, INITIALIZE02386300
                C                                                                   02386400
                C                                                                   02386500
ISN 0003            REAL  DUMMY1(6), SUMQ(3)                                        02386600
                C                                                                   02386700
                C     INCLUDE  DSHARE                                               02386800
                C                                                                   02386900
                C ************************ INTEGER VARIABLES ************************ C02387000
                C                                                                   02387100
                C  GENERAL VARIABLES                                                02387200
ISN 0004            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT  02387300
ISN 0005            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      02387400
ISN 0006            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 02387500
                C  SECTION VARIABLES  (LMSECT)                                      02387600
ISN 0007            INTEGER   NTOPS(140)                                            02387700
ISN 0008            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)     02387800
ISN 0009            INTEGER   TABL13(140), TABL20(140), TABL21(140)                 02387900
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02388000
ISN 0010            INTEGER   ND(140), NDS(141), NDSS(142)                          02388100
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 02388200
ISN 0011            INTEGER   LKAN(420)                                             02388300
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)               02388400
ISN 0012            INTEGER   TABL14(400)                                           02388500
                C  NODE VARIABLES  (LMNODE)                                         02388600
ISN 0013            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)     02388700
ISN 0014            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                 02388800
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                              02388900
ISN 0015            INTEGER   TABL2(1500)                                           02389000
                C   NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 02389100
ISN 0016            INTEGER   TABL17(130,5), TABL18(130,5)                          02389200
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                  02389300
ISN 0017            INTEGER   TABL19(400)                                           02389400
                C  LOOP VARIABLES  (LMNLOP)                                         02389500
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                 02389600
ISN 0018            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 02389700
ISN 0019            INTEGER   TYPLS(90)                                             02389800
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 02389900
ISN 0020            INTEGER   TRNNLS(90,8)                                          02390000
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                02390100
ISN 0021            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     02390200
ISN 0022            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 02390300
                C  SUBSEGMENT VARIABLES  (LMSS)                                     02390400
ISN 0023            INTEGER   TABL7(300), TABL44(300)                               02390500
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )               02390600
ISN 0024            INTEGER   EXDTDB(250,6)                                         02390700
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )              02390800
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ISN 0025          INTEGER   ITNLSS(250,6)                                    02390900
                C HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          02391000
ISN 0026          INTEGER   TYPCL(30)                                        02391100
                C SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                    02391200
ISN 0027          INTEGER   NCARV(3), NPCARV(3)                              02391300
                C UNDERPLATFORM EXHAUST VARIABLES                            02391400
ISN 0028          INTEGER   OPTUX                                            02391500
                C ROUTE VARIABLES  (LMTRRT)                                  02391600
ISN 0029          INTEGER   COPTRT(6), NTSRT(6)                              02391700
                C   DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)      02391800
ISN 0030          INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)      02391900
ISN 0031          INTEGER   NTRGR(15,6)                                      02392000
ISN 0032          INTEGER   GRHDWY(15,6)                                     02392100
                C   TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)              02392200
ISN 0033          INTEGER   DWLTS(260,6)                                     02392300
ISN 0034          INTEGER   NPETTS(260,6), NSEGTS(260,6)                     02392400
                C   EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)  02392500
ISN 0035          INTEGER   NEXPDP(6)                                        02392600
ISN 0036          INTEGER   TIMEV(201,6)                                     02392700
                C OPERATIONAL TRAIN VARIABLES  (LMTRAN)                      02392800
ISN 0037          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  02392900
ISN 0038          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                   02393000
ISN 0039          INTEGER   TLPSV(30), TSTRTV(30)                            02393100
                C FAN TYPE VARIABLES  (LMFNTP)                               02393200
                C UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                     02393300
ISN 0040          INTEGER   LSSUL(10)                                        02393400
                C PRINT GROUP VARIABLES  ( LMPRGP )                          02393500
ISN 0041          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)     02393600
                C                                                            02393700
                C ************************** REAL VARIABLES ************************** C02393800
                C                                                            02393900
                C GENERAL VARIABLES                                          02394000
ISN 0042          REAL      NUAIR, MPHFPS                                    02394100
                C SECTION VARIABLES                                          02394200
                C NODE VARIABLES                                             02394300
                C LOOP VARIABLES                                             02394400
                C LINE SEGMENT VARIABLES                                     02394500
ISN 0043          REAL      LLS(90), LLSS(90)                                02394600
                C VENTILATION SHAFT SEGMENT VARIABLES                        02394700
ISN 0044          REAL      LVS(60), LVSS(60)                                02394800
                C SUBSEGMENT VARIABLES                                       02394900
ISN 0045          REAL      LHLTSS(300), LSUMSS(300)                         02395000
                C LINE SUBSEGMENT VARIABLES                                  02395100
ISN 0046          REAL      LACLSS(250), LHLSS(250)                          02395200
                C ZONE VARIABLES                                             02395300
                C SUBWAY VEHICLE TYPE VARIABLES                              02395400
ISN 0047          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)  02395500
ISN 0048          REAL      MOTORV(3)                                        02395600
                C ROUTE VARIABLES                                            02395700
                C   DISPATCHER VARIABLES                                     02395800
                C   TRACK SECTION VARIABLES                                  02395900
                C   EXPLICIT TRAIN PERFORMANCE VARIABLES                     02396000
                C OPERATIONAL TRAIN VARIABLES                                02396100
                C FAN TYPE VARIABLES                                         02396200
                C PRINT GROUP VARIABLES                                      02396300
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                C                                                                       02396400
                C ******************************** COMMON ********************************* C02396500
                C                                                                       02396600
                C GENERAL VARIABLES                                                     02396700
ISN 0049            COMMON   AFTIME, ANNAMP, BLANK, BLPREC, DATE, DEATH                 02396800
ISN 0050            COMMON   DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, ESCFT     02396900
ISN 0051            COMMON   HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT        02397000
ISN 0052            COMMON   IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAF, JRATTH, JRATTR  02397100
ISN 0053            COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE  02397200
ISN 0054            COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT  02397300
ISN 0055            COMMON   NDTYPA, NEW, NFNTYP, NLCOP, NLS, NLSCP1, NLSEC, NNODE     02397400
ISN 0056            COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER       02397500
ISN 0057            COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC        02397600
ISN 0058            COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                          02397700
ISN 0059            COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB             02397800
ISN 0060            COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02397900
ISN 0061            COMMON   TWAMBM, WNTSUM                                          02398000
                C  ARRAY SIZE LIMITS                                                    02398100
ISN 0062            COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK02398200
ISN 0063            COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    02398300
ISN 0064            COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     02398400
ISN 0065            COMMON   LMTPGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     02398500
                C  PHYSICAL CONSTANTS                                                   02398600
ISN 0066            COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC   02398700
ISN 0067            COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS      02398800
ISN 0068            COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      02398900
ISN 0069            COMMON   WGCONS, WTBTUS                                          02399000
                C  SECTION VARIABLES  ( LMSECT )                                        02399100
ISN 0070            COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    02399200
ISN 0071            COMMON   CFNS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS       02399300
ISN 0072            COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   02399400
ISN 0073            COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  02399500
ISN 0074            COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          02399600
                C    SECTION * TWO  (LMSECT*2)                                        02399700
ISN 0075            COMMON   NOSS                                                    02399800
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 02399900
ISN 0076            COMMON   LKAN                                                    02400000
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                          02400100
ISN 0077            COMMON   TABL14                                                  02400200
                C  NODE VARIABLES  ( LMNODE )                                        02400300
ISN 0078            COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23   02400400
ISN 0079            COMMON   TABL45, TYPIND                                          02400500
                C   NODE EXTERNAL IDENTIFICATION NUMBERS                            02400600
ISN 0080            COMMON   TABL19                                                  02400700
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                              02400800
ISN 0081            COMMON   TABL2                                                   02400900
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                      02401000
ISN 0082            COMMON   COAEN(950)                                              02401100
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                          02401200
ISN 0083            COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)        02401300
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE   02401400
                C    ( LMTHND X LMSCND )                                             02401500
ISN 0084            COMMON   ENHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)             02401600
                C  LOOP VARIABLES  ( LMNLOP )                                        02401700
ISN 0085            COMMON   DQDTLP(75), CMEGLP(75), QERRLP(75), QLP(75)             02401800
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                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          02401900
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                02402000
ISN 0086            COMMON   BLP(1000)                                                  02402100
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                   02402200
ISN 0087            COMMON   ALS(90), CILS(90), CHNLS(90), CBPLS(90), CFNLS(90)         02402300
ISN 0088            COMMON   CFPLS(90), DBILS(90), DTDELS(90), DTDNLS(90), DTHELS(90)   02402400
ISN 0089            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90)   02402500
ISN 0090            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS             02402600
ISN 0091            COMMON   PDPYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)    02402700
ISN 0092            COMMON   SURLSS(90), TABL3, TABL4, TABL5, THCNLS(2,90)             02402800
ISN 0093            COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)               02402900
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 02403000
ISN 0094            COMMON   TRNNLS                                                     02403100
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       02403200
                C    (LMLSEG X 2*LMTRSG)                                                02403300
ISN 0095            COMMON   TRNDLS(90,16)                                              02403400
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                      02403500
ISN 0096            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)          02403600
ISN 0097            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS             02403700
ISN 0098            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      02403800
ISN 0099            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    02403900
ISN 0100            COMMON   VOLVSS(60), VOMXVS(60)                                   02404000
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)        02404100
ISN 0101            COMMON   DEPHSS(300), DEPTSS(300), EMTBSS(300), EMTESS(300)        02404200
ISN 0102            COMMON   EMHBSS(300), EMHESS(300), FBSS(300), FESS(300)            02404300
ISN 0103            COMMON   FLOBSS(300), FLOESS(300), HRMN(300), HRMX(300)           02404400
ISN 0104            COMMON   HSUMSS(300), HTPNSS(300), HTMPSS(300), HTSMSS(300)       02404500
ISN 0105            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)        02404600
ISN 0106            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)            02404700
ISN 0107            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)       02404800
ISN 0108            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)        02404900
ISN 0109            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 02405000
ISN 0110            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)   02405100
ISN 0111            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)           02405200
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                   02405300
ISN 0112            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)           02405400
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRT)                    02405500
ISN 0113            COMMON   ITNLSS                                                     02405600
                C  ZONE CLUSTER VARIABLES                                               02405700
ISN 0114            COMMON   TYPCL                                                      02405800
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                            02405900
ISN 0115            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       02406000
ISN 0116            COMMON   AV(3), CDRVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         02406100
ISN 0117            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), CCBTEV(3), CORMV(3,3)02406200
ISN 0118            COMMON   CDTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECVIV(3)       02406300
ISN 0119            COMMON   DIACCV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV02406400
ISN 0120            COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      02406500
ISN 0121            COMMON   PERMV(3), REGENV(3)                                      02406600
ISN 0122            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 02406700
ISN 0123            COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            02406800
ISN 0124            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   02406900
                C   UNDERPLATFORM EXHAUST VARIABLES                                    02407000
ISN 0125            COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                              02407100
                C  ROUTE VARIABLES  ( LMTRRT )                                          02407200
ISN 0126            COMMON   COPTRT, NTSRT, CRIGRT(6), UMINRT(6)                       02407300
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                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )                02407400
ISN 0127             COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)              02407500
ISN 0128             COMMON   NTRGR, NUMBTR                                               02407600
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                          02407700
ISN 0129             COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                    02407800
ISN 0130             COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                          02407900
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )             02408000
ISN 0131             COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV                 02408100
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                                 02408200
ISN 0132             COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)    02408300
ISN 0133             COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV                02408400
ISN 0134             COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)          02408500
ISN 0135             COMMON   QTRPE(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30)     02408600
ISN 0136             COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV        02408700
ISN 0137             COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)           02408800
                C  FAN TYPE VARIABLES  ( LMFNTP )                                          02408900
ISN 0138             COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)       02409000
ISN 0139             COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)       02409100
ISN 0140             COMMON   TIMFT(4)                                                    02409200
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                  02409300
ISN 0141             COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)         02409400
                C  PATRON CHARACTERISTICS                                                  02409500
ISN 0142             COMMON   PATWHT                                                      02409600
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                       02409700
ISN 0143             COMMON   GINTPR, GRABBP, GRSUM, NPRGR                                02409800
                C                                                                          02409900
ISN 0144             EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                                02410000
                C                                                                          02410100
                C                                                                          02410200
                C                                                                          02410300
ISN 0145             IF (ICPT) 2000,2000,10                                               02410400
ISN 0146        10   IF (IOPT-2) 990,20,20                                                02410500
                C                                                                          02410600
ISN 0147        20   TIME=FLOAT(NTIME)/100.0                                              02410700
ISN 0148             DO 685 ISCTX=1,LMSCTX                                                02410800
ISN 0149             IF (TABL14(ISCTX)) 685,685,30                                        02410900
ISN 0150        30   ISCT=TABL14(ISCTX)                                                   02411000
ISN 0151             ISEGL=TABL9(ISCT)                                                    02411100
ISN 0152             ISEGH=TABL10(ISCT)                                                   02411200
ISN 0153             NODEB=TABL12(ISCT)                                                   02411300
ISN 0154             NODEE=TABL13(ISCT)                                                   02411400
                C                                                                          02411500
ISN 0155             IF (ISEGL) 40,50,50                                                  02411600
                C---- VENTILATION SHAFT SECTION                                          02411700
ISN 0156        40   IVS=-ISEGL                                                           02411800
ISN 0157             ISEGL=IVS                                                            02411900
ISN 0158             ISEGH=IVS                                                            02412000
ISN 0159             ISEGX=NUMVS(IVS)                                                     02412100
ISN 0160             GO TO 60                                                             02412200
ISN 0161        50   IVS=0                                                                02412300
                C                                                                          02412400
ISN 0162        60   DO 630 ILS=ISEGL,ISEGH                                               02412500
                C                                                                          02412600
ISN 0163             WRITE (OUT,70) DATE,SYSTEM                                           02412700
ISN 0164        70   FORMAT (1H1,8A1,6X,'  SES   ',7X,18A4,9X,'PAGE'/115X,'------')       02412800
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ISN 0165            WRITE (OUT,80) SUMTST,TIME                                      02412900
ISN 0166       80   FORMAT (1HO,T34,'SUMMARY OF SIMULATION FROM',F8.2,' TO',F8.2,' SEC02413000
                   1ONDS')                                                         02413100
               C                                                                   02413200
ISN 0167            IF ((VS) 140,140,50                                            02413300
               C---- VENTILATION SHAFT                                            02413400
ISN 0168       90   IDUMY=TYPVS((VS)                                               02413500
ISN 0169            GO TO (100,120), IDUMY                                         02413600
ISN 0170       100  WRITE (OUT,110) (NAMVS(IVS,J),J=1,9),TABL15(NODEB),TABL15(NODEF) 02413700
ISN 0171       110  FORMAT (1HO,'( VENTILATION SHAFT )',T43,9A4,T97,'FROM NODE',I3,' T02413800
                   1O NODE',I3)                                                   02413900
ISN 0172            GO TO 135                                                      02414000
ISN 0173       120  WRITE (OUT,130) (NAMVS(IVS,J),J=1,9),TABL15(NODEB),TABL15(NODEF) 02414100
ISN 0174       130  FORMAT (1HO,'( STAIRWAY )',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I02414200
                   13)                                                            02414300
ISN 0175       135  WRITE(OUT,220)  LVS(IVS), AVS(IVS)                             02414400
ISN 0176            GO TO 225                                                      02414500
               C---- LINE SEGMENTS                                                02414600
ISN 0177       140  ISEGX = NUMLS((LS)                                             02414700
ISN 0178            IDUMY=TYPLS((LS)                                               02414800
ISN 0179            GO TO (150,170,190), IDUMY                                     02414900
ISN 0180       150  WRITE (OUT,160) (NAMLS((LS,J),J=1,9),TABL15(NODEB),TABL15(NODEF) 02415000
ISN 0181       160  FORMAT (1HO,' (TUNNEL)',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I3) 02415100
ISN 0182            GO TO 210                                                      02415200
ISN 0183       170  WRITE (OUT,180) (NAMLS(ILS,J),J=1,9),TABL15(NODEB),TABL15(NODEF) 02415300
ISN 0184       180  FORMAT (1HO,' (STATION)',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I3)02415400
ISN 0185            GO TO 210                                                      02415500
ISN 0186       190  WRITE (OUT,200) (NAMLS(ILS,J),J=1,9),TABL15(NODEB),TABL15(NODEF) 02415600
ISN 0187       200  FORMAT (1HO,T34,9A4,T97,'FROM NODE',I3,' TO NODE',I3)          02415700
               C                                                                   02415800
ISN 0188       210  WRITE (OUT,220)  LLS(ILS), ALS(ILS)                            02415900
ISN 0189       220  FORMAT(1HO,' LENGTH',F8.1,' FT'/'  AREA',F10.1,' SQ FT',T54,'M  A 02416000
                   1 X  I  M  U  M',T80,'M  I  N  I  M  U  M',T106,'A V E R A G E'/T4102416100
                   2,'SYSTEM',T54,19('-'),T80,19('-'),T105,15('-') /                02416200
                   3     T39,'PARTITIONING',T56,'VALUE',T67,                       02416300
                   4   'TIME',T82,'VALUE',T93,'TIME',T110,'VALUE'/T38,12('-'),T54,9('-02416400
                   5'),T66,7('-'),T80,9('-'),T92,7('-'),T109,7('-')/T102,'POSITIVE',T102416500
                   614,'NEGATIVE'/T102,8('-'),T114,8('-'))                         02416600
ISN 0190       225  AVGP=SUMQPS(ISCT)*60.0/MXMNPT                                  02416700
ISN 0191            AVGN=SUMQNS(ISCT)*60.0/MXMNPT                                  02416800
ISN 0192            DUMY3=QSMX(ISCT)*60.0                                          02416900
ISN 0193            DUMY4=QSMN(ISCT)*60.0                                          02417000
ISN 0194            DUMY1=MXQS(ISCT)/100.0                                         02417100
ISN 0195            DUMY2=MNQS(ISCT)/100.0                                         02417200
ISN 0196            WRITE (OUT,230) ISCTX,(SEGX,DUMY3,DUMY1,DUMY4,DUMY2,AVGP,AVGN  02417300
ISN 0197       230  FORMAT (1HO,' AIR FLOW RATE',T25,'( CFM )',T37,I3,' -',I3,F17.0,F102417400
                   11.1,F15.0,F11.1,F11.0,F12.0)                                  02417500
ISN 0198            IF (IVS) 240,240,250                                           02417600
ISN 0199       240  A=ALS(ILS)                                                    02417700
ISN 0200            GO TO 260                                                      02417800
ISN 0201       250  A=AVS(IVS)                                                    02417900
ISN 0202       260  DUMY3=DUMY3/A                                                 02418000
ISN 0203            DUMY4=DUMY4/A                                                  02418100
ISN 0204            AVGP = AVGP / A                                                02418200
ISN 0205            AVGN = AVGN / A                                                02418300
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ISN 0206            WRITE (OUT,270) ISCTX,ISEGX,DUMY3,DUMY1,DUMY4,DUMY2,AVGP,AVGN      02418400
ISN 0207       270  FORMAT (1HO,' AIR VELOCITY',T25,'( FPM )',T37,I3,' -',I3,F17.0,F11 02418500
                   1.1,F15.0,F11.1,F11.0,F12.0)                                       02418600
ISN 0208            DUMY1=(100.0*NTQPS(ISCT))/MXMNPT                                  02418700
ISN 0209            DUMY2 = 100.0 - DUMY1                                             02418800
ISN 0210            WRITE(OUT,275) ISCTX,ISEGX,DUMY1,DUMY2                            02418900
ISN 0211         275 FORMAT(1HO,' AIR FLOW DIRECTION',T25,'( PERCENT )',T37,I3,' -',I3,02419000
                   1  54X,F11.1,F12.1 )                                              02419100
ISN 0212            IF (IVS) 280,280,290                                              02419200
                C---- LINE SEGMENT                                                   02419300
ISN 0213       280  ISSL=TABL3(ILS)                                                   02419400
ISN 0214            ISSH=TABL4(ILS)                                                   02419500
ISN 0215            GO TO 330                                                         02419600
                C---- VENTILATION SHAFT                                              02419700
ISN 0216       290  ISSL=TABL5(IVS)                                                   02419800
ISN 0217            ISSH=TABL6(IVS)                                                   02419900
ISN 0218            DUMY1=(100.0*EXVOVS(IVS))/MXMNPT                                  02420000
ISN 0219            DUMY2=VOMXVS(IVS)*60.0                                            02420100
ISN 0220            WRITE (OUT,300) DUMY2,ISCTX,ISEGX,DUMY1                           02420200
ISN 0221       300  FORMAT (1HO,' PERCENTAGE OF TIME OUTFLOW VELOCITY'/5X,'EXCEEDS',F802420300
                   1.1,' FPM',T37,I3,' -',I3,T98,F18.1)                              02420400
ISN 0222            DUMY2=MXEPVS(IVS)/100.0                                           02420500
ISN 0223            DUMY4=MNEPVS(IVS)/100.0                                           02420600
                C*****REMAINING CALCULATIONS FOR MAXIMUM AND MINIMUM                  02420700
                C*****STRAIGHT-THROUGH VENTILATION SHAFT PRESSURES (ABOVE             02420800
                C*****AND BELOW AMBIENT) TO BE INSERTED HERE                          02420900
                C                                                                     02421000
                C***** SKIP TEMPERATURE AND HUMIDITY SUMMARY IF THERMO NOT RUNNING     02421100
ISN 0224       330  IF (JRATTH) 680,680,340                                          02421200
ISN 0225       340  DUMY1=MXTDB(ISSL)/100.0                                         02421300
ISN 0226            DUMY2=MNTDB(ISSL)/100.0                                         02421400
ISN 0227            IF( NTQPS(ISCT) ) 342,342,343                                   02421500
ISN 0228         342 AVGP = 0.0                                                     02421600
ISN 0229            GO TO 344                                                       02421700
ISN 0230         343 AVGP=STDPSS(ISSL)/NTQPS(ISCT)                                  02421800
ISN 0231         344 IF( MXMNPT - NTQPS(ISCT)) 345,345,346                          02421900
ISN 0232         345 AVGN = 0.0                                                     02422000
ISN 0233            GO TO 347                                                       02422100
ISN 0234         346 AVGN=STDNSS(ISSL)/(MXMNPT-NTQPS(ISCT))                         02422200
ISN 0235         347 J=1                                                           02422300
ISN 0236            WRITE (OUT,350) ISCTX,ISEGX,J,TDBMX(ISSL),DUMY1,TDBMN(ISSL),DUMY2,02422400
                   1AVGP,AVGN                                                      02422500
ISN 0237       350  FORMAT (1HO,' DRY-BULB TEMPERATURE',T25,'( DEG F )',T37,2(I3,' -')02422600
                   1,I3,F12.1,F11.1,F15.1,F11.1,F11.1,F12.1)                       02422700
ISN 0238            J3=ISSH-ISSL+1                                                  02422800
ISN 0239            J2=ISSL-1                                                       02422900
ISN 0240            IF (J3-2) 390,360,360                                           02423000
ISN 0241       360  DO 370 J=2,J3                                                   02423100
ISN 0242            DUMY1=MXTDB(J2+J)/100.0                                         02423200
ISN 0243            DUMY2=MNTDB(J2+J)/100.0                                         02423300
ISN 0244            IF( NTQPS(ISCT) ) 362,362,363                                   02423400
ISN 0245         362 AVGP = 0.0                                                     02423500
ISN 0246            GO TO 364                                                       02423600
ISN 0247         363 AVGP=STDPSS(J2+J)/NTQPS(ISCT)                                  02423700
ISN 0248         364 IF( MXMNPT - NTQPS(ISCT) ) 365,365,366                         02423800
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ISN 0249       365 AVGN = C.0                                                    02423900
ISN 0250           GO TO 37C                                                     02424000
ISN 0251       366 AVGN=STDNSS(J2+J)/(MXMNPT-NTQPS(ISCT))                        02424100
ISN 0252       370   WRITE (OUT,380) ISCTX,ISEGX,J,TDBMX(J2+J),DUMY1,TDBMN(J2+J),DUMY2,02424200
                    1 AVGP,AVGN                                                  02424300
ISN 0253       380   FORMAT (1H ,T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F11.1,F12.1)02424400
               C                                                                 02424500
ISN 0254       390   GO TO (400,450,500), HUMOPT                                 02424600
               C---- HUMIDITY RATIO                                             02424700
ISN 0255       400   DUMY1=MXHR(ISSL)/100.0                                      02424800
ISN 0256             DUMY2=MNHR(ISSL)/100.0                                      02424900
ISN 0257             AVG=SHRSS(ISSL)/MXMNPT                                      02425000
ISN 0258             J=1                                                         02425100
ISN 0259             WRITE (OUT,410) ISCTX,ISEGX,J,HRMX(ISSL),DUMY1,HRMN(ISSL),DUMY2,AV02425200
                    1G                                                           02425300
ISN 0260       410   FORMAT (1HO,' HUMIDITY RATIO',T25,'( LB/LB )',T37,2(I3,' -'),I3,F102425400
                    12.4,F11.1,F15.4,F11.1,F17.4)                                02425500
ISN 0261             IF (J3-2) 550,420,420                                       02425600
ISN 0262       420   DO 430 J=2,J3                                               02425700
ISN 0263             DUMY1=MXHR(J2+J)/100.0                                      02425800
ISN 0264             DUMY2=MNHR(J2+J)/100.0                                      02425900
ISN 0265             AVG=SHRSS(J2+J)/MXMNPT                                      02426000
ISN 0266       430   WRITE (OUT,440) ISCTX,ISEGX,J,HRMX(J2+J),DUMY1,HRMN(J2+J),DUMY2,AV02426100
                    1G                                                           02426200
ISN 0267       440   FORMAT (1H ,T37,2(I3,' -'),I3,F12.4,F11.1,F15.4,F11.1,F17.4)02426300
ISN 0268             GO TO 550                                                   02426400
               C---- WET-BULB TEMPERATURE                                       02426500
ISN 0269       450   DUMY1=MXTWB(ISSL)/100.0                                     02426600
ISN 0270             DUMY2=MNTWB(ISSL)/100.0                                     02426700
ISN 0271             AVG=STWBSS(ISSL)/MXMNPT                                     02426800
ISN 0272             J=1                                                         02426900
ISN 0273             WRITE (OUT,460) ISCTX,ISEGX,J,TWBMX(ISSL),DUMY1,TWBMN(ISSL),DUMY2,02427000
                    1AVG                                                         02427100
ISN 0274       460   FORMAT (1HO,' WET-BULB TEMPERATURE',T25,'( DEG F )',T37,2(I3,' -')02427200
                    1,I3,F12.1,F11.1,F15.1,F11.1,F17.1)                          02427300
ISN 0275             IF (J3-2) 550,470,470                                       02427400
ISN 0276       470   DO 480 J=2,J3                                               02427500
ISN 0277             DUMY1=MXTWB(J2+J)/100.0                                     02427600
ISN 0278             DUMY2=MNTWB(J2+J)/100.0                                     02427700
ISN 0279             AVG=STWBSS(J2+J)/MXMNPT                                     02427800
ISN 0280       480   WRITE (OUT,490) ISCTX,ISEGX,J,TWBMX(J2+J),DUMY1,TWBMN(J2+J),DUMY2,02427900
                    1AVG                                                         02428000
ISN 0281       490   FORMAT (1H ,T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F17.1)02428100
ISN 0282             GO TO 550                                                   02428200
               C---- RELATIVE HUMIDITY                                          02428300
ISN 0283       500   DUMY1=MXTWB(ISSL)/100.0                                     02428400
ISN 0284             DUMY2=MNTWB(ISSL)/100.0                                     02428500
ISN 0285             AVG=STWBSS(ISSL)/MXMNPT                                     02428600
ISN 0286             J=1                                                         02428700
ISN 0287             WRITE (OUT,510) ISCTX,ISEGX,J,TWBMX(ISSL),DUMY1,TWBMN(ISSL),DUMY2,02428800
                    1AVG                                                         02428900
ISN 0288       510   FORMAT (1HO,' RELATIVE HUMIDITY',T25,'( PERCENT )',T37,2(I3,' -'),02429000
                    1I3,F12.1,F11.1,F15.1,F11.1,F17.1)                           02429100
ISN 0289             IF (J3-2) 550,520,520                                       02429200
ISN 0290       520   DO 530 J=2,J3                                               02429300
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ISN 0291            DUMY1=MXTWB(J2+J)/1C0.C                                          02429400
ISN 0292            DUMY2=MNTWB(J2+J)/1C0.C                                          02429500
ISN 0293            AVG=STWBSS(J2+J)/MXMNPT                                          02429600 <-- C
ISN 0294       530  WRITE (OUT,540) ISCTX,ISEGX,J,TWBMX(J2+J),DUMY1,TWBMN(J2+J),DUMY2,02429700
                   1AVG                                                             02429800
ISN 0295         540 FORMAT (1H .T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F17.1)   02429900 <-- C
                 C                                                                  02430000
                 C---- PRINT PERCENTAGE OF TIME ABOVE OR BELOW DESIGN TEMPERATURE     02430100
                 C----          ( LINE SEG. IN TYPE 1 ZONE  ONLY )                  02430200
ISN 0296         550  IF (IVS) 555,555,680                                          02430300
ISN 0297         555  IF( HCCPT ) 655,655,560                                       02430400
ISN 0298         560  ICLUST = TABL44(ISSL)                                        02430500
ISN 0299              IF( TYPCL(ICLUST) - 1 ) 661,561,661                          02430600
ISN 0300         561  IF( DESPER - 1 ) 562,562,565                                 02430700
                 C---- MORNING DESIGN                                              02430800
ISN 0301         562  DO  563  I = 1, 6                                            02430900
ISN 0302         563  DUMMY1(I) = DTDMLS(ILS) + WNTSUM*FLOAT(I-3)                  02431000
ISN 0303              GO TO 570                                                    02431100
                 C---- EVENING DESIGN                                              02431200
ISN 0304         565  DO  567  I = 1, 6                                            02431300
ISN 0305         567  DUMMY1(I) = DTDELS(ILS) + WNTSUM*FLOAT(I-3)                  02431400
ISN 0306         570  IF (WNTSUM) 630,580,580                                      02431500
ISN 0307         580  WRITE (OUT,590) DUMMY1                                      02431600
ISN 0308         590  FORMAT (//T43,'P E R C E N T A G E  O F  T I M E  T E M P E R A T 02431700
                   1U R E  I S  A B O V E'//T49,6F11.1/T54,6(8('-'),3X)/)         02431800
ISN 0309              DO 610 J=1,J3                                                02431900
ISN 0310              ISS=J2+J                                                     02432000
ISN 0311              DO 600 K=1,6                                                 02432100
ISN 0312         600  DUMMY1(K)=(100.0*EXDTDB(ISS,K))/MXMNPT                       02432200
ISN 0313         610  WRITE (OUT,620) ISCTX,ISEGX,J,DUMMY1                        02432300
ISN 0314         620  FORMAT (T37,2(I3,' -'),I3,F10.1,5F11.1)                     02432400
ISN 0315              GO TO 655                                                    02432500
ISN 0316         630  WRITE (OUT,640) DUMMY1                                      02432600
ISN 0317         640  FORMAT (//T43,'P E R C E N T A G E  O F  T I M E  T E M P E R A T 02432700
                   1U R E  I S  B E L O W'//T49,6F11.1/T54,6(8('-'),3X)/)         02432800
ISN 0318              DO 660 J=1,J3                                                02432900
ISN 0319              ISS=J2+J                                                     02433000
ISN 0320              DO 650 K=1,6                                                 02433100
ISN 0321         650  DUMMY1(K)=(100.0*EXDTDB(ISS,K))/MXMNPT                       02433200
ISN 0322         660  WRITE (OUT,620) ISCTX,ISEGX,J,DUMMY1                        02433300
ISN 0323         655  IF (IVS)  661,661,680                                       02433400
ISN 0324         661  WRITE(OUT,662)                                              02433500
ISN 0325         662  FORMAT(//1H0,T34,'AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT'/ 02433600
                   1T34,'------- -------- ---- ----- ------ --- -------')         02433700
ISN 0326              HRFTUV = 0.0                                                 02433800
ISN 0327              HRFSSS = 0.0                                                 02433900
ISN 0328              HRFECS = 0.0                                                 02434000
ISN 0329              HETSNK = 0.0                                                 02434100
ISN 0330              UPLATE = 0.0                                                 02434200
ISN 0331              DO 668  ISS = ISSL,ISSH                                      02434300
                 C                                                                  02434400
                 C---- HRFTUV = THE HEAT RELEASE FROM TRAINS,UNSTEADY HEAT         02434500
                 C----          SOURCES, VISCOUS HEATING, AND EVAPORATION           02434600
                 C                                                                  02434700
ISN 0332              HRFTUV = HRFTUV + (QSUMSS(ISS)-SHLSS(ISS)*MXMNPT + QSMXSS(ISS)) 02434800
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                C                                                                02434900
                C---- HRFSSS = THE HEAT RELEASE FROM STEADY-STATE HEAT SOURCES    02435000
                C                                                                02435100
ISN 0333              HRFSSS = HRFSSS + (SHLSS(ISS) - SACLSS(ISS))               02435200
                C                                                                02435300
                C---- HRFECS = THE HEAT RELEASE FROM THE ENVIRONMENTAL CONTROL SYSTEM  02435400
                C                                                                02435500
ISN 0334              IF (HCCPT) 665,665,663                                     02435600
ISN 0335       663    ICLUST = TABL44(ISS)                                       02435700
ISN 0336              IF(TYPCL(ICLUST) - 2) 664,665,665                          02435800
ISN 0337       664    HRFECS = HRFECS + SACLSS(ISS)                              02435900
                C                                                                02436000
                C---- HETSNK = THE AMOUNT OF HEAT ABSORBED BY THE WALLS          02436100
                C                                                                02436200
ISN 0338       665    HETSNK = HETSNK+(HTSMSS(ISS)-HSUMSS(ISS)*TSFSS(ISS))*SURLSS(ILS)  02436300
                C                                                                02436400
                C---- UPLATE = THE AMOUNT OF TRAIN HEAT RELEASE EXTRACTED BY     02436500
                C----          THE UNDERPLATFORM EXHAUST SYSTEM                  02436600
                C                                                                02436700
ISN 0339              IF (OPTUV) 668,668,667                                     02436800
ISN 0340       667    UPLATE = UPLATE + QSMXSS(ISS)                              02436900
ISN 0341       668    CONTINUE                                                   02437000
ISN 0342              HRFTUV = (HRFTUV/MXMNPT)*3600.0                            02437100
ISN 0343              HRFSSS = HRFSSS*3600.0                                     02437200
ISN 0344              HRFECS = HRFECS*3600.0                                     02437300
ISN 0345              HETSNK = -(HETSNK/MXMNPT)*3600.0                           02437400
ISN 0346              UPLATE = -(UPLATE/MXMNPT)*3600.0                           02437500
ISN 0347              WRITE(OUT,669) HRFTUV                                      02437600
ISN 0348       669    FORMAT(1HO,T8,'HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES'02437700
                     1,T89,F11.1,T102,'BTU/HR')                                  02437800
ISN 0349              WRITE(OUT,670) HRFSSS                                      02437900
ISN 0350       670    FORMAT(1HO,T8,'STEADY-STATE HEAT SOURCES',T89,F11.1,T102,'BTU/HR')02438000
ISN 0351              IF (HCOPT) 676,676,672                                     02438100
ISN 0352       672    IF (TYPCL(ICLUST) - 2) 674,676,676                         02438200
ISN 0353       674    WRITE(OUT,675) HRFECS                                      02438300
ISN 0354       675    FORMAT(1HO,T8,'ENVIRONMENTAL CONTROL SYSTEM',T89,F11.1,T102,'BTU/H02438400
                     1R')                                                        02438500
ISN 0355       676    WRITE(OUT,677) HETSNK                                      02438600
ISN 0356       677    FORMAT(1HO,T8,'HEAT SINK',T89,F11.1,T102,'BTU/HR')         02438700
ISN 0357              IF (TYPLS(ILS) - 2) 680,678,680                            02438800
ISN 0358       678    WRITE(OUT,679) UPLATE                                      02438900
ISN 0359       679    FORMAT(1HO,T8,'UNDERPLATFORM EXHAUST SYSTEM',T89,F11.1,T102,'BTU/H02439000
                     1R')                                                        02439100
ISN 0360       680    CONTINUE                                                   02439200
                C                                                                02439300
ISN 0361       685    CONTINUE                                                   02439400
                C                                                                02439500
                C                                                                02439600
                C---- PRINT HEAT SINK SUMMARIES IF HEAT SINK HAS BEEN REQUESTED  02439700
                C                                                                02439800
ISN 0362              IF (HSCPT) 950,950,690                                     02439900
                C                                                                02440000
ISN 0363       690    WRITE (OUT,700) NSEC,NLS,NVSEC,NTNODE,TNSS,NNODE,MXMNPT    02440100
ISN 0364       700    FORMAT (1H1,T40,' SES DEEP HEAT SINK ANALYSIS  '//' NUMBER OF SECT02440200
                     1IONS',T40,I5/' NUMBER OF LINE SEGMENTS',T40,I5/' NUMBER OF VENTILA02440300
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     2TION SHAFT SECTIONS',T40,I5/' NUMBER OF THERMAL NODES',T40,I5/' TO02440400
     3TAL NUMBER OF SUBSEGMENTS',T40,I5/' NUMBER OF AERO NODES',T40,I5/'02440500
     4 NUMBER OF POINTS TAKEN IN THE SUMMARY',T40,I5//)                  02440600
ISN 0365          WRITE (OUT,710)                                       02440700
ISN 0366   710    FORMAT (T14,'LOW',T24,'HIGH'/' SECTION',4X,'SEGMENT',3X,'SEGMENT',02440800
     1T34,'TABL20',T44,'TABL21',T54,'TABL12',T64,'TABL13')               02440900
ISN 0367          DO 720 ISCT=1,NSEC                                    02441000
ISN 0368   720    WRITE (OUT,730) ISCT,TABL9(ISCT),TABL10(ISCT),TABL20(ISCT),TABL21(02441100
     1ISCT),TABL12(ISCT),TABL13(ISCT)                                    02441200
ISN 0369   730    FORMAT (I6,6I10)                                      02441300
ISN 0370          WRITE (OUT,740)                                       02441400
ISN 0371   740    FORMAT (T14,'LOW',T24,'HIGH'/' LINE SEG',3X,'SUBSEG.',3X,'SUBSEG.02441500
     1')                                                                 02441600
ISN 0372          DO 750 ILS=1,NLS                                      02441700
ISN 0373   750    WRITE (OUT,760) ILS,TABL3(ILS),TABL4(ILS)             02441800
ISN 0374   760    FORMAT (I6,2I10)                                      02441900
ISN 0375          IF( NVSEC ) 795,795,765                               02442000
ISN 0376   765    WRITE (OUT,770)                                       02442100
ISN 0377   770    FORMAT (T14,'LOW',T24,'HIGH'/' VENT SHAFT',2X,'SUBSEG.',3X,'SUBSEG02442200
     1.')                                                                02442300
ISN 0378          DO 780 IVS=1,NVSEC                                    02442400
ISN 0379   780    WRITE (OUT,790) IVS,TABL5(IVS),TABL6(IVS)             02442500
ISN 0380   790    FORMAT (I6,2I10)                                      02442600
ISN 0381   795    WRITE (OUT,800)                                       02442700
ISN 0382   800    FORMAT (' LINE SEGMENT',3X,'SUBSEGMENT SURFACE',3X,'PERIMETER',3X,02442800
     1'AREA')                                                            02442900
ISN 0383          DO 810 ILS=1,NLS                                      02443000
ISN 0384   810    WRITE (OUT,820) ILS,SURLSS(ILS),PERMLS(ILS),ALS(ILS)  02443100
ISN 0385   820    FORMAT (I7,15X,4F10.2)                                02443200
ISN 0386          IF( NVSEC ) 855,855,825                               02443300
ISN 0387   825    WRITE (OUT,830)                                       02443400
ISN 0388   830    FORMAT (' VENT SHAFT',3X,'SUBSEGMENT SURFACE')        02443500
ISN 0389          DO 840 IVS=1,NVSEC                                    02443600
ISN 0390   840    WRITE (OUT,850) IVS,SURVSS(IVS)                       02443700
ISN 0391   850    FORMAT (I7,F15.1)                                     02443800
ISN 0392   855    WRITE (OUT,860)                                       02443900
ISN 0393   860    FORMAT (T2,'SUBSEGMENT',5X,'EMTFSS',6X,'EMTBSS',6X,'STDBSS',6X,  02444000
     1'HSUMSS',6X,'HTSMSS',6X,'QSUMSS',6X,'LSUMSS',6X,'EMHFSS',          02444100
     2  6X,'EMHBSS' )                                                   02444200
ISN 0394          DO 870 ISS=1,TNSS                                     02444300
ISN 0395          DUMY1 = EMTFSS(ISS) / MXMNPT                          02444400
ISN 0396          DUMY2 = EMTBSS(ISS) / MXMNPT                          02444500
                C DUMY3 = STDPSS(ISS) / MXMNPT                          02444600
                C DUMY3A= STDNSS(ISS) / MXMNPT                          02444700
ISN 0397          DUMY3 = STDBSS(ISS) / MXMNPT                          02444800
ISN 0398          DUMY4 = HSUMSS(ISS) / MXMNPT                          02444900
ISN 0399          DUMY5 = HTSMSS(ISS) / MXMNPT                          02445000
ISN 0400          DUMY6 = QSUMSS(ISS) / MXMNPT                          02445100
ISN 0401          DUMY7 = LSUMSS(ISS) / MXMNPT                          02445200
ISN 0402          DUMY8 = EMHFSS(ISS) / MXMNPT                          02445300
ISN 0403          DUMY9 = EMHBSS(ISS) / MXMNPT                          02445400
ISN 0404   870    WRITE(OUT,880) ISS,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,  02445500
     1  DUMY7,DUMY8,DUMY9                                                02445600
ISN 0405          DO 875 ISS = 1,TNSS                                   02445700
ISN 0406          DUMY10 = FLOFSS(ISS) / MXMNPT                         02445800
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ISN 0407          DUMY11 = FLOPSS(ISS) / MXMNPT                                  02445900
ISN 0408        875 WRITE(OUT,877) ISS,DUMY10,DUMY11                             02446000
ISN 0409        877 FORMAT(I7,2F12.3)                                            02446100
ISN 0410        880   FORMAT( I7,F15.0,F12.0,F12.2,2F12.7,2F12.5,2F12.5 )        02446200
ISN 0411          WRITE (OUT,890)                                                02446300
ISN 0412        890   FORMAT(/T3,'NODTH',T14,'EMTBR1',T26,'EMTBR2',T38,'EMTBR3',T50,'EMT02446400
                     1BR4',T62,'EMTBR5')                                         02446500
ISN 0413          DO 900 I=1,NTNODE                                              02446600
ISN 0414          DUMY1 = EMTBTN(I,1) / MXMNPT                                   02446700
ISN 0415          DUMY2 = EMTBTN(I,2) / MXMNPT                                   02446800
ISN 0416          DUMY3 = EMTBTN(I,3) / MXMNPT                                   02446900
ISN 0417          DUMY4 = EMTBTN(I,4) / MXMNPT                                   02447000
ISN 0418          DUMY5 = EMTBTN(I,5) / MXMNPT                                   02447100
ISN 0419          DUMY11 = FLOBTN(I,1) / MXMNPT                                  02447200
ISN 0420          DUMY12 = FLOBTN(I,2) / MXMNPT                                  02447300
ISN 0421          DUMY13 = FLOBTN(I,3) / MXMNPT                                  02447400
ISN 0422          DUMY14 = FLOBTN(I,4) / MXMNPT                                  02447500
ISN 0423          DUMY15 = FLOBTN(I,5) / MXMNPT                                  02447600
ISN 0424        900   WRITE(OUT,910) I,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,             02447700
                     1 DUMY11,DUMY12,DUMY13,DUMY14,DUMY15                        02447800
ISN 0425        910   FORMAT (I7,F14.0,4F12.0,5F12.3)                            02447900
ISN 0426          WRITE(OUT,911)                                                 02448000
ISN 0427        911   FORMAT(/T3,'NODTH',T14,'EMHBR1',T26,'EMHBR2',T38,'EMHBR3',  02448100
                     1  T50,'EMHBR4',T62,'EMHBR5' ,T74,'TAVGTN',T86,'HAVGTN')    02448200
ISN 0428          DO  912  I = 1, NTNODE                                         02448300
ISN 0429          DUMY1 = EMHBTN(I,1) / MXMNPT                                   02448400
ISN 0430          DUMY2 = EMHBTN(I,2) / MXMNPT                                   02448500
ISN 0431          DUMY3 = EMHBTN(I,3) / MXMNPT                                   02448600
ISN 0432          DUMY4 = EMHBTN(I,4) / MXMNPT                                   02448700
ISN 0433          DUMY5 = EMHBTN(I,5) / MXMNPT                                   02448800
ISN 0434          DUMY6 = TAVGTN(I)/MXMNPT                                       02448900
ISN 0435          DUMY7 = HAVGTN(I)/MXMNPT                                       02449000
ISN 0436        912   WRITE(OUT,913) I,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7  02449100
ISN 0437        913   FORMAT(I7,F14.6,4F12.6 ,F12.3,F12.6)                       02449200
ISN 0438          WRITE(OUT,920)                                                 02449300
ISN 0439        920   FORMAT (' AERO NODE',T15,'TYPE',T24,'TABL22(NODE)')        02449400
ISN 0440          DO 930 I=1,NNODE                                               02449500
ISN 0441        930   WRITE (OUT,940) I,TYPTND(I),TABL22(I)                      02449600
ISN 0442        940   FORMAT (I6,I11,I10)                                        02449700
                C                                                                02449800
                C---- SUMMARY TOTAL INITIALIZATION   ****************************02449900
                C                                                                02450000
ISN 0443          950 IF( ICPT - 2 ) 990,2000,990                                02450100
ISN 0444          990 IF( NOSYS ) 1500,1500,1000                                 02450200
                C                                                                02450300
                C---- LOOP OVER SECTIONS                                         02450400
                C                                                                02450500
ISN 0445         1000 DO  1080  ISCT = 1, NSEC                                   02450600
ISN 0446              QSMN(ISCT) = QSAVES(ISCT)                                  02450700
ISN 0447              QSMX(ISCT) = QSAVES(ISCT)                                  02450800
ISN 0448              MNQS(ISCT) = NTIME                                         02450900
ISN 0449              MXQS(ISCT) = NTIME                                         02451000
ISN 0450              IF( QSAVES(ISCT) ) 1020,1010,1010                          02451100
                C---- Q IS POSITIVE                                             02451200
ISN 0451         1010 SUMQPS(ISCT) = QSAVES(ISCT)                                02451300
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ISN 0452            SUMQNS(ISCT) = 0.0                                                    02451400
ISN 0453            NTQPS(ISCT) = 1                                                       02451500
ISN 0454            GO TO 1025                                                            02451600
                  C---- Q IS NEGATIVE                                                     02451700
ISN 0455           1020 SUMQNS(ISCT) = QSAVES(ISCT)                                       02451800
ISN 0456            SUMQPS(ISCT) = 0.0                                                    02451900
ISN 0457            NTQPS(ISCT) = 0                                                       02452000
                  C---- CHECK IF VENT SHAFT                                               02452100
ISN 0458           1025 IF( TABL9(ISCT) ) 1030,1080,1080                                  02452200
                  C---- VENT SHAFT  -  CHECK MAX OUTFLOW VELOCITY                        02452300
ISN 0459           1030 IVS = - TABL9(ISCT)                                               02452400
ISN 0460            EXVQVS(IVS) = 0                                                       02452500
ISN 0461            IF( VCMXVS(IVS) * AGVS(IVS) - ABS( QSAVES(ISCT))) 1040,1071,1071      02452600
ISN 0462           1040 NODEB = TABL12(ISCT)                                              02452700
ISN 0463            IF( TABL16(NODEB) - 1 ) 1050,1050,1060                                02452800
                  C---- BACKWARD END OF V.S. IS CONN. TO ATMOS. - OUTFLOW IS NEGATIVE      02452900
ISN 0464           1050 IF( QSAVES(ISCT) ) 1070,1071,1071                                 02453000
                  C---- FORWARD END OF V.S. IS CONN. TO ATMOS. OR SHAFT IS BETWEEN        02453100
                  C---- TWO BRANCHED JUNCTIONS  -  OUTFLOW IS POSITIVE                    02453200
ISN 0465           1060 IF( QSAVES(ISCT) ) 1071,1071,1070                                 02453300
ISN 0466           1070 EXVQVS(IVS) = 1                                                   02453400
                  C---- MAXIMUM AND MINIMUM PRESSURE IN VENT SHAFT                       02453500
ISN 0467           1071 FPMXVS(IVS) = 0.0                                                 02453600
ISN 0468            MXFPVS(IVS) = NTIME                                                   02453700
ISN 0469            FPMNVS(IVS) = 0.0                                                     02453800
ISN 0470            MNFPVS(IVS) = NTIME                                                   02453900
ISN 0471           1080 CONTINUE                                                          02454000
                  C                                                                       02454100
                  C                                                                       02454200
ISN 0472            IF( JRATTH ) 1500,1500,1090                                           02454300
                  C                                                                       02454400
                  C---- LINE AND VENT SHAFT SUBSEGMENT INITIALIZATION  **************      02454500
                  C                                                                       02454600
ISN 0473           1090 DO  1130  ISS = 1, INSS                                           02454700
ISN 0474            TDBMX(ISS) = TDBSS(ISS)                                               02454800
ISN 0475            TDBMN(ISS) = TDBSS(ISS)                                               02454900
ISN 0476            MXTDB(ISS) = NTIME                                                    02455000
ISN 0477            MNTDB(ISS) = NTIME                                                    02455100
ISN 0478            HRMX(ISS) = HUMSS(ISS)                                                02455200
ISN 0479            HRMN(ISS) = HUMSS(ISS)                                                02455300
ISN 0480            MXHR(ISS) = NTIME                                                     02455400
ISN 0481            MNHR(ISS) = NTIME                                                     02455500
ISN 0482            STDBSS(ISS) = TDBSS(ISS)                                              02455600
ISN 0483            SHRSS(ISS) = HUMSS(ISS)                                               02455700
ISN 0484            HSUMSS(ISS) = HTRNSS(ISS)                                             02455800
ISN 0485            HTSMSS(ISS) = HTRNSS(ISS)*TDBSS(ISS)                                  02455900
ISN 0486            QSUMSS(ISS) = SHLTSS(ISS)                                             02456000
ISN 0487            QSMXSS(ISS) = SHUXSS(ISS)                                             02456100
ISN 0488            LSUMSS(ISS) = LHLTSS(ISS)                                             02456200
ISN 0489            EMTFSS(ISS) = 0.0                                                     02456300
ISN 0490            EMTBSS(ISS) = 0.0                                                     02456400
ISN 0491            EMHFSS(ISS) = 0.0                                                     02456500
ISN 0492            EMHBSS(ISS) = 0.0                                                     02456600
ISN 0493            FLOFSS(ISS) = 0.0                                                     02456700
ISN 0494            FLOBSS(ISS) = 0.0                                                     02456800
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ISN 0495            IF( FFSS(ISS) ) 1110,1110,1100                                  02456900
ISN 0496      1100  EMTFSS(ISS) = TDBSS(ISS)*FFSS(ISS)                               02457000
ISN 0497            EMHFSS(ISS) = HUMSS(ISS)*FFSS(ISS)                              02457100
ISN 0498            FLOFSS(ISS) = FFSS(ISS)                                         02457200
ISN 0499      1110  IF( FBSS(ISS) ) 1120,1130,1130                                  02457300
ISN 0500      1120  EMTBSS(ISS) = - TDBSS(ISS)*FBSS(ISS)                           02457400
ISN 0501            EMHBSS(ISS) = - HUMSS(ISS)*FBSS(ISS)                            02457500
ISN 0502            FLOBSS(ISS) = - FBSS(ISS)                                       02457600
ISN 0503      1130  CONTINUE                                                        02457700
ISN 0504            DO  1139  ISCT = 1, NSEC                                        02457800
ISN 0505            ISEGL = TABL9(ISCT)                                             02457900
ISN 0506            ISEGH = TABL10(ISCT)                                            02458000
ISN 0507            IF( ISEGL ) 1132,1133,1133                                      02458100
                  C---- VENT SHAFT SECTION                                          02458200
ISN 0508      1132  ISEGL = - ISEGL                                                 02458300
ISN 0509            ISSL = TABL5(ISEGL)                                             02458400
ISN 0510            ISSH = TABL6(ISEGL)                                             02458500
ISN 0511            GO TO 1134                                                      02458600
                  C---- LINE SECTION                                               02458700
ISN 0512      1133  ISSL = TABL3(ISEGL)                                            02458800
ISN 0513            ISSH = TABL4(ISEGH)                                             02458900
ISN 0514      1134  IF( QSAVES(ISCT) ) 1137,1135,1135                               02459000
ISN 0515      1135  DO  1136  ISS = ISSL,ISSH                                      02459100
ISN 0516            STDPSS(ISS) = TDBSS(ISS)                                        02459200
ISN 0517      1136  STDNSS(ISS) = 0                                                 02459300
ISN 0518            GO TO 1139                                                      02459400
ISN 0519      1137  DO  1138  ISS = ISSL,ISSH                                      02459500
ISN 0520            STDNSS(ISS) = TDBSS(ISS)                                        02459600
ISN 0521      1138  STDPSS(ISS) = 0                                                 02459700
ISN 0522      1139  CONTINUE                                                        02459800
                  C                                                               02459900
ISN 0523            GO TO ( 1180, 1140, 1160 ), HUMOPT                            02460000
                  C---- WET-BULB TEMPERATURE                                       02460100
ISN 0524      1140  DO  1150  ISS = 1, NSS                                         02460200
ISN 0525            CALL  WETBLB( TDBSS(ISS), HUMSS(ISS), TWBSS(ISS) )            02460300
ISN 0526            TWBMX(ISS) = TWBSS(ISS)                                         02460400
ISN 0527            TWBMN(ISS) = TWBSS(ISS)                                         02460500
ISN 0528            MXTWB(ISS) = NTIME                                              02460600
ISN 0529            MNTWB(ISS) = NTIME                                              02460700
ISN 0530      1150  STWBSS(ISS) = TWBSS(ISS)                                        02460800
ISN 0531            GO TO 1180                                                      02460900
                  C---- RELATIVE HUMIDITY                                          02461000
ISN 0532      1160  DO  1170  ISS = 1, NSS                                         02461100
ISN 0533            CALL  RELHUM( TDBSS(ISS), HUMSS(ISS), TWBSS(ISS) )            02461200
ISN 0534            TWBMX(ISS) = TWBSS(ISS)                                         02461300
ISN 0535            TWBMN(ISS) = TWBSS(ISS)                                         02461400
ISN 0536            MXTWB(ISS) = NTIME                                              02461500
ISN 0537            MNTWB(ISS) = NTIME                                              02461600
ISN 0538      1170  STWBSS(ISS) = TWBSS(ISS)                                        02461700
                  C                                                               02461800
                  C---- DESIGN TEMPERATURE TABULATION                               02461900
ISN 0539      1180  IF( HCOPT ) 1252,1252,1181                                      02462000
ISN 0540      1181  DO  1250  ILS = 1, NLS                                         02462100
ISN 0541            ISSL = TABL3(ILS)                                               02462200
ISN 0542            ISSH = TABL4(ILS)                                               02462300
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ISN 0543            ICLUST = TABL44(ISSL)                                          02462400
ISN 0544            IF( TYPCL(ICLUST) - 1 ) 1250,1183,1250                         02462500
ISN 0545       1183 IF( DESPER - 1 ) 1185,1185,1241                                02462600
               C                                                                   02462700
               C---- MORNING DESIGN PERIOD                                        02462800
ISN 0546       1185 IF( WNTSUM ) 1220,1190,1190                                    02462900
               C---- SUMMER DESIGN                                                02463000
ISN 0547       1190 DO  1210  ILSS = ISSL, ISSH                                    02463100
ISN 0548            DO  1210  I = 1, 6                                             02463200
ISN 0549            EXDTDB(ILSS,I) = 0                                             02463300
ISN 0550            IF( TDBSS(ILSS) - DTDMLS(ILS) - WNTSUM*FLOAT(I-3) ) 1210,1210,1200 02463400
ISN 0551       1200 EXDTDB(ILSS,I) = 1                                             02463500
ISN 0552       1210 CONTINUE                                                       02463600
ISN 0553            GO TO 1250                                                     02463700
               C---- WINTER DESIGN                                                02463800
ISN 0554       1220 DO  1240  ILSS = ISSL, ISSH                                    02463900
ISN 0555            DO  1240  I = 1, 6                                             02464000
ISN 0556            EXDTDB(ILSS,I) = 0                                             02464100
ISN 0557            IF( TDBSS(ILSS) - DTDMLS(ILS) - WNTSUM*FLOAT(I-3) ) 1230,1240,1240 02464200
ISN 0558       1230 EXDTDB(ILSS,I) = 1                                             02464300
ISN 0559       1240 CONTINUE                                                       02464400
ISN 0560            GO TO 1250                                                     02464500
               C                                                                   02464600
               C---- EVENING DESIGN PERIOD                                        02464700
ISN 0561       1241 IF( WNTSUM ) 1245,1242,1242                                    02464800
               C---- SUMMER DESIGN                                                02464900
ISN 0562       1242 DO  1244  ILSS = ISSL, ISSH                                    02465000
ISN 0563            DO  1244  I = 1, 6                                             02465100
ISN 0564            EXDTDB(ILSS,I) = 0                                             02465200
ISN 0565            IF( TDBSS(ILSS) - DTDELS(ILS) - WNTSUM*FLOAT(I-3) )1244,1244,1243 02465300
ISN 0566       1243 EXDTDB(ILSS,I) = 1                                             02465400
ISN 0567       1244 CONTINUE                                                       02465500
ISN 0568            GO TO 1250                                                     02465600
               C---- WINTER DESIGN                                                02465700
ISN 0569       1245 DO  1247  ILSS = ISSL, ISSH                                    02465800
ISN 0570            DO  1247  I= 1, 6                                              02465900
ISN 0571            EXDTDB(ILSS,I) = 0                                             02466000
ISN 0572            IF( TDBSS(ILSS) - DTDELS(ILS) - WNTSUM*FLOAT(I-3) )1246,1247,1247 02466100
ISN 0573       1246 EXDTDB(ILSS,I) = 1                                             02466200
ISN 0574       1247 CONTINUE                                                       02466300
ISN 0575       1250 CONTINUE                                                       02466400
               C                                                                   02466500
               C---- NODE SUMMARY INITIALIZATION  ****************************************02466600
               C                                                                   02466700
ISN 0576       1252 DO  1410  NODE = 1, NNODE                                      02466800
ISN 0577            ITYPT = TYPIND(NODE)                                           02466900
ISN 0578            IT22 = TABL22(NODE)                                            02467000
ISN 0579            GO TO ( 1256,1255,1255,1263,1263),ITYPT                        02467100
ISN 0580       1255 K = 3                                                          02467200
ISN 0581            GO TO 1257                                                     02467300
ISN 0582       1256 K = 1                                                          02467400
ISN 0583       1257 DO  1260  I = 1, K                                             02467500
               C---- INITIALIZE NODE FLOW SUMMATION                               02467600
ISN 0584            SUMQ(I) = 0.0                                                  02467700
ISN 0585            NODTH = IT22 + I                                               02467800
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                C---- INITIALIZE ENERGY FLOWS AT NODE                                    02467900
ISN 0586              DO  1260  J = 1, LMSCND                                           02468000
ISN 0587              EMHBTN(NODTH,J) = 0.0                                             02468100
ISN 0588              FLOBTN(NODTH,J) = 0.0                                             02468200
ISN 0589       1260   EMTBTN(NODTH,J) = 0.0                                             02468300
ISN 0590              GO TO 1265                                                        02468400
                C***** THERMODYNAMIC TYPE 4 AND 5 NODES - INTERNAL TYPES                 02468500
ISN 0591       1263   SUMQ(1) = 0.0                                                     02468600
ISN 0592              NODTH = IT22 + 1                                                  02468700
ISN 0593              EMHBTN(NODTH,1) = 0.0                                             02468800
ISN 0594              FLOBTN(NODTH,1) = 0.0                                             02468900
ISN 0595              EMTBTN(NODTH,1) = 0.0                                             02469000
ISN 0596       1265   KSCT = TABL16(NODE)                                               02469100
ISN 0597              DO  1340  I = 1, KSCT                                             02469200
ISN 0598              NUMY1=TABL17(NODE,I)                                              02469300
ISN 0599              ISCT=IABS(NUMY1)                                                  02469400
ISN 0600              ISIGN=ISCT/NUMY1                                                  02469500
ISN 0601              ISS = TABL18(NODE,I)                                              02469600
ISN 0602              IF( ISIGN ) 1310,1280,1280                                        02469700
                C---- FORWARD END OF SECTION IS CONNECTED TO NODE                       02469800
ISN 0603       1280   NODTH = TABL21(ISCT) / 64                                         02469900
ISN 0604              IF( FFSS(ISS) ) 1290,1300,1300                                    02470000
ISN 0605       1290   IBRCH = TABL21(ISCT) - NODTH*64                                   02470100
ISN 0606              EMHBTN(NODTH,IBRCH) = EMHBTN(NODTH,IBRCH) - FFSS(ISS)*HUMTN(NODTH)02470200
ISN 0607              EMTBTN(NODTH,IBRCH) = EMTBTN(NODTH,IBRCH) - FFSS(ISS)*TDBTN(NODTH)02470300
ISN 0608              FLOBTN(NODTH,IBRCH) = FLOBTN(NODTH,IBRCH) - FFSS(ISS)             02470400
ISN 0609       1300   J = NODTH - TABL22(NODE)                                          02470500
ISN 0610              SUMQ(J) = SUMQ(J) - FFSS(ISS)                                     02470600
ISN 0611              GO TO 1340                                                        02470700
                C---- BACKWARD END OF SECTION IS CONNECTED TO NODE                      02470800
ISN 0612       1310   NODTH = TABL20(ISCT) / 64                                         02470900
ISN 0613              IF( FBSS(ISS) ) 1330,1330,1320                                    02471000
ISN 0614       1320   IBRCH = TABL20(ISCT) - NODTH*64                                   02471100
ISN 0615              EMHBTN(NODTH,IBRCH) = EMHBTN(NODTH,IBRCH) + FBSS(ISS)*HUMTN(NODTH)02471200
ISN 0616              EMTBTN(NODTH,IBRCH) = EMTBTN(NODTH,IBRCH) + FBSS(ISS)*TDBTN(NODTH)02471300
ISN 0617              FLOBTN(NODTH,IBRCH) = FLOBTN(NODTH,IBRCH) + FBSS(ISS)             02471400
ISN 0618       1330   J = NODTH - TABL22(NODE)                                          02471500
ISN 0619              SUMQ(J) = SUMQ(J) + FBSS(ISS)                                     02471600
ISN 0620       1340   CONTINUE                                                          02471700
ISN 0621              ITYPT = TYPTND(NODE)                                              02471800
ISN 0622              GO TO ( 1410, 1350, 1350, 1410, 1410 ), ITYPT                     02471900
                C                                                                       02472000
                C***** THERMODYNAMIC TYPE 2 AND 3 NODES (NON-MIXING)                    02472100
                C --   SUMQ IS POSITIVE FOR AIR ENTERING END NODE FROM CENTER NODE      02472200
                C---- COMPUTE INTRA-NODE FLOWS                                         02472300
ISN 0623       1350   IT22 = TABL22(NODE)                                               02472400
ISN 0624              IF( SUMQ(1) ) 1360,1360,1370                                      02472500
                C---- AIR IS FLOWING FROM 1(A) TO 2(B)                                 02472600
ISN 0625       1360   EMTBTN(IT22+1,5) = EMTBTN(IT22+1,5) - SUMQ(1)*TDBTN(IT22+1)       02472700
ISN 0626              EMHBTN(IT22+1,5) = EMHBTN(IT22+1,5) - SUMQ(1)*HUMTN(IT22+1)       02472800
ISN 0627              FLOBTN(IT22+1,5) = FLOBTN(IT22+1,5) - SUMQ(1)                     02472900
ISN 0628              GO TO 1380                                                        02473000
                C---- AIR IS FLOWING FROM 2(B) TO 1(A)                                 02473100
ISN 0629       1370   EMTBTN(IT22+2,4) = EMTBTN(IT22+2,4) + SUMQ(1)*TDBTN(IT22+2)       02473200
ISN 0630              EMHBTN(IT22+2,4) = EMHBTN(IT22+2,4) + SUMQ(1)*HUMTN(IT22+2)       02473300
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ISN 0631            FLOBTN(IT22+2,4) = FLOBTN(IT22+2,4) + SUMQ(1)                    02473400
                   C                                                                 02473500
ISN 0632            1380 IF( SUMQ(3) ) 1390,1400,1400                                02473600
                   C---- AIR IS FLOWING FROM 3(C) TO 2(B)                            02473700
ISN 0633            1390 EMTBTN(IT22+3,5) = EMTBTN(IT22+3,5) - SUMQ(3)*TDBTN(IT22+3) 02473800
ISN 0634                 EMHBTN(IT22+3,5) = EMHBTN(IT22+3,5) - SUMQ(3)*HUMTN(IT22+3) 02473900
ISN 0635                 FLOBTN(IT22+3,5) = FLOBTN(IT22+3,5) - SUMQ(3)               02474000
ISN 0636                 GO TO 1410                                                  02474100
                   C---- AIR IS FLOWING FROM 2(B) TO 3(C)                           02474200
ISN 0637            1400 EMTBTN(IT22+2,5) = EMTBTN(IT22+2,5) + SUMQ(3)*TDBTN(IT22+2) 02474300
ISN 0638                 EMHBTN(IT22+2,5) = EMHBTN(IT22+2,5) + SUMQ(3)*HUMTN(IT22+2) 02474400
ISN 0639                 FLOBTN(IT22+2,5) = FLOBTN(IT22+2,5) + SUMQ(3)               02474500
                   C                                                                 02474600
ISN 0640            1410 CONTINUE                                                    02474700
ISN 0641                 DO 1415 NODTH = 1,NTNODE                                    02474800
ISN 0642                 TAVGTN(NODTH) = TDBTN(NODTH)                                02474900
ISN 0643                 HAVGTN(NODTH) = HUMTN(NODTH)                                02475000
ISN 0644            1415 CONTINUE                                                    02475100
                   C                                                                 02475200
                   C     MXMNPT IS A COUNT OF THE NUMBER OF POINTS WHICH             02475300
                   C     HAVE BEEN ADDED INTO TOTALS                                 02475400
                   C                                                                 02475500
ISN 0645            1500 MXMNPT = 1                                                  02475600
                   C                                                                 02475700
                   C---- SUMTST CONTAINS THE TIME OF THE LAST SUMMARY INITIALIZATION 02475800
ISN 0646                 SUMTST = FLOAT(NTIME)/ 100.0                                02475900
ISN 0647            2000 RETURN                                                      02476000
                   C                                                                 02476100
ISN 0648                 END                                                         02476200
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SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 3 TO VERSION 2

Problem

Under certain circumstances a floating point division by zero may occur in subroutine TRAIN. This may also result in the "runaway" operation of the affected train.

Symptoms

Floating point division by zero will result in a Simulation Error Type 2. The accompanying message gives the simulation time at which the error occurred.

Correction

See attached corrected listing of subroutine TRAIN. Corrected lines are indicated by the letter "C,"; new lines are indicated by the letter "I."

Effect on Previous Results

This problem is present only in runs containing a Simulation Error Type 2. Runs containing this message must be examined on an individual basis to determine the validity of the results.

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE TRAIN                                                02579800
                C   INCLUDE  DSHARE                                                  02579900
                C                                                                   02580000
                C ************************ INTEGER VARIABLES ************************ C02580100
                C                                                                   02580200
                C  GENERAL VARIABLES                                                02580300
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, ESCFT  02580400
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      02580500
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME C2580600
                C  SECTION VARIABLES  (LMSECT)                                      02580700
ISN 0006            INTEGER   NTOPS(140)                                            02580800
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)     02580900
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                 02581000
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02581100
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                          02581200
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 02581300
ISN 0010            INTEGER   LKAN(420)                                             02581400
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)               02581500
ISN 0011            INTEGER   TABL14(400)                                           02581600
                C  NODE VARIABLES  (LMNODE)                                         02581700
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)     02581800
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                 02581900
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                              02582000
ISN 0014            INTEGER   TABL2(1500)                                           02582100
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 02582200
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                          02582300
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                  02582400
ISN 0016            INTEGER   TABL19(400)                                           02582500
                C  LOOP VARIABLES  (LMNLOP)                                         02582600
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                 02582700
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 02582800
ISN 0018            INTEGER   TYPLS(90)                                             02582900
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 02583000
ISN 0019            INTEGER   TRNNLS(90,8)                                          02583100
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                02583200
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     02583300
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 02583400
                C  SUBSEGMENT VARIABLES  (LMSS)                                     02583500
ISN 0022            INTEGER   TABL7(300), TABL44(300)                               02583600
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )               02583700
ISN 0023            INTEGER   EXOTOB(250,6)                                         02583800
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )              02583900
ISN 0024            INTEGER   ITNLSS(250,6)                                         02584000
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)              02584100
ISN 0025            INTEGER   TYPCL(30)                                             02584200
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                          02584300
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                   02584400
                C  UNDERPLATFORM EXHAUST VARIABLES                                  02584500
ISN 0027            INTEGER   OPTUX                                                 02584600
                C  ROUTE VARIABLES  (LMTRRT)                                        02584700
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                   02584800
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)            02584900
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           02585000
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ISN 0030           INTEGER   NTRGP(15,6)                                          02585100
ISN 0031           INTEGER   GRHDWY(15,6)                                         02585200
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                   02585300
ISN 0032           INTEGER   DWLTS(260,6)                                         02585400
ISN 0033           INTEGER   NPETTS(260,6), NSEGTS(260,6)                         02585500
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)      02585600
ISN 0034           INTEGER   NEXPDP(6)                                            02585700
ISN 0035           INTEGER   TIMEV(201,6)                                         02585800
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                         02585900
ISN 0036           INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30) 02586000
ISN 0037           INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                       02586100
ISN 0038           INTEGER   TLPSV(30), TSTRTV(30)                                02586200
                C  FAN TYPE VARIABLES  (LMFNTP)                                  02586300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                        02586400
ISN 0039           INTEGER   LSSUL(10)                                            02586500
                C  PRINT GROUP VARIABLES  ( LMPRGP )                             02586600
ISN 0040           INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)         02586700
                C                                                                02586800
                C ************************** REAL VARIABLES ************************** C02586900
                C                                                                02587000
                C  GENERAL VARIABLES                                             02587100
ISN 0041           REAL      NUAIR, MPHFPS                                        02587200
                C  SECTION VARIABLES                                             02587300
                C  NODE VARIABLES                                                02587400
                C  LOOP VARIABLES                                                02587500
                C  LINE SEGMENT VARIABLES                                        02587600
ISN 0042           REAL      LLS(90), LLSS(90)                                    02587700
                C  VENTILATION SHAFT SEGMENT VARIABLES                           02587800
ISN 0043           REAL      LVS(60), LVSS(60)                                    02587900
                C  SUBSEGMENT VARIABLES                                          02588000
ISN 0044           REAL      LHLTSS(300), LSUMSS(300)                             02588100
                C  LINE SUBSEGMENT VARIABLES                                     02588200
ISN 0045           REAL      LACLSS(250), LHLSS(250)                              02588300
                C  ZONE VARIABLES                                                02588400
                C  SUBWAY VEHICLE TYPE VARIABLES                                 02588500
ISN 0046           REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)     02588600
ISN 0047           REAL      MOTORV(3)                                            02588700
                C  ROUTE VARIABLES                                               02588800
                C    DISPATCHER VARIABLES                                        02588900
                C    TRACK SECTION VARIABLES                                     02589000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                        02589100
                C  OPERATIONAL TRAIN VARIABLES                                   02589200
                C  FAN TYPE VARIABLES                                            02589300
                C  PRINT GROUP VARIABLES                                         02589400
                C                                                                02589500
                C ***************************** COMMON ***************************** C02589600
                C                                                                02589700
                C GENERAL VARIABLES                                              02589800
ISN 0048           COMMON    AETIME, ANNAMP, BLANK, BLPREC, DATE, DEATH           02589900
ISN 0049           COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, ESCFT 02590000
ISN 0050           COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT   02590100
ISN 0051           COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 02590200
ISN 0052           COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 02590300
ISN 0053           COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 02590400
ISN 0054           COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE  02590500
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ISN 0055          COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER        02590600
ISN 0056          COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC       02590700
ISN 0057          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                          02590800
ISN 0058          COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TOBAMB            02590900
ISN 0059          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02591000
ISN 0060          COMMON   TWAMBM, WNTSUM                                           02591100
                C  ARRAY SIZE LIMITS                                               02591200
ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEGRP, LMEXPD, LMFNTP, LMLPK, LMLPLK02591300
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND   02591400
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN    02591500
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG    02591600
                C  PHYSICAL CONSTANTS                                              02591700
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC  02591800
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RORYAR, RHOCP, RHOMAS     02591900
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR     02592000
ISN 0068          COMMON   WGCONS, WTBTUS                                          02592100
                C  SECTION VARIABLES  ( LMSECT )                                   02592200
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)   02592300
ISN 0070          COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS      02592400
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)  02592500
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 02592600
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)         02592700
                C    SECTION + TWO  (LMSECT+2)                                     02592800
ISN 0074          COMMON   NDSS                                                    02592900
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  02593000
ISN 0075          COMMON   LKAN                                                    02593100
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                       02593200
ISN 0076          COMMON   TABL14                                                  02593300
                C  NODE VARIABLES  ( LMNODE )                                      02593400
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23   02593500
ISN 0078          COMMON   TABL45, TYPTND                                          02593600
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                          02593700
ISN 0079          COMMON   TABL19                                                  02593800
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                            02593900
ISN 0080          COMMON   TABL2                                                   02594000
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                    02594100
ISN 0081          COMMON   COAEND(950)                                             02594200
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                        02594300
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)        02594400
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE 02594500
                C    ( LMTHND X LMSCND )                                           02594600
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)             02594700
                C  LOOP VARIABLES  ( LMNLOP )                                      02594800
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)             02594900
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT    02595000
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                           02595100
ISN 0085          COMMON   BLP(1000)                                               02595200
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                              02595300
ISN 0086          COMMON   ALS(90), CILS(90), CONLS(90), COPLS(90), CPNLS(90)      02595400
ISN 0087          COMMON   CPPLS(90), DBILS(90), DTOELS(90), DTOMLS(90), DTHELS(90) 02595500
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFELS(90) 02595600
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS          02595700
ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNELS(90), RPRMLS(90) 02595800
ISN 0091          COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)           02595900
ISN 0092          COMMON   THOELS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)            02596000
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                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 02596100
ISN 0093            COMMON   TRNNLS                                                     02596200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       02596300
                C    (LMLSEG X 2*LMTRSG)                                               02596400
ISN 0094            COMMON   TRNDLS(90,16)                                             02596500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                     02596600
ISN 0095            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)         02596700
ISN 0096            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS           02596800
ISN 0097            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)     02596900
ISN 0098            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS   02597000
ISN 0099            COMMON   VOLVSS(60), VOMXVS(60)                                   02597100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)       02597200
ISN 0100            COMMON   DERISS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)       02597300
ISN 0101            COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)           02597400
ISN 0102            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)          02597500
ISN 0103            COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)      02597600
ISN 0104            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHP(300), MNTDB(300)      02597700
ISN 0105            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)          02597800
ISN 0106            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)      02597900
ISN 0107            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)      02598000
ISN 0108            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 02598100
ISN 0109            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300) 02598200
ISN 0110            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)          02598300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                  02598400
ISN 0111            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)          02598500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                  02598600
ISN 0112            COMMON   ITNLSS                                                    02598700
                C  ZONE CLUSTER VARIABLES                                              02598800
ISN 0113            COMMON   TYPCL                                                     02598900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                           02599000
ISN 0114            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       02599100
ISN 0115            COMMON   AV(3), CD3VOV(3), CDEVOV(3), CHPR1V(3), CHPR2V(3)        02599200
ISN 0116            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)02599300
ISN 0117            COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)       02599400
ISN 0118            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV02599500
ISN 0119            COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      02599600
ISN 0120            COMMON   PERMV(3), REGENV(3)                                     02599700
ISN 0121            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 02599800
ISN 0122            COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            02599900
ISN 0123            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)  02600000
                C   UNDERPLATFORM EXHAUST VARIABLES                                   02600100
ISN 0124            COMMON   EESUX, EFMUX, OPTLX, UMAXUX                            02600200
                C  ROUTE VARIABLES  ( LMTRRT )                                         02600300
ISN 0125            COMMON   CORTRT, NTSRT, ORIGRT(6), UMINRT(6)                     02600400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )          02600500
ISN 0126            COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGP, NTIMTR(6)         02600600
ISN 0127            COMMON   NTRGR, NUMRTR                                           02600700
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                      02600800
ISN 0128            COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                02600900
ISN 0129            COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                      02601000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )         02601100
ISN 0130            COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV             02601200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                             02601300
ISN 0131            COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDCV(30), DPV, DRAGV(30)02601400
ISN 0132            COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV            02601500
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ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      02601600
ISN 0134          COMMON   QTRRF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 02601700
ISN 0135          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    02601800
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        02601900
                  C  FAN TYPE VARIABLES  ( LMFNTP )                                 02602000
ISN 0137          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)    02602100
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)    02602200
ISN 0139          COMMON   TIMFT(4)                                                 02602300
                  C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                         02602400
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)      02602500
                  C  PATRON CHARACTERISTICS                                         02602600
ISN 0141          COMMON   PATWHT                                                   02602700
                  C  PRINT GROUP VARIABLES  ( LMPRGP )                              02602800
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                             02602900
                  C                                                                 02603000
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                             02603100
                  C                                                                 02603200
                  C                                                                 02603300
                  C                                                                 02603400
                  C*****THIS SUBROUTINE IS THE DRIVING PORTION OF THE SES TRAIN     02603500
                  C*****PERFORMANCE SUBPROGRAM. IT HAS THREE MAJOR PARTS. THEY ARE  02603600
                  C*****  1) THE TRAIN 'DISPATCHER' WHICH PLACES TRAINS IN OPERATION ON ALL02603700
                  C*****     ROUTES AND REMOVES FROM OPERATION ANY TRAINS THAT HAVE GONE  02603800
                  C*****     BEYOND THE LAST TRACK SECTION OF THEIR ROUTE                 02603900
                  C*****  2) THE IMPLICIT TRAIN PERFORMANCE WHICH COMPUTES THE LOCATION,  02604000
                  C*****     SPEED, ACCELERATION, ETC. OF EACH TRAIN WHEN THE IMPLICIT    02604100
                  C*****     TRAIN PERFORMANCE OPTION IS SPECIFIED (TPOPT=1)              02604200
                  C*****  3) THE EXPLICIT TRAIN PERFORMANCE WHICH COMPUTES THE LOCATION,  02604300
                  C*****     SPEED, ACCELERATION, ETC. OF EACH TRAIN WHEN THE EXPLICIT    02604400
                  C*****     TRAIN PERFORMANCE OPTION IS SPECIFIED (TPOPT=2,3)            02604500
                  C                                                                 02604600
                  C*****TRAIN OPERATING MODES                                       02604700
                  C*****  IMPLICIT TRAIN PERFORMANCE - TPOPT=1                      02604800
                  C*****     MODE 0 = STOPPED                                       02604900
                  C*****          1 = MAINTAINING CONSTANT SPEED                    02605000
                  C*****          2 = ACCELERATING AT FULL AVAILABLE POWER          02605100
                  C*****          3 = BRAKING (DECELERATION RATE VARIES LINEARLY WITH 02605200
                  C*****                       RESPECT TO TRAIN SPEED)              02605300
                  C*****          4 = BRAKING (CONSTANT DECELERATION RATE)          02605400
                  C*****          5 = COASTING                                      02605500
                  C*****          6 = MAINTAINING MINIMUM SPEED IN A TRACK SECTION WHERE 02605600
                  C*****              COASTING IS PERMITTED                         02605700
                  C*****          7 = ATTEMPTING TO MAINTAIN CONSTANT MINIMUM SPEED IN A 02605800
                  C*****              TRACK SECTION WHERE COASTING IS PERMITTED      02605900
                  C*****  EXPLICIT TRAIN PERFORMANCE - HEAT REJECTION COMPUTED - TPOPT=2 02606000
                  C*****     MODE 1 = ALL ACTIVITIES                                02606100
                  C*****  EXPLICIT TRAIN PERFORMANCE - HEAT REJECTION INPUT - TPOPT=3 02606200
                  C*****     MODE 1 = ALL ACTIVITIES                                02606300
                  C                                                                 02606400
                  C*****INITIALIZE NUMBER OF TRAINS IN EACH SEGMENT TO ZERO         02606500
ISN 0144          IF (NLS) 1280,30,10                                               02606600
ISN 0145       10 DO 20 ILS=1,NLS                                                   02606700
ISN 0146       20 NTRNLS(ILS)=0                                                     02606800
                  C                                                                 02606900
                  C                                                                 02607000
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                C*****DISPATCHER - FIRST 'REMOVE', THEN 'DISPATCH'                      02607100
                C                                                                       02607200
                C                                                                       02607300
                C*****SKIP DISPATCHER IF NOT TIME FOR COMPLETE TRAIN EVALUATION         02607400
ISN 0147           30 IF (NTIME-TRTIME) 240,40,40                                       02607500
                C*****IF NO TRAINS ARE OPERATING THEN NONE MUST BE REMOVED              02607600
ISN 0148           40 IF (NTRAN) 150,150,50                                             02607700
                C*****LOOP OVER OPERATING TRAINS CHECKING IF THEY SHOULD BE REMOVED     02607800
                C*****INITIALIZE INDEX OF OPERATING TRAINS                             02607900
ISN 0149           50 JTRAIN=0                                                          02608000
                C*****INCREMENT INDEX OF OPERATING TRAINS                              02608100
ISN 0150           60 JTRAIN=JTRAIN+1                                                   02608200
                C*****FIND TRAIN NUMBER, ROUTE, AND NUMBER OF TRACK SECTIONS IN ROUTE   02608300
ISN 0151           70 NUMV=INDEX(JTRAIN)                                                02608400
ISN 0152              IROUTE=IROTEV(NUMV)                                               02608500
ISN 0153              NTS=NTSRT(IROUTE)                                                 02608600
                C*****REMOVE TRAIN FROM OPERATION WHEN FRONT IS BEYOND LAST T.S.        02608700
ISN 0154              IF (XV(NUMV)-FSTS(NTS,IROUTE)) 80,80,100                          02608800
ISN 0155           80 GO TO (140,90,90), IPOPT                                          02608900
                C*****REMOVE FROM OPERATION TRAINS THAT HAVE PASSED LAST POINT          02609000
                C*****IN SPEED-TIME PROFILE                                            02609100
ISN 0156           90 IF (NEXPOP(IROUTE)-DPV(NUMV)) 100,100,140                         02609200
                C*****REMOVE TRAIN FROM OPERATION - REDUCE INDEX OF ACTIVE TRAINS       02609300
                C*****AND RE-PACK ARRAY 'INDEX'                                        02609400
ISN 0157          100 IF (JTRAIN-LMTRAN) 110,130,130                                   02609500
ISN 0158          110 I1=LMTRAN-1                                                      02609600
ISN 0159              DO 120 I=JTRAIN,I1                                               02609700
ISN 0160          120 INDEX(I)=INDEX(I+1)                                              02609800
                C*****THIS ENTRY MEANS THAT THE ENTRIES IN INDEX FROM INDEX(NTRAN+1)    02609900
                C*****TO INDEX(LMTRAN) CONTAIN THE 'NUMV' THAT ARE AVAILABLE FOR REUSE 02610000
ISN 0161              INDEX(LMTRAN)=NUMV                                               02610100
                C*****DECREASE THE NUMBER OF OPERATING TRAINS BY ONE                   02610200
ISN 0162          130 NTRAN=NTRAN-1                                                    02610300
                C*****CHECK IF TRAIN REMOVED WAS LAST TRAIN NEEDING REMOVAL CHECK       02610400
ISN 0163              IF (JTRAIN-NTRAN) 70,70,150                                      02610500
                C*****CHECK IF ALL TRAINS HAVE BEEN CHECKED FOR REMOVAL                02610600
ISN 0164          140 IF (JTRAIN-NTRAN) 60,150,150                                     02610700
                C*****TRAIN DISPATCHING FOR ALL TRAIN ROUTES                           02610800
ISN 0165          150 DO 230 IROUTE=1,NTRTE                                            02610900
ISN 0166              IGROUP=JGROUP(IROUTE)                                            02611000
                C*****CHECK IF TRAIN GROUP INFORMATION FOR ROUTE HAS BEEN EXHAUSTED     02611100
ISN 0167              IF (IIGROUP-NGRV(IROUTE)) 160,160,230                            02611200
                C*****CHECK IF TIME TO DISPATCH NEXT TRAIN ON THIS ROUTE               02611300
ISN 0168          160 IF (NTIME-NTIMTR(IROUTE)) 230,170,170                            02611400
                C*****PLACE A NEW TRAIN INTO OPERATION                                 02611500
ISN 0169          170 NTRAN=NTRAN+1                                                    02611600
                C*****CHECK IF AN ATTEMPT IS BEING MADE TO PLACE TOO MANY TRAINS IN     02611700
                C*****OPERATION AT ONCE - IF SO, DO NOT PLACE TRAIN IN OPERATION AND    02611800
                C*****HOLD ALL DISPATCHING ON THIS ROUTE FOR ONE HEADWAY                02611900
ISN 0170              IF (NTRAN-LMTRAN) 180,190,180                                    02612000
ISN 0171          180 CALL SIMERR (1)                                                  02612100
ISN 0172              NTRAN=NTRAN-1                                                    02612200
ISN 0173              NTIMTR(IROUTE)=NTIME+GRHDWY(IGROUP,IROUTE)                       02612300
ISN 0174              GO TO 230                                                        02612400
                C*****FIND INTERNAL NUMBER OF NEWLY DISPATCHED TRAIN                   02612500
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ISN 0175        190 NUMV=INDEX(NTRAN)                                                   02612600
               C*****INCREMENT TOTAL NUMBER OF TRAINS THAT HAVE ENTERED SYSTEM          02612700
ISN 0176              NUMBTR=NUMBTR+1                                                   02612800
               C*****ASSIGN TRAIN EXTERNAL NUMBER - STORED ALPHAMERICALLY               02612900
ISN 0177              CALL ALCHAR (NUMBTR,TNUMV(NUMV))                                  02613000
               C*****INCREMENT NUMBER OF TRAINS DISPATCHED FOR THIS GROUP               02613100
ISN 0178              NMTRGR(IROUTE)=NMTRGR(IROUTE)+1                                   02613200
               C*****CHECK IF ALL TRAINS IN THIS GROUP HAVE BEEN DISPATCHED             02613300
ISN 0179              IF (NMTRGR(IROUTE)-NTRGR(IGROUP,IROUTE)) 210,200,200              02613400
ISN 0180        200 JGROUP(IROUTE)=JGROUP(IROUTE)+1                                     02613500
               C*****INITIALIZE NUMBER OF TRAINS DISPATCHED IN NEW GROUP                02613600
ISN 0181              NMTRGR(IROUTE)=0                                                  02613700
               C*****COMPUTE TIME OF NEXT TRAIN DISPATCH FOR THIS ROUTE                 02613800
ISN 0182        210 KGROUP=JGROUP(IROUTE)                                               02613900
ISN 0183              NTIMTR(IROUTE)=NTIME+GRHDWY(KGROUP,IROUTE)                        02614000
               C*****INITIALIZE OPERATIONAL TRAIN PARAMETERS ASSUMING IMPLICIT TRAIN     02614100
               C*****PERFORMANCE                                                        02614200
ISN 0184              IROTEV(NUMV)=IROUTE                                               02614300
ISN 0185              XV(NUMV)=ORIGRT(IROUTE)                                           02614400
ISN 0186              TEV(NUMV)=0.0                                                     02614500
ISN 0187              AMPV(NUMV)=0.0                                                    02614600
ISN 0188              AMPLV(NUMV)=0.0                                                   02614700
ISN 0189              UV(NUMV)=0.0                                                      02614800
ISN 0190              TSTRTV(NUMV)=0                                                    02614900
ISN 0191              ITYPV(NUMV)=GRTYPV(IGROUP,IROUTE)                                 02615000
ISN 0192              ITYP=ITYPV(NUMV)                                                  02615100
ISN 0193              WPATV(NUMV)=NPETTS(1,IROUTE)*PATWHT                               02615200
ISN 0194              DUDTV(NUMV)=0.0                                                   02615300
ISN 0195              MODEV(NUMV)=0                                                     02615400
ISN 0196              TSTPTV(NUMV)=0                                                    02615500
ISN 0197              QERDCV(NUMV)=0.0                                                  02615600
ISN 0198              QERACV(NUMV)=0.0                                                  02615700
ISN 0199              TGACCV(NUMV)=TIACCV(ITYP)                                         02615800
ISN 0200              TGDECV(NUMV)=TIDECV(ITYP)                                         02615900
ISN 0201              TLPSV(NUMV)=NDELT                                                 02616000
ISN 0202              NTSV(NUMV)=2                                                      02616100
ISN 0203              NTSV2(NUMV)=2                                                     02616200
ISN 0204              DRAGV(NUMV)=0.0                                                   02616300
ISN 0205              QACCV(NUMV)=0.0                                                   02616400
ISN 0206              QDECV(NUMV)=0.0                                                   02616500
ISN 0207              RMHTV(NUMV)=0.0                                                   02616600
ISN 0208              QTRPE(NUMV)=SHREV(ITYP)                                           02616700
ISN 0209              RGSUMV(NUMV)=0.0                                                  02616800
ISN 0210              TAAVGV(NUMV)=0.0                                                  02616900
ISN 0211              TWAVGV(NUMV)=0.0                                                  02617000
ISN 0212              ANVV(NUMV)=0.0                                                    02617100
ISN 0213              GO TO (230,220,220), TPOPT                                        02617200
               C*****INITIALIZE OR MODIFY OPERATIONAL TRAIN PARAMETERS FOR EXPLICIT     02617300
               C*****TRAIN PERFORMANCE                                                  02617400
ISN 0214        220 MODEV(NUMV)=1                                                       02617500
ISN 0215              DPV(NUMV)=1                                                       02617600
ISN 0216              UV(NUMV)=SPEEDV(1,IROUTE)                                         02617700
ISN 0217              XLASTV(NUMV)=ORIGRT(IROUTE)                                       02617800
ISN 0218              DUDTV(NUMV)=(SPEEDV(1,IROUTE)-SPEEDV(2,IROUTE))/(TIMEV(1,IROUTE)-T02617900
                     1IMEV(2,IROUTE))*100.0                                             02618000
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ISN 0219        230 CONTINUE                                                    02618100
               C*****IF NO TRAINS ARE OPERATIONAL THEN NO PERFORMANCE MUST BE COMPUTED 02618200
ISN 0220        240 IF (NTRAN) 1280,1270,250                                    02618300
ISN 0221        250 GO TO (260,1090,1090), IPCPT                                02618400
               C                                                               02618500
               C                                                               02618600
               C*****IMPLICIT TRAIN PERFORMANCE                 IPCPT = 1      02618700
               C                                                               02618800
               C                                                               02618900
               C*****LOOP OVER ALL OPERATING TRAINS                            02619000
ISN 0222        260 DO 1080 ITRAN=1,NTRAN                                       02619100
               C*****FIND TRAIN NUMBER, TYPE, ROUTE, AND TRACK SECTION         02619200
ISN 0223            NUMV=INDEX(ITRAN)                                          02619300
ISN 0224            ITYP=ITYPV(NUMV)                                           02619400
ISN 0225            IROUTE=IROTEV(NUMV)                                        02619500
ISN 0226            JTS=NTSV(NUMV)                                             02619600
               C*****BRANCH ON MODE OF TRAIN                                   02619700
ISN 0227            NUMY1=MODEV(NUMV)+1                                        02619800
ISN 0228            GO TO (270,310,310,460,460,560,680,760), NUMY1             02619900
               C                                                               02620000
               C*****TRAIN IS STOPPED - MODE=0                                 02620100
               C                                                               02620200
               C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE   02620300
ISN 0229        270 CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                        02620400
               C*****CHECK IF TIME TO RESTART TRAIN                            02620500
ISN 0230            IF (TSTRTV(NUMV)-NTIME) 280,280,1080                       02620600
               C*****RESTART THE TRAIN                                         02620700
ISN 0231        280 MODEV(NUMV)=2                                               02620800
               C*****FIND TRAIN TOTAL WEIGHT, GRADE AND CURVE RESISTANCES AND SUM OF 02620900
               C*****GRADE CURVE, AND ROLLING RESISTANCES                      02621000
ISN 0232            WTRN=WV(ITYP)+WPATV(NUMV)                                  02621100
ISN 0233            RG=RG*WTRN                                                 02621200
ISN 0234            RC=RC*WTRN/TONLB                                           02621300
ISN 0235            RSISTV(NUMV)=CORMV(ITYP,1)*WTRN+CORMV(ITYP,2)*RG+RC        02621400
               C*****FIND TRACTIVE EFFORT AVAILABLE                            02621500
ISN 0236            TEV(NUMV)=TORQUE(0.0,ITYP)                                 02621600
               C*****FIND ACCELERATION TRAIN IS CAPABLE OF                     02621700
ISN 0237            DUDTV(NUMV)=(TEV(NUMV)*MOTORV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(02621800
                   1ITYP)+WPATV(NUMV))/GRACC)                                  02621900
               C*****CHECK IF MAXIMUM ACCELERATION ALLOWED WOULD BE EXCEEDED    02622000
ISN 0238            IF (DUDTV(NUMV)-ACCV(ITYP)) 300,300,290                    02622100
               C*****SET ACCELERATION TO MAXIMUM ALLOWED AND RECOMPUTE TRACTIVE EFFORT 02622200
ISN 0239        290 DUDTV(NUMV)=ACCV(ITYP)                                      02622300
ISN 0240            TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV))/GRACC)+RS02622400
                   1ISTV(NUMV))/MOTORV(ITYP)                                   02622500
               C*****COMPUTE MOTOR CURRENT AND LINE CURRENT                    02622600
ISN 0241        300 AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                           02622700
ISN 0242            AMPLV(NUMV)=AMPERL(0.0,TEV(NUMV),ITYP)                     02622800
ISN 0243            GO TO 1070                                                 02622900
               C                                                               02623000
               C*****TRAIN IS MAINTAINING CONSTANT SPEED OR ACCELERATING - MODE=1,2 02623100
               C                                                               02623200
               C*****APPROXIMATE NEW SPEED USING LAST VALUE OF ACCELERATION     02623300
ISN 0244        310 UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                              02623400
ISN 0245            UAVG=0.5*(UV(NUMV)+UNEW)                                   02623500
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                C*****FIND TRACTIVE EFFORT AVAILABLE                                    02623600
ISN 0246              TE=TCROLS(UAVG,ITYP)                                              02623700
ISN 0247              TEV(NUMV)=TE                                                      02623800
ISN 0248              IF (MODEV(NUMV)-1) 1280,320,390                                   02623900
                C                                                                       02624000
                C*****MAINTAINING CONSTANT SPEED  -  MODE=1                             02624100
                C                                                                       02624200
                C*****COMPUTE T.E. REQUIRED TO MAINTAIN SPEED                           02624300
ISN 0249        320   TEREQ=RSISTV(NUMV)/MOTORV(ITYP)                                   02624400
                C*****CHECK IF AVAILABLE T.E. IS GREATER THAN REQUIRED T.E.             02624500
ISN 0250              IF (TE-TEREQ) 330,340,340                                         02624600
                C*****SWITCH TO ACCELERATION MODE TO USE ALL AVAILABLE POWER - MODE=2    02624700
ISN 0251        330   MODEV(NUMV)=2                                                     02624800
ISN 0252              GO TO 390                                                         02624900
                C*****ENOUGH POWER IS AVAILABLE - COMPUTE MOTOR CURRENT AND LINE CURRENT02625000
ISN 0253        340   AMPV(NUMV)=AMPERE(TEREQ,ITYP)                                     02625100
ISN 0254              AMPLV(NUMV)=AMPERL(UAVG,TEREQ,ITYP)                               02625200
ISN 0255              TEV(NUMV)=TEREQ                                                   02625300
                C*****COMPUTE NEW TRAIN LOCATION                                        02625400
ISN 0256              XV(NUMV)=XV(NUMV)+UV(NUMV)*DELT                                   02625500
                C*****CHECK IF TRAIN HAS EXCEEDED CURRENT SPEED RESTRICTION             02625600
ISN 0257              IF (UNEW-ABS(UMXTS(JTS,IROUTE))+0.01) 370,350,350                 02625700
                C*****CHECK IF TRAIN HAS JUST ENTERED TRACK SECTION WHERE COASTING IS    02625800
                C*****PERMITTED WHILE RUNNING AT CONSTANT SPEED                         02625900
ISN 0258        350   IF (UMXTS(JTS,IROUTE)) 360,820,820                              02626000
                C*****SWITCH TO COASTING MODE - MODE=5                                  02626100
ISN 0259        360   MODEV(NUMV)=5                                                     02626200
ISN 0260              TEV(NUMV)=0.0                                                     02626300
ISN 0261              AMPV(NUMV)=0.0                                                    02626400
ISN 0262              AMPLV(NUMV)=0.0                                                   02626500
ISN 0263              GO TO 820                                                         02626600
                C*****TRAIN IS BELOW MAXIMUM SPEED ALLOWED IN THIS TRACK SECTION. SWITCH02626700
                C*****TO ACCELERATION ONLY IF TRAIN IS BEYOND THE TRACK SECTION THAT IT  02626800
                C*****BRAKED FOR, OR, IF IT IS IN THE TRACK SECTION THAT IT BRAKED FOR  02626900
                C*****IT IS GOING TOO SLOW                                              02627000
ISN 0264        370   IF (NTSV(NUMV)-NTSV2(NUMV)) 820,380,380                         02627100
ISN 0265        380   MODEV(NUMV)=2                                                     02627200
ISN 0266              GO TO 820                                                         02627300
                C                                                                       02627400
                C*****ACCELERATING MODE - MODE=2                                        02627500
                C                                                                       02627600
ISN 0267        390   DUDTV(NUMV)=(TE*MOTORV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(ITYP)+W02627700
                     1PATV(NUMV)/GRACC)                                                 02627800
                C*****CHECK IF ACCELERATION EXCEEDS MAXIMUM ALLOWABLE                   02627900
ISN 0268              IF (DUDTV(NUMV)-ACCV(ITYP)) 410,410,400                           02628000
                C*****SET ACCELERATION TO MAXIMUM ALLOWED AND RECOMPUTE TRACTIVE EFFORT 02628100
ISN 0269        400   DUDTV(NUMV)=ACCV(ITYP)                                            02628200
ISN 0270              TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)+RS02628300
                     1ISTV(NUMV))/MOTORV(ITYP)                                          02628400
                C*****COMPUTE MOTOR CURRENT AND LINE CURRENT                            02628500
ISN 0271        410   AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                                 02628600
ISN 0272              AMPLV(NUMV)=AMPERL(UAVG,TEV(NUMV),ITYP)                           02628700
                C*****COMPUTE NEW TRAIN SPEED                                           02628800
ISN 0273              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                                    02628900
                C*****COMPARE TRAIN SPEED TO MAXIMUM ALLOWED IN CURRENT TRACK SECTION   02629000
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ISN 0274          IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 420,430,430                    02629100
                C*****CONTINUE ACCELERATION                                       02629200
                C*****COMPUTE NEW TRAIN LOCATION                                  02629300
ISN 0275          420 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                  02629400
                C*****STORE NEW TRAIN SPEED                                       02629500
ISN 0276          UV(NUMV)=UNEW                                                   02629600
ISN 0277          GO TO 820                                                       02629700
                C*****COMPUTE NEW TRAIN LOCATION                                  02629800
ISN 0278          430 DUDTV(NUMV)=0.0                                             02629900
ISN 0279          XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+ABS(UMXTS(JTS,IROUTE)))   02630000
                C*****SET TRAIN SPEED EQUAL TO CURRENT OR ANTICIPATED SPEED       02630100
                C*****RESTRICTION                                                 02630200
ISN 0280          UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                                 02630300
                C*****CHECK IF SWITCH IS TO MAINTAINING CONSTANT SPEED OR COASTING MODE 02630400
ISN 0281          IF (UMXTS(JTS,IROUTE)) 440,450,450                              02630500
                C*****SWITCH TO COASTING MODE - MODE=5                            02630600
ISN 0282          440 MODEV(NUMV)=5                                               02630700
ISN 0283          TEV(NUMV)=0.0                                                   02630800
ISN 0284          AMPV(NUMV)=0.0                                                  02630900
ISN 0285          AMPLV(NUMV)=0.0                                                 02631000
ISN 0286          GO TO 820                                                       02631100
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1           02631200
ISN 0287          450 MODEV(NUMV)=1                                               02631300
                C*****SET TRACK SECTION TRAIN HAS BRAKED FOR TO CURRENT TRACK SECTION 02631400
ISN 0288          NTSV2(NUMV)=JTS                                                 02631500
ISN 0289          GO TO 820                                                       02631600
                C                                                                 02631700
                C*****BRAKING MODES - MODE=3,4                                    02631800
                C                                                                 02631900
ISN 0290          460 UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                              02632000
                C*****CHECK IF TRAIN HAS STOPPED                                  02632100
ISN 0291          IF (UNEW) 550,550,470                                           02632200
                C*****CHECK IF GOVERNING SPEED RESTRICTION HAS BEEN MET           02632300
ISN 0292          470 JTS=NTSV2(NUMV)                                             02632400
ISN 0293          IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 430,430,480                    02632500
ISN 0294          480 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                  02632600
ISN 0295          UV(NUMV)=UNEW                                                   02632700
ISN 0296          IF (MODEV(NUMV)-4) 490,820,820                                  02632800
                C*****COMPUTE NEW BRAKING RATE                                    02632900
ISN 0297          490 IF (UNEW-DECVIV(ITYP)) 510,500,500                          02633000
                C*****ABOVE SPEED V1 - VARYING PORTION OF DECELERATION RATE CURVE  02633100
ISN 0298          500 DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UNEW                   02633200
ISN 0299          GO TO 820                                                       02633300
                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                 02633400
ISN 0300          510 JTS2=NTSV2(NUMV)                                            02633500
ISN 0301          IF (ABS(UMXTS(JTS2,IROUTE))-0.1) 520,530,530                    02633600
                C*****TRAIN IS STOPPING FOR A STATION                             02633700
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                 02633800
ISN 0302          520 STTIM=(ESTS(JTS2-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)           02633900
ISN 0303          IF( STTIM ) 537,537,525                                         02633910 <-- I
ISN 0304          525 DUDTV(NUMV)=-UV(NUMV)/STTIM                                 02634000 <-- C
ISN 0305          GO TO 540                                                       02634100
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                    02634200
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                  02634300
ISN 0306          530 STTIM=(UV(NUMV)-ABS(UMXTS(JTS2,IROUTE)))/DECV(ITYP)         02634400
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ISN 0307          INT=IFIX(STTIM/DELT+C.9999)                                    02634500
ISN 0309          STTIM=FLOAT(INT)*DELT                                          02634600
ISN 0309          IF( STTIM ) 537,537,535                                        02634610 <-- I
ISN 0310        535 DUDTV(NUMV)=(ABS(UMXTS(JTS2,IROUTE))-UV(NUMV))/STTIM         02634700 <-- C
ISN 0311          GO TO 540                                                      02634710
                C**** USE MAXIMUM DECELERATION RATE                            02634720 <-- I
ISN 0312        537 DUDTV(NUMV) = DECV(ITYP)                                     02634730
                C*****SWITCH TO MODE 4                                         02634900
                C*****USE THIS DECELERATION RATE FOR REMAINDER OF BRAKING CYCLE 02634900
ISN 0313        540 MODEV(NUMV)=4                                              02635000
ISN 0314          GO TO 820                                                    02635100
                C*****TRAIN HAS STOPPED                                        02635200
ISN 0315        550 MODEV(NUMV)=0                                              02635300
ISN 0316          DUDTV(NUMV)=0.0                                              02635400
ISN 0317          UV(NUMV)=C.0                                                 02635500
ISN 0318          JTS=NTSV2(NUMV)                                              02635600
ISN 0319          XV(NUMV)=FSTS(JTS,IROUTE)                                    02635700
                C*****COMPUTE TIME OF RESTART                                  02635800
ISN 0320          TSTRTV(NUMV)=NTIME+DELTS(JTS,IROUTE)                         02635900
ISN 0321          NTSV(NUMV)=NTSV2(NUMV)+1                                     02636000
ISN 0322          TEV(NUMV)=0.0                                                02636100
ISN 0323          AMPV(NUMV)=0.0                                               02636200
ISN 0324          AMPLV(NUMV)=0.0                                              02636300
ISN 0325          QACCV(NUMV)=C.0                                              02636400
ISN 0326          QDECV(NUMV)=0.0                                              02636500
ISN 0327          RMHTV(NUMV)=0.0                                              02636600
                C*****COMPUTE NEW WEIGHT OF PATRONS ON TRAIN                   02636700
ISN 0328          WPATV(NUMV)=WPATV(NUMV)+NPETTS(JTS,IROUTE)*PATWHT            02636800
ISN 0329          GO TO 820                                                    02636900
                C                                                              02637000
                C*****COASTING MODE - MODE=5                                   02637100
                C                                                              02637200
                C*****COMPUTE NEW ACCELERATION                                 02637300
ISN 0330        560 DUDTV(NUMV)=-RSISTV(NUMV)/(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)02637400
                C*****COMPUTE ANTICIPATED SPEED                                02637500
ISN 0331          UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                               02637600
                C*****IF ANTICIPATED SPEED IS LESS THAN UMIN THEN SWITCH TO ANOTHER MODE02637700
ISN 0332          IF (UNEW-UMINRT(IROUTE)) 570,570,600                         02637800
ISN 0333        570 UNEW=UMINRT(IROUTE)                                        02637900
                C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED      02638000
ISN 0334          XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                   02638100
ISN 0335          UV(NUMV)=UNEW                                                02638200
ISN 0336          DUDTV(NUMV)=C.0                                              02638300
ISN 0337          IF (CCPTR(IROUTE)) 1280,590,580                              02638400
                C*****SWITCH TO ACCELERATING MODE - MODE=2                      02638500
ISN 0338        580 MODEV(NUMV)=2                                              02638600
ISN 0339          GO TO 820                                                    02638700
                C*****SWITCH TO COASTING CONSTANT SPEED MODE - MODE=6           02638800
ISN 0340        590 MODEV(NUMV)=6                                              02638900
ISN 0341          GO TO 64C                                                    02639000
                C*****IF ANTICIPATED SPEED IS GREATER THAN MAXIMUM ALLOWED THEN MAINTAIN02639100
                C*****MAXIMUM SPEED                                            02639200
ISN 0342        600 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 620,610,610               02639300
ISN 0343        610 UNEW=ABS(UMXTS(JTS,IROUTE))                                02639400
                C*****FIND 'NEGATIVE' TRACTIVE' EFFORT (BRAKING EFFORT) REQUIRED TO KEEP02639500
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                C*****TRAIN FROM GOING TOO FAST                                    02639600
ISN 0344              TEV(NUMV)=RSISTV(NUMV)/MOTORV(ITYP)                          02639700
ISN 0345              DUOTV(NUMV)=0.0                                              02639800
ISN 0346              GO TO 630                                                    02639900
ISN 0347            620 TEV(NUMV)=0.0                                              02640000
                C*****COMPUTE NEW TRAIN LOCATION AND SPEED                         02640100
ISN 0348            630 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                 02640200
ISN 0349              UV(NUMV)=UNEW                                                02640300
                C*****CHECK IF TRAIN HAS LEFT COASTING TRACK SECTION               02640400
ISN 0350            640 IF (UMXTS(JTS,IROUTE)) 820,650,650                         02640500
                C*****TRAIN CAN NO LONGER COAST - SWITCH TO ANOTHER MODE           02640600
ISN 0351            650 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 670,660,660               02640700
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1           02640800
ISN 0352            660 MODEV(NUMV)=1                                              02640900
ISN 0353              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                              02641000
ISN 0354              GO TO 820                                                    02641100
                C*****SWITCH TO ACCELERATING MODE - MODE=2                         02641200
ISN 0355            670 MODEV(NUMV)=2                                              02641300
ISN 0356              GO TO 820                                                    02641400
                C                                                                  02641500
                C*****MAINTAINING CONSTANT MINIMUM SPEED IN A TRACK SECTION WHERE  02641600
                C*****COASTING IS PERMITTED MODE - MODE=6                          02641700
                C                                                                  02641800
                C*****FIND TRAIN SPEED                                             02641900
ISN 0357            680 UNEW=UV(NUMV)                                              02642000
                C*****FIND TRACTIVE EFFORT REQUIRED                                02642100
ISN 0358              TEREQ=RSISTV(NUMV)/MOTORV(ITYP)                              02642200
                C*****IF TRACTIVE EFFORT REQUIRED IS NEGATIVE THEN SWITCH TO COASTING 02642300
                C*****MODE - MODE=5                                                02642400
ISN 0359              IF (TEREQ) 690,690,700                                       02642500
ISN 0360            690 MODEV(NUMV)=5                                              02642600
ISN 0361              TEV(NUMV)=0.0                                                02642700
ISN 0362              GO TO 560                                                    02642800
                C*****FIND TRACTIVE EFFORT AVAILABLE                               02642900
ISN 0363            700 TE=TORQUE(UNEW,ITYP)                                       02643000
                C*****CHECK IF AVAILABLE T.E. IS GREATER THAN REQUIRED T.E.         02643100
ISN 0364              IF (TE-TEREQ) 750,710,710                                    02643200
                C*****COMPUTE AVAILABLE TRACTIVE EFFORT, LINE CURRENT AND MOTOR CURRENT 02643300
ISN 0365            710 TEV(NUMV)=TEREQ                                            02643400
ISN 0366              AMPV(NUMV)=AMPERE(TEREQ,ITYP)                                02643500
ISN 0367              AMPLV(NUMV)=AMPERL(UNEW,TEREQ,ITYP)                          02643600
                C*****COMPUTE NEW TRAIN LOCATION                                   02643700
ISN 0368              XV(NUMV)=XV(NUMV)+UNEW*DELT                                  02643800
                C*****CHECK IF TRAIN HAS LEFT COASTING SECTION                     02643900
ISN 0369              IF (UMXTS(JTS,IROUTE)) 820,720,720                           02644000
ISN 0370            720 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 730,740,740               02644100
                C*****SWITCH TO ACCELERATION MODE - MODE=2                         02644200
ISN 0371            730 MODEV(NUMV)=2                                              02644300
ISN 0372              GO TO 820                                                    02644400
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1           02644500
ISN 0373            740 MODEV(NUMV)=1                                              02644600
ISN 0374              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                              02644700
ISN 0375              GO TO 820                                                    02644800
                C*****SWITCH TO ATTEMPTING TO MAINTAIN MINIMUM SPEED MODE - MODE=7 02644900
ISN 0376            750 MODEV(NUMV)=7                                              02645000
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                C                                                                       02645100
                C*****ATTEMPTING TO MAINTAIN CONSTANT MINIMUM SPEED IN A TRACK SECTION  02645200
                C*****WHERE COASTING IS PERMITTED - MODE=7                              02645300
                C                                                                       02645400
                C*****COMPUTE AVAILABLE TRACTIVE EFFORT, LINE CURRENT AND MOTOR CURRENT 02645500
ISN 0377          760 TE=TORQUE(UV(NUMV),ITYP)                                          02645600
ISN 0378              TEV(NUMV)=TE                                                      02645700
ISN 0379              AMPV(NUMV)=AMPERE(TE,ITYP)                                        02645800
ISN 0380              AMPLV(NUMV)=AMPERL(UV(NUMV),TE,ITYP)                              02645900
                C*****FIND ACCELERATION TRAIN IS CAPABLE OF                             02646000
ISN 0381              DUDTV(NUMV)=(TE*NOTCRV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(ITYP)+W02646100
                     1PATV(NUMV)/GRACC)                                                 02646200
                C*****FIND NEW TRAIN SPEED                                              02646300
ISN 0382              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                                    02646400
                C*****IF TRAIN SPEED IS GREATER THAN UMIN, SET SPEED TO UMIN AND        02646500
                C*****SWITCH BACK TO CONSTANT MINIMUM SPEED MODE                        02646600
ISN 0383              IF (UNEW-UMINRT(IROUTE)) 780,770,770                              02646700
ISN 0384          770 UNEW=UMINRT(IROUTE)                                               02646800
ISN 0385              MODEV(NUMV)=6                                                     02646900
ISN 0386              DUDTV(NUMV)=0.0                                                   02647000
                C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED               02647100
ISN 0387          780 XV(NUMV)=XV(NUMV)+0.5*(UV(NUMV)+UNEW)                             02647200
ISN 0388              UV(NUMV)=UNEW                                                     02647300
                C*****CHECK IF TRAIN HAS LEFT COASTING TRACK SECTION                    02647400
ISN 0389              IF (UMXTS(JTS,IROUTE)) 820,790,790                                02647500
                C*****TRAIN CAN NO LONGER COAST - SWITCH TO ANOTHER MODE                02647600
ISN 0390          790 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 800,810,810                      02647700
                C*****SWITCH TO ACCELERATION MODE - MODE=2                              02647800
ISN 0391          800 MODEV(NUMV)=2                                                     02647900
ISN 0392              GO TO 820                                                         02648000
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1                02648100
ISN 0393          810 MODEV(NUMV)=1                                                     02648200
ISN 0394              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                                   02648300
                C                                                                       02648400
                C*****CONVERGENCE POINT FOR MODES 0,1,2,3,4,5,6,7     ( TPOPT=1 )      02648500
                C                                                                       02648600
ISN 0395          820 RSISTV(NUMV)=DRAGV(NUMV)                                          02648700
                C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE           02648800
ISN 0396              CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                              02648900
                C*****FIND TRAIN TOTAL WEIGHT, GRADE AND CURVE RESISTANCES AND SUM OF    02649000
                C*****GRADE, CURVE, AND ROLLING RESISTANCES                             02649100
ISN 0397              WTRN=WV(ITYP)+WPATV(NUMV)                                         02649200
ISN 0398              RG=RG*WTRN                                                        02649300
ISN 0399              RC=RC*WTRN/TONLB                                                  02649400
                C*****COMPUTE MECHANICAL ROLLING RESISTANCE OF TRAIN                    02649500
ISN 0400              RM=CORMV(ITYP,2)+(CORMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*WTRN     02649600
                C*****COMPUTE HEAT REJECTION CAUSED BY MECHANICAL RESISTANCE            02649700
ISN 0401              RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLOBTU                               02649800
                C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE                02649900
ISN 0402              IF (JRATAE) 850,850,830                                           02650000
                C*****IF IT IS NOT TIME FOR AERO STEP REPLACE AIR DRAG                  02650100
ISN 0403          830 IF (AETIME-NTIME) 860,860,840                                     02650200
ISN 0404          840 DRAGV(NUMV)=RSISTV(NUMV)                                          02650300
ISN 0405              GO TO 860                                                         02650400
                C*****COMPUTE AIR DRAG ON TRAIN RUNNING IN OPEN AIR                     02650500
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ISN 0406        850 DRAGV(NUMV)=IAV(ITYP)*(CDEVCV(ITYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LVI 02650600
                   1ITYP)/4.0)*0.5*PHOMAS*LV(NUMV)**2                                  02650700
ISN 0407            RSISTV(NUMV)=DRAGV(NUMV)                                           02650800
ISN 0408          860 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                               02650900
                  C*****CHECK IF TIME FOR COMPLETE TRAIN BRAKING CHECK                  02651000
ISN 0409            IF (NTIME-TRTIME) 1070,870,870                                     02651100
                  C*****BYPASS COMPLETE TRAIN BRAKING CHECK IF MODES 3 OR 4             02651200
ISN 0410          870 NUMV1=MODEV(NUMV)+1                                              02651300
ISN 0411            GO TO (1070,880,880,1070,1070,880,880,880), NUMV1                  02651400
                  C                                                                    02651500
                  C*****COMPLETE TRAIN BRAKING CHECK - INITIATES BRAKING               02651600
                  C                                                                    02651700
                  C*****CHECK SPEED RESTICTIONS IN FRONT OF TRAIN, CONTINUING UNTIL A  02651800
                  C*****STATION (0 MPH) OR THE END OF THE ROUTE IS FOUND               02651900
ISN 0412          880 JTS=NTSV(NUMV)+1                                                 02652000
ISN 0413            NTS=NTSPT(IROUTE)                                                  02652100
                  C*****CHECK FOR END OF TRACK SECTIONS                                02652200
ISN 0414          890 IF (NTS-JTS) 1070,900,900                                        02652300
                  C*****COMPUTE ANTICIPATED SPEED AT NEXT TIME OF COMPLETE TRAIN       02652400
                  C*****BRAKING CHECK. THIS POINT IS WORKED WITH TO CAUSE THE TRAIN TO  02652500
                  C*****BRAKE 'EARLY' RATHER THAN 'LATE'                               02652600
ISN 0415          900 UNEXT=LV(NUMV)+DUDTV(NUMV)*DELTR                                 02652700
                  C*****COMPUTE SPEED REDUCTION REQUIRED                               02652800
ISN 0416            SPDIF= UV(NUMV) - ABS(UMXTS(JTS,IROUTE))                           02652900 <-- C
ISN 0417            IF (SPDIF) 1050,1050,910                                           02653000
                  C*****SPEED RESTRICTION IS LOWER THAN CURRENT TRAIN SPEED, THEREFORE  02653100
                  C*****COMPUTE BRAKING TIME AND DISTANCE. BEGIN BY DETERMINING IF IN  02653200
                  C*****CONSTANT OR VARYING DECELERATION RATE RANGE                    02653300
ISN 0418          910 IF (UNEXT-DECV1V(ITYP)) 920,920,930                              02653400
                  C*****CONSTANT DECELERATION RATE                                     02653500
ISN 0419          920 STTIM= (UNEXT-ABS(UMXTS(JTS,IROUTE))) / DECV(ITYP)               02653600 <-- C
ISN 0420            STDIS=UNEXT*STTIM-0.5*DECV(ITYP)*STTIM**2                          02653700
ISN 0421            GO TO 990                                                          02653800
                  C*****VARYING DECELERATION RATE RANGE, COMPUTE LOWEST SPEED THAT WILL 02653900
                  C*****OCCUR IN IT                                                    02654000
ISN 0422          930 IF (ABS(UMXTS(JTS,IROUTE))-DECV1V(ITYP)) 950,950,940             02654100
ISN 0423          940 V1T=ABS(UMXTS(JTS,IROUTE))                                       02654200
ISN 0424            GO TO 960                                                          02654300
ISN 0425          950 V1T=DECV1V(ITYP)                                                 02654400
                  C*****COMPUTE BRAKING TIME AND DISTANCE FOR VARYING PORTION OF CURVE  02654500
ISN 0426          960 T1=-ALOG((DECAV(ITYP)*V1T+DECBV(ITYP))/(DECAV(ITYP)*UNEXT+DECBV(IT 02654600
                     1YP)))/DECAV(ITYP)                                                02654700
ISN 0427            S1=(DECAV(ITYP)*UNEXT+DECBV(ITYP))*(1.0-EXP(-DECAV(ITYP)*T1))/DECA 02654800
                    1V(ITYP)**2-DECBV(ITYP)*T1/DECAV(ITYP)                            02654900
ISN 0428            IF (ABS(UMXTS(JTS,IROUTE))-DECV1V(ITYP)) 980,980,970               02655000
                  C*****CONSTANT DECELERATION PORTION OF CURVE IS NOT BEING USED        02655100
                  C*****BECAUSE SPEED RESTRICTION 'UMXTS' IS ABOVE 'DECV1V'            02655200
ISN 0429          970 STDIS=S1                                                         02655300
ISN 0430            GO TO 990                                                          02655400
                  C*****COMPUTE BRAKING TIME AND DISTANCE ON CONSTANT DECELERATION     02655500
                  C*****PORTION OF CURVE                                               02655600
ISN 0431          980 T2=(DECV1V(ITYP)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)              02655700
ISN 0432            S2=DECV1V(ITYP)*T2-0.5*DECV(ITYP)*T2**2                            02655800
ISN 0433            STDIS=S1+S2                                                        02655900
                  C*****CHECK IF NECESSARY TO BRAKE FOR THIS SPEED RESTRICTION BEFORE   02656000
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                C*****NEXT COMPLETE TRAIN EVALUATION                                    02656100
ISN 0434          990 IF (STOPS+UV(NUMV)*DELTR+0.5*DUDTV(NUMV)*DELTR**2-(FSTS(JTS-1,IROU02656200
                 1TE)-XV(NUMV))) 1050,1050,1000                                         02656300
                C*****IT IS NECESSARY TO BRAKE NOW - SWITCH TO MODE 3 OR 4              02656400
                C*****SET TRACK SECTION TRAIN IS BRAKING FOR                            02656500
ISN 0435         1000 NTSV2(NUMV)=JTS                                                   02656600
                C*****TURN TRAIN POWER OFF                                              02656700
ISN 0436               TEV(NUMV)=0.0                                                    02656800
ISN 0437               AMPV(NUMV)=0.0                                                   02656900
ISN 0438               AMPLV(NUMV)=0.0                                                  02657000
                C*****COMPUTE DECELERATION RATE                                         02657100
ISN 0439               IF (UV(NUMV)-DECV1V(ITYP)) 1020,1020,1010                        02657200
                C*****ABOVE SPEED V1 - VARYING DECELERATION RATE                        02657300
ISN 0440         1010 MODEV(NUMV)=3                                                     02657400
ISN 0441               DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UV(NUMV)                    02657500
ISN 0442               GO TO 1070                                                       02657600
                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                       02657700
ISN 0443         1020 MODEV(NUMV)=4                                                     02657800
ISN 0444               IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1030,1040,1040                   02657900
                C*****TRAIN IS STOPPING FOR A STATION                                   02658000
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                       02658100
ISN 0445         1030 STTIM=(FSTS(JTS-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)                  02658200
ISN 0446               IF( STTIM ) 1047,1047,1035                                       02658210  <-- I
ISN 0447         1035 DUDTV(NUMV)=-UV(NUMV)/STTIM                                       02658300  <-- C
ISN 0448               GO TO 1070                                                       02658400
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                          02658500
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                        02658600
ISN 0449         1040 STTIM=(UV(NUMV)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)                02658700
ISN 0450               INT=IFIX(STTIM/DELT+0.9999)                                      02658800
ISN 0451               STTIM=FLOAT(INT)*DELT                                            02658900
ISN 0452               IF( STTIM ) 1047,1047,1045                                       02658910  <-- I
ISN 0453         1045 DUDTV(NUMV)=(ABS(UMXTS(JTS,IROUTE))-UV(NUMV))/STTIM               02659000  <-- C
ISN 0454               GO TO 1070                                                       02659100
                C*****USE MAXIMUM DECELERATION RATE                                     02659110
ISN 0455         1047 DUDTV(NUMV) = DECV(ITYP)                                          02659120  <-- I
ISN 0456               GO TO 1070                                                       02659130
                C*****SPEED RESTRICTION IS HIGHER THAN CURRENT SPEED OR THERE IS        02659200
                C*****SUFFICIENT BRAKING DISTANCE                                       02659300
                C*****CHECK FOR A STATION (MAXIMUM SPEED OF ZERO)                       02659400
ISN 0457         1050 IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1070,1070,1060                    02659500
ISN 0458         1060 JTS=JTS+1                                                         02659600
ISN 0459               GO TO 890                                                        02659700
ISN 0460         1070 CONTINUE                                                          02659800
ISN 0461               CALL HEAT (NUMV,ITYP,TEV(NUMV),AMPV(NUMV),AMPLV(NUMV))           02659900
ISN 0462         1080 CONTINUE                                                          02660000
                C*****END OF IMPLICIT TRAIN PERFORMANCE                                 02660100
ISN 0463               RETURN                                                           02660200
                C                                                                       02660300
                C                                                                       02660400
                C*****EXPLICIT TRAIN PERFORMANCE                TPOPT = 2 + 3           02660500
                C                                                                       02660600
                C                                                                       02660700
ISN 0464         1090 DO 1260 ITRAN=1,NTRAN                                             02660800
                C*****FIND TRAIN NUMBER, TYPE, AND ROUTE                                02660900
ISN 0465               NUMV=INDEX(ITRAN)                                                02661000
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ISN 0466            ITYP=ITYPV(NUMV)                                                02661100
ISN 0467            IROUTE=)PCTEV(NUMV)                                             02661200
                  C*****COMPUTE THE TRAIN POSITION, SPEED, ACCELERATION AND POWER   02661300
                  C*****REJECTIONS (TPOPT=3 ONLY) BY INTERPOLATION OF THE USER-SUPPLIED 02661400
                  C*****SPEED AND POWER REJECTIONS VS. TIME                         02661500
ISN 0468            CALL RATES (NUMV,IROUTE,QACC,QDEC)                              02661600
ISN 0469            RSISTV(NUMV)=DRAGV(NUMV)                                        02661700
                  C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE     02661800
ISN 0470            CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                            02661900
ISN 0471            GO TO (1280,1100,1200), TPOPT                                   02662000
                  C                                                                 02662100
                  C*****IMPLICIT HEAT REJECTION                    TPOPT = 2        02662200
                  C                                                                 02662300
                  C*****COMPUTE HEAT REJECTION FROM MOTOR CURVES                    02662400
                  C*****COMPUTE MECHANICAL ROLLING RESISTANCE OF TRAIN              02662500
ISN 0472             1100 RM=CORMV(ITYP,2)+(CCRMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*(WV(ITYP)+02662600
                         1WPATV(NUMV))                                              02662700
ISN 0473            RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLBBTU                             02662800
                  C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE          02662900
ISN 0474            IF (JRATAE) 1130,1130,1110                                      02663000
                  C*****IF IS NOT TIME FOR AERO STEP REPLACE AIR DRAG               02663100
ISN 0475             1110 IF (AETIME-NTIME) )140,1140,1120                          02663200
ISN 0476             1120 DRAGV(NUMV)=RSISTV(NUMV)                                  02663300
ISN 0477            GO TO 1140                                                      02663400
ISN 0478             1130 DRAGV(NUMV)=(AV(ITYP)*(CDEVOV()TYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LV(02663500
                         1)TYP)/4.0)*0.5*RHOMAS*LV(NUMV)**2                         02663600
ISN 0479            RSISTV(NUMV)=DRAGV(NUMV)                                        02663700
ISN 0480             1140 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                        02663800
                  C*****COMPUTE TRACTIVE EFFORT REQUIRED TO PRODUCE DESIRED ACCELERATION 02663900
ISN 0481            TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)+RS02664000
                         1ISTV(NUMV))/MOTORV()TYP)                                  02664100
ISN 0482            IF (UV(NUMV)-0.01) 1170,1150,1150                               02664200
ISN 0483             1150 IF (TEV(NUMV)) 1180,1180,1160                             02664300
ISN 0484             1160 AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                         02664400
ISN 0485            AMPLV(NUMV)=AMPERL(UV(NUMV),TEV(NUMV),ITYP)                     02664500
ISN 0486            GO TO 1190                                                      02664600
ISN 0487             1170 TEV(NUMV)=0.0                                             02664700
ISN 0488             1180 AMPV(NUMV)=0.0                                            02664800
ISN 0489            AMPLV(NUMV)=0.0                                                 02664900
ISN 0490             1190 CALL HEAT (NUMV,ITYP,TEV(NUMV),AMPV(NUMV),AMPLV(NUMV))    02665000
ISN 0491            GO TO 1250                                                      02665100
                  C                                                                 02665200
                  C*****EXPLICIT HEAT REJECTION                    TPOPT = 3        02665300
                  C                                                                 02665400
                  C*****COMPUTE HEAT REJECTIONS IN BTU FROM POWER REJECTIONS IN KW  02665500
ISN 0492             1200 QACCV(NUMV)=QACC*WTBTUS*1000.0                            02665600
ISN 0493            QDECV(NUMV)=QDEC*WTBTUS*1000.0                                  02665700
                  C*****COMPUTE HEAT CREATED BY MECHANICAL ROLLING FRICTION         02665800
ISN 0494            RM=CORMV(ITYP,2)+(CORMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*(WV(ITYP)+02665900
                         1WPATV(NUMV))                                              02666000
ISN 0495            RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLBBTU                             02666100
                  C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE          02666200
ISN 0496            IF (JRATAE) 1230,1230,1210                                      02666300
                  C*****IF IT IS NOT TIME FOR AERO STEP REPLACE AIR DRAG            02666400
ISN 0497             1210 IF (AETIME-NTIME) 1240,1240,1220                          02666500
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ISN 0498      1220 DRAGV(NUMV)=RSISTV(NUMV)                                        02666600
ISN 0499           GO TO 1240                                                      02666700
ISN 0500      1230 DRAGV(NUMV)=(AV(ITYP)*(CDFVOV(ITYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LV(02666800
                  1ITYP)/4.0)*0.5*RHOMAS*LV(NUMV)**2                              02666900
ISN 0501           RSISTV(NUMV)=DRAGV(NUMV)                                        02667000
ISN 0502      1240 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                              02667100
              C*****INCREMENT TIME SINCE TRAIN DISPATCH                           02667200
ISN 0503      1250 TLPSV(NUMV)=TLPSV(NUMV)+NDELT                                   02667300
ISN 0504      1260 CONTINUE                                                        02667400
              C*****END OF EXPLICIT TRAIN PERFORMANCE                             02667500
ISN 0505      1270 RETURN                                                          02667600
              C                                                                   02667700
              C*****IMPOSSIBLE SITUATION                                          02667800
              C                                                                   02667900
ISN 0506      1280 WRITE (OUT,1290)                                                02668000
ISN 0507      1290 FORMAT (1H1,'IMPOSSIBLE SITUATION - SUBROUTINE TRAIN')          02668100
ISN 0508           STOP                                                          02668200
ISN 0509           END                                                           02668300
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July 23, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 4 TO VERSION 2

Problem

An unitialized variable has been found which may sometimes result in UNDERFLOW or OVERFLOW messages. Results are not affected. The program version number is also updated to 2.04.

Symptoms

This problem is intermittent, and may result in floating point UNDERFLOW or OVERFLOW messages produced in subroutine MAXMIN.

Correction

See attached corrected listing of subroutine VSINS. New lines are indicated by the letter "I." Also see attached corrected listing of subroutine INPUT. Changed lines are indicated by the letter "C."

Effect on Previous Results

The UNDERFLOW or OVERFLOW messages may have prevented program operation. However, the results are not affected.

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE  VSINS( IVS )                                    02766900
                C                                                               02767000
                C      VENTILATION SHAFT INPLT SUBROUTINE                       02767100
                C                                                               02767200
                C     INCLUDE  CSHARE                                           02767300
                C                                                               02767400
                C ************************ INTEGER VARIABLES ************************ C02767500
                C                                                               02767600
                C  GENERAL VARIABLES                                            02767700
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT  02767800
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT  02767900
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME  02768000
                C  SECTION VARIABLES  (LMSECT)                                  02768100
ISN 0006            INTEGER   NTOPS(140)                                        02768200
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)  02768300
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)             02768400
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02768500
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                      02768600
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  02768700
ISN 0010            INTEGER   LKAN(420)                                         02768800
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)           02768900
ISN 0011            INTEGER   TABL14(400)                                       02769000
                C  NODE VARIABLES  (LMNODE)                                     02769100
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)  02769200
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPIND(130)             02769300
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          02769400
ISN 0014            INTEGER   TABL2(1500)                                       02769500
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  02769600
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                      02769700
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)              02769800
ISN 0016            INTEGER   TABL19(400)                                       02769900
                C  LOOP VARIABLES  (LMNLOP)                                     02770000
                C  LINE SEGMENT VARIABLES  (LMLSEG)                             02770100
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  02770200
ISN 0018            INTEGER   TYPLS(90)                                         02770300
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)  02770400
ISN 0019            INTEGER   TRNNLS(90,8)                                      02770500
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )            02770600
ISN 0020            INTEGER   FTCFVS(60), FTONVS(60), NUMVS(60)                 02770700
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60)  02770800
                C  SUBSEGMENT VARIABLES  (LMSS)                                 02770900
ISN 0022            INTEGER   TABL7(300), TABL44(300)                           02771000
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )           02771100
ISN 0023            INTEGER   EXDTOR(250,6)                                     02771200
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )          02771300
ISN 0024            INTEGER   ITNLSS(250,6)                                     02771400
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          02771500
ISN 0025            INTEGER   TYPCL(30)                                         02771600
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                      02771700
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                               02771800
                C  UNDERPLATFORM EXHAUST VARIABLES                              02771900
ISN 0027            INTEGER   OPTUX                                             02772000
                C  ROUTE VARIABLES  (LMTRRT)                                    02772100
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ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                  02772200
                C   DISPATCHER VARIABLES (LMTRPT) AND (LMTRGP X LMTRRT)             02772300
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)          02772400
ISN 0030            INTEGER   NTRGR(15,6)                                          02772500
ISN 0031            INTEGER   GRHDNV(15,6)                                         02772600
                C   TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                     02772700
ISN 0032            INTEGER   DWLTS(260,6)                                         02772800
ISN 0033            INTEGER   NPETTS(260,6), NSEGTS(260,6)                         02772900
                C   EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)       02773000
ISN 0034            INTEGER   NEXPDP(6)                                            02773100
ISN 0035            INTEGER   TIMEV(201,6)                                         02773200
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                          02773300
ISN 0036            INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30) 02773400
ISN 0037            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                       02773500
ISN 0038            INTEGER   TLPSV(30), TSTRTV(30)                                02773600
                C  FAN TYPE VARIABLES  (LMFNTP)                                   02773700
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                         02773800
ISN 0039            INTEGER   LSSUL(10)                                            02773900
                C  PRINT GROUP VARIABLES  ( LMPRGP )                              02774000
ISN 0040            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)         02774100
                C                                                                 02774200
                C ************************** REAL VARIABLES ************************** C02774300
                C                                                                 02774400
                C  GENERAL VARIABLES                                              02774500
ISN 0041            REAL      RUAIR, RPHFPS                                       02774600
                C  SECTION VARIABLES                                              02774700
                C  NODE VARIABLES                                                 02774800
                C  LOOP VARIABLES                                                 02774900
                C  LINE SEGMENT VARIABLES                                         02775000
ISN 0042            REAL      LLS(90), LLSS(90)                                   02775100
                C  VENTILATION SHAFT SEGMENT VARIABLES                            02775200
ISN 0043            REAL      LVS(60), LVSS(60)                                   02775300
                C  SUBSEGMENT VARIABLES                                           02775400
ISN 0044            REAL      LDLTSS(300), LSUMSS(300)                            02775500
                C  LINE SUBSEGMENT VARIABLES                                      02775600
ISN 0045            REAL      LACLSS(250), LHLSS(250)                             02775700
                C  ZONE VARIABLES                                                 02775800
                C  SUBWAY VEHICLE TYPE VARIABLES                                  02775900
ISN 0046            REAL      LAMDAV(3), LHREV(3), LV(3), MCPCAV(3), MCPGDV(3)    02776000
ISN 0047            REAL      MOTORV(3)                                           02776100
                C  ROUTE VARIABLES                                                02776200
                C    DISPATCHER VARIABLES                                         02776300
                C    TRACK SECTION VARIABLES                                      02776400
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                         02776500
                C  OPERATIONAL TRAIN VARIABLES                                    02776600
                C  FAN TYPE VARIABLES                                             02776700
                C  PRINT GROUP VARIABLES                                          02776800
                C                                                                 02776900
                C ****************************** COMMON ****************************** C02777000
                C                                                                 02777100
                C GENERAL VARIABLES                                               02777200
ISN 0048            COMMON    AETIME, ANNAMP, BLANK, BLPREC, DATE, DEATH          02777300
ISN 0049            COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, ESCET 02777400
ISN 0050            COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT  02777500
ISN 0051            COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 02777600
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ISN 0052          COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 02777700
ISN 0053          COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 02777800
ISN 0054          COMMON   NDTYPA, NEX, NENTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE    02777900
ISN 0055          COMMON   NOSUMY, NOSYS, NCTRAN, NPGRP, NPORTL, NSEC, NSIMER       02778000
ISN 0056          COMMON   NTIME, NTNODE, NTRAN, NTRBTE, NTRTYP, NUMUL, NVSEC      02778100
ISN 0057          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                         02778200
ISN 0058          COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDRAMB            02778300
ISN 0059          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02778400
ISN 0060          COMMON   TWAMBM, WNTSUM                                          02778500
                C  ARRAY SIZE LIMITS                                               02778600
ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK02779700
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND   02778800
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN    02778900
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG    02779000
                C  PHYSICAL CONSTANTS                                              02779100
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC  02779200
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RORYAR, RHOCP, RHOMAS     02779300
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR     02779400
ISN 0068          COMMON   WGCONS, WTBTUS                                          02779500
                C  SECTION VARIABLES  ( LMSECT )                                   02779600
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)   02779700
ISN 0070          COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS      02779800
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)  02779900
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 02780000
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)         02780100
                C    SECTION + TWO  (LMSECT+2)                                     02780200
ISN 0074          COMMON   NDSS                                                    02780300
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 02780400
ISN 0075          COMMON   LKAN                                                    02780500
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                       02780600
ISN 0076          COMMON   TABL14                                                  02780700
                C  NODE VARIABLES  ( LMNODE )                                      02780800
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23   02780900
ISN 0078          COMMON   TABL45, TYPTND                                          02781000
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                          02781100
ISN 0079          COMMON   TABL19                                                  02781200
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                            02781300
ISN 0080          COMMON   TABL2                                                   02731400
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                    02781500
ISN 0081          COMMON   COAEND(950)                                             02781600
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                        02781700
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)        02781800
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE 02781900
                C    ( LMTHND X LMSCND )                                           02782000
ISN 0083          COMMON   EHUBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)             02782100
                C  LOOP VARIABLES  ( LMNLOP )                                      02782200
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)             02782300
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT    02782400
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                           02782500
ISN 0085          COMMON   BLP(1000)                                               02782600
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                              02782700
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CENLS(90)      02782800
ISN 0087          COMMON   CEPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 02782900
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FEELS(90) 02783000
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTBNLS, NUMLS          02783100
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ISN 0090          COMMON   PDRVLS(90), PERMLS(90), RELS(90), RNELS(90), RPRMLS(90)  02783200
ISN 0091          COMMON   SUPLSS(90), TABL3, TABL4, TAPL8, TRCNLS(2,90)           02783300
ISN 0092          COMMON   TRDELS(2,90), TSAALS(90), TYPLS, VOLLSS(90)             02783400
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 02783500
ISN 0093          COMMON   TRNNLS                                                  02783600
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT  02783700
                C    (LMLSEG X 2*LMTRSG)                                          02783800
ISN 0094          COMMON   TRNDLS(90,16)                                           02783900
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                02784000
ISN 0095          COMMON   AGVS(60), AVS(60), EXVGVS, FDIRVS(60), FPMXVS(60)       02784100
ISN 0096          COMMON   FPMNVS(60), FTOEVS, FTONVS, FTYPVS, LVS, LVSS           02784200
ISN 0097          COMMON   NAMVS(60,9), RNEPVS(60), RXEPVS(60), NUMVS, REVS(60)    02784300
ISN 0098          COMMON   RNEVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS  02784400
ISN 0099          COMMON   VOLVSS(60), VOMXVS(60)                                  02784500
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)   02784600
ISN 0100          COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTESS(300)      02784700
ISN 0101          COMMON   EMHBSS(300), EMHESS(300), FBSS(300), FESS(300)          02784800
ISN 0102          COMMON   FLOBSS(300), FLOESS(300), HRMN(300), HRMX(300)          02784900
ISN 0103          COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)      02785000
ISN 0104          COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDR(300)       02785100
ISN 0105          COMMON   MNTWR(300), MXHR(300), MXTDR(300), MXTWR(300)           02785200
ISN 0106          COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)      02785300
ISN 0107          COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDRSS(300)       02785400
ISN 0108          COMMON   STDNSS(300), STDPSS(300), STWRSS(300), TABL7, TDBSS(300) 02785500
ISN 0109          COMMON   TDBMN(300), TDBMX(300), TSESS(300), TABL44, TTMPSS(300) 02785600
ISN 0110          COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)          02785700
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                             02785800
ISN 0111          COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)          02785900
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)             02786000
ISN 0112          COMMON   ITNLSS                                                  02786100
                C  ZONE CLUSTER VARIABLES                                         02786200
ISN 0113          COMMON   TYPCL                                                   02786300
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                      02786400
ISN 0114          COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)     02786500
ISN 0115          COMMON   AV(3), CDRVOV(3), CDEVOV(3), CHPR1V(3), CHPR2V(3)       02786600
ISN 0116          COMMON   CCAMP(3,4), CCAMPL(3,6), CCATEV(3), CCBTEV(3), CCRMV(3,3) 02786700
ISN 0117          COMMON   CCTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)     02786800
ISN 0118          COMMON   DIACCV(3), DIDCCV(3), EMISAC(3), EMISDC(3), LAMDAV, LHREV 02786900
ISN 0119          COMMON   LV, MCPCAV, MCPCDV, MOTORV, NCARV, NOPIV(3), NPCARV     02787000
ISN 0120          COMMON   PER3V(3), RECENV(3)                                     02787100
ISN 0121          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHPEV(3), SLOPEV(3) 02787200
ISN 0122          COMMON   SP1(3), SP2(3), SPE1M(3), SRE2M(3), TESP1(3)           02787300
ISN 0123          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)  02787400
                C   UNDERPLATFORM EXHAUST VARIABLES                               02787500
ISN 0124          COMMON   EESUX, EEMUX, OPTLX, UMAXUX                            02787600
                C  ROUTE VARIABLES  ( LMTRRT )                                    02787700
ISN 0125          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                     02787800
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )     02787900
ISN 0126          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NPTRGR, NTIMTR(6)         02788000
ISN 0127          COMMON   NTRGR, NUMPTR                                           02788100
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                 02788200
ISN 0128          COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                02788300
ISN 0129          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                      02788400
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )    02788500
ISN 0130          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV             02788600
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                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                                        02788700
ISN 0131            COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDGV(30), DPV, DRAGV(30)           02788800
ISN 0132            COMMON   DUDTV(30), INDEX, IRUTEV, ITYPV, MODEV, NTSV                       02788900
ISN 0133            COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)                02789000
ISN 0134            COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30)           02789100
ISN 0135            COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV              02789200
ISN 0136            COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)                   02789300
                C  FAN TYPE VARIABLES  ( LMFNTP )                                               02789400
ISN 0137            COMMON   CFMRFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)              02789500
ISN 0138            COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)              02789600
ISN 0139            COMMON   T(MFT(4)                                                           02789700
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                       02789800
ISN 0140            COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)                02789900
                C  PATRON CHARACTERISTICS                                                       02790000
ISN 0141            COMMON   PATWHT                                                             02790100
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                            02790200
ISN 0142            COMMON   GINTPR, GRABBP, GRSUM, NPRGR                                       02790300
                C                                                                               02790400
ISN 0143            EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                                       02790500
                C                                                                               02790600
                C                                                                               02790700
                C                                                                               02790800
ISN 0144          20 FORMAT( 8F10.2 )                                                           02790900
ISN 0145          21 FORMAT( 2F10.2, 9A4 )                                                      02791000
ISN 0146          50 FORMAT(1H0,' INPUT VERIFICATION FOR VENTILATION SHAFT',                    02791100
                    1  I5,' -',I3,T57,9A4,T113,'FORM 5A' )                                     02791200
ISN 0147          52 FORMAT(1H0,' SECTION TYPE',T80,I14,T97,'(VENTILATION SHAFT)' )             02791300
ISN 0148          53 FORMAT(1H0,' SECTION TYPE',T80,I14,T97,'(STAIRWAY)' )                      02791400
ISN 0149          56 FORMAT(1H0,' NUMBER OF SEGMENTS IN THIS VENT SHAFT', T80,I14,T113,02791500
                    1'FORM 5B')                                                                 02791600
ISN 0150          57 FORMAT(1H0,' NUMBER OF SUBSEGMENTS IN RESULTING EQUIVALENT VENT SH02791700
                    1AFT',  T80,I14 )                                                           02791800
ISN 0151          58 FORMAT(1H0,' GRATE FREE AREA',T80,F14.1,T97,'SQ FT')                       02791900
ISN 0152          59 FORMAT(1H0,' DESIGN MAXIMUM OUTFLOW AIR VELOCITY AT GRATE',               02792000
                    1  T80,F14.0,T97,'FPM'   )                                                02792100
ISN 0153          61 FORMAT(1H0,' WALL SURFACE TEMPERATURE', T80,F14.1,T97,'DEG F' )            02792200
ISN 0154          62 FORMAT(1H0,' INITIAL AIR DRY-BULB TEMPERATURE',T80,F14.1,                  02792300
                    1  T97,'DEG F' )                                                          02792400
ISN 0155          63 FORMAT(1H0,' INITIAL AIR WET-BULB TEMPERATURE',T80,F14.1,                 02792500
                    2  T97,'DEG F' )                                                          02792600
ISN 0156          64 FORMAT(1H0,' STACK HEIGHT',T80,F14.1,T97,'FT' )                            02792700
ISN 0157          65 FORMAT(1H0,' FAN TYPE',T80,I14,T113,'FORM 5C')                             02792800
ISN 0158          66 FORMAT(1H0,' FAN TYPE',T80,I14,T97,'(NO FAN)',T113,'FORM 5C')              02792900
ISN 0159          68 FORMAT(1H0,' SIMULATION TIME AFTER WHICH FAN SWITCHES ON',                 02793000
                    1  T80,I14,T97,'SECONDS' )                                                02793100
ISN 0160          69 FORMAT(1H0,' SIMULATION TIME AFTER WHICH FAN SWITCHES OFF',                02793200
                    1  T80,I14,T97,'SECONDS' )                                                02793300
ISN 0161          70 FORMAT(1H0,' DIRECTION OF FAN OPERATION',T80,I14,                          02793400
                    1  T97,'(OUTFLOW OR EXHAUST)' )                                           02793500
ISN 0162          71 FORMAT(1H0,' DIRECTION OF FAN OPERATION',T80,I14,                          02793600
                    1  T97,'(INFLOW OR SUPPLY)' )                                             02793700
ISN 0163          75 FORMAT(1H0,' SEGMENT CHARACTERISTICS',T113,'FORM 5D'/                      02793800
                    1  T70,'SEGMENT TOTAL HEAD LOSS COEFFICIENTS' //                          02793900
                    2  T18,'LENGTH',T34,'AREA',T47,'PERIMETER',T66,'FORWARD',                  02794000
                    3  T77,'FORWARD',T91,'BACKWARD',T102,'BACKWARD' /                         02794100
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                4  T19,'(FT)',T33,'(SQ FT)',T50,'(FT)',T66,'POSITIVE',                02794200
                5  T77,'NEGATIVE',T91,'POSITIVE',T102,'NEGATIVE' /)                   02794300
ISN 0164       77 FORMAT( T7,I4,F12.1,F15.1,F15.1,F19.2,F11.2,F14.2,F11.2 )          02794400
ISN 0165       80 FORMAT(1HO,' EQUIVALENT VENTILATION SHAFT PROPERTIES' /            02794500
                1  1HO,T2,'LENGTH',T25,F11.1,3X,'FT',                               02794600
                2  T67,'TOTAL HEAD CHANGE COEFFICIENTS' /                           02794700
                3  1HO,T8,'AREA',T25,F11.1,3X,'SQ FT',T60,'POSITIVE FLOW',F15.2/    02794800
                4  1HO,T8,'PERIMETER',T25,F11.1,3X,'FT',T60,'NEGATIVE FLOW'F15.2)   02794900
              C                                                                      02795000
              C     INPUT FORM 5A                                                    02795100
              C                                                                      02795200
ISN 0166            READ(IN,21) DUMY1, DUMY2, (NAMVS(IVS,J),J=1,9)                   02795300
ISN 0167            NUMY1=DUMY1                                                      02795400
ISN 0168            NUMVS(IVS)=NUMY1                                                 02795500
ISN 0169            TYPVS(IVS) = DUMY2                                               02795600
ISN 0170            ISCT = NLSEC + IVS                                               02795700
ISN 0171            ISCTX = TABL11( ISCT )                                           02795800
ISN 0172            WRITE(OUT,50) ISCTX, NUMY1, (NAMVS(IVS,J),J=1,9)                 02795900
ISN 0173            CALL CHECKI( NUMY1, 1, 999, 149 )                                02796000
              C---- CHECK FOR DUPLICATE I.D. NUMBERS                                02796100
ISN 0174            NUMY1 = IVS - 1                                                  02796200
ISN 0175            IF( NUMY1 ) 104,104,101                                          02796300
ISN 0176      101 DO  103  J = 1, NUMY1                                              02796400
ISN 0177            IF( NUMVS(J) - NUMVS(IVS) ) 103,102,103                          02796500
ISN 0178      102 CALL ERROR( 162 )                                                  02796600
ISN 0179      103 CONTINUE                                                           02796700
ISN 0180      104 DO  1042  J=1,NLS                                                  02796800
ISN 0181            IF( NUMLS(J) - NUMVS(IVS) ) 1042,1041,1042                       02796900
ISN 0182     1041 CALL ERROR( 162 )                                                  02797000
ISN 0183     1042 CONTINUE                                                           02797100
ISN 0184            IF( TYPVS(IVS) ) 108,108,105                                     02797200
ISN 0185      105 IF( TYPVS(IVS) - 2 ) 106,107,108                                   02797300
ISN 0186      106 WRITE(OUT,52) TYPVS(IVS)                                           02797400
ISN 0187            GO TO 110                                                        02797500
ISN 0188      107 WRITE(OUT,53) TYPVS(IVS)                                           02797600
ISN 0189            GO TO 110                                                        02797700
ISN 0190      108 WRITE(OUT,52) TYPVS(IVS)                                           02797800
ISN 0191            CALL ERROR( 167 )                                                02797900
ISN 0192            TYPVS(IVS) = 1                                                   02798000
              C                                                                      02798100
              C     INPUT FORM 5B                                                    02798200
              C                                                                      02798300
ISN 0193      110 READ(IN,20) DUMY1,DUMY2,AGVS(IVS),VCMXVS(IVS),DUMY3,DUMY4,         02798400
                1  DUMY5, STAKVS(IVS)                                               02798500
ISN 0194            NVSEG = DUMY1                                                    02798600
ISN 0195            WRITE(OUT,56) NVSEG                                              02798700
ISN 0196            IF( NVSEG ) 111,111,112                                          02798800
ISN 0197      111 CALL ERROR( 172 )                                                  02798900
ISN 0198            GO TO 990                                                        02799000
ISN 0199      112 NSS = DUMY2                                                        02799100
ISN 0200            WRITE(OUT,57) NSS                                                02799200
ISN 0201            CALL CHECKI( NSS, 1, LMSS, 42 )                                  02799300
              C---- ASSIGN SUBSEGMENT LOCATIONS                                     02799400
ISN 0202            ISSL = INSS + 1                                                  02799500
ISN 0203            TABL5(IVS) = ISSL                                                02799600
```

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ISN 0204            TNSS = TASS + NSS                                        02799700
ISN 0205            TABL6(IVS) = TNSS                                        02799800
ISN 0206            DO 114 ISS = ISSL,TASS                                   02799900
ISN 0207          114 TABL7(ISS) = -IVS                                      02800000
ISN 0208            CALL CHECKI( TNSS, 1, LMSS, 43 )                         02800100
ISN 0209            GO TO ( 990, 120 ), NE                                   02800200
ISN 0210          120 WRITE(IOUT,58) AGVS(IVS)                               02800300
ISN 0211            CALL CHECKR( AGVS(IVS), 3.0, 3000.0, 38 )                02800400
ISN 0212            WRITE(IOUT,59) VOMXVSI(IVS)                              02800500
ISN 0213            CALL CHECKR( VOMXVSI(IVS), 0.0, 6000.0, 169 )            02800600
ISN 0214            VOMXVSI(IVS) = VOMXVS(IVS) / 60.0                        02800700
ISN 0215            WRITE(IOUT,61) DUMY3                                     02800800
ISN 0216            CALL CHECKR(DUMY3,0.0,130.0,23)                          02800900
ISN 0217            WRITE(IOUT,62) DUMY4                                     02801000
ISN 0218            CALL CHECKR( DUMY4, 0.0, 130.0, 24 )                     02801100
ISN 0219            WRITE(IOUT,63) DUMY5                                     02801200
ISN 0220            CALL CHECKR( DUMY5, 0.0, DUMY4, 25 )                     02801300
ISN 0221            WRITE(IOUT,64) STAKVS(IVS)                               02801400
ISN 0222            CALL CHECKR( STAKVS(IVS), 0.0, 1000.0, 37 )              02801500
ISN 0223            CALL LATENT( DUMY4, DUMY5, DUMY6 )                       02801600
                  C---- LOOP OVER SUBSEGMENTS IN VENT SHAFT                  02801700
ISN 0224            DO 130 ISS = ISSL, TASS                                  02801800
ISN 0225            QERTSS(ISS) = 0.0                                        02801900
ISN 0226            QERHSS(ISS) = 0.0                                        02802000
ISN 0227            LHLTSSI(ISS) = 0.0                                       02802100
ISN 0228            SHLTSS(ISS) = 0.0                                        02802200
ISN 0229            SHUXSS(ISS) = 0.0                                        02802210
ISN 0230            FFSSI(ISS) = 0.0                                         02802220
ISN 0231            FBSS(ISS) = 0.0                                          02802230
ISN 0232            HTRNSSI(ISS) = 0.0                                       02802240
ISN 0233            TSFSS(ISS) = DUMY3                                       02802300
ISN 0234            TDBSS(ISS) = DUMY4                                       02802400
ISN 0235            TTMPSS(ISS) = DUMY4                                      02802500
ISN 0236            TWBSS(ISS) = DUMY5                                       02802600
ISN 0237            HUMSSI(ISS) = DUMY6                                      02802700
ISN 0238          130 HTMPSS(ISS) = DUMY6                                    02802800
                  C                                                          02802900
                  C---- FAN INFORMATION                FORM 5C               02803000
ISN 0239            IF( NFNTYP ) 151,151,132                                 02803100
ISN 0240          132 READIN,20) DUMY1,DUMY2,DUMY3,DUMY4                     02803200
ISN 0241            FTYPVS(IVS) = DUMY1                                      02803300
ISN 0242            IF( FTYPVSI(IVS) ) 155,150,155                           02803400
ISN 0243          150 WRITE(IOUT,66) FTYPVS(IVS)                             02803500
ISN 0244          151 FTYPVS(IVS) = 0                                        02803600
ISN 0245            FDIRVSI(IVS) = 0.0                                       02803700
ISN 0246            FTONVSI(IVS) = 0                                         02803800
ISN 0247            FTOFVS(IVS) = 0                                          02803900
ISN 0248            GO TO 170                                                02804000
ISN 0249          155 WRITE(IOUT,65) FTYPVS(IVS)                             02804100
ISN 0250            IF( FTYPVS(IVS) - NFNTYP ) 157,157,156                   02804200
ISN 0251          156 CALL ERROR( 170 )                                      02804300
ISN 0252          157 IF( TYPVSI(IVS) - 2 ) 160,158,160                      02804400
ISN 0253          158 CALL ERROR( 171 )                                      02804500
ISN 0254          160 FTONVSI(IVS) = DUMY2                                   02804600
ISN 0255            FTOFVS(IVS) = DUMY3                                      02804700
```

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ISN 0256            WRITE(OUT,68) FTONVS(IVS)                                    02804800
ISN 0257            WRITE(OUT,69) FTOFVS(IVS)                                    02804900
ISN 0258            IF( FTONVS(IVS) - FTOFVS(IVS) ) 164,164,161                  02805000
ISN 0259          161 CALL ERROR( 76 )                                           02805100
ISN 0260          164 FTONVS(IVS) = FTONVS(IVS) * 100 + 1                        02805200
ISN 0261            FTOFVS(IVS) = FTOFVS(IVS) * 100                              02805300
ISN 0262            NUMY1 = DUMY4                                                02805400
ISN 0263            IF( NUMY1 ) 166,165,165                                      02805500
ISN 0264          165 WRITE(OUT,70) NUMY1                                        02805600
ISN 0265            FDIRVS(IVS) = 1.0                                            02805700
ISN 0266            GO TO 167                                                    02805800
ISN 0267          166 WRITE(OUT,71) NUMY1                                        02805900
ISN 0268            FDIRVS(IVS) = -1.0                                           02806000
                  C---- DETERMINE SIGN OF OUTFLOW OR EXHAUST                     02806100
ISN 0269          167 NODE = TABL12( ISCT )                                      02806200
ISN 0270            IF( TABL16( NODE ) - 1 ) 170,168,170                         02806300
                  C --  BACKWARD END IS CONNECTED TO ATMOSPHERE - REVERSE DIRECTION SIGN  02806400
ISN 0271          168 FDIRVS(IVS) = - FDIRVS(IVS)                                02806500
                  C                                                            02806600
                  C---- SEGMENT CHARACTERISITCS - COMPUTE EQUIVALENT VENT SHAFT   FORM 5D C2806700
ISN 0272          170 WRITE(OUT,75)                                              02806800
ISN 0273            CEPS(ISCT) = 0.0                                             02806900
ISN 0274            CENS(ISCT) = 0.0                                             02807000
ISN 0275            X3 = 0.0                                                     02807100
ISN 0276            X4 = 0.0                                                     02807200
ISN 0277            X5 = 0.0                                                     02807300
ISN 0278            X6 = 0.0                                                     02807400
                  C---- READ SEGMENT PROPERTIES AND COMPUTE SUMMATIONS            02807500
ISN 0279            DO  240  ISEG = 1, NVSEG                                     02807600
ISN 0280            READ(IN,20) DUMY1,DUMY2, DUMY3, DUMY4, DUMY5, DUMY6, DUMY7   02807700
ISN 0281            WRITE(OUT,77) ISEG,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7 02807800
                  C --  LENGTH                                                   02807900
ISN 0282            CALL CHECKR( DUMY1, 0.0, 2000.0, 40 )                        02808000
                  C --  AREA                                                     02808100
ISN 0283            CALL CHECKR( DUMY2, 3.0, 3000.0, 38 )                        02808200
                  C --  PERIMETER                                               02808300
ISN 0284            CALL CHECKP( DUMY3, 5.0, 500.0, 39 )                         02808400
                  C --  FORWARD POSITIVE                                        02808500
ISN 0285            CALL CHECKP( DUMY4, 0.0, 300.0, 28 )                         02808600
                  C --  FORWARD NEGATIVE                                        02808700
ISN 0286            CALL CHECKR( DUMY5, 0.0, 300.0, 28 )                         02808800
                  C --  BACKWARD POSITIVE                                       02808900
ISN 0287            CALL CHECKR( DUMY6, 0.0, 300.0, 28 )                         02809000
                  C --  BACKWARD NEGATIVE                                       02809100
ISN 0288            CALL CHECKR( DUMY7, 0.0, 300.0, 28 )                         02809200
ISN 0289            DUMY8 = (4.0*PI*DUMY2)**0.5                                  02809300
ISN 0290            IF( DUMY3 - DUMY8 ) 153,180,180                              02809400
ISN 0291          153 CALL ERROR( 70 )                                           02809500
                  C                                                            02809600
ISN 0292          180 IF(ISEG-1) 185,185,190                                     02809700
ISN 0293          185 ALONGS(ISCT) = DUMY2                                       02809800
ISN 0294          190 IF(NVSEG-ISEG) 195,195,200                                 02809900
ISN 0295          195 AHIGHS(ISCT) = DUMY2                                       02810000
ISN 0296          200 CEPS(ISCT) = CEPS(ISCT) + 0.25 * (DUMY4 + DUMY6) / (DUMY2 * DUMY2)02810100
ISN 0297            CENS(ISCT) = CENS(ISCT) + 0.25 * (DUMY5 + DUMY7) / (DUMY2 * DUMY2)02810200
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                C***** SUM OF L OVER A                                                  02810300
ISN 0298              X3 = X3 + DUMY1/DUMY2                                             02810400
                C --  SUM OF SURFACE AREA                                              02810500
ISN 0299              X4 = X4 + DUMY1 * DUMY3                                           02810600
                C --  SUM OF VOLUME                                                    02810700
ISN 0300              X5 = X5 + DUMY1 * DUMY2                                           02810800
                C*****SUM OF LENGTHS                                                    02810900
ISN 0301        240   X6 = X6 + DUMY1                                                  02811000
ISN 0302              AVS(IVS) = SQRT(X5/X3)                                            02811100
ISN 0303              LVS(IVS) = SQRT(X5*X3)                                            02811200
ISN 0304              BS(ISCT) = X3                                                     02811300
ISN 0305              BCS(ISCT)=BS(ISCT)                                                02811400
ISN 0306              PERIM = X4 / LVS(IVS)                                             02811500
ISN 0307              RNEVS(IVS)=4.0*RHOMAS/(PERIM*VISAIR)                              02811600
ISN 0308              DUMY1=4.0*AVS(IVS)*AVS(IVS)*CEPS(ISCT)                            02811700
ISN 0309              DUMY2=4.0*AVS(IVS)*AVS(IVS)*CENS(ISCT)                            02811800
ISN 0310              WRITE(OUT,80) LVS(IVS),AVS(IVS),DUMY1,PERIM,DUMY2                 02811900
ISN 0311              VOLVSS(IVS) = X5 / FLOAT( NSS )                                   02812000
ISN 0312              SURVSS(IVS) = X4 / FLOAT( NSS )                                   02812100
                C---- CHECK IF STACK HEIGHT EXCEEDS SUM OF INDIVIDUAL LENGTHS          02812200
ISN 0313              IF( STAKVS(IVS) - X6 ) 255,255,250                                02812300
ISN 0314        250   CALL EPROR( 173 )                                               02812400
ISN 0315        255   STAKVS(IVS)=STAKVS(IVS)*GRACC                                   02812500
ISN 0316              LVSS(IVS)=LVS(IVS)/NSS                                            02812600
ISN 0317              CALL CHECKR(X6,10.0,2000.0,190)                                   02812700
ISN 0318        990   RETURN                                                          02812800
ISN 0319              END                                                               02812900
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         COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                            SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002           SUBROUTINE INPUT                                                01029400
                 C                                                                 01029500
                 C     THIS SUBROUTINE CONTROLS THE READING,CHECKING, AND INPUT    01029600
                 C     VERIFICATION OF ALL THE INPUT DATA. SOME DATA IS READ BY THIS 01029700
                 C     SUBROUTINE, AND SOME IS READ BY OTHER SUBROUTINES WHICH READ 01029800
                 C     CERTAIN ITEMS OF DATA. THESE ARE -                          01029900
                 C               LSINS  - LINE SEGMENT INPUT SUBROUTINE            01030000
                 C               VSINS  - VENTILATION SHAFT INPUT SUBROUTINE       01030100
                 C               TRINS  - TRAIN ROUTE INPUT SUBROUTINE             01030200
                 C               GARAGE - TRAIN 'TYPE' INPUT SUBROUTINE            01030300
                 C                                                                 01030400
                 C     OTHER SUBROUTINES WHICH ARE USED ARE -                      01030500
                 C               CHECKI - CHECKS INTEGER VARIABLE BETWEEN TWO LIMITS 01030600
                 C               CHECKR - CHECKS REAL VARIABLE BETWEEN TWO LIMITS  01030700
                 C               ERROR  - WRITES ERROR MESSAGES                    01030800
                 C                                                                 01030900
                 C                                                                 01031000
ISN 0003           DIMENSION    MONTHS(2,12), NUMMY1(18)                          01031100
ISN 0004           DIMENSION    DUMMY1(8), NUMMY2(8),NUMMY3(8),NUMMY4(8),NUMMY5(8) 01031200
                 C                                                                 01031300
                 C                                                                 01031400
                 C     INCLUDE  DSHARE                                             01031500
                 C                                                                 01031600
                 C ************************ INTEGER VARIABLES ************************ C01031700
                 C                                                                 01031800
                 C  GENERAL VARIABLES                                              01031900
ISN 0005           INTEGER   AFTIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, ESCFT  01032000
ISN 0006           INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      01032100
ISN 0007           INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 01032200
                 C  SECTION VARIABLES  (LMSECT)                                    01032300
ISN 0008           INTEGER   NTOPS(140)                                            01032400
ISN 0009           INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)     01032500
ISN 0010           INTEGER   TABL13(140), TABL20(140), TABL21(140)                 01032600
                 C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)01032700
ISN 0011           INTEGER   ND(140), NDS(141), NDSS(142)                          01032800
                 C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 01032900
ISN 0012           INTEGER   LKAN(420)                                             01033000
                 C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)             01033100
ISN 0013           INTEGER   TABL14(400)                                           01033200
                 C  NODE VARIABLES  (LMNODE)                                       01033300
ISN 0014           INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)     01033400
ISN 0015           INTEGER   TABL23(132), TABL45(130), TYPTND(130)                 01033500
                 C  AERODYNAMIC NODE VARIABLES (LMTBL2)                            01033600
ISN 0016           INTEGER   TABL2(1500)                                           01033700
                 C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 01033800
ISN 0017           INTEGER   TABL17(130,5), TABL18(130,5)                          01033900
                 C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                01034000
ISN 0018           INTEGER   TABL19(400)                                           01034100
                 C  LOOP VARIABLES  (LMNLOP)                                       01034200
                 C  LINE SEGMENT VARIABLES  (LMLSEG)                               01034300
ISN 0019           INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 01034400
ISN 0020           INTEGER   TYPLS(90)                                             01034500
                 C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 01034600
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ISN 0021            INTEGER   TRNDLS(90,8)                                                    01034700
                C   VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                        01034800
ISN 0022            INTEGER   FTOEVS(60), FTONVS(60), NUMVS(60)                              01034900
ISN 0023            INTEGER   TABL4(60), ITYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60)       01035000
                C   SUBSEGMENT VARIABLES  (LMSS)                                            01035100
ISN 0024            INTEGER   TABL7(300), TABL44(300)                                        01035200
                C   LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                      01035300
ISN 0025            INTEGER   EXDTOB(250,6)                                                  01035400
                C     LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                      01035500
ISN 0026            INTEGER   ITNLSS(250,6)                                                  01035600
                C   HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                      01035700
ISN 0027            INTEGER   TYPCL(30)                                                      01035800
                C   SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                                 01035900
ISN 0028            INTEGER   NCARV(3), NPCARV(3)                                            01036000
                C   UNDERPLATFORM EXHAUST VARIABLES                                         01036100
ISN 0029            INTEGER   OPTUX                                                          01036200
                C   ROUTE VARIABLES  (LMTRRT)                                               01036300
ISN 0030            INTEGER   COPTRT(6), NTSRT(6)                                            01036400
                C     DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)                    01036500
ISN 0031            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)                    01036600
ISN 0032            INTEGER   NTRGR(15,6)                                                    01036700
ISN 0033            INTEGER   GRNDWY(15,6)                                                   01036800
                C     TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                             01036900
ISN 0034            INTEGER   DWLTS(260,6)                                                   01037000
ISN 0035            INTEGER   NPETTS(260,6), NSEGTS(260,6)                                   01037100
                C     EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)                01037200
ISN 0036            INTEGER   NEXPDP(6)                                                      01037300
ISN 0037            INTEGER   TIMEV(201,6)                                                   01037400
                C   OPERATIONAL TRAIN VARIABLES  (LMTRAN)                                   01037500
ISN 0038            INTEGER   OPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)           01037600
ISN 0039            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                                 01037700
ISN 0040            INTEGER   TLPSV(30), TSTRTV(30)                                          01037800
                C   FAN TYPE VARIABLES  (LMFNTP)                                           01037900
                C   UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                 01038000
ISN 0041            INTEGER   LSSUL(10)                                                      01038100
                C   PRINT GROUP VARIABLES  ( LMPRGP )                                      01038200
ISN 0042            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)                   01038300
                C                                                                           01038400
                C ************************** REAL VARIABLES ************************** C01038500
                C                                                                           01038600
                C   GENERAL VARIABLES                                                       01038700
ISN 0043            REAL      NUAIR, MPHFPS                                              01038800
                C   SECTION VARIABLES                                                       01038900
                C   NODE VARIABLES                                                        01039000
                C   LOOP VARIABLES                                                        01039100
                C   LINE SEGMENT VARIABLES                                                01039200
ISN 0044            REAL      LLS(90), LLSS(90)                                          01039300
                C   VENTILATION SHAFT SEGMENT VARIABLES                                   01039400
ISN 0045            REAL      LVS(60), LVSS(60)                                          01039500
                C   SUBSEGMENT VARIABLES                                                  01039600
ISN 0046            REAL      LHLTSS(300), LSUMSS(300)                                   01039700
                C   LINE SUBSEGMENT VARIABLES                                             01039800
ISN 0047            REAL      LACLSS(250), LHLSS(250)                                    01039900
                C   ZONE VARIABLES                                                        01040000
                C   SUBWAY VEHICLE TYPE VARIABLES                                         01040100
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ISN 0048          REAL     LAMDAV(3), LHPEV(3), LV(3), MCPGAV(3), MCPGDV(3)          01040200
ISN 0049          REAL     MOTORV(3)                                                 01040300
                  C  ROUTE VARIABLES                                                 01040400
                  C    DISPATCHER VARIABLES                                          01040500
                  C    TRACK SECTION VARIABLES                                       01040600
                  C    EXPLICIT TRAIN PERFORMANCE VARIABLES                          01040700
                  C  OPERATIONAL TRAIN VARIABLES                                     01040800
                  C  FAN TYPE VARIABLES                                              01040900
                  C  PRINT GROUP VARIABLES                                           01041000
                  C                                                                  01041100
                  C ********************************* COMMON ********************************* C01041200
                  C                                                                  01041300
                  C GENERAL VARIABLES                                                01041400
ISN 0050          COMMON  AFTIME, ANNAMP, BLANK, BLPREC, DATE, DEATH                 01041500
ISN 0051          COMMON  DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, ESCFT     01041600
ISN 0052          COMMON  HCOPT, HMAMBF, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT         01041700
ISN 0053          COMMON  IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR   01041800
ISN 0054          COMMON  KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE   01041900
ISN 0055          COMMON  LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT   01042000
ISN 0056          COMMON  NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE      01042100
ISN 0057          COMMON  NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER         01042200
ISN 0058          COMMON  NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC         01042300
ISN 0059          COMMON  NZONE, OUT, PAMB, PRTIME, SLASH                            01042400
ISN 0060          COMMON  SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDRAMB               01042500
ISN 0061          COMMON  THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE  01042600
ISN 0062          COMMON  TWAMBM, WNTSUP                                             01042700
                  C  ARRAY SIZE LIMITS                                               01042800
ISN 0063          COMMON  LMBLP,LMCLST,LMCOND,LMFORM, LMEXPD, LMENTP, LMLPK, LMLPLK  01042900
ISN 0064          COMMON  LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND      01043000
ISN 0065          COMMON  LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LNTHND, LMTRAN       01043100
ISN 0066          COMMON  LMTEGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG       01043200
                  C  PHYSICAL CONSTANTS                                              01043300
ISN 0067          COMMON  AETEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC     01043400
ISN 0068          COMMON  HVH2O, MPHFPS, NUAIR, PI, PR, RORYAR, RHOCP, RHOMAS        01043500
ISN 0069          COMMON  RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR        01043600
ISN 0070          COMMON  WGCONS, WTBTUS                                             01043700
                  C  SECTION VARIABLES  ( LMSECT )                                   01043800
ISN 0071          COMMON  AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)      01043900
ISN 0072          COMMON  CFNS(140), DODTS(140), MNOS(140), MXOS(140), NTOPS         01044000
ISN 0073          COMMON  OMEGS(140), OS(140), OSAVES(140), OSMX(140), OSMN(140)     01044100
ISN 0074          COMMON  SUMQNS(140), SUMOPS(140), TABL9, TABL10, TABL11, TABL12    01044200
ISN 0075          COMMON  TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)            01044300
                  C    SECTION + TWO  (LMSECT+2)                                     01044400
ISN 0076          COMMON  NDSS                                                       01044500
                  C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  01044600
ISN 0077          COMMON  LKAN                                                       01044700
                  C    SECTION EXTERNAL IDENTIFICATION NUMBERS                       01044800
ISN 0078          COMMON  TABL14                                                     01044900
                  C  NODE VARIABLES  ( LMNODE )                                      01045000
ISN 0079          COMMON  TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23       01045100
ISN 0080          COMMON  TABL45, TYPTND                                             01045200
                  C    NODE EXTERNAL IDENTIFICATION NUMBERS                          01045300
ISN 0081          COMMON  TABL19                                                     01045400
                  C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                            01045500
ISN 0082          COMMON  TABL2                                                      01045600
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                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          01045700
ISN 0083            COMMON   COAEND(950)                                                01045800
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              01045900
ISN 0084            COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)           01046000
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       01046100
                C    ( LMTHND X LMSCND )                                                01046200
ISN 0085            COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)                01046300
                C  LOOP VARIABLES  ( LMNLCP )                                            01046400
ISN 0086            COMMON   DQDTLP(75), QMFGLP(75), QERRLP(75), QLP(75)                01046500
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          01046600
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 01046700
ISN 0087            COMMON   BLP(10CC)                                                  01046800
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    01046900
ISN 0088            COMMON   ALS(90), CILS(90), CBNLS(90), CRPLS(90), CFNLS(90)         01047000
ISN 0089            COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90)   01047100
ISN 0090            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), FDSLS(90), FFFLS(90)   01047200
ISN 0091            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS             01047300
ISN 0092            COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)    01047400
ISN 0093            COMMON   SUPLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)             01047500
ISN 0094            COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              01047600
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 01047700
ISN 0095            COMMON   TRNNLS                                                     01047800
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       01047900
                C    (LMLSEG X 2*LMTRSG)                                                01048000
ISN 0096            COMMON   TRNDLS(90,16)                                              01048100
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                       01048200
ISN 0097            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)          01048300
ISN 0098            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS              01048400
ISN 0099            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      01048500
ISN 0100            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    01048600
ISN 0101            COMMON   VOLVSS(60), VOMXVS(60)                                   01048700
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)         01048800
ISN 0102            COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)         01048900
ISN 0103            COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)             01049000
ISN 0104            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)            01049100
ISN 0105            COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)        01049200
ISN 0106            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)         01049300
ISN 0107            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)             01049400
ISN 0108            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)        01049500
ISN 0109            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)        01049600
ISN 0110            COMMON   STDUSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)  01049700
ISN 0111            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)   01049800
ISN 0112            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)           01049900
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                    01050000
ISN 0113            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)             01050100
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                   01050200
ISN 0114            COMMON   ITMLSS                                                     01050300
                C  ZONE CLUSTER VARIABLES                                                01050400
ISN 0115            COMMON   TYPCL                                                      01050500
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                             01050600
ISN 0116            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)        01050700
ISN 0117            COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         01050800
ISN 0118            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3) 01050900
ISN 0119            COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)        01051000
ISN 0120            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV 01051100
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ISN 0121            COMMON   LV, MCPGAV, MCPGDV, MOTGRV, NCARV, NOPTV(3), NPCARV      01051200
ISN 0122            COMMON   PER4V(3), RCGENV(3)                                      01051300
ISN 0123            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3, SHREV(3), SLOPEV(3) 01051400
ISN 0124            COMMON   SP1(3), SP2(3), SRE1M(3, SRE2M(3, TESP1(3)               01051500
ISN 0125            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   01051600
                C   UNDERPLATFORM EQUALST VARIABLES                                   01051700
ISN 0126            COMMON   EESUX, EEMUX, OPTGX, UMAXUX                             01051800
                C  ROUTE VARIABLES  ( LMTRRT )                                       01051900
ISN 0127            COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                     01052000
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )        01052100
ISN 0128            COMMON   GRHOWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTINTR(6)         01052200
ISN 0129            COMMON   NTRGR, NUMBTR                                           01052300
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                    01052400
ISN 0130            COMMON   DWLTS, ESTS(260,6), GRDTS(260,6), NPETTS                01052500
ISN 0131            COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                      01052600
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRPT )       01052700
ISN 0132            COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV             01052800
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                           01052900
ISN 0133            COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)01053000
ISN 0134            COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV            01053100
ISN 0135            COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      01053200
ISN 0136            COMMON   QTRPE(30), RGSUMV(30), RMUTV(30), RSISTV(30), TAAVGV(30) 01053300
ISN 0137            COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    01053400
ISN 0138            COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        01053500
                C  FAN TYPE VARIABLES  ( LMFNTP )                                    01053600
ISN 0139            COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)   01053700
ISN 0140            COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)   01053800
ISN 0141            COMMON   TIMFT(4)                                                01053900
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                            01054000
ISN 0142            COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)     01054100
                C  PATRON CHARACTERISTICS                                            01054200
ISN 0143            COMMON   PATWHT                                                  01054300
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                 01054400
ISN 0144            COMMON   GINTPR, GRABBP, GRSUM, NPRGR                            01054500
                C                                                                    01054600
ISN 0145            EQUIVALENCE  (NO(1), NOS(2), NOSS(3))                            01054700
                C                                                                    01054800
                C                                                                    01054900
                C                                                                    01055000
                C                                                                    01055100
ISN 0146            DATA MONTHS /  4HJANU,4HARY ,4HFEBR,4HUARY,4HMARC,4H    ,       01055200
                   1 4HAPRI,4HL    ,4HMAY ,4H     ,4HJUNE,4H     ,4HJULY,4H    ,    01055300
                   2 4HAUGU,4HST  ,4HSEPT,4H,    ,4HOCTO,4HBER ,4HNOVE,4HMBER,      01055400
                   3 4HDECE,4HMBER /                                                 01055500
ISN 0147      10    FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------')  01055600
ISN 0148      20    FORMAT (17A4,A2)                                                 01055700
ISN 0149      30    FORMAT (8F10.2)                                                  01055800
ISN 0150      40    FORMAT (9A4,4X,4F10.2)                                           01055900
ISN 0151      50    FORMAT (1H1,4(/),T45,'TRANSIT DEVELOPMENT CORPORATION',5(/),T49,5(01056000
                   1'X'),3X,7('X'),3X,5('X')/T48,'X',T57,'X',T66,'X'/T49,5('X'),T57,5(01056100
                   2'X')/T67,5('X')/T54,'X',T57,'X',T72,'X'/T54,'X',T57,'X',T72,'X'/T401056200
                   38,6('X'),T57,7('X'),T66,6('X')///T46,'SUBWAY ENVIRONMENT SIMULATI001056300
                   4N',6(/))                                                         01056400
ISN 0152      60    FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                   1/)                                                               01056600
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ISN 0153     70    FORMAT (25X,17A4,A2,////)                                          01056700
ISN 0154     80    FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)             01056800
ISN 0155     90    FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)             01056900
ISN 0156    100    FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PAPSONS, BRINCKER01057000
                   1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                   2/,T97,'VERSION 2.04')                                             01057200  <-- C
ISN 0157    110    FORMAT (1HO,T45,'INPUT VERIFICATION OF GENERAL DATA')              01057300
ISN 0158    120    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                   190,'BYPASS')                                                      01057500
ISN 0159    130    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                   190,'IMPLICIT')                                                    01057700
ISN 0160    140    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                   190,'EXPLICIT (HEAT REJ. COMPUTED)')                               01057900
ISN 0161    150    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                   190,'EXPLICIT (HEAT REJ. INPUT)')                                  01058100
ISN 0162    160    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                   1T90,'BYPASS')                                                     01058300
ISN 0163    170    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                   1T90,'YES')                                                        01058500
ISN 0164    180    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                   1T90,'YES - EVAPORATION')                                          01058700
ISN 0165    190    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RATC1058800
                   110')                                                              01058900
ISN 0166    200    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEMC1059000
                   1PERATURE')                                                        01059100
ISN 0167    210    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                   1IDITY')                                                           01059300
ISN 0168    220    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T800105940C
                   1,I5,T90,'BYPASS')                                                 01059500
ISN 0169    230    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059600
                   1,I5,T90,'YES')                                                    01059700
ISN 0170    240    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059800
                   1,I5,T90,'OFF-HOUR')                                               01059900
ISN 0171    250    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                   1S')                                                               01060100
ISN 0172    260    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173    270    FORMAT (1HO,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)              01060300
ISN 0174    280    FORMAT (1HO,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)              01060400
ISN 0175    290    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                   01060500
ISN 0176    300    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                   1')                                                                01060700
ISN 0177    310    FORMAT (/1HO,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D')  01060800
ISN 0178    320    FORMAT (1HO,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)                 01060900
ISN 0179    330    FORMAT (1HO,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5)     01061000
ISN 0180    340    FORMAT (1HO,T30,'NUMBER OF NODES',T80,I5)                          01061100
ISN 0181    350    FORMAT (1HO,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)             01061200
ISN 0182    360    FORMAT (1HO,T30,'NUMBER OF PORTALS',T80,I5)                        01061300
ISN 0183    370    FORMAT (1HO,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)          01061400
ISN 0184    380    FORMAT (1HO,T30,'NUMBER OF FAN TYPES',T80,I5)                      01061500
ISN 0185    390    FORMAT (1HO,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM 1E')    01061600
ISN 0186    400    FORMAT (1HO,T30,'NUMBER OF TRAIN TYPES',T80,I5)                    01061700
ISN 0187    410    FORMAT (1HO,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5)    01061800
ISN 0188    420    FORMAT (1HO,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)          01061900
ISN 0189    430    FORMAT (1H+,T90,'MEANINGLESS')                                     01062000
ISN 0190    440    FORMAT (1H+,T90,'SIMULATION TERMINATION')                          01062100
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No changes in remaining portion of subroutine INPUT.

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 5 TO VERSION 2

Problem

Items to be printed as part of the optional supplementary output did not print correctly.

Symptoms

The use of supplementary output option number one should cause the output of additional items in the Environmental Control System Load Estimates. Among these items should be the directional components of the sensible and latent convective loads for each subsegment. The program has been printing asterisks for these items.

Correction

See the attached partial listing of Subroutine ACEST2. The three lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any other items.

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      COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                         SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE ACEST2 (TAIR,HRATIO,DTDXLS,DTHXLS,DTWXLS,NBRNCH)      00000100
                    C                                                                 00000200
                    C     THIS SUBROUTINE COMPUTES AN AIR CONDITIONING LOAD ESTIMATE   00000300
                    C     FOR EACH SUBSEGMENT LOCATED IN A TEMPERATURE CONTROLLED ZONE 00000400
                    C                                                                 00000500
                    C DTDXLS(ISEG) IS THE DESIGN DRY BULB TEMPERATURE IN DEG F FOR A  00000600
                    C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG 00000700
                    C        IN THE ZONE.                                             00000800
                    C                                                                 00000900
                    C DTHXLS(ISEG) IS THE DESIGN SPECIFIC HUMIDITY IN DEG F FOR A     00001000
                    C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG 00001100
                    C        IN THE ZONE.                                             00001200
                    C                                                                 00001300
                    C DTWXLS(ISEG) IS THE DESIGN WET BULB TEMPERATURE IN DEG F FOR A  00001400
                    C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG 00001500
                    C        IN THE ZONE.                                             00001600
                    C                                                                 00001700
                    C HRATIO(IZZ) HAS TWO MEANINGS                                    00001800
                    C        1) FOR VALUES OF IZZ FROM 1 TO TNSS, HRATIO(IZZ) IS THE AVERAGE00001900
                    C           SUBSEGMENT AIR SPECIFIC HUMIDITY RATIO FOR SUBSEGEMNT IZZ 00002000
                    C           THAT HAS BEEN COMPUTED BY THE 'DTRH' AS PART OF THE HEAT 00002100
                    C           SINK - AIR CONDITIONING ITERATION. IT IS USED ONLY FOR   00002200
                    C           SUBSEGMENTS IN UNCONTROLLED ZONES SINCE THE SUBSEGMENTS IN 00002300
                    C           CONTROLLED ZONES ARE ASSUMED TO HAVE AVERAGE SPECIFIC    00002400
                    C           HUMIDITY RATIOS EQUAL TO DESIGN.                         00002500
                    C        2) FOR VALUES OF IZZ FROM TNSS+1 TO TNSS+NTNODE, HRATIO(IZZ) IS00002600
                    C           THE AVERAGE MOISTURE LEAVING THERMODYNAMIC NODE IZZ-TNSS (OR00002700
                    C           NODE+TNSS) IN (FT**3)/SEC THAT HAS BEEN COMPUTED BY THE  00002800
                    C           'DTRH' AS PART OF THE HEAT SINK - AIR CONDITIONING ITERATION00002900
                    C           IT IS ONLY USED FOR NODES IN UNCONTROLLED ZONES SINCE ALL 00003000
                    C           OTHER NODES ARE AT DESIGN SPECIFIC HUMIDITY (THOSE INTERIOR 00003100
                    C           TO ZONES) OR ARE AT BOUNDARY SPECIFIC HUMIDITIES.        00003200
                    C                                                                 00003300
                    C TAIR(IZZ) HAS TWO MEANINGS                                      00003400
                    C        1) FOR VALUES OF IZZ FROM 1 TO TNSS, TAIR(IZZ) IS THE AVERAGE 00003500
                    C           SUBSEGMENT AIR TEMPERATURE FOR SUBSEGEMNT IZZ IN DEG F THAT 00003600
                    C           HAS BEEN COMPUTED BY THE 'DTRM' AS PART OF THE HEAT SINK 00003700
                    C           - AIR CONDITIONING ITERATION. IT IS USED ONLY FOR        00003800
                    C           SUBSEGMENTS IN UNCONTROLLED ZONES SINCE THE SUBSEGMENTS IN 00003900
                    C           CONTROLLED ZONES ARE ASSUMED TO HAVE AVERAGE TEMPERATURES 00004000
                    C           EQUAL TO DESIGN.                                         00004100
                    C        2) FOR VALUES OF IZZ FROM TNSS+1 TO TNSS+NTNODE, TAIR(IZZ) IS 00004200
                    C           THE AVERAGE ENERGY LEAVING THERMODYNAMIC NODE IZZ-TNSS (OR 00004300
                    C           NODE+TNSS) IN (FT**3)*(DEG F)/SEC THAT HAS BEEN COMPUTED BY 00004400
                    C           THE 'DTRM' AS PART OF THE HEAT SINK - AIR CONDITIONING 00004500
                    C           ITERATION. IT IS ONLY USED FOR NODES IN UNCONTROLLED ZONES 00004600
                    C           SINCE ALL OTHER NODES ARE AT DESIGN TEMPERATURE (THOSE 00004700
                    C           INTERIOR TO ZONES) OR ARE AT BOUNDARY TEMPERATURES.      00004800
                    C                                                                 00004900
                    C     INCLUDE  DSHARE                                             00005000
                    C                                                                 00005100
                    C ************************ INTEGER VARIABLES ************************ C00005200
                    C                                                                 00005300
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                C  GENERAL VARIABLES                                                    00005400
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT    00005500
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT       00005600
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME  00005700
                C  SECTION VARIABLES  (LMSECT)                                          00005800
ISN 0006            INTEGER   NTOPS(140)                                            00005900
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)     00006000
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                 00006100
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00006200
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                          00006300
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  00006400
ISN 0010            INTEGER   LKAN(420)                                             00006500
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                00006600
ISN 0011            INTEGER   TABL14(400)                                           00006700
                C  NODE VARIABLES  (LMNODE)                                             00006800
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)     00006900
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                 00007000
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                                  00007100
ISN 0014            INTEGER   TABL2(1500)                                           00007200
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  00007300
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                          00007400
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                   00007500
ISN 0016            INTEGER   TABL19(400)                                           00007600
                C  LOOP VARIABLES  (LMNLOP)                                             00007700
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                     00007800
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  00007900
ISN 0018            INTEGER   TYPLS(90)                                             00008000
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)   00008100
ISN 0019            INTEGER   TRNNLS(90,8)                                          00008200
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                    00008300
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     00008400
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 00008500
                C  SUBSEGMENT VARIABLES  (LMSS)                                         00008600
ISN 0022            INTEGER   TABL7(300), TABL44(300)                               00008700
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                   00008800
ISN 0023            INTEGER   EXDTOB(250,6)                                         00008900
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                  00009000
ISN 0024            INTEGER   ITNLSS(250,6)                                         00009100
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                  00009200
ISN 0025            INTEGER   TYPCL(30)                                             00009300
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                              00009400
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                   00009500
                C  UNDERPLATFORM EXHAUST VARIABLES                                      00009600
ISN 0027            INTEGER   OPTUX                                                 00009700
                C  ROUTE VARIABLES  (LMTRRT)                                            00009800
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                   00009900
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)            00010000
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           00010100
ISN 0030            INTEGER   NTRGR(15,6)                                           00010200
ISN 0031            INTEGER   GRHOWY(15,6)                                          00010300
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                     00010400
ISN 0032            INTEGER   DWLTS(260,6)                                          00010500
ISN 0033            INTEGER   NPETTS(260,6), NSEGTS(260,6)                          00010600
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)        00010700
ISN 0034            INTEGER   NEXPOP(6)                                             00010800
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ISN 0035            INTEGER   TIMEV(201,6)                                          00010900
                  C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                          00011000
ISN 0036            INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  00011100
ISN 0037            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                        00011200
ISN 0038            INTEGER   TLPSV(30), TSTRTV(30)                                 00011300
                  C  FAN TYPE VARIABLES  (LMFNTP)                                   00011400
                  C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                         00011500
ISN 0039            INTEGER   LSSUL(10)                                             00011600
                  C  PRINT GROUP VARIABLES  ( LMPRGP )                              00011700
ISN 0040            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)          00011800
                  C                                                                 00011900
                  C ************************** REAL VARIABLES ************************** C00012000
                  C                                                                 00012100
                  C  GENERAL VARIABLES                                              00012200
ISN 0041            REAL      NUAIR, MPHFPS                                       00012300
                  C  SECTION VARIABLES                                              00012400
                  C  NODE VARIABLES                                                 00012500
                  C  LOOP VARIABLES                                                 00012600
                  C  LINE SEGMENT VARIABLES                                         00012700
ISN 0042            REAL      LLS(90), LLSS(90)                                   00012800
                  C  VENTILATION SHAFT SEGMENT VARIABLES                            00012900
ISN 0043            REAL      LVS(60), LVSS(60)                                   00013000
                  C  SUBSEGMENT VARIABLES                                           00013100
ISN 0044            REAL      LHLTSS(300), LSUMSS(300)                            00013200
                  C  LINE SUBSEGMENT VARIABLES                                      00013300
ISN 0045            REAL      LACLSS(250), LHLSS(250)                             00013400
                  C  ZONE VARIABLES                                                 00013500
                  C  SUBWAY VEHICLE TYPE VARIABLES                                  00013600
ISN 0046            REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)    00013700
ISN 0047            REAL      MOTORV(3)                                           00013800
                  C  ROUTE VARIABLES                                                00013900
                  C    DISPATCHER VARIABLES                                         00014000
                  C    TRACK SECTION VARIABLES                                      00014100
                  C    EXPLICIT TRAIN PERFORMANCE VARIABLES                         00014200
                  C  OPERATIONAL TRAIN VARIABLES                                    00014300
                  C  FAN TYPE VARIABLES                                             00014400
                  C  PRINT GROUP VARIABLES                                          00014500
                  C                                                                 00014600
                  C ***************************** COMMON ***************************** C00014700
                  C                                                                 00014800
                  C GENERAL VARIABLES                                               00014900
ISN 0048            COMMON    AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH          00015000
ISN 0049            COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  00015100
ISN 0050            COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT  00015200
ISN 0051            COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 00015300
ISN 0052            COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 00015400
ISN 0053            COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 00015500
ISN 0054            COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE  00015600
ISN 0055            COMMON    NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER  00015700
ISN 0056            COMMON    NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC  00015800
ISN 0057            COMMON    NZONE, OUT, PAMB, PRTIME, SLASH                     00015900
ISN 0058            COMMON    SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB        00016000
ISN 0059            COMMON    THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00016100
ISN 0060            COMMON    TWAMBM, WNTSUM                                      00016200
                  C  ARRAY SIZE LIMITS                                              00016300
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ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK00016400
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    00016500
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMT8L2, LMTHND, LMTRAN     00016600
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG    00016700
                C PHYSICAL CONSTANTS                                               00016800
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC  00016900
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS     00017000
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR     00017100
ISN 0068          COMMON   WGCONS, WTBTUS                                          00017200
                C SECTION VARIABLES  ( LMSECT )                                    00017300
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)   00017400
ISN 0070          COMMON   CFNS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS      00017500
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)  00017600
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 00017700
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)         00017800
                C   SECTION * TWO  (LMSECT*2)                                     00017900
ISN 0074          COMMON   NDSS                                                    00018000
                C   SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 00018100
ISN 0075          COMMON   LKAN                                                    00018200
                C   SECTION EXTERNAL IDENTIFICATION NUMBERS                        00018300
ISN 0076          COMMON   TABL14                                                  00018400
                C NODE VARIABLES  ( LMNODE )                                       00018500
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23   00018600
ISN 0078          COMMON   TABL45, TYPIND                                          00018700
                C   NODE EXTERNAL IDENTIFICATION NUMBERS                          00018800
ISN 0079          COMMON   TABL19                                                  00018900
                C AERODYNAMIC NODE VARIABLES  (LMTBL2)                             00019000
ISN 0080          COMMON   TABL2                                                   00019100
                C AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                     00019200
ISN 0081          COMMON   COAFND(950)                                             00019300
                C THERMODYNAMIC NODE VARIABLES  ( LMTHND ).                        00019400
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)        00019500
                C   THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE  00019600
                C   ( LMTHND X LMSCND )                                            00019700
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)             00019800
                C LOOP VARIABLES  ( LMNLOP )                                       00019900
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)             00020000
                C AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT     00020100
                C APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                            00020200
ISN 0085          COMMON   BLP(1000)                                               00020300
                C LINE SEGMENT VARIABLES  ( LMLSEG )                               00020400
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)      00020500
ISN 0087          COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 00020600
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90) 00020700
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS          00020800
ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90) 00020900
ISN 0091          COMMON   SURLSS(90), TABL3, TABL4, TAPLB, THCNLS(2,90)           00021000
ISN 0092          COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)            00021100
                C   LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 00021200
ISN 0093          COMMON   TRNNLS                                                  00021300
                C   LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT   00021400
                C   (LMLSEG X 2*LMTRSG)                                            00021500
ISN 0094          COMMON   TRNDLS(90,16)                                           00021600
                C VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                  00021700
ISN 0095          COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)       00021800
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ISN 0096          COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS                00021900
ISN 0097          COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)        00022000
ISN 0098          COMMON   RNEVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS      00022100
ISN 0099          COMMON   VOLVSS(60), VOMXVS(60)                                      00022200
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)       00022300
ISN 0100          COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)         00022400
ISN 0101          COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)             00022500
ISN 0102          COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)             00022600
ISN 0103          COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)         00022700
ISN 0104          COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)         00022800
ISN 0105          COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)             00022900
ISN 0106          COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)        00023000
ISN 0107          COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)         00023100
ISN 0108          COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)  00023200
ISN 0109          COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)   00023300
ISN 0110          COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)            00023400
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                 00023500
ISN 0111          COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)            00023600
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                 00023700
ISN 0112          COMMON   ITNLSS                                                     00023800
                C  ZONE CLUSTER VARIABLES                                             00023900
ISN 0113          COMMON   TYPCL                                                      00024000
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                          00024100
ISN 0114          COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       00024200
ISN 0115          COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         00024300
ISN 0116          COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)  00024400
ISN 0117          COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)        00024500
ISN 0118          COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV  00024600
ISN 0119          COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV       00024700
ISN 0120          COMMON   PERMV(3), REGENV(3)                                        00024800
ISN 0121          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3)  00024900
ISN 0122          COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)              00025000
ISN 0123          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)    00025100
                C   UNDERPLATFORM EXHAUST VARIABLES                                   00025200
ISN 0124          COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                               00025300
                C  ROUTE VARIABLES  ( LMTRRT )                                        00025400
ISN 0125          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                        00025500
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )         00025600
ISN 0126          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)           00025700
ISN 0127          COMMON   NTRGR, NUMBTR                                              00025800
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                     00025900
ISN 0128          COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                   00026000
ISN 0129          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                         00026100
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )        00026200
ISN 0130          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV                00026300
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                            00026400
ISN 0131          COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)  00026500
ISN 0132          COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV               00026600
ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)        00026700
ISN 0134          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30)   00026800
ISN 0135          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV      00026900
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)          00027000
                C  FAN TYPE VARIABLES  ( LMFNTP )                                     00027100
ISN 0137          COMMON   CFMIFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)     00027200
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)     00027300
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ISN 0139          COMMON   TIMFT(4)                                                    00027400
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                             00027500
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTCNUL(10), LTOFUL(10)        00027600
                C  PATRON CHARACTERISTICS                                             00027700
ISN 0141          COMMON   PATWHT                                                     00027800
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                  00027900
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                               00028000
                C                                                                     00028100
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                               00028200
                C                                                                     00028300
                C                                                                     00028400
                C     INCLUDE  DSHRHS                                                 00028500
                C                                                                     00028600
                C*************************  INTEGER VARIABLES  ************************00028700
                C                                                                     00028800
                C THERMODYNAMIC NODE VARIABLES  (LMTHND)                              00028900
ISN 0144          INTEGER   TABL42(140)                                               00029000
                C SUBSEGMENT VARIABLES  (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)      00029100
ISN 0145          INTEGER   TABL40(300)                                               00029200
                C DYNAMIC THERMAL RESPONSE MATRIX VARIABLES  (LMEQRM)                 00029300
ISN 0146          INTEGER   TABL41(120)                                               00029400
                C                                                                     00029500
                C*************************  REAL VARIABLES  ***************************00029600
                C                                                                     00029700
                C DYNAMIC THERMAL RESPONSE MATRIX  (LMEQRM * LMEQRM )                 00029800
ISN 0147          REAL     DTRM2(14400)                                               00029900
                C                                                                     00030000
                C*************************   COMMON   *********************************00030100
                C                                                                     00030200
                C THERMODYNAMIC NODE VARIABLE  (LMTHND)                               00030300
ISN 0148          COMMON   /HSSHAR/  TABL42                                           00030400
                C LINE SEGMENT VARIABLES  (LMLSEG)                                    00030500
ISN 0149          COMMON   /HSSHAR/  TAALS(90)                                        00030600
                C VENTILATION SHAFT VARIABLES  (LMVSEG)                               00030700
ISN 0150          COMMON   /HSSHAR/  TSFV(60)                                         00030800
                C SUBSEGMENT VARIABLES  (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)      00030900
ISN 0151          COMMON   /HSSHAR/  HCNLSS(300), TABL40, TMALSS(300)                 00031000
                C SUBSEGMENT PLUS THERMODYNAMIC NODE VARIABLES  (LMSS + LMTHND)       00031100
ISN 0152          COMMON   /HSSHAR/  HUMESS(440), HUMMSS(440), TSFALS(440),           00031200
                 1     TSFMLS(440), TSMAX(440), TSMEAN(440), TSMN2(440), TSMX2(440)   00031300
                C DYNAMIC THERMAL (AND HUMIDITY) RESPONSE MATRIX  (LMEQRM)            00031400
                C                                          OR (LMEQRM , LMEQRM)       00031500
ISN 0153          COMMON   /HSSHAR/  DTRM(120,120), FORCE2(120), FORCE3(120),         00031600
                 1      HTSKFM(120), TABL41                                          00031700
                C                                                                     00031800
ISN 0154          EQUIVALENCE (DTRM(1,1),DTRM2(1))                                    00031900
                C                                                                     00032000
ISN 0155          REAL      TAIR(LMSSTN), HRATIO(LMSSTN), DTDXLS(LMLSEG)              00032100
ISN 0156          REAL      DTHXLS(LMLSEG), DTWXLS(LMLSEG), HELPL(30), HELPS(30)      00032200
ISN 0157          INTEGER   IZNODE(30), IZSCT(30), IZSEG(30)                          00032300
ISN 0158        10 FORMAT (1H1,8A1,12X,'SES',7X,18A4,9X,'PAGE',/,115X,'------')       00032400
ISN 0159        20 FORMAT (1HO,T46,'ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES')     00032500
ISN 0160        30 FORMAT (1HO,T40,'AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), BTU00032600
                  1U/HR')                                                             00032700
ISN 0161        40 FORMAT (1HO,T48,'THE DESIGN PERIOD IS MORNING RUSH HOUR')          00032800
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ISN 0162        50 FORMAT (1HO,T48,'THE DESIGN PERIOD IS EVENING RUSH HOUR')          00032900
ISN 0163        60 FORMAT (1HO,T38,'THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING 00033000
                  1RUSH HOUR')                                                       00033100
ISN 0164        70 FORMAT (1HO,'----------------  ZONE NUMBER',I3,'  -----  DESIGN ',00033200
                  1'CONDITION  -----',F6.1,' DEG F DRY BULB  -----',F6.1,' DEG F WET 00033300
                  2BULB  ----------------')                                          00033400
ISN 0165        80 FORMAT (1HO,T5,'SYSTEM',T116,'TOTAL',/,T2,'PARTITIONING',T21,'TRAI00033500
                  1NS',T36,'STEADY-STATE',T53,'HEAT SINK',T69,'AIR FLOW',T83,'ENVIRON00033600
                  2MENTAL CONTROL',T108,'ENVIRONMENTAL CONTROL',/,T113,'REQUIREMENT')00033700
ISN 0166        90 FORMAT (1HO,T16,'SENSIBLE',T26,'LATENT',T34,'SENSIBLE',T44,'LATENT00033800
                  1',T53,'SENSIBLE',T64,3('SENSIBLE    LATENT  '),T126,'TOTAL',/)    00033900
ISN 0167      100   FORMAT(1HO,'S+L BREAKDOWN',I6,6G14.7)                           00034000 <--C
ISN 0168      110   FORMAT(1HO,'SENSIBLE',11X,5G14.7,//,1X,'LATENT',13X,5G14.7)     00034100 <--C
ISN 0169        120 FORMAT (1HO,I3,' -',I3,' -',I2,4I9,2I11,5I10,I11)                00034200
ISN 0170        130 FORMAT (1H ,T16,4('-------  '),T54,'-------',T65,6('-------   '),'00034300
                  1--------')                                                        00034400
ISN 0171        140 FORMAT (1H ,T3,'ZONE TOTAL ',4I9,2I11,5I10,I11)                  00034500
ISN 0172        150 FORMAT (1HO,T51,'CONVECTIVE LOAD BREAKDOWN',//,T36,'AVERAGED ZONE 00034600
                  1CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR',//,T11,'SOURCE',T200034700
                  21,'NODE',T30,'SECTION',T40,'SEGMENT',T60,'SEGMENT NAME',T87,'SENSI00034800
                  3BLE',T100,'LATENT',T113,'TOTAL',/,T13,'NO',T22,'NO',T32,'NO',T42,'00034900
                  4NO',T89,'GAIN',T101,'GAIN',/)                                     00035000
ISN 0173      160   FORMAT(1HO,'SOURCE DUMP',4I6,5X,2G14.7)                         00035100 <--C
ISN 0174        170 FORMAT (1H ,T12,I3,T21,I3,T84,I11,T95,I12,T107,I12)              00035200
ISN 0175        180 FORMAT (1H ,T12,I3,T31,I3,T41,I3,T48,9A4,T84,I11,T95,I12,T107,I12)00035300
ISN 0176        200 FORMAT (1HO,' IMPOSSIBLE SITUATION CREATED IN AIR CONDITIONING EST00035400
                  1IMATE SUBROUTINE')                                                00035500
                C                                                                    00035600
                C*****LOOP OVER ALL ZONES IN SYSTEM COMPUTING AND PRINTING TOTALS FOR 00035700
                C*****EACH CONTROLLED ZONE ONLY                                      00035800
                C                                                                    00035900
ISN 0177              DO 1040 ICLST=1,NCLUST                                         00036000
                C*****CHECK IF ZONE IS A CONTROLLED ZONE - IF NOT GO TO END OF LOOP   00036100
ISN 0178              IF (TYPCL(ICLST)-1) 1040,210,1040                              00036200
                C*****ZONE IS A CONTROLLED ZONE - WRITE PAGE HEADINGS                00036300
ISN 0179        210   IPRINT=0                                                       00036400
ISN 0180              WRITE (OUT,10) DATE,SYSTEM                                     00036500
ISN 0181              WRITE (OUT,20)                                                 00036600
ISN 0182              WRITE (OUT,30)                                                 00036700
                C*****WRITE DESIGN PERIOD - MORNING, EVENING OR OTHER                00036800
ISN 0183              GO TO (220,230,240), DESPER                                    00036900
ISN 0184        220   WRITE (OUT,40)                                                 00037000
ISN 0185              GO TO 250                                                      00037100
ISN 0186        230   WRITE (OUT,50)                                                 00037200
ISN 0187              GO TO 250                                                      00037300
ISN 0188        240   WRITE (OUT,60)                                                 00037400
                C*****INITIALIZE TO ZERO ZONE TOTALS THAT WILL BE COMPUTED AND PRINTED 00037500
ISN 0189        250   NUMY11=0                                                       00037600
ISN 0190              NUMY12=0                                                       00037700
ISN 0191              NUMY13=0                                                       00037800
ISN 0192              NUMY14=0                                                       00037900
ISN 0193              NUMY15=0                                                       00038000
ISN 0194              NUMY16=0                                                       00038100
ISN 0195              NUMY17=0                                                       00038200
ISN 0196              NUMY18=0                                                       00038300
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November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 6 TO VERSION 2

Problem

A superannuated title appeared in the output.

Symptoms

The development of the SES computer program was sponsored by the Transit Development Corporation through a grant from UMTA and contributions made by the various operating properties. It is now being sponsored by the Department of Transportation/Transportation Systems Center. The program titling did not indicate this new sponsorship.

Correction

See the attached partial listing of Subroutine INPUT. The six lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any other items.

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE INPUT                                          01029400
                C                                                             01029500
                C     THIS SUBROUTINE CONTROLS THE READING,CHECKING, AND INPUT 01029600
                C     VERIFICATION OF ALL THE INPUT DATA. SOME DATA IS READ BY THIS 01029700
                C     SUBROUTINE, AND SOME IS READ BY OTHER SUBROUTINES WHICH READ 01029800
                C     CERTAIN ITEMS OF DATA. THESE ARE -                      01029900
                C               LSINS  - LINE SEGMENT INPUT SUBROUTINE        01030000
                C               VSINS  - VENTILATION SHAFT INPUT SUBROUTINE   01030100
                C               TRINS  - TRAIN ROUTE INPUT SUBROUTINE         01030200
                C               GARAGE - TRAIN 'TYPE' INPUT SUBROUTINE        01030300
                C                                                             01030400
                C     OTHER SUBROUTINES WHICH ARE USED ARE -                  01030500
                C               CHECKI - CHECKS INTEGER VARIABLE BETWEEN TWO LIMITS 01030600
                C               CHECKR - CHECKS REAL VARIABLE BETWEEN TWO LIMITS 01030700
                C               ERROR  - WRITES ERROR MESSAGES                01030800
                C                                                             01030900
                C                                                             01031000
ISN 0003            DIMENSION    MONTHS(2,12), NUMMY1(18)                     01031100
ISN 0004            DIMENSION    DUMMY1(8), NUMMY2(8),NUMMY3(8),NUMMY4(8),NUMMY5(8) 01031200
                C                                                             01031300
                C                                                             01031400
                C     INCLUDE  DSHARE                                         01031500
                C                                                             01031600
                C ************************ INTEGER VARIABLES ************************ C01031700
                C                                                             01031800
                C  GENERAL VARIABLES                                          01031900
ISN 0005            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT 01032000
ISN 0006            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT 01032100
ISN 0007            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 01032200
                C  SECTION VARIABLES  (LMSECT)                                01032300
ISN 0008            INTEGER   NTOPS(140)                                      01032400
ISN 0009            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140) 01032500
ISN 0010            INTEGER   TABL13(140), TABL20(140), TABL21(140)           01032600
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)01032700
ISN 0011            INTEGER   ND(140), NDS(141), NDSS(142)                    01032800
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 01032900
ISN 0012            INTEGER   LKAN(420)                                       01033000
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)         01033100
ISN 0013            INTEGER   TABL14(400)                                     01033200
                C  NODE VARIABLES  (LMNODE)                                   01033300
ISN 0014            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130) 01033400
ISN 0015            INTEGER   TABL23(132), TABL45(130), TYPTNO(130)           01033500
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                        01033600
ISN 0016            INTEGER   TABL2(1500)                                     01033700
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 01033800
ISN 0017            INTEGER   TABL17(130,5), TABL18(130,5)                    01033900
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)            01034000
ISN 0018            INTEGER   TABL19(400)                                     01034100
                C  LOOP VARIABLES  (LMNLOP)                                   01034200
                C  LINE SEGMENT VARIABLES  (LMLSEG)                           01034300
ISN 0019            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 01034400
ISN 0020            INTEGER   TYPLS(90)                                       01034500
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 01034600
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ISN 0021            INTEGER   TRNNLS(90,8)                                                    01034700
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                          01034800
ISN 0022            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                               01034900
ISN 0023            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60)         01035000
                C  SUBSEGMENT VARIABLES  (LMSS)                                               01035100
ISN 0024            INTEGER   TABL7(300), TABL44(300)                                         01035200
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                         01035300
ISN 0025            INTEGER   EXDTDB(250,6)                                                   01035400
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                        01035500
ISN 0026            INTEGER   ITNLSS(250,6)                                                   01035600
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                        01035700
ISN 0027            INTEGER   TYPCL(30)                                                       01035800
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                                    01035900
ISN 0028            INTEGER   NCARV(3), NPCARV(3)                                             01036000
                C  UNDERPLATFORM EXHAUST VARIABLES                                            01036100
ISN 0029            INTEGER   OPTUX                                                           01036200
                C  ROUTE VARIABLES  (LMTRRT)                                                  01036300
ISN 0030            INTEGER   COPTRT(6), NTSRT(6)                                             01036400
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)                      01036500
ISN 0031            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)                     01036600
ISN 0032            INTEGER   NTRGR(15,6)                                                     01036700
ISN 0033            INTEGER   GRHDWY(15,6)                                                    01036800
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                               01036900
ISN 0034            INTEGER   DWLTS(260,6)                                                    01037000
ISN 0035            INTEGER   NPETTS(260,6), NSEGTS(260,6)                                    01037100
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)                  01037200
ISN 0036            INTEGER   NEXPOP(6)                                                       01037300
ISN 0037            INTEGER   TIMEV(201,6)                                                    01037400
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                                      01037500
ISN 0038            INTEGER   OPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)            01037600
ISN 0039            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                                  01037700
ISN 0040            INTEGER   TLPSV(30), TSTRTV(30)                                           01037800
                C  FAN TYPE VARIABLES  (LMFNTP)                                               01037900
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                     01038000
ISN 0041            INTEGER   LSSUL(10)                                                       01038100
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                          01038200
ISN 0042            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)                    01038300
                C                                                                             01038400
                C ************************** REAL VARIABLES ************************** C01038500
                C                                                                             01038600
                C  GENERAL VARIABLES                                                          01038700
ISN 0043            REAL      NUAIR, MPHFPS                                                 01038800
                C  SECTION VARIABLES                                                          01038900
                C  NODE VARIABLES                                                             01039000
                C  LOOP VARIABLES                                                             01039100
                C  LINE SEGMENT VARIABLES                                                     01039200
ISN 0044            REAL      LLS(90), LLSS(90)                                             01039300
                C  VENTILATION SHAFT SEGMENT VARIABLES                                        01039400
ISN 0045            REAL      LVS(60), LVSS(60)                                             01039500
                C  SUBSEGMENT VARIABLES                                                       01039600
ISN 0046            REAL      LHLTSS(300), LSUMSS(300)                                      01039700
                C  LINE SUBSEGMENT VARIABLES                                                  01039800
ISN 0047            REAL      LACLSS(250), LHLSS(250)                                       01039900
                C  ZONE VARIABLES                                                             01040000
                C  SUBWAY VEHICLE TYPE VARIABLES                                              01040100
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ISN 0048          REAL     LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)          01040200
ISN 0049          REAL     MOTORV(3)                                                 01040300
                C  ROUTE VARIABLES                                                   01040400
                C    DISPATCHER VARIABLES                                          01040500
                C    TRACK SECTION VARIABLES                                       01040600
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                          01040700
                C  OPERATIONAL TRAIN VARIABLES                                     01040800
                C  FAN TYPE VARIABLES                                              01040900
                C  PRINT GROUP VARIABLES                                           01041000
                C                                                                  01041100
                C ****************************** COMMON ****************************** C01041200
                C                                                                  01041300
                C GENERAL VARIABLES                                                01041400
ISN 0050          COMMON   AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH              01041500
ISN 0051          COMMON   DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  01041600
ISN 0052          COMMON   HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT      01041700
ISN 0053          COMMON   IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 01041800
ISN 0054          COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 01041900
ISN 0055          COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 01042000
ISN 0056          COMMON   NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE    01042100
ISN 0057          COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER      01042200
ISN 0058          COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMJL, NVSEC      01042300
ISN 0059          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                         01042400
ISN 0060          COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB            01042500
ISN 0061          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE01042600
ISN 0062          COMMON   TWAMBM, WNTSUM                                          01042700
                C  ARRAY SIZE LIMITS                                               01042800
ISN 0063          COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPO, LMFNTP, LMLPK, LMLPLK01042900
ISN 0064          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND   01043000
ISN 0065          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     01043100
ISN 0066          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     01043200
                C  PHYSICAL CONSTANTS                                              01043300
ISN 0067          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC  01043400
ISN 0068          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS     01043500
ISN 0069          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR     01043600
ISN 0070          COMMON   WGCONS, WTBTUS                                          01043700
                C  SECTION VARIABLES  ( LMSECT )                                   01043800
ISN 0071          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)   01043900
ISN 0072          COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS      01044000
ISN 0073          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)  01044100
ISN 0074          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 01044200
ISN 0075          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)         01044300
                C    SECTION + TWO  (LMSECT+2)                                     01044400
ISN 0076          COMMON   NOSS                                                    01044500
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 01044600
ISN 0077          COMMON   LKAN                                                    01044700
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                       01044800
ISN 0078          COMMON   TABL14                                                  01044900
                C  NODE VARIABLES  ( LMNODE )                                      01045000
ISN 0079          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23   01045100
ISN 0080          COMMON   TABL45, TYPIND                                          01045200
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                          01045300
ISN 0081          COMMON   TABL19                                                  01045400
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                            01045500
ISN 0082          COMMON   TABL2                                                   01045600
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                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          01045700
ISN 0083            COMMON   COAEND(950)                                                01045800
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              01045900
ISN 0084            COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)           01046000
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       01046100
                C    ( LMTHND X LMSCND )                                                01046200
ISN 0085            COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)                01046300
                C  LOOP VARIABLES  ( LMNLOP )                                            01046400
ISN 0086            COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)                01046500
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          01046600
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 01046700
ISN 0087            COMMON   BLP(1000)                                                  01046800
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    01046900
ISN 0088            COMMON   ALS(90), C1LS(90), CBNLS(90), CBPLS(90), CFNLS(90)         01047000
ISN 0089            COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90)   01047100
ISN 0090            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90)   01047200
ISN 0091            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS             01047300
ISN 0092            COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)    01047400
ISN 0093            COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)             01047500
ISN 0094            COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)               01047600
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 01047700
ISN 0095            COMMON   TRNNLS                                                     01047800
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       01047900
                C    (LMLSEG X 2*LMTRSG)                                                01048000
ISN 0096            COMMON   TRNDLS(90,16)                                              01048100
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                       01048200
ISN 0097            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)          01048300
ISN 0098            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS              01048400
ISN 0099            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      01048500
ISN 0100            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    01048600
ISN 0101            COMMON   VOLVSS(60), VOMXVS(60)                                    01048700
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)         01048800
ISN 0102            COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)         01048900
ISN 0103            COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)            01049000
ISN 0104            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)            01049100
ISN 0105            COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)        01049200
ISN 0106            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)         01049300
ISN 0107            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)             01049400
ISN 0108            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)        01049500
ISN 0109            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)        01049600
ISN 0110            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)  01049700
ISN 0111            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)   01049800
ISN 0112            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)           01049900
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                    01050000
ISN 0113            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)            01050100
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                   01050200
ISN 0114            COMMON   ITNLSS                                                     01050300
                C  ZONE CLUSTER VARIABLES                                                01050400
ISN 0115            COMMON   TYPCL                                                      01050500
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                             01050600
ISN 0116            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       01050700
ISN 0117            COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         01050800
ISN 0118            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)01050900
ISN 0119            COMMON   COTEV(3,4), DECAV(3), DECPV(3), DECV(3), DECV1V(3)       01051000
ISN 0120            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV01051100
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ISN 0121          COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      01051200
ISN 0122          COMMON   PERMV(3), REGENV(3)                                     01051300
ISN 0123          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 01051400
ISN 0124          COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            01051500
ISN 0125          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)  01051600
                C   UNDERPLATFORM EXHAUST VARIABLES                               01051700
ISN 0126          COMMON   FFSUX, FFMUX, OPTUX, UMAXUX                           01051800
                C  ROUTE VARIABLES  ( LMTRRT )                                    01051900
ISN 0127          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                    01052000
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )     01052100
ISN 0128          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)        01052200
ISN 0129          COMMON   NTRGR, NUMBTR                                          01052300
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                 01052400
ISN 0130          COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS               01052500
ISN 0131          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                     01052600
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )    01052700
ISN 0132          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV            01052800
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                        01052900
ISN 0133          COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)01053000
ISN 0134          COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV           01053100
ISN 0135          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)     01053200
ISN 0136          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 01053300
ISN 0137          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV   01053400
ISN 0138          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)       01053500
                C  FAN TYPE VARIABLES  ( LMFNTP )                                 01053600
ISN 0139          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)  01053700
ISN 0140          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)  01053800
ISN 0141          COMMON   TIMFT(4)                                               01053900
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                         01054000
ISN 0142          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)    01054100
                C  PATRON CHARACTERISTICS                                         01054200
ISN 0143          COMMON   PATWHT                                                 01054300
                C  PRINT GROUP VARIABLES  ( LMPRGP )                              01054400
ISN 0144          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                           01054500
                C                                                                 01054600
ISN 0145          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                           01054700
                C                                                                 01054800
                C                                                                 01054900
                C                                                                 01055000
                C                                                                 01055100
ISN 0146          DATA MONTHS /  4HJANU,4HARY ,4HFEBR,4HUARY,4HMARC,4HH    ,     01055200
                1 4HAPRI,4HL    ,4HMAY ,4H     .4HJUNE.4H     .4HJULY.4H     ,   01055300
                2 4HAUGU,4HST   ,4HSEPT,4H.    ,4HOCTO,4HBER ,4HNOVE,4HMBER,     01055400
                3 4HDECE,4HMBER /                                                 01055500
ISN 0147     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------') 01055600
ISN 0148     20   FORMAT (17A4,A2)                                                01055700
ISN 0149     30   FORMAT (8F10.2)                                                 01055800
ISN 0150     40   FORMAT (9A4,4X,4F10.2)                                          01055900
ISN 0151     50   FORMAT (1H1,4(/),T30,'DEPARTMENT OF TRANSPORTATION / TRANSPORTATI01056000 <-- C
                1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100 <-- C
                27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200 <-- C
                3,T72,'X',/,T54,'X',T57,'X',T72,'X',/,T48,6('X'),T57,7('X'),T66,6('01056300 <-- C
                4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                01056400 <-- C
ISN 0152     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                1/)                                                               01056600
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ISN 0153      70    FORMAT (25X,17A4,A2,////)                                        01056700
ISN 0154      80    FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)           01056800
ISN 0155      90    FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)           01056900
ISN 0156     100    FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                   1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                   2/,T97,'VERSION 2.07')                                           01057200 <-- C
ISN 0157     110    FORMAT (1HO,T45,'INPUT VERIFICATION OF GENERAL DATA')            01057300
ISN 0158     120    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                   190,'BYPASS')                                                    01057500
ISN 0159     130    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                   190,'IMPLICIT')                                                  01057700
ISN 0160     140    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                   190,'EXPLICIT (HEAT REJ. COMPUTED)')                             01057900
ISN 0161     150    FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                   190,'EXPLICIT (HEAT REJ. INPUT)')                                01058100
ISN 0162     160    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                   1T90,'BYPASS')                                                   01058300
ISN 0163     170    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                   1T90,'YES')                                                      01058500
ISN 0164     180    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                   1T90,'YES - EVAPORATION')                                        01058700
ISN 0165     190    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                   11O')                                                            01058900
ISN 0166     200    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                   1PERATURE')                                                      01059100
ISN 0167     210    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                   1IDITY')                                                         01059300
ISN 0168     220    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                   1,I5,T90,'BYPASS')                                               01059500
ISN 0169     230    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
                   1,I5,T90,'YES')                                                  01059700
ISN 0170     240    FORMAT ()HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
                   1,I5,T90,'OFF-HOUR')                                             01059900
ISN 0171     250    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                   1S')                                                             01060100
ISN 0172     260    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173     270    FORMAT (1HO,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)            01060300
ISN 0174     280    FORMAT (1HO,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)            01060400
ISN 0175     290    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                 01060500
ISN 0176     300    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                   1')                                                              01060700
ISN 0177     310    FORMAT (/1HO,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
ISN 0178     320    FORMAT (1HO,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)               01060900
ISN 0179     330    FORMAT (1HO,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5)   01061000
ISN 0180     340    FORMAT (1HO,T30,'NUMBER OF NODES',T80,I5)                        01061100
ISN 0181     350    FORMAT (1HO,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)           01061200
ISN 0182     360    FORMAT (1HO,T30,'NUMBER OF PORTALS',T80,I5)                      01061300
ISN 0183     370    FORMAT (1HO,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)        01061400
ISN 0184     380    FORMAT (1HO,T30,'NUMBER OF FAN TYPES',T80,I5)                    01061500
ISN 0185     390    FORMAT (1HO,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM 1E')  01061600
ISN 0186     400    FORMAT (1HO,T30,'NUMBER OF TRAIN TYPES',T80,I5)                  01061700
ISN 0187     410    FORMAT (1HO,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5)  01061800
ISN 0188     420    FORMAT (1HO,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)        01061900
ISN 0189     430    FORMAT (1H+,T90,'MEANINGLESS')                                   01062000
ISN 0190     440    FORMAT (1H+,T90,'SIMULATION TERMINATION')                        01062100
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VII. Revision No. 7

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 7 TO VERSION 2

Problem

Program response following the diagnosis of a fatal error in an input data set was occasionally wrong.

Symptoms

Following the diagnosis of a fatal error in an input data deck, the program searches for either a blank card (program termination) or a card with two slashes in card columns 71 through 78 (beginning of a new data set). This process occasionally ended with the program mistakenly determining that a non-blank card had two slashes in card columns 71 through 78. The resulting program output would then show the beginning of the input verification of a non-existent data deck followed by more fatal errors, etc.

Correction

See the attached partial listing of the Mainline Program DSES. The four lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any items. Future input verifications terminated by a fatal error will tend to be less voluminous.

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            INTEGER  BLANK2,SLASH2                                          00295800
                C   INCLUDE  DSHARE                                                  00295900
                C                                                                   00296000
                C ************************ INTEGER VARIABLES ************************ C00296100
                C                                                                   00296200
                C  GENERAL VARIABLES                                                00296300
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT  00296400
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      00296500
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 00296600
                C  SECTION VARIABLES  (LMSECT)                                      00296700
ISN 0006            INTEGER   NTQPS(140)                                            00296800
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)     00296900
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                 00297000
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00297100
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                          00297200
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 00297300
ISN 0010            INTEGER   LKAN(420)                                             00297400
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)               00297500
ISN 0011            INTEGER   TABL14(400)                                           00297600
                C  NODE VARIABLES  (LMNODE)                                         00297700
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)     00297800
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                 00297900
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                              00298000
ISN 0014            INTEGER   TABL2(1500)                                           00298100
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 00298200
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                          00298300
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                  00298400
ISN 0016            INTEGER   TABL19(400)                                           00298500
                C  LOOP VARIABLES  (LMNLOP)                                         00298600
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                 00298700
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 00298800
ISN 0018            INTEGER   TYPLS(90)                                             00298900
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 00299000
ISN 0019            INTEGER   TRNNLS(90,8)                                          00299100
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                00299200
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     00299300
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 00299400
                C  SUBSEGMENT VARIABLES  (LMSS)                                     00299500
ISN 0022            INTEGER   TABL7(300), TABL44(300)                               00299600
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )               00299700
ISN 0023            INTEGER   EXOTDB(250,6)                                         00299800
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )              00299900
ISN 0024            INTEGER   ITNLSS(250,6)                                         00300000
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)              00300100
ISN 0025            INTEGER   TYPCL(30)                                             00300200
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                          00300300
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                   00300400
                C  UNDERPLATFORM EXHAUST VARIABLES                                  00300500
ISN 0027            INTEGER   OPTUX                                                 00300600
                C  ROUTE VARIABLES  (LMTRRT)                                        00300700
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                   00300800
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)            00300900
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           00301000
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ISN 0030           INTEGER   NTRGR(15,6)                                                    00301100
ISN 0031           INTEGER   GRHDWY(15,6)                                                   00301200
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                            00301300
ISN 0032           INTEGER   DWLTS(260,6)                                                   00301400
ISN 0033           INTEGER   NPETTS(260,6), NSEGTS(260,6)                                   00301500
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)               00301600
ISN 0034           INTEGER   NEXPDP(6)                                                      00301700
ISN 0035           INTEGER   TIMEV(201,6)                                                   00301800
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                                   00301900
ISN 0036           INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)           00302000
ISN 0037           INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                                 00302100
ISN 0038           INTEGER   TLPSV(30), TSTRTV(30)                                          00302200
                C  FAN TYPE VARIABLES  (LMFNTP)                                            00302300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                                  00302400
ISN 0039           INTEGER   LSSUL(10)                                                      00302500
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                       00302600
ISN 0040           INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)                   00302700
                C                                                                          00302800
                C ************************** REAL VARIABLES ************************** C00302900
                C                                                                          00303000
                C  GENERAL VARIABLES                                                       00303100
ISN 0041           REAL      NUAIR, MPHFPS                                                00303200
                C  SECTION VARIABLES                                                       00303300
                C  NODE VARIABLES                                                          00303400
                C  LOOP VARIABLES                                                          00303500
                C  LINE SEGMENT VARIABLES                                                  00303600
ISN 0042           REAL      LLS(90), LLSS(90)                                            00303700
                C  VENTILATION SHAFT SEGMENT VARIABLES                                     00303800
ISN 0043           REAL      LVS(60), LVSS(60)                                            00303900
                C  SUBSEGMENT VARIABLES                                                    00304000
ISN 0044           REAL      LHLTSS(300), LSUMSS(300)                                     00304100
                C  LINE SUBSEGMENT VARIABLES                                               00304200
ISN 0045           REAL      LACLSS(250), LHLSS(250)                                      00304300
                C  ZONE VARIABLES                                                          00304400
                C  SUBWAY VEHICLE TYPE VARIABLES                                           00304500
ISN 0046           REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)             00304600
ISN 0047           REAL      MOTORV(3)                                                    00304700
                C  ROUTE VARIABLES                                                         00304800
                C    DISPATCHER VARIABLES                                                  00304900
                C    TRACK SECTION VARIABLES                                               00305000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                                  00305100
                C  OPERATIONAL TRAIN VARIABLES                                             00305200
                C  FAN TYPE VARIABLES                                                      00305300
                C  PRINT GROUP VARIABLES                                                   00305400
                C                                                                          00305500
                C ***************************** COMMON ***************************** C00305600
                C                                                                          00305700
                C GENERAL VARIABLES                                                        00305800
ISN 0048           COMMON    AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH                   00305900
ISN 0049           COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT       00306000
ISN 0050           COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT           00306100
ISN 0051           COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR     00306200
ISN 0052           COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE     00306300
ISN 0053           COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT     00306400
ISN 0054           COMMON    NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCPI, NLSEC, NNODE        00306500
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ISN 0055           COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER      00306600
ISN 0056           COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC      00306700
ISN 0057           COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                         00306800
ISN 0058           COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB           00306900
ISN 0059           COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00307000
ISN 0060           COMMON   TWAMBM, WNTSUM                                         00307100
                 C  ARRAY SIZE LIMITS                                              00307200
ISN 0061           COMMON   LMBLP,LMCLST,LMCOND,LMEQPM, LMEXPD, LMFNTP, LMLPK, LMLPLK00307300
ISN 0062           COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND  00307400
ISN 0063           COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN   00307500
ISN 0064           COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG   00307600
                 C  PHYSICAL CONSTANTS                                             00307700
ISN 0065           COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC 00307800
ISN 0066           COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS   00307900
ISN 0067           COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR    00308000
ISN 0068           COMMON   WGCONS, WTBTUS                                        00308100
                 C  SECTION VARIABLES  ( LMSECT )                                  00308200
ISN 0069           COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)  00308300
ISN 0070           COMMON   CFNS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS     00308400
ISN 0071           COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140) 00308500
ISN 0072           COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 00308600
ISN 0073           COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)       00308700
                 C    SECTION + TWO  (LMSECT+2)                                   00308800
ISN 0074           COMMON   NOSS                                                  00308900
                 C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 00309000
ISN 0075           COMMON   LKAN                                                  00309100
                 C    SECTION EXTERNAL IDENTIFICATION NUMBERS                     00309200
ISN 0076           COMMON   TABL14                                                00309300
                 C  NODE VARIABLES  ( LMNODE )                                     00309400
ISN 0077           COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23  00309500
ISN 0078           COMMON   TABL45, TYPTND                                        00309600
                 C    NODE EXTERNAL IDENTIFICATION NUMBERS                        00309700
ISN 0079           COMMON   TABL19                                                00309800
                 C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                           00309900
ISN 0080           COMMON   TABL2                                                 00310000
                 C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                   00310100
ISN 0081           COMMON   COAEND(950)                                           00310200
                 C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                       00310300
ISN 0082           COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)      00310400
                 C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE 00310500
                 C    ( LMTHND X LMSCND )                                         00310600
ISN 0083           COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)           00310700
                 C  LOOP VARIABLES  ( LMNLOP )                                     00310800
ISN 0084           COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)           00310900
                 C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT   00311000
                 C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                          00311100
ISN 0085           COMMON   BLP(1000)                                             00311200
                 C  LINE SEGMENT VARIABLES  ( LMLSEG )                             00311300
ISN 0086           COMMON   ALS(90), C1LS(90), CBNLS(90), CBPLS(90), CFNLS(90)    00311400
ISN 0087           COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 00311500
ISN 0088           COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FEELS(90) 00311600
ISN 0089           COMMON   ELS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS        00311700
ISN 0090           COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNELS(90), RPRMLS(90) 00311800
ISN 0091           COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)         00311900
ISN 0092           COMMON   THDELS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)          00312000
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                C    LINE SEGMENT BY NUMBER OF TRAINS.IN LINE SEGMENT (LMLSEG X LMTRSG) 00312100
ISN 0093             COMMON   TRNNLS                                                    00312200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       00312300
                C    (LMLSEG X 2*LMTRSG)                                                00312400
ISN 0094             COMMON   TRNDLS(90,16)                                             00312500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                      00312600
ISN 0095             COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)         00312700
ISN 0096             COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS             00312800
ISN 0097             COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)     00312900
ISN 0098             COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS   00313000
ISN 0099             COMMON   VOLVSS(60), VOMXVS(60)                                   00313100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)        00313200
ISN 0100             COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)       00313300
ISN 0101             COMMON   EMHRSS(300), EMHFSS(300), FRSS(300), FFSS(300)           00313400
ISN 0102             COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)           00313500
ISN 0103             COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)       00313600
ISN 0104             COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)       00313700
ISN 0105             COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)           00313800
ISN 0106             COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)       00313900
ISN 0107             COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)       00314000
ISN 0108             COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 00314100
ISN 0109             COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)  00314200
ISN 0110             COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)           00314300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                   00314400
ISN 0111             COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)           00314500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                   00314600
ISN 0112             COMMON   ITNLSS                                                    00314700
                C  ZONE CLUSTER VARIABLES                                               00314800
ISN 0113             COMMON   TYPCL                                                     00314900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                            00315000
ISN 0114             COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       00315100
ISN 0115             COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         00315200
ISN 0116             COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)00315300
ISN 0117             COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)       00315400
ISN 0118             COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV00315500
ISN 0119             COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      00315600
ISN 0120             COMMON   PERMV(3), REGENV(3)                                     00315700
ISN 0121             COMMON   RE1M(3), RE2M(3), RE3M(3), RPACC(3), SHREV(3), SLOPEV(3) 00315800
ISN 0122             COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            00315900
ISN 0123             COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   00316000
                C   UNDERPLATFORM EXHAUST VARIABLES                                    00316100
ISN 0124             COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                             00316200
                C  ROUTE VARIABLES  ( LMTRRT )                                          00316300
ISN 0125             COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                       00316400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )           00316500
ISN 0126             COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)          00316600
ISN 0127             COMMON   NTRGR, NUMBTR                                           00316700
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                       00316800
ISN 0128             COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                 00316900
ISN 0129             COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                       00317000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )          00317100
ISN 0130             COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV              00317200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                              00317300
ISN 0131             COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)00317400
ISN 0132             COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV             00317500
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ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      00317600
ISN 0134          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 00317700
ISN 0135          COMMON   TFV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    00317800
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        00317900
                  C  FAN TYPE VARIABLES  ( LMFNTP )                                 00318000
ISN 0137          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)    00318100
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)    00318200
ISN 0139          COMMON   TIMFT(4)                                                 00318300
                  C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                         00318400
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)      00318500
                  C  PATRON CHARACTERISTICS                                         00318600
ISN 0141          COMMON   PATWHT                                                   00318700
                  C  PRINT GROUP VARIABLES  ( LMPRGP )                              00318800
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                             00318900
                  C                                                                 00319000
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                             00319100
                  C                                                                 00319200
                  C                                                                 00319300
ISN 0144          DATA   SLASH2, BLANK2 / 1H/, 1H  /                                00319400
ISN 0145         1 FORMAT( 1H1 )                                                    00319500
ISN 0146         2 FORMAT(  17A4,A2,8A1,A2  )                                       00319600
ISN 0147         3 FORMAT( 1H0, 15X,17A4,A2,8A1,A2 )                                00319700
ISN 0148         4 FORMAT( 1H1,15X,'EXECUTION TERMINATED DUE TO BLANK CARD IN INPUT',00319800
                  1/,16X,'IF ALL BATCHES HAVE BEEN RUN THIS IS A NORMAL TERMINATION.'00319900
                  2,/, 16X,'IF NOT - NOT.' /// )                                    00320000
ISN 0149         6 FORMAT(/// 16X,'END OF SES INPUT VERIFICATION.',                 00320100
                  1  I4,' ERRORS WERE FOUND.' )                                     00320200
ISN 0150         7 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION HA00320300
                  1S BEEN SUPRESSED AT THE USER''S OPTION.' )                       00320400
ISN 0151         8 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION HA00320500
                  1S BEEN SUPRESSED BY INPUT ERRORS.' )                             00320600
ISN 0152         9 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION IS00320700
                  1 TO PROCEED.')                                                   00320800
                 C*****FORTRAN LOGICAL UNIT NUMBER OF INPUT DEVICE                  00320900
ISN 0153           IN = 5                                                          00321000
                 C*****FORTRAN LOGICAL UNIT NUMBER OF OUTPUT DEVICE                 00321100
ISN 0154           OUT = 6                                                         00321200
                 C*****LOAD SLASH AND BLANK INTO COMMON SINCE THEY ARE DEFINED BY A 00321300
                 C*****DATA STATEMENT                                               00321400
ISN 0155           SLASH = SLASH2                                                  00321500
ISN 0156           BLANK = BLANK2                                                  00321600
                 C                                                                 00321700
                 C*****CERTAIN PHYSICAL CONSTANTS - DEFINED                        00321800
                 C                                                                 00321900
                 C*****ABSOLUTE TEMPERATURE CONVERSION CONSTANT  DEG F TO DEG R    00322000
ISN 0157           ABTEMP=459.67                                                   00322100
                 C*****CONVERSION FROM BTU TO FT-LBS - (FT-LB)/BTU                 00322200
ISN 0158           BTUFLB=778.0                                                    00322300
                 C*****SPECIFIC HEAT OF AIR  BTU/(SLUG-DEG F)                      00322400
ISN 0159           CP=7.728                                                        00322500
                 C*****CONVERSION FROM FT-LBS TO HP - HP/(FT-LB)                   00322600
ISN 0160           FLBHP=1.0/550.0                                                 00322700
                 C*****CONVERSION FROM FEET TO INCHES - INCHES/FT                  00322800
ISN 0161           FTIN=12.0                                                       00322900
                 C*****ACCELERATION CAUSED BY GRAVITY  FT/(SEC**2)                 00323000
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ISN 0162          GRACC=32.2                                                    00323100
                C*****HEAT OF VAPORIZATION OF WATER - BTU/(LB OF H2O VAPORIZED)  00323200
ISN 0163          HVH2O=1050.0                                                  00323300
                C*****CONVERSION OF MILES/HOUR TO FEET/SECOND - ((FT-HR)/(MILES-SEC))  00323400
ISN 0164          MPHFPS=88.0/60.0                                              00323500
                C*****RATIO OF CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER        00323600
ISN 0165          PI = 3.14159265                                               00323700
                C*****GAS CONSTANT FOR DRY AIR - ((FT/SEC)**2)/DEG R            00323800
ISN 0166          PDRYAR=53.34                                                  00323900
                C*****CONVERSION OF STANDARD ATMOSPHERE TO IN. HG. - (IN. HG.)/(S.A.)  00324000
ISN 0167          SAINHG=29.921                                                 00324100
                C*****CONVERSION OF STANDARD ATMOSPHERE TO LBS/SQ IN - LBS/(SQ IN-S.A.) 00324200
ISN 0168          SAPSI=14.696                                                  00324300
                C*****STEFAN-BOLTZMAN CONSTANT - BTU/(HR*FT*FT*(DEG R**4))      00324400
ISN 0169          STEFAN=1.714E-09                                              00324500
                C*****THERMAL CONDUCTIVITY OF AIR  BTU/(FT-SEC-DEG F)           00324600
ISN 0170          THCON=4.27777778E-06                                          00324700
                C*****CONVERSION FROM TONS WEIGHT TO LBS - LBS/TON              00324800
ISN 0171          TONLB=2000.0                                                  00324900
                C*****ABSOLUTE VISCOSITY OF AIR  SLUG/(FT-SEC)                  00325000
ISN 0172          VISAIR=0.399E-06                                              00325100
                C*****WATER GUAGE PRESSURE CONVERSION CONSTANT - (LBS H2O)/(FT*FT*IN)  00325200
ISN 0173          WGCONS=5.2                                                    00325300
                C*****CONVERSION FROM WATTS TO BTU/SEC - BTU/(WATT-SEC)         00325400
ISN 0174          WTBTUS=9.4866E-04                                             00325500
                C                                                               00325600
                C*****CERTAIN PHYSICAL CONTANTS - COMPUTED                      00325700
                C                                                               00325800
                C*****CONVERSION FROM FT-LBS TO BTU - BTU/(FT-LB)               00325900
ISN 0175          FLBBTU=1.0/BTUFLB                                             00326000
                C*****CONVERSION OF FEET/SECOND TO MILES/HOUR - ((MILES-SEC)/(FT-HR))  00326100
ISN 0176          FPSMPH=1.0/MPHFPS                                             00326200
                C*****PRANDTL NUMBER FOR AIR - PR EQUALS ABOUT 0.72081          00326300
                C*****                         PR**0.6 EQUALS ABOUT 0.82166     00326400
ISN 0177          PR=CP*VISAIR/THCON                                            00326500
                C                                                               00326600
                C****  ARRAY SIZE LIMITS       ****************************************  00326700
                C                                                               00326800
ISN 0178          LMBLP  = 1000                                                 00326900
ISN 0179          LMCLST = 30                                                   00327000
ISN 0180          LMCOND = 950                                                  00327100
ISN 0181          LMEQRM = 120                                                  00327200
ISN 0182          LMEXPD = 201                                                  00327300
ISN 0183          LMFNTP = 4                                                    00327400
ISN 0184          LMLPK  = 225                                                  00327500
ISN 0185          LMLPLK = 420                                                  00327600
ISN 0186          LMLSEG = 90                                                   00327700
ISN 0187          LMLSS  = 250                                                  00327800
ISN 0188          LMNLOP = 75                                                   00327900
ISN 0189          LMNODE = 130                                                  00328000
ISN 0190          LMNODX = 400                                                  00328100
ISN 0191          LMPRGP = 15                                                   00328200
ISN 0192          LMSCND = 5                                                    00328300
ISN 0193          LMSCTX = 400                                                  00328400
ISN 0194          LMSECT = 140                                                  00328500
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ISN 0195            LMSS    = 300                                                  00328600
ISN 0196            LMSSTN  = 440                                                  00328700
ISN 0197            LMTBL2  = 1500                                                 00328800
ISN 0198            LMTHND  = 140                                                  00328900
ISN 0199            LMTRAN  = 30                                                   00329000
ISN 0200            LMTRGP  = 15                                                   00329100
ISN 0201            LMTRRT  = 6                                                    00329200
ISN 0202            LMTRSG  = 8                                                    00329300
ISN 0203            LMTRTP  = 3                                                    00329400
ISN 0204            LMTSRT  = 260                                                  00329500
ISN 0205            LMUL    = 10                                                   00329600
ISN 0206            LMVSEG  = 60                                                   00329700
                  C                                                                00329800
ISN 0207            200 WRITE( OUT,1)                                              00329900
ISN 0208            210 READ(IN,2) SYSTEM,DATE,IX                                  00330000
ISN 0209                NUMY1 = 0                                                  00330100
ISN 0210                NUMY2 = 0                                                  00330200
ISN 0211                DO  250  I = 1,8                                           00330300
ISN 0212                IF(DATE(I).NE.BLANK) GO TO 230                             00330400 <--C
ISN 0214            220 NUMY1 = NUMY1 + 1                                          00330500
ISN 0215                GO TO 250                                                  00330600
ISN 0216            230 IF(DATE(I).NE.SLASH) GO TO 250                             00330700 <--C
ISN 0218            240 NUMY2 = NUMY2 + 1                                          00330800
ISN 0219            250 CONTINUE                                                   00330900
ISN 0220                IF( NUMY2 - 2 ) 260,290,290                                00331000
ISN 0221            260 IF( NUMY1 - 8 ) 280,265,265                                00331100
ISN 0222            265 DO  270  I=1,18                                            00331200
ISN 0223                IF(SYSTEM(I).NE.BLANK) GO TO 280                           00331300 <--C
ISN 0225            270 CONTINUE                                                   00331400
ISN 0226                IF(IX.EQ.BLANK) GO TO 285                                  00331500 <--C
ISN 0228            280 WRITE(OUT,3) SYSTEM,DATE,IX                                00331600
ISN 0229                GO TO 210                                                  00331700
                  C*****BLANK CARD WAS FOUND - END OF DATA DECKS                   00331800
ISN 0230            285 WRITE(OUT,4)                                               00331900
ISN 0231                STOP                                                       00332000
                  C*****2 SLASHES FOUND IN CARD COLUMNS 70-78 - BEGINNING OF NEW DATA DECK00332100
ISN 0232            290 NEW = 2                                                    00332200
                  C*****CALL TO SUBROUTINE 'ALCHAR' IS NECESSARY TO LOAD PROPER OVERLAY 00332300
                  C*****BLOCK TO PROVIDE LINKAGE TO THE OVERLAYS CONTAINING SUBROUTINES 00332400
                  C*****'INPUT' AND 'SIMLAT'.                                    00332500
ISN 0233                CALL ALCHAR( 1, ICHAR )                                  00332600
                  C                                                              00332700
                  C*****SES INPUT VERIFICATION                                   00332800
                  C                                                              00332900
ISN 0234                CALL INPUT                                               00333000
                  C*****END OF INPUT VERIFICATION - IF FATAL ERROR HAS OCCURRED GO TO 00333100
                  C*****INITIAL INPUT PHASE OF PROGRAM                           00333200
ISN 0235                GO TO( 200,300), NEW                                     00333300
ISN 0236            300 NUMY1 = IABS( LIFE )                                     00333400
ISN 0237                WRITE(OUT,6) NUMY1                                       00333500
ISN 0238                IF( LIFE + DEATH ) 302,350,350                           00333600
ISN 0239            302 IF( DEATH ) 303,304,304                                  00333700
ISN 0240            303 WRITE(OUT,7)                                             00333800
ISN 0241                GO TO 200                                                00333900
ISN 0242            304 WRITE(OUT,8)                                             00334000
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VIII. Revision No. 8

January 21, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 8 TO VERSION 2

Problem

The air pressure change in a line segment, which contributes to both the airflows and the train drag, was sometimes being computed incorrectly. The error occurred in line segments that were in line sections having more than one line segment. It did not occur in the last line segment of a line section. The error only could occur for a line segment if its line section had trains in it. For these possibilities the error consisted of the previous value for the change in air pressure over the end of a train being added at the end of a line segment when a zero value should have been added.

Symptoms

The airflows computed by the first step of the aerodynamic subprogram, which is at simulation time 0.0 seconds, were very large: about 10^{25} CFM. This caused a program halt during the second step of the program, which for the problem under consideration, occurrred at simulation time 0.1 seconds. This failure occurred because the "previous value" mentioned above had an extremely large value at 0.0 seconds since it had not yet been set to a value by the program. Most input data files had caused the program to set the value before attempting to use it, thus eliminating the symptom but not the problem.

Correction

See the attached partial listings of Subroutines INPUT and OMEGA2. Changed lines are indicated by a "C."

Effect on Previous Results

This problem is system dependent. It is recommended that the user check the impact on his previous results by rerunning one or more data sets whose aerodynamic parameters are typical for his system.

SUBROUTINE INPUT

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                2 4HAUGU,4HST  ,4HSEPT,4H.   ,4HOCTO,4HBER ,4HNOVE,4HMBER,          01055400
                3 4HDECE,4HMBER /                                                   01055500
ISN 0150     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'-------')  01055600
ISN 0151     20   FORMAT (17A4,A2)                                                  01055700
ISN 0152     30   FORMAT (9F10.2)                                                   01055800
ISN 0153     40   FORMAT (9A4,4X,4F10.2)                                            01055900
ISN 0154     50   FORMAT (1H1,4(/),T30,'DEPARTMENT OF TRANSPORTATION / TRANSPORTATIO01056000
                1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100
                27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200
                3,T72,'X',/,T54,'X',T57,'X',T72,'X',/,T49,6('X'),T57,7('X'),T66,6('01056300
                4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                  01056400
ISN 0155     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                1/)                                                                 01056600
ISN 0156     70   FORMAT (25X,17A4,A2,////)                                         01056700
ISN 0157     80   FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)            01056800
ISN 0158     90   FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)            01056900
ISN 0159    100   FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                2/,T97,'VERSION 2.08')                                              01057200
ISN 0160    110   FORMAT (1HO,T45,'INPUT VERIFICATION OF GENERAL DATA')             01057300
ISN 0161    120   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                190,'BYPASS')                                                       01057500
ISN 0162    130   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                190,'IMPLICIT')                                                     01057700
ISN 0163    140   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                190,'EXPLICIT (HEAT REJ. COMPUTED)')                            01057900
ISN 0164    150   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                190,'EXPLICIT (HEAT REJ. INPUT)')                               01058100
ISN 0165    160   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                1T90,'BYPASS')                                                  01058300
ISN 0166    170   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                1T90,'YES')                                                     01058500
ISN 0167    180   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                1T90,'YES - EVAPORATION')                                       01058700
ISN 0168    190   FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                1IO')                                                           01058900
ISN 0169    200   FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                1PERATURE')                                                     01059100
ISN 0170    210   FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                1IDITY')                                                        01059300
ISN 0171    220   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T801059400
                1,I5,T90,'BYPASS')                                              01059500
ISN 0172    230   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059600
                1,I5,T90,'YES')                                                 01059700
ISN 0173    240   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059800
                1,I5,T90,'OFF-HOUR')                                            C1059900
ISN 0174    250   FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                1S')                                                            01060100
ISN 0175    260   FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0176    270   FORMAT (1HO,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)             01060300
ISN 0177    280   FORMAT (1HO,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)             01060400
ISN 0178    290   FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                  01060500
ISN 0179    300   FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                1')                                                             01060700
ISN 0180    310   FORMAT (/1HO,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
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C

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ISN 0289          IF (TRLIST(IT)) 440,470,440                                    01644200
                C*****TRAIN NUMBER                                               01644300
ISN 0290        440   NUMV=TRNMLS(ILS,IT)                                        01644400
ISN 0291          NUMV=IABS(NUMV)                                                01644500
                C*****TRAIN TYPE                                                 01644600
ISN 0292          ITYP=ITYPV(NUMV)                                               01644700
                C*****AIR VELOCITY IN REGION RELATIVE TO TRAIN                   01644800
ISN 0293          VRVRG=VNETRG-TRLIST(IT)*UV(NUMV)                               01644900
                C*****ABSOLUTE AIR VELOCITY IN REGION RELATIVE TO TRAIN          01645000
ISN 0294          ABVVRG=ABS(VRVRG)                                              01645100
                C*****COMPUTE (TRAIN SKIN VISCOUS FORCE/AIR MASS DENSITY)        01645200
ISN 0295          SUM7A=-LAMDAV(ITYP)*LRG*VRVRG*ABVVRG/8.0                       01645300
                C*****CHECK FOR NECESSITY OF TRAIN DRAG COMPUTATION - SEE DEFINITION OF 01645400
                C*****KAERO IN DICTIONARY OF VARIABLES FOR PHILOSOPHY BEHIND THIS 01645500
ISN 0296          IF (KAERO) 460,450,460                                         01645600
                C*****ADD TRAIN HEAD CHANGE CAUSED BY TRAIN SKIN VISCOUS FORCE TO TOTAL 01645700
                C*****TRAIN HEAD CHANGE. ADD ESTIMATED TRAIN HEAD CHANGE CAUSED BY 01645800
                C*****AIRFLOW ACCELERATION TO TOTAL TRAIN HEAD CHANGE USING PREVIOUSLY 01645900
                C*****KNOWN VALUE OF AIRFLOW ACCELERATION.                       01646000
ISN 0297        450   DRAGV(NUMV)=DRAGV(NUMV)+TRLIST(IT)*(SUM7A/AV(ITYP)-LRG*DQDTS(ISCT)01646100
                     1/ANETRG)                                                   01646200
                C*****COMPUTE REGION VISCOUS HEAD CHANGE FOR FLOW AT PERIMETER OF ALL 01646300
                C*****TRAINS IN REGION BY ADDING COMPONENT FOR A TRAIN           01646400
ISN 0298        460   SUM7=SUM7+SUM7A/ANETRG                                     01646500
ISN 0299        470   CONTINUE                                                   01646600
ISN 0300          IF (AHTRRG) 610,480,610                                        01646700
                C*****HEAD CHANGES AT FRONT END OF LINE SEGMENT - ONLY COMPUTED IF FRONT01646800
                C*****END OF REGION IS FRONT END OF LINE SEGMENT - OTHERWISE ZERO 01646900
ISN 0301        480   SUM8=-VNETRG*(CFPLS(ILS)*(VNETRG+ABVNRG)-CFNLS(ILS)*(VNETRG-ABVNRG01647000
                     1))/4.0                                                     01647100
                C*****SET HEAD CHANGE AT FORWARD END OF REGION CAUSED BY END OF TRAIN 01647200 <---- C
                C*****TO ZERO                                                    01647300 <---- C
ISN 0302          SUM9=0.0                                                       01647400 <---- C
ISN 0303          IF (ILS-NHIGHS) 720,490,720                                    01647500 <---- C
                C*****STORE AIR VELOCITY AND AREA AT FORWARD END OF SECTION FOR LATER 01647600
                C*****USE BY JUNCTION SUBROUTINES                                01647700
ISN 0304        490   VHIGHS(ISCT)=VNETRG                                        01647800 <---- C
ISN 0305          AHIGHS(ISCT)=ANETRG                                            01647900
                C*****COMPUTATION AND STORAGE OF TRAIN-AT-NODE DATA FOR USE BY JUNCTION 01648000
                C*****SUBROUTINES - COMPUTED ONLY FOR MULTIPLY BRANCHED JUNCTIONS 01648100
                C*****FIND NUMBER OF NODE AT FORWARD END OF SEGMENT              01648200
ISN 0306          IF(KAERO) 720,495,720                                          01648300
ISN 0307        495   INODE=TABL13(ISCT)                                         01648400
                C*****FIND RANGE OF LOCATIONS IN ARRAY TABL2 WHERE NODE DATA IS STORED 01648500
ISN 0308          NLOW=TABL1(INODE)                                              01648600
ISN 0309          NHIGH=TABL1(INODE+1)-1                                         01648700
                C*****CHECK IF NODE IS A MULTIPLY BRANCHED JUNCTION              01648800
ISN 0310          IF (NHIGH-NLOW) 720,500,500                                    01648900
                C*****NODE IS A MULTIPLY BRANCHED JUNCTION. COMPUTE LOWER RANGE OF 01649000
                C*****LOCATIONS OF TRAIN-AT-NODE DATA IN ARRAY TABL2 (UPPER RANGE 01649100
                C*****IS THE SAME). FOR EACH NODE THAT IS A MULTIPLY BRANCHED JUNCTION 01649200
                C*****THE TRAIN-AT-NODE DATA IS STORED IN THE UPPER 3*LMTRRT LOCATIONS 01649300
                C*****OF THE PORTION OF ARRAY TABL2 SET ASIDE FOR THIS NODE. IF NODE 01649400
                C*****INODE IS A MULTIPLY BRANCHED JUNCTION THEN THE NODE-AT-TRAIN DATA 01649500
                C*****IS STORED IN ARRAY TABL2 FROM TABL1(INODE+1)-3*LMTRRT TO    01649600
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SES SAMPLE PROBLEM

SAMPL 5

REVISED OUTPUT REFLECTING
REVISIONS THROUGH V2M08

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 1	1952.	930.0	319.	906.0	668.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76091.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43513.5	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 1	1952.	930.0	319.	906.0	668.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76091.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43513.5	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3 .

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 2	2343.	930.0	383.	906.0	802.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	930.0	81.6	923.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	74028.1	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47748.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 3	2603.	930.0	425.	906.0	891.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	932.0	81.3	924.0	82.4	0.0
		1 - 3 - 2	87.9	935.0	81.1	926.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	900.0	0.0165	900.0	0.0165	
		1 - 3 - 2	0.0165	900.0	0.0165	936.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	299351.5	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216430.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-81995.	928.0	-584012.	960.0	0.	-222926.
AIR VELOCITY	(FPM)	2 - 4	-364.	928.0	-2596.	960.0	0.	-991.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	964.0	81.9	956.0	0.0	84.1
		2 - 4 - 2	89.3	962.0	81.8	954.0	0.0	83.8
		2 - 4 - 3	88.8	960.0	81.7	951.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	966.0	0.0158	961.0	0.0159	
		2 - 4 - 2	0.0159	936.0	0.0157	961.0	0.0159	
		2 - 4 - 3	0.0161	928.0	0.0156	952.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	500405.9	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-482663.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	292731.	929.0	-127742.	937.0	25120.	-44129.
AIR VELOCITY	(FPM)	3 -103	1464.	929.0	-639.	937.0	126.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103						6.6
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	968.0	81.4	931.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	965.0	0.0165	932.0	0.0165	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136195.	952.0	-299697.	960.0	13740.	-61204.
AIR VELOCITY	(FPM)	4 -104	1026.	952.0	-2258.	960.0	104.	-461.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104					9.9	
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	965.0	81.6	950.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	931.0	0.0156	952.0	0.0163	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -RTE 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	499096.	935.0	63238.	983.0	219461.	0.
AIR VELOCITY	(FPM)	5 - 5	2218.	935.0	281.	983.0	975.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	938.0	81.1	929.0	82.7	0.0
		5 - 5 - 2	89.0	940.0	81.0	931.0	83.1	0.0
		5 - 5 - 3	90.4	944.0	81.0	933.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	955.0	0.0165	900.0	0.0165	
		5 - 5 - 2	0.0165	965.0	0.0165	900.0	0.0165	
		5 - 5 - 3	0.0165	953.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT-RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	562443.3	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418640.4	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-332.	920.0	-348721.	952.0	0.	-175462.
AIR VELOCITY	(FPM)	6 - 6	-1.	920.0	-1550.	952.0	0.	-780.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.3	958.0	81.5	947.0	0.0	83.7
		6 - 6 - 2	89.5	956.0	81.2	941.0	0.0	83.3
		6 - 6 - 3	89.9	952.0	80.7	904.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0159	977.0	0.0153	943.0	0.0155	
		6 - 6 - 2	0.0160	971.0	0.0151	910.0	0.0154	
		6 - 6 - 3	0.0162	967.0	0.0147	901.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	623324.1	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-419551.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362535.	934.0	-184908.	977.0	89457.	-45458.
AIR VELOCITY	(FPM)	7 - 7	518.	934.0	-264.	977.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.5	952.0	76.6	913.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	952.0	0.0127	911.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	693411.1	BTU/HR
STEADY-STATE HEAT SOURCES	70000.4	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1230098.0	BTU/HR
HEAT SINK	-4038.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97515.	932.0	-102979.	950.0	17589.	-19159.
AIR VELOCITY	(FPM)	8 - 8	217.	932.0	-229.	950.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	80.1	908.0	79.5	940.0	79.9	79.8
		8 - 8 - 2	80.6	964.0	80.1	942.0	80.4	80.4
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0141	965.0	0.0140	929.0	0.0141	
		8 - 8 - 2	0.0145	964.0	0.0139	942.0	0.0141	

PERCENTAGE OF TIME TEMPERATUPE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	30.8	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	100.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.2	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-102104.9	BTU/HR
HEAT SINK	-5998.0	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280988.	935.0	-241894.	992.0	92016.	-46407.
AIR VELOCITY	(FPM)	9 - 9	401.	935.0	-346.	992.0	131.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.5	950.0	77.8	935.0	79.6	80.1
		9 - 9 - 2	81.1	905.0	78.3	940.0	79.9	79.6
		9 - 9 - 3	81.2	907.0	77.8	990.0	79.9	78.8
		9 - 9 - 4	82.1	909.0	77.0	978.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0143	950.0	0.0137	925.0	0.0141	
		9 - 9 - 2	0.0142	967.0	0.0139	934.0	0.0141	
		9 - 9 - 3	0.0140	969.0	0.0139	907.0	0.0140	
		9 - 9 - 4	0.0140	967.0	0.0139	904.0	0.0140	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	49.5	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	46.2	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	29.7	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	34.1	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3416520.0	BTU/HR
STEADY-STATE HEAT SOURCES	275999.7	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3546868.0	BTU/HR
HEAT SINK	-23453.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52 .

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130547.	932.0	-105933.	949.0	27692.	-35055.
AIR VELOCITY	(FPM)	10 -110	1353.	932.0	-1098.	949.0	287.	-363.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110						12.1
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	915.0	80.1	978.0	80.5	81.6
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	921.0	0.0138	940.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	95729.	909.0	-109030.	969.0	21458.	-15705.
AIR VELOCITY	(FPM)	11 - 10	213.	909.0	-242.	969.0	48.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.6	922.0	80.0	905.0	80.3	80.3
		11 - 10 - 2	80.2	963.0	79.1	979.0	79.8	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0145	922.0	0.0137	905.0	0.0141	
		11 - 10 - 2	0.0140	964.0	0.0139	910.0	0.0140	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	93.4	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	25.3	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.9	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-94586.9	BTU/HR
HEAT SINK	-5197.9	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271237.	937.0	-262545.	973.0	105669.	-54307.
AIR VELOCITY	(FPM)	12 - 11	387.	937.0	-375.	973.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	85.2	910.0	75.9	966.0	80.2	78.1
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0140	911.0	0.0138	900.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	39.6	3.3	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719437.5	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1054050.0	BTU/HR
HEAT SINK	-14632.8	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271237.	937.0	-262545.	973.0	105669.	-54307.
AIR VELOCITY	(FPM)	13 - 12	678.	937.0	-656.	973.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.6	911.0	80.3	963.0	84.6	83.4
		13 - 12 - 2	91.7	914.0	83.7	964.0	87.5	86.3
		13 - 12 - 3	91.8	916.0	86.5	964.0	89.2	88.5
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	912.0	0.0140	963.0	0.0140	
		13 - 12 - 2	0.0147	914.0	0.0141	963.0	0.0143	
		13 - 12 - 3	0.0154	915.0	0.0144	963.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1066610.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-358160.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153791.	966.0	119234.	914.0	137945.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	968.0	795.	914.0	919.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.5	926.0	87.5	952.0	88.9	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	905.0	0.0146	950.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133181.	918.0	-391137.	972.0	33732.	-120315.
AIR VELOCITY	(FPM)	15 - 13	333.	918.0	-978.	972.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					44.0	56.0
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.2	976.0	88.3	909.0	89.7	89.3
		15 - 13 - 2	90.2	973.0	86.5	910.0	87.9	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	916.0	0.0157	950.0	0.0160	
		15 - 13 - 2	0.0164	922.0	0.0162	972.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	673970.6	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-327793.4	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133181.	918.0	-391137.	972.0	33732.	-120315.
AIR VELOCITY	(FPM)	15 - 14	190.	918.0	-559.	972.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					44.0	56.0
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.5	971.0	84.8	910.0	85.6	86.0
		15 - 14 - 2	85.7	969.0	83.0	910.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	924.0	0.0164	971.0	0.0164	
		15 - 14 - 2	0.0165	925.0	0.0165	970.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	469402.1	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-128030.9	BTU/HR

SES HEAT SINK ANALYSIS

ZONE NUMBER 1

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
1 - 1 - 1	82.1	0.01648
1 - 2 - 1	82.1	0.01648
1 - 3 - 1	82.3	0.01648
1 - 3 - 2	82.6	0.01649
2 - 4 - 1	83.9	0.01582
2 - 4 - 2	83.7	0.01582
2 - 4 - 3	83.4	0.01581
5 - 5 - 1	82.7	0.01648
5 - 5 - 2	83.1	0.01648
5 - 5 - 3	83.7	0.01648
6 - 6 - 1	83.7	0.01544
6 - 6 - 2	83.2	0.01532
6 - 6 - 3	82.9	0.01538
3 -103 - 1	81.6	0.01648
4 -104 - 1	81.8	0.01631

SES HEAT SINK ANALYSIS

ZONE NUMBER 3

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
10 -110 - 1	81.0	0.01529

SES HEAT SINK ANALYSIS

ZONE NUMBER 4

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
13 - 12 - 1	84.5	0.01387
13 - 12 - 2	87.2	0.01420
13 - 12 - 3	89.1	0.01479
15 - 13 - 1	89.4	0.01599
15 - 13 - 2	87.8	0.01634
15 - 14 - 1	85.8	0.01644
15 - 14 - 2	84.0	0.01647
14 -114 - 1	88.8	0.01537

ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES

AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), BTU/HR

THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING RUSH HOUR

ZONE NUMBER 2 ----- DESIGN CONDITION ----- 80.0 DEG F DRY BULB ----- 70.0 DEG F WET BULB

SYSTEM PARTITIONING	TRAINS		STEADY-STATE HEAT SINK		AIR FLOW	ENVIRONMENTAL CONTROL		TOTAL ENVIRONMENTAL CONTROL REQUIREMENT			
	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	LATENT	TOTAL
7 - 7 - 1	693411	9	70000	35999	-10722	451074	1072160	-1230097	-1092677	-1203763	-1108148	-2311931
8 - 8 - 1	2	0	50000	36000	-2539	-6273	23772	-40950	-50936	-41140	-59772	-100912
8 - 8 - 2	2	0	50000	36000	-2729	28544	195697	-61153	-198436	-75817	-231697	-307514
9 - 9 - 1	844136	0	69000	36000	-11748	14217	70611	-871170	-67620	-915605	-106611	-1022216
9 - 9 - 2	857907	0	69000	36000	-11650	-51454	-22700	-849941	-8072	-863803	-13300	-877103
9 - 9 - 3	861544	0	69000	36000	-11507	-56972	-30930	-877203	-15624	-862065	-5070	-867135
9 - 9 - 4	852933	0	68999	36000	-11610	12841	-12224	-948551	-21201	-923163	-22776	-945939
11 - 10 - 1	2	0	50000	36000	-2746	27763	197066	-64513	-207444	-75019	-233066	-308085
11 - 10 - 2	2	0	50000	36000	-2572	-25939	-1153	-30072	-33191	-21591	-34847	-56438
12 - 11 - 1	719437	0	69999	36000	-12218	329335	50044	-1054049	-68016	-1106553	-86044	-1192597
ZONE TOTAL	4829376	9	615998	359999	-80091	723236	1541343	-6027699	-1763217	-6088519	-1901351	-7989870

CONVECTIVE LOAD BREAKDOWN

AVERAGED ZONE CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR

SOURCE NO	NODE NO	SECTION NO	SEGMENT NO	SEGMENT NAME	SENSIBLE GAIN	LATENT GAIN	TOTAL
1	5				353981	1123092	1477073
2	7				33629	190461	224089
3	7				33363	196879	220242
4	9				302262	40909	343171

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	P T E	T Y P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2874.41	18.97	2.82	324.	3.74	2305.	307.	3876.	16.	268.4	739.7	2.503	2.263
22	2	1	2743.59	11.13	-2.50	-64.	-2.13	0.	0.	0.	-2.	241.6	750.7	3.435	1.990

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	82.10	0.01648	96749.8	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	82.12	0.01648	96749.8	387.0						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	82.28	0.01648	96749.8	430.0						
	1 - 3 - 2		0.4	0.0	82.64	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	83.95	0.01582	-232932.6	-1035.3						
	2 - 4 - 2		6.2	0.0	83.74	0.01582								
	2 - 4 - 3		6.2	0.0	83.44	0.01581								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1500 FT - ROUTE 1									
	3 -103 - 1				81.65	0.01648	20712.4	103.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.78	0.01631	-48742.9	-367.2						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	82.67	0.01648	76037.4	337.9						
	5 - 5 - 2		0.4	0.0	83.11	0.01648								
	5 - 5 - 3		0.4	0.0	83.65	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.69	0.01544	-184189.8	-818.6						
	6 - 6 - 2		5.9	0.0	83.22	0.01532								
	6 - 6 - 3		5.9	0.0	82.94	0.01538								

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY					
	7 - 7 - 1	-122.3	-297.8	80.00	0.01364	-108152.4	-154.5		22	
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT					
	8 - 8 - 1	2.5	-6.6	80.00	0.01364	-34191.3	-76.0			
	8 - 8 - 2	-7.2	-54.4	80.00	0.01364					
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS					
	9 - 9 - 1	-0.7	-19.6	80.00	0.01364	-73941.1	-105.7	21	22	
	9 - 9 - 2	17.5	6.3	80.00	0.01364			21	22	
	9 - 9 - 3	19.0	8.6	80.00	0.01364			21	22	
	9 - 9 - 4	-0.3	3.7	80.00	0.01364			21	22	
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE					
	10 -110 - 1			81.04	0.01529	-30248.1	-313.5			
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE					
	11 - 10 - 1	-6.9	-54.7	80.00	0.01364	-3943.3	-8.8			
	11 - 10 - 2	7.9	0.3	80.00	0.01364					
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION					
	12 - 11 - 1	-88.1	-13.9	80.00	0.01364	-77904.4	-111.3	21	22	
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT					
	13 - 12 - 1	205.7	0.0	84.50	0.01387	-77904.4	-194.8	21	22	
	13 - 12 - 2	4.7	0.0	87.24	0.01420					
	13 - 12 - 3	4.7	0.0	89.05	0.01479					
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE					
	14 -114 - 1			88.83	0.01537	140712.3	937.9			
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT					
	15 - 13 - 1	5.8	0.0	89.38	0.01599	-218616.7	-546.5			
	15 - 13 - 2	5.8	0.0	97.82	0.01634					
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT					
	15 - 14 - 1	4.3	0.0	85.76	0.01644	-218616.7	-312.3			
	15 - 14 - 2	4.3	0.0	83.98	0.01647					

April 14, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 9 TO VERSION 2

Problem

A precision problem occurred in Subroutine TRAIN.

Symptoms

The train performance subprogram subroutines TRAIN and LOCATE monitor and control the passage of a subway train through the system. For the rare circumstance described herein, the train performance subroutines could not properly monitor the location of a train and therefore could not control it. The data set that uncovered the problem had a train initialized at a system location where trains stopped. This initialization data was input in accordance with Input Form 10. After the remaining dwell time was exhausted, the train was dispatched. The train should have had an initial acceleration of 3 mph/sec, reached a constant speed of 55 mph and braked for the next stop along the route. Instead, the train accelerated at 2 mph/sec until it exited the system at over 100 mph. The direct cause of this was that the distance the train was to move during the first time increment after the train was dispatched was 1/4,000,000th of the location of the train along the route. It is beyond the single precision capability of IBM 370 computers to properly add or subtract numbers of this range in magnitude, the result being that the number of larger magnitude is taken as the answer. Therefore, the train performance subprogram could not determine that the train had moved beyond the stopping location and attempted to make the train brake for it. It was then in the computational sequence that the second problem occurred. The train was assigned an acceleration of 2 mph/sec instead of a deceleration of 2 mph/sec with the indicators set by Subroutine TRAIN stating the train was braking.

Correction

See attached partial listings of Subroutines INPUT, LOCATE, and TRAIN. The four lines to be corrected are indicated by a "C." The change in Subroutine INPUT updated the program output to state "Version 2.09." The change in Subroutine LOCATE eliminated the precision problem. The changes in Subroutine TRAIN eliminated the possibility of the train deceleration being given the wrong sign.

Effect on Previous Results

The nature of this problem was such that the train performance subprogram either monitored an initialized train properly or permitted a train to constantly accelerate until it exited the system. The occurrence of this problem may be readily noted by observing the train operations. This problem required a very rare combination of circumstances.

It could only occur if the time at which the train was dispatched was an integer multiple of the complete train evaluation time. Furthermore, it required that the distance the train was to move during the first time increment after the train was dispatched was 1/4,000,000th of the location of the train along the route. This problem could not occur on UNIVAC or CDC computers unless this distance ratio was much smaller, perhaps 1/25,000,000th, because of the greater precision at which they operate.

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                2 4HAUGU,4HST  ,4HSEPT,4H.   ,4HOCTO,4HBER ,4HNOVE,4HMBER,          01055400
                3 4HDECE,4HMBER /                                                   01055500
ISN 0150     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------'I   01055600
ISN 0151     20   FORMAT (17A4,A2)                                                  01055700
ISN 0152     30   FORMAT (8F10.2)                                                   01055800
ISN 0153     40   FORMAT (9A4,4X,4F10.2)                                            01055900
ISN 0154     50   FORMAT (1H1,4(/),T30,'DEPARTMENT OF TRANSPORTATION / TRANSPORTAT1001056000
               1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100
               27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200
               3,T72,'X',/,T54,'X',T57,'X',T72,'X',/,T48,6('X'),T57,7('X'),T66,6('01056300
               4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                   01056400
ISN 0155     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
               1/)                                                                 01056600
ISN 0156     70   FORMAT (25X,17A4,A2,////)                                         01056700
ISN 0157     80   FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,(6,///)            01056800
ISN 0158     90   FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,16,/)            01056900
ISN 0159    100   FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -',//,T97,'PARSONS, BRINCKER01057000
               1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
               2/,T97,'VERSION 2.09'I                                              01057200 <-- C
ISN 0160    110   FORMAT (1HO,T45,'INPUT VERIFICATION OF GENERAL DATA')             01057300
ISN 0161    120   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
               190,'BYPASS')                                                       01057500
ISN 0162    130   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
               190,'IMPLICIT')                                                     01057700
ISN 0163    140   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
               190,'EXPLICIT (HEAT REJ. COMPUTED)')                                01057900
ISN 0164    150   FORMAT (1HO,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
               190,'EXPLICIT (HEAT REJ. INPUT)'I                                   01058100
ISN 0165    160   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
               1T90,'BYPASS'I                                                      01058300
ISN 0166    170   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
               1T90,'YES')                                                         01058500
ISN 0167    180   FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
               1T90,'YES - EVAPORATION')                                           01058700
ISN 0168    190   FORMAT ((HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
               1IO'I                                                               01058900
ISN 0169    200   FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
               1PERATURE')                                                         01059100
ISN 0170    210   FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
               1IDITY')                                                            01059300
ISN 0171    220   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
               1,I5,T90,'BYPASS')                                                  01059500
ISN 0172    230   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
               1,I5,T90,'YES'I                                                     01059700
ISN 0173    240   FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
               1,I5,T90,'OFF-HOUR')                                                01059900
ISN 0174    250   FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPASO1060000
               1S')                                                                01060100
ISN 0175    260   FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0176    270   FORMAT (1HO,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)             01060300
ISN 0177    280   FORMAT (1HO,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)             01060400
ISN 0178    290   FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                  01060500
ISN 0179    300   FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATIONO1060600
               1')                                                                 01060700
ISN 0180    310   FORMAT (/1HO,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
```

```
ISN 0152      100 IF (XV(NUMV)-FSTS(JTS,IROUTE)) 130,110,110-                  -  -01393800
             C---- TRAIN HAS MOVED PAST T.S. BOUNDARY -ADVANCE 'JTS' PAST TRAIN FRONT01393900
ISN 0153      110 JTS = JTS + 1                                                  01394000
             C---- CHECK FOR END OF TRACK SECTIONS                               01394100
ISN 0154          IF( JTS - NTS ) 100,100,120                                    01394200
             C---- FRONT OF TRAIN IS PAST LAST T.S.  -  OUTSIDE OF TUNNEL SYSTEM 01394300
ISN 0155      120 JTS = NTS                                                      01394400
ISN 0156          SUM = XV(NUMV) - FSTS(NTS,IROUTE)                              01394500
ISN 0157          IDIR = 0                                                       01394600
ISN 0158          ISEGF = 0                                                      01394700
             C---- DRAG ON FRONT OF TRAIN AND SIDES OF LENGTH 'SUM'               01394800
ISN 0159          DRAGV(NUMV)=(CDFVOV(ITYP)/2.0+LAMDAV(ITYP)*SUM/                01394900
                 1(8.0*AV(ITYP)))*UV(NUMV)*UV(NUMV)                             01395000
ISN 0160          ISEG=NSEGTS(JTS,IROUTE)                                        01395100
ISN 0161          ISEG=IABS(ISEG)                                                01395200
ISN 0162          NTSV(NUMV)=JTS                                                 01395300
ISN 0163          IF( ISEG ) 175,175,160                                         01395400
             C---- FRONT OF TRAIN IS LOCATED WITHIN TRACK SECTIONS                01395500
ISN 0164      130 SUM = 0.0                                                      01395600
             C---- GET SEGMENT NUMBER AND DIRECTION OF TRAIN MOVEMENT IN SEGMENT  01395700
ISN 0165      140 ISEG=NSEGTS(JTS,IROUTE)                                        01395800
ISN 0166          ISEG=IABS(ISEG)                                                01395900
ISN 0167          NTSV(NUMV)=JTS                                                 01396000
ISN 0168          ISEGF = ISEG                                                   01396100
             C---- CHECK IF OUTSIDE OF TUNNEL SYSTEM                              01396200
ISN 0169          IF( ISEG ) 150,150,160                                         01396300
             C---- OUTSIDE OF TUNNEL SYSTEM                                       01396400
ISN 0170      150 IDIR = 0                                                       01396500
             C---- DRAG ON FRONT OF TRAIN                                         01396600
ISN 0171          DRAGV(NUMV) = CDFVOV(ITYP)*UV(NUMV)*UV(NUMV)/2.0               01396700
ISN 0172          GO TO 175                                                      01396800
             C---- TRAIN IS INSIDE TUNNEL SYSTEM - STORE SEGMENT OF TRAIN FRONT   01396900
ISN 0173      160 IDIR = NSEGTS(JTS,IROUTE) / ISEG                               01397000
             C---- INCREMENT NUMBER OF TRAINS IN THIS SEGMENT                     01397100
ISN 0174          NTRNLS(ISEG) = NTRNLS(ISEG) + 1                                01397200
ISN 0175          NTRN = NTRNLS(ISEG)                                            01397300
ISN 0176          NF = 2 * NTRN                                                  01397400
ISN 0177          NB = NF - 1                                                    01397500
             C---- CHECK IF GREATER THAN MAXIMUM NUMBER OF TRAINS ALLOWED IN SEGMENT 01397600
             C----     LIMITED BY ARRAY SIZE ('TRNNLS','TRNDLS') TO 'LMTRSG' TRAINS 01397700
ISN 0178          IF( NTRN - LMTRSG ) 170,170,800                                01397800
ISN 0179      170 TRNNLS(ISEG,NTRN) = IDIR * NUMV                                01397900
ISN 0180      175 TNL1 = XV(NUMV) - FSTS(JTS-1, IROUTE)                          01398000
             C                                                                   01398100
             C---- CHECK IF ENTIRE TRAIN HAS BEEN PROPORTIONED                    01398200
             C                                                                   01398300
ISN 0181      200 IF( SUM + TNL1 - LV(ITYP) ) 210,400,400                        01398400
             C---- CONTINUE PROPORTIONING TRAIN OVER TRACK SECTIONS                01398500
ISN 0182      210 SUM = SUM + TNL1                                               01398600
ISN 0183          RG = RG + TNL1 * GRDTS(JTS,IROUTE)                             01398700
ISN 0184          IF( RADTS(JTS,IROUTE) ) 225,225,220                            01398800
ISN 0185      220 RC = RC + TNL1 / RADTS(JTS,IROUTE)                             01398900
ISN 0186      225 IF( ISEG ) 227,227,230                                         01399000
             C---- COMPUTE DRAG ON TRAIN SIDE OF LENGTH 'TNL1'                    01399100
ISN 0187      227 DRAGV(NUMV)=DRAGV(NUMV)+LAMDAV(ITYP)*TNL1/                     01399200
```

C

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                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                        02633400
ISN 0303          510 JTS2=NTSV2(NUMV)                                                  02633500
ISN 0304              IF (ABS(UMXTS(JTS2,IROUTE))-0.1) 520,530,530                      02633600
                C*****TRAIN IS STOPPING FOR A STATION                                   02633700
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                       02633800
ISN 0305          520 STTIM=(FSTS(JTS2-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)                 02633900
ISN 0306              IF( STTIM ) 537,537,525                                           02633910
ISN 0307          525 DUDTV(NUMV)=-UV(NUMV)/STTIM                                       02634000
ISN 0308              GO TO 540                                                         02634100
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                          02634200
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                        02634300
ISN 0309          530 STTIM=(UV(NUMV)-ABS(UMXTS(JTS2,IROUTE)))/DECV(ITYP)               02634400
ISN 0310              INT=(IFIX(STTIM/DELT+0.9999)                                      02634500
ISN 0311              STTIM=FLOAT(INT)*DELT                                             02634600
ISN 0312              IF( STTIM ) 537,537,535                                           02634610
ISN 0313          535 DUDTV(NUMV)=(ABS(UMXTS(JTS2,IROUTE))-UV(NUMV))/STTIM              02634700
ISN 0314              GO TO 540                                                         02634710
                C**** USE MAXIMUM DECELERATION RATE                                     02634720
ISN 0315          537 DUDTV(NUMV)=-DECV(ITYP)                                           02634730
                C*****SWITCH TO MODE 4                                                  02634800
                C*****USE THIS DECELERATION RATE FOR REMAINDER OF BRAKING CYCLE         02634900
ISN 0316          540 MODEV(NUMV)=4                                                     02635000
ISN 0317              GO TO 820                                                         02635100
                C*****TRAIN HAS STOPPED                                                 02635200
ISN 0318          550 MODEV(NUMV)=0                                                     02635300
ISN 0319              DUDTV(NUMV)=0.0                                                   02635400
ISN 0320              UV(NUMV)=0.0                                                      02635500
ISN 0321              JTS=NTSV2(NUMV)                                                   02635600
ISN 0322              XV(NUMV)=FSTS(JTS,IROUTE)                                         02635700
                C*****COMPUTE TIME OF RESTART                                           02635800
ISN 0323              TSTRTV(NUMV)=NTIME+DWLTS(JTS,IROUTE)                              02635900
ISN 0324              NTSV(NUMV)=NTSV2(NUMV)+1                                          02636000
ISN 0325              TEV(NUMV)=0.0                                                     02636100
ISN 0326              AMPV(NUMV)=0.0                                                    02636200
ISN 0327              AMPLV(NUMV)=0.0                                                   02636300
ISN 0328              QACCV(NUMV)=0.0                                                   02636400
ISN 0329              QDECV(NUMV)=0.0                                                   02636500
ISN 0330              RMHTV(NUMV)=0.0                                                   02636600
                C*****COMPUTE NEW WEIGHT OF PATRONS ON TRAIN                            02636700
ISN 0331              WPATV(NUMV)=WPATV(NUMV)+NPETTS(JTS,IROUTE)*PATWHT                 02636800
ISN 0332              GO TO 820                                                         02636900
                C                                                                       02637000
                C*****COASTING MODE - MODE=5                                            02637100
                C                                                                       02637200
                C*****COMPUTE NEW ACCELERATION                                          02637300
ISN 0333          560 DUDTV(NUMV)=-RS(STV(NUMV)/(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)02637400
                C*****COMPUTE ANTICIPATED SPEED                                         02637500
ISN 0334              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                                    02637600
                C*****IF ANTICIPATED SPEED IS LESS THAN UMIN THEN SWITCH TO ANOTHER MODE02637700
ISN 0335              IF (UNEW-UMINRT(IROUTE)) 570,570,600                              02637800
ISN 0336          570 UNEW=UMINRT(IROUTE)                                               02637900
                C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED               02638000
ISN 0337              XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                        02638100
ISN 0338              UV(NUMV)=UNEW                                                     02638200
ISN 0339              DUDTV(NUMV)=0.0                                                   02638300
```

C

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                IV(ITYP)**2-DECBV(ITYP)*TI/DECAV(ITYP)                                  02654900
ISN 0431          IF (ABS(UMXTS(JTS,IROUTE))-DECVIV(ITYP)) 980,980,970                  02655000
                C*****CONSTANT DECELERATION PORTION OF CURVE IS NOT BEING USED           02655100
                C*****BECAUSE SPEED RESTRICTION 'UMXTS' IS ABOVE 'DECVIV'               02655200
ISN 0432        970 STDIS=S1                                                            02655300
ISN 0433          GO TO 990                                                             02655400
                C*****COMPUTE BRAKING TIME AND DISTANCE ON CONSTANT DECELERATION        02655500
                C*****PORTION OF CURVE                                                  02655600
ISN 0434        980 T2=(DECVIV(ITYP)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)                 02655700
ISN 0435          S2=DECVIV(ITYP)*T2-0.5*DECV(ITYP)*T2**2                               02655800
ISN 0436          STDIS=S1+S2                                                           02655900
                C*****CHECK IF NECESSARY TO BRAKE FOR THIS SPEED RESTRICTION BEFORE      02656000
                C*****NEXT COMPLETE TRAIN EVALUATION                                    02656100
ISN 0437        990 IF (STDIS+UV(NUMV)*DELTR+0.5*DUDTV(NUMV)*DELTR**2-(ESTS(JTS-1,IROU02656200
                  ITE)-XV(NUMV))) 1050,1050,1000                                        02656300
                C*****IT IS NECESSARY TO BRAKE NOW - SWITCH TO MODE 3 OR 4              02656400
                C*****SET TRACK SECTION TRAIN IS BRAKING FOR                            02656500
ISN 0438        1000 NTSV2(NUMV)=JTS                                                    02656600
                C*****TURN TRAIN POWER OFF                                              02656700
ISN 0439          TEV(NUMV)=0.0                                                         02656800
ISN 0440          AMPV(NUMV)=0.0                                                        02656900
ISN 0441          AMPLV(NUMV)=0.0                                                       02657000
                C*****COMPUTE DECELERATION RATE                                         02657100
ISN 0442          IF (UV(NUMV)-DECVIV(ITYP)) 1020,1020,1010                             02657200
                C*****ABOVE SPEED V1 - VARYING DECELERATION RATE                        02657300
ISN 0443        1010 MODEV(NUMV)=3                                                      02657400
ISN 0444          DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UV(NUMV)                         02657500
ISN 0445          GO TO 1070                                                            02657600
                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                       02657700
ISN 0446        1020 MODEV(NUMV)=4                                                      02657800
ISN 0447          IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1030,1040,1040                        02657900
                C*****TRAIN IS STOPPING FOR A STATION                                   02658000
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                       02658100
ISN 0448        1030 STTIM=(ESTS(JTS-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)                   02658200
ISN 0449          IF( STTIM ) 1047,1047,1035                                            02658210
ISN 0450        1035 DUDTV(NUMV)=-UV(NUMV)/STTIM                                        02658300
ISN 0451          GO TO 1070                                                            02658400
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                          02658500
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                        02658600
ISN 0452        1040 STTIM=(UV(NUMV)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)                 02658700
ISN 0453          INT=IFIX(STTIM/DELT+0.9999)                                           02658800
ISN 0454          STTIM=FLOAT(INT)*DELT                                                 02658900
ISN 0455          IF( STTIM ) 1047,1047,1045                                            02658910
ISN 0456        1045 DUDTV(NUMV)=(ABS(UMXTS(JTS,IROUTE))-UV(NUMV))/STTIM                02659000
ISN 0457          GO TO 1070                                                            02659100
                C*****USE MAXIMUM DECELERATION RATE                                     02659110
ISN 0458        1047 DUDTV(NUMV)=-DECV(ITYP)                                            02659120
ISN 0459          GO TO 1070                                                            02659130
                C*****SPEED RESTRICTION IS HIGHER THAN CURRENT SPEED OR THERE IS        02659200
                C*****SUFFICIENT BRAKING DISTANCE                                       02659300
                C*****CHECK FOR A STATION (MAXIMUM SPEED OF ZERO)                       02659400
ISN 0460        1050 IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1070,1070,1060                     02659500
ISN 0461        1060 JTS=JTS+1                                                          02659600
ISN 0462          GO TO 990                                                             02659700
ISN 0463        1070 CONTINUE                                                           02659800
```

C

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 10 TO VERSION 2

Problem

An incorrect upper limit was used for checking the Front of Train Drag Coefficient on Input Form 9B.

Symptoms

The allowable range of the Front of Train Drag Coefficient on Input Form 9B should be from 0.0 to 1.5. An upper limit of 1.0 was being incorrectly used. This caused an Error Type 115 message to be incorrectly printed for values ranging from 1.0 to 1.5.

Correction

See the attached partial listing of subroutine GARAGE. The line to be corrected is indicated by a "C."

Effect on Previous Results

None.

```
                INT REQUIRED BASED ON THE VEHICLE DATA',                                00777300
                2 / 1H0,2(4X,'SPEED',6X,'TRACTIVE EFFORT',4X,'MOTOR CURRENT',3X,        00777400
                3 'LINE CURRENT',2X) ,T67,'.',/1H ,                                     00777500
                4 2(4X,'(MPH)',8X,'(LBS/MOTOR)',6X,'(AMPS/MOTOR)',3X,'(AMPS/PWR CAR)00777600
                5)',1X),T67,'.',/,T67,'.')                                              00777700
ISN 0197    452   FORMAT (1H ,2(3X,F6.1,F16.0,2F17.0,5X),T67,'.')                       00777800
ISN 0198    460   FORMAT (1H ,6X,2(F10.1,F18.0,F17.0,8X) , T61,'.' )                    00777900
ISN 0199    461   FORMAT (/1H0,' INTERNAL MOTOR RESISTANCE',T80,F14.3,T97,'OHMS/MOT)00778000
                IR',T113,'FORM 9H')                                                     00778100
ISN 0200    470   FORMAT (/1H0,' MOTOR CIRCUIT RESISTANCE PER MOTOR  (SUM OF MOTOR A)00778200
                IND EXTERNAL RESISTANCES)',T113,'FORM 9H' )                             00778300
ISN 0201    475   FORMAT(1H0,T10,'RESISTANCE',T29,3F12.3,T97,'OHMS')                    00778400
ISN 0202    480   FORMAT (1H0,T10,'SPEED',T38,'0.0',2F12.1,T97,'MPH')                   00778500
ISN 0203    490   FORMAT (1H0,' MAXIMUM ALLOWABLE ACCELERATION RATE',                   00778600
                1  T80,F14.1,T97,'MPH/SEC' ,T113,'FORM 9I' )                          00778700
ISN 0204    500   FORMAT (1H0,' NORMAL DECELERATION RATE FROM SPEED V1 TO ZERO',T80,00778800
                1 F14.1,T97,'MPH/SEC')                                                  00778900
ISN 0205    510   FORMAT (1H0,' SPEED V1',T80,F14.1,T97,'MPH')                          00779000
ISN 0206    520   FORMAT (1H0,' NORMAL DECELERATION RATE AT SPEED V2',T80,F14.1,T97,00779100
                1  'MPH/SEC')                                                          00779200
ISN 0207    530   FORMAT (1H0,' SPEED V2',T80,F14.1,T97,'MPH')                          00779300
                C                                                                       00779400
                C                                                                       00779500
                C-----    INPUT FORM 9A                                                 00779600
ISN 0208          READ (IN,110) NUMMY1,DUMY1,DUMY2,LV(I),AV(I)                          00779700
ISN 0209          WRITE (OUT,130) I,NUMMY1                                              00779800
ISN 0210          NCARV(I)=DUMY1                                                        00779900
ISN 0211          NUMY1=DUMY1                                                           00780000
ISN 0212          WRITE (OUT,150) NUMY1                                                 00780100
ISN 0213          CALL CHECKI (NUMY1,1,20,51)                                           00780200
ISN 0214          NPCARV(I)=DUMY2                                                       00780300
ISN 0215          NUMY2=DUMY2                                                           00780400
ISN 0216          WRITE(OUT,155) NUMY2                                                  00780500
ISN 0217          CALL CHECKI( NUMY2, 1, NUMY1, 116 )                                   00780600
ISN 0218          WRITE (OUT,160) LV(I)                                                 00780700
ISN 0219          CALL CHECKR (LV(I),25.0,1500.0,52)                                    00780800
ISN 0220          WRITE (OUT,170) AV(I)                                                 00780900
ISN 0221          CALL CHECKR (AV(I),25.0,300.0,53)                                     00781000
                C                                                                       00781100
                C-----    INPUT FORM 9B                                                 00781200
ISN 0222          READ(IN,120) PERMV(I),LAMDAV(I),DUMY2,CDFVOV(I),SHREV(I),THREV(I) 00781300
ISN 0223          WRITE (OUT,180) PERMV(I)                                              00781400
ISN 0224          CALL CHECKR (PERMV(I),20.0,200.0,78)                                  00781500
ISN 0225          DUMY1=PERMV(I)-(4.0*PI*AV(I))**0.5                                    00781600
ISN 0226          IF (DUMY1) 540,550,550                                                00781700
ISN 0227    540   CALL ERROR (70)                                                       00781800
ISN 0228      550 WRITE (OUT,190) LAMDAV(I)                                             00781900
ISN 0229          CALL CHECKR (LAMDAV(I),0.0,0.10,55)                                   00782000
ISN 0230          CDBVOV(I)=0.029/SQRT(0.5*LV(I)*LAMDAV(I)*PERMV(I)/(4.0*AV(I)))    00782100
ISN 0231          WRITE(OUT,195) DUMY2                                                  00782200
ISN 0232          CALL CHECKR(DUMY2,0.0,500.0,201)                                      00782300
ISN 0233          DUMY2=DUMY2/(4.0*LV(I)*PERMV(I))                                      00782400
ISN 0234          LAMDAV(I)=LAMDAV(I)+DUMY2                                             00782500
ISN 0235          LAMDAV(I)=LAMDAV(I)*PERMV(I)                                          00782600
ISN 0236          WRITE (OUT,210) CDFVOV(I)                                             00782700
```

```
ISN 0237            CALL CHECKR ( CDEVOV(I), 0.0, 1.5, 115 )                    00782800 <-- C
ISN 0238            WRITE (OUT,230) SHREV(I)                                    00782900
ISN 0239            CALL CHECKR (SHREV(I),0.0,0.1E7,57)                         00783000
ISN 0240            WRITE(OUT,235)  LHREV(I)                                    00783100
ISN 0241            CALL CHECKR (LHREV(I),0.0,0.2E6,58)                         00783200
                  C                                                             00783300
                  C**** RESISTOR GRID DATA                                      00783400
                  C-----    INPUT FORM 9C                                       00783500
ISN 0242            WRITE (OUT,240)                                             00783600
ISN 0243            READ (IN,120) DUMY1,DUMY2,DIACGV(I),DIDCGV(I),ACACCV(I),ACDECV(I),00783700
                   1  ARACCV(I), ARDECV(I)                                      00783800
ISN 0244            WRITE (OUT,250) DUMY1,DUMY2                                 00783900
ISN 0245            CALL CHECKR (DUMY1,0.0,2000.,101)                           00784000
ISN 0246            CALL CHECKR (DUMY2,0.0,2000.,102)                           00784100
ISN 0247            WRITE (OUT,260) DIACGV(I),DIDCGV(I)                         00784200
ISN 0248            CALL CHECKR (DIACGV(I),0.0,24.,103)                         00784300
ISN 0249            CALL CHECKR (DIDCGV(I),0.0,24.,104)                         00784400
ISN 0250            DIACGV(I)=DIACGV(I)/FTIN                                    00784500
ISN 0251            DIDCGV(I)=DIDCGV(I)/FTIN                                    00784600
ISN 0252            WRITE (OUT,270) ACACCV(I),ACDECV(I)                         00784700
ISN 0253            CALL CHECKR (ACACCV(I),0.0,500.,105)                        00784800
ISN 0254            CALL CHECKR (ACDECV(I),0.0,500.,106)                        00784900
ISN 0255            WRITE (OUT,280) ARACCV(I),ARDECV(I)                         00785000
ISN 0256            CALL CHECKR (ARACCV(I),0.0,500.,107)                        00785100
ISN 0257            CALL CHECKR (ARDECV(I),0.0,500.,108)                        00785200
ISN 0258            READ (IN,120) EMISAG(I),EMISDG(I),DUMY3,DUMY4, TIACCV(I),TIDECV(I)00785300
ISN 0259            WRITE (OUT,290) EMISAG(I),EMISDG(I)                         00785400
ISN 0260            CALL CHECKR (EMISAG(I),0.0,1.0,109)                         00785500
ISN 0261            CALL CHECKR (EMISDG(I),0.0,1.0,110)                         00785600
ISN 0262            WRITE (OUT,300) DUMY3,DUMY4                                 00785700
ISN 0263            CALL CHECKR (DUMY3,0.0,1.0,111)                             00785800
ISN 0264            CALL CHECKR (DUMY4,0.0,1.0,112)                             00785900
ISN 0265            IF( ABS(TIACCV(I)) - 0.1 ) 553,554,554                      00786000
ISN 0266          553 TIACCV(I) = TDBAMB                                        00786100
ISN 0267          554 IF( ABS(TIDECV(I)) - 0.1 ) 555,556,556                    00786200
ISN 0268          555 TIDECV(I) = TDBAMB                                        00786300
ISN 0269          556 WRITE(OUT,302)  TIACCV(I),TIDECV(I)                       00786400
ISN 0270            MCPGAV(I)=DUMY1*DUMY3                                       00786500
ISN 0271            MCPGDV(I)=DUMY2*DUMY4                                       00786600
ISN 0272            IF (DUMY1-0.01) 560,560,570                                 00786700
ISN 0273      560   MCPGAV(I)=0.0                                               00786800
ISN 0274            WRITE (OUT,310)                                             00786900
ISN 0275      570   IF (DUMY2-0.01) 580,580,590                                 00787000
ISN 0276      580   MCPGDV(I)=0.0                                               00787100
ISN 0277            WRITE (OUT,320)                                             00787200
ISN 0278      590   CONTINUE                                                    00787300
                  C                                                             00787400
ISN 0279            WRITE (OUT,9) DATE,SYSTEM                                   00787500
ISN 0280            WRITE (OUT,140) I,NUMMY1                                    00787600
                  C                                                             00787700
                  C-----    INPUT FORM 9D                                       00787800
ISN 0281            READ (IN,120) WV(I),MOTORV(I),CORMV(I,1),CORMV(I,2),        00787900
                   1   CORMV(I,3),DUMY4                                         00788000
ISN 0282            WRITE (OUT,325) WV(I)                                       00788100
ISN 0283            CALL CHECKR (WV(I),5.0,150.0,56)                            00788200
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 11 TO VERSION 2

Problem

Two problems existed in the routine which processes the Train Route Description input data.

Symptoms

Input data processing was not being terminated immediately after printing Error Type 65 (a fatal error) for the First Train Type on Input Form 8A.

The offending section number was not being printed when Error Type 124, 153 or 180 was detected on Input Form 8F.

Correction

See the attached partial listing of subroutine TRINS. The five lines that are to be inserted are indicated by the letter "I." The six lines that are to be changed are indicated by the letter "C."

Effect on Previous Results

None.

```
ISN 0219            GO TO 389                                                    02717700
ISN 0220          385 CALL ERROR(215)                                            02717800
ISN 0221            CONTRT(IROUTE)=0                                             02717900
                  C*****SET NUMBER OF TRAINS IN FIRST TRAIN GROUP TO ONE         02718000
ISN 0222          389 NTRGR(1,IROUTE)=1                                          02718100
                  C*****STORE TYPE OF TRAINS IN FIRST TRAIN GROUP                02718200
ISN 0223            GRTYPV(1,IROUTE)=DUMY4                                       02718300
ISN 0224            NUMY3=DUMY4                                                  02718400
ISN 0225            NUMY1=1                                                      02718500
ISN 0226            NUMY2=IA                                                     02718600
ISN 0227            WRITE (OUT,90)                                               02718700
                  C*****WRITE FIRST TRAIN GROUP INFORMATION                      02718800
ISN 0228            WRITE (OUT,100) NUMY1,NTRGR(1,IROUTE),NUMY3,IA,NUMY2         02718900
                  C*****CHECK TRAIN TYPE                                         02719000
ISN 0229            CALL CHECKI (NUMY3,1,NTRTYP,65)                              02719100
ISN 0230            GO TO ( 1370, 387),NEW                                       02719110 <-- I
                  C*****INITIALIZE TRAIN DISPATCHER GROUP COUNTER, NUMBER OF TRAINS 02719200
                  C*****ALREADY DISPATCHED FOR THIS GROUP, AND TIME OF NEXT (FIRST) TRAIN 02719300
                  C*****DISPATCH                                                 02719400
ISN 0231          387 JGROUP(IROUTE) = 1                                         02719500 <-- C
ISN 0232            NMTRGR(IROUTE)=0                                             02719600
ISN 0233            NTIMTR(IROUTE)=GRHDWY(1,IROUTE)                              02719700
                  C*****CHECK FOR READING OF ADDITIONAL TRAIN GROUP DATA          02719800
ISN 0234            IB=NGRV(IROUTE)                                              02719900
ISN 0235            IF (IB-2) 410,390,390                                        02720000
                  C                                                              02720100
                  C                                                              02720200
                  C***** INPUT FORM 8B - TRAIN GROUP DATA FOR REST OF GROUPS - TPOPT=1,2,3 02720300
                  C                                                              02720400
                  C                                                              02720500
                  C*****LOOP OVER REST OF TRAIN GROUPS                           02720600
ISN 0236          390 DO 400 IC=2,IB                                             02720700
                  C*****READ AND STORE NUMBER OF TRAINS IN GROUP, THEIR TYPE, AND HEADWAY 02720800
ISN 0237            READ (IN,340) DUMY1,DUMY2,DUMY3                              02720900
ISN 0238            NTRGR(IC,IROUTE)=DUMY1                                       02721000
ISN 0239            GRTYPV(IC,IROUTE)=DUMY2                                      02721100
ISN 0240            IA=DUMY3                                                     02721200
                  C*****HEADWAY IS STORED IN 100TH'S OF SECONDS                  02721300
ISN 0241            GRHDWY(IC,IROUTE)=IA*100                                     02721400
                  C*****COMPUTE TIME LAST TRAIN IN THIS GROUP IS DISPATCHED      02721500
ISN 0242            NUMY2=NUMY2+NTRGR(IC,IROUTE)*IA                              02721600
ISN 0243            WRITE (OUT,100) IC,NTRGR(IC,IROUTE),GRTYPV(IC,IROUTE),IA,NUMY2 02721700
                  C*****CHECK NUMBER OF TRAINS IN GROUP AND THEIR TYPE           02721800
ISN 0244            NUMY1=NTRGR(IC,IROUTE)                                       02721900
ISN 0245            CALL CHECKI (NUMY1,1,1000,66)                                02722000
ISN 0246            NUMY1=GRTYPV(IC,IROUTE)                                      02722100
ISN 0247            CALL CHECKI (NUMY1,1,NTRTYP,65)                              02722200
ISN 0248            GO TO (1370,400), NEW                                        02722300
                  C*****CHECK HEADWAY                                            02722400
ISN 0249          400 CALL CHECKI (IA,0,10000,67)                                02722500
ISN 0250          410 GO TO (420,420,670), TPOPT                                 02722600
                  C                                                              02722700
                  C                                                              02722800
                  C***** INPUT FORM 8C - TRACK SECTION DATA - TPOPT=1,2           02722900
                  C                                                              02723000
```

```
ISN 0458        970 NUMY4=NTS-JTS+1                                                 02750600
ISN 0459            DO 980 K=1,NUMY4                                                02750700
ISN 0460            NUMY5=NTS-K+1                                                   02750800
ISN 0461            DWLTS(NUMY5+1,IROUTE)=DWLTS(NUMY5,IROUTE)                       02750900
ISN 0462            NPETTS(NUMY5+1,IROUTE)=NPETTS(NUMY5,IROUTE)                     02751000
ISN 0463            UMXTS(NUMY5+1,IROUTE)=UMXTS(NUMY5,IROUTE)                       02751100
ISN 0464            GRDTS(NUMY5+1,IROUTE)=GRDTS(NUMY5,IROUTE)                       02751200
ISN 0465            FSTS(NUMY5+1,IROUTE)=FSTS(NUMY5,IROUTE)                         02751300
ISN 0466          980 RADTS(NUMY5+1,IROUTE)=RADTS(NUMY5,IROUTE)                     02751400
                  C --  INSERT TRACK SECTION BOUNDARY AT 'DIST'                     02751500
ISN 0467            DWLTS(JTS,IROUTE)=0                                             02751600
ISN 0468            NPETTS(JTS,IROUTE)=0                                            02751700
ISN 0469            FSTS(JTS,IROUTE)=DIST                                           02751800
ISN 0470            NTSRT1(IROUTE)=NTSRT1(IROUTE)+1                                 02751900
ISN 0471            NTS=NTSRT1(ROUTE)                                               02752000
ISN 0472            NSEGTS(NTS,IROUTE)=0                                            02752100
                  C                                                                 02752200
                  C --  READ SECTIONS AND INSERT SEGMENTS INTO TRACK SECTION ARRAYS  02752300
ISN 0473          990 ISCT=0                                                        02752400
ISN 0474            ISIGN=0                                                         02752500
ISN 0475            DO 1270 ISEC=1,KSECT                                            02752600
ISN 0476            ISCT2=ISCT                                                      02752700
ISN 0477            ISIGN2=ISIGN                                                    02752800
ISN 0478            READ (IN,340) DUMY1                                             02752900
ISN 0479            ISCTX=ABS(DUMY1)                                                02753000
ISN 0480            ISIGN=DUMY1/(ABS(DUMY1)+.01)                                    02753100
ISN 0481            CALL CHECK1 (ISCTX,1,LMSCTX,153)                                02753200
ISN 0482            GO TO( 1010, 996 ), NEW                                         02753210  <--I
ISN 0483          996 ISCT = TABL14(ISCTX)                                          02753300  <--C
ISN 0484            IF (ISCT) 1010,1010,1000                                        02753400
ISN 0485         1000 IF( TABL9(ISCT) ) 1020,1010,1020                              02753500  <--C
ISN 0486         1010 WRITE(OUT,1011) ISCTX                                         02753510  <--I
ISN 0487         1011 FORMAT(1HO,10X,'SECTION',(4 )                                 02753520  <--I
ISN 0488            CALL ERROR( 124 )                                               02753600  <--C
ISN 0489            GO TO 1370                                                      02753700
ISN 0490         1020 (A=ISCTX*(SIGN                                                02753800
ISN 0491            K2=0                                                            02753900
ISN 0492            ISEGL=TABL9(ISCT)                                               02754000
ISN 0493            ISEGH=TABL10(ISCT)                                              02754100
ISN 0494            IF ((SEGL) 1030,1030,1040                                       02754200
ISN 0495         1030 WR(TE(OUT,1011) ISCTX                                         02754210  <--I
ISN 0496            CALL ERROR ( 180 )                                              02754300  <--C
ISN 0497            GO TO 1370                                                      02754400
                  C---- LOOP OVER SEGMENTS IN THIS SECTION                         02754500
                  C --  THIS 'DO 1260' RUNS FORWARD IF (SIGN IS +, BACKWARD IF ISIGN IS - 02754600  <--C
ISN 0498         1040 IF (ISIGN) 1060,1270,1050                                     02754700
ISN 0499         1050 ISEG=ISEGL                                                    02754800
ISN 0500            ISEG2=ISEGH                                                     02754900
ISN 0501            INC=+1                                                          02755000
ISN 0502            GO TO 1070                                                      02755100
ISN 0503         1060 ISEG=ISEGH                                                    02755200
ISN 0504            ISEG2=ISEGL                                                     02755300
ISN 0505            INC=-1                                                          02755400
                  C                                                                 02755500
ISN 0506         1070 DIST1=DIST                                                    02755600
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 12 TO VERSION 2

Problem

Under certain circumstances the rear-of-train component of the aerodynamic drag on a train was being computed incorrectly.

Symptoms

The rear-of-train component of the train aerodynamic drag was being computed incorrectly when a tunnel system was being simulated and the rear of the train was outside the tunnel system. This component of the train drag was computed correctly when the rear of the train was inside the tunnel system or when a tunnel system was not being simulated.

Correction

See the attached partial listing of subroutine LOCATE. The one line to be corrected is indicated by the letter "C."

Effect on Previous Results

This correction has no effect on the airflow or temperature results for a tunnel system since the component of air drag is computed incorrectly only when the rear of the train is located outside the tunnel system. The rear-of-train component contributes only a small part of the total aerodynamic drag on a train. This correction may have a small effect on the train speed and location when a train is running outside the tunnel system; however, the effect of this revision is insignificant.

```
                C---- DIRECTION IS +                                                    01400500
ISN 0190          260 TRNDLS(ISEG,NF) = XV(NUMV) - FSTS(JTS,IROUTE)                    01400600
ISN 0191              TRNDLS(ISEG,NB) = TRNDLS(ISEG,NF) - LV(ITYP)                     01400700
ISN 0192              GO TO 300                                                        01400800
                C---- DIRECTION IS -                                                    01400900
ISN 0193          270 TRNDLS(ISEG,NB) = FSTS(JTS,IROUTE) - XV(NUMV) + LLS(ISEG)        01401000
ISN 0194              TRNDLS(ISEG,NF) = TRNDLS(ISEG,NB) + LV(ITYP)                     01401100
                C                                                                      01401200
                C---- GET NEW SEGMENT NUMBER AND DIRECTION                             01401300
ISN 0195          300 ISEG=NSEGTS(JTS,IROUTE)                                          01401400
ISN 0196              ISEG=IABS(ISEG)                                                  01401500
                C---- CHECK IF OUTSIDE OF TUNNEL SYSTEM                                01401600
ISN 0197              IF(ISEG) 305,305,310                                             01401700
                C---- TRAIN IS OUTSIDE OF TUNNEL                                       01401800
ISN 0198          305 IDIR = 0                                                         01401900
ISN 0199              GO TO 350                                                        01402000
                C---- TRAIN IS INSIDE TUNNEL SYSTEM                                    01402100
ISN 0200          310 IDIR = NSEGTS(JTS,IROUTE) / ISEG                                 01402200
ISN 0201              NTRNLS(ISEG) = NTRNLS(ISEG) + 1                                  01402300
ISN 0202              NTRN = NTRNLS(ISEG)                                              01402400
ISN 0203              NF = 2 * NTRN                                                    01402500
ISN 0204              NB = NF - 1                                                      01402600
                C---- CHECK IF GREATER THAN MAXIMUM NUMBER OF TRAINS ALLOWED IN SEGMENT 01402700
                C----     LIMITED BY ARRAY SIZE ('TRNNLS','TRNDLS') TO 'LMTRSG' TRAINS 01402800
ISN 0205              IF( NTRN - LMTRSG ) 320,320,800                                  01402900
                C---- STORE TRAIN NUMBER WITH SEGMENT                                  01403000
ISN 0206          320 TRNNLS(ISEG,NTRN)= IDIR * NUMV                                   01403100
                C---- COMPUTE LENGTH OF TRAIN IN THIS TRACK SECTION                    01403200
ISN 0207          350 TNL1 = FSTS(JTS,IROUTE) - FSTS(JTS-1,IROUTE)                     01403300
ISN 0208              GO TO 200                                                        01403400
                C                                                                      01403500
                C                                                                      01403600
                C---- BEGINNING OF TRACK SECTION ARRAY - REMAINDER OF TRAIN            01403700
                C---- HAS NOT ENTERED SYSTEM YET                                       01403800
ISN 0209          360 IF( IDIR ) 380,385,370                                           01403900
                C---- DIRECTION IS +                                                   01404000
ISN 0210          370 TRNDLS(ISEG,NF) = XV(NUMV) - FSTS(JTS,IROUTE)                    01404100
ISN 0211              TRNDLS(ISEG,NB) = TRNDLS(ISEG,NF) - LV(ITYP)                     01404200
ISN 0212              GO TO 385                                                        01404300
                C---- DIRECTION IS -                                                   01404400
ISN 0213          380 TRNDLS(ISEG,NB) = FSTS(JTS,IROUTE) - XV(NUMV) + LLS(ISEG)       01404500
ISN 0214              TRNDLS(ISEG,NF) = TRNDLS(ISEG,NB) + LV(ITYP)                     01404600
ISN 0215          385 TNL1 = LV(ITYP) - SUM                                            01404700
                C---- COMPUTE DRAG ON TRAIN SIDE 'TNL1' AND REAR OF TRAIN             01404800
ISN 0216          390 DRAGV(NUMV)=DRAGV(NUMV)+(LAMDAV(ITYP)*TNL1/18.0*AV(ITYP))+     01404900
                     1 CDBVOV(ITYP) /2.0 ) * UV(NUMV)* UV(NUMV)                       01405000 <-- C
ISN 0217              GO TO 600                                                        01405100
                C                                                                      01405200
                C                                                                      01405300
                C---- REAR OF TRAIN HAS BEEN PASSED - COMPUTE REMAINING PORTION OF TRAIN01405400
ISN 0218          400 TNL1 = LV(ITYP) - SUM                                            01405500
ISN 0219              RG = RG + TNL1 * GRDTS(JTS,IROUTE)                               01405600
ISN 0220              IF( RADTS(JTS,IROUTE) ) 420,420,410                              01405700
ISN 0221          410 RC = RC + TNL1 / RADTS(JTS,IROUTE)                               01405800
ISN 0222          420 IF( ISEG ) 390,390,480                                           01405900
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 13 TO VERSION 2

Problem

Fans were not active during the first cycle of simulation (time = 0.0 seconds) when the Simulation Time After Which Fan Switches On on Input Form 5C is entered as 0.

Symptoms

When a system containing fans is initialized at the steady-state airflow rates with fans operating from time zero and zero run-up time, the airflows are observed to decay for the first aerodynamic cycle. The fans became active during the second cycle, sometimes producing a large acceleration in the airflows. As a result of these airflow perturbations, it was sometimes necessary to use a smaller aerodynamic time increment for the entire simulation than would otherwise be necessary.

Correction

See the attached partial listing of subroutine VSINS. The three corected lines of code are indicated by the letter "C." The two lines of code which were inserted are indicated by the letter "I."

Effect on Previous Results

This revision may produce slightly different airflow values during the first few seconds of a simulation in which fans that become active at time zero are used. The remainder of the simulation results are not affected.

```
ISN 0204            TNSS = TNSS + NSS                                          02799700
ISN 0205            TABI6(IVS) = TNSS                                          02799800
ISN 0206            DO 114 ISS = ISSL,TNSS                                     02799900
ISN 0207          114 TABI7(ISS) = -IVS                                        02800000
ISN 0208            CALL CHECKI( TNSS, 1, LMSS, 43 )                           02800100
ISN 0209            GO TO ( 990, 120 ), NEW                                    02800200
ISN 0210          120 WRITE(OUT,58) AGVS(IVS)                                  02800300
ISN 0211            CALL CHECKR( AGVS(IVS), 3.0, 3000.0, 38 )                  02800400
ISN 0212            WRITE(OUT,59) VOMXVS(IVS)                                  02800500
ISN 0213            CALL CHECKR( VOMXVS(IVS), 0.0, 6000.0, 169 )               02800600
ISN 0214            VOMXVS(IVS) = VOMXVS(IVS) / 60.0                           02800700
ISN 0215            WRITE(OUT,61) DUMY3                                        02800800
ISN 0216            CALL CHECKR(DUMY3,0.0,130.0,23)                            02800900
ISN 0217            WRITE(OUT,62) DUMY4                                        02801000
ISN 0218            CALL CHECKR( DUMY4, 0.0, 130.0, 24 )                       02801100
ISN 0219            WRITE(OUT,63) DUMY5                                        02801200
ISN 0220            CALL CHECKR( DUMY5, 0.0, DUMY4, 25 )                       02801300
ISN 0221            WRITE(OUT,64) STAKVS(IVS)                                  02801400
ISN 0222            CALL CHECKR( STAKVS(IVS), 0.0, 1000.0, 37 )                02801500
ISN 0223            CALL LATENT( DUMY4, DUMY5, DUMY6 )                         02801600
                  C---- LOOP OVER SUBSEGMENTS IN VENT SHAFT                    02801700
ISN 0224            DO  130  ISS = ISSL, TNSS                                  02801800
ISN 0225            QFRTSS(ISS) = 0.0                                          02801900
ISN 0226            QFRHSS(ISS) = 0.0                                          02802000
ISN 0227            LHLTSS(ISS) = 0.0                                          02802100
ISN 0228            SHLTSS(ISS) = 0.0                                          02802200
ISN 0229            SHUXSS(ISS) = 0.0                                          02802210
ISN 0230            FFSS(ISS) = 0.0                                            02802220
ISN 0231            FBSS(ISS) = 0.0                                            02802230
ISN 0232            HTRNSS(ISS) = 0.0                                          02802240
ISN 0233            TSFSS(ISS) = DUMY3                                         02802300
ISN 0234            TDBSS(ISS) = DUMY4                                         02802400
ISN 0235            TTMPSS(ISS) = DUMY4                                        02802500
ISN 0236            TWBSS(ISS) = DUMY5                                         02802600
ISN 0237            HUMSS(ISS) = DUMY6                                         02802700
ISN 0238          130 HTMPSS(ISS) = DUMY6                                      02802800
                  C                                                          02802900
                  C---- FAN INFORMATION                FORM 5C                02803000
ISN 0239            IF( NFNTYP ) 151,151,132                                   02803100
ISN 0240          132 READ(IN,20) DUMY1,DUMY2,DUMY3,DUMY4                      02803200
ISN 0241            FTYPVS(IVS) = DUMY1                                        02803300
ISN 0242            IF( FTYPVS(IVS) ) 155,150,155                              02803400
ISN 0243          150 WRITE(OUT,66) FTYPVS(IVS)                                02803500
ISN 0244          151 FTYPVS(IVS) = 0                                          02803600
ISN 0245            FDIRVS(IVS) = 0.0                                          02803700
ISN 0246            FTONVS(IVS) = 0                                            02803800
ISN 0247            FTOFVS(IVS) = 0                                            02803900
ISN 0248            GO TO 170                                                  02804000
ISN 0249          155 WRITE(OUT,65) FTYPVS(IVS)                                02804100
ISN 0250            IF( FTYPVS(IVS) - NFNTYP ) 157,157,156                     02804200
ISN 0251          156 CALL ERROR( 170 )                                        02804300
ISN 0252          157 IF( TYPVSI(VS) - 2 ) 160,158,160                         02804400
ISN 0253          158 CALL ERROR( 171 )                                        02804500
ISN 0254          160 FTONVS(IVS) = DUMY2                                      02804600
ISN 0255            FTOFVS(IVS) = DUMY3                                        02804700
```

```
ISN 0256          WRITE(OUT,68) FTONVS(IVS)                                    02804800
ISN 0257          WRITE(OUT,69) FTOFVS(IVS)                                    02804900
ISN 0258          IF( FTONVS(IVS) - FTOFVS(IVS) )162,162,161                   02805000 <---- C
ISN 0259        161 CALL ERROR( 76 )                                           02805100
ISN 0260        162 FTONVS(IVS) = FTONVS(IVS) * 100                            02805200 <---- C
ISN 0261            IF( FTONVS(IVS) ) 164,164,163                              02805210 <---- I
ISN 0262        163 FTONVS(IVS) = FTONVS(IVS) + 1                              02805220 <---- I
ISN 0263        164 FTOFVS(IVS) = FTOFVS(IVS) * 100                            02805300 <---- C
ISN 0264            NUMY1 = DUMY4                                              02805400
ISN 0265            IF( NUMY1 ) 166,165,165                                    02805500
ISN 0266        165 WRITE(OUT,70) NUMY1                                        02805600
ISN 0267            FDIRVS(IVS) = 1.0                                          02805700
ISN 0268            GO TO 167                                                  02805800
ISN 0269        166 WRITE(OUT,71) NUMY1                                        02805900
ISN 0270            FDIRVS(IVS) = -1.0                                         02806000
                C---- DETERMINE SIGN OF OUTFLOW OR EXHAUST                     02806100
ISN 0271        167 NODE = TABL12( ISCT )                                      02806200
ISN 0272            IF( TABL16( NODE ) - 1 ) 170,168,170                       02806300
                C --  BACKWARD END IS CONNECTED TO ATMOSPHERE - REVERSE DIRECTION SIGN  02806400
ISN 0273        168 FDIRVS(IVS) = - FDIRVS(IVS)                                02806500
                C                                                              02806600
                C---- SEGMENT CHARACTERISTICS - COMPUTE EQUIVALENT VENT SHAFT   FORM 5D 02806700
ISN 0274        170 WRITE(OUT,75)                                              02806800
ISN 0275            CEPSI(ISCT) = 0.0                                          02806900
ISN 0276            CENS(ISCT) = 0.0                                           02807000
ISN 0277            X3 = 0.0                                                   02807100
ISN 0278            X4 = 0.0                                                   02807200
ISN 0279            X5 = 0.0                                                   02807300
ISN 0280            X6 = 0.0                                                   02807400
                C---- READ SEGMENT PROPERTIES AND COMPUTE SUMMATIONS           02807500
ISN 0281            DO  240  ISEG = 1, NVSEG                                   02807600
ISN 0282            READ(IN,20) DUMY1,DUMY2, DUMY3, DUMY4, DUMY5, DUMY6, DUMY7  02807700
ISN 0283            WRITE(OUT,77) ISEG,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7  02807800
                C --  LENGTH                                                   02807900
ISN 0284            CALL CHECKR( DUMY1, 0.0, 2000.0, 40 )                      02808000
                C --  AREA                                                     02808100
ISN 0285            CALL CHECKR( DUMY2, 3.0, 3000.0, 38 )                      02808200
                C --  PERIMETER                                                02808300
ISN 0286            CALL CHECKR( DUMY3, 5.0, 500.0, 39 )                       02808400
                C --  FORWARD POSITIVE                                         02808500
ISN 0287            CALL CHECKR( DUMY4, 0.0, 300.0, 28 )                       02808600
                C --  FORWARD NEGATIVE                                         02808700
ISN 0288            CALL CHECKR( DUMY5, 0.0, 300.0, 28 )                       02808800
                C --  BACKWARD POSITIVE                                        02808900
ISN 0289            CALL CHECKR( DUMY6, 0.0, 300.0, 28 )                       02809000
                C --  BACKWARD NEGATIVE                                        02809100
ISN 0290            CALL CHECKR( DUMY7, 0.0, 300.0, 28 )                       02809200
ISN 0291            DUMY8 = (4.0*PI*DUMY2)**0.5                                02809300
ISN 0292            IF( DUMY3 - DUMY8 ) 153,180,180                            02809400
ISN 0293        153 CALL ERROR( 70 )                                           02809500
                C                                                              02809600
ISN 0294        180 IF(ISEG-1) 185,185,190                                     02809700
ISN 0295        185 ALOWS(ISCT) = DUMY2                                        02809800
ISN 0296        190 IF(NVSEG-ISEG) 195,195,200                                 02809900
ISN 0297        195 AHIGHS(ISCT) = DUMY2                                       02810000
```

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 14 TO VERSION 2

Problem

The severity of the error types was revised.

Symptoms

The following error type was changed from a fatal error (which terminates all processing) to a non-fatal error:

Error Type 159

The deep sink temperature is less than 0 or greater than 100 deg F.

The following error type was changed from a non-fatal error to a fatal error:

Error Type 124

This section has not been defined.

The SES version number is revised to "Version 2.14."

Correction

See the attached partial listing of subroutine ERROR. The two lines of code to be changed are indicated by the letter "C."

See the attached partial listing of subroutine INPUT. The one line of code to be changed is indicated by the letter "C."

Effect on Previous Results

None.

```
ISN 0574          GO TO 500                                                00570200
ISN 0575      104 WRITE(OUT,604)                                           00570300
ISN 0576          GO TO 500                                                00570400
ISN 0577      105 WRITE(OUT,605)                                           00570500
ISN 0578          GO TO 500                                                00570600
ISN 0579      106 WRITE(OUT,606)                                           00570700
ISN 0580          GO TO 500                                                00570800
ISN 0581      107 WRITE(OUT,607)                                           00570900
ISN 0582          GO TO 500                                                00571000
ISN 0583      108 WRITE(OUT,608)                                           00571100
ISN 0584          GO TO 500                                                00571200
ISN 0585      109 WRITE(OUT,609)                                           00571300
ISN 0586          GO TO 500                                                00571400
ISN 0587      110 WRITE(OUT,610)                                           00571500
ISN 0588          GO TO 500                                                00571600
ISN 0589      111 WRITE(OUT,611)                                           00571700
ISN 0590          GO TO 500                                                00571800
ISN 0591      112 WRITE(OUT,612)                                           00571900
ISN 0592          GO TO 500                                                00572000
ISN 0593      113 WRITE(OUT,613)                                           00572100
ISN 0594          GO TO 499                                                00572200
ISN 0595      114 WRITE(OUT,614)                                           00572300
ISN 0596          GO TO 500                                                00572400
ISN 0597      115 WRITE(OUT,615)                                           00572500
ISN 0598          GO TO 500                                                00572600
ISN 0599      116 WRITE(OUT,616)                                           00572700
ISN 0600          GO TO 500                                                00572800
ISN 0601      117 WRITE(OUT,617)                                           00572900
ISN 0602          GO TO 500                                                00573000
ISN 0603      118 WRITE(OUT,618)                                           00573100
ISN 0604          GO TO 500                                                00573200
ISN 0605      119 WRITE(OUT,619)                                           00573300
ISN 0606          GO TO 500                                                00573400
ISN 0607      120 WRITE(OUT,620)                                           00573500
ISN 0608          GO TO 500                                                00573600
ISN 0609      121 WRITE(OUT,621)                                           00573700
ISN 0610          GO TO 500                                                00573800
ISN 0611      122 WRITE(OUT,622)                                           00573900
ISN 0612          GO TO 500                                                00574000
ISN 0613      123 WRITE(OUT,623)                                           00574100
ISN 0614          GO TO 499                                                00574200
ISN 0615      124 WRITE(OUT,624)                                           00574300
ISN 0616          GO TO 499                                                00574400 <-- C
ISN 0617      125 WRITE(OUT,625)                                           00574500
ISN 0618          GO TO 500                                                00574600
ISN 0619      126 WRITE(OUT,626)                                           00574700
ISN 0620          GO TO 499                                                00574800
ISN 0621      127 WRITE(OUT,627) LMSECT                                    00574900
ISN 0622          GO TO 499                                                00575000
ISN 0623      128 WRITE(OUT,628)                                           00575100
ISN 0624          GO TO 500                                                00575200
ISN 0625      129 WRITE(OUT,629)                                           00575300
ISN 0626          GO TO 500                                                00575400
ISN 0627      130 WRITE(OUT,630)                                           00575500
ISN 0628          GO TO 500                                                00575600
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ISN 0629        131 WRITE(OUT,631)                                  00575700
ISN 0630            GO TO 499                                       00575800
ISN 0631        132 WRITE(OUT,632( LMUL                             00575900
ISN 0632            GO TO 499                                       00576000
ISN 0633        133 WRITE(OUT,633) LMENTP                           00576100
ISN 0634            GO TO 499                                       00576200
ISN 0635        134 WRITE(OUT,634(                                  00576300
ISN 0636            GO TO 499                                       00576400
ISN 0637        135 WRITE(OUT,635) LMTRBT                           00576500
ISN 0638            GO TO 499                                       00576600
ISN 0639        136 WRITE(OUT,636)                                  00576700
ISN 0640            GO TO 499                                       00576800
ISN 0641        137 WRITE(OUT,637) LMTRTP                           00576900
ISN 0642            GO TO 499                                       00577000
ISN 0643        138 WRITE(OUT,638)                                  00577100
ISN 0644            GO TO 500                                       00577200
ISN 0645        139 WRITE(OUT,639)                                  00577300
ISN 0646            GO TO 500                                       00577400
ISN 0647        140 WRITE(OUT,640)                                  00577500
ISN 0648            GO TO 500                                       00577600
ISN 0649        141 WRITE(OUT,641) LMTRAN                           00577700
ISN 0650            GO TO 499                                       00577800
ISN 0651        142 WRITE(OUT,642)                                  00577900
ISN 0652            GO TO 500                                       00578000
ISN 0653        143 WRITE(OUT,643(                                  00578100
ISN 0654            GO TO 500                                       00578200
ISN 0655        144 WRITE(OUT,644(                                  00578300
ISN 0656            GO TO 500                                       00578400
ISN 0657        145 WRITE(OUT,645)                                  00578500
ISN 0658            GO TO 500                                       00578600
ISN 0659        146 WRITE(OUT,646)                                  00578700
ISN 0660            GO TO 500                                       00578800
ISN 0661        147 WRITE(OUT,647)                                  00578900
ISN 0662            GO TO 500                                       00579000
ISN 0663        148 WRITE(OUT,648(                                  00579100
ISN 0664            GO TO 500                                       00579200
ISN 0665        149 WRITE(OUT,649(                                  00579300
ISN 0666            GO TO 500                                       00579400
ISN 0667        150 WRITE(OUT,650)                                  00579500
ISN 0668            GO TO 499                                       00579600
ISN 0669        151 WRITE(OUT,651(                                  00579700
ISN 0670            GO TO 500                                       00579800
ISN 0671        152 WRITE(OUT,652)                                  00579900
ISN 0672            GO TO 499                                       00580000
ISN 0673        153 WRITE(OUT,653) LMSGTX                           00580100
ISN 0674            GO TO 499                                       00580200
ISN 0675        154 WRITE(OUT,654) LMNODX                           00580300
ISN 0676            GO TO 499                                       00580400
ISN 0677        155 WRITE(OUT,655(                                  00580500
ISN 0678            GO TO 500                                       00580600
ISN 0679        156 WRITE(OUT,656)                                  00580700
ISN 0680            GO TO 499                                       00580800
ISN 0681        157 WRITE(OUT,657(                                  00580900
ISN 0682            GO TO 499                                       00581000
ISN 0683        158 WRITE(OUT,658)                                  00581100
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ISN 0684            GO TO 499                                                   00581200
ISN 0685          159 WRITE(OUT,659)                                            00581300
ISN 0686            GO TO 500                                                   00581400  <-- C
ISN 0687          160 WRITE(OUT,660)                                            00581500
ISN 0688            GO TO 499                                                   00581600
ISN 0689          161 WRITE(OUT,661)                                            00581700
ISN 0690            GO TO 499                                                   00581800
ISN 0691          162 WRITE(OUT,662)                                            00581900
ISN 0692            GO TO 500                                                   00582000
ISN 0693          163 WRITE(OUT,663)                                            00582100
ISN 0694            GO TO 500                                                   00582200
ISN 0695          164 WRITE(OUT,664)                                            00582300
ISN 0696            GO TO 500                                                   00582400
ISN 0697          165 WRITE(OUT,665)                                            00582500
ISN 0698            GO TO 500                                                   00582600
ISN 0699          166 WRITE(OUT,666)                                            00582700
ISN 0700            GO TO 500                                                   00582800
ISN 0701          167 WRITE(OUT,667)                                            00582900
ISN 0702            GO TO 500                                                   00583000
ISN 0703          168 WRITE(OUT,668)                                            00583100
ISN 0704            GO TO 499                                                   00583200
ISN 0705          169 WRITE(OUT,669)                                            00583300
ISN 0706            GO TO 500                                                   00583400
ISN 0707          170 WRITE(OUT,670)                                            00583500
ISN 0708            GO TO 500                                                   00583600
ISN 0709      171   WRITE(OUT,671)                                              00583700
ISN 0710            GO TO 500                                                   00583800
ISN 0711      172   WRITE(OUT,672)                                              00583900
ISN 0712            GO TO 499                                                   00584000
ISN 0713      173   WRITE(OUT,673)                                              00584100
ISN 0714            GO TO 500                                                   00584200
ISN 0715      174   WRITE(OUT,674)                                              00584300
ISN 0716            GO TO 500                                                   00584400
ISN 0717      175   WRITE(OUT,675)                                              00584500
ISN 0718            GO TO 500                                                   00584600
ISN 0719          176 WRITE(OUT,676)                                            00584700
ISN 0720            GO TO 500                                                   00584800
ISN 0721          177 WRITE(OUT,677)                                            00584900
ISN 0722            GO TO 500                                                   00585000
ISN 0723          178 WRITE(OUT,678)                                            00585100
ISN 0724            GO TO 500                                                   00585200
ISN 0725          179 WRITE(OUT,679) LMTHND                                     00585300
ISN 0726            GO TO 499                                                   00585400
ISN 0727          180 WRITE(OUT,680)                                            00585500
ISN 0728            GO TO 499                                                   00585600
ISN 0729          181 WRITE(OUT,681)                                            00585700
ISN 0730            GO TO 499                                                   00585800
ISN 0731          182 WRITE(OUT,682)                                            00585900
ISN 0732            GO TO 499                                                   00586000
ISN 0733          183 WRITE(OUT,683)                                            00586100
ISN 0734            GO TO 499                                                   00586200
ISN 0735          184 WRITE(OUT,684)                                            00586300
ISN 0736            GO TO 500                                                   00586400
ISN 0737          185 WRITE(OUT,685)                                            00586500
ISN 0738            GO TO 500                                                   00586600
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ISN 0153      70    FORMAT (25X,17A4,A2,////)                                        01056700
ISN 0154      80    FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)           01056800
ISN 0155      90    FORMAT (1H ,39X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)           01056900
ISN 0156     100    FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKERO1057000
                   1HOFF,',',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                   2/,T97,'VERSION 2.14')                                           01057200
ISN 0157     110    FORMAT (1HO,T45,'INPUT VERIFICATION OF GENERAL DATA')            01057300
ISN 0158     120    FORMAT (1HO,T113,'FORM IC'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                   190,'BYPASS')                                                    01057500
ISN 0159     130    FORMAT (1HO,T113,'FORM IC'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                   190,'IMPLICIT')                                                  01057700
ISN 0160     140    FORMAT (1HO,T113,'FORM IC'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                   I90,'EXPLICIT (HEAT REJ. COMPUTED)'I                             01057900
ISN 0161     150    FORMAT (1HO,T113,'FORM IC'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                   190,'EXPLICIT (HEAT REJ. INPUT)')                                01059100
ISN 0162     160    FORMAT (1HC,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                   IT90,'BYPASS')                                                   01058300
ISN 0163     170    FORMAT (1HC,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                   1190,'YES')                                                      01058500
ISN 0164     180    FORMAT (1HO,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                   IT90,'YES - EVAPORATION')                                        01058700
ISN 0165     190    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                   110')                                                            01058900
ISN 0166     200    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                   IPERATURE')                                                      01059100
ISN 0167     210    FORMAT (1HO,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                   IIDITY')                                                         01059300
ISN 0168     220    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                   1,I5,T9C,'BYPASS')                                               01059500
ISN 0169     230    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
                   1,I5,T9C,'YES')                                                  01059700
ISN 0170     240    FORMAT (1HO,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
                   1,I5,T9C,'OFF-HOUR')                                             01059900
ISN 0171     250    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                   IS')                                                             01060100
ISN 0172     260    FORMAT (1HO,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173     270    FORMAT (1HO,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)            01060300
ISN 0174     280    FORMAT (1HO,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)            01060400
ISN 0175     290    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                 01060500
ISN 0176     300    FORMAT (1HO,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATIONO1060600
                   I')                                                              01060700
ISN 0177     310    FORMAT (/1HO,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM ID') 01060800
ISN 0178     320    FORMAT (1HC,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)               01060900
ISN 0179     330    FORMAT (1HO,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5I   01061000
ISN 0180     340    FORMAT (1HO,T30,'NUMBER OF NODES',T80,I5)                        01061100
ISN 0181     350    FORMAT (1HO,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)           01061200
ISN 0182     360    FORMAT (1HO,T30,'NUMBER OF PORTALS',T80,I5I                      01061300
ISN 0183     370    FORMAT (1HO,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)        01061400
ISN 0184     380    FORMAT (1HO,T30,'NUMBER OF FAN TYPES',T80,I5)                    01061500
ISN 0185     390    FORMAT (1HO,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM IE')  01061600
ISN 0186     400    FORMAT (1HO,T30,'NUMBER OF TRAIN TYPES',T80,I5)                  01061700
ISN 0187     410    FORMAT (1HO,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5)  01061800
ISN 0188     420    FORMAT (1HO,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)        01061900
ISN 0189     430    FORMAT (1H+,T90,'MEANINGLESS')                                   01062000
ISN 0190     440    FORMAT (1H+,T9C,'SIMULATION TERMINATION')                        01062100
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SES SAMPLE PROBLEM

SAMPL 5

REVISED OUTPUT REFLECTING
REVISIONS THROUGH V2M14

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RTE	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
22	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)		WEST PORTAL TO 1100 FT - ROUTE 1										
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96768.6	322.6						
100.0	1 - 2	(TUNNEL)		1100 TO 1200 FT - ROUTE 1										
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96768.6	387.1						
400.0	1 - 3	(TUNNEL)		1200 TO 1600 FT - ROUTE 1										
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96768.6	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)		PORTAL TO 1600 FT - ROUTE 2										
	2 - 4 - 1		6.2	0.0	84.39	0.01585	-233181.7	-1036.4						
	2 - 4 - 2		6.2	0.0	84.00	0.01586								
	2 - 4 - 3		6.2	0.0	83.58	0.01585								
110.0	3 -103	(VENTILATION SHAFT)		VENT SHAFT AT 1600 FT - ROUTE 1										
	3 -103 - 1				81.61	0.01648	20498.8	102.5						
95.1	4 -104	(VENTILATION SHAFT)		VENT SHAFT AT 1600 FT - ROUTE 2										
	4 -104 - 1				81.81	0.01647	-49208.6	-370.8						
600.0	5 - 5	(TUNNEL)		1600 TO 2200 FT(START OF STA) -RTE 1										
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76269.8	339.0						
	5 - 5 - 2		0.4	0.0	81.97	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)		1600 TO 2200 FT(START OF STA)- RTE 2										
	6 - 6 - 1		5.9	0.0	83.22	0.01561	-183973.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.03	0.01523								
	6 - 6 - 3		5.9	0.0	80.76	0.01470								

100.0	7 - 7	(STATION)	START OF STATION TO WEST STAIRWAY							
	7 - 7 - 1	-234.6	-294.9	78.03	0.01322	-107703.1	-153.9		22	
200.0	8 - 8	(STATION)	WEST END OF MEZZANINE TO STREET EXIT							
	8 - 8 - 1	2.5	-4.2	79.94	0.01412	-35432.3	-78.7			
	8 - 8 - 2	-3.1	-45.6	80.40	0.01414					
400.0	9 - 9	(STATION)	PLATFORM AREA BETWEEN STAIRWAYS							
	9 - 9 - 1	165.0	-9.7	80.16	0.01414	-72270.9	-103.2	21	22	
	9 - 9 - 2	210.7	8.4	80.20	0.01410			21	22	
	9 - 9 - 3	202.1	5.6	79.78	0.01402			21	22	
	9 - 9 - 4	181.6	4.0	79.41	0.01397			21	22	
20.0	10 -110	(STAIRWAY)	STREET LEVEL STAIRWAY TO MEZZANINE							
	10 -110 - 1			81.11	0.01542	-30769.7	-318.9			
200.0	11 - 10	(STATION)	STREET EXIT TO EAST END OF MEZZANINE							
	11 - 10 - 1	-4.0	-47.2	80.00	0.01377	-4662.6	-10.4			
	11 - 10 - 2	5.5	0.8	79.27	0.01395					
100.0	12 - 11	(STATION)	EAST STAIRWAY TO END OF STATION							
	12 - 11 - 1	153.1	-9.1	80.21	0.01393	-76933.6	-109.9	21	22	
500.0	13 - 12	(TUNNEL)	STATION END TO EXHAUST FAN AT 3300FT							
	13 - 12 - 1	211.2	0.0	86.32	0.01407	-76933.6	-192.3	21	22	
	13 - 12 - 2	4.7	0.0	88.15	0.01441					
	13 - 12 - 3	4.7	0.0	89.46	0.01512					
78.7	14 -114	(VENTILATION SHAFT)	FAN SHAFT AT 3300 FT - EXHAUST MODE							
	14 -114 - 1			89.06	0.01597	140738.2	938.0			
400.0	15 - 13	(TUNNEL)	EXHAUST FAN TO 3700 FT							
	15 - 13 - 1	5.8	0.0	88.92	0.01612	-217671.8	-544.2			
	15 - 13 - 2	5.8	0.0	87.01	0.01636					
300.0	15 - 14	(TUNNEL)	3700 FT TO EAST PORTAL AT 4000 FT							
	15 - 14 - 1	4.3	0.0	85.18	0.01644	-217671.8	-311.0			
	15 - 14 - 2	4.3	0.0	83.19	0.01647					

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 1	1958.	930.0	319.	906.0	670.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76090.6	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43539.2	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 2	2350.	930.0	383.	906.0	803.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	930.0	81.6	923.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	73981.4	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47824.8	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 3	2611.	930.0	425.	906.0	893.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	932.0	81.3	924.0	82.4	0.0
		1 - 3 - 2	87.9	935.0	81.1	926.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	900.0	0.0165	900.0	0.0165	
		1 - 3 - 2	0.0165	900.0	0.0165	936.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	298991.9	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216768.9	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-82104.	928.0	-582130.	960.0	0.	-223626.
AIR VELOCITY	(FPM)	2 - 4	-365.	928.0	-2587.	960.0	0.	-994.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	964.0	81.9	956.0	0.0	84.1
		2 - 4 - 2	89.4	962.0	81.8	954.0	0.0	83.8
		2 - 4 - 3	88.8	960.0	81.7	951.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	966.0	0.0158	961.0	0.0159	
		2 - 4 - 2	0.0159	936.0	0.0157	961.0	0.0159	
		2 - 4 - 3	0.0161	928.0	0.0156	952.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	501021.3	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-484219.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	293913.	929.0	-128151.	937.0	25307.	-44189.
AIR VELOCITY	(FPM)	3 -103	1470.	929.0	-641.	937.0	127.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103						6.6
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	968.0	81.4	931.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	963.0	0.0165	932.0	0.0165	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136778.	951.0	-295975.	960.0	13681.	-61571.
AIR VELOCITY	(FPM)	4 -104	1031.	951.0	-2230.	960.0	103.	-464.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104						9.9
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	964.0	81.6	950.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	931.0	0.0156	952.0	0.0163	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -PTF 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	500073.	935.0	62998.	983.0	219747.	0.
AIR VELOCITY	(FPM)	5 - 5	2223.	935.0	280.	983.0	977.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	937.0	81.1	929.0	82.7	0.0
		5 - 5 - 2	89.0	940.0	81.0	931.0	83.1	0.0
		5 - 5 - 3	90.4	944.0	81.0	933.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	951.0	0.0165	900.0	0.0165	
		5 - 5 - 2	0.0165	963.0	0.0165	900.0	0.0165	
		5 - 5 - 3	0.0165	953.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	561485.6	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418783.8	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-415.	920.0	-347433.	952.0	0.	-175736.
AIR VELOCITY	(FPM)	6 - 6	-2.	920.0	-1544.	952.0	0.	-781.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.2	958.0	81.5	947.0	0.0	83.7
		6 - 6 - 2	89.4	956.0	81.2	941.0	0.0	83.3
		6 - 6 - 3	90.0	952.0	80.6	904.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0158	977.0	0.0153	943.0	0.0155	
		6 - 6 - 2	0.0160	971.0	0.0151	910.0	0.0154	
		6 - 6 - 3	0.0162	967.0	0.0147	901.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	622781.8	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-419917.9	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362812.	934.0	-185586.	977.0	89416.	-45404.
AIR VELOCITY	(FPM)	7 - 7	518.	934.0	-265.	977.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.5	952.0	76.6	913.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	952.0	0.0127	910.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	692956.1	BTU/HR
STEADY-STATE HEAT SOURCES	70000.4	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1234364.0	BTU/HR
HEAT SINK	-3776.7	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97627.	932.0	-101546.	949.0	17405.	-19426.
AIR VELOCITY	(FPM)	8 - 8	217.	932.0	-226.	949.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	80.1	923.0	79.5	940.0	79.9	79.8
		8 - 8 - 2	80.7	964.0	80.1	941.0	80.4	80.4
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0141	965.0	0.0140	929.0	0.0141	
		8 - 8 - 2	0.0145	964.0	0.0138	942.0	0.0141	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	30.8	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	100.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.3	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-102118.9	BTU/HR
HEAT SINK	-6063.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280441.	935.0	-242229.	982.0	92334.	-46301.
AIR VELOCITY	(FPM)	9 - 9	401.	935.0	-346.	982.0	132.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.5	950.0	77.8	935.0	79.6	80.1
		9 - 9 - 2	81.1	904.0	78.3	940.0	79.9	79.6
		9 - 9 - 3	81.2	907.0	77.8	980.0	79.8	78.8
		9 - 9 - 4	82.1	909.0	76.9	978.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0143	950.0	0.0137	924.0	0.0141	
		9 - 9 - 2	0.0142	967.0	0.0139	934.0	0.0141	
		9 - 9 - 3	0.0140	969.0	0.0139	907.0	0.0140	
		9 - 9 - 4	0.0140	967.0	0.0139	904.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	48.4	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	45.1	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	29.7	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	33.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3415714.0	BTU/HR
STEADY-STATE HEAT SOURCES	275999.3	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3544811.0	BTU/HR
HEAT SINK	-22684.9	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130795.	932.0	-106110.	949.0	27732.	-35082.
AIR VELOCITY	(FPM)	10 -110	1355.	932.0	-1100.	949.0	287.	-364.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110					12.1	
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	915.0	80.1	978.0	80.5	81.6
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	921.0	0.0138	940.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	94587.	909.0	-109270.	969.0	21110.	-15780.
AIR VELOCITY	(FPM)	11 - 10	210.	909.0	-243.	969.0	47.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.6	922.0	80.0	905.0	80.3	80.3
		11 - 10 - 2	80.1	963.0	79.1	979.0	79.7	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0145	922.0	0.0137	905.0	0.0141	
		11 - 10 - 2	0.0140	964.0	0.0139	910.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	89.0	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	24.2	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	5.0	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-94258.9	BTU/HR
HEAT SINK	-5140.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271428.	939.0	-263316.	973.0	105658.	-54296.
AIR VELOCITY	(FPM)	12 - 11	388.	939.0	-376.	973.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	85.3	910.0	75.9	966.0	80.2	78.1
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0140	911.0	0.0138	900.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	39.6	3.3	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719308.1	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1054949.0	BTU/HR
HEAT SINK	-14444.3	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

TUNNEL STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271428.	939.0	-263316.	973.0	105658.	-54296.
AIR VELOCITY	(FPM)	13 - 12	679.	939.0	-658.	973.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.6	911.0	80.2	963.0	84.6	83.4
		13 - 12 - 2	91.7	914.0	83.7	964.0	87.5	86.3
		13 - 12 - 3	91.9	916.0	86.6	964.0	89.3	88.5
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	912.0	0.0140	963.0	0.0140	
		13 - 12 - 2	0.0147	914.0	0.0141	963.0	0.0143	
		13 - 12 - 3	0.0154	915.0	0.0144	963.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1068786.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-359598.6	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153832.	968.0	119003.	914.0	137966.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	968.0	793.	914.0	920.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.6	926.0	87.5	952.0	88.9	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	905.0	0.0146	950.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133467.	918.0	-391841.	972.0	33636.	-120240.
AIR VELOCITY	(FPM)	15 - 13	334.	918.0	-980.	972.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.3	976.0	88.4	909.0	89.8	89.4
		15 - 13 - 2	90.2	973.0	86.6	910.0	88.0	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	916.0	0.0157	950.0	0.0160	
		15 - 13 - 2	0.0164	922.0	0.0162	972.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	674234.6	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-330693.8	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133467.	918.0	-391841.	972.0	33636.	-120240.
AIR VELOCITY	(FPM)	15 - 14	191.	918.0	-560.	972.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.6	971.0	84.9	910.0	85.8	86.1
		15 - 14 - 2	85.8	969.0	83.0	910.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	923.0	0.0164	971.0	0.0164	
		15 - 14 - 2	0.0165	925.0	0.0165	970.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	470772.6	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-130576.6	BTU/HR

SES HEAT SINK ANALYSIS

ZONE NUMBER 1

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
1 - 1 - 1	82.1	0.01648
1 - 2 - 1	82.1	0.01648
1 - 3 - 1	82.3	0.01648
1 - 3 - 2	82.6	0.01648
2 - 4 - 1	83.9	0.01582
2 - 4 - 2	83.7	0.01582
2 - 4 - 3	83.4	0.01581
5 - 5 - 1	82.7	0.01648
5 - 5 - 2	83.1	0.01648
5 - 5 - 3	83.6	0.01648
6 - 6 - 1	83.7	0.01544
6 - 6 - 2	83.2	0.01532
6 - 6 - 3	82.9	0.01538
3 -103 - 1	81.6	0.01648
4 -104 - 1	81.8	0.01631

SES HEAT SINK ANALYSIS

ZONE NUMBER 3

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
10 -110 - 1	81.0	0.01529

SES HEAT SINK ANALYSIS

ZONE NUMBER 4

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
13 - 12 - 1	84.5	0.01387
13 - 12 - 2	87.3	0.01420
13 - 12 - 3	89.1	0.01480
15 - 13 - 1	89.4	0.01600
15 - 13 - 2	87.9	0.01634
15 - 14 - 1	85.9	0.01644
15 - 14 - 2	84.0	0.01647
14 -114 - 1	88.9	0.01537

ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES

AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), BTU/HR

THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING RUSH HOUR

ZONE NUMBER 2 ----- DESIGN CONDITION ----- 80.0 DEG F DRY BULB ----- 70.0 DEG F WET BULB

SYSTEM PARTITIONING	TRAINS		STEADY-STATE		HEAT SINK	AIR FLOW		ENVIRONMENTAL CONTROL		TOTAL ENVIRONMENTAL CONTROL REQUIREMENT		
	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	LATENT	TOTAL
7 - 7 - 1	692955	10	70000	36000	-10706	453874	1076654	-1234363	-1097461	-1206123	-1112664	-2318787
8 - 8 - 1	2	0	50000	36000	-2599	-6206	23880	-40938	-51037	-41197	-59880	-101077
8 - 8 - 2	2	0	50000	36000	-2737	28788	197738	-61179	-200199	-76053	-233738	-309791
9 - 9 - 1	843498	0	69000	36000	-11762	19326	75759	-869718	-70744	-920062	-111759	-1031821
9 - 9 - 2	858009	0	69000	36000	-11672	-56925	-26015	-846361	-5702	-858412	-9985	-868397
9 - 9 - 3	861375	0	69000	36000	-11511	-58571	-31109	-877397	-15786	-860293	-4891	-865184
9 - 9 - 4	852831	0	68999	36000	-11623	16015	-12591	-951334	-21426	-926222	-23409	-949631
11 - 10 - 1	2	1	50000	36000	-2743	27534	195518	-64226	-205914	-74793	-231519	-306312
11 - 10 - 2	2	0	50000	36000	-2563	-25842	-1098	-30031	-33245	-21597	-34902	-56499
12 - 11 - 1	719308	0	69999	36000	-12209	331327	50506	-1054948	-68612	-1108425	-86506	-1194931
ZONE TOTAL	4827984	11	615998	360000	-80125	729320	1549242	-6030495	-1770126	-6093177	-1909253	-8002430

CONVECTIVE LOAD BREAKDOWN

AVERAGED ZONE CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR

SOURCE NO	NODE NO	SECTION NO	SEGMENT NO	SEGMENT NAME	SENSIBLE GAIN	LATENT GAIN	TOTAL
1	5				356447	1129576	1486023
2	7				33850	192558	226408
3	7				33084	185646	218730
4	9				305937	41460	347397

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RT F	TY P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
22	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	82.10	0.01648	96768.6	322.6						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	82.12	0.01648	96768.6	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	82.28	0.01648	96768.6	430.1						
	1 - 3 - 2		0.4	0.0	82.64	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	83.93	0.01582	-233181.7	-1036.4						
	2 - 4 - 2		6.2	0.0	83.73	0.01582								
	2 - 4 - 3		6.2	0.0	83.43	0.01581								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.65	0.01648	20498.8	102.5						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.78	0.01631	-49208.6	-370.8						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	82.66	0.01648	76269.8	339.0						
	5 - 5 - 2		0.4	0.0	83.10	0.01648								
	5 - 5 - 3		0.4	0.0	83.64	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.67	0.01544	-183973.1	-817.7						
	6 - 6 - 2		5.9	0.0	83.22	0.01532								
	6 - 6 - 3		5.9	0.0	82.94	0.01530								

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY						
	7 - 7 - 1		-123.1	-299.1	80.00	0.01364	-107703.3	-153.9			22
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT						
	8 - 8 - 1		2.4	-6.6	80.00	0.01364	-35432.3	-78.7			
	8 - 8 - 2		-7.2	-54.9	80.00	0.01364					
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS						
	9 - 9 - 1		-2.1	-21.0	80.00	0.01364	-72270.9	-103.2	21		22
	9 - 9 - 2		19.1	7.2	80.00	0.01364			21		22
	9 - 9 - 3		19.5	8.6	80.00	0.01364			21		22
	9 - 9 - 4		-1.2	3.5	80.00	0.01364			21		22
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE						
	10 -110 - 1				81.04	0.01529	-30769.7	-318.9			
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE						
	11 - 10 - 1		-6.9	-54.3	80.00	0.01364	-4662.6	-10.4			
	11 - 10 - 2		7.9	0.3	80.00	0.01364					
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION						
	12 - 11 - 1		-88.6	-14.0	80.00	0.01364	-76933.6	-109.9	21		22
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT						
	13 - 12 - 1		211.2	0.0	84.51	0.01387	-76933.6	-192.3	21		22
	13 - 12 - 2		4.7	0.0	87.27	0.01420					
	13 - 12 - 3		4.7	0.0	89.09	0.01480					
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE						
	14 -114 - 1				88.87	0.01537	140738.2	938.0			
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT						
	15 - 13 - 1		5.8	0.0	89.42	0.01600	-217671.8	-544.2			
	15 - 13 - 2		5.8	0.0	87.87	0.01634					
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT						
	15 - 14 - 1		4.3	0.0	85.88	0.01644	-217671.8	-311.0			
	15 - 14 - 2		4.3	0.0	84.02	0.01647					

TIME 1170.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RT F	TY P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION
25	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
26	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96764.9	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96764.9	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96764.9	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.46	0.01586	-233189.0	-1036.4						
	2 - 4 - 2		6.2	0.0	84.06	0.01586								
	2 - 4 - 3		6.2	0.0	83.64	0.01585								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20515.9	102.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49197.0	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76248.9	338.9						
	5 - 5 - 2		0.4	0.0	81.98	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.29	0.01559	-103991.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.09	0.01519								
	6 - 6 - 3		5.9	0.0	80.82	0.01463								

TIME 1170.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RT F	TY P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
25	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
26	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96764.9	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96764.9	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96764.9	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.46	0.01586	-233189.0	-1036.4						
	2 - 4 - 2		6.2	0.0	84.06	0.01586								
	2 - 4 - 3		6.2	0.0	83.64	0.01585								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20515.9	102.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.01	0.01647	-49197.8	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76248.9	338.9						
	5 - 5 - 2		0.4	0.0	81.98	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.29	0.01559	-183991.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.09	0.01519								
	6 - 6 - 3		5.9	0.0	80.82	0.01463								

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY					
	7 - 7 - 1	-226.8	-299.1		78.06	0.01308	-107742.2	-153.9		26
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT					
	8 - 8 - 1	2.4	-6.6		79.80	0.01387	-35465.9	-78.8		
	8 - 8 - 2	-7.2	-54.9		80.00	0.01381				
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS					
	9 - 9 - 1	151.0	-21.0		79.87	0.01396	-72276.3	-103.3	25	26
	9 - 9 - 2	207.4	7.2		80.19	0.01398			25	26
	9 - 9 - 3	206.9	8.6		79.95	0.01390			25	26
	9 - 9 - 4	188.6	3.5		79.47	0.01382			25	26
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE					
	10 -110 - 1				80.98	0.01529	-30833.9	-319.5		
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE					
	11 - 10 - 1	-6.9	-54.3		79.74	0.01350	-4632.0	-10.3		
	11 - 10 - 2	7.9	0.3		79.27	0.01376				
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION					
	12 - 11 - 1	138.3	-14.0		79.72	0.01375	-76908.3	-109.9	25	26
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT					
	13 - 12 - 1	211.2	0.0		86.07	0.01392	-76908.3	-192.3	25	26
	13 - 12 - 2	4.7	0.0		87.97	0.01428				
	13 - 12 - 3	4.7	0.0		89.40	0.01504				
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE					
	14 -114 - 1				89.13	0.01594	140730.6	938.0		
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT					
	15 - 13 - 1	5.8	0.0		89.00	0.01610	-217646.9	-544.1		
	15 - 13 - 2	5.8	0.0		87.10	0.01635				
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT					
	15 - 14 - 1	4.3	0.0		85.25	0.01644	-217646.9	-310.9		
	15 - 14 - 2	4.3	0.0		83.21	0.01647				

TIME 1260.00 SECONDS 2 TRAINIS) ARE OPERATIONAL

TRAIN NO.	RT FP	TY P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
27	))		2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
28	2)		2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96761.2	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96761.2	387.0						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96761.2	430.0						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.39	0.01583	-233191.6	-1036.4						
	2 - 4 - 2		6.2	0.0	84.01	0.01584								
	2 - 4 - 3		6.2	0.0	83.59	0.01583								
110.0	3 -103	)VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20518.2	102.6						
95.)	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49200.8	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76243.0	338.9						
	5 - 5 - 2		0.4	0.0	81.97	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	)TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.24	0.01558	-183990.8	-817.7						
	6 - 6 - 2		5.9	0.0	82.04	0.01518								
	6 - 6 - 3		5.9	0.0	80.75	0.01463								

100.0	7 - 7	(STATION)		START OF STATION TO WEST STAIRWAY						
	7 - 7 - 1	-226.8	-299.1	77.93	0.01308	-107747.9	-153.9		28	
200.0	8 - 8	(STATION)		WEST END OF MEZZANINE TO STREET EXIT						
	8 - 8 - 1	2.4	-6.6	79.65	0.01390	-35473.9	-78.8			
	8 - 8 - 2	-7.2	-54.9	79.93	0.01385					
400.0	9 - 9	(STATION)		PLATFORM AREA BETWEEN STAIRWAYS						
	9 - 9 - 1	151.1	-21.0	79.70	0.01397	-72273.9	-103.2	27	28	
	9 - 9 - 2	207.5	7.2	80.02	0.01399			27	28	
	9 - 9 - 3	206.9	8.6	79.80	0.01392			27	28	
	9 - 9 - 4	188.6	3.5	79.37	0.01386			27	28	
20.0	10 -110	(STAIRWAY)		STREET LEVEL STAIRWAY TO MEZZANINE						
	10 -110 - 1			80.95	0.01530	-30848.8	-319.7			
200.0	11 - 10	(STATION)		STREET EXIT TO EAST END OF MEZZANINE						
	11 - 10 - 1	-6.9	-54.3	79.66	0.01351	-4625.1	-10.3			
	11 - 10 - 2	7.9	0.3	79.19	0.01379					
100.0	12 - 11	(STATION)		EAST STAIRWAY TO END OF STATION						
	12 - 11 - 1	138.3	-14.0	79.68	0.01380	-76898.9	-109.9	27	28	
500.0	13 - 12	(TUNNEL)		STATION END TO EXHAUST FAN AT 3300FT						
	13 - 12 - 1	211.2	0.0	86.07	0.01399	-76898.9	-192.2	27	28	
	13 - 12 - 2	4.7	0.0	87.98	0.01434					
	13 - 12 - 3	4.7	0.0	89.37	0.01509					
78.7	14 -114	(VENTILATION SHAFT)		FAN SHAFT AT 3300 FT - EXHAUST MODE						
	14 -114 - 1			89.03	0.01595	140737.4	938.0			
400.0	15 - 13	(TUNNEL)		EXHAUST FAN TO 3700 FT						
	15 - 13 - 1	5.8	0.0	88.90	0.01612	-217636.3	-544.1			
	15 - 13 - 2	5.8	0.0	87.00	0.01636					
300.0	15 - 14	(TUNNEL)		3700 FT TO EAST PORTAL AT 4000 FT						
	15 - 14 - 1	4.3	0.0	85.18	0.01644	-217636.3	-310.9			
	15 - 14 - 2	4.3	0.0	83.19	0.01647					

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 1	1958.	1200.0	319.	1176.0	670.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	1200.0	81.8	1192.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76090.6	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43538.2	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 2	2350.	1200.0	383.	1176.0	803.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	1200.0	81.6	1193.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	73981.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47824.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 3	2611.	1200.0	425.	1176.0	893.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	1202.0	81.3	1194.0	82.4	0.0
		1 - 3 - 2	87.9	1205.0	81.1	1196.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	
		1 - 3 - 2	0.0165	1170.0	0.0165	1206.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	298992.0	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216770.1	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-82105.	1198.0	-582129.	1230.0	0.	-223620.
AIR VELOCITY	(FPM)	2 - 4	-365.	1198.0	-2587.	1230.0	0.	-994.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	1234.0	81.9	1226.0	0.0	84.1
		2 - 4 - 2	89.4	1232.0	81.8	1224.0	0.0	83.9
		2 - 4 - 3	88.8	1230.0	81.7	1221.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	1236.0	0.0158	1231.0	0.0158	
		2 - 4 - 2	0.0159	1206.0	0.0157	1231.0	0.0158	
		2 - 4 - 3	0.0161	1198.0	0.0156	1222.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	501011.4	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-484632.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	293918.	1199.0	-128149.	1207.0	25310.	-44189.
AIR VELOCITY	(FPM)	3 -103	1470.	1199.0	-641.	1207.0	127.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103					6.6	
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	1238.0	81.4	1201.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	1235.0	0.0165	1201.0	0.0165	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136777.	1221.0	-295976.	1230.0	13683.	-61570.
AIR VELOCITY	(FPM)	4 -104	1031.	1221.0	-2230.	1230.0	103.	-464.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104						9.9
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	1234.0	81.6	1220.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	1201.0	0.0155	1222.0	0.0163	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -RTE 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	500070.	1205.0	62976.	1253.0	219742.	0.
AIR VELOCITY	(FPM)	5 - 5	2223.	1205.0	280.	1253.0	977.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	1207.0	81.1	1199.0	82.7	0.0
		5 - 5 - 2	89.0	1210.0	81.0	1201.0	83.1	0.0
		5 - 5 - 3	90.4	1214.0	81.0	1203.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	1233.0	0.0165	1170.0	0.0165	
		5 - 5 - 2	0.0165	1219.0	0.0165	1170.0	0.0165	
		5 - 5 - 3	0.0165	1227.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	561493.2	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418780.1	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-413.	1190.0	-347432.	1222.0	0.	-175741.
AIR VELOCITY	(FPM)	6 - 6	-2.	1190.0	-1544.	1222.0	0.	-781.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.2	1228.0	81.5	1217.0	0.0	83.7
		6 - 6 - 2	89.4	1226.0	81.2	1211.0	0.0	83.3
		6 - 6 - 3	90.0	1222.0	80.6	1174.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0158	1247.0	0.0152	1213.0	0.0155	
		6 - 6 - 2	0.0160	1241.0	0.0150	1180.0	0.0153	
		6 - 6 - 3	0.0162	1237.0	0.0146	1171.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	622783.9	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-420483.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362801.	1204.0	-185603.	1247.0	89413.	-45412.
AIR VELOCITY	(FPM)	7 - 7	518.	1204.0	-265.	1247.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.6	1222.0	76.6	1183.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	1222.0	0.0126	1180.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	693016.5	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1206122.0	BTU/HR
HEAT SINK	-4514.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97618.	1202.0	-101540.	1219.0	17397.	-19428.
AIR VELOCITY	(FPM)	8 - 8	217.	1202.0	-226.	1219.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	79.8	1193.0	79.4	1210.0	79.7	79.6
		8 - 8 - 2	80.3	1234.0	79.7	1212.0	80.0	80.0
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0140	1210.0	0.0138	1198.0	0.0139	
		8 - 8 - 2	0.0143	1233.0	0.0135	1212.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	0.0	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	56.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.5	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-117249.9	BTU/HR
HEAT SINK	-4136.0	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280438.	1205.0	-242232.	1252.0	92333.	-46301.
AIR VELOCITY	(FPM)	9 - 9	401.	1205.0	-346.	1252.0	132.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.3	1220.0	77.5	1204.0	79.2	79.7
		9 - 9 - 2	80.9	1174.0	78.0	1210.0	79.6	79.4
		9 - 9 - 3	81.2	1177.0	77.7	1250.0	79.8	78.8
		9 - 9 - 4	82.0	1179.0	76.9	1248.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0142	1220.0	0.0135	1194.0	0.0139	
		9 - 9 - 2	0.0140	1238.0	0.0137	1204.0	0.0139	
		9 - 9 - 3	0.0139	1258.0	0.0138	1209.0	0.0139	
		9 - 9 - 4	0.0139	1236.0	0.0138	1175.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	31.9	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	28.6	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	28.6	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	33.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3416093.0	BTU/HR
STEADY-STATE HEAT SOURCES	275998.3	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3564987.0	BTU/HR
HEAT SINK	-14298.7	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130770.	1202.0	-106115.	1219.0	27721.	-35095.
AIR VELOCITY	(FPM)	10 -110	1355.	1202.0	-1100.	1219.0	287.	-364.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110					12.1	
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	1185.0	79.6	1210.0	80.1	81.5
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	1192.0	0.0136	1210.0	0.0153	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	94592.	1179.0	-109265.	1239.0	21119.	-15776.
AIR VELOCITY	(FPM)	11 - 10	210.	1179.0	-243.	1239.0	47.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.3	1192.0	79.7	1260.0	80.0	80.0
		11 - 10 - 2	80.2	1234.0	79.0	1249.0	79.7	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0143	1192.0	0.0134	1175.0	0.0138	
		11 - 10 - 2	0.0138	1234.0	0.0137	1181.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	60.4	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	23.1	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	5.1	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-96389.9	BTU/HR
HEAT SINK	-4156.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271456.	1209.0	-263306.	1243.0	105665.	-54290.
AIR VELOCITY	(FPM)	12 - 11	388.	1209.0	-376.	1243.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	84.9	1180.0	75.5	1236.0	79.9	77.7
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0139	1181.0	0.0137	1170.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	35.2	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719403.1	BTU/HR
STEADY-STATE HEAT SOURCES	69998.7	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1108424.0	BTU/HR
HEAT SINK	-9829.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271456.	1209.0	-263306.	1243.0	105665.	-54290.
AIR VELOCITY	(FPM)	13 - 12	679.	1209.0	-658.	1243.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.5	1101.0	80.0	1233.0	84.4	83.2
		13 - 12 - 2	91.6	1184.0	83.5	1234.0	87.3	86.1
		13 - 12 - 3	91.8	1186.0	86.4	1234.0	89.1	88.4
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	1182.0	0.0139	1233.0	0.0140	
		13 - 12 - 2	0.0147	1184.0	0.0140	1233.0	0.0142	
		13 - 12 - 3	0.0154	1185.0	0.0143	1233.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1068952.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-350839.4	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153831.	1238.0	119003.	1184.0	137966.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	1238.0	793.	1184.0	920.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.5	1196.0	87.4	1222.0	88.8	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	1174.0	0.0145	1220.0	0.0153	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133468.	1188.0	-391831.	1242.0	33641.	-120232.
AIR VELOCITY	(FPM)	15 - 13	334.	1188.0	-980.	1242.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.2	1246.0	88.4	1179.0	89.8	89.4
		15 - 13 - 2	90.2	1243.0	86.5	1180.0	88.0	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	1186.0	0.0157	1220.0	0.0160	
		15 - 13 - 2	0.0164	1192.0	0.0162	1242.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	674258.7	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-330029.1	BTU/HR

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SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133468.	1188.0	-391831.	1242.0	33641.	-120232.
AIR VELOCITY	(FPM)	15 - 14	191.	1188.0	-560.	1242.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.6	1241.0	84.8	1180.0	85.8	86.1
		15 - 14 - 2	85.8	1239.0	83.0	1180.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	1193.0	0.0164	1241.0	0.0164	
		15 - 14 - 2	0.0165	1195.0	0.0165	1240.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	470771.1	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-130541.5	BTU/HR

END OF SIMULATION

APPENDIX D

REPORT OF NEW TECHNOLOGY

After a diligent review of the work performed under this contract, no new innovation, discovery, improvement or invention was made.

During the course of this contract, computer software and companion user documentation were modified and revised to support recurring applications of SES technology. Each application has served to enhance the range of techniques, analyses, and methodologies available for subway environmental design. By presenting a detailed, chronological account of all software maintenance, this volume describes for the first time, and in one consolidated volume, an advancing state-of-the-art which is essential to all users of the SES Computer Program.

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Software maintenance or
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