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TAP-LOOP: A STABLE THERMAL
ANALYZER CODE FOR THERMAL ANALYSIS
OF CLOSED HYDRAULIC SYSTEMS

January 1970

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OF CLOSED HYDRAULIC SYSTEMS

C. E. Leach and E. L. Kelley, Jr.

Fuels and Materials Department
Chemistry and Metallurgy Division

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PACIFIC NORTHWEST LABORATORIES
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ABSTRACT

A finite difference digital code for steady-state and transient thermal analysis of recirculating fluid loops, TAP-LOOF, was derived from the original TAP code developed by Atomics International. Stability improvement and transport lag times were incorporated in the TAP code to provide a more useful design tool for thermal analysis of closed hydraulic systems. Theory, logic, program listing, input and test case results are given.

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TAP-LOOP: A STABLE THERMAL ANALYZER CODE FOR THERMAL ANALYSIS OF CLOSED HYDRAULIC SYSTEMS

1. INTRODUCTION

TAP-Loop is a finite difference digital code for both steady-state and transient thermal analysis of recirculating fluid loops and associated heat transfer equipment, however, it is not limited to loop analysis. TAP-Loop was developed to perform scoping and conceptual design analyses for closed test loops in the Fast Flux Test Facility. The code has proved to be a useful design tool and provided the basis for computing thermal capabilities of these loops. TAP-Loop is a derivative of the Atomics International TAP code described in NAA-SR-MEMO 11812. The majority of information presented in this document is also contained within NAA-SR-MEMO 11812 and has been included verbatim for convenience of the user.

Experience with TAP demonstrated it to be conditionally stable in both the steady-state and transient modes when analyzing recirculating fluid systems. The cause of this instability was an iterative lag in recalculating the fluid outlet temperature in the normal iterative process. This difficulty was overcome by forcing a sequential order of calculation. Except for one instance, which is described in Section 3.3 under Initial and Constant Values, this new logic precludes the use of arithmetic routine-calculated temperatures in the loop iteration process.

A transport lag time subroutine has also been included in TAP-Loop. Fluid temperature perturbations move essentially at the velocity of the fluid when the fluid velocity is much greater than the rate of thermal diffusion in the fluid. When the ratio of distance between adjacent fluid nodes to velocity is approximately equal to or greater than the node thermal response time, this transport time becomes significant to the transient thermal analysis.

2. TAP-LOOP DESCRIPTION

2.1 THEORY

The general area of the program capability lies in solution of the partial differential equation:

$$\nabla^2 T(x,y,z) + \frac{Q}{K}(x,y,z) = \frac{1}{\alpha} \frac{\partial T(x,y,z)}{\partial \theta}. \quad (1)$$

The code will, therefore, handle a variety of problems which can be described in terms of potentials, sources, sinks and storage. These include (in addition to heat transfer problems) potential fluid flow, electrical networks, and fields and stress analysis.

TAP also includes a series of functions described later which may be made functions of themselves or any other program variable, including time. In addition these functions may be employed to connect or disconnect various regions of the problem under analysis. As an example, the temperature history of a nuclear fuel pin as it slumps during a power excursion may be described. The functions also allow the solution of the general equation with nonconstant coefficients or calculation of initial values for the coefficients.

Through these functions, Equation (1) has been further generalized to include energy transport by flowing fluids.

$$\rho c \frac{\partial T}{\partial \theta} + \rho c u \frac{\partial T}{\partial X} = K \nabla^2 T + Q. \quad (2)$$

TAP-Loop obviates the necessity to employ the functions for fluid transport and precludes doing so as pointed out earlier.

The finite difference approximation used by TAP-Loop requires that the problem be broken into mesh points, each representing a small volume or node. Temperatures are then calculated depending on whether the analysis is steady-state or transient and whether the node contains fluid transport in addition to diffusion or diffusion only. The differential energy

balance is derived as follows: Equation (2) is transformed to finite difference form to eliminate the partial derivatives by integration over the node volume. The process assumes the partial differentials and coefficients to be independent of one another during integration over the nodal volume.

After integration, Equation (2) becomes:

$$mc \frac{dT}{d\theta} = \dot{m}c(T_1 - T_2) + QV + \sum q \quad (3)$$

where,

- c = specific heat
- m = weight of fluid contained in the volume
- $\dot{m}$ = mass flow rate
- T = fluid node temperature
- T_1 = fluid node inlet temperature
- T_2 = fluid node outlet temperature
- Q = internal heat generation rate in node
- V = node volume
- q = heat transport in or out by conduction, radiation, etc. from adjacent connecting nodes.

The heat transport terms are conventionally calculated via conductances or admittances and potential differences, i.e.,

$$q_i = y_i(T_i - T) \quad (4)$$

where,

- q_i = heat transported between adjacent node i and node under consideration
- y_i = admittance between node i and node under consideration
- T_i = temperature of adjacent connected node
- T = temperature of node under consideration

In integration of Equation (2) in the direction of fluid flow, it was assumed that T_i and Q were constant and that the node is

$$T_1 - T_2 = T - \frac{T_1 - T}{2}; T_2 = 2T - T_1$$

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$$T_1 - T_2 = T_1 - 2T + T_1 = 2(T_1 - T)$$

small enough that T is equal to a constant value. In the absence of heat generation and time variation, this value is generally the log mean temperature. In the more general case, the problem is not so easily reduced, hence either an average of T_1 and T_2 is assumed, or it is assumed that $T_2 = T$. Substitution of the first assumption along with Equation (4) into Equation (3) produces:

$$\frac{dT}{d\theta} = \frac{1}{\dot{m}c} [2\dot{m}c(T_1 - T) + QV + \sum_i y_i(T_i - T)]. \quad (5)$$

If it is assumed that $T_2 = T$, Equation (5) produces:

$$\frac{dT}{d\theta} = \frac{1}{\dot{m}c} [\dot{m}c(T_1 - T) + QV + \sum_i y_i(T_i - T)]. \quad (5a)$$

Inspection of Equation (5) reveals that the fluid transport term may be included with the other transport terms if the admittance $\dot{m}c$ is multiplied by two, i.e.,

$$y = 2 \dot{m}c. \quad (6)$$

Similarly, for the assumption of $T_2 = T$, the admittance is included without the multiplication, i.e.,

$$y = \dot{m}c. \quad (6a)$$

Introducing (6) into (5) and casting (5) in terms of first forward differences results in the numerical equation used by TAP-Loop.

$$\Delta T = \frac{\Delta\theta}{\dot{m}c} [QV + \sum_i y_i(T_i - T)], T_{\theta} + \Delta\theta = T_{\theta} + \Delta T. \quad (7)$$

Knowledge of T and T_1 , assuming the temperature average applies, permits calculation of the outlet temperature, T_2 , by the following equation:

$$T_2 = 2T - T_1. \quad (8)$$

The assumption that the outlet temperature is the same as the node temperature results in an alternate equation for calculation of T_2 , i.e.,

$$T_2 = T. \quad (8a)$$

In the instance of Equation (8a), Equation (8) is used, but the user enters coefficients such that the result,

$$T_2 = 2T - T, \quad (8b)$$

gives Equation (8a).

Provision is made for the alternate method of outlet temperature calculation because the averaging technique results in initial instability in the fluid node outlet temperature during transient analysis. The averaging technique results in more accurate temperatures for steady-state analysis and there is no instability problem. Averaging is recommended for steady-state analysis. This is further discussed in Section 3.3 under Fluid Nodes and under Sample Loading.

Steady-state temperature distributions can be found from Equation (7) by setting $\dot{Q} = 0$ and rearranging the terms in the brackets. Solving for T gives

$$T = \frac{QV + \sum_i y_i T_i}{\sum_i y_i} \quad (9)$$

Equation (9) is solved by direct iteration among the various nodes. TAP-Loop forces this iteration to proceed from node 2 in ascending numerical order (including fluid nodes). A node identified as No. 1 is not permitted. Equation (9) solves the general steady heat transport case in absence of fluid flow. Equation (9) in conjunction with (8) solves the general steady-state case with fluid transport. Equation (7) solves the general transient case and in conjunction with (8)

solves the general transient case with fluid flow when the fluid transport time between nodes is negligible.

There are frequent practical instances when a system is investigated where the transport time is not negligible. In this instance a relationship is required which describes the spatial motion of temperature perturbations propagated at the fluid velocity by the fluid. Inspection of Equation (2), which includes the substantive derivative, reveals a characteristic, x/u , upon which the temperature is constant in an adiabatic system. This characteristic is lost during derivation of (7) and must, with this method of solution, be reintroduced as an associated equation.

In this instance, the method selected to account for transport time can best be explained in terms of an example. Consider two adjacent fluid nodes connected by a flowing fluid with node numbers as shown below.

Assume they are separated by a pipe 30 ft long and the fluid velocity is 30 ft/sec. The displacement between nodes 3 and 4 is 30 ft when 3 is the outlet of 2, and 4 is the inlet to 5. Node 3 is a "cathode follower" node whose temperature is calculated by Equation (8). The time for a temperature wave

to travel from 3 to 4 is x/u or 1 sec. A temperature plot of these two nodes might be represented as shown below, where T_4 is the same as T_3 but lagged in time by x/u or,

$$T_4 = T_3(\theta - x/u). \quad (10)$$

T_4 , in the code, is termed a time lag node and is identified in the input as explained later. During steady-state calculations there is no time lag, so T_4 is set equal to T_3 . In transient analysis T_3 is stored by a polynomial in time, i.e.,

$$T_3 = A + B\theta + C\theta^2 + \dots \quad (11)$$

According to Equation (10)

$$T_4 = A + B(\theta - x/u) + C(\theta - x/u)^2 + \dots \quad (12)$$

These additions enhance the flexibility of the TAP code. Fluid flow is handled without recourse to the arithmetic functions. Sequential ordering of the fluid nodes together with the fluid node option allows stable solutions of closed recirculating loop problems in both the transient and steady-state modes. Utilization of the time lag capability allows a true portrayal of temperature-space-time history.

2.2 TAP EQUATIONS

In preparing a problem for solution with the TAP code, it is first necessary to approximate the physical system with a

lumped-geometry network. In general, the more finely divided the network, the more nearly accurate will be the solution. The use of small subdivisions increases the required computing time, so a judicious compromise is usually necessary. The preparation of networks is an art in itself and will not be discussed in this report.

In the lumped-geometry approximation, the total thermal capacity of the physical system is assumed to be apportioned among a set of discrete lumps, called "nodes." Each node is assumed to be connected to each of its neighbors by a conducting path to which a value called the "admittance," (Y), is assigned. (The "admittance," (Y), is the reciprocal of the thermal resistance.) Each node may be assigned a heat generation rate equivalent to the rate of heat generation in the element of volume of the physical system represented by the node. The temperature assigned to or calculated for each node represents the temperature at the centroid of the corresponding element of the physical system. For example, consider a portion of the network as shown below.

The computer code applies the following finite-difference approximation equation to each of the nodes of the network for each time step or "iteration" (See Table 1 for definition of terms.):

$$T_{o, \theta + \Delta\theta} = T_{o, \theta} + \frac{\Delta\theta}{C_o} [Q + \sum (Y_i T_i) - (\sum Y_i) T_o]. \quad (13)$$

TABLE 1. *Definition of Terms Used in Finite-Difference Equation*

<u>Symbol</u>	<u>Definition</u>	<u>Typical Dimension</u>
C	Capacitance of a node	Btu/°F
Q	Heat generation rate of a node	Btu/sec
T	Temperature of a node	°F
Y	Admittance of a heat-flow path	Btu/sec-°F
θ	Time	Sec

Subscripts

o	Designates the node which is being iterated at a given moment
i	Designates a node connected to node _o
θ	Designates a value at time θ
$\theta + \Delta\theta$	Designates a value at the end of the time step, $\Delta\theta$

It is necessary that the time step, $\Delta\theta$, be sufficiently small. If too large a step is used, the calculation process will become divergent, and the temperatures will be calculated to be alternately extremely large positive and negative values. The code determines the critical step time during each iteration, but provisions are made for the user to exert some control over the values used (control constant #2).

The formula for finding the maximum stable time step size is as follows:

$$(\Delta\theta)_{\text{stable}} = \frac{C_o}{\sum_i Y_{o, i}}.$$

This formula is applied before each iteration to each node having a nonzero capacity, and the least value found is used

as the $\Delta\theta$ for that iteration. If the user desires to use a smaller time step than is calculated, he may specify his own, and/or he may specify a multiplier less than 1.0 to be applied to the calculated value. A multiplier of 0.8 or less is generally recommended to avoid incipient instability of the computation. A minimum allowable time step may also be specified. If the internally-calculated value becomes less than this minimum, the run is terminated.

When time lag is used, the $\Delta\theta$ (stable) is the smaller of the former and one-fourth of the minimum x/u or lag time. When formulating the problem, it is necessary to gauge the time lag and node thermal response time of those nodes tied to the time lagged, or preceding fluid node. If the time lag is much less than the thermal response time of these nodes, the time lag should not be included. The short time lag would increase the running time of the code. On the other hand, if the thermal response time of the nodes is much shorter than the time lag the temperature response of the nodes will be that of the fluid. Time-lagged nodes may be used at will and therefore may be included in or excluded from the problem (as necessary) to achieve the detail desired.

In some problems it is advantageous to use nodes of zero capacitance. A typical case occurs when the temperature of a surface (as distinct from the temperature at a depth within the material) is desired. Another common situation arises when only the steady-state temperature distribution is required. In this case, the computing time is greatly reduced if all the nodes are assumed to have zero capacitance. The finite-difference equation used for the iteration of zero-capacitance nodes is:

$$T_{o, \theta + \Delta\theta} = \frac{Q + \sum_i (Y_i T_i)}{\sum_i Y_i}$$

Steady-state over relaxation is also provided as a new feature of TAP-Loop to speed convergence. To be stable during the iterative process, the system of equations must be at least "critically damped" (no oscillations). The temperature change from iteration to iteration is generally much less than that which would cause instability. A multiplier is included to increase the temperature change after the change is one degree or less. Experimentation is required to determine the best value to minimize run time; however, it has generally been found to be 1.0 to 1.2.

2.3 TAP-LOOP FLOW CHART

The basic working cycle of the code is shown in the flow diagram below.

* INCLUDING THE FUNCTIONS TO BE PERFORMED ONLY ONCE.
 ** OMITTING THE FUNCTIONS TO BE PERFORMED ONLY ONCE.

3. TAP-LOOP INPUT

3.1 INPUT FORMS

Special load sheets, Form No. BB1570-067(5-68), for TAP are available. Each line of the TAP input sheet represents one card which is generally read in the following format:

(2(A1, I3), I4, 2F12.0, 2(A1, I3), 2I4, 3A6, A2, 2A4)

The four columns in each of the Fields I1, I2, J1, and J2 contain parameter identification numbers consisting of a prefix, D, 8, 0, Y, T, C, Q, K or (*), and three or less digits. The prefix must be left-adjusted and the number must be right-adjusted; intermediate blanks are permitted. The blank or zero prefix is the same as D. Anything in Field I2 indicates consecutive items, I1 through I2, and the latter prefix will be the same as that in I1; therefore, it is unnecessary to prefix Field I2. A blank in Fields J1 and/or J2 indicates time.

Field I3 is used to specify a table number, an arithmetic operation, or one of the miscellaneous flags. I3 may be a positive or negative integer.

The E1 and E2 fields accept decimal data; if no decimal point is entered, the code will follow Column 24 for Field E1 and Column 36 for Field E2. Any exponents must be right-adjusted within these fields.

K1 and K2 increment and/or decrement the parameters in J1 and J2, respectively, when a series of items is loaded on one card. If the value of K1 and/or K2 = 0, a blank will suffice.

The comment section is only for the user's clarification and may contain any acceptable FORTRAN characters in any format. Comments are printed with the list of input at the beginning of the run and thereafter ignored by the code.

Columns 73 through 80 contain identification numbers for sorting data cards.

3.2 CONTROL CARDS

Each block of input data must be preceded by a control card which contains (1) an asterisk [*] in Column 1 of Field I1, (2) a number <100, right-adjusted in Field I1, and (3) an identification number for sorting in Columns 73 through 80. These control cards indicate the next type of data to be read in and direct the program to the proper section of the input subroutine TAPIN. On the input printout, each type of data is labeled as shown below; therefore, comments are unnecessary on control cards. *Input data must not be entered on control cards.* The major control cards and their classification are:

<u>Number in I1</u>	<u>Type of Input Data to Follow</u>
"001	Titles
"010	Network Descriptions
"020	Initial Values
*030	Functions
*040	Tables
"050	Latent Heat
*060	Fluid Nodes
"070	Special Constant Values
"080	Printout Specifications
*090	Run Control

The following cards signal the end of input data for one run and, if more than one run is being made, the type of input to expect for the succeeding run.

*096 Input data to be read as input for the following run, before additions or replacements are read in, is saved on scratch tape.

- *097 Memory will not be cleared after execution of this run. Values in storage will be used as input data for the next run with changes indicated.
- *098 Memory will be cleared at the end of this run. Input for the succeeding run will be for an entirely new run.
- *099 Job will be terminated at the end of this run. The designation *099 is used for single runs and at the end of the job in the case of a series or chain of runs.

When making additions and/or replacements after a *096 or *097, it is only necessary to enter the data to be changed and their appropriate control cards. Input data are read for only one run at a time. The run is then executed, another set of input is read in and the next run begins at a point in the program indicated by the *096, 097, or 098 at the end of the input for the preceding run.

It is not mandatory that control cards be in numerical order, however, it is a good practice. Any control card $\leq$ *090 may be entered more than once per run; the values in the last block of input will replace any values of the same parameters previously entered.

3.3 INPUT DESCRIPTION

Each type of input is illustrated in the sample loading in Item 12 at the end of this section.

1. Titles (*001)

It is not necessary to specify how many title cards will be entered; however, a maximum of nine titles may be stored. A title is stored when a number is entered in Column 4 of Field 11. (Columns 1 through 3 are disregarded by the program.)

Every title card will be printed with the input data, and the stored titles may be printed elsewhere at the user's request (functions, KEY = 90). Titles may extend from Column 5 through 72 and are read in the format:

(A1, 13, 11A6, A2, 2A4).

2. Network Description (*010)

Each admittance, Y , and the nodes to which each is connected must be entered here. Each fluid admittance must be entered according to Equation (6) or (6a), whether entered here or calculated by the Type 30 cards. Under *010, it is not necessary to prefix the identification numbers since they are understood to be Y in I1 and T in Fields J1 and J2. An initial value for Y may be given in Field E1. If E1 is zero or blank, it is ignored by the code. The maximum number to be assigned to a node is 500, and to a connector, 999. Forethought in setting up the numbering sequence in a network can greatly simplify the quantity of input. It is also desirable to number nodes consecutively so the machine does not waste time searching gaps. Fluid nodes must be numbered in ascending order in the direction of flow but need not be numbered consecutively. No connection is used for cathode follower nodes or for the fluid input to the time lagged nodes. A typical network without fluid flow is shown in the following sketch:

NOTES.

1. THE NUMBERS WITHIN CIRCLES ARE NODE NUMBERS.
2. NUMBERS WITHOUT CIRCLES ARE ADMITTANCE IDENTIFICATION NUMBERS
3. DASHED LINES INDICATE INCREMENT BOUNDARIES.

The entrance of this network into the program could be shown under *010 of the sample loading in Item 12 at the end of this section. A sample fluid flow loading is shown in Item 12.

If two or more values are entered for any parameter, the last value encountered (physically in the data deck) will be stored. In the illustrated network, if admittances 5, 6, 8, and 9 are equal to each other but not to Y007, one input procedure is to enter the more common value under the *010, Column E1, and then override the incorrect value for Y007 under *020.

3. Initial and Constant Values (*020)

It is necessary to list here the temperatures of all nodes which are to be iterated. Nodes whose temperatures are determined by tabular or arithmetic functions are generally not permitted. Nodes whose temperatures would be determined by tabular or arithmetic functions would be calculated out of order regardless of the numbering sequence and could cause instability.

Temperatures may be calculated by tabular or arithmetic means only by an artifice. Temperatures to be calculated by these means must have zero capacitance, a zero or +1 flag, and may not be connected by an admittance to any other node. The temperature so calculated may be connected to a time-lagged node by flagging the time-lagged node with the negative of the node number calculated by tabular or arithmetic means. A false time lag must then be entered (as later explained) for this connection. A node whose temperature is calculated in this fashion can therefore only represent a fluid source whose temperature is that calculated at the current time less the time lag, which may be simply overcome by anticipation of the lag time.

Nodes having constant temperatures must have a -1 flag in Field 13; the initial or constant value is placed in Field E1

(decimal type). Whether or not fluid nodes are used, constant temperature nodes must also be entered on the Type 60 cards.

A typical nucleus arrangement of fluid flow nodes is illustrated below. Fluid flow is from left to right. Node 2 may be connected to other nodes than shown or be a constant temperature node. Node 3 is the fluid node showing the capacitance of the fluid. Node 4 is a "cathode follower" node so termed because of the analogy with analog circuits. Node 10 is similarly a cathode follower node and is illustrated to show the connection between this type of node and node 11. Node 11, in this instance, is a time-lagged node. If time lagged nodes are not used, node 10 would replace node 11. The fluid admittance is shown connecting nodes 11 and 3.

Cathode follower nodes are flagged with a -1 right-adjusted in the I3 field. In the below figure, node 4 would be flagged with a -1. Time-lagged nodes are flagged with the negative of the immediately preceding cathode follower node number. In this example, node 11 would be flagged with a -10. If node 2 were a constant temperature node, it would have to be flagged with a -1. A node numbered 1 is not permitted; this could cause an ambiguous flag for time-lagged nodes.

The prefix must be used in Column 1 of Field 11; however, if consecutive items are loaded, it is unnecessary in Field 12. All initial or constant values are given in Field E1.

<u>Prefix</u>	<u>Name</u>	<u>Maximum ID No.</u>
D	Dummy	500
Y	Connector admittance	999
T	Temperature of a node	500
C	Capacitance of a node	500
Q	Heat generation rate of a node	500

D or blank (with an identification number) indicates a dummy value throughout the input.

Unless determined elsewhere, values of D, Y, T, C, and Q should also be entered here. These may be in any order. Duplicate entries result in storage of the last value only. Anything not entered will remain set equal to zero.

Whether entered on Type 20 card or calculated in the arithmetic functions, time lags in seconds are stored in the D array. The D number corresponding to the time-lagged node number is this time lag. In the preceding fluid flow example D011 would be the fluid transport time between nodes 10 and 11.

Five hundred "Dummy" locations are available for storing constants, and intermediate and final results of arithmetic functions. Constant values necessary for these functions should be stored under *020. A block of *020 type input is shown in the sample loading in Item 12.

To summarize, all temperatures to be calculated must be entered in a Type 20 card. Five types of nodes are provided. These include fluid flow nodes consisting of cathode follower and time-lagged nodes, constant-temperature nodes, zero capacitance and finite capacitance nodes. A fluid flow nucleus always consists of at least the preceding cathode follower node, finite

or zero-capacitance node and cathode follower node. The fluid flow nucleus can contain a time-lagged node in place of the preceding cathode follower node. The time lag is stored as the **Dummy** whose number corresponds to the time-lagged node number.

Function Specifications *030

With the exceptions noted in Item 3, it is possible to specify that the value of any of the 2999 parameters stored as dummies (D), admittances (Y), temperatures (T), capacitances (C), or heat generation rates (Q), be algebraic functions of themselves or any other value or pair of values in the system. A maximum of 500 such specifications can be used. Consecutive items, entered on one card, are stored as a block; therefore, each card counts as one function.

A list of the functions which have been built into the code are tabulated in Table 2. Table 3 defines terms used in Table 2 and specifies where (on the input sheets) each term is entered into the program.

TABLE 2. *TAP-3F Functions*

Key	Function	Key	Function
1	$Z = G * X$	16	
2	$Z = G / X$	17	
3	$Z = G * X^2$	18	
4	$Z = G * \sqrt{X}$	19	
5	$Z = G * X^3$	20	$Z = G * \sin (X) \text{ } X \text{ in degrees}$
6	$Z = G * X^4$	21	$Z = G * \cos (X) \text{ } X \text{ in degrees}$
7	$Z = G$	22	$Z = G * \tan (X) \text{ } X \text{ in degrees}$
8		23	$Z = G * \arcsin (X)$
9		24	$Z = G * \arccos (X)$
10	$Z = G * \theta^X$	25	$Z = G * \arctan (X / W)$
11	$Z = G * 10^X$	26	
12	$Z = G * \ln (X)$	27	
13	$Z = G * 10^{\log_{10} X}$	28	
14		29	
15		30	$Z = G * \sinh (X)$

TABLE 2. (contd)

Key	Function	Key	Function
31	$Z = G * \cosh (X)$	66	
32	$Z = G * \tanh (X)$	67	
33		68	
34		69	
35		70	$Z = G * \text{(The remainder when } X/W \text{)}$
36		71	$Z = G * \text{max of } (X, W)$
37		72	$Z = G * \text{min of } (X, W)$
38		73	$Z = G * X \text{ if } W \text{ is } -$
39		74	$Z = G * X \text{ if } W \text{ is } 0$
40	$Z = G * \text{(heat flow through } X \text{)}$	75	$Z = G * X \text{ if } W \text{ is } +$
41	FUN 41 (X)	76	$Z = G * X \text{ if time } \geq W$
42		77	$Z = G * 1.0 \text{ if } X \geq W$ $Z = G * 0.0 \text{ if } X < W$
43		78	$Z = G * 0.0 \text{ if } X \geq W$ $Z = G * 1.0 \text{ if } X < W$
44		79	
45		80	Disconnect node Z if $X \geq W$
46		81	Reinstate node Z if $X \geq W$
47		82	$Z = Z + G \text{ if } X \geq W \text{ one time only}$
48		83	$Z = Z + G \text{ if } X \geq W \text{ each iteration}$
49	$Z = G * \text{(Radiation between terminals of connector Z)}$ $A, \sigma \text{ is entered as gain}$	84	
50	$Z = G * (X + W)$	85	
51	$Z = G * (X - W)$	86	
52	$Z = G * (X * W)$	87	
53	$Z = G * (X / W)$	88	
54	$Z = G * \sqrt{X * W}$	89	
55	$Z = G * 1/2(X + W)$	90	Write title No. Z when $X \geq W$
56	$Z = G * \log_{\text{mean}} (X, W)$	91	FUN 91 (X, W)
57	$Z = G * \sqrt{X^2 + W^2}$	92	
58	$Z = G * \text{arith average of } X \rightarrow W$	93	
59	$Z = G * \text{weighted average } T(X) \rightarrow T(W)$	94	
60	$Z = G * (X)^W$	95	
61	$Z = G * [(X) + (X+1) + (X+2) \rightarrow W]$	96	
62	$Z = G * [(X) * (X+1) * (X+2) \rightarrow W]$	97	
63		98	If CØN 5 $\neq$ 1 call SUB 98
64		99	Halt run when $X \geq W$
65			

TABLE 3. *Nomenclature for Table 2*

<u>Name</u>	<u>Field Input</u>	<u>Definition</u>
Z	I1	Dependent Parameter
	I2	Continuation of I1
KEY	I3	Function Identification Number
	E1	Initial or Constant Value
G (GAIN)	E2	Multiplying Factor
X	J1	First Independent Variable
W	J2	Second Independent Variable
	K1	Increment for J1
	K2	Increment for J2

Each function is identified by a KEY number, which must be given in Field I3 of the input form. In general, if the value of KEY is positive and less than 50, the function has one independent variable. If KEY = 50 through 99, two independent variables are involved. A negative KEY indicates a table number: -1 through -49, a monovariate table, and -50 through -99, a bivariate table. If /KEY/ > 100, the code will perform function number (/KEY/ - 100) the first time only.

The method used for loading a series of function specifications is the same as the method used for the network connections, *010. A multiplying factor or GAIN, (G), may be loaded into Field E2. This factor will be multiplied by the result of the arithmetic operation or table lookup, and the product will be stored as the value of the dependent parameter. If nothing is entered in Field E2, the GAIN will be assumed to be 1.0: A zero entered in E2 will be treated as such. Initial values may be entered in the E1 field.

The letter, D, Y, T, C, or Q must be used at the left of Fields I1, J1, and J2 to signify which parameter is being requested. The prefix is not required in Field I2. If no entry is made in J1 for a monovariate function or table, it is

automatically assumed that the independent variable is TIME. For bivariate functions and tables, a blank in either J1 or J2 will be assumed to be TIME.

During execution of the problem, the functions will be performed in the order in which they have been entered. Complex expressions may be built up by the use of dummy spaces, saving the result of each unit operation. In a problem where an extremely large number of parameters involve functions, and if intermediate values are not desired for the printing, they may be re-evaluated in another expression (taking into consideration the order of computation). This is very useful in conserving storage. For example, see the sample loading of Item 12, cards 30070 through 30100.

Sometimes it will be found convenient to use the functions for evaluating the initial parameters of a problem. For example, if the admittances are functions of the logarithmic means of certain areas, it is possible to enter the areas as dummy parameters and let the code compute the log means. In such cases, it would be wasteful to run through this work for each iteration. When a function should be performed only once, i.e., before the first iteration, the KEY number should be preceded by the number 1 (in the hundreds place). Thus, KEY = -102 means use Table 2 the first time only, disregarding this function thereafter. This does not prevent Table 2 from being used in other function specifications.

In multiple runs, functions may be replaced rather than overridden by *03X, $1 \leq X \leq 8$. "X" indicates the number of times the dependent variable to be changed has been previously entered +1. (See Item 12, cards 31000 through 31050.) Overriding may be time consuming since previous functions are computed and the value replaced by a later operation. The designation, *039, removes all previous functions for every parameter.

It is especially efficient on multiple runs, when it is unnecessary and undesirable to perform some of the functions from earlier runs, to omit (but not replace) by making KEY = 0.

KEY 098 is the time lag routine. Ninety-eight must be called once by providing a card with 98 punched in the I3 field. If the time lags are calculated in the arithmetic routine, they must precede the 98 card.

The user is cautioned that errors may result when time lags are calculated and the time lags change about the same "time constant," or less than the magnitude of the lag. For example, if the fluid flow rate changes 60% in 10 sec and the time lag is 10 sec, erratic results may be produced. The nodal structure which represents the time lag would have to be refined to reduce the individual time lags to somewhat less than 10 sec.

5. Tables (*040)

Up to 99 sets of tabular data may be loaded into the memory provided that the total number of data pairs does not exceed the available storage space. This space is nominally limited to 500 pairs, but it is possible to store more pairs if the network is such that it does not require the full allocated space of 10,000 words for the instructions summing the Y and Y T products. The sets may be assigned table numbers in any order desired, table number ≤ 99 . (If the same table number is used more than once in the input for a run, or for successive runs connected by *097 or *096 cards, only the last entries will be effective, but extra storage space will be required.

Values of the independent variables are listed in Column E1, and they must be in ascending order. Corresponding dependent variables are listed in Column E2. Interpolation will be linear point-to-point.

If the set of independent values is identical (in values and in length) with the values in a previously loaded table, the number of the table to be copied may be put in Column 12, and only the values in Column E2 need be entered. (See Table 2 of the sample loading of Item 12.) If a smaller number of E2 values is entered, the difference will be made up by copying the next table. More values entered will result in the loss of any value remaining after the copied table is complete.

Any table number (requested in *030), which is greater than or equal to 50 but less than 100, indicates a bivariate table. Among the *040 input, this table number is entered in Field I1, the values of the second independent variable (W) are entered in Field E1 and the monovariate table numbers corresponding to those curves are listed in Field E2 (E2 is read as floating point input). The procedure just discussed is illustrated in the sample loading of Item 12. The latter table numbers may range from 1 to 99 and may be used in other functions if they comply with the monovariate or bivariate conditions.

During execution, subroutine BIVAR brackets the W to be evaluated between the input tabular values in Field E1 and enters the respective tables to evaluate the parameter as a function of the first independent variable. The final value Z will be found by interpolation between the values determined from the two tables.

To illustrate this, if the program were evaluating Z from Table 50 (Figure 1) for the conditions $W = 150.0$, and $X = 2.5$, the process would be: from Table 51 ($W = 100$) at $X = 2.5$, $Z_1 = 18.6$, and from Table 3 ($W = 200$) at $X = 2.5$, $Z_2 = 15.6$. Then, interpolating between these two values for $W = 150$, $Z = 17.1$ would be the final result.

NOTE:

INPUT FOR THIS TABLE IS ILLUSTRATED IN THE SAMPLE
LOADING, CARDS 41000 THROUGH 41170.

FIGURE 1. *Example of a Family of Curves Which May Be Entered
in TAP-3F as a Bivariate Table*

6. Latent Heat (*050)

Up to 100 nodes may be specified as having latent heats of phase change. One or two phase changes may be used for each node. (If data for the same node is entered twice in the same run, both entries will be effective. This may be a way of obtaining more than two phase changes in a node.)

Successive nodes having the same phase change data may be entered by use of the I1 and I2 columns.. Since the latent

heats are in terms of heat per node, this requires that nodes in a series have the same volume.

Column E1 contains the phase change temperatures and Column E2 contains the latent heat values. When two phase changes are used, the second temperature must be greater than the first.

For multiple runs, phase change input may be omitted or replaced in part, or entirely. A *051 means replace the first phase change entry for the node entered in Field I1, *052 replaces the second entry, and *059 removes all previous latent heat input. The sample loading cards 51000 through 51020, shows how this is done.

7. Fluid Nodes (*060)

The input to the *060 cards is arranged as follows: the cathode follower node number, right-adjusted prefixed with a left-adjusted K, is entered in the I1 field; the fluid node number, right-adjusted, is entered in the I2 field; and the previous cathode follower, time lagged, or constant-temperature fluid node number is entered right-adjusted in the I3 field. These node numbers are entered in the order of the averaging equation below and are previously derived. The equation for the first fluid node given in the below figure is:

$$T_4 = 2 * T_3 - T_{11}.$$

As demonstrated previously, this method of solution is an approximation to an LMID or some other temperature distribution within the fluid node. It is a central difference approximation that substitutes a linear spatial distribution of temperature for the true spatial distribution. The true distribution may be obtained by refining the fluid flow mesh. In the limit, this refinement results in the exact temperature distribution; however this method is generally not practical.

Experience has demonstrated that this approximation results in some oscillation of temperature during transient analysis. This oscillation is most prevalent with small perturbations in inlet temperature, and is caused by the direct coupling between the downstream cathode follower node or time lag node and cathode follower node. The cathode follower node response is instantaneous because of its thermal capacitance lags. For example, if T_{11} were to increase a small amount, T_3 would not change materially with the result that T_4 would decrease--an obvious physical impossibility. The effects of these perturbations may be reduced by refining the mesh. That is, breaking the existing fluid nodes into smaller fluid nodes. This instability has been found to be essentially independent of time step size.

Instability may be overcome by another technique. This technique assumes the outlet temperature of the fluid node to be the same as the node temperature. The procedure is to program the problem with the assumption that the cathode follower nodes are to be used as previously described. When filling out the *060 cards, if averaging is not desired, enter the fluid node number in the I3 field. This will result in the following equation:

$$T_4 = 2 \cdot T_3 - T_3.$$

The fluid admittances are then entered as $\dot{m}c$, rather than $2\dot{m}c$ on the *020 cards or as calculated in the *030 cards.

All fluid nodes and constant temperature nodes are entered in the *060 cards. Constant temperature nodes must be entered here even if fluid flow is not used. They must be entered in sequential fashion in ascending order beginning with the lowest numbered cathode follower or constant temperature node. Failure to enter all such nodes in sequential fashion and ascending order will result in an error message identifying the first node out of order. Subsequent nodes will also cause an error message. An example for consideration is illustrated below.

In this example, fluid flow is from left to right. In programming this example, a K is entered in the I1 field left-adjusted followed by a 004 right-adjusted in the I1 field. This is the cathode follower node. A 3 is next entered in the I2 field right-adjusted. An 11 is next entered in the I3 field right-adjusted. On the immediately following card, a K007 is entered in the I1 field, 006 entered in the I2 field and 005 entered in the I3 field. Node 5 may or may not be a time-lagged node depending upon the problem. If time lag were not required, node 5 would not be used. In this instance, a 004 would be entered in the I3 field. Node 11 may be either a cathode follower node connected to a previous fluid node, time lagged node or constant temperature node. If 11 were a constant temperature node, a K011 would be entered in the I1 field, 011 entered in the I2 field and 011 entered in the I3 field. This card, if node 11 were the highest numbered fluid-type node, would be last in order. Other constant temperature nodes not associated with fluid nodes are handled in the same manner, they too must appear in order.

Finally, it is important to note that the finite capacitance node, which represents the fluid (nodes 3 and 6), is handled like any other finite capacitance node and may connect with any number of admittances compatible with the code limitations. Cathode follower and time-lagged nodes may not be connected in any other fashion than shown. Connecting them to any other node will result in erroneous data.

8. Special Constants (*070)

The program does not require any constants to operate; however, they are necessary for control. There is no limit imposed regarding the maximum number of constants used. Decimal-type input only is to be used in Field E1; Field I1 requires an integer, right-adjusted. The constants included in the program, and their effect, are:

Constant No.	Definition and Effect on Program
1	Specified delta-time. Code uses minimum of Constant 1 and internally computed delta-time for each iteration.
2	Minimum allowed delta-time. If internally computed, value becomes less than this; the run will be terminated.
3	Delta-time multiplier. Code will use 1.0 unless otherwise specified.
4	Convergence test delta-temperature. Problem will terminate when the greatest temperature change is less than or equal to Constant 4. Constant 4 = 0.0 unless a greater value is entered.
5	A +1.0 entered here indicates a steady-state problem and omits areas of the program necessary only for transient cases. Steady-state cases will run without this, but less expediently.
6	A +1.0 entered here requests a labeled, decimal dump of the values stored as D, Y, T, C, and Q at the end of the run.
7	A +1.0 requests a complete core dump in octal at the end of the run. Equivalent to preceding deck with a *DUMP card.
8	Unassigned.
9	Stefan-Boltzmann constant, 0.4761×10^{-12} Btu per $\text{ft}^2(\text{sec})(^\circ\text{R})^4$ is programmed into the code. Enter 0.1714×10^{-8} Btu/ $\text{ft}^2(\text{hr})(^\circ\text{R})^4$ if the latter units are compatible with the input.
10	Absolute zero temperature. (-459.69 °F is built-in.)

Constant No.	Definition and Effect on Program
11	A node summary is automatically provided at the beginning of each run unless otherwise requested here. A +1.0 will suppress printout of the node summary. A -1.0 (to be used only <u>after</u> first case in a series of runs) will suppress both node summary and compilation: if the networks are identical, this will save machine time.
12	Steady-state convergence acceleration factor, which is applied after convergence to 1 Fo/iteration is achieved. No entry provides a convergence acceleration factor of 1. Values between 1.0 and 1.2 are recommended.

Constants 8 and 13 through 20 are unassigned; if they are read in, a slogan will be printed and the run will be terminated as will all runs based upon this input. The sample loading of Item 11 shows how these special constants are entered into the code.

The words in the comment field are automatically printed out when a constant is requested; therefore, the code user need not write them.

A DYTCQ Dump, the result of Constant 6, is shown at the end of the Sample Problem Number 2.

9. Printout Specifications (*080)

All parameters to be printed in the output must be listed here. A maximum of 500 parameters may be printed out. Items entered in Field I1 and Field I2 indicate successive entries of Items I1 through I2. A flag of +1 in Field I3 renames (for printout purposes only) the parameter listed in I1, or the series. The replacing label must be entered in the first six columns of the comment field (Columns 53 through 58). This is very useful for calling dummies by name rather than by number. This procedure is illustrated in the sample loading, Card 80040.

10. Run Control (*090)

This block of input specifies print times. Field E1 is the first print time for any interval and Field E2 contains the value by which it is incremented until time is equal to the value of the next E1 entry. The increment need not be an even multiple; the program will accommodate a shorter time interval in place of the last increment. A maximum of ten entries of time intervals is permitted. A zero or blank in Field E2 indicates that its respective E1 value will be the final print time. Negative times may be used, but each successive time must increase. An illustration of run control is given in the sample loading of Item 12, Cards 90000 through 90030.

11. Multiple Runs

When submitting a series of runs (connected by *096 or 097), the only input data required are those parameters to be changed and the appropriate control cards. However, if the node flags of the previous problem have been altered, it is necessary to reenter the temperatures under (*020). This will correct the node flags.

The effect should be taken into consideration when a *097 is used and any functions are performed once for the first run and recalculated one time for the second run. Cards 3300 through 34010 of the sample loading in Item 12 illustrate the procedure to be used.

12. Sample Loading

The sample loading in following pages demonstrates the input format of the various types of data. Sample problems and solutions are given in Chapter 7.

The numbers and values assigned in this sample loading are for illustration only and may not be related to one another. Their purpose is only to demonstrate the method of input.

A sample loading for TAP-Loop is first given to illustrate the essentials in utilization of the fluid flow capabilities. This is followed by a partial transcription from the AI TAP 3F Manual.

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5	K 0.0	9	K 0.0	8	0.0	7																																																																										
6	K004, 007, and 009 are cathode follower nodes. 003, 006, and 008 are fluid nodes. 015 and 005 are time-lagged nodes. Reference to the *020 example, T005 card is flagged with a -4. This flag connects nodes 4 and 5. In the direction of fluid flow, begin with 015 thence 003, and 004. 005 is next downstream and is connected as just discussed. 005 flows into 006 thence 007. No time lag exists between the outlet of 006 and 008, so 007 feeds directly into 008 thence 009. The remaining cards below complete the closed loop. It is not necessary to enter the K in the I2 Field.																																																																															
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13	K 0.1	4	0.1	3	0.1	2																																																																										
14																																																																																
15	Node 015 is a time-lagged node and would be flagged with a -14. Note carefully the order of the cards. They begin with the lowest numbered cathode follower node (these nodes ascend in order in the direction of the fluid flow). Node numbers are skipped to provide for other finite capacitance nodes or zero capacitance nodes. It is desirable to number these finite and zero capacitance nodes in order, as they are connected to the fluid nodes, i.e., node 2 is connected to node 3. If finite and zero capacitance nodes were connected to node 6, these would be next numbered and followed by the cathode follower node issuing from node 6. This assures that, in calculation of the node 6 outlet temperature, (cathode follower node temperature) all nodes connected to 6 have been relaxed so this outlet temperature represents the true heat balance on the fluid node. It is important to note that unless a conductive path is provided in the fluid, downstream temperature perturbations are not felt by the upstream fluid node. Therefore, more accurate calculations result with the above-mentioned numbering scheme. This (the suggested numbering scheme) will not always be possible as conductive paths that parallel the fluid flow may exist. In this instance, estimate the point where the adiabatic line exists (temperature in conductive path and fluid are equal) and break the numbering. It is not mandatory to do the above numbering technique, but steady state solutions will converge more quickly. Since the transient integration technique is not a relaxation method, but is an explicit method, more accurate solutions will result with use of the recommended numbering method. However, the fluid nodes MUST be entered in ascending order beginning with the lowest numbered cathode follower node. If averaging is not desired, it is necessary to set the temperature of the cathode follower node equal to the temperature of the fluid node as with the following card.																																																																															
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The code's procedure on each of the preceding functions is as follows:

KEY

```

40      Y002 connects T001 and T002
      Q010 = 0.5 × Y002 (T001 - T002)

49      Y019 connects T010 and T100
      TA = T010 + TZERO
      TB = T100 + TZERO
      Y019 = 0.0403 × SIGMA × [(TA)2 + (TB)2](TA + TB)

59      D001 = 1.0 ×  $\sum_{i=1}^7 C_i T_i / \sum_{i=1}^7 C_i$ 

77      If (TIME < D010), D002 = 0.0
      If (TIME ≥ D010), D002 = 3.0 × 1.0

78      If (D010 < D100), D003 = 3.7 × 1.0
      If (D010 ≥ D100), D003 = 0.0

80      If (T001 < D011), continue.
      If (T001 ≥ D011), NFLAG (T011) = -1, signal to discon-
      tinue iteration of this node and not to perform this
      comparison again.

81      If (T001 < D011), NFLAG (T011) = -1, do not iterate T011.
      If (T001 ≥ D011), NFLAG (T011) = +1, iterate this node,
      do not compare again.

82      If (T001 < D012), continue, compare again on the next
      iteration.
      If (T001 ≥ D012), T001 = T001 + 90.0, discontinue
      comparison.

83      If (T001 < D013), continue.
      If (T001 ≥ D013), T001 = T001 + 0.125, performed each
      iteration.

91      D004 = 4.5 × FUN91 (T009, T015). Functions FUN41 and/or
      FUN91 are to be written by the user (if requested),
      and placed before the TAP-3F file deck. FUN41 has
      one argument: FUN91, two.

98      If [CON(5) = 1], do not call. If [CON(5) ≠ 1], call 98.
      With the included 98, all nodes are swept with one
      call.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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5			0 .1 7 1 4 E - 0.8																																						7 0 0 5 0																																						
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			Values for constants which differ from those built into the code.																																																																												
			Constant number requested (see text, Paragraph 3.3, Item 7, for definition of each).																																																																												
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			The 1 in I3 names D032 "(ALT.)" for printing purposes. The name must be entered in the first six columns of the comment field.																																																																												

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3.4 STORAGE AND LIMITATIONS

Storage and other limitations for the TAP-SF program are listed here with appropriate comments. These limitations should be considered when designing a problem simulation.

	<u>Storage Limitations</u>	<u>Comments</u>
D	500	
Y	999	
T	500	
C	500	
Q	500	
K	100	
Titles	9	An unlimited number of titles may be read in, but only nine may be stored with the input data.
Functions	500	If functions are entered consecutively on one card, the entire block counts as only one function.
Latent Heat	100	100 nodes may have latent heat.
Tables	1000*	99 different tables may be used, and all table numbers must be less than 100. 1000 tabular values (500 pairs) may be accommodated.
Printed Parameters	500	500 different items may be printed. Each one counts individually, even when entered as a series on one card.
Printout Intervals	10	The printout interval may change 10 times, there is no limit on the number of printouts at each interval.

* *The program is dimensioned for 1000 tabular values and 10,000 instructions. However, slightly exceeding these limits may not cause trouble. If the quantity of tabular input is small, more instructions will be permitted, and fewer instructions make room for more than 1000 tabular values. The size of the core is the limiting factor here.*

	<u>Storage Limitations</u>	<u>Comments</u>
Instructions	10,000*	Approximately 10 instructions are generated by the code for each connector in the network.

4. TAP OUTPUT FORMAT

4.1 INPUT LISTING

The input data are printed verbatim with two exceptions: (1) control cards are followed by titles identifying the type of data being entered, and (2) Fields E1 and E2 are written in E15.6 format.

4.2 NODE SUMMARY

An initial run through the functions is made to evaluate each parameter before the printout of the node summary. This summary consists of two sections: one for nonzero capacitance nodes, and the other for nodes having zero capacitance.

Within the section, each node is listed in numerical order with its values of T, C, and Q. Next, every admittance (number and value) connected and the number of the other terminal node are listed.

The printout of the node summary may be eliminated by setting constant 11 = +1.0. However, discretion should be used; the node summary gives a complete but concise picture of the entire problem and any input discrepancies are most easily noted here.

* *The program is dimensioned for 1000 tabular values and 10,000 instructions. However, slightly exceeding these limits may not cause trouble. If the quantity of tabular input is small, more instructions will be permitted, and fewer instructions make room for more than 1000 tabular values. The size of the core is the limiting factor here.*

At the end of the node summary, a slogan states how many instructions were required for compilation--a good warning device if the problem is approaching limits of core storage.

4.3 OUTPUT

The output information includes time, critical node, critical delta-time and actual delta-time. Steady-state printouts comprise time, greatest temperature change per iteration, and node involved. Each parameter is identified by a prefix and an identification number.

4.4 DIAGNOSTICS AND RUN TERMINATION

A run might be terminated for several reasons other than normal convergence and job completion. If such is the case, one of the following diagnostic statements will be printed to assist in correcting the error.

<u>Location</u>	<u>Slogan</u>
MAIN (THRMAN)	<ol style="list-style-type: none"> 1. Greatest temperature change (DTMAX) is less than convergence test value (CON4). 2. This run has been discontinued. Final values are--(This slogan appears after an error during execution.) 3. KNODE (K) is not equal to J. Check data and/or steady state loop.
SETUP	<ol style="list-style-type: none"> 4. Compiled instructions for summing Y and YT have exceeded allotted storage.
TAPIN	<ol style="list-style-type: none"> 5. (FTAG) entry number (ITT), not located among functions. 6. Error, copying of a nonexistent table requested. 7. Error, table number is equal to or exceeds 100. 8. Node (11), entry number (ITT) not located in latent heat input. 9. This type of input is illegal. 10. Nonexistent constant requested. (This applies to constants 8, 12 through 20, and over.)

<u>Location</u>	<u>Slogan</u>
	11. Error, storage capacity for this type of data exceeded. (*030, *050, *080, and *090)
ARITH	12. Impossible to take weighted average of zero capacity nodes (JX) through (JW).
	13. Nonexistent arithmetic operation indicated.
TABLE	14. In the evaluation of (TDVTAG), as a function of (TDTAG), (X) exceeds limits of table (NTAB).
BIVAR	15. In the evaluation of (TDVTAG), as a function of (TDTAG), (W) exceeds limits of table (NTAB) .
	16. A nonexistent table, number (NTAB), has been called.
DELTA	17. Delta-time, (DELTAT) is less than permissible minimum, (NCRIT) .

If a run is terminated due to convergence, the program will proceed to the following run (*096, 097, or 098). If any other diagnostic appears, only runs with completely independent input (*098) will be attempted.

5. QUICK CHECK LIST

Large complicated problems, or problems using many functions for unusual situations, often require highly complex programming within the TAP-3F program. To assist the user in eliminating as many errors as possible, the following check list has been devised.

1. Control cards contain no data; an asterisk must be in Column 1.
2. Decimal points are entered in the E fields or assumed following the field.
3. Fields I, J, and K contain no decimal points; integers are right-adjusted.
4. All nodes to be iterated are entered under *20.
5. Independent variables and increments are entered where necessary. (*010 and *030)
6. All initial and constant values are entered in Field E1 (*010, *020, *030, and *070). Gains or multiplying factors are entered in Field E2 (not E1)(*030).
7. Value for delta-theta is reasonable.
8. Units are consistent.
9. Minimum input requirements: *010, *020, *080, *090, and *099 (or equivalent input-terminating card).

6. PROGRAM

6.1 SYNOPSIS OF SUBROUTINES AND FUNCTIONS IN ORDER OF THEIR APPEARANCE (SUBROUTINES UNLESS OTHERWISE NOTED)

1. HEADER

Prints title page at the beginning of each job.

2. Function LOCATE

Stores name of person submitting job for printout at the beginning of input list and records the lowest common and highest program locations. These locations, combined with variable dimensions, allow maximum use of core storage while disallowing overlap. (FAP)

3. TAPIN

Controls reading in, writing out, and storage of all input data. Checks to see that specific storage limits are not exceeded. Storage information regarding any type of input data to follow.

4. READ

Reads and writes input data. Calls function LINK.

5. Function LINK

Converts input data prefixes; D, Y, T, C, and Q to 0, 1, 2, 3, and 4 respectively. The letters are only for the user's convenience: the code operates with numerical prefixes.

6. Functions KPACK and KTAIL

KPACK - Stores two integers in one location. (Solution to problem of inadequate core storage.)

KTAIL- Extracts the rear integer stored by KPACK. The front number is obtained by setting a variable equal to the subscripted, stored number or by multiplying it by +1. (FAP)

7. Function PRØID
Converts the numbers (obtained in function LINK) of items to be printed back as letters in the output format. (FAP)
8. SETUP
Stores location of first point in each table; readies latent heat data, initial flags, and variables; sets up instructions for iterating; and requests printout of node summary and initial values.
9. CØMPIN, CØMPIL, TRAIN, TRA1 TRA2
Sets up instructions and calculates for each node to be iterated the sum of the admittances and the sum of the product of the admittances and temperatures. (FAP)
10. ARITH
Calculates values for parameters that are to be evaluated by functions and prepares those to be determined by tabular data.
11. TABLE
Called by subroutines ARITH and BIVAR. Verifies that the independent variable lies between the end points of the table and evaluates the dependent variable by linear interpolation between two input points.
12. BIVAR
Brackets second independent variable and calls subroutine TABLE twice with respective table numbers. Interpolates linearly between two values returned.
13. FUN41, FUN91
Represented by a dummy routine in the program. Either or both of these routines may be written by the user if he so desires. FUN41 and FUN91 are functions with one and two arguments respectively.

14. DELTA
Determines critical node and time step to be used each iteration. Prevents time step from becoming less than minimum allowed.
15. TIMER
Checks to see if it is time to print output data. Will set up shorter printout interval if and when it is necessary. Also turns on a flag to terminate run when final print time is reached.
16. LATENT
Determines when phase changes occur and writes appropriate slogans. Notes the node, first or second phase, time, temperature, and integrated heating.
17. TAPØUT
Writes output information at beginning of run and at requested printout times.
18. SPILL
Labels and dumps in decimal all values of D, Y, T, C, and Q. (Only called if requested by Constant Number 6 under *070 input.)
19. ERROR
Reads and lists remaining input data until a *098 or *099 is found (if an error occurs during input). Succeeding *096 and *097 runs are not attempted because their input is based upon that of a preceding run which was in error.
20. SUB 98
Processes all nodes and determines temperature of time-lagged nodes according to the inlet node and time lag calculated in *030 or entered in *020.

21. SUMS
Sums up admittances for all connected nodes and admittance-temperature products. Called once each iteration. Generates SUMY and SUMYT.
 22. SUM1
Same as SUMS but is called once each connected node and sums up admittances only for the node being iterated on. Assists in making code stable in loop calculations.
 23. AMATQ4
Matrix inversion routine called by SUB 98 to fit time lag polynomials.
- 6.2 TAP-LOOP PROGRAM LISTING

W XOT CUR

1. III A

END FILE --- UNIT A

2. TRI A

3. TOC

63

HLADEP	CODE	RELOCATABLE
HEADER		SYMBOLIC
SPILL	CODE	RELOCATABLE
SPILL		SYMBOLIC
ERROR	CODE	RELOCATABLE
ERROR		SYMBOLIC
FUN#1	CODE	RELOCATABLE
FUN#1		SYMBOLIC
FUN#2	CODE	RELOCATABLE
FUN#1		SYMBOLIC
IPRIO	CODE	RELOCATABLE
IPRIO		SYMBOLIC
TAPAS		ABSOLUTE
AMATQ4	CODE	RELOCATABLE
AMATQ4		SYMBOLIC
TIMER	CODE	RELOCATABLE
TIMER		SYMBOLIC
DELTA	CODE	RELOCATABLE
DELTA		SYMBOLIC
SUB#8	CODE	RELOCATABLE
SUB#8		SYMBOLIC
ARITH	CODE	RELOCATABLE
ARITH		SYMBOLIC
LATENT	CODE	RELOCATABLE

ELEMENT TABLE

06 MAY 68	01:52:28	1	00437654	36	1
		0	00437720	14	7
06 MAY 68	01:52:28	0	00440062	14	12
06 MAY 68	01:53:14	1	00440332	36	1
		0	00440376	14	31
06 MAY 68	01:53:14	0	00441260	14	77
06 MAY 68	01:53:21	1	00443346	36	1
		0	00443412	14	11
06 MAY 68	01:53:21	0	00443644	14	23
06 MAY 68	01:53:27	1	00444346	36	1
		0	00444412	14	2
06 MAY 68	01:53:27	0	00444446	14	4
06 MAY 68	01:53:31	1	00444536	36	1
		0	00444602	14	2
06 MAY 68	01:53:31	0	00444636	14	4
06 MAY 68	01:53:34	1	00444726	36	1
		0	00444772	14	5
06 MAY 68	01:53:34	0	00445100	14	13
06 MAY 68	01:53:45	1	00445366	8664	1
30 JUN 68	15:13:59	1	00466316	36	1
		0	00466362	14	35
30 JUN 68	15:13:59	0	00467334	14	85
12 MAR 69	09:57:03	1	00471602	36	1
		0	00471646	14	7
12 MAR 69	09:57:03	0	00472010	14	31
12 MAR 69	09:57:09	1	00472672	48	1
		0	00472752	14	11
12 MAR 69	09:57:09	0	00473204	14	36
12 MAR 69	09:57:16	1	00474174	48	1
		0	00474254	14	09
12 MAR 69	09:57:16	0	00475102	14	32
12 MAR 69	09:57:24	1	00477276	72	1
		0	00477406	14	90
12 MAR 69	09:57:24	0	00501762	14	274
12 MAR 69	09:57:31	1	00511356	48	1
		0	00511436	14	28

LATENT	CODE	SYMBOLIC
TAPOUT	CODE	RELOCATABLE
TAPOUT	CODE	SYMBOLIC
SETUP	CODE	RELOCATABLE
SETUP	CODE	SYMBOLIC
TABLE	CODE	RELOCATABLE
TABLE	CODE	SYMBOLIC
BIVAR	CODE	RELOCATABLE
BIVAR	CODE	SYMBOLIC
SUM1	CODE	RELOCATABLE
SUMS	CODE	RELOCATABLE
SUM	CODE	SYMBOLIC
THR AN	CODE	RELOCATABLE
TRMAH	CODE	SYMBOLIC
LINK	CODE	RELOCATABLE
LINK	CODE	SYMBOLIC
READ	CODE	RELOCATABLE
TAPII	CODE	RELOCATABLE
TAPII		SYMBOLIC

12 MAY 69	09:57:31	0	00512246	14	90
12 MAY 69	09:57:46	1	00514622	48	1
		0	00514702	14	12
12 MAY 69	09:57:46	0	00515152	14	33
12 MAY 69	09:57:53	1	00516070	48	1
		0	00516150	14	31
12 MAY 69	09:57:53	0	00517032	14	123
12 MAY 69	09:57:59	1	00522324	48	1
		0	00522404	14	17
12 MAY 69	09:57:59	0	00522762	14	58
12 MAY 69	09:58:05	1	00524436	48	1
		0	00524516	14	22
12 MAY 69	09:58:05	0	00525202	14	67
12 MAY 69	09:58:10	1	00527054	36	1
		0	00527120	14	7
12 MAY 69	09:58:10	0	00527262	14	30
12 MAY 69	09:58:17	1	00530126	36	1
		0	00530172	14	11
12 MAY 69	09:58:17	0	00530424	14	48
12 MAY 69	17:01:01	1	00531664	36	1
		0	00531730	14	72
12 MAY 69	17:01:01	0	00533710	14	265
12 MAY 69	17:01:06	1	00543106	36	1
		0	00543152	14	10
12 MAY 69	17:01:06	0	00543366	14	36
12 MAY 69	17:01:10	1	00544356	48	1
		0	00544436	14	16
12 MAY 69	17:01:10	0	00544776	14	33
12 MAY 69	17:01:18	1	00545714	60	1
		0	00546010	14	96
12 MAY 69	17:01:18	0	00550510	14	302

ENTRY POINT TABLE

ANATG4 (ANATG4/CODE)	1	000406
DELTA (DELTA/CODE)	1	000110
FUN91 (FUN91/CODE)	1	000015
LATENT (LATENT/CODE)	1	000332
SETUP (SETUP/CODE)	1	000364
SUMS (SUMS/CODE)	1	000193
TAPII (TAPII/CODE)	1	001343

ARITH (ARITH/CODE)	1	001553
ERROR (ERROR/CODE)	1	000066
HEADER (HEADER/CODE)	1	000016
LINK (LINK/CODE)	1	000112
SPILL (SPILL/CODE)	1	000326
SUM1 (SUM1/CODE)	1	000057
TAPOUT (TAPOUT/CODE)	1	000102

BIVAR (BIVAR/CODE)	1	000247
FUN41 (FUN41/CODE)	1	000014
IPROIC (IPROIC/CODE)	1	000051
READ (READ/CODE)	1	000172
SUB98 (SUB98/CODE)	1	000400
TABLE (TABLE/CODE)	1	000207
TIMER (TIMER/CODE)	1	000077

BLOCK TABLE EMPTY

COBOL LIBRARY TABLE EMPTY

PROCEDURE NAME TABLE EMPTY

4. LIST 1

ELT ADER,1,680506, 6746

```
000001      C      SUBROUTINE **HEADER**                      BTAP4005
000002      SUBROUTINE HEADER                      BTAP4010
000003      CHEADER
000004      10 WRITE (6,20)                      BTAP4015
000005      20 FORMAT(1H1,44X,30H**THERMAL ANALYZER PROGRAM **//40X,37HCONVERTE
000006      1D TO UNIVAC 1157 FROM IBM 360 // 25X, 69HCONVERSION MADE BY ENGINE
000007      XERING ANALYSIS SECTION, BATTELLE NORTHWEST //
000008      X                      11X, 95HORIGINAL DECK FROM ATOMIC
000009      2S INTERNATIONAL DIVISION, N.A.A. INC., ENG. ANALYSIS GROUP, DEPT.
000010      3371 // 44X, 30HPROGRAM CODING - FORTRAN IV      )
000011      RETURN                      BTAP4035
000012      END                      BTAP4040
```

ELT SPILL,1,680506, 6794

000001	SUBROUTINE SPILL	PTAP4010
850002	CSPILL	
000003	C	
000004	DUMP OF D,Y,T,C, AND Q VALUES AT END OF RUN	PTAP4007
000005	DIMENSION ZZ(18000),DYTCQ(5000)	PTAP4015
000006	EQUVALENCE ,ZZ(0002),DYTCQ),,ZZ(06345),,MAXNOT),,ZZ(06346),,MAXUOY)	PTAP4020
000007	COMMON ZZ	PTAP4025
000008	ISPIL = 0	PTAP4030
000009	ID = 1	PTAP4035
000010	MAXMOD = 0	PTAP4040
000011	DO 35 IX=1,499	PTAP4045
000012	IF (DYTCQ(IX)) 34,35,34	PTAP4050
000013	34 MAXMOD = MAXQ(IX,MAXMOD)	PTAP4055
000014	35 CONTINUE	PTAP4060
000015	WRITE (6,36)	PTAP4065
000016	36 FORMAT (1H1 42X, 11H DYTCQ DUMP/)	PTAP4070
000017	1 WRITE (6,2)	PTAP4080
000018	2 FORMAT (1H0/31H NO DUMMY VALUES FOR THIS RUN)	PTAP4085
000019	ISPIL = 1	PTAP4090
000020	3 ISPIL = ISPIL+1	PTAP4095
000021	27 GO TO (4,6,8,10,12,33),ISPIL	PTAP4100
000022	4 MAXSP = MAXMOD	PTAP4105
000023	WRITE (6,5)	PTAP4110
000024	5 FORMAT (1H0 8H DUMMY/10H NUMBER, 10X, 13H DUMMY VALUES/)	PTAP4115
000025	GO TO 14	PTAP4120
000026	6 MAXSP = MAXUOY + 1000	
000027	ID = 1001	PTAP4130
000028	WRITE (6,7)	PTAP4135
000029	7 FORMAT (1H0 12H CONNECTOR/10H NUMBER, 10X, 12H ADMITTANCES/)	PTAP4140
000030	GO TO 14	PTAP4145
000031	8 MAXSP = MAXNOT + 2000	PTAP4150
000032	ID = 2001	PTAP4155
000033	WRITE (6,9)	PTAP4160
000034	9 FORMAT (1H0 7F1 NODE/10H NUMBER, 10X, 13H TEMPERATURES/)	PTAP4165
000035	GO TO 14	PTAP4170
000036	10 MAXSP = MAXSP + 1000	PTAP4175
000037	ID = 3001	4180
000038	WRITE (6,11)	PTAP4185
000039	11 FORMAT (1H0 8H NODE/10H NUMBER, 10X, 11H CAPACITIES/)	PTAP4190
000040	GO TO 14	PTAP4195
000041	12 MAXSP = MAXSP + 1000	PTAP4200
000042	ID = 4001	PTAP4205
000043	WRITE (6,13)	PTAP4210
000044	13 FORMAT (9H0 NODE/10H NUMBER,10X,22H HEAT GENERATION RATES/)	PTAP4215

000045	14 IZFLG = 0	PTAP4220
000046	15 IXL = ID+4	PTAP4225
000047	IF (MAXSP-ID) 28,16,16	PTAP4230
000048	16 IF (DYTCQ(ID)) 17,20,17	PTAP4235
000049	17 IF (IZFLG) 18,18,31	PTAP4240
000050	18 IMOD = MOD(ID,1000)	PTAP4245
000051	WRITE (6,19) IMOD,(DYTCQ(IX),IX=ID,IXL)	PTAP4250
000052	19 FORMAT (1H 3X, I3, 4X, 5E18.5)	PTAP4255
000053	ID = IXL+1	PTAP4260
000054	GO TO 15	PTAP4265
000055	20 IZ = ID+1	PTAP4270
000056	21 IF (DYTCQ(IZ)) 17,22,17	PTAP4275
000057	22 IF (IZ-IXL) 23,24,24	PTAP4280
000058	23 IZ = IZ+1	PTAP4285
000059	GO TO 21	PTAP4290
000060	24 IF (IZFLG) 25,25,26	PTAP4295
000061	25 IZFLG = ID	PTAP4300
000062	26 ID = IXL+1	PTAP4305
000063	GO TO 15	PTAP4310
000064	28 IF (IZFLG) 3,3,29	PTAP4315
000065	29 JMOD = MOD(IZFLG,1000)	PTAP4320
000066	LMOD = MOD(MAXSP,1000)	PTAP4325
000067	WRITE (6,32) JMOD,LMOD	PTAP4330
000068	GO TO 3	PTAP4335
000069	31 IZE = IXL-5	PTAP4340
000070	JMOD = MOD(IZE,1000)	PTAP4345
000071	KMOD = MOD(IZE,1000)	
000072	WRITE (6,32) JMOD,KMOD	
000073	32 FORMAT (1H0 34X,11H LOCATIONS ,I3,9H THROUGH ,I3,11H EQUAL ZERO/)	PTAP4360
000074	IZFLG = 0	PTAP4365
000075	GO TO 18	PTAP4370
000076	33 RETURN	PTAP4375
000077	END	PTAP4380

ELT ERROR,1,680506, 6801

000001	C	SUBROUTINE **ERROR**	OTAP4005
000002		SUBROUTINE ERROR	OTAP4010
000003		CERROR	
000004		DIMENSION ZZ(18000), A(19)	OTAP4015
000005		EQUIVALENCE (A11,I0)	OTAP4020
000006		EQUIVALENCE (ZZ(66330), IERFL)	OTAP4021
000007		COMMON ZZ	OTAP4022
000008		DATA KTEST/1H*/	OTAP4023
000009		WRITE (6,7)	OTAP4025
000010		7 FORMAT (108H- AN ERROR HAS OCCURRED, THE FOLLOWING IS A LISTING OF	OTAP4030
000011		1 THE REMAINING INPUT DATA UNTIL A *98 OR *99 IS FOUND,/2X,70H AT W	OTAP4035
000012		2HICH POINT THE PROGRAM WILL START A NEW RUN OR QUIT, RESPECTIVELY)	OTAP4040
000013		1 READ (5,2) A11,I11,A	OTAP4045
000014		WRITE(6,3) A11,I11,A	
000015		2 FORMAT (A1,I3,19A4)	OTAP4050
000016		3 FORMAT (5X,A1,I3,17A4,2X,2A4)	OTAP4060
000017	C	SEE IF CARD HAS A *	OTAP4070
000018		IF (IO.NE.KTEST) GO TO 1	OTAP4075
000019	C	SEE IF CARD HAS A 99 OR 98	OTAP4080
000020		4 IF (I11-98) 1,6,5	OTAP4085
000021		5 IERFL = 2	OTAP4095
000022		6 RETURN	OTAP4100
000023		END	OTAP4105

Q ELT FUN91, 680506, 6807

000001	FUNCTION FUN91(A,B)	JTAP4110
000002	FUN91 = A+B	JTAP4120
000003	RETURN	JTAP4130
000004	END	JTAP4140

Q ELT FUN41,1,680506, 6811

000001 FUNCTION FUN41(A)
000002 FUN41 = A
000003 RETURN
000004 END

JTAP4210
JTAP4220
JTAP4230
JTAP4240

Q ELT IPRIOD,1,680506 6814

000001	C	FUNCTION **IPROID**	TTAP4010
000002		FUNCTION IPR0ID(I1)	TTAP4020
000003	CIPROID		
000004		DIMENSION IPRTST(5)	TTAP4030
000005		DATA IPRTST/4H0000 ,4HY000 , 4HT000 , 4HC000 , 4HQ000	TTAP4040
000006	C		TTAP4050
000007		1 J = (I1/1000)+1	TTAP4060
000008		K = MOD(I1,1000)	TTAP4065
000009		HEIU = ((K/100)*2**24) + (((MOD(K,100))/10)*2**18) + (MOD(K,10)	
000010		1 *2**12)	
000011		2 IPR0ID = IPRTST(J) + HEIU	TTAP4090
000012		RETURN	TTAP4120
000013		END	TTAP4130

@ ELT AMATQ4,1,680630, 54839

```

000001      C  MATRIX INVERSION ROUTINE
000002      C      ARGUMENTS OF RECIPIENT
000003      C      SUBROUTINE AMATQ4(A,B,N,DTM)
000004      C  MATRIX INVERSION ROUTINE
000005      C  A / INPUT MATRIX WITH RETURN A AS INVERSE MATRIX
000006      C  N / SIZE OF A MATRIX
000007      C  DTM / DETERMINANT VALUE OF A
000008      C  B / RIGHT HAND SIDE - SOLUTION FOR X IS RETURNED IN B.
000009      C  M / NUMBER OF COLUMN VECTORS IN RIGHT HAND SIDE.
000010      C      DIMENSION B(N,1), A(N,N), IP(50), ID(50,2), PIV(50)
000011      C      EQUIVALENCE(IR,IRW),(IC,ICM),(AM,PNR,TEM)
000012      C      M = 1
000013      C      ID = ID
000014      C  INITIALIZE DETERMINANT
000015      C      DTM = 1.0
000016      C  INITIALIZE COLUMN INDICATOR IP(II)
000017      C      DO 100 II = 1,N
000018      C      100 IP(II) = 0
000019      C      DO 270 IL=1,N
000020      C      AM = 0
000021      C  LOOK FOR PIVOT ELEMENT ON THE DIAGONAL BY INTERCHANGING ROWS
000022      C      DO 120 II = 1,N
000023      C      IF(IP(II) - 1)105,120,105
000024      C      105 DO 115 JJ = 1,N
000025      C      IF(IP(JJ) - 1)110,115,310
000026      C      110 IF(ABS(AM) - ABS(A(II,JJ))) 112,115,115
000027      C      112 AM = A(II,JJ)
000028      C      IR = II
000029      C      IC = JJ
000030      C      115 CONTINUE
000031      C      120 CONTINUE
000032      C      IP(IC) = IP(IC) + 1
000033      C
000034      C  PLACE PIVOT ELEMENT ON THE DIAGONAL BY INTERCHANGING ROWS
000035      C
000036      C      IF(IR - IC)130,130,130
000037      C  INTERCHANGING ROWS
000038      C      130 DTM = - DTM
000039      C      DO 150 K = 1,N
000040      C      TEM = A(IR,K)
000041      C      A(IR,K) = A(IC,K)
000042      C      150 A(IC,K) = TEM
000043      C  RIGHT HAND SIDE
000044      C      IF(M)160,160,160

```

```

000045      160 DO 170 K=1,M
000046          TEM = B(IR,K)
000047          B(IR,K) = B(IC,K)
000048      170 B(IC,K) = TEM
000049      180 IDX(IL,1) = IR
000050          IDX(IL,2) = IC
000051      C STORE PIVOT ELEMENT WHICH IS NOW DIAGONAL ELEMENT IN PIV(IL)
000052          PIV(IL) = B(IC,IC)
000053          DTM = DTM / PIV(IL)
000054          B(IC,IC) = 1.0
000055      C NOW DIVIDE PIVOT ROW BY PIVOT ELEMENT
000056          DO 190 K=1,M
000057              190 A(IC,K) = A(IC,K)/PIV(IL)
000058      C NOW REDUCE THE NON-PIVOT ROWS
000059          IF(M)220,220,230
000060      200 DO 210 K=1,M
000061          210 B(IC,K) = B(IC,K) / PIV(IL)
000062      220 DO 270 IX = 1,N
000063          IF (IX - IC)230,270,230
000064      230 PIR = A(IX,IC)
000065          A(IX,IC) = 0.0
000066          DO 240 K = 1,M
000067              240 A(IX,K) = A(IX,K) - A(IC,K)*PIR
000068          IF(M)270,270,250
000069      250 DO 260 K=1,M
000070          260 B(IX,K) = B(IX,K) - B(IC,K) * PIR
000071      270 CONTINUE
000072      C INTERCHANGE COLUMNS
000073          DO 300 KK = 1,N
000074              MM = N + 1 - KK
000075              IF (IDX(NM,1) - IDX(MM,2))280,300,280
000076      280 IRW = IDX(NM,1)
000077          ICM = IDX(NM,2)
000078          DO 290 IK = 1,M
000079              TEM = A(IK,IRW)
000080              A(IK,IRW) = A(IK,ICM)
000081              A(IK,ICM) = TEM
000082      290 CONTINUE
000083      300 CONTINUE
000084      310 RETURN
000085      END

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DEL TImER,1,690312, 35823

000001	C	SUBROUTINE **TImER**	MTAP4005
000002		SUBROUTINE TImER	MTAP4010
000003	CTIMER		
000004		DIMENSION ZZ(18000), PRTIM(10), DELTIM(10)	MTAP4020
000005		EQUIVALENCE (ZZ(0001), TIME), (ZZ(6335), DELTAT),	MTAP4030
000006	1	(ZZ(6292), PRTIM), (ZZ(6343), IPFLAG),	MTAP4032
000007	2	(ZZ(6302), DELTIM), (ZZ(6344), ISFLAG),	MTAP4034
000008	3	(ZZ(6331), PRTMX), (ZZ(6349), NTIME),	MTAP4036
000009	4	(ZZ(6332), DTHETA)	MTAP4038
000010		COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KOONT,	*JEW-
000011	1	POTIME, DELTP, TPREV(500)	*NEW
000012		NTIME = NTIME	***1
000013		IF (IPFLAG .NE. 1) GO TO 4	MTAP4050
000014	1	POTIME = TIME + DELTIM(NTIME)	MTAP4060
000015		IF (POTIME .LT. PRTIM(NTIME+1)) GO TO 4	MTAP4065
000016		IF ((TIME+DELTAT) .GT. PRTMX) GO TO 3	MTAP4067
000017	2	NTIME = NTIME+1	MTAP4070
000018		= PRTIM(NTIME)	MTAP4075
000019		GO TO 4	MTAP4077
000020		ISFLAG = 1	MTAP4087
000021	4	TIMEX = TIME + DELTAT	MTAP4090
000022		IF (TIMEX .GT. POTIME) GO TO 5	MTAP4095
000023	5	DTHETA = DELTAT	MTAP4100
000024		TIME = TIMEX	MTAP4105
000025		IPFLAG = 0	MTAP4110
000026			MTAP4115
000027	6	DTHETA = POTIME - TIME	MTAP4120
000028	8	TIME = POTIME	MTAP4130
000029	9	IPFLAG = 1	MTAP4135
000030	7	RETURN	MTAP4140
000031		END	

Q ELT DELTA,1,699312, 35829

000001	SUBROUTINE DELTA		LTAP4010
000002	CDELTA		
000003	DIMENSION	ZZ(18000), C(500), SUMY(500), CON(020)	LTAP4020
000004	INTEGER	NFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), NXP(500),	*NEW
000005	1	INXP(500), NWP(500), INWP(500), NPREV(500), KEY(500),	LTAP4032**-1
000006	2	IPR(500), IPH(100), NTHEAD(100), NTAIL(100), NODE(2500),	LTAP4033
000007	3	NC(2500)	LTAP4034
000008	COMMON / 12BY7	NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,	LTAP4035
000009	1	NPREV, KEY, IPR, IPH, NTHEAD, NTAIL, NODE, NC	LTAP4036
000010	EQUIVALENCE	(ZZ(00502), SUMY), (ZZ(06333), RCMIN),	LTAP4040
000011	1	(ZZ(03002), C), (ZZ(06335), DELTAT),	LTAP4042
000012	2	(ZZ(06272), CON), (ZZ(06345), MAXNOT),	LTAP4044
000013	3	(ZZ(06330), IERFL), (ZZ(06348), NCRT)	LTAP4046
000014	C		LTAP4048
000015	COMMON	ZZ, ISAVE(500), INODE(500), KSAVE, KOUNT,	*NEW
000016	1	POTIME, DELTP, TPREV(500)	*NEW
000017		MAXNOT = MAXNOT	** -1
000018	1	RCMIN = 1.0E36	LTAP4100
000019	DO 5	INH=1, MAXNOT	LTAP4101
000020	IF	(NFLAG(INH) .LE. 0) GO TO 5	LTAP4102
000021	2	IF((C(INH) .LE. 0) .OR. (SUMY(INH) .LE. 0)) GO TO 5	LTAP4103
000022	3	RC = C(INH)/SUMY(INH)	LTAP4104
000023	IF	(RC .GE. RCMIN) GO TO 5	LTAP4105
000024	4	RCMIN = RC	LTAP4106
000025		NCRT = INH	LTAP4107
000026	5	CONTINUE	LTAP4108
000027		DELTAT = AMIN1((RCMIN * CON(3)), CON(1))	LTAP4109
000028		DELTAT = AMIN1(DELTAT, DELTP)	*NEW
000029	IF	(DELTAT .GE. CON(2)) GO TO 11	LTAP4110
000030	6	WRITE (6,7) DELTAT, NCRT	LTAP4112
000031	7	FORMAT (' DELTA-TIME IS ' E12.5, ' WHICH IS LESS THAN PERMISSIBLE	*NEW
000032	1	MINIMUM OF ' 15, ' CHECK EITHER FINITE CAPACITY NODES OR TIME	*NEW
000033	2	LAG. ')	*NEW
000034		IERFL = 2	LTAP4125**-2
000035	11	RETURN	LTAP4130
000036		END	LTAP4135

Q ELT SUB98,1,690312, 35836

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000001      SUBROUTINE SUB98
000002      DIMENSION ZZ(18000), DYTQ(5000), T(500), C(500), DT(500)
000003      INTEGER NFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500),      *NEW
000004      1 NXP(500), INXP(500), NWP(500), INWP(500), NPREV(500), KEY(500),      ***-1
000005      2 IPR(500), IPH(100), NTHEAD(100), NNTAIL(100), NODE(2500), NC(2500)
000006      COMMON / I2BYT / NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,
000007      1 NPREV, KEY, IPR, IPH, NTHEAD, NNTAIL, NODE, NC
000008      EQUIVALENCE (ZZ(0001), TIME), (ZZ(0002), DYTQ(0)),
000009      1 (ZZ(1002), Y),
000010      2 (ZZ(2002), T),
000011      3 (ZZ(3002), C), (ZZ(06345), MAXNOT),
000012      4 (ZZ(06355), DELTAT)
000013      DIMENSION JS(100), HUM(100), TME(5,100), DEG(5,100), TT(5,5),
000014      1 TLAG(100), D(5), LAG1(100), A(5,100)
000015      COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KOUNT,
000016      1 PTIME, DELTP, TPREV(500)      *NEW
000017      DIMENSION DEJOM(100)      *NEW
000018      DELTP = 1.0E+35      *NEW
000019      TIME1 = TIME      *NEW
000020      CALL DELTA      *NEW
000021      CALL TIMER      *NEW
000022      TOUT = TIME      *NEW
000023      C      NEW SUB98      ***-1
000024      NDIV = 4
000025      NH = 5
000026      NNS = 0
000027      DO 500 J = 1, MAXNOT
000028      IF(NFLAG(J) .GT. -2) GO TO 500
000029      NNS = NNS + 1
000030      NUM(NNS) = IABS(NFLAG(J))
000031      JS(NNS) = J
000032      KS = HUM(NNS)
000033      IF (KOUNT .NE. 0) GO TO 50
000034      DO 10 K = 1, NH
000035      TME(K,NNS) = TIME1      *NEW
000036      DEG(K,NNS) = T(KS)      ***-1
000037      10 CONTINUE
000038      LAG1(NNS) = 0
000039      GO TO 500
000040      50 TEST = TIME1 - TME(5,NNS)      *NEW
000041      TLAG(NNS) = D(J)      ***-1
000042      DELT = TLAG(NNS)/NDIV
000043      IF (DELT .LT. DELTP) DELTP = DELT      *NEW
000044      IF (TEST .LT. DELT) GO TO 85

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000045	60 DO 70 K=2,NH	
000046	TME(K-1,NHS) = TME(K,NHS)	
000047	70 DEG(K-1,NHS) = DEG(K,NHS)	
000048	TME(5,NHS) = TIME1	*NEW
000049	DEG(5,NHS) = T(KS)	**1
000050	IF(LAG1(NHS) .EQ. 1) GO TO 100	
000051	83 IF (TDUM .GE. TLAG(NHS)) GO TO 90	*NEW
000052	T(J) = DEG(1,NHS)	**1
000053	C SET T TO OLDEST VALUE OF TEMP.	
000054	GO TO 500	
000055	85 IF(LAG1(NHS) .EQ. 1) GO TO 200	
000056	GO TO 83	
000057	90 LAG1(NHS)=1	
000058	100 CONTINUE	
000059	DENOM(NHS) = TME(5,NHS) - TME(1,NHS)	*NEW
000060	N1 = 0	**1
000061	DO 110 K=1,NH	
000062	B(K)=DEG(K,NHS)	
000063	TSUM = 1.0	
000064	TT(K,1) = 1.0	
000065	N1 = N1 + 1	
000066	DO 110 I=2,NH	
000067	PHI = (TME(N1,NHS) - TME(1,NHS)) / DENOM(NHS)	*NEW
000068	TT(K,I) = TSUM * PHI	**1
000069	TSUM = TT(K,1)	
000070	110 CONTINUE	
000071	CALL AMATQ4(TT,B,NH,DTM)	
000072	DO 199 K=1,5	
000073	A(K,NHS)=B(K)	
000074	199 CONTINUE	
000075	200 PHI = (TDUM - TLAG(NHS) - TME(1,NHS)) / DENOM(NHS)	*NEW
000076	TPREV(J) = T(J)	*NEW
000077	TT(J)=A(1,NHS)+A(2,NHS)*PHI+A(3,NHS)*PHI**2.+A(4,NHS)*PHI**3.	**1
000078	1+A(5,NHS)*PHI**4.	
000079	500 CONTINUE	
000080	KOUNT = KOUNT + 1	
000081	RETURN	
000082	END	

3 ELT ARITH,1,690312, 35844

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000001      C      SUBROUTINE **ARITH**                      GTAP4002
000002      SUBROUTINE ARITH                                GTAP4004
000003      CARITH
000004      DIMENSION ZZ(10000), DYTQ(5000), Y(1000), T(0500), GTAP4020
000005      1          C(0500), GAIN(0500), TITLE(18,10)      GTAP4022
000006      2, CON(20)
000007      C
000008      INTEGER IFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), INXP(500), *NEW
000009      1          INXP(500), NWP(500), INWP(500), NPREV(500), KEY(500), GTAP4032**-1
000010      2          IPR(500), IPH(100), NTHED(100), NTAIL(100), NOD(2500), GTAP4033
000011      3          NC(2500)
000012      COMMON / I2BYT/ IFLAG, NY1, NY2, NZA, NZB, INXP, INWP, NWP, INWP, GTAP4035
000013      1          NPREV, KEY, IPR, IPH, NTHED, NTAIL, NOD, NC GTAP4036
000014      EQUIVALENCE (ZZ(0001), TIME), (ZZ(6343), IPFLAG), GTAP4040
000015      1          (ZZ(0002), DYTQ), (ZZ(6344), ISFLAG), GTAP4042
000016      2          (ZZ(1002), Y), (ZZ(6347), NARITH), GTAP4044
000017      3          (ZZ(2002), T), (ZZ(6350), IXX), GTAP4046
000018      4          (ZZ(3002), C), (ZZ(6352), NWW), GTAP4048
000019      5          (ZZ(5002), GAIN), (ZZ(6353), NXX), GTAP4050
000020      6          (ZZ(6102), TITLE), (ZZ(6354), HZZ), GTAP4052
000021      7          (ZZ(6280), SIGMA), (ZZ(6355), W), GTAP4054
000022      8          (ZZ(6281), TZERO), (ZZ(6356), X), GTAP4056
000023      9          (ZZ(6330), IERFL), (ZZ(6357), Z), GTAP4058
000024      EQUIVALENCE (ZZ(6332), DTHETA), (ZZ(6358), NTAB), GTAP4060
000025      1          (ZZ(6337), IMIN), (ZZ(6362), IXSAVE), GTAP4062
000026      2          (ZZ(6338), IMAX), GTAP4064
000027      3          (ZZ(6339), IXMIN), GTAP4066
000028      4          (ZZ(6340), IXMAX), (ZZ(6272), CON)
000029      EQUIVALENCE (ZZ(06333), PCMIN), (ZZ(06335), DELTAT),
000030      1          (ZZ(06349), NTIME), (ZZ(06343), IPFLAG)
000031      COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KODMT, *NEW
000032      1          POTIME, DELTP, TPREV(500) *NEW
000033      IMIN = IMIN *NEW
000034      IMAX = IMAX ** -2
000035      DO 304 IX = IMIN, IMAX
000036      KEYP = KEY(IX)
000037      KH = KEYP/100
000038      IF (NARITH) 302, 9302, 302
000039      9302 IF (KH) 304, 303, 304
000040      302 IF (KH) 321, 307, 303
000041      321 KEYP = KEYP+100
000042      GO TO 306
000043      307 IXMIN = MIN0(IXMIN, IX)
000044      IXMAX = MAX0(IXMAX, IX)

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000045	303 IF (KEYP) 306,304,305	GTAP4096
000046	305 KEYM = KEYP - (100*KH)	GTAP4098
000047	KT = (KEYM/1A)+1	GTAP4100
000048	KU = KEYM+11-(10*KT)	GTAP4102
000049	306 HZZ = HZA(IX)	GTAP4104
000050	HXX = HXP(IX)	GTAP4108
000051	HWW = HWP(IX)	GTAP4110
000052	IF (H2B(IX) .LE. 0) GO TO 311	GTAP4112
000053	310 HZB1 = HZB(IX)	GTAP4114
000054	HXD = HXP(IX)	GTAP4116
000055	HWD = HWP(IX)	GTAP4118
000056	311 X = DYTQ(HXX)	GTAP4122
000057	W = DYTQ(HWW)	GTAP4124
000058	IF (KEYP) 330,304,331	GTAP4126
000059	330 NTAB = -KEYP	GTAP4128
000060	IXX = IX	GTAP4130
000061	IF (NTAB .LT. 50) GO TO 350	GTAP4132
000062	352 CALL DIVAR	GTAP4134
000063	GO TO 351	GTAP4136
000064	350 CALL TABLE	GTAP4138
000065	351 IF (IERFL .EQ. 1) GO TO 312	GTAP4140
000066	GO TO 320	GTAP4141
000067	331 GO TO (101,110,120,130,140,150,160,170,180,190),KT	GTAP4142
000068	101 KV = KU-1	GTAP4144
000069	GO TO (1,2,3,4,5,6,7,201,201,201),KV	
000070	1 Z = X	GTAP4148
000071	GO TO 312	GTAP4150
000072	2 Z = 1.0/X	GTAP4152
000073	GO TO 312	GTAP4154
000074	3 Z = X * X	GTAP4156
000075	GO TO 312	GTAP4158
000076	4 Z = SQRT(ABS(X))	GTAP4159
000077	GO TO 312	GTAP4160
000078	5 Z = X**3	GTAP4161
000079	GO TO 312	GTAP4162
000080	6 Z = X**4	GTAP4163
000081	GO TO 312	GTAP4164
000082	7 Z = 1.0	
000083	GO TO 312	
000084	110 GO TO (10,11,12,13,201,15,16,201,201,201),KU	GTAP4165
000085	10 Z = EXP(X)	GTAP4166
000086	GO TO 312	GTAP4167
000087	11 Z = EXP(0.434294*X)	GTAP4168
000088	GO TO 312	GTAP4169
000089	12 Z = ALOG(X)	GTAP4170
000090	GO TO 312	GTAP4171
000091	13 Z = ALOG10(X)	GTAP4172
000092	GO TO 312	GTAP4173
000093	15 Z = X*DTHEA	GTAP4174

000094	GO TO 312	GTAP4175
000095	16 Z = X/DTHETA	GTAP4176
000096	GO TO 312	GTAP4177
000097	120 GO TO (20,21,22,23,24,25,201,201,201,201),KU	GTAP4182
000098	20 Z = SIN (X)	
000099	GO TO 312	GTAP4186
000100	21 Z = COS (X)	GTAP4188
000101	GO TO 312	GTAP4190
000102	22 Z = SIN (X)/COS (X)	GTAP4192
000103	GO TO 312	GTAP4194
000104	23 W = SQRT(1.0-X*X)	GTAP4196
000105	GO TO 25	GTAP4198
000106	24 W = X	GTAP4200
000107	X = SQRT(1.0-X*X)	GTAP4202
000108	25 Z = ATANH(X,W)	GTAP4204
000109	GO TO 312	GTAP4206
000110	130 GO TO (131,131,131, 201,201,201,201,201,201,201),KU	GTAP4208
000111	131 XE = EXP(X)	GTAP4210
000112	GO TO (30,31,32),KU	GTAP4212
000113	30 Z = (XE-(1.0/XE))/2.0	GTAP4214
000114	GO TO 312	GTAP4216
000115	31 Z = (XE+(1.0/XE))/2.0	GTAP4218
000116	GO TO 312	GTAP4220
000117	32 Z = (XE-(1.0/XE))/(XE+(1.0/XE))	GTAP4222
000118	GO TO 312	GTAP4224
000119	140 GO TO (40,41,201,201,201,201,201,201,49),KU	GTAP4226
000120	C CALCULATE HEAT FLOW THROUGH PATH SPECIFIED	GTAP4228
000121	40 HXX = MOD(HXX,1000)	GTAP4230
000122	HA = HY1(HXX)	GTAP4235
000123	HB = HY2(HXX)	GTAP4236
000124	Z = Y(HXX)*(T(HA)-T(HB))	GTAP4238
000125	GO TO 312	GTAP4240
000126	41 Z = FURH1(X)	GTAP4242
000127	GO TO 312	GTAP4244
000128	C RADIATION PATH EQUIVALENT CONDUCTANCE	GTAP4246
000129	49 HZZZ = MOD(HZZZ,1000)	GTAP4248
000130	HA = HY1(HZZZ)	GTAP4251
000131	HB = HY2(HZZZ)	GTAP4252
000132	TA = T(HA)+TZERO	GTAP4256
000133	TB = T(HB)+TZERO	GTAP4258
000134	Z = SIGMA*(TA**2+TB**2)*(TA+TB)	GTAP4260
000135	GO TO 312	GTAP4262
000136	150 GO TO (50,51,52,53,54,55,56,57,58,59),KU	GTAP4264
000137	50 Z = X*W	GTAP4266
000138	GO TO 312	GTAP4268
000139	51 Z = X-W	GTAP4270
000140	GO TO 312	GTAP4272
000141	52 Z = X*W	GTAP4274
000142	GO TO 312	GTAP4276

000143	53 Z = X/W	GTAP4278
000144	GO TO 312	GTAP4280
000145	54 Z = SQRT(X*W)	GTAP4282
000146	GO TO 312	GTAP4284
000147	55 Z = (X+W)/2.0	GTAP4286
000148	GO TO 312	GTAP4288
000149	56 IF (X .NE. W) GO TO 562	GTAP4290
000150	561 Z = X	GTAP4292
000151	GO TO 312	GTAP4294
000152	562 Z = (X-W)/(ALOG(X/W))	GTAP4296
000153	GO TO 312	GTAP4298
000154	57 Z = SQRT(X*X + W*W)	GTAP4300
000155	GO TO 312	GTAP4302
000156	58 Z = 0.0	GTAP4304
000157	DEIION = 0.0	GTAP4306
000158	DO 581 J=HXX,IIWW	GTAP4308
000159	Z = Z + DYTCo(J)	GTAP4310
000160	581 DEIION = DEIION + 1.0	GTAP4312
000161	Z = Z/DEIION	GTAP4314
000162	GO TO 312	GTAP4316
000163	59 JX = MOD(HXX,1000)	GTAP4318
000164	JW = MOD(IIWW,1000)	GTAP4320
000165	SUMCT = 0.0	GTAP4322
000166	SUMC = 0.0	GTAP4324
000167	DO 591 J=JX,JW	GTAP4326
000168	SUMCT = SUMCT + C(J)*T(J)	GTAP4328
000169	591 SUMC = SUMC + C(J)	GTAP4330
000170	IF (SUMC .GT. 0.3) GO TO 594	GTAP4332
000171	592 KEY(IX) = 159	GTAP4334
000172	WRITE (6,593) JX,JW	GTAP4336
000173	593 FORMAT (59H IMPOSSIBLE TO TAKE WEIGHTED AVERAGE OF ZERO CAPACITY	GTAP4338
000174	CDPC 16, 8H THROUGH 16)	GTAP4340
000175	GO TO 304	GTAP4342
000176	594 Z = SUMCT/SUMC	GTAP4344
000177	GO TO 312	GTAP4346
000178	100 GO TO (60,61,62,201,201,201,201,201,201,201,201),KU	GTAP4348
000179	60 Z = X*W	GTAP4350
000180	GO TO 312	GTAP4352
000181	61 Z = 0.0	GTAP4354
000182	DO 610 J=HXX,IIWW	GTAP4356
000183	610 Z = Z + DYTCo(J)	GTAP4358
000184	GO TO 312	GTAP4360
000185	62 Z = 0.0	GTAP4362
000186	DO 620 J=HXX,IIWW	GTAP4364
000187	620 Z = Z*DYTCo(J)	GTAP4366
000188	GO TO 312	GTAP4368
000189	170 GO TO (70,71,72,73,74,75,76,77,78,201),KU	GTAP4370
000190	70 Z = AMOD(X*W)	GTAP4372
000191	GO TO 312	GTAP4374

000192	71 Z = AMAX1(X,W)	GTAP4376
000193	GO TO 312	GTAP4378
000194	72 Z = AMIN1(X,W)	GTAP4380
000195	GO TO 312	GTAP4382
000196	73 IF (W) 171,340,340	GTAP4384
000197	74 IF (W) 340,171,340	GTAP4386
000198	75 IF (W) 340,340,171	GTAP4388
000199	171 Z = X	GTAP4390
000200	GO TO 312	GTAP4392
000201	76 IF (TIME .LT. W) GO TO 340	GTAP4394
000202	761 Z = X	GTAP4396
000203	GO TO 312	GTAP4398
000204	77 IF (X .GE. W) GO TO 772	GTAP4400
000205	771 Z = 0.0	GTAP4402
000206	GO TO 312	GTAP4404
000207	772 Z = 1.0	GTAP4406
000208	GO TO 312	GTAP4408
000209	78 IF (X-W) 772,771,771	GTAP4410
000210	180 GO TO (80,80,82,83,201,201,201,201,201,201,201),KU	GTAP4412
000211	80 IF (X .LT. W) GO TO (340,802),KU	GTAP4414
000212	801 KEY(IX) = KEY(IX)+100	GTAP4416
000213	802 NZZZ = MOD(NZZZ,1000)	GTAP4418
000214	NFLAG(NZZZ) = +1	GTAP4419
000215	IF (KU .EQ. 1) NFLAG(NZZZ)=-1	GTAP4420
000216	GO TO 340	GTAP4424
000217	82 IF (X-W) 340,831,831	GTAP4426
000218	83 IF (X-W) 340,832,832	GTAP4428
000219	831 KEY(IX) = KEY(IX)+100	GTAP4430
000220	832 DYTCQ(NZZ) = DYTCQ(NZZ) + GAIN(IX)	GTAP4432
000221	GO TO 340	GTAP4433
000222	190 GO TO (90,91,201,201,201,201,201,970,980,99),KU	GTAP4434
000223	90 IF (X .LT. W) GO TO 340	GTAP4436
000224	901 NZZ = MOD(NZZ,10)	GTAP4438
000225	WRITE (6,902) (TITLE(M,NZZ),M=1,17)	GTAP4440
000226	902 FORMAT (11X,17A4)	GTAP4442
000227	KEY(IX) = KEY(IX)+100	GTAP4444
000228	GO TO 340	GTAP4446
000229	91 Z = FUN91(X,W)	GTAP4448
000230	GO TO 312	GTAP4450
000231	980 IF (CON(5) .EQ.1.) GO TO 340	
000232	IPFLG = IPFLAG	*NEW
000233	PPTIME = POTIME	*NEW
000234	DRCMIN = RCMIN	
000235	DUMDLT = DELTAT	
000236	NNTIME = NTIME	
000237	ISFLG = ISFLAG	
000238	DDTHTA = DTHETA	
000239	DDTIM = TIME	
000240	CALL SUB98	

000241	IPFLAG = IIPFLG	*NEW
000242	POTIME = PPTIME	*NEW
000243	RCMIN = DRCMIN	
000244	DELTAT = DUMDLT	
000245	HTIME = HHTIME	
000246	ISFLAG = ISFLG	
000247	DTHETA = DDHTA	
000248	TIME = DDTIM	
000249	GO TO 340	GTAP4456
000250	970 IF (X.LT. W) GO TO 340	GTAP4458
000251	97 IXSAVE = IX+1	GTAP4460
000252	GO TO 309	GTAP4462
000253	99 IF (X.LT. W) GO TO 340	GTAP4464
000254	991 IPFLAG = 1.0	GTAP4466
000255	ISFLAG = 1.0	GTAP4468
000256	GO TO 340	GTAP4470
000257	312 DYTGO(HZZ) = Z*GAIN(IX)	GTAP4472
000258	340 IF (HZZ(IX) .LE. 0) GO TO 304	GTAP4474
000259	332 HZZ = HZZ+1	GTAP4476
000260	IF (HZZ.GT. NZB1) GO TO 304	GTAP4478
000261	333 HXX = HXX+HXD	GTAP4480
000262	HWW = HWW+HWD	GTAP4482
000263	GO TO 311	GTAP4484
000264	304 CONTINUE	GTAP4486
000265	IF (HARITH .NE. 1) GO TO 309	GTAP4488
000266	308 IMIN = IXMIN	GTAP4490
000267	IMAX = IXMAX	GTAP4492
000268	HARITH = 0	GTAP4494
000269	309 RETURN	GTAP4496
000270	201 WRITE (6,202)	GTAP4498
000271	202 FORMAT (1H0 43H NONEXISTENT ARITHMETIC OPERATION INDICATED)	GTAP4500
000272	320 IERFL = 2	GTAP4502
000273	GO TO 309	GTAP4504
000274	END	GTAP4516

ELT LATENT,1,690312, 35851

000001	C	SUBROUTINE **LATENT**	KTAP4005
000002		CLATENT	
000003		SUBROUTINE LATENT	KTAP4010
000004		DIMENSION ZZ(18000), QCH1(100), QCH2(100), T(500), C(500),	KTAP4015
000005	1	TPREV(500), PHT1(100), PHH1(100), PHH2(100), PHT2(100)	KTAP4020
000006	C		KTAP4021
000007	C		KTAP4030
000008		INTEGER NFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), NXP(500),	*NEW
000009	1	INXP(500), NWP(500), INWP(500), NPREV(500), KEY(500),	KTAP4032*-1
000010	2	IPR(500), IPH(100), NTHEAD(100), NTAIL(100), NODE(2500),	KTAP4033
000011	3	NC(2500)	KTAP4034
000012		COMMON / 12BYT/ NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,	KTAP4035
000013	1	NPREV, KEY, IPR, IPH, NTHEAD, NTAIL, NODE, NC	KTAP4036
000014	C		KTAP4037
000015		EQUIVALENCE (ZZ(00001), TIME), (ZZ(05802), PHH2),	KTAP4040
000016	1	(ZZ(02002), T), (ZZ(05902), QCH1),	KTAP4041
000017	2	(ZZ(06002), QCH2),	*NEW
000018	3	(ZZ(03002), C), (ZZ(06332), DTHETA),	KTAP4043*-1
000019	4	(ZZ(05502), PHT1), (ZZ(06335), DELTAT),	KTAP4044
000020	5	(ZZ(05602), PHH1), (ZZ(06341), IPHMAX),	KTAP4045
000021	6	(ZZ(05702), PHT2)	KTAP4046
000022		DATA COOL, HEAT/4HCOOL, 4HHEAT/	KTAP4048
000023		COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KOUNT,	*NEW
000024	1	POTIME, DELTP, TPREV	*NEW
000025		IPHMAX = IPHMAX	** -1
000026	1	DO 90 I = 1, IPHMAX	KTAP4070
000027		K = IPH(I)	KTAP4075
000028		IF (NFLAG(K)) 90, 90, 2	KTAP4080
000029	2	N2 = 1	KTAP4085
000030		DT = T(K) - TPREV(K)	KTAP4090
000031		IF (DT) 6, 90, 7	KTAP4095
000032	6	A = COOL	KTAP4100
000033		TXS = T(K) - PHT2(I)	KTAP4105
000034		TXSP = TPREV(K) - PHT2(I)	KTAP4110
000035		N3 = 2	KTAP4115
000036		GO TO 10	KTAP4120
000037	7	A = HEAT	KTAP4125
000038		TXS = T(K) - PHT1(I)	KTAP4130
000039		TXSP = TPREV(K) - PHT1(I)	KTAP4135
000040		N3 = 1	KTAP4140
000041	10	TEST = TXS * TXSP	KTAP4145
000042		IF (TEST) 11, 11, 80	KTAP4150
000043	11	GO TO (12, 13), N3	KTAP4155
000044	12	QCH = QCH1(I)	KTAP4160

	PHT = PHT1(I)	KTAP4165
	PHH = PHH1(I)	KTAP4170
	GO TO 14	KTAP4175
13	QCH = QCH2(I)	KTAP4180
	PHT = PHT2(I)	KTAP4185
	PHH = PHH2(I)	KTAP4190
14	IF(TEST) 15,16,80	KTAP4195
15	TIMEP = TIME - DTHETA*(TXS/DT)	KTAP4200
	WRITE (6,100) K,N3,A,TIMEP,PHT	KTAP4205
100	FORMAT (7H0 NODE,I4,14H, PHASE CHANGE,I2,2H, ,A4,20H)ING BEGINS	KTAP4210
	1T TIME =,F8.2,8H, TEMP =,F8.2)	KTAP4215
16	QCH = QCH + C(K)*TXS	KTAP4220
	IF (DT) 18,90,17	KTAP4225
17	IF (QCH -PHH) 19,20,20	KTAP4230
18	IF (QCH) 21,21,19	KTAP4235
19	T(K) = PHT	KTAP4240
	N2 = 2	KTAP4245
	GO TO 79	KTAP4250
20	DTP = (QCH -PHH)/C(K)	KTAP4255
	QCH = PHH	KTAP4260
	GO TO 78	KTAP4265
21	DTP = (QCH)/C(K)	KTAP4270
	QCH =0.0	KTAP4275
78	TIMEP = TIME - DTHETA*(DTP/DT)	KTAP4280
	T(K) = PHT + DTP	KTAP4285
	WRITE (6,101) K,N3,A,TIMEP,PHT,QCH	KTAP4290
101	FORMAT (7H0 NODE,I4,14H, PHASE CHANGE,I2,2H, ,A4,20H)ING ENDS	KTAP4295
	1 TIME =,F8.2,8H, TEMP =,F8.2, 22H, INTEGRATED HEATING =,E11.4)	KTAP4300
79	IF (N3 .EQ. 2) GO TO 62	KTAP4305
61	QCH1(I) = QCH	KTAP4310
	GO TO 80	KTAP4315
62	QCH2(I) = QCH	KTAP4320
80	IF (N2 .EQ. 2) GO TO 90	KTAP4325
81	IF (N3 .EQ. 2) GO TO 83	KTAP4330
82	TXS = T(K) -PHT2(I)	KTAP4335
	TXSP = TPREV(K) -PHT2(I)	KTAP4340
	N3 = 2	KTAP4345
	GO TO 84	KTAP4350
83	TXS = T(K) -PHT1(I)	KTAP4355
	TXSP = TPREV(K) -PHT1(I)	KTAP4360
	N3 = 1	KTAP4365
84	N2 = 2	KTAP4370
	GO TO 10	KTAP4375
90	CONTINUE	KTAP4380
	RETURN	KTAP4385
	END	KTAP4390

ELT TAPOUT,1,690312, 35866

000001	C	SUBROUTINE *TAPOUT*	NTAP4005
000002		SUBROUTINE TAPOUT	NTAP4010
000003	C	DATA OUTPUT	NTAP4007
000004		DIMENSION ZZ(18000), DYTCC(5000), IPRTAG(500), PROUT(500)	NTAP4015
000005		INTEGER NFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), NXP(500),	*NEW
000006	1	INXP(500), INWP(500), INWP(500), NPREV(500), KEY(500),	NTAP4032*-1
000007	2	IPR(500), IPH(100), NTHED(100), NTTAIL(100), NODE(2500),	NTAP4033
000008	3	NC(2500)	NTAP4034
000009		COMMON / 12BYT/ NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,	NTAP4035
000010	1	NPREV, KEY, IPR, IPH, NTHED, NTTAIL, NODE, NC	NTAP4036
000011		EQUIVALENCE (ZZ(0001), TIME), (ZZ(6334), USAVE),	NTAP4040
000012	1	(ZZ(0002), DYTCC), (ZZ(6335), DELTAT),	NTAP4042
000013	2	(ZZ(3502), IPRTAG), (ZZ(6336), DTMAX),	NTAP4044
000014	3	(ZZ(4502), PROUT), (ZZ(6342), IPRMAX),	NTAP4046
000015	4	(ZZ(6276), CON5), (ZZ(6348), HCRIT),	NTAP4048
000016	5	(ZZ(6333), RCHIN)	NTAP4050
000017		COMMON ZZ	NTAP4055
000018		IPRMAX = IPRMAX	
000019	1	DO 2 I=1,IPRMAX	NTAP4060
000020		K = IPR(I)	NTAP4065
000021	2	PROUT(I) = DYTCC(K)	NTAP4070
000022		IF (CON5) 5,7,5	NTAP4075
000023	5	WRITE (6,6) TIME,DTMAX,USAVE	NTAP4080
000024	6	FORMAT (1H0/9H TIME =F8.2,46H GREATEST TEMPERATURE CHANGE PER	NTAP4085
000025		1 ITERATION = E12.5, 9H ON NODE 14)	NTAP4090
000026		GO TO 8	NTAP4095
000027	7	WRITE (6,3) TIME,HCRIT,RCHIN,DELTAT	NTAP4100
000028	3	FORMAT (1H0/9H TIME =F8.2,18H CRITICAL NODE =I4,21H CRITICAL	NTAP4105
000029	1	DELTA T =E12.5,19H ACTUAL DELTA T =E12.5)	NTAP4110
000030	8	WRITE (6,4) (IPRTAG(I), PROUT(I), I=1,IPRMAX)	NTAP4115
000031	4	FORMAT (5(2X,1H(,A4,3H) =,1PE12.5))	NTAP4120
000032		RETURN	NTAP4125
000033		END	NTAP4130

2 ELT SETUP,1,09,312, 35873

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000001      C      SUBROUTINE **SETUP**                      CTAP4005
000002      SUBROUTINE SETUP                      CTAP4010
000003      CSETUP
000004      DIMENSION ZZ(18000), SUMY(9500), Y(1000), T(0500), CTAP4020
000005      1 SUMYT(9500), C(0500), Q(0500), PHT1(0100), CTAP4022
000006      2 PHH1(0100), PHT2(0100), PHH2(0100), GCH1(0100), CTAP4024
000007      3 GCH2(0100), CON(0020), PRTIM(0010), INSTR(0500) CTAP4026
000008      INTEGER IFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), INXP(500), *NEW
000009      1 INXP(500), NWP(500), INWP(500), INPREV(500), KEY(500), CTAP4032**-1
000010      2 IPR(500), IPH(100), NTHD(100), NTAIL(100), NODE(2500), CTAP4033
000011      3 NC(2500) CTAP4034
000012      COMMON / 128BYT/ IFLAG, NY1, NY2, NZA, NZB, INXP, INWP, NWP, INWP, CTAP4035
000013      1 INPREV, KEY, IPR, IPH, NTHD, NTAIL, NODE, NC CTAP4036
000014      EQUIVALENCE (ZZ(0001), TIME), CTAP4040
000015      1 (ZZ(0502), SUMY), (ZZ(6338), IMAX), CTAP4042
000016      2 (ZZ(1002), Y), (ZZ(6339), IXMIN), CTAP4044
000017      3 (ZZ(2002), T), (ZZ(6340), IXMAX), CTAP4046
000018      4 (ZZ(2502), SUMYT), (ZZ(6341), IPHMAX), CTAP4048
000019      5 (ZZ(3002), C), (ZZ(6343), IPFLAG), CTAP4050
000020      6 (ZZ(4002), Q), (ZZ(6344), ISFLAG), CTAP4052
000021      7 (ZZ(5002), PHT1), (ZZ(6345), MAXNOT), CTAP4054
000022      8 (ZZ(5602), PHH1), (ZZ(6346), MAXNOY), CTAP4056
000023      9 (ZZ(5702), PHT2), (ZZ(6347), NARITH), CTAP4058
000024      EQUIVALENCE (ZZ(5802), PHH2), (ZZ(6349), NTIME), CTAP4060
000025      1 (ZZ(5902), GCH1), (ZZ(6351), NTLAST), CTAP4062
000026      2 (ZZ(6002), GCH2), (ZZ(6358), NTAB), CTAP4064
000027      3 (ZZ(6272), CON), (ZZ(6359), NTRA), CTAP4066
000028      4 (ZZ(6281), YZERO), (ZZ(6360), NODEIND), CTAP4068
000029      5 (ZZ(6292), PRTIM), (ZZ(6361), IORG), CTAP4070
000030      6 (ZZ(6330), IERFL), (ZZ(7400), INSTR) CTAP4072
000031      C CTAP4074
000032      COMMON ZZ CTAP4150
000033      C SET INITIAL ENTRY POINT FOR EACH TABLE FUNCTION CTAP4155
000034      IMAX = IMAX
000035      IPHMAX = IPHMAX
000036      MAXNOY = MAXNOY
000037      NTAB = NTAB
000038      DO 120 IX=1,IMAX CTAP4160
000039      IF (KEY(IX).GE. 0) GO TO 120 CTAP4165
000040      110 NTAB = -MOD(KEY(IX),100) CTAP4170
000041      INPREV(IX) = NTHD(NTAB) CTAP4175
000042      120 CONTINUE CTAP4180
000043      C SET LATENT HEAT DATA CTAP4185
000044      200 DO 206 I = 1,IPHMAX CTAP4190

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000045		K = IPH(I)	CTAP4195
000046		IF (T(K) - PHT1(I)) 201,203,202	CTAP4200
000047	201	OCH1(I) = 0.0	CTAP4205
000048		GO TO 203	CTAP4210
000049	202	OCH1(I) = PHH1(I)	CTAP4215
000050	203	IF (T(K) - PHT2(I)) 204,206,205	CTAP4220
000051	204	OCH2(I) = 0.0	CTAP4225
000052		GO TO 206	CTAP4230
000053	205	OCH2(I) = PHH2(I)	CTAP4235
000054	206	CONTINUE	CTAP4240
000055		TIME = PRTIM(1)	CTAP4245
000056		HTIME = 1	CTAP4250
000057		IPFLAG = 1	CTAP4255
000058		ISFLAG = 0	CTAP4260
000059		NRATH = 1	CTAP4265
000060		IXMIN = 500	CTAP4270
000061		IXMAX = 0	CTAP4275
000062		TZERO = ADS(TZERO)	CTAP4280
000063	300	CALL ARITH	CTAP4285
000064		GO TO (310,730),IERFL	CTAP4290
000065	310	IF (CON(11)) 750,410,430	CTAP4300
000066	410	WRITE (6,420)	CTAP4330
000067	420	FORMAT (1H1 36X, 28H SUMMARY OF NODE CONNECTIONS//5X, 5H NODE 4X,	CTAP4335
000068		18H INITIAL 18X, 16H HEAT GENERATION 4X, 5H NODE 6X, 10H CONNECTOR	CTAP4340
000069		23X, 8H INITIAL/6X, 4H NO. 2X, 12H TEMPERATURE 3X, 9H CAPACITY 10X,	CTAP4345
000070		35H RATE 7X 10H CONNECTED 5X, 7H NUMBER 3X, 11H ADMITTANCE//)	CTAP4350
000071	430	NTRA = 0	CTAP4355
000072		K = 0	CTAP4357
000073		ASSIGN 510 TO N3	CTAP4360
000074		GO TO 500	CTAP4365
000075	440	NTRA = 1	CTAP4370
000076		IORG = M + 1	CTAP4372
000077		ASSIGN 520 TO N3	CTAP4375
000078		MAXHOT = MAXHOT	
000079	500	DO 690 J1=1,MAXHOT	CTAP4380
000080		GO TO N3,(510,520)	CTAP4385
000081	510	IF (C(J1)) 690,690,530	CTAP4390
000082	520	IF (C(J1)) 690,530,690	CTAP4395
000083	530	HCZERO = 0	CTAP4400
000084		H = 0	CTAP4405
000085		DO 570 J2=1, MAXHOT	CTAP4410
000086		IF (HY1(J2) .NE. J1) GO TO 550	CTAP4420
000087	540	N = N+1	CTAP4425
000088		INSTR(H) = J2	CTAP4430
000089	550	IF (HY2(J2) .NE. J1) GO TO 570	CTAP4440
000090	560	N = N+1	CTAP4445
000091		INSTR(H) = -J2	CTAP4450
000092	570	CONTINUE	CTAP4460
000093		IF (H) 680,680,580	CTAP4465

000094	580 IF (CON(11)) 750,690,640	CTAP4467
000095	600 WRITE (6,610) J1, T(J1), C(J1), Q(J1)	CTAP4470
000096	610 FORMAT (1H 18, 3E15.5)	CTAP4475
000097	640 K = K+1	CTAP4476
000098	MODE(K) = J1	CTAP4477
000099	HC(K) = -H	CTAP4478
000100	DO 630 L=1,N	CTAP4480
000101	M = K+L	CTAP4482
000102	J2 = IABS(INSTR(L))	CTAP4484
000103	HC(M) = J2	CTAP4486
000104	MODE (M) = HY1(J2)	CTAP4488
000105	IF (INSTR(L) .LT. 0) GO TO 615	CTAP4490
000106	MODE (M) = HY2(J2)	CTAP4492
000107	IF (CON(11) - 1.0) 615,630,615	
000108	615 WRITE (6,620) MODE(M), J2, Y(J2)	CTAP4494
000109	620 FORMAT (51X,2I13,F17.5)	CTAP4495
000110	630 CONTINUE	CTAP4500
000111	K = K+1	CTAP4505
000112	GO TO 690	CTAP4510
000113	680 CONTINUE	
000114	C 680 HFLAG(J1) = :	
000115	690 CONTINUE	CTAP4545
000116	700 MODEND = M	CTAP4558
000117	IF (INTRA) 440,440,750	CTAP4560
000118	C PRINT INITIAL VALUES AS GIVEN	CTAP4580
000119	750 WRITE (6,720)	CTAP4585
000120	720 FORMAT (35H1 INITIAL VALUES GIVEN FOR THIS RUN)	CTAP4590
000121	CALL TAPCUT	CTAP4595
000122	730 RETURN	CTAP4610
000123	END	CTAP4615

000001	C	SUBROUTINE **TABLE**	HTAP4005
000002	C	THIS SUBROUTINE USES LINEAR INTERPOLATION IN EVALUATING TABLE	HTAP4010
000003	C	FUNCTIONS	HTAP4015
000004		SUBROUTINE TABLE	HTAP4020
000005	CTABLE		
000006		DIMENSION ZZ(1000), TABL(1000)	HTAP4025
000007	C		HTAP4030
000008		INTEGER NFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), NXP(500),	*NEW
000009	1	INXP(500), NWP(500), IHWP(500), NPREV(500), KEY(500),	HTAP4032*-1
000010	2	IPR(500), IPH(100), NTHEAD(100), NTTAIL(100), NNODE(2500),	HTAP4033
000011	3	NC(2500)	HTAP4034
000012		COMMON / I2BYT/ NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, IHWP,	HTAP4035
000013	1	NPREV, KEY, IPR, IPH, NTHEAD, NTTAIL, NNODE, NC	HTAP4036
000014		EQUIVALENCE (ZZ(00001), TIME), (ZZ(06354), HZZ),	HTAP4040
000015	1	(ZZ(06330), IERFL), (ZZ(06356), X),	HTAP4042
000016	2	(ZZ(06344), ISFLAG), (ZZ(06357), Z),	HTAP4044
000017	3	(ZZ(06350), IXX), (ZZ(06358), NTAB),	HTAP4046
000018	4	(ZZ(06353), MXX), (ZZ(06400), TABL)	HTAP4048
000019		DATA ITDTAG/4HTIME/	HTAP4050
000020		COMMON ZZ	HTAP4060
000021		IX = IXX	HTAP4065
000022		NT = NPREV(IX)	HTAP4070
000023		NTAB = NTAB	HTAP4075
000024		NTH = NTHEAD(NTAB)	HTAP4080
000025		NTT = NTTAIL(NTAB)	HTAP4085
000026		IF (X-TABL(NT)) 7,1,2	HTAP4090
000027	1	Z = TABL(NT+1)	HTAP4095
000028		GO TO 16	HTAP4100
000029	2	IF (NT-NTT) 3,3,12	HTAP4105
000030	3	IF (X-TABL(NT+2)) 6,4,5	HTAP4110
000031	4	NT=NT+2	HTAP4115
000032		GO TO 1	HTAP4120
000033	5	NT=NT+2	HTAP4125
000034		GO TO 2	HTAP4130
000035	6	SLOPE=(TABL(NT+3)-TABL(NT+1))/(TABL(NT+2)-TABL(NT))	HTAP4135
000036		Z = TABL(NT+1)+SLOPE*(X-TABL(NT))	HTAP4140
000037		GO TO 16	HTAP4145
000038	7	IF (NT-NTH) 12,8,8	HTAP4150
000039	8	IF (X-TABL(NT-2)) 10,9,11	HTAP4155
000040	9	NT = NT-2	HTAP4160
000041		GO TO 1	HTAP4165
000042	10	NT = NT-2	HTAP4170
000043		GO TO 7	HTAP4175
000044	11	SLOPE=(TABL(NT+1)-TABL(NT-1))/(TABL(NT)-TABL(NT-2))	HTAP4180

000045	Z = TABL(HT+1)-SLOPE*(TABL(HT)-X)	HTAP4185
000046	GO TO 16	HTAP4190
000047	12 IERFL = 2	HTAP4195
000048	IF (NXX) 13,17,13	HTAP4200
000049	13 ITDTAG = IPR01D(NXX)	HTAP4215
000050	17 ITDVTG = IPR01D(NZZ)	HTAP4220
000051	WRITE (6,18) ITDVTG, ITDTAG, ITDTAG, X, HTAB	HTAP4225
000052	18 FORMAT (1H0,2X, 24H***IN THE EVALUATION OF A4, 18H AS A FUNCTION	
000053	1 OF A4,2H, A4, 2H = 1PE12.5, 32H, WHICH EXCEEDS LIMITS OF TABLE	
000054	2I3, 3H***)	
000055	15 ISFLAG = 1	HTAP4240
000056	16 NPREV(IX) = HT	HTAP4245
000057	RETURN	HTAP4250
000058	END	HTAP4255

ELT BIVAR,1,690312, 35885

000001	C	SUBROUTINE **BIVAR**	ITAP4005
000002		SUBROUTINE BIVAR	ITAP4010
000003	CBIVAR		
000004	C	BIVARIATE TABLES	ITAP4007
000005		DIMENSION ZZ(18000), TABL(1000)	ITAP4015
000006		INTEGER IFLAG(500), NY1(1000), NY2(1000), NZA(500), HZA(500), HXP(500),	*NEW
000007	1	INXP(500), INWP(500), INWP(500), INPREV(500), KEY(500),	ITAP4032*-1
000008	2	IPR(500), IPH(100), NTHEAD(100), NTTAIL(100), NODE(2500),	ITAP4033
000009	3	HC(2500)	ITAP4034
000010		COMMON / I2BYT/ IFLAG, NY1, NY2, NZA, HZA, INXP, INWP, INWP,	ITAP4035
000011	1	NPREV, KEY, IPR, IPH, NTHEAD, NTTAIL, NODE, HC	ITAP4036
000012		EQUIVALENCE (ZZ(00001), TIME), (ZZ(06354), HZZ),	ITAP4040
000013	1	(ZZ(06330), IEPFL), (ZZ(06355), W),	ITAP4042
000014	2	(ZZ(06344), ISFLAG), (ZZ(06357), Z),	ITAP4044
000015	3	(ZZ(06350), IXX), (ZZ(06358), NTAB),	ITAP4046
000016	4	(ZZ(06352), NWV), (ZZ(06400), TABL)	ITAP4048
000017		DATA ITDTAG/4HTIME/	ITAP4049
000018		COMMON ZZ	ITAP4050
000019	1	NTAB = NTAB	ITAP4055
000020		NT = NTHEAD(NTAB)	ITAP4060
000021		NTT = (NTT(NTAB))-1	ITAP4065
000022	2	IF (W-TABL(NT)) 16,13,3	ITAP4070
000023	3	IF (W-TABL(NTT)) 4,14,16	ITAP4075
000024	4	NT = NTH+2	ITAP4080
000025		DO 6 I=NT,NTT,2	ITAP4085
000026	5	IF (W-TABL(I)) 7,14,6	ITAP4090
000027	6	CONTINUE	ITAP4095
000028	7	NT=I	ITAP4100
000029		ASSIGN 10 TO IDV	ITAP4105
000030		NTAB2 = TABL(NT-1)+0.1	ITAP4110
000031		W2 = TABL(NT-2)	ITAP4115
000032		W1 = TABL(NT)	ITAP4120
000033	8	NTAB = TABL(NT+1)+0.1	ITAP4125
000034		IF (NTHEAD(NTAB)) 31,31,29	ITAP4130
000035	29	IX=IXX	ITAP4135
000036		NPREV(IX) = NTHEAD(NTAB)	ITAP4140
000037		CALL TABLE	ITAP4145
000038		GO TO (9,27), IEPFL	ITAP4150
000039	9	GO TO IDV, (28,10)	ITAP4155
000040	10	Z1 = Z	ITAP4160
000041		NTAB = NTAB2	ITAP4165
000042		IF (NTHEAD(NTAB)) 31,31,30	ITAP4170
000043	30	IX=IXX	ITAP4175
000044		NPREV(IX) = NTHEAD(NTAB)	ITAP4180

000045	CALL TABLE	ITAP4185
000046	IF (IERFL-1)12,12,27	ITAP4190
000047	12 Z = ((Z1-Z)*(W-W2)/(W1-W2))+2	ITAP4195
000048	GO TO 28	ITAP4200
000049	13 NT=INT	ITAP4205
000050	15 ASSIGN 28 TO IBV	ITAP4210
000051	GO TO 8	ITAP4215
000052	14 INT=INT	ITAP4220
000053	GO TO 15	ITAP4225
000054	16 IF (NRW) 19,25,19	ITAP4230
000055	19 ITDTAG = IPROID(NRW)	ITAP4245
000056	25 ITDVTG = IPROID(HZZ)	ITAP4250
000057	WRITE (6,18) ITDVTG, ITDTAG, ITDTAG, W, NTAB	ITAP4255
000058	18 FORMAT (1H0,2X, 24H***IN THE EVALUATION OF A4, 18H AS A FUNCTION	
000059	1 OF A4,2H, A4, 2H = 1PE12.5, 32H, WHICH EXCEEDS LIMITS OF TABLE	
000060	2I3, 3H***)	
000061	GO TO 27	ITAP4270
000062	31 WRITE (6,32) NTAB	ITAP4275
000063	32 FORMAT (29H0 A NONEXISTENT TABLE, NUMBER I3, 17H, HAS BEEN CALLED)	ITAP4280
000064	27 IERF = 2	ITAP4285
000065	ISFLAG = 1	ITAP4290
000066	28 RETURN	ITAP4295
000067	END	ITAP4300

ELT SUM1,1,690312, 35892

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000001      C      SUM1 SUBROUTINE
000002      SUBROUTINE SUM1(II,II)
000003      DIMENSION ZZ(18000), SUMY(500), Y(1000), T(500), SUMYT(500)
000004      INTEGER IFLAG(500),NY1(1000),NY2(1000),NZA(500),NZB(500),
000005      1 NXP(500), INXP(500), NWP(500), INWP(500), IPREV(500), KEY(500),
000006      2 IPR(500), IPH(100), NTHEAD(100), HTTAIL(100), NODE(2500),HC(2500)
000007      COMMON / I2BYT / IFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,
000008      1 IPREV, KEY, IPR, IPH, NTHEAD, HTTAIL, NODE, HC
000009      EQUIVALENCE (ZZ(30502), SUMY), (ZZ(06361), IORG),
000010      1 (ZZ(01002), Y), (ZZ(06360), NODEND),
000011      2 (ZZ(02002), T), (ZZ(02502), SUMYT),
000012      3 (ZZ(06359), NTRA)
000013      COMMON ZZ, ISAVE(500), INODE(500), KSAVE
000014      I = II
000015      N = II
000016      J1 = I + 1
000017      JJ = IABS(HC(1))
000018      J2 = I + JJ
000019      SUMY(I) = 0.0
000020      SUMYT(I) = 0.0
000021      C
000022      C
000023      DO 50 J = J1,J2
000024      K = HC(J)
000025      KK = NODE(J)
000026      SUMY(I) = SUMY(I) + Y(K)
000027      SUMYT(I) = SUMYT(I) + (Y(K) * T(KK))
000028      50 CONTINUE
000029      RETURN
000030      END

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*NEW
**-1

@ ELT SUMS,1,690312, 35897

000001		SUBROUTINE SUMS	QTAP4015
000002	C	SUBROUTINE **SUMS**	QTAP4010
000003		CSUMS	
000004	C		QTAP4020
000005		DIMENSION ZZ(18000), SUMY(0500), Y(1000), T(0500),	QTAP4022
000006	1	SUMYT(0500)	QTAP4024
000007	C		QTAP4026
000008		INTEGER NFLAG(500),NY1(1000),NY2(1000),NZA(500),NZB(500),NXP(500),	*NEW
000009	1	INXP(500),NWP(500),INWP(500),NPREV(500),KEY(500),	QTAP4032**-1
000010	2	IPR(500),IPH(100),NTHHEAD(100),HTTAIL(100),NODE(2500),	QTAP4033
000011	3	HC(2500)	QTAP4034
000012		COMMON / I2BYT/ NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP,	QTAP4035
000013	1	NPREV, KEY, IPR, IPH, NTHHEAD, HTTAIL, NODE, NC	QTAP4036
000014		EQUIVALENCE (ZZ(00502), SUMY), (ZZ(06361), IORG),	QTAP4040
000015	1	(ZZ(01002), Y), (ZZ(06360), NODEND),	QTAP4042
000016	2	(ZZ(02002), T),	QTAP4044
000017	3	(ZZ(2502), SUMYT),	QTAP4046
000018	4	(ZZ(06359), HTTRA)	QTAP4048
000019		COMMON ZZ, ISAVE(500), INODE(500), KSAVE	
96 000020	C		QTAP4050
000021		HTTRA = HTTRA	
000022	1	IF (HTTRA.EQ. 1) GO TO 3	QTAP4100
000023		NODEMX = NODEND	QTAP4110
000024		GO TO 10	QTAP4120
000025	3	NODEMX = IORG	QTAP4130
000026	C		QTAP4140
000027		KP = 0	
000028	10	DO 100 I=HTTRA,NODEMX	QTAP4150
000029		N = NODE(I)	QTAP4160
000030		IF((NFLAG(N).NE. 1).OR. (NC(I).GE. 0)) GO TO 100	QTAP4170
000031		KP= KP + 1	
000032		ISAVE(KP) = 1	
000033		INODE(KP) = N	
000034		J1 = I+1	QTAP4180
000035		JJ = IABS(HC(I))	QTAP4190
000036		J2 = I +JJ	QTAP4200
000037		SUMY(I) = 0.0	QTAP4210
000038		SUMYT(I) = 0.0	QTAP4220
000039	C		QTAP4230
000040		DO 50 J=J1,J2	QTAP4240
000041		K = NC(J)	QTAP4250
000042		KK = NODE(J)	QTAP4255
000043		SUMY(I) = SUMY(I) + Y(K)	QTAP4260
000044	50	SUMYT(I) = SUMYT(I) + (Y(K)*T(KK))	QTAP4270

000045
000046
000047
000048

100 CONTINUE
KSAVE = KP
RETURN
END

QTAP4280

QTAP4290
QTAP4300

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000001      C      THERMAL ANALYZER PROGRAM (TAP-3F) - ATOMICS INTERNATIONAL      ATAP4002
000002      C      DIMENSION      ZZ(18000), DYTCC(5000),      C(0500),      SUMY(0500),      ATAP4004
000003      1      NY(0500),      Y(1000),      T(0500),      TPREV(0500),      ATAP4020
000004      2      SUMYT(0500),      NY(0500),      C(0500),      IPRTAG(0500),      ATAP4021
000005      3      Q(0500),      PROUT(0500),      GAIN(0500),      PHT1(0100),      ATAP4022
000006      4      PHH1(0100),      PHT2(0100),      PHH2(0100),      QCH1(0100),      ATAP4023
000007      5      QCH2(0100),      CON(0020),      PRTIM(0010),      DELTIM(0010),      ATAP4024
000008      6      TITLE(17,10),      NAME(0005),      TABL(1000),      INSTR(00500)      ATAP4025
000009      DIMENSION DYTCC(5000)      ATAP4026
000010      C      INTEGER IFLAG(500), NY1(1000), NY2(1000), NZA(500), NZB(500), IXP(500),      ATAP4027
000011      1      IIXP(500), IWP(500), IIWP(500), IPREV(500), KEY(500),      ATAP4029
000012      2      IPR(500), IPH(100), ITHHEAD(100), IHTAIL(100), IODE(2500),      ATAP4032
000013      3      IC(2500)      ATAP4033
000014      COMMON / I2BYT/ IFLAG, NY1, NY2, NZA, NZB, IXP, IIXP, IWP, IIWP,      ATAP4034
000015      1      IPREV, KEY, IPR, IPH, ITHHEAD, IHTAIL, IODE, IC      ATAP4035
000016      C      EQUIVALENCE (ZZ(00001), TIME),      (ZZ(06331), PRTMX),      ATAP4036
000017      1      (ZZ(00002), DYTCC,      C),      (ZZ(06332), LTHETA),      ATAP4037
000018      2      (ZZ(00003), SUMY,      IN),      (ZZ(06333), RCMIN),      ATAP4038
000019      3      (ZZ(01002), Y),      (ZZ(06334), USAVE),      ATAP4039
000020      4      (ZZ(02002), T),      (ZZ(06335), DELTAT),      ATAP4040
000021      5      (ZZ(02502), SUMYT, NY),      (ZZ(06336), DTMAX),      ATAP4041
000022      6      (ZZ(03002), C),      (ZZ(06337), IMIN),      ATAP4042
000023      7      (ZZ(03502), IPRTAG),      (ZZ(06338), IMAX),      ATAP4043
000024      8      (ZZ(04002), Q),      (ZZ(06339), IXMIN),      ATAP4044
000025      9      (ZZ(04502), PROUT),      (ZZ(06340), IXMAX),      ATAP4045
000026      EQUIVALENCE (ZZ(05002), GAIN),      (ZZ(06341), IPHMAX),      ATAP4046
000027      1      (ZZ(05502), PHT1),      (ZZ(06342), IPRMAX),      ATAP4047
000028      2      (ZZ(05602), PHH1),      (ZZ(06343), IPFLAG),      ATAP4048
000029      3      (ZZ(05702), PHT2),      (ZZ(06344), ISFLAG),      ATAP4049
000030      4      (ZZ(05802), PHH2),      (ZZ(06345), MAXHOT),      ATAP4050
000031      5      (ZZ(05902), QCH1),      (ZZ(06346), MAXHOY),      ATAP4051
000032      6      (ZZ(06002), QCH2),      (ZZ(06347), HARITH),      ATAP4052
000033      7      (ZZ(06102), TITLE),      (ZZ(06348), ICRT),      ATAP4053
000034      8      (ZZ(06272), CON),      (ZZ(06349), ITIME),      ATAP4054
000035      9      (ZZ(06285), CON9,      SIGMA),      (ZZ(06350), IT),      ATAP4055
000036      EQUIVALENCE (ZZ(06281), CON10,      TZERO),      (ZZ(06351), IITLAST),      ATAP4056
000037      1      (ZZ(06292), PRTIM),      (ZZ(06352), IIX),      ATAP4057
000038      2      (ZZ(06302), DELTIM),      (ZZ(06353), IXX),      ATAP4058
000039      3      (ZZ(06313), IREAD),      (ZZ(06354), IZZ),      ATAP4059
000040      4      (ZZ(06316), E),      (ZZ(06355), W),      ATAP4060
000041      5      (ZZ(06318), JREAD),      (ZZ(06356), X),      ATAP4061

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000045	6	(ZZ(06320), K),	(ZZ(06357), Z),	ATAP4066
000046	7	(ZZ(06322), A),	(ZZ(06358), NTAB),	ATAP4067
000047	8	(ZZ(06329), LFLAG),	(ZZ(06400), TABL),	ATAP4068
000048	9	(ZZ(06330), IERFL),	(ZZ(07400), INSTR),	ATAP4069
000049		EQUIVALENCE (ZZ(06359), NTRA),		ATAP4070
000050	1	(ZZ(06360), NODEND),		ATAP4071
000051	2	(ZZ(06361), IORG),		ATAP4072
000052				ATAP4075
000053	C	COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KOINT, POTIME, DELTP, TPREV,		*NEW
000054	1	KNODE(100), KNODE1(100), KNODE2(100)		*NEW
000055	C			ATAP4086**=3
000056		DELTP = 1.0E+35		
000057		KNTDT = 0		
000058		MAXHOT = MAXHOT		
000059		KKNT = 0		
000060		DTMAX = DTMAX		
000061		HDT = 1		
000062	100	CALL HEADER		ATAP4170
000063	C	CLEAR CORE LOCATIONS AND EQUATE PROGRAM VARIABLES		ATAP4178
000064	105	DO 110 I=1,7900		ATAP4179
000065	110	ZZ(I) = 0.0		ATAP4180
000066		DO 112 I=1,11300		ATAP4181
000067	112	HFLAG(I) = 0		ATAP4182
000068		DO 114 I=1,5000		ATAP4183
000069	114	DYTCQ2(I) = 0.0		ATAP4184
000070		NSTART = -98		ATAP4185
000071		IERFL = 1		ATAP4186
000072		IMIN = 1		ATAP4188
000073		IPRK = 0		ATAP4190
000074		ISTART = 0		ATAP4192
000075		ITLAST = -1		ATAP4194
000076		HCZERO = 1		ATAP4196
000077		SIGMA = 0.4761E-12		ATAP4198
000078		TZERO = 459.69		ATAP4200
000079		CON(1) = 1.0E35		ATAP4201
000080		CON(3) = 1.0		ATAP4202
000081		CON(8) = .021		
000082	115	CONTINUE		ATAP4208**=9
000083		KOINT = 0		
000084		IF (NSTART+97) 145,135,125		ATAP4210
000085	125	WRITE (6,130)		ATAP4212
000086	130	FORMAT (1H1 754 THIS RUN USES THE SAME INITIAL DATA AS THE PREVIOUS		ATAP4214
000087		15 RUN WITH SOME NEW DATA)		ATAP4216
000088		DO 132 I=1,5000		ATAP4218
000089	132	DYTCQ(I) = DYTCQ2(I)		ATAP4220
000090		GO TO 200		ATAP4222
000091	135	WRITE (6,140)		ATAP4224
000092	140	FORMAT (1H1 66H THIS RUN IS A CONTINUATION OF THE PREVIOUS RUN WITH		ATAP4226
000093		1H SOME NEW DATA)		ATAP4228

000094	GO TO 200	ATAP4230
000095	145 WRITE (6,150)	ATAP4232
000096	150 FORMAT (1H1 32H ALL NEW INPUT DATA FOR THIS RUN)	ATAP4234
000097	C INPUT	ATAP4236
000098	200 CALL TAPIN (1START,11START)	ATAP4238
000099	IF (IERFL-2) 220,105,999	ATAP4240
000100	220 IF (11START .NE. -96) GO TO 240	ATAP4244
000101	230 DO 232 I=1,5000	ATAP4246
000102	232 DYTCQ2(I) = DYTCQ(I)	ATAP4248
000103	240 CALL SETUP	ATAP4252
000104	ICFLAG = 0	ATAP4254
000105	IF (IERFL .GT. 1) GO TO 830	ATAP4256
000106	C PREPARE FOR ZEROth ITERATION	ATAP4258
000107	C BEGINNING OF ITERATION LOOP	ATAP4260
000108	300 IF (CON(5) .LT. 1.0) GO TO 320	ATAP4262
000109	310 ASSIGN 600 TO N2	ATAP4264
000110	DELTAT = 1.0	ATAP4265
000111	GO TO 330	ATAP4266
000112	320 ASSIGN 360 TO N2	ATAP4268
000113	330 DTHAX = 0.0	ATAP4270
000114	340 NTRA = 1	ATAP4272
000115	CALL SUMS	ATAP4273
000116	350 GO TO N2, (470,360,600)	ATAP4274
000117	360 ASSIGN 470 TO N2	ATAP4276
000118	CALL DELTA	ATAP4278
000119	400 NTRA = IORG+1	ATAP4280
000120	CALL SUMS	ATAP4281
000121	C RELAX ALL ZERO CAPACITY NODES	ATAP4282
000122	KN = 0	
000123	410 DO 450 J=1,MAXNOT	ATAP4284
000124	420 IF (HFLAG(J) + 1) 450,445,425	
000125	425 IF (C(J) .GT. 0.) GO TO 450	
000126	IF (SUMY(J) .EQ. 0.0) GO TO 450	
000127	DO 9440 I=1,KSAVE	
000128	IJ = I	
000129	IF (11NODE(I) .EQ. J) GO TO 9445	
000130	9440 CONTINUE	
000131	9445 II = ISAVE(IJ)	
000132	IN = J	
000133	CALL SUM1(II,IN)	
000134	440 DT = ((Q(J)+SUMYT(J))/SUMY(J))-T(J)	ATAP4292
000135	DTHAX = AMAX1(ABS(DT),DTHAX)	ATAP4294
000136	TPREV(J) = T(J)	ATAP4296
000137	T(J) = T(J) + DT	
000138	GO TO 450	
000139	445 KN = KN + 1	
000140	K = 11NODE(KN)	
000141	IF (K .EQ. J) GO TO 447	
000142	WRITE (6,3030) KN, 11K, K, J	

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000143 3000 FORMAT ( 27H * * * ERROR * * * KNODE(I3,20H) IS NOT EQUAL TO J.
000144 1 / 7H KNODE(I3, 3H) = I3, 7H, J = I3, 45H . CHECK DATA AND/OR
000145 2ZERO CAPACITY LOOP.
000146 GO TO 830
000147 447 TPREV(J) = T(J)
000148 K1 = KNODE1(KH)
000149 K2 = KNODE2(KH)
000150 T(K) = 2.0 * T(K1) - T(K2)
000151 450 CONTINUE
000152 460 GO TO (700,830),IERFL
000153 C DETERMINE COMPUTING TIME INTERVAL
000154 470 CALL ARITH
000155 CALL DELTA
000156 GO TO (480,830),IERFL
000157 480 CALL TIMER
000158 C RELAX ALL FINITE CAPACITY NODES
000159 KN = 0
000160 500 DO 540 J=1,MAXNOT
000161 IF (NFLAG(J) + 1) 540,512,515
000162 512 KN = KN + 1
000163 K = KNODE(KH)
000164 IF ( K .EQ. J ) GO TO 514
000165 WRITE (6,3010) KN,KH,K,J
000166 3010 FORMAT ( 27H * * * ERROR * * * KNODE(I3,20H) IS NOT EQUAL TO J.
000167 1 / 7H KNODE(I3, 3H) = I3, 7H, J = I3, 45H . CHECK DATA AND/OR
000168 2FINITE CAPACITY LOOP
000169 GO TO 830
000170 514 TPREV(K) = T(K)
000171 K1 = KNODE1(KH)
000172 K2 = KNODE2(KH)
000173 T(K) = 2.0 * T(K1) - T(K2)
000174 GO TO 540
000175 515 IF (C(J) .GT. 0.) GO TO 530
000176 NCZERO = 0
000177 GO TO 540
000178 530 DO 9530 I = 1, KSAVE
000179 IJ = I
000180 IF (INODE(I) .EQ. J) GO TO 9535
000181 9530 CONTINUE
000182 9535 II = ISAVE(IJ)
000183 IN = J
000184 DT = (DTHETA / C(J)) * ( Q(J) + SUMYT(J) - T(J) * SUMY(J) )
000185 DTMAX = AMAX1(ABS(DT),DTMAX)
000186 TPREV(J) = T(J)
000187 T(J) = T(J) + DT
000188 540 CONTINUE
000189 IF (IPHMAX .LE. 0) GO TO 560
000190 550 CALL LATENT
000191 560 IF (NCZERO) 400,400,460

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ATAP4300

ATAP4316

ATAP4318

ATAP4320

ATAP4322

ATAP4330

**-3

*NEW

*NEW

*NEW

ATAP4340**-8

ATAP4342

ATAP4344

ATAP4346

000192	600	NTRA = IORG+1	ATAP4348
000193		CALL SUMS	ATAP4349
000194		CALL TIMER	ATAP4350
000195	C	STEADY-STATE	ATAP4352
000196		KN = 0	
000197	610	DO 650 J=1,MAXNOT	
000198	620	IF (NFLAG(J) + 1) 622,645,625	
000199	622	NNUM = IABS(NFLAG(J))	
000200		T(J) = T(NNUM)	
000201		GO TO 650	
000202	625	IF (SUMY(J).EQ. 0.) GO TO 650	
000203	630	DO 9630 I = 1,KSAVE	
000204		IJ = I	
000205		IF (INODE(I) .EQ. J) GO TO 9635	
000206	9630	CONTINUE	
000207	9635	II = ISAVE(IJ)	
000208		IN = J	
000209		CALL SUM1(II,IN)	
000210		DT = ((0(J) + SUMY(J)) / SUMY(J)) - T(J)	
000211		TPREV(J) = T(J)	ATAP4362
000212		GO TO (9636,9637),NDT	
000213	9636	T(J) = T(J) + DT	
000214		GO TO 9640	
000215	9637	T(J) = T(J) + DT * COH(12)	
000216	9640	DT = ABS(T(J) - TPREV(J))	
000217		IF (DT .LE. DTMAX) GO TO 650	ATAP4366
000218	640	DTMAX = DT	ATAP4368
000219		JSAVE = J	ATAP4370
000220		GO TO 650	
000221	645	KN = KN + 1	
000222		K = KNODE(KII)	
000223		IF (K.EQ. J) GO TO 647	
000224		WRITE (6,3020) KN,KII,K,J	
000225	3020	FORMAT (27H * * * ERROR * * * KNODE(,I3,20H) IS NOT EQUAL TO J.	
000226		1 / 7H KNODE(I3, 3H) = I3, 7H, J = I3, 45H . CHECK DATA AND/OR	
000227		2STEADY STATE LOOP)	
000228	647	K1 = KNODE1(KN)	
000229		K2 = KNODE2(KII)	
000230		T(K) = 2.0 * T(K1) - T(K2)	
000231	650	CONTINUE	ATAP4372
000232		KN = 0	
000233		IF (DTMAX .LE. 1.0) NDT = 2	
000234		IF (DTMAX .GT. 1.0) NDT = 1	
000235		CALL ARITH	*NEW
000236		GO TO 460	ATAP4374
000237	C	TEST FOR PRINT-OUT SIGNAL	ATAP4376
000238	700	KKNT = KKNT + 1	
000239		IF (ISFLAG) 710,710,770	
000240	710	IF (IPFLAG) 730,730,720	ATAP4380

000241	720 CALL TAPOUT	ATAP4382
000242	730 IF (DTMAX-CON(4)) 740,740,330	ATAP4384
000243	740 ICFLAG = ICFLAG+1	ATAP4386
000244	IF (ICFLAG-1) 330,330,750	ATAP4388
000245	750 WRITE (6,760) DTMAX, CON(4)	ATAP4390
000246	760 FORMAT (30H0 GREATEST TEMPERATURE CUANGE E12.5, 36H IS LESS THAN	ATAP4392
000247	1CONVERGENCE TEST VALUE E12.5)	ATAP4394
000248	ICFLAG = 0	ATAP4396
000249	770 IF (TIME - PRMX) 780,780,800	ATAP4398
000250	780 CALL TAPOUT	ATAP4399
000251	C TEST FOR FINAL DUMP SIGNAL	ATAP4400
000252	800 IF (CON(6)) 820,820,810	ATAP4402
000253	810 CALL SPILL	ATAP4404
000254	820 NS = NSTART+100	ATAP4406
000255	GO TO (860,105,115,115),NS	ATAP4408
000256	830 WRITE (6,840)	ATAP4410
000257	840 FORMAT (52H0 THIS RUN HAS BEEN DISCONTINUED, FINAL VALUES ARE -)	ATAP4412
000258	CALL TAPOUT	ATAP4414
000259	IF (NSTART+97) 820,850,850	ATAP4415
000260	850 CALL ERROR	ATAP4416
000261	GO TO 820	ATAP4417
000262	860 CONTINUE	ATAP4418
000263	999 CALL EXIT	ATAP4421
000264	STOP	ATAP4422
000265	END	ATAP4424

Q ELT LINK,1,690512, 61266

000001	C	FUNCTION **LINK**	FTAP4006
000002		FUNCTION LINK(LA, LB)	FTAP4008
000003	CLINK		
000004		DIMENSION ITEST(11)	FTAP4010
000005		DATA ITEST / 1H*, 1HD, 1HO, 1H , 1H-, 1HY, 1HT, 1HC, 1HQ, 1HG,	
000006		1 IHK /	*NEW
000007		DO 1 I=1, 11	*NEW
000008		KTEST = ITEST(I)	FTAP4022**-2
000009		IF (LA .EQ. KTEST) GO TO (4,5,5,5,5,6,7,8,9,11,12), I	*NEW
000010		1 CONTINUE	FTAP4026**-1
000011		CALL ERROR	FTAP4028
000012		GO TO 13	FTAP4030
000013	C	PREFIX IS AH * (CONTROL CARD)	FTAP4040
000014		4 LAB = -LB	FTAP4045
000015		GO TO 13	FTAP4050
000016	C	PREFIX IS D, ZERO, BLANK (DUMMY LOCATIONS)	FTAP4055
000017		5 LAB = LB	FTAP4060
000018		GO TO 13	FTAP4065
000019	C	PREFIX IS Y (ADMITTANCE)	FTAP4070
000020		6 LAB = 1000 + LB	FTAP4075
000021		GO TO 13	FTAP4080
000022	C	PREFIX IS T (TEMPERATURE)	FTAP4085
000023		7 LAB = 2000 + LB	FTAP4090
000024		GO TO 13	FTAP4095
000025	C	PREFIX IS C (CAPACITANCE)	FTAP4100
000026		8 LAB = 3000 + LB	FTAP4105
000027		GO TO 13	FTAP4110
000028	C	PREFIX IS Q (HEAT GENERATION RATE)	FTAP4115
000029		9 LAB = 4000 + LB	FTAP4120
000030		GO TO 13	FTAP4125
000031		11 LAB = 5000 + LB	FTAP4130
000032		GO TO 13	*NEW
000033		12 LAB = 6000 + LB	*NEW
000034		10 LINK = LAB	FTAP4135
000035		RETURN	FTAP4140
000036		END	FTAP4145

9 ELT READ,1,690512, 61270

000001	C	SUBROUTINE **READ**	ETAP4005
000002		SUBROUTINE READ	ETAP4010
000003	CREAD		
000004		DIMENSION ZZ(10000), I(3), E(2), J(2), K(2), A(7), ABLNK(3)	ETAP4015
000005	C		ETAP4016
000006		EQUIVALENCE (ZZ(6313), I, I1), (ZZ(6318), J, J1),	ETAP4020
000007	1	(ZZ(6314), I2), (ZZ(6319), J2),	ETAP4025
000008	2	(ZZ(6315), I3), (ZZ(6320), K),	ETAP4030
000009	3	(ZZ(6316), E), (ZZ(6322), A),	ETAP4035
000010	4	(ZZ(6329), LFLAG)	ETAP4040
000011		DATA BLANK/1H /	ETAP4042
000012		COMMON ZZ	ETAP4045
000013	C		ETAP4047
000014		INTEGER A	ETAP4017
000015	C	LOGICAL ABLNK,BLANK	ETAP4018
000016		READ (5,1) A11,I1,A12,I2,I3,E,AJ1,J1,AJ2,J2,K,A	
000017	1	FORMAT (2(A1,I3),I4,2F12.6, 2(A1,I3),2I4,7A4)	
000018		WRITE (6,2) A11,I1,A12,I2,I3,E,AJ1,J1,AJ2,J2,K,A	ETAP4060
000019	2	FORMAT (6X,2(A1,I3,1X),I4,2E15.6,2(1X,A1,I3),2I5,2X,5A4,2X,2A4)	
000020		I1 = LINK(A11,I1)	ETAP4070
000021		IF (I1) 6,12,12	*NEW
000022	12	IF (I1 .GE. 6000) GO TO 6	*NEW
000023	3	I2 = LINK(A11,I2)	ETAP4080**-1
000024	C	LFLAG = 1 FOR FUNIN	ETAP4085
000025		IF (LFLAG) 6,6,4	ETAP4090
000026	4	J1 = LINK(AJ1,J1)	ETAP4095
000027		J2 = LINK(AJ2,J2)	ETAP4100
000028		IF (E(2)) 6,5,6	
000029	C	5 IF (ABLNK(1) .EQ. BLANK .AND. ABLNK(2) .EQ. BLANK .AND. ABLNK(3) .EQ. BLANK)	ETAP4102
000030	C	10. BLANK) E(2) = 1.0	ETAP4103
000031		5 E(2) = 1.0	
000032		6 RETURN	ETAP4105
000033		END	ETAP4110

Q ELT TAPIN,1,690512, 61278

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000001 C SUBROUTINE **TAPIN** DTAP4002
000002 SUBROUTINE TAPIN (ISTART,NSTART) DTAP4006
000003 CTAPIN
000004 C DATA INPUT DTAP4004
000005 DIMENSION ZZ(18000), I(3), E(2), J(2), K(2), TPREV(500), *NEW
000006 1 BYTCG(5000), Y(1000), YORTAG(0500), GAIN(0500), DTAP4010**-1
000007 2 PHT1(0100), PHH1(0100), PHT2(0100), PHH2(0100), DTAP4012
000008 3 CON(0020), PRTIM(0010), DELTIM(0010), A(0007), DTAP4014
000009 4 TITL(17,10), TL(6,10), CL(12,11), TABL(1000) DTAP4016
000010 C DTAP4017
000011 DATA (CL(I,1),I=1,5) / 4HSPEC,4HIFIE,4HD DE,4HITA-,4HTIME /
000012 1 (CL(I,2),I=1,7) /4HMINI,4HNUM,4HALLO,4HWABL,4HE DE,4HITA-,
000013 2 4HTIME /
000014 3 (CL(I,3),I=1,6) /4HDELTA-TI,4HMF M,4HULTI,4HPLIE,4H /
000015 4 (CL(I,4),I=1,9) /4HCONV,4HERGE,4HNE,4HTEST,4H DEL,4HITA-T,
000016 5 4HEMPE,4HRATU,4H /
000017 6 (CL(I,5),I=1,5) /4H+1.0,4H = S,4HTEAT,4HY-ST,4H,TE /
000018 7 (CL(I,6),I=1,8) /4H+1.0,4H = O,4HYTCQ,4H DUM,4H AT,4H END,
000019 8 4H OF,4HRUN /
000020 DATA (CL(I,8),I=1,8) /4HNONE,4HXIST,4HENT,4HCONS,4HTAIT,4H REQ,
000021 1 4HUEST,4HED /
000022 2 (CL(I,9),I=1,7) /4HSTEF,4HAN-B,4HOLTZ,4HMANH,4H CON,4HSTAN,
000023 3 4HT /
000024 4 (CL(I,10),I=1,7) /4HABSO,4HLUTE,4H 2ER,4HO TH,4HMPER,4HATUR,
000025 5 4HE /
000026 6 (CL(I,11),I=1,12) /4HSUPP,4HRESS,4HIGN-,4HMODE,4H SUM,4HMARY,
000027 7 4H(+1.,4H0),4HCOMP,4HILAT,4HION(,4H-1.) /
000028 DATA (TL(I,1),I=1,4) /4HTITL,4HES,4H,4H /
000029 1 (TL(I,2),I=1,6) /4HNETW,4HORK,4HDESC,4HRIPT,4HION,4H /
000030 2 ((TL(I,J),I=1,4),J=3,6) /4HINIT,4HIAL,4HVALU,4HES,4HFUIC,
000031 3 4HTION,4HS,4H,4HTABL,4HES,
000032 4 4H,4H,4HLATE,4HIT H,4HEAT,
000033 5 4H /
000034 6 (TL(I,8),I=1,6) /4HSPEC,4HIAL,4HCONS,4HTAHT,4H VAL,4HUES /
000035 7 (TL(I,9),I=1,6) /4HPRIN,4HT SP,4HECIF,4HCAT,4HIONS,4H /
000036 8 (TL(I,10),I=1,3) /4HPUN,4HCONT,4HROGL /
000037 C DTAP4053
000038 INTEGER NFLAG(500),NY1(1000),NY2(1000),NZA(500),NZB(500),NXP(500),
000039 1 INXP(500),NWP(500),INWP(500),NPREV(500),KEY(500), DTAP4055
000040 2 IPP(500),IPH(100),NTHRAD(100),NTTAIL(100),NOD(2500), DTAP4056
000041 3 NC(2500) DTAP4057
000042 COMMON / ICBY7/ NFLAG, NY1, NY2, NZA, NZB, NXP, INXP, NWP, INWP, DTAP4058
000043 1 NPREV, KEY, IPP, IPH, NTHRAD, NTTAIL, NOD, NC DTAP4060
000044 EQUIVALENCE (I(1),I1), (I(2),I2), (I(3),I3), (E(1),E1), (E(2),E2), DTAP4062

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000045	1	(J(1),JA), (J(2),JB),	(K(1),KA), (K(2),KB), DTAP4064
000046	2	(ZZ(00002), DYTQ),	(ZZ(06313), J), DTAP4066
000047	3	(ZZ(01002), Y),	(ZZ(06320), K), DTAP4068
000048	4	(ZZ(03502), IPRTAG),	(ZZ(06322), A), DTAP4070
000049	EQUIVALENCE	(ZZ(06337), IMIN),	(ZZ(06353), NTAB), DTAP4071
000050	5	(ZZ(05002), GAIN),	(ZZ(06329), LFLAG), DTAP4072
000051	6	(ZZ(05502), PHT1),	(ZZ(06330), IERFL), DTAP4074
000052	7	(ZZ(05602), PHH1),	(ZZ(06331), PRTHX), DTAP4076
000053	8	(ZZ(05702), PHT2),	(ZZ(06333), IMAX), DTAP4078
000054	9	(ZZ(05802), PHH2),	(ZZ(06341), IPHMAX), DTAP4080
000055	EQUIVALENCE	(ZZ(06102), TITLE),	(ZZ(06342), IPRMAX), DTAP4082
000056	#	(ZZ(06272), CON),	(ZZ(06345), MAXHOT), DTAP4084
000057	2	(ZZ(06292), PRTIM),	(ZZ(06346), MAXHOY), DTAP4086
000058	3	(ZZ(06302), DELTIM),	(ZZ(06351), HTLAST), DTAP4088
000059	4	(ZZ(06313), I),	(ZZ(06400), TABL), DTAP4090
000060	5	(ZZ(06316), E)	DTAP4092
000061	INTEGER A		DTAP4094
000062	C		DTAP4095
000063	COMMON ZZ, ISAVE(500), INODE(500), KSAVE, KOUNT, POTIME, DELTP, TPREV,		*NEW
000064	1 KNODE(100), KNODE1(100), KNODE2(100)		*NEW
000065	MAXHOY = MAXHOY		**=I
000066	MAXHT = MAXHT		
000067	IPHMAX = IPHMAX		
000068	LFLAG = 0		DTAP4098
000069	1 CALL READ		DTAP4100
000070	IF (I1) 2,1,12		DTAP4102
000071	2 IF (I1 .GE. -90) GO TO 5		DTAP4104
000072	3 IF (I1 .LE. -100) GO TO 14		DTAP4106
000073	GO TO 9		DTAP4108
000074	C IT = 1+COL 3 OF FIELD I1 = DIRECTION FOR TYPE OF INPUT		DTAP4110
000075	5 IT=I-(I1/I3)		DTAP4112
000076	C ITT = 1+COL 4 OF FIELD I1 = DIRECTION FOR REPLACEMENT OF INPUT		DTAP4114
000077	ITT = (I3*(I1/I3))-ITT		DTAP4116
000078	LFLAG = 0		DTAP4118
000079	WRITE (6,13) (TL(M,ITT),M=1,6)		DTAP4120
000080	13 FORMAT (21X,6A4)		DTAP4122
000081	KF = 0		*NEW
000082	GO TO (50,100,200,300,400,500,600,752,800,900), IT		*NEW
000083	C TITLES		DTAP4126**=I
000084	50 IF=10		DTAP4128
000085	READ (5,51) A11,I11, (TITLE(M,N),M=1,17),C,D		DTAP4130
000086	51 FORMAT (A1,I3,19A4)		DTAP4132
000087	I1 = LINK(A11,I11)		DTAP4134
000088	57 WRITE (6,58) A11,I11, (TITLE(M,N),M=1,17),C,D		DTAP4140
000089	58 FORMAT (6X,A1,I3,17A4,16X,2A4)		DTAP4142
000090	IF (I1) 2,50,52		DTAP4144
000091	52 N = MOD(I11,10)		DTAP4146
000092	DO 53 M=1,17		DTAP4148
000093	53 TITLE(M,N) = TITLE(M,10)		DTAP4150

000094	GO TO 50	DTAP4152
000095	C NETWORK DESCRIPTION	DTAP4154
000096	100 LFLAG = -1	DTAP4156
000097	102 CALL READ	DTAP4158
000098	IF (I1) 2,102,103	DTAP4160
000099	103 I1 = MOD(I1,1000)	DTAP4162
000100	I2 = MOD(I2,1000)	DTAP4164
000101	104 HY1(I1) = JA	DTAP4166
000102	HY2(I1) = JB	DTAP4168
000103	IF (E1.EQ. 0.0) GO TO 105	DTAP4172
000104	Y(I1) = E1	DTAP4174
000105	105 IF (I1.LT. I2) GO TO 107	DTAP4176
000106	106 MAXNOY = MAX0(MAXNOY,I1)	DTAP4178
000107	GO TO 102	DTAP4180
000108	107 JA = JA+KA	DTAP4182
000109	JB = JB+KB	DTAP4184
000110	I1 = I1 + 1	DTAP4185
000111	GO TO 104	DTAP4186
000112	C INITIAL AND CONSTANT VALUES	DTAP4188
000113	200 CALL READ	DTAP4190
000114	IF (I1) 210,200,203	DTAP4192
000115	210 MAXHOT = MAXHT - 2000	DTAP4194
000116	GO TO 2	DTAP4196
000117	203 IA = I1	DTAP4198
000118	IB = I2	DTAP4200
000119	204 DO 205 IX=IA,IB	DTAP4202
000120	205 DYT0G(IX) = E1	DTAP4204
000121	IF (IA/1000.NE. 2) GO TO 200	DTAP4206
000122	206 IF (I3.EQ. 0) I3 = 1	DTAP4208
000123	208 DO 209 IX=IA,IB	DTAP4210
000124	209 NFLAG(IX-2000) = I3	DTAP4212
000125	MAXHT = MAX0(IA,IB,MAXHT)	DTAP4214
000126	GO TO 200	DTAP4216
000127	C FUNCTIONS	DTAP4218
000128	300 IX = ISTART	DTAP4220
000129	LFLAG = 1	DTAP4222
000130	302 CALL READ	DTAP4224
000131	303 IF (I1.LT. 0) GO TO 311	DTAP4226
000132	304 GO TO (314,316,316,316,316,316,316,316,327),ITT	DTAP4228
000133	C REPLACEMENT OF SPECIFIC FUNCTIONS	DTAP4230
000134	316 NAB = 1	DTAP4232
000135	317 DO 322 IX=1,IMAX	DTAP4234
000136	319 IF (HZA(IX).NE. I1) GO TO 322	DTAP4236
000137	320 NAB = NAB+1	DTAP4238
000138	321 IF (ITT.EQ. NAB) GO TO 315	DTAP4240
000139	322 CONTINUE	DTAP4242
000140	324 IFTAG = IPR0ID(I1)	DTAP4244
000141	WRITE (6,325) IFTAG,ITT	DTAP4246
000142	325 FORMAT (1H0,6XA4,14H, ENTRY NUMBER, I3, 29H, NOT LOCATED AMONG FUDTAP4248	

000143	FUNCTIONS)	DTAP4250
000144	309 I1 = -99	DTAP4252
000145	GO TO 9	DTAP4254
000146	327 ITT = 1	DTAP4256
000147	331 IX = 0	DTAP4258
000148	332 IMAX = 0	DTAP4260
000149	IMIN = 1	DTAP4262
000150	C STANDARD INPUT FOR FUNCTIONS	DTAP4264
000151	314 IX = IX+1	DTAP4266
000152	IF (IX .GT. 500) GO TO 10	DTAP4268
000153	315 HZA(IX) = I1	DTAP4270
000154	HZB(IX) = I2	DTAP4272
000155	HXP(IX) = JA	DTAP4274
000156	INXP(IX) = KA	DTAP4276
000157	HWP(IX) = JB	DTAP4278
000158	INWP(IX) = KB	DTAP4280
000159	KEY(IX)=I3	DTAP4282
000160	GAIN(IX)=E2	DTAP4284
000161	307 IF (E1 .EQ. 0.3) GO TO 302	DTAP4286
000162	313 DO 328 IC=I1,I2	DTAP4288
000163	328 DYTQ(IC) = F1	DTAP4290
000164	GO TO 302	DTAP4291
000165	311 IF (ITT .GT. 1) GO TO 330	DTAP4292
000166	329 ISTART = IX	DTAP4294
000167	330 IMAX = MAX0(IMAX,IX)	DTAP4296
000168	LFLAG = 0	DTAP4297
000169	GO TO 2	DTAP4298
000170	C TABLES	DTAP4300
000171	400 NT = NTLAST	DTAP4302
000172	NTAB=0	DTAP4304
000173	402 CALL READ	DTAP4306
000174	IF (I1 .NE. 0) GO TO 405	DTAP4308
000175	403 NT = NTP+2	DTAP4310
000176	TABL(NT)=E1	DTAP4312
000177	TABL(NT+1)=E2	DTAP4314
000178	GO TO N4, (402,404)	DTAP4316
000179	404 NTP = NTP+2	DTAP4318
000180	TABL(NT) = TABL(NTP)	DTAP4320
000181	GO TO 402	DTAP4322
000182	405 ASSIGN 402 TO N4	DTAP4324
000183	406 NTPAIL(NTAB) = NT+1	DTAP4326
000184	IF (I1 .LE. 0) GO TO 419	DTAP4328
000185	410 NTAB = I1	DTAP4330
000186	IF (NTAB .GE. 100) GO TO 414	09/16/69*NEW
000187	IF (NSTART .EQ. -96) GO TO 416	09/16/69*NEW
000188	IF (NSTART .EQ. -97) GO TO 416	09/16/69*NEW
000189	GO TO 411	09/16/69*NEW
000190	416 NT=NTHEAD(NTAB) - 2	04/22/69***2
000191	GO TO 425	DTAP4334
	411 NTHEAD(NTAB) = NT+2	04/22/69
	425 IF (I2 .LE. 0) GO TO 403	

000192	407 ASSIGN 404 TO N4	DTAP4338**=1
000193	NTABP = 12	DTAP4340
000194	IF (NTHEAD(NTABP) .LE. 0) GO TO 412	DTAP4342
000195	408 NTP = (NTHEAD(NTABP)) - 2	DTAP4344
000196	GO TO 403	DTAP4346
000197	412 WRITE (6,413)	DTAP4348
000198	413 FORMAT (49H0 ERROR, COPYING OF A NONEXISTENT TABLE REQUESTED)	DTAP4350
000199	GO TO 12	DTAP4352
000200	414 WRITE (6,415)	DTAP4354
000201	415 FORMAT (48H0 ERROR, TABLE NUMBER IS EQUAL TO OR EXCEEDS 100)	DTAP4356
000202	GO TO 12	DTAP4358
000203	419 NTLAST = NT	DTAP4360
000204	GO TO 2	DTAP4362
000205	C LATENT HEAT	DTAP4364
000206	500 IPP = IPHMAX+1	DTAP4366
000207	502 CALL READ	DTAP4368
000208	IF (I1) 513,509,503	DTAP4370
000209	503 GO TO (504,515,515,515,515,515,515,515,522),ITT	DTAP4372
000210	C REPLACEMENT OF SPECIFIC INPUT ITEMS	DTAP4374
000211	515 NAB = 1	DTAP4376
000212	DO 516 IX=1,IPHMAX	DTAP4378
000213	IF (I1 .NE. 0) GO TO 516	DTAP4380
000214	516 NAB = NAB+1	DTAP4382
000215	IF (NAB=ITT) 518,521,519	DTAP4384
000216	518 CONTINUE	DTAP4386
000217	519 WRITE (6,523) I1,ITT	DTAP4388
000218	520 FORMAT (1HC 6X, 5H NODE 14,13H ENTRY NUMBER 13,33H NOT LOCATED IN	DTAP4390
000219	1LATENT HEAT INPUT)	DTAP4392
000220	GO TO 309	DTAP4394
000221	521 IPP = IX	DTAP4396
000222	GO TO 504	DTAP4398
000223	C REMOVAL OF ALL PREVIOUS INPUT OF THIS TYPE	DTAP4400
000224	522 ITT = 1	DTAP4402
000225	IPHMAX = 0	DTAP4404
000226	IPP = 1	DTAP4406
000227	504 IA = MOD(I1,1000)	DTAP4408
000228	ID = MOD(I2,1000)	DTAP4410
000229	IPX = IPP	DTAP4412
000230	505 IF (IPP=100) 506,506,10	DTAP4414
000231	506 IPH(IPP) = IA	DTAP4416
000232	PHH1(IPP) = E2	DTAP4418
000233	PHT1(IPP) = F1	DTAP4420
000234	PHT2(IPP) = 1.0E+15	DTAP4422
000235	PHH2(IPP) = 0.0	DTAP4424
000236	IPP = IPP+1	DTAP4426
000237	IF (I8 .GT. 1A) GO TO 508	DTAP4428
000238	507 IPZ = IPP-1	DTAP4430
000239	GO TO 502	DTAP4432
000240	508 IA = IA+1	DTAP4434

000241	GO TO 505	DTAP4436
000242	509 DO 510 IP=IPX,IPZ	DTAP4438
000243	PHH2(IP) = E1	DTAP4440
000244	510 PHH2(IP) = E2	DTAP4442
000245	GO TO 502	DTAP4444
000246	513 IF (IPP .GT. 100) GO TO 10	DTAP4446
000247	IPHMAX = IPP-1	DTAP4448
000248	GO TO 2	DTAP4450
000249	C KATHODE FOLLOWER FLUID NODES	*NEW
000250	609 CALL READ	*NEW
000251	IF (I1) 2,600,610	*NEW
000252	610 KF = KF + 1	*NEW
000253	KNODE(KF) = 11 - 6000	*NEW
000254	KNODE1(KF) = 12	*NEW
000255	KNODE2(KF) = 13	*NEW
000256	GO TO 600	*NEW
000257	C RUN CONTROL CONSTANTS	DTAP4452
000258	752 READ (5,753) AI,LT,AI2,AI3,F,C,D	DTAP4454
000259	753 FORMAT (A1,I3,2A4,1F12.0,40X,2A4)	DTAP4456
000260	CON(LT) = F	DTAP4457
000261	WRITE (6,701) AI,LT,F,(CL(H,LT),M=1,12),C,D	DTAP4458
000262	701 FORMAT (7X,A1,I2,10X,E15.6,2X,12A4,9X,2A4)	DTAP4460
000263	IB = LINK(AI,LT)	DTAP4461
000264	IF (IB) 758,752,754	DTAP4462
000265	754 IF (LT-20) 752,752,12	DTAP4463
000266	758 I1 = IB	DTAP4464
000267	GO TO 2	DTAP4465
000268	C PRINT-OUT SPECIFICATIONS	DTAP4466
000269	800 IP = IPRMAX	DTAP4468
000270	802 CALL READ	DTAP4470
000271	803 IF (I1) 808,802,804	DTAP4472
000272	804 IP = IP+1	DTAP4474
000273	IPR(IP) = I1	DTAP4476
000274	807 IPRTAG(IP) = IPR0ID(I1)	DTAP4478
000275	IF (I3 .EQ. 0) GO TO 809	DTAP4480
000276	806 IPRTAG(IP) = A(1)	DTAP4482
000277	809 IF (I2 .LE. 11) GO TO 802	DTAP4484
000278	805 I1 = I1+1	DTAP4486
000279	GO TO 804	DTAP4488
000280	808 IPRMAX = IP	DTAP4490
000281	IF (IP .GT. 500) GO TO 10	DTAP4492
000282	GO TO 2	DTAP4494
000283	C RUN CONTROL	DTAP4496
000284	900 L = 0	DTAP4498
000285	902 CALL READ	DTAP4500
000286	IF (I1 .LT. 0) GO TO 905	DTAP4502
000287	903 L = L+1	DTAP4504
000288	PRTIM(L) = E1	DTAP4506
000289	DELTIM(L) = F2	DTAP4508

010290	GO TO 902	DTAP4509
010291	900 PRINTX = PRINTM(L)	DTAP4510
010292	904 IF (L .GT. 1) GO TO 10	DTAP4512
010293	GO TO 2	DTAP4514
010294	10 WRITE (6,11)	DTAP4516
010295	11 FORMAT(55H) ERROR-STORAGE CAPACITY FOR THIS TYPE OF DATA EXCEEDED)	DTAP4518
010296	GO TO 12	DTAP4520
010297	14 WRITE (6,15)	DTAP4522
010298	15 FORMAT (53H THIS TYPE OF INPUT IS ILLEGAL)	DTAP4524
010299	12 CALL ERROR	DTAP4526
010300	9 ISTART = 11	DTAP4528
010301	RETURN	DTAP4530
010302	END	DTAP4532

END CUR

6.3 DEFINITION OF PROGRAM VARIABLES

This section lists the variables used in TAP-3F and their definition.

1. Variables found in COMMON

<u>Variable Name</u>	<u>Description</u>
A	Common field on input sheet
C	Capacitance
CØN	Special constants (*070 input)
D	Dummy
DYTCQ	General numerical notation for D, Y, T, C, or Q
DELTAT	Specified delta time
DELTIM	Increment of printout time
DTHETA	Actual time step
E	E fields on input sheet
GAIN	Multiplying factor for functions
I	I fields in input sheets
IMAX	Number of functions entered
IMIN	First function to be performed
IPFLAG	Signal to print
IPH	Node number, latent heat
IPHMAX	Maximum identification number of nodes employ- ing latent heat
IPR	Identification number of item to be printed
IPRMAX	Maximum identification number of items to be printed
ISFLAG	Signal to stop run
IXMAX	Sets up IMAX, does not count functions done only once
IXMIN	Sets up IMIN, does not count functions done only once
J	J fields from input sheets
K	K fields from input sheets

Variable Name	Description
KEY	Notes specific arithmetic operation or table to be done once or always
LFLAG	Signal to read specific input format
MAXNØT	Highest iterated node number used
MAXNØY	Highest admittance number used
NARITH	Signifies if this is the initial calculation of the functions
NCRIT	Critical Node
NFLAG	(+) value for nodes to be iterated; (-), if not
NN	Neighbor of a specific node
NPREV	Starting location for table search
NT	Index for tabular values
NTAB	Table number
NTHEAD	Location of the beginning of a specific table
NTIME	Subscript for PRTIM
NTLAST	Location of end point among tabular values
NTTAIL	Location of the end of a specific table
NWP	In the *030 or function section, the independent variable name of Field J2, and the increment for changing this name, stored in Field K2, are stored together in this location.
NWW	Subscripted NWP
NXP	In the *030 or function section, the independent variable name of Field J1 and the increment for changing this name from Field K1 are stored together in this location.
NXX	Subscripted NXP
NY	Connector identification number
NYT	Packed terminals of a connector
NZAB	Dependent variable in functions and tables, negative if a series is stored.
PHH1	Latent heat for first phase change
PHH2	Latent heat for second phase change

Variable Name	Description
PHT1	Temperature for first phase change
PHT2	Temperature for second phase change
PRØUT	Specific item to be printed
PRTAG	Label for specific item to be printed
Q	Heat generation rate
QCH1	Integrated heating, phase change 1
QCH2	Integrated heating, phase change 2
RCMIN	Smallest value of $\frac{C}{SUMY}$
SIGMA	Stefan-Boltzmann Constant
SUMY	Sum of the Y's of a node
SUMYT	Sum of the YT's of a node
T	Temperature
TIME	Time
TITLE	Stored titles as entered under *001
TPREV	Temperature for the previous iteration
TZERØ	Absolute zero temperature
W	Value of second independent variable in functions and tables
X	Value of first independent variable in functions and tables
Y	Admittance
Z	Value of dependent variable in functions and tables before applying GAIN

2. Variables not in COMMON

Variable Name	Description
DT	Change in temperature from previous iteration
DTMAX	Maximum DT
FTAG	Parameter identification number among functions
ICFLAG	Signals convergence
IØRG	Location of last instruction

Variable Name	Description
IØRGE	Location of last table entry
IØRGS	Location of the end of program
IØRZ	Number of instructions required (IØRG-IØRGS)
ISTART	Index number for the first function to be performed
IT	Tens digit on * card + 1
ITT	Unit digit on * card + 1
LAB or LINK	The variable identification number with a numerical prefix
MAXNØD	Highest identification number used for a dummy
MAXNT	Highest identification number used for an iterated node including the prefix, MAXNOT + 2000
NAME	Name of person submitting the run
NS	NSTART + 100
NSTART	May be *096, 097, 098, or 099 card inserted at end of input data for a run. An indicator for signaling whether or not more data follows. The machine interprets an asterisk as a minus sign.
NYTA and NYTAB	Neighbors of an admittance, stored together as NYT
N2	Indicates first time through, transient, or steady-state by the assignment of 360, 470, or 600, respectively.
POTIME	Next printout time

7. SAMPLE PROBLEMS

To further illustrate the instructions for using TAP, given in earlier sections of this report, two sample problems are included. Each problem comprises (1) a description, (2) a sketch of the network, (3) TAP input sheets and (4) a listing of the TAP output.

7.1 CLASSIC SLAB PROBLEM

The classic slab problem has been chosen due to its relative simplicity and well known classical solution. Assuming constant thermal properties, the Fourier equation becomes:

$$\left(\frac{k}{\rho C_p}\right) \frac{\partial^2 T}{\partial x^2} = \frac{\partial T}{\partial \theta}.$$

The boundary conditions for a slab as shown below are

$$T(x, 0) = T_o,$$

$$T(L, 0) = T_s,$$

$$\left(\frac{\partial T}{\partial x}\right)_{x=0} = 0.$$

The solution can be shown to be

$$\frac{T(x, \theta)}{T_o} = \sum_{n=1}^{\infty} \exp\left[(-\delta_n^2) \left(\frac{\theta \alpha}{L^2}\right)\right] 2 \frac{\sin \delta_n \cos(\delta_n x/L)}{\delta_n + \sin \delta_n \cos \delta_n}.$$

where δ_n is the solution of:

$$\delta_n \tan \delta_n = B_L$$

$$\alpha = \text{thermal diffusivity} = \frac{k}{\rho C_p}$$

$$\theta = \text{time}$$

$$B_L = \text{Biot Number} = hL/k,$$

and

in our case (constant surface temperature),

$$B_L = \infty.$$

The solution for $T(x, \theta)$ has been graphically presented in charts to which we will compare a TAP-3F solution (Figure 2). The parameters needed for the graphical solution (Heisler charts) are:

$$1/B_L = 0$$

$$F_o = \frac{\alpha \theta}{L^2} = 0.20 \text{ (Fourier Number)}$$

$$T_o = 10^\circ \text{F}$$

$$T_s = 100^\circ \text{F}.$$

The thermal circuit (using 10 nodes and total length = 1 ft) is shown in Figure 3.

7.2 CLOSED RECIRCULATING LOOP PROBLEM

The second problem illustrates the use of the fluid nodes. Thermal energy is generated in a nuclear reactor fuel element, and said energy is transferred to the flowing coolant. The coolant then flows into a heat dump heat exchanger where the thermal energy is removed to the environs. The coolant then passes through a pump which again forces it past the fuel element to absorb thermal energy--thereby completing the loop. The temperature of the coolant nodes are assumed to be the average of the inlet and outlet temperatures for both the steady state and transient analysis. The nodal model below illustrates the above-described problem.

FIGURE 2. Sample Problem Solution--Classic Slab Problem

THERMAL PROPERTIES:

$$K = 10 \text{ B/HR-FT } ^\circ\text{F}$$

$$C_p = 0.1 \text{ B/LB } ^\circ\text{F}$$

$$\rho = 500 \text{ LB/FT}^3$$

(N) NODE NUMBERS

N ADMITTANCE NUMBERS

$$Y001 - Y009 = KA/L = 10 \times 1/0.1 \\ = 100.1$$

$$Y010 = 10 \times 1/0.05 = 200.0$$

$$C001 - C010 = \rho L A C_p \\ = (500)(0.1)(1)(0.1) \\ = 5.0$$

$$C013 = 0.0$$

FIGURE 3. Heat Conduction in a Slab

**.THERMAL ANALYZER PROGRAM **

CONVERTED TO UNIVAC 1107 FROM IBM 360

CONVERSION MADE BY ENGINEERING ANALYSIS SECTION, BATTELLE NORTHWEST

ORIGINAL DECK FROM ATOMICS INTERNATIONAL DIVISION, N.A.A. INC., ENG. ANALYSIS GROUP, DEPT. 371

PROGRAM CODING - FORTRAN IV

ALL NEW INPUT DATA FOR THIS RUN

* 1	-0	-0	-.000000	-.000000	-0	-0	-0	-0
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TITLES

TIME LAG LOOP CHECK OUT

* 10

NETWORK DESCRIPTION

Y102	-0	-0	.295000-01	-.000000	T 2	T 3	-0	-0
Y103	Y105	-0	.926670-02	-.000000	T 6	T 16	2	-0
Y201	Y203	-0	.209200-00	-.000000	T 5	T 6	2	2
Y204	-0	-0	.209200-00	-.000000	T 12	T 13	-0	-0
Y205	-0	-0	.209200-00	-.000000	T 15	T 3	-0	-0
* 20	-0	-0	-.000000	-.000000	-0	-0	-0	-0

INITIAL VALUES

T 2	T 3	-0	.100000+03	-.000000	-0	-0	-0	-0
T 4	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
T 5	-0	-4	.100000+03	-.000000	-0	-0	-0	-0
T 6	-0	-0	.100000+03	-.000000	-0	-0	-0	-0
T 7	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
T 8	-0	-0	.100000+03	-.000000	-0	-0	-0	-0
T 9	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
T 10	-0	-0	.100000+03	-.000000	-0	-0	-0	-0
T 11	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
T 12	-0	-11	.100000+03	-.000000	-0	-0	-0	-0
T 13	-0	-0	.100000+03	-.000000	-0	-0	-0	-0
T 14	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
T 15	-0	-14	.102869+04	-.000000	-0	-0	-0	-0
T 16	-0	-1	.100000+03	-.000000	-0	-0	-0	-0
C 2	-0	-0	.954000-01	-.000000	-0	-0	-0	-0
C 3	-0	-0	.100000-01	-.000000	-0	-0	-0	-0
C 6	-0	-0	.666700-01	-.000000	-0	-0	-0	-0
C 8	-0	-0	.666700-01	-.000000	-0	-0	-0	-0
C 10	-0	-0	.666700-01	-.000000	-0	-0	-0	-0
C 13	-0	-0	.110000+00	-.000000	-0	-0	-0	-0
Q 2	-0	-0	.284400+02	-.000000	-0	-0	-0	-0
Q 13	-0	-0	.100000+01	-.000000	-0	-0	-0	-0
D 5	-0	-0	.100000+00	-.000000	-0	-0	-0	-0
D 12	-0	-0	.500000-00	-.000000	-0	-0	-0	-0
D 15	-0	-0	.500000-00	-.000000	-0	-0	-0	-0
* 30	-0	-0	-.000000	-.000000	-0	-0	-0	-0

FUNCTIONS

-0	-0	98	-.000000	-.000000	-0	-0	-0	-0
* 60	-0	-0	-.000000	-.000000	-0	-0	-0	-0

K 4	K 3	15	-.000000	-.000000	-0	-0	-0	-0
K 7	K 6	5	-.000000	-.000000	-0	-0	-0	-0
K 9	K 8	7	-.000000	-.000000	-0	-0	-0	-0
K 11	10	9	-.000000	-.000000	-0	-0	-0	-0
K 14	K 13	12	-.000000	-.000000	-0	-0	-0	-0

K	16	16	16	-.000000	-.000000	-0	-0	-0	-0
*	70	-0	-0	-.000000	-.000000	-0	-0	-0	-0
SPECIAL CONSTANT VALUES									
	4			.100000-01	CONVERGENCE TEST DELTA-TEMPERATURE	*****			
	5			.100000+01	+1.0 STEY-STE.	*****			
	12			.150000+01	*****	*	****		*****
	*80			-.000000	*****				*****
PRINT SPECIFICATIONS									
T	2	T	16	-0	-.000000	-.000000	-0	-0	-0
C	2	C	3	-0	-.000000	-.000000	-0	-0	-0
C	6		-0	-0	-.000000	-.000000	-0	-0	-0
C	8		-0	-0	-.000000	-.000000	-0	-0	-0
C	10		-0	-0	-.000000	-.000000	-0	-0	-0
C	13		-0	-0	-.000000	-.000000	-0	-0	-0
Y102	Y105		-0	-0	-.000000	-.000000	-0	-0	-0
Y201	Y205		-0	-0	-.000000	-.000000	-0	-0	-0
Q	2		-0	-0	-.000000	-.000000	-0	-0	-0
Q	13		-0	-0	-.000000	-.000000	-0	-0	-0
U	5		-0	-0	-.000000	-.000000	-0	-0	-0
D	12		-0	-0	-.000000	-.000000	-0	-0	-0
D	15		-0	-0	-.000000	-.000000	-0	-0	-0
*	90		-0	-0	-.000000	-.000000	-0	-0	-0
RUN CONTROL *****									
	-0	-0	-0	-.000000	.500000+02	-0	-0	-0	-0
	-0	-0	-0	.100000+03	-.000000	-0	-0	-0	-0
*	97	-0	-0	-.000000	-.000000	-0	-0	-0	-0

SUMMARY OF NODE CONNECTIONS

NODE NO.	INITIAL TEMPERATURE	CAPACITY	HEAT GENERATION RATE	NODE CONNECTED	CONNECTOR NUMBER	INITIAL ADMITTANCE
2	.10000+03	.95400-01	.28440+02	3	102	.29500-01
3	.10000+03	.10000-01	.00000	2	102	.29500-01
6	.10000+03	.66670-01	.00000	15	205	.20920-00
8	.10000+03	.66670-01	.00000	16	103	.92667-02
10	.10000+03	.66670-01	.00000	5	201	.20920-00
13	.10000+03	.11000+00	.10000+01	16	104	.92667-02
5	.10000+03	.00000	.00000	7	202	.20920-00
7	.10000+03	.00000	.00000	16	105	.92667-02
9	.10000+03	.00000	.00000	9	203	.20920-00
12	.10000+03	.00000	.00000	12	204	.20920-00
15	.10287+04	.00000	.00000	6	201	.20920-00
16	.10000+03	.00000	.00000	8	202	.20920-00
				10	203	.20920-00
				13	204	.20920-00
				3	205	.20920-00
				6	103	.92667-02
				8	104	.92667-02
				10	105	.92667-02

INITIAL VALUES GIVEN FOR THIS RUN

TIME = -0.00 GREATEST TEMPERATURE CHANGE PER ITERATION = .00000 ON NODE 0

(T002) = 1.00000+02	(T003) = 1.00000+02	(T004) = 1.00000+02	(T005) = 1.00000+02	(T006) = 1.00000+02
(T007) = 1.00000+02	(T008) = 1.00000+02	(T009) = 1.00000+02	(T010) = 1.00000+02	(T011) = 1.00000+02
(T012) = 1.00000+02	(T013) = 1.00000+02	(T014) = 1.00000+02	(T015) = 1.02869+03	(T016) = 1.00000+02
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 2.84400+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

TIME = 50.00 GREATEST TEMPERATURE CHANGE PER ITERATION = .42609+01 ON NODE 2

(T002) = 2.12416+03	(T003) = 1.16157+03	(T004) = 1.29731+03	(T005) = 1.29731+03	(T006) = 1.24652+03
(T007) = 1.19574+03	(T008) = 1.14926+03	(T009) = 1.10278+03	(T010) = 1.06024+03	(T011) = 1.01771+03
(T012) = 1.01771+03	(T013) = 1.02249+03	(T014) = 1.02727+03	(T015) = 1.02727+03	(T016) = 1.00000+02
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 2.84400+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

TIME = 100.00 GREATEST TEMPERATURE CHANGE PER ITERATION = .13201+01 ON NODE 2

(T002) = 2.12649+03	(T003) = 1.16370+03	(T004) = 1.29947+03	(T005) = 1.29947+03	(T006) = 1.24859+03
(T007) = 1.19771+03	(T008) = 1.15115+03	(T009) = 1.10459+03	(T010) = 1.06198+03	(T011) = 1.01937+03
(T012) = 1.01937+03	(T013) = 1.02415+03	(T014) = 1.02893+03	(T015) = 1.02893+03	(T016) = 1.00000+02
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 2.84400+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

TIME = 100.00 GREATEST TEMPERATURE CHANGE PER ITERATION = .12842+01 ON NODE 2

(T002) = 2.12777+03	(T003) = 1.16473+03	(T004) = 1.30053+03	(T005) = 1.30053+03	(T006) = 1.24961+03
(T007) = 1.19869+03	(T008) = 1.15208+03	(T009) = 1.10548+03	(T010) = 1.06283+03	(T011) = 1.02018+03
(T012) = 1.02018+03	(T013) = 1.02496+03	(T014) = 1.02974+03	(T015) = 1.02974+03	(T016) = 1.00000+02
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 2.84400+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

THIS RUN IS A CONTINUATION OF THE PREVIOUS RUN WITH SOME NEW DATA

* 20	-0	-0	-.000000	-.000000	-0	-0	-0	-0
			INITIAL VALUES '*****'					
Q 2	-0	-0	.350000+02	-.000000	-0	-0	-0	-0
* 70	-0	-0	-.000000	-.000000	-0	-0	-0	-0
			SPECIAL CONSTANT VALUES					
3			.800000-00	DELTA-TIME MULTIPLIER	'*****'			
4			-.000000	CONVERGENCE TEST DELTA-TEMPERATURE	'*****'			
5			-.000000	+1.0 STEY-STF.	'*****'			
12			.100000+01	'*****'	*	'	'	'
*90			-.000000	'*****'				
			RUN CONTROL '*****'					
-0	-0	-0	-.000000	.100000+00	-0	-0	-0	-0
-0	-0	-0	.100000+02	-.000000	-0	-0	-0	-0
* 99	-0	-0	-.000000	-.000000	-0	-0	-0	-0

SUMMARY OF NODE CONNECTIONS

NODE NO.	INITIAL TEMPERATURE	CAPACITY	HEAT GENERATION RATE	NODE CONNECTED	CONNECTOR NUMBER	INITIAL ADMITTANCE
2	.21278+04	.95400-01	.35000+02	3	102	.29500-01
3	.11647+04	.10000-01	.00000	2	102	.29500-01
				15	205	.20920-00
6	.12496+04	.66670-01	.00000	16	103	.92667-02
				5	201	.20920-00
8	.11521+04	.66670-01	.00000	16	104	.92667-02
				7	202	.20920-00
10	.10628+04	.66670-01	.00000	16	105	.92667-02
				9	203	.20920-00
13	.10250+04	.11000+00	.10000+01	12	204	.20920-00
5	.13005+04	.00000	.00000	6	201	.20920-00
7	.11987+04	.00000	.00000	8	202	.20920-00
9	.11055+04	.00000	.00000	10	203	.20920-00
12	.10202+04	.00000	.00000	13	204	.20920-00
15	.10297+04	.00000	.00000	3	205	.20920-00
16	.10000+03	.00000	.00000	6	103	.92667-02
				8	104	.92667-02
				10	105	.92667-02

INITIAL VALUES GIVEN FOR THIS RUN

TIME =	-.00	CRITICAL NODE =	3	CRITICAL DELTA T =	.00000	ACTUAL DELTA T =	.10000+01		
(T002) =	2.12777+03	(T003) =	1.16473+03	(T004) =	1.30053+03	(T005) =	1.30053+03	(T006) =	1.24961+03
(T007) =	1.19869+03	(T008) =	1.15208+03	(T009) =	1.10548+03	(T010) =	1.06283+03	(T011) =	1.02018+03
(T012) =	1.02018+03	(T013) =	1.02496+03	(T014) =	1.02974+03	(T015) =	1.02974+03	(T016) =	1.00000+02
(C002) =	9.54000-02	(C003) =	1.00000-02	(C006) =	6.66700-02	(C008) =	6.66700-02	(C010) =	6.66700-02
(C013) =	1.10000-01	(Y102) =	2.95000-02	(Y103) =	9.26670-03	(Y104) =	9.26670-03	(Y105) =	9.26670-03
(Y201) =	2.09200-01	(Y202) =	2.09200-01	(Y203) =	2.09200-01	(Y204) =	2.09200-01	(Y205) =	2.09200-01
(Q002) =	3.50000+01	(Q013) =	1.00000+00	(D005) =	1.00000-01	(D012) =	5.00000-01	(D015) =	5.00000-01

TIME =	-.00	CRITICAL NODE =	3	CRITICAL DELTA T =	.41894-01	ACTUAL DELTA T =	.33515-01		
(T002) =	2.12777+03	(T003) =	1.16473+03	(T004) =	1.29972+03	(T005) =	1.30053+03	(T006) =	1.24961+03
(T007) =	1.19869+03	(T008) =	1.15208+03	(T009) =	1.10548+03	(T010) =	1.06283+03	(T011) =	1.02018+03
(T012) =	1.02018+03	(T013) =	1.02496+03	(T014) =	1.02974+03	(T015) =	1.02974+03	(T016) =	1.00000+02
(C002) =	9.54000-02	(C003) =	1.00000-02	(C006) =	6.66700-02	(C008) =	6.66700-02	(C010) =	6.66700-02
(C013) =	1.10000-01	(Y102) =	2.95000-02	(Y103) =	9.26670-03	(Y104) =	9.26670-03	(Y105) =	9.26670-03
(Y201) =	2.09200-01	(Y202) =	2.09200-01	(Y203) =	2.09200-01	(Y204) =	2.09200-01	(Y205) =	2.09200-01
(Q002) =	3.50000+01	(Q013) =	1.00000+00	(D005) =	1.00000-01	(D012) =	5.00000-01	(D015) =	5.00000-01

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TIME =	.10	CRITICAL NODE =	3	CRITICAL DELTA T =	.41894-01	ACTUAL DELTA T =	.25000-01		
(T002) =	2.13462+03	(T003) =	1.16593+03	(T004) =	1.30211+03	(T005) =	1.30053+03	(T006) =	1.24961+03
(T007) =	1.19869+03	(T008) =	1.15208+03	(T009) =	1.10548+03	(T010) =	1.06283+03	(T011) =	1.02018+03
(T012) =	1.02018+03	(T013) =	1.02496+03	(T014) =	1.02974+03	(T015) =	1.02974+03	(T016) =	1.00000+02
(C002) =	9.54000-02	(C003) =	1.00000-02	(C006) =	6.66700-02	(C008) =	6.66700-02	(C010) =	6.66700-02
(C013) =	1.10000-01	(Y102) =	2.95000-02	(Y103) =	9.26670-03	(Y104) =	9.26670-03	(Y105) =	9.26670-03
(Y201) =	2.09200-01	(Y202) =	2.09200-01	(Y203) =	2.09200-01	(Y204) =	2.09200-01	(Y205) =	2.09200-01
(Q002) =	3.50000+01	(Q013) =	1.00000+00	(D005) =	1.00000-01	(D012) =	5.00000-01	(D015) =	5.00000-01

TIME =	.20	CRITICAL NODE =	3	CRITICAL DELTA T =	.41894-01	ACTUAL DELTA T =	.25000-01		
(T002) =	2.14128+03	(T003) =	1.16677+03	(T004) =	1.30380+03	(T005) =	1.30211+03	(T006) =	1.24980+03
(T007) =	1.19748+03	(T008) =	1.15191+03	(T009) =	1.10635+03	(T010) =	1.06298+03	(T011) =	1.01961+03
(T012) =	1.02018+03	(T013) =	1.02496+03	(T014) =	1.02974+03	(T015) =	1.02974+03	(T016) =	1.00000+02
(C002) =	9.54000-02	(C003) =	1.00000-02	(C006) =	6.66700-02	(C008) =	6.66700-02	(C010) =	6.66700-02
(C013) =	1.10000-01	(Y102) =	2.95000-02	(Y103) =	9.26670-03	(Y104) =	9.26670-03	(Y105) =	9.26670-03
(Y201) =	2.09200-01	(Y202) =	2.09200-01	(Y203) =	2.09200-01	(Y204) =	2.09200-01	(Y205) =	2.09200-01
(Q002) =	3.50000+01	(Q013) =	1.00000+00	(D005) =	1.00000-01	(D012) =	5.00000-01	(D015) =	5.00000-01

TIME =	.30	CRITICAL NODE =	3	CRITICAL DELTA T =	.41894-01	ACTUAL DELTA T =	.25000-01		
(T002) =	2.14777+03	(T003) =	1.16758+03	(T004) =	1.30542+03	(T005) =	1.30380+03	(T006) =	1.25040+03
(T007) =	1.19700+03	(T008) =	1.15152+03	(T009) =	1.10604+03	(T010) =	1.06320+03	(T011) =	1.02035+03
(T012) =	1.02018+03	(T013) =	1.02496+03	(T014) =	1.02974+03	(T015) =	1.02974+03	(T016) =	1.00000+02
(C002) =	9.54000-02	(C003) =	1.00000-02	(C006) =	6.66700-02	(C008) =	6.66700-02	(C010) =	6.66700-02

(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

TIME = .40	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.15408+03	(T003) = 1.16837+03	(T004) = 1.30700+03	(T005) = 1.30542+03
(T006) = 1.25129+03	(T007) = 1.19716+03	(T008) = 1.15119+03	(T009) = 1.10523+03
(T010) = 1.06320+03	(T011) = 1.02116+03	(T012) = 1.02018+03	(T013) = 1.02496+03
(T014) = 1.02974+03	(T015) = 1.02974+03	(T016) = 1.00000+02	(C002) = 9.54000-02
(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y105) = 9.26670-03	(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01
(Y204) = 2.09200-01	(Y205) = 2.09200-01	(Q002) = 3.50000+01	(Q013) = 1.00000+00
(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01	

TIME = .50	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.16023+03	(T003) = 1.16914+03	(T004) = 1.30853+03	(T005) = 1.30700+03
(T006) = 1.25236+03	(T007) = 1.19773+03	(T008) = 1.15105+03	(T009) = 1.10438+03
(T010) = 1.06296+03	(T011) = 1.02154+03	(T012) = 1.02018+03	(T013) = 1.02496+03
(T014) = 1.02974+03	(T015) = 1.02974+03	(T016) = 1.00000+02	(C002) = 9.54000-02
(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y105) = 9.26670-03	(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01
(Y204) = 2.09200-01	(Y205) = 2.09200-01	(Q002) = 3.50000+01	(Q013) = 1.00000+00
(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01	

TIME = .60	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.16621+03	(T003) = 1.16988+03	(T004) = 1.31003+03	(T005) = 1.30853+03
(T006) = 1.25356+03	(T007) = 1.19858+03	(T008) = 1.15114+03	(T009) = 1.10371+03
(T010) = 1.06257+03	(T011) = 1.02143+03	(T012) = 1.01947+03	(T013) = 1.02493+03
(T014) = 1.03038+03	(T015) = 1.02974+03	(T016) = 1.00000+02	(C002) = 9.54000-02
(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y105) = 9.26670-03	(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01
(Y204) = 2.09200-01	(Y205) = 2.09200-01	(Q002) = 3.50000+01	(Q013) = 1.00000+00
(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01	

TIME = .70	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.17203+03	(T003) = 1.17061+03	(T004) = 1.31148+03	(T005) = 1.31003+03
(T006) = 1.25483+03	(T007) = 1.19963+03	(T008) = 1.15147+03	(T009) = 1.10331+03
(T010) = 1.06213+03	(T011) = 1.02095+03	(T012) = 1.01971+03	(T013) = 1.02482+03
(T014) = 1.02992+03	(T015) = 1.02974+03	(T016) = 1.00000+02	(C002) = 9.54000-02
(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y105) = 9.26670-03	(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01
(Y204) = 2.09200-01	(Y205) = 2.09200-01	(Q002) = 3.50000+01	(Q013) = 1.00000+00
(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01	

TIME = .80	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.17769+03	(T003) = 1.17132+03	(T004) = 1.31290+03	(T005) = 1.31148+03
(T006) = 1.25614+03	(T007) = 1.20080+03	(T008) = 1.15201+03	(T009) = 1.10322+03
(T010) = 1.06175+03	(T011) = 1.02027+03	(T012) = 1.02035+03	(T013) = 1.02481+03
(T014) = 1.02926+03	(T015) = 1.02974+03	(T016) = 1.00000+02	

(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = .90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.18320+03 (T003) = 1.17202+03 (T004) = 1.31429+03 (T005) = 1.31290+03 (T006) = 1.25747+03
 (T007) = 1.20204+03 (T008) = 1.15272+03 (T009) = 1.10341+03 (T010) = 1.06148+03 (T011) = 1.01955+03
 (T012) = 1.02100+03 (T013) = 1.02492+03 (T014) = 1.02884+03 (T015) = 1.02975+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 1.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.18857+03 (T003) = 1.17267+03 (T004) = 1.31561+03 (T005) = 1.31429+03 (T006) = 1.25880+03
 (T007) = 1.20332+03 (T008) = 1.15358+03 (T009) = 1.10385+03 (T010) = 1.06137+03 (T011) = 1.01889+03
 (T012) = 1.02134+03 (T013) = 1.02511+03 (T014) = 1.02887+03 (T015) = 1.02973+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 1.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.19379+03 (T003) = 1.17341+03 (T004) = 1.31690+03 (T005) = 1.31561+03 (T006) = 1.26013+03
 (T007) = 1.20465+03 (T008) = 1.15455+03 (T009) = 1.10446+03 (T010) = 1.06143+03 (T011) = 1.01841+03
 (T012) = 1.02134+03 (T013) = 1.02529+03 (T014) = 1.02924+03 (T015) = 1.02993+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 1.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.19887+03 (T003) = 1.17420+03 (T004) = 1.31847+03 (T005) = 1.31690+03 (T006) = 1.26142+03
 (T007) = 1.20595+03 (T008) = 1.15562+03 (T009) = 1.10529+03 (T010) = 1.06166+03 (T011) = 1.01803+03
 (T012) = 1.02095+03 (T013) = 1.02541+03 (T014) = 1.02987+03 (T015) = 1.02992+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 1.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.20382+03 (T003) = 1.17434+03 (T004) = 1.31950+03 (T005) = 1.31847+03 (T006) = 1.26274+03
 (T007) = 1.20702+03 (T008) = 1.15670+03 (T009) = 1.10638+03 (T010) = 1.06210+03 (T011) = 1.01783+03

(T012) = 1.02010+03	(T013) = 1.02541+03	(T014) = 1.03071+03	(T015) = 1.02917+03	(T016) = 1.00000+02
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02	(C010) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03	(Y105) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01	(Y205) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01	(D015) = 5.00000-01

TIME = 1.40	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.20862+03	(T003) = 1.17446+03	(T004) = 1.32010+03	(T005) = 1.31950+03
(T007) = 1.20866+03	(T008) = 1.15781+03	(T009) = 1.10695+03	(T010) = 1.06267+03
(T012) = 1.01946+03	(T013) = 1.02526+03	(T014) = 1.03106+03	(T015) = 1.02883+03
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01

TIME = 1.50	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.21328+03	(T003) = 1.17497+03	(T004) = 1.32108+03	(T005) = 1.32010+03
(T007) = 1.21035+03	(T008) = 1.15910+03	(T009) = 1.10786+03	(T010) = 1.06322+03
(T012) = 1.01889+03	(T013) = 1.02503+03	(T014) = 1.03117+03	(T015) = 1.02887+03
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01

TIME = 1.60	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.21781+03	(T003) = 1.17577+03	(T004) = 1.32234+03	(T005) = 1.32108+03
(T007) = 1.21142+03	(T008) = 1.16041+03	(T009) = 1.10941+03	(T010) = 1.06395+03
(T012) = 1.01845+03	(T013) = 1.02475+03	(T014) = 1.03105+03	(T015) = 1.02921+03
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01

TIME = 1.70	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.22224+03	(T003) = 1.17685+03	(T004) = 1.32374+03	(T005) = 1.32234+03
(T007) = 1.21222+03	(T008) = 1.16160+03	(T009) = 1.11099+03	(T010) = 1.06492+03
(T012) = 1.01789+03	(T013) = 1.02443+03	(T014) = 1.03097+03	(T015) = 1.02995+03
(C002) = 9.54000-02	(C003) = 1.00000-02	(C006) = 6.66700-02	(C008) = 6.66700-02
(C013) = 1.10000-01	(Y102) = 2.95000-02	(Y103) = 9.26670-03	(Y104) = 9.26670-03
(Y201) = 2.09200-01	(Y202) = 2.09200-01	(Y203) = 2.09200-01	(Y204) = 2.09200-01
(Q002) = 3.50000+01	(Q013) = 1.00000+00	(D005) = 1.00000-01	(D012) = 5.00000-01

TIME = 1.80	CRITICAL NODE = 3	CRITICAL DELTA T = .41894-01	ACTUAL DELTA T = .25000-01
(T002) = 2.22656+03	(T003) = 1.17805+03	(T004) = 1.32543+03	(T005) = 1.32374+03
			(T006) = 1.26836+03

(T007) = 1.21297+03 (T008) = 1.16269+03 (T009) = 1.11241+03 (T010) = 1.06600+03 (T011) = 1.01959+03
(T012) = 1.01783+03 (T013) = 1.02409+03 (T014) = 1.03035+03 (T015) = 1.03066+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 1.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.23079+03 (T003) = 1.17904+03 (T004) = 1.32698+03 (T005) = 1.32543+03 (T006) = 1.26957+03
(T007) = 1.21371+03 (T008) = 1.16363+03 (T009) = 1.11355+03 (T010) = 1.06717+03 (T011) = 1.02078+03
(T012) = 1.01841+03 (T013) = 1.02387+03 (T014) = 1.02934+03 (T015) = 1.03111+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.23492+03 (T003) = 1.17975+03 (T004) = 1.32838+03 (T005) = 1.32698+03 (T006) = 1.27088+03
(T007) = 1.21479+03 (T008) = 1.16455+03 (T009) = 1.11432+03 (T010) = 1.06825+03 (T011) = 1.02219+03
(T012) = 1.01834+03 (T013) = 1.02376+03 (T014) = 1.02917+03 (T015) = 1.03111+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.23893+03 (T003) = 1.18025+03 (T004) = 1.32928+03 (T005) = 1.32827+03 (T006) = 1.27223+03
(T007) = 1.21619+03 (T008) = 1.16553+03 (T009) = 1.11488+03 (T010) = 1.06922+03 (T011) = 1.02357+03
(T012) = 1.01845+03 (T013) = 1.02365+03 (T014) = 1.02884+03 (T015) = 1.03122+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.24284+03 (T003) = 1.18068+03 (T004) = 1.33040+03 (T005) = 1.32828+03 (T006) = 1.27350+03
(T007) = 1.21771+03 (T008) = 1.16665+03 (T009) = 1.11560+03 (T010) = 1.07006+03 (T011) = 1.02453+03
(T012) = 1.01885+03 (T013) = 1.02361+03 (T014) = 1.02836+03 (T015) = 1.03097+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01

(T002) = 2.24664+03 (T003) = 1.18053+03 (T004) = 1.33098+03 (T005) = 1.33040+03 (T006) = 1.27469+03
(T007) = 1.21898+03 (T008) = 1.16784+03 (T009) = 1.11671+03 (T010) = 1.07091+03 (T011) = 1.02511+03
(T012) = 1.01947+03 (T013) = 1.02366+03 (T014) = 1.02784+03 (T015) = 1.03009+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.25032+03 (T003) = 1.18035+03 (T004) = 1.33119+03 (T005) = 1.33098+03 (T006) = 1.27581+03
(T007) = 1.22064+03 (T008) = 1.16906+03 (T009) = 1.11747+03 (T010) = 1.07179+03 (T011) = 1.02612+03
(T012) = 1.02073+03 (T013) = 1.02386+03 (T014) = 1.02699+03 (T015) = 1.02950+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.25388+03 (T003) = 1.18039+03 (T004) = 1.33167+03 (T005) = 1.33119+03 (T006) = 1.27669+03
(T007) = 1.22220+03 (T008) = 1.17041+03 (T009) = 1.11863+03 (T010) = 1.07264+03 (T011) = 1.02665+03
(T012) = 1.02219+03 (T013) = 1.02426+03 (T014) = 1.02634+03 (T015) = 1.02911+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.25733+03 (T003) = 1.18055+03 (T004) = 1.33230+03 (T005) = 1.33167+03 (T006) = 1.27743+03
(T007) = 1.22319+03 (T008) = 1.17172+03 (T009) = 1.12025+03 (T010) = 1.07365+03 (T011) = 1.02705+03
(T012) = 1.02359+03 (T013) = 1.02486+03 (T014) = 1.02613+03 (T015) = 1.02881+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.26069+03 (T003) = 1.18062+03 (T004) = 1.33292+03 (T005) = 1.33230+03 (T006) = 1.27809+03
(T007) = 1.22387+03 (T008) = 1.17289+03 (T009) = 1.12190+03 (T010) = 1.07482+03 (T011) = 1.02773+03
(T012) = 1.02411+03 (T013) = 1.02554+03 (T014) = 1.02698+03 (T015) = 1.02831+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.26394+03 (T003) = 1.18052+03 (T004) = 1.33332+03 (T005) = 1.33292+03 (T006) = 1.27875+03
 (T007) = 1.22457+03 (T008) = 1.17390+03 (T009) = 1.12323+03 (T010) = 1.07608+03 (T011) = 1.02893+03
 (T012) = 1.02517+03 (T013) = 1.02622+03 (T014) = 1.02726+03 (T015) = 1.02772+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 2.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.26708+03 (T003) = 1.18035+03 (T004) = 1.33370+03 (T005) = 1.33332+03 (T006) = 1.27935+03
 (T007) = 1.22538+03 (T008) = 1.17484+03 (T009) = 1.12429+03 (T010) = 1.07730+03 (T011) = 1.03030+03
 (T012) = 1.02612+03 (T013) = 1.02697+03 (T014) = 1.02781+03 (T015) = 1.02699+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.27013+03 (T003) = 1.17996+03 (T004) = 1.33392+03 (T005) = 1.33370+03 (T006) = 1.27990+03
 (T007) = 1.22610+03 (T008) = 1.17570+03 (T009) = 1.12531+03 (T010) = 1.07847+03 (T011) = 1.03163+03
 (T012) = 1.02649+03 (T013) = 1.02770+03 (T014) = 1.02890+03 (T015) = 1.02601+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.27307+03 (T003) = 1.18009+03 (T004) = 1.33392+03 (T005) = 1.33392+03 (T006) = 1.28036+03
 (T007) = 1.22681+03 (T008) = 1.17653+03 (T009) = 1.12625+03 (T010) = 1.07956+03 (T011) = 1.03286+03
 (T012) = 1.02696+03 (T013) = 1.02836+03 (T014) = 1.02977+03 (T015) = 1.02626+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.27593+03 (T003) = 1.18091+03 (T004) = 1.33505+03 (T005) = 1.33392+03 (T006) = 1.28066+03
 (T007) = 1.22740+03 (T008) = 1.17738+03 (T009) = 1.12735+03 (T010) = 1.08054+03 (T011) = 1.03373+03
 (T012) = 1.02773+03 (T013) = 1.02902+03 (T014) = 1.03030+03 (T015) = 1.02677+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.27873+03 (T003) = 1.18152+03 (T004) = 1.33594+03 (T005) = 1.33505+03 (T006) = 1.28106+03
 (T007) = 1.22708+03 (T008) = 1.17796+03 (T009) = 1.12884+03 (T010) = 1.08168+03 (T011) = 1.03452+03
 (T012) = 1.02888+03 (T013) = 1.02972+03 (T014) = 1.03057+03 (T015) = 1.02710+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.28147+03 (T003) = 1.18240+03 (T004) = 1.33702+03 (T005) = 1.33594+03 (T006) = 1.28164+03
 (T007) = 1.22734+03 (T008) = 1.17835+03 (T009) = 1.12935+03 (T010) = 1.08278+03 (T011) = 1.03621+03
 (T012) = 1.03007+03 (T013) = 1.03053+03 (T014) = 1.03098+03 (T015) = 1.02779+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.28415+03 (T003) = 1.18354+03 (T004) = 1.33822+03 (T005) = 1.33695+03 (T006) = 1.28230+03
 (T007) = 1.22765+03 (T008) = 1.17872+03 (T009) = 1.12979+03 (T010) = 1.08368+03 (T011) = 1.03757+03
 (T012) = 1.03162+03 (T013) = 1.03142+03 (T014) = 1.03121+03 (T015) = 1.02886+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.28679+03 (T003) = 1.18477+03 (T004) = 1.33976+03 (T005) = 1.33822+03 (T006) = 1.28305+03
 (T007) = 1.22788+03 (T008) = 1.17907+03 (T009) = 1.13026+03 (T010) = 1.08443+03 (T011) = 1.03860+03
 (T012) = 1.03286+03 (T013) = 1.03241+03 (T014) = 1.03197+03 (T015) = 1.02977+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.28938+03 (T003) = 1.18556+03 (T004) = 1.34101+03 (T005) = 1.33976+03 (T006) = 1.28400+03
 (T007) = 1.22823+03 (T008) = 1.17938+03 (T009) = 1.13052+03 (T010) = 1.08509+03 (T011) = 1.03966+03
 (T012) = 1.03333+03 (T013) = 1.03339+03 (T014) = 1.03344+03 (T015) = 1.03012+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.29191+03 (T003) = 1.18619+03 (T004) = 1.34183+03 (T005) = 1.34101+03 (T006) = 1.28507+03
 (T007) = 1.22912+03 (T008) = 1.17975+03 (T009) = 1.13038+03 (T010) = 1.08558+03 (T011) = 1.04078+03
 (T012) = 1.03463+03 (T013) = 1.03432+03 (T014) = 1.03401+03 (T015) = 1.03056+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 3.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.29439+03 (T003) = 1.18687+03 (T004) = 1.34288+03 (T005) = 1.34183+03 (T006) = 1.28612+03
 (T007) = 1.23041+03 (T008) = 1.18032+03 (T009) = 1.13024+03 (T010) = 1.08587+03 (T011) = 1.04150+03
 (T012) = 1.03621+03 (T013) = 1.03535+03 (T014) = 1.03449+03 (T015) = 1.03086+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.29680+03 (T003) = 1.18721+03 (T004) = 1.34342+03 (T005) = 1.34288+03 (T006) = 1.28711+03
 (T007) = 1.23134+03 (T008) = 1.18104+03 (T009) = 1.13075+03 (T010) = 1.08612+03 (T011) = 1.04149+03
 (T012) = 1.03773+03 (T013) = 1.03647+03 (T014) = 1.03521+03 (T015) = 1.03099+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.29916+03 (T003) = 1.18820+03 (T004) = 1.34435+03 (T005) = 1.34342+03 (T006) = 1.28807+03
 (T007) = 1.23271+03 (T008) = 1.18185+03 (T009) = 1.13099+03 (T010) = 1.08642+03 (T011) = 1.04184+03
 (T012) = 1.03837+03 (T013) = 1.03761+03 (T014) = 1.03686+03 (T015) = 1.03205+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.30148+03 (T003) = 1.18951+03 (T004) = 1.34581+03 (T005) = 1.34435+03 (T006) = 1.28889+03
 (T007) = 1.23343+03 (T008) = 1.18279+03 (T009) = 1.13214+03 (T010) = 1.08675+03 (T011) = 1.04136+03
 (T012) = 1.03963+03 (T013) = 1.03869+03 (T014) = 1.03775+03 (T015) = 1.03322+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01

(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.30377+03 (T003) = 1.19067+03 (T004) = 1.34734+03 (T005) = 1.34581+03 (T006) = 1.28983+03
 (T007) = 1.23386+03 (T008) = 1.18356+03 (T009) = 1.13326+03 (T010) = 1.08737+03 (T011) = 1.04148+03
 (T012) = 1.04078+03 (T013) = 1.03981+03 (T014) = 1.03885+03 (T015) = 1.03401+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.30602+03 (T003) = 1.19118+03 (T004) = 1.34815+03 (T005) = 1.34734+03 (T006) = 1.29090+03
 (T007) = 1.23447+03 (T008) = 1.18427+03 (T009) = 1.13406+03 (T010) = 1.08807+03 (T011) = 1.04207+03
 (T012) = 1.04116+03 (T013) = 1.04087+03 (T014) = 1.04057+03 (T015) = 1.03422+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.30822+03 (T003) = 1.19213+03 (T004) = 1.34898+03 (T005) = 1.34815+03 (T006) = 1.29204+03
 (T007) = 1.23593+03 (T008) = 1.18501+03 (T009) = 1.13409+03 (T010) = 1.08870+03 (T011) = 1.04332+03
 (T012) = 1.04174+03 (T013) = 1.04181+03 (T014) = 1.04187+03 (T015) = 1.03529+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.31039+03 (T003) = 1.19348+03 (T004) = 1.35043+03 (T005) = 1.34898+03 (T006) = 1.29302+03
 (T007) = 1.23705+03 (T008) = 1.18596+03 (T009) = 1.13488+03 (T010) = 1.08919+03 (T011) = 1.04350+03
 (T012) = 1.04166+03 (T013) = 1.04264+03 (T014) = 1.04363+03 (T015) = 1.03653+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.31253+03 (T003) = 1.19483+03 (T004) = 1.35192+03 (T005) = 1.35043+03 (T006) = 1.29405+03
 (T007) = 1.23767+03 (T008) = 1.18685+03 (T009) = 1.13602+03 (T010) = 1.08986+03 (T011) = 1.04370+03
 (T012) = 1.04136+03 (T013) = 1.04329+03 (T014) = 1.04522+03 (T015) = 1.03775+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03

(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.31464+03 (T003) = 1.19613+03 (T004) = 1.35332+03 (T005) = 1.35192+03 (T006) = 1.29517+03
 (T007) = 1.23843+03 (T008) = 1.18768+03 (T009) = 1.13693+03 (T010) = 1.09060+03 (T011) = 1.04427+03
 (T012) = 1.04113+03 (T013) = 1.04379+03 (T014) = 1.04645+03 (T015) = 1.03894+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 4.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.31673+03 (T003) = 1.19755+03 (T004) = 1.35476+03 (T005) = 1.35332+03 (T006) = 1.29640+03
 (T007) = 1.23947+03 (T008) = 1.18849+03 (T009) = 1.13751+03 (T010) = 1.09136+03 (T011) = 1.04520+03
 (T012) = 1.04234+03 (T013) = 1.04426+03 (T014) = 1.04617+03 (T015) = 1.04035+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

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TIME = 5.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.31881+03 (T003) = 1.19917+03 (T004) = 1.35637+03 (T005) = 1.35475+03 (T006) = 1.29763+03
 (T007) = 1.24050+03 (T008) = 1.18939+03 (T009) = 1.13828+03 (T010) = 1.09205+03 (T011) = 1.04581+03
 (T012) = 1.04332+03 (T013) = 1.04487+03 (T014) = 1.04643+03 (T015) = 1.04197+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.32087+03 (T003) = 1.20088+03 (T004) = 1.35812+03 (T005) = 1.35637+03 (T006) = 1.29894+03
 (T007) = 1.24152+03 (T008) = 1.19029+03 (T009) = 1.13906+03 (T010) = 1.09278+03 (T011) = 1.04650+03
 (T012) = 1.04340+03 (T013) = 1.04545+03 (T014) = 1.04750+03 (T015) = 1.04363+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.32292+03 (T003) = 1.20264+03 (T004) = 1.35975+03 (T005) = 1.35812+03 (T006) = 1.30033+03
 (T007) = 1.24253+03 (T008) = 1.19121+03 (T009) = 1.13989+03 (T010) = 1.09351+03 (T011) = 1.04713+03
 (T012) = 1.04342+03 (T013) = 1.04594+03 (T014) = 1.04847+03 (T015) = 1.04554+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02

(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.32496+03 (T003) = 1.20391+03 (T004) = 1.36175+03 (T005) = 1.35998+03 (T006) = 1.30182+03
 (T007) = 1.24365+03 (T008) = 1.19216+03 (T009) = 1.14067+03 (T010) = 1.09426+03 (T011) = 1.04785+03
 (T012) = 1.04423+03 (T013) = 1.04640+03 (T014) = 1.04858+03 (T015) = 1.04607+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.32696+03 (T003) = 1.20431+03 (T004) = 1.36245+03 (T005) = 1.36175+03 (T006) = 1.30342+03
 (T007) = 1.24509+03 (T008) = 1.19314+03 (T009) = 1.14119+03 (T010) = 1.09502+03 (T011) = 1.04885+03
 (T012) = 1.04520+03 (T013) = 1.04695+03 (T014) = 1.04869+03 (T015) = 1.04617+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.32892+03 (T003) = 1.20482+03 (T004) = 1.36320+03 (T005) = 1.36245+03 (T006) = 1.30492+03
 (T007) = 1.24738+03 (T008) = 1.19436+03 (T009) = 1.14133+03 (T010) = 1.09562+03 (T011) = 1.04991+03
 (T012) = 1.04587+03 (T013) = 1.04754+03 (T014) = 1.04921+03 (T015) = 1.04644+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33083+03 (T003) = 1.20570+03 (T004) = 1.36389+03 (T005) = 1.36320+03 (T006) = 1.30613+03
 (T007) = 1.24907+03 (T008) = 1.19584+03 (T009) = 1.14260+03 (T010) = 1.09617+03 (T011) = 1.04974+03
 (T012) = 1.04652+03 (T013) = 1.04814+03 (T014) = 1.04977+03 (T015) = 1.04752+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33272+03 (T003) = 1.20682+03 (T004) = 1.36532+03 (T005) = 1.36389+03 (T006) = 1.30719+03
 (T007) = 1.25049+03 (T008) = 1.19733+03 (T009) = 1.14418+03 (T010) = 1.09695+03 (T011) = 1.04971+03
 (T012) = 1.04713+03 (T013) = 1.04876+03 (T014) = 1.05040+03 (T015) = 1.04832+03 (T016) = 1.00000+02

(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33457+03 (T003) = 1.20727+03 (T004) = 1.36608+03 (T005) = 1.36532+03 (T006) = 1.30823+03
 (T007) = 1.25114+03 (T008) = 1.19867+03 (T009) = 1.14620+03 (T010) = 1.09804+03 (T011) = 1.04987+03
 (T012) = 1.04765+03 (T013) = 1.04936+03 (T014) = 1.05107+03 (T015) = 1.04845+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 5.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33639+03 (T003) = 1.20765+03 (T004) = 1.36663+03 (T005) = 1.36608+03 (T006) = 1.30933+03
 (T007) = 1.25257+03 (T008) = 1.19986+03 (T009) = 1.14716+03 (T010) = 1.09926+03 (T011) = 1.05136+03
 (T012) = 1.04913+03 (T013) = 1.05001+03 (T014) = 1.05089+03 (T015) = 1.04866+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33815+03 (T003) = 1.20819+03 (T004) = 1.36725+03 (T005) = 1.36663+03 (T006) = 1.31027+03
 (T007) = 1.25391+03 (T008) = 1.20113+03 (T009) = 1.14834+03 (T010) = 1.10039+03 (T011) = 1.05244+03
 (T012) = 1.04977+03 (T013) = 1.05076+03 (T014) = 1.05176+03 (T015) = 1.04913+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.33989+03 (T003) = 1.20891+03 (T004) = 1.36804+03 (T005) = 1.36725+03 (T006) = 1.31110+03
 (T007) = 1.25496+03 (T008) = 1.20236+03 (T009) = 1.14976+03 (T010) = 1.10156+03 (T011) = 1.05335+03
 (T012) = 1.04974+03 (T013) = 1.05144+03 (T014) = 1.05315+03 (T015) = 1.04977+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34159+03 (T003) = 1.20976+03 (T004) = 1.36893+03 (T005) = 1.36804+03 (T006) = 1.31188+03
 (T007) = 1.25572+03 (T008) = 1.20349+03 (T009) = 1.15127+03 (T010) = 1.10279+03 (T011) = 1.05431+03

(T012) = 1.04928+03 (T013) = 1.05196+03 (T014) = 1.05464+03 (T015) = 1.05058+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34327+03 (T003) = 1.21036+03 (T004) = 1.36996+03 (T005) = 1.36893+03 (T006) = 1.31268+03
 (T007) = 1.25642+03 (T008) = 1.20449+03 (T009) = 1.15256+03 (T010) = 1.10408+03 (T011) = 1.05559+03
 (T012) = 1.05014+03 (T013) = 1.05239+03 (T014) = 1.05464+03 (T015) = 1.05075+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34491+03 (T003) = 1.21076+03 (T004) = 1.37049+03 (T005) = 1.36996+03 (T006) = 1.31354+03
 (T007) = 1.25711+03 (T008) = 1.20535+03 (T009) = 1.15360+03 (T010) = 1.10535+03 (T011) = 1.05711+03
 (T012) = 1.05136+03 (T013) = 1.05294+03 (T014) = 1.05452+03 (T015) = 1.05103+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34652+03 (T003) = 1.21137+03 (T004) = 1.37105+03 (T005) = 1.37049+03 (T006) = 1.31434+03
 (T007) = 1.25820+03 (T008) = 1.20624+03 (T009) = 1.15429+03 (T010) = 1.10646+03 (T011) = 1.05863+03
 (T012) = 1.05244+03 (T013) = 1.05360+03 (T014) = 1.05475+03 (T015) = 1.05170+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34810+03 (T003) = 1.21276+03 (T004) = 1.37211+03 (T005) = 1.37105+03 (T006) = 1.31507+03
 (T007) = 1.25908+03 (T008) = 1.20716+03 (T009) = 1.15523+03 (T010) = 1.10748+03 (T011) = 1.05972+03
 (T012) = 1.05326+03 (T013) = 1.05430+03 (T014) = 1.05535+03 (T015) = 1.05342+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.34968+03 (T003) = 1.21415+03 (T004) = 1.37391+03 (T005) = 1.37224+03 (T006) = 1.31577+03

(T007) = 1.25930+03 (T008) = 1.20800+03 (T009) = 1.15671+03 (T010) = 1.10850+03 (T011) = 1.06028+03
(T012) = 1.05427+03 (T013) = 1.05504+03 (T014) = 1.05581+03 (T015) = 1.05439+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.35124+03 (T003) = 1.21479+03 (T004) = 1.37494+03 (T005) = 1.37391+03 (T006) = 1.31669+03
(T007) = 1.25947+03 (T008) = 1.20861+03 (T009) = 1.15776+03 (T010) = 1.10963+03 (T011) = 1.06150+03
(T012) = 1.05559+03 (T013) = 1.05585+03 (T014) = 1.05611+03 (T015) = 1.05464+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 6.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.35277+03 (T003) = 1.21488+03 (T004) = 1.37542+03 (T005) = 1.37494+03 (T006) = 1.31774+03
(T007) = 1.26054+03 (T008) = 1.20920+03 (T009) = 1.15787+03 (T010) = 1.11059+03 (T011) = 1.06332+03
(T012) = 1.05710+03 (T013) = 1.05678+03 (T014) = 1.05646+03 (T015) = 1.05434+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.35426+03 (T003) = 1.21515+03 (T004) = 1.37553+03 (T005) = 1.37542+03 (T006) = 1.31871+03
(T007) = 1.26199+03 (T008) = 1.20998+03 (T009) = 1.15796+03 (T010) = 1.11129+03 (T011) = 1.06462+03
(T012) = 1.05865+03 (T013) = 1.05781+03 (T014) = 1.05697+03 (T015) = 1.05477+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.35571+03 (T003) = 1.21582+03 (T004) = 1.37630+03 (T005) = 1.37553+03 (T006) = 1.31945+03
(T007) = 1.26337+03 (T008) = 1.21096+03 (T009) = 1.15855+03 (T010) = 1.11182+03 (T011) = 1.06510+03
(T012) = 1.05972+03 (T013) = 1.05892+03 (T014) = 1.05812+03 (T015) = 1.05534+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01

(T002) = 2.35714+03 (T003) = 1.21639+03 (T004) = 1.37705+03 (T005) = 1.37630+03 (T006) = 1.32010+03
 (T007) = 1.26389+03 (T008) = 1.21191+03 (T009) = 1.15993+03 (T010) = 1.11251+03 (T011) = 1.06509+03
 (T012) = 1.06025+03 (T013) = 1.05995+03 (T014) = 1.05964+03 (T015) = 1.05573+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.35854+03 (T003) = 1.21678+03 (T004) = 1.37758+03 (T005) = 1.37705+03 (T006) = 1.32079+03
 (T007) = 1.26453+03 (T008) = 1.21273+03 (T009) = 1.16093+03 (T010) = 1.11335+03 (T011) = 1.06577+03
 (T012) = 1.06151+03 (T013) = 1.06095+03 (T014) = 1.06039+03 (T015) = 1.05599+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.35991+03 (T003) = 1.21720+03 (T004) = 1.37814+03 (T005) = 1.37758+03 (T006) = 1.32147+03
 (T007) = 1.26536+03 (T008) = 1.21350+03 (T009) = 1.16165+03 (T010) = 1.11419+03 (T011) = 1.06673+03
 (T012) = 1.06331+03 (T013) = 1.06204+03 (T014) = 1.06077+03 (T015) = 1.05626+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36125+03 (T003) = 1.21782+03 (T004) = 1.37867+03 (T005) = 1.37814+03 (T006) = 1.32210+03
 (T007) = 1.26606+03 (T008) = 1.21427+03 (T009) = 1.16248+03 (T010) = 1.11500+03 (T011) = 1.06752+03
 (T012) = 1.06462+03 (T013) = 1.06324+03 (T014) = 1.06186+03 (T015) = 1.05697+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36258+03 (T003) = 1.21900+03 (T004) = 1.37979+03 (T005) = 1.37867+03 (T006) = 1.32267+03
 (T007) = 1.26668+03 (T008) = 1.21503+03 (T009) = 1.16338+03 (T010) = 1.11578+03 (T011) = 1.06819+03
 (T012) = 1.06490+03 (T013) = 1.06436+03 (T014) = 1.06382+03 (T015) = 1.05820+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36390+03 (T003) = 1.22027+03 (T004) = 1.38106+03 (T005) = 1.37979+03 (T006) = 1.32330+03
 (T007) = 1.26680+03 (T008) = 1.21567+03 (T009) = 1.16454+03 (T010) = 1.11664+03 (T011) = 1.06874+03
 (T012) = 1.06520+03 (T013) = 1.06532+03 (T014) = 1.06545+03 (T015) = 1.05948+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36523+03 (T003) = 1.22137+03 (T004) = 1.38247+03 (T005) = 1.38106+03 (T006) = 1.32405+03
 (T007) = 1.26704+03 (T008) = 1.21619+03 (T009) = 1.16534+03 (T010) = 1.11751+03 (T011) = 1.06968+03
 (T012) = 1.06577+03 (T013) = 1.06618+03 (T014) = 1.06660+03 (T015) = 1.06026+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 7.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36653+03 (T003) = 1.22174+03 (T004) = 1.38293+03 (T005) = 1.38247+03 (T006) = 1.32500+03
 (T007) = 1.26754+03 (T008) = 1.21661+03 (T009) = 1.16567+03 (T010) = 1.11835+03 (T011) = 1.07103+03
 (T012) = 1.06664+03 (T013) = 1.06703+03 (T014) = 1.06741+03 (T015) = 1.06055+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36782+03 (T003) = 1.22281+03 (T004) = 1.38374+03 (T005) = 1.38293+03 (T006) = 1.32597+03
 (T007) = 1.26901+03 (T008) = 1.21716+03 (T009) = 1.16530+03 (T010) = 1.11893+03 (T011) = 1.07256+03
 (T012) = 1.06759+03 (T013) = 1.06788+03 (T014) = 1.06817+03 (T015) = 1.06188+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.36910+03 (T003) = 1.22446+03 (T004) = 1.38516+03 (T005) = 1.38367+03 (T006) = 1.32676+03
 (T007) = 1.26984+03 (T008) = 1.21794+03 (T009) = 1.16603+03 (T010) = 1.11932+03 (T011) = 1.07261+03
 (T012) = 1.06815+03 (T013) = 1.06872+03 (T014) = 1.06929+03 (T015) = 1.06377+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.37040+03 (T003) = 1.22622+03 (T004) = 1.38699+03 (T005) = 1.38496+03 (T006) = 1.32759+03
(T007) = 1.27023+03 (T008) = 1.21866+03 (T009) = 1.16708+03 (T010) = 1.11987+03 (T011) = 1.07266+03
(T012) = 1.06874+03 (T013) = 1.06951+03 (T014) = 1.07029+03 (T015) = 1.06545+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.37170+03 (T003) = 1.22744+03 (T004) = 1.38838+03 (T005) = 1.38684+03 (T006) = 1.32865+03
(T007) = 1.27047+03 (T008) = 1.21920+03 (T009) = 1.16793+03 (T010) = 1.12058+03 (T011) = 1.07323+03
(T012) = 1.06939+03 (T013) = 1.07028+03 (T014) = 1.07118+03 (T015) = 1.06650+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.37300+03 (T003) = 1.22839+03 (T004) = 1.38944+03 (T005) = 1.38829+03 (T006) = 1.32989+03
(T007) = 1.27150+03 (T008) = 1.21975+03 (T009) = 1.16799+03 (T010) = 1.12122+03 (T011) = 1.07445+03
(T012) = 1.07117+03 (T013) = 1.07111+03 (T014) = 1.07105+03 (T015) = 1.06735+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.37429+03 (T003) = 1.22931+03 (T004) = 1.39037+03 (T005) = 1.38934+03 (T006) = 1.33112+03
(T007) = 1.27290+03 (T008) = 1.22048+03 (T009) = 1.16806+03 (T010) = 1.12167+03 (T011) = 1.07528+03
(T012) = 1.07256+03 (T013) = 1.07210+03 (T014) = 1.07164+03 (T015) = 1.06825+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.37557+03 (T003) = 1.23034+03 (T004) = 1.39146+03 (T005) = 1.39026+03 (T006) = 1.33226+03
(T007) = 1.27426+03 (T008) = 1.22139+03 (T009) = 1.16852+03 (T010) = 1.12204+03 (T011) = 1.07557+03
(T012) = 1.07300+03 (T013) = 1.07306+03 (T014) = 1.07313+03 (T015) = 1.06922+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.37684+03 (T003) = 1.23141+03 (T004) = 1.39252+03 (T005) = 1.39127+03 (T006) = 1.33333+03
 (T007) = 1.27540+03 (T008) = 1.22238+03 (T009) = 1.16936+03 (T010) = 1.12249+03 (T011) = 1.07562+03
 (T012) = 1.07259+03 (T013) = 1.07386+03 (T014) = 1.07514+03 (T015) = 1.07029+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.37810+03 (T003) = 1.23220+03 (T004) = 1.39366+03 (T005) = 1.39242+03 (T006) = 1.33439+03
 (T007) = 1.27635+03 (T008) = 1.22339+03 (T009) = 1.17043+03 (T010) = 1.12307+03 (T011) = 1.07570+03
 (T012) = 1.07303+03 (T013) = 1.07449+03 (T014) = 1.07595+03 (T015) = 1.07075+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 8.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.37935+03 (T003) = 1.23243+03 (T004) = 1.39403+03 (T005) = 1.39366+03 (T006) = 1.33548+03
 (T007) = 1.27730+03 (T008) = 1.22435+03 (T009) = 1.17140+03 (T010) = 1.12378+03 (T011) = 1.07616+03
 (T012) = 1.07443+03 (T013) = 1.07519+03 (T014) = 1.07595+03 (T015) = 1.07083+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38056+03 (T003) = 1.23305+03 (T004) = 1.39446+03 (T005) = 1.39396+03 (T006) = 1.33649+03
 (T007) = 1.27903+03 (T008) = 1.22541+03 (T009) = 1.17179+03 (T010) = 1.12445+03 (T011) = 1.07712+03
 (T012) = 1.07513+03 (T013) = 1.07596+03 (T014) = 1.07680+03 (T015) = 1.07165+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.10 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38176+03 (T003) = 1.23438+03 (T004) = 1.39542+03 (T005) = 1.39431+03 (T006) = 1.33728+03
 (T007) = 1.28025+03 (T008) = 1.22660+03 (T009) = 1.17295+03 (T010) = 1.12512+03 (T011) = 1.07728+03
 (T012) = 1.07546+03 (T013) = 1.07669+03 (T014) = 1.07792+03 (T015) = 1.07333+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01

(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.20 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38298+03 (T003) = 1.23627+03 (T004) = 1.39720+03 (T005) = 1.39517+03 (T006) = 1.33799+03
 (T007) = 1.28081+03 (T008) = 1.22770+03 (T009) = 1.17458+03 (T010) = 1.12598+03 (T011) = 1.07739+03
 (T012) = 1.07566+03 (T013) = 1.07733+03 (T014) = 1.07900+03 (T015) = 1.07534+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.30 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38421+03 (T003) = 1.23725+03 (T004) = 1.39883+03 (T005) = 1.39729+03 (T006) = 1.33889+03
 (T007) = 1.28048+03 (T008) = 1.22850+03 (T009) = 1.17653+03 (T010) = 1.12713+03 (T011) = 1.07772+03
 (T012) = 1.07554+03 (T013) = 1.07787+03 (T014) = 1.08020+03 (T015) = 1.07567+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.40 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38542+03 (T003) = 1.23761+03 (T004) = 1.39923+03 (T005) = 1.39883+03 (T006) = 1.34010+03
 (T007) = 1.28137+03 (T008) = 1.22908+03 (T009) = 1.17679+03 (T010) = 1.12831+03 (T011) = 1.07984+03
 (T012) = 1.07608+03 (T013) = 1.07833+03 (T014) = 1.08057+03 (T015) = 1.07598+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.50 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38661+03 (T003) = 1.23834+03 (T004) = 1.39989+03 (T005) = 1.39916+03 (T006) = 1.34120+03
 (T007) = 1.28324+03 (T008) = 1.22992+03 (T009) = 1.17660+03 (T010) = 1.12909+03 (T011) = 1.08158+03
 (T012) = 1.07714+03 (T013) = 1.07886+03 (T014) = 1.08058+03 (T015) = 1.07679+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
 (Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
 (Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.60 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
 (T002) = 2.38778+03 (T003) = 1.23936+03 (T004) = 1.40085+03 (T005) = 1.39978+03 (T006) = 1.34210+03
 (T007) = 1.28442+03 (T008) = 1.23096+03 (T009) = 1.17750+03 (T010) = 1.12972+03 (T011) = 1.08195+03
 (T012) = 1.07724+03 (T013) = 1.07942+03 (T014) = 1.08159+03 (T015) = 1.07787+03 (T016) = 1.00000+02
 (C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
 (C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03

(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.70 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.38896+03 (T003) = 1.24055+03 (T004) = 1.40196+03 (T005) = 1.40071+03 (T006) = 1.34295+03
(T007) = 1.28519+03 (T008) = 1.23196+03 (T009) = 1.17874+03 (T010) = 1.13048+03 (T011) = 1.08223+03
(T012) = 1.07712+03 (T013) = 1.07987+03 (T014) = 1.08263+03 (T015) = 1.07914+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.80 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.39013+03 (T003) = 1.24177+03 (T004) = 1.40321+03 (T005) = 1.40180+03 (T006) = 1.34384+03
(T007) = 1.28587+03 (T008) = 1.23288+03 (T009) = 1.17988+03 (T010) = 1.13136+03 (T011) = 1.08283+03
(T012) = 1.07733+03 (T013) = 1.08025+03 (T014) = 1.08316+03 (T015) = 1.08034+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 9.90 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.39131+03 (T003) = 1.24230+03 (T004) = 1.40425+03 (T005) = 1.40334+03 (T006) = 1.34481+03
(T007) = 1.28629+03 (T008) = 1.23368+03 (T009) = 1.18107+03 (T010) = 1.13231+03 (T011) = 1.08355+03
(T012) = 1.07977+03 (T013) = 1.08077+03 (T014) = 1.08177+03 (T015) = 1.08034+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

TIME = 10.00 CRITICAL NODE = 3 CRITICAL DELTA T = .41894-01 ACTUAL DELTA T = .25000-01
(T002) = 2.39245+03 (T003) = 1.24257+03 (T004) = 1.40446+03 (T005) = 1.40426+03 (T006) = 1.34590+03
(T007) = 1.28755+03 (T008) = 1.23444+03 (T009) = 1.18133+03 (T010) = 1.13322+03 (T011) = 1.08512+03
(T012) = 1.08148+03 (T013) = 1.08161+03 (T014) = 1.08174+03 (T015) = 1.08067+03 (T016) = 1.00000+02
(C002) = 9.54000-02 (C003) = 1.00000-02 (C006) = 6.66700-02 (C008) = 6.66700-02 (C010) = 6.66700-02
(C013) = 1.10000-01 (Y102) = 2.95000-02 (Y103) = 9.26670-03 (Y104) = 9.26670-03 (Y105) = 9.26670-03
(Y201) = 2.09200-01 (Y202) = 2.09200-01 (Y203) = 2.09200-01 (Y204) = 2.09200-01 (Y205) = 2.09200-01
(Q002) = 3.50000+01 (Q013) = 1.00000+00 (D005) = 1.00000-01 (D012) = 5.00000-01 (D015) = 5.00000-01

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