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IREKIN
PROGRAM FOR THE NUMERICAL SOLUTION
OF THE REACTOR KINETIC EQUATIONS

R. J. Wagner

March 1, 1963

PHILLIPS
PETROLEUM
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ATOMIC ENERGY DIVISION

NATIONAL REACTOR TESTING STATION
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OF THE REACTOR KINETIC EQUATIONS

by

R. J. Wagner

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I. INTRODUCTION

The purpose of this code is to obtain a numerical solution of the ordinary, space-independent, differential equations which describe the power behavior of a reactor in response to an arbitrary function of reactivity. In addition, the code yields numerical solutions to other ordinary differential equations which might be used to describe a particular reactor system. Some, or all, or even none of these additional differential equations may describe the feedback mechanisms representing the dependence of the reactivity of the system upon the reactor power and/or energy release. Thus, the reactivity can be represented as the sum of an arbitrary function of time and a function of the power, energy, and other variables which may be specified in the differential equations.

In methods and purpose, this code is similar to the AIREK¹ code. Neither is a complete code in the sense that subprograms must be added in order to define the particular model for the reactor feedback and to specify the desired variables and the form for the output. The IREKIN code differs from the AIREK code mainly in programming details in order to permit easier inclusion of a description of the reactor model of interest and also to reduce the computation time to some extent. The IREKIN code represents an attempt to write a flexible code, readily adaptable to any reactor kinetic problem, but yet remaining easy to use. It is hoped that through the use of the subprograms, a wide range of reactor kinetic problems with special input and output requirements can be easily accommodated.

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II. DESCRIPTION OF THE PROGRAM

A. Mathematics

1. Differential Equations Solved

The reactor kinetic equations used by the code are

$$\dot{\phi}(t) = \frac{[\rho(t) - \beta]\phi(t)}{\Lambda} + \sum_{i=1}^I \lambda_i C_i(t) + S \quad (1)$$

$$\dot{C}_i(t) = \frac{\beta f_i}{\Lambda} \phi(t) - \lambda_i C_i(t) \quad (2)$$

where:

t is the time;

ϕ is the reactor power;

C_i is the number of delayed neutrons precursors of group i ;

β is the effective delayed neutron fraction;

Λ is the prompt-neutron generation time;

ρ is the reactivity of the system; (only the time dependence has been indicated; however, the reactivity may be dependent upon other variables, as indicated earlier);

f_i is the fraction of the delayed neutrons of group i ;

λ_i is the decay constant for group i .

S is the source term.

Substituting

$$r(t) = \frac{\rho(t)}{\beta}, \text{ and } C_i(t) = \frac{\beta f_i W_i(t)}{\Lambda \lambda_i},$$

the reactor kinetic equations become

$$\dot{\phi}(t) = \frac{\beta}{\Lambda} \left[[r(t) - 1] \phi(t) + \sum_{i=1}^I f_i W_i(t) \right] + S \quad (3)$$

$$\dot{W}_i(t) = \lambda_i \phi(t) - \lambda_i W_i(t) \quad (4)$$

This is the form of the reactor kinetics equations used in the code. The energy released is given by

$$\dot{E}(t) = \varphi(t) - X\varphi(t_0) \quad (5)$$

where $\varphi(t_0)$ is the initial power and X is either 0 or 1.

If additional differential equations are required to describe the reactor system, "feedback" equations are used. These have the form,

$$X_j = a_{cj} + a_{\varphi j} \varphi(t) + a_{Ej} E(t) + \sum_{k=1}^J a_{jk} X_k(t); \quad (j=1, 2, \dots, J) \quad (6)$$

where the coefficients a_{pq} may be the time-dependent and non-linear.

As an example of the method used to handle equations with variable coefficients, consider the equation

$$X_1(t) = \cos \omega t + g_1 \varphi^2(t) + g_2 E^{g_3}(t) + g_4 X_1(t)^{1/2} \cos \omega t.$$

To convert this equation to the form of Eq. 6, the coefficients a_{pq} can be expressed as follows:

$$\begin{aligned} a_{c1} &= \cos \omega t & a_{\varphi 1} &= g_1 \varphi(t) \\ a_{E1} &= g_2 E^{g_3-1}(t) & a_{11} &= g_4 X^{-1/2}(t) \cos \omega t. \end{aligned}$$

When the numerical procedure for solving the differential equation requires the current value of the derivatives, the coefficients in Eq. 6 are first set to the above values before the derivatives are evaluated.

2. Numerical Procedures

The IREKIN program uses the modified Runge-Kutta method of Cohen² for the numerical integration. The IREKIN program provides third-, fourth- or fifth-order integration of the differential equations. The higher order approximations are better approximations to the differential equations, but require more computer time. However, considering the small amount of computer time required for the fifth-order approximation (of the order of tens of seconds for a typical problem), the fifth-order approximation is recommended.

The time increment is automatically increased or decreased during the calculations in order to maintain a specified degree of accuracy. After each set of calculations (for one time value), the program uses an empirical formula to estimate the error. If the error is too large, the

time increment is halved and the previous set of calculations is repeated. If the error is sufficiently small, the time interval is doubled for the next time step. If the estimated error is between the limits, the same time interval is used for the next time advancement.

B. General Program Description

A complete program for solving a particular reactor kinetics problem consists of (a) the IREKIN code and (b) subprograms supplied by the user. The IREKIN routine solves the general reactor kinetics equations described in the previous mathematical discussion.

The subprograms provide flexibility by allowing the user to vary input and output, change initial conditions or add any differential equations which may be required to describe the system. The subprograms are coded in FORTRAN or FAP in a specified manner and connected automatically to the IREKIN portion. A wide range of reactor kinetics problems with special requirements can be accommodated.

The IREKIN input data are entered in a standard format. Succeeding problems need to supply only data which vary from that of the previous problem. Checks are made to detect errors in the input data.

Given the delayed neutron parameters, prompt neutron generation time, the reactivity in the power equation and the coefficients for the feedback equations, the routine will compute the solution for increasing values of the independent variable, time.

Initial conditions of the reactor power, energy and delayed neutron variables are calculated in two ways: (a) initial conditions corresponding to a state of steady power and (b) initial conditions corresponding to an asymptotic exponential rise in power. The sample problems in Appendices C and D illustrate the input format.

All of the standard IREKIN input is printed. The calculated values are stored until the results for 50 time increments have been accumulated. Then the time-dependent information for each of the 50 time values is printed; this time dependent information is: power, $\phi(t)$; reactivity, $r(t)$; instantaneous reciprocal period, $\frac{\phi(t)}{\phi'(t)}$; average reciprocal period,

$$\frac{1}{\Delta t} \ln \frac{\phi(t + \Delta t)}{\phi(t)} ; \text{ delayed sum, } \sum_{i=1}^I f_i W_i(t); \text{ energy; } E(t); W_i; X_j. \text{ In}$$

addition to this standard printout, any other desired quantities may be

printed. There is a heading to identify each column. Maximum and minimum values of the results are also listed (see Appendices C and D). Calculations are terminated after the desired number of time increments or after some other specified condition has been satisfied.

A minimum of two subprograms is required in any problem. The purposes of the subprograms are described here in a general fashion. A flow chart showing their logical relation to the IREKIN code is given in Appendix A, and detailed specifications for writing these subprograms are given in Section III, USE OF THE CODE.

1. RANAL

This subroutine calculates the reactivity as a function of time and of the other variables. This subprogram is always required.

2. TEST

This function subprogram signals the IREKIN routines when a sufficient number of time advancements has been made. This subprogram is always required.

3. SPIN

This routine can be used to enter data not easily entered by the built-in input routine and to perform preliminary calculations.

4. SPSTRT

This subroutine is used to calculate the initial conditions of the power, energy, and the delayed neutron variables if the built-in routines can not be used.

5. SPRINT

This subroutine can be used to perform preliminary calculations and print out any input not printed out by the IREKIN routines.

6. GETA

This routine is used to calculate the non-constant coefficients in the feedback differential equations.

7. FINPR

This routine can be used to print out the reason the TEST subprogram halted the calculation.

8. DRVCAL

This routine can be used to calculate quantities derived from power, energy, feedback variables, reactivity, etc., and enter them in a position for the IREKIN output routines to print them out.

III. USE OF THE CODE

The IREKIN routine has been coded in FAP. However, compatibility with FORTRAN II has been maintained. The subprograms that are used with IREKIN can be coded in either FORTRAN or FAP.

In the present section, the COMMON storage layout is described first, then the format of the input data. Some of the COMMON variables have TYPE numbers associated with them; these are explained in the description of the input format which follows. A description of the output format is then given. Finally, the detailed specifications for the subprograms is presented.

A. COMMON Storage

1. INTGR (Type 0). This is a subscripted integer variable of 30 elements. The i^{th} element is designated by INTGR(i).
INTGR(1) Number of delayed groups, I. Must be at least 1, and less than 48.
INTGR(2) Number of feedback variables, J. $I + J + 2$ must be less than 50. J may be 0.
INTGR(3) Order of advancement approximation. May be 3, 4, or 5. Order of 5 is recommended.
INTGR(4) Type of start calculation. If this quantity is 0 the SPSTRT subprogram will be furnished to calculate the initial values of power, energy, and the delayed neutron variables. If this quantity is 1 the initial values correspond to steady-state conditions. If this quantity is 2, the initial conditions correspond to an asymptotic exponential rise of power. The last two conditions can be calculated by the IREKIN routines. Data input and restrictions for these calculations are given below.
INTGR(5) The number of results in addition to the standard output that is to be printed out. This quantity must be less than 50.
INTGR(6) Plot cards control. (IREKIN does not now have plotting routines; when these have been added to the code, this quantity will indicate to the program that plots of the output are to be prepared automatically.)

- INTGR(7) If this quantity is zero, the delayed neutron variables will not be printed in the output.
- INTGR(8) This quantity is used to determine whether the initial power is to be included in the calculation of the energy, as described below. If the initial power is not included in the energy calculation, a statement to this effect is printed in the output.
- INTGR(9) The maximum number of time advancements.
- INTGR(10) If this quantity is non zero, a complete octal core print-out occurs after the normal end of processing one set of data, and the calculation is terminated rather than proceeding with the next set of data. This feature is provided primarily for program checkout purposes and should not be used by the program user.

The elements INTGR(11) through INTGR(30) are available for use in the subprograms.

2. FLØAT (Type 1). This is a floating point subscripted variable of 250 elements. The i^{th} element is designated by FLØAT(i).
- FLØAT(1) Initial time, t_0 .
- FLØAT(2) Initial time increment. However, program will adjust time increment to maintain a specified accuracy.)
- FLØAT(3) Upper limit of the time increment.
- FLØAT(4) Lower limit of the time increment.
- FLØAT(5) Q upper limit.
- FLØAT(6) Q lower limit. (Q is a quantity used by the program to test the accuracy of the calculation of the power for a given time increment. Consult reference¹ for the definition and use of Q for this purpose. It is suggested that 0.001 and 0.0001 be tried initially for the Q upper limit and the Q lower limit. A case can be run with smaller Q values and checked for differences in the answers. The largest values for Q which can be tolerated should be used because decreasing the Q values decreases the time increment.)
- FLØAT(7) The ratio of the effective delayed neutron fraction to the prompt-neutron generation time, $\frac{\beta}{\Lambda}$.
- FLØAT(8) Source, S.
- FLØAT(9) Initial power, $\phi(t_0)$.

FLØAT(10) Initial energy, $E(t_0)$.

FLØAT(11) Initial period, τ .

FLØAT(12) Initial reactivity, $r(t_0)$.

The elements FLØAT(8) through FLØAT(12) are used by the built-in initial condition routines. The steady state conditions are derived by setting the derivatives in Equations(3) and (4) to zero. Thus, if both the source and the initial reactivity are non-zero,

$$\phi(t_0) = \frac{-\Lambda S}{\beta r(t_0)} \quad (7)$$

$$W_i(t_0) = \phi(t_0) . \quad (8)$$

If either the source or the reactivity is zero, then the other quantity must also be zero; the initial power, $\phi(t_0)$ is given by FLØAT(9), and Equation (7) is not used. The code checks these conditions. The initial energy is taken from FLØAT(10). INTGR(8) is used to indicate whether the initial power should be included in the energy calculation. If INTGR(8) is zero, the initial power is included in the energy calculation; i.e., X in Equation (5) equals 1.

In the initial condition routine corresponding to an asymptotic exponential power rise, the initial power is given by FLØAT(9). Then using the period τ in FLØAT(11),

$$\omega \equiv \frac{1}{\tau} , \quad (9)$$

$$W_i(t_0) = \frac{\lambda_i}{\omega + \lambda_i} , \quad (10)$$

$$r(t_0) = \omega \left[\frac{\Lambda}{\beta} + \sum_{i=1}^I \frac{f_i}{a + \lambda_i} + \frac{\Lambda S}{\beta} \right] , \quad (11)$$

$$E(t_0) = \phi(t_0) \tau . \quad (12)$$

The initial reactivity computed above is stored in REACO, and is printed out by the input print-out routine.

The elements FLØAT(13) through FLØAT(250) are available for use by the subprograms.

3. FRACT (Type 2). This is a floating point subscripted variable of 48 elements. It is used to store the delayed neutron fractions, f_i . The element FRACT(i) contains f_i .
4. DECAY (Type 2). This is a floating point subscripted variable of 48 elements. It is used to store the delayed neutron decay constants, λ_i . The element DECAY(i) contains λ_i .
5. CØNST (Type 3). This is a floating point subscripted variable of 50 elements. It is used to store the a_{cj} of Equation (6). The element CØNST(j) contains a_{cj} .
6. APØW (Type 3). This is a floating point subscripted variable of 50 elements. It is used to store $a_{\phi j}$ of Equation (6). The element APØW(j) contains $a_{\phi j}$.
7. AENG (Type 3). This is a subscripted floating point variable of 50 elements. It is used to store a_{Ej} of Equation (6). The element AENG(j) contains a_{Ej} .
8. AMATRX (Type 3). This is a double subscripted floating point variable of dimensions 50 by 50. It is used to store the a_{jk} of Equation (6). The element AMATRX(j,k) contains a_{jk} .
9. VINP (type 4). This is a subscripted floating point variable of 50 elements. It is used to store the initial conditions of the feedback variables. The element VINP(j) contains $X_j(t_0)$.
10. WRK (Type 5). This is a subscripted floating point variable of 50 elements. A non-zero quantity in WRK(j) indicates that AMATRX(j,j) will remain constant, i.e., its value is not changed by any of the subprograms. If this diagonal element of the feedback matrix is always constant, some computing time can be saved if it is so indicated. No error occurs if the diagonal element is constant and is not indicated to be constant by the WRK quantity. However, errors occur if this diagonal varies with time, and the quantity in WRK has indicated that the diagonal element is constant. A check is made at the completion of each set of input data that those diagonal elements that had been stated to be constant have the same values at the last time advancement that they had at the beginning of the calculations.

11. ~~PL~~OT (Type 6). This is a subscripted integer variable of 100 elements. (It is not used by the IREKIN routine at this time, but is intended for use in automatic plotting when this feature is added to the code.)

The input routine is able to enter data into any one of the COMMON locations thus far described. The IREKIN routine does not change any of these quantities; i.e., they always contain the quantity entered by the input routine, unless the user's subprogram changes them. The remaining COMMON locations described below are used by the IREKIN routine and either contain data that might be required by the subprograms supplied by the user, or are locations into which the user's subprograms should store data.

12. DRV A subscripted floating point variable of length 50. This quantity is used to store results that are to be printed in addition to the standard output. INTGR(5) gives the number of these quantities that are to be printed; if INTGR(5) is non-zero, then the quantities DRV(1), DRV(2), thru DRV(I) where I is the quantity in INTGR(5) will be printed. The subprograms RANAL, GETA, or DRVCAL can be used to store information in DRV.

13. X A subscripted floating point variable of length 50. This quantity contains the values of the dependent variable of the differential equations at the last successful advancement of the solution.

14. T A subscripted floating point variable of length 50. This quantity contains the current values of the dependent variables of the differential equations. Using I to represent the number of delayed neutron groups, and J to represent the number of feedback equations, the order of the dependent variables stored in T is:

T(1) contains X_1 of Eq. 6;

.

.

T(J) contains X_J of Eq. 6;

T(J+1) contains W_1 of Eq. 4;

.

.

T(J+I+1) contains the energy;

T(J+I+2) contains the power.

When computing the current value of the reactivity (RANAL subprogram) or computing the non-linear elements for the feedback equations (GETA subprogram), the variables stored in T should be used. The X variable described above has the same order of the dependent variables as the T variable.

15. ~~P~~OWER This quantity contains the current value of the power. It has the same value as the quantity T(J+I+2), and is stored here for the user's convenience in programming the subprograms.

16. ENERGY This quantity contains the current value of the energy. It has the same value as the quantity T(J+I+1), and is stored here for the user's convenience in programming the subprograms.

17. REAC This floating point quantity contains the value of the reactivity, $r(t)$, at the last successful time advancement.

18. REACO This floating point quantity contains the reactivity corresponding to the initial asymptotic period. If the start calculation for the conditions of an asymptotic exponential rise in power is used, the reactivity corresponding to that asymptotic period (period is supplied as input data in FLØAT(11)) is stored by the start calculation routine in REACO.

19. REAC2 This floating point variable contains the current value of reactivity. The RANAL subprogram must store the value of the reactivity in this location.

20. W3 After the completion of a time step, this floating point, subscripted variable contains the current value of the instantaneous reciprocal period defined by $\frac{\Phi}{\phi}$.

21. W1 This floating point quantity contains the value of the instantaneous reciprocal period at the last successful time advancement.

22. WAVG After the completion of a time step, this floating point quantity contains the average value of the reciprocal period computed from $\frac{1}{h} \ln \frac{\phi(t+h)}{\phi(t)}$, where h is the time increment.

23. HUSED At the completion of a time advancement this floating point quantity contains the time interval used in that time advancement.

24. TIME This floating point quantity contains the value of the time at the last successful time advancement.

25. TIMEA This floating point quantity contains the current value of time. When computing the current value of the reactivity (RANAL) or computing the non-linear elements for the feedback equations (GETA), this quantity should be used for the current time.

26. SFW This floating point quantity contains the current value of the summation $\sum_{i=1}^I f_i W_i(t)$.

27. HEAD This subscripted variable of length 14 is used to store the title card of a set of data. The order of the BCD information in these locations is the reverse of the normal FORTRAN subscripted variable order.

28. PAGE This integer variable contains the current page number of the output.

29. FEO If the initial power is to be included in the calculation of the energy, this quantity contains zero. If the initial power is not to be included in the calculation of the energy, this quantity contains the initial power. This quantity is set by the built in initial conditions routine. If the SPSTRT, subprogram is used, the subprogram should set this quantity.

30. LINES This integer quantity contains as a negative quantity the number of lines remaining on the output page.

31. SBØVL This quantity contains $\frac{\Lambda}{\beta}$ S. If the problem has a time dependent source, this quantity must be set to its current value by the RANAL subprogram.

32. ICT This integer quantity contains the number of time advancements that have been made.

33. TESTX This floating point quantity is set by the TEST subprogram; if zero, the time advancements are to be continued; if non-zero, the problem is to be terminated.

Appendix B contains a listing of these COMMON variables as used in the IREKIN code. A list of equivalence statements is included and may be used if desired. A list of DIMENSION, COMMON, EQUIVALENCE statements that can be used in FORTRAN subprograms is also given. Note some FORTRAN variables have been slightly changed to make them compatible with FORTRAN fixed and floating point conventions.

B. IREKIN Input Routine

The IREKIN input routine reads one title card and any number of decimal cards. The routine can store the decimal data into any position of the COMMON locations INTGR, FLOAT, FRACT, DECAY, CONST, APW, AENG, AMATRX, VINP, WRK, and PLOT. Different problems are allowed to be stacked in one job; since the IREKIN routine does not change the values in these locations, only the data that are different from the previous problem need be changed in succeeding problems.

The title card is the first card of every problem. It may contain any alphanumeric or special characters desired by the user.

The remaining cards of one problem are decimal data cards, and are all of the same format. Each card contains three control words, and 6 data words. [For those familiar with FORTRAN, the format is I2, 2I3, 6E12.0).]

Control Word 1. Type number. This number, given within parentheses in the description of the COMMON storage, is entered in column 2. (Note that only type numbers 0 through 6 are defined.) Column 1 contains a minus sign if this card is the last card of a set of data; otherwise it is either blank or contains a plus sign.

Control Word 2. The subscript, i, which is described below for each type. This quantity is punched in columns 3 through 5. There must be no minus sign and no decimal point, and the number is right justified. Leading zeros may be blank.

Control Word 3. The subscript, j, which is described below for each type. This quantity is punched in column 6 through 8. It is of the same form as Control Word 2.

Data Words.

Data Word 1 is punched as a floating point quantity in columns 9 through 20. Data Word 2 is punched as a floating point quantity in columns 21 through 32. In similar fashion, Data Words 3 through 6 are punched in 12 column fields. The floating point quantity is punched with a decimal point, and may be positioned anywhere in the 12 column field. If the quantity is minus, the sign should precede the quantity. A factor of some power of ten may be applied to the quantity; if present, this power of ten should be punched as $\pm XX$, and be right justified in the 12 columns of the field, where the $\pm XX$ represents the exponent of

ten. (For a complete description of this form of floating point input and a greater variety of form, consult the FORTRAN manual.) The data words of each type are stored as described below. In all cases, however, if the data word is blank, or minus zero, that data word is not stored, but rather is skipped. The code detects any improper type number as well as any attempt to store quantities outside of the allowed storage area.

TYPE 0. Data word 1 is stored in $INTGR(i)$, Data Word 2 is stored in $INTGR(i+1)$, and so on for Data Words 3 through 6. For example, suppose a card is punched as "bObb6bbbbbl2.Obbbbbb2.Obbbbbb...
x x x x x

(remainder of card blank)", where b represents a blank and x indicates the end of a field. The blank in column 1 means that this is not the last card of this problem, the 0 in column 2 means that this is a type 0 data card, the bb6 in columns 3 through 5 indicate that the 12.0 in columns 9 through 20 is to be placed in $INTGR(6)$. Then the 2.0 in Data Word 2 is placed in $INTGR(7)$, and no change is made in $INTGR(8)$ through $INTGR(11)$ since the Data Words 3 through 6 are blank. j is not used, but should contain blanks.

TYPE 1. Data Word 1 is stored in $FL\emptyset AT(i)$, Data Word 2 is stored in $FL\emptyset AT(i+1)$, and so on for Data Words 3 through 6. j is not used.

TYPE 2. Data Word 1 is stored in $FRACT(i)$, Data Word 2 is stored in $DECAY(i)$, Data Word 3 is stored in $FRACT(i+1)$, Data Word 4 is stored in $DECAY(i+1)$, and Data Words 5 and 6 are stored in $FRACT(i+2)$ and $DECAY(i+2)$, respectively. j is not used.

TYPE 3. If j is zero, Data Word 1 is stored in $C\emptyset NST(i)$, Data Word 2 is stored in $AP\emptyset W(i)$, Data Word 3 is stored in $AENG(i)$, Data Word 4 is stored in $AMATRX(i,1)$, Data Word 5 is stored in $AMATRX(i,2)$, and Data Word 6 is stored in $AMATRX(i,3)$.

If j is non-zero, Data Word 1 is stored in $AMATRX(i,j)$, Data Word 2 is stored in $AMATRX(i,j+1)$, Data Word 3 is stored in $AMATRX(i,j+2)$, and so on for Data Words 4 through 6.

TYPE 4. Data Word 1 is stored in $VINP(i)$, Data Word 2 is stored in $VINP(i+1)$, and so on for Data Words 3 through 6.

TYPE 5. Data Word 1 is stored in $WRK(i)$, Data Word 2 is stored in $WRK(i+1)$, and so on for Data Words 3 through 6.

Type 6. Data Word 1 is stored in $PL\emptyset T(i)$, Data Word 2 is stored in $PL\emptyset T(i+1)$, and so on for Data Words 3 through 6.

For a particular problem the only restrictions on the order of the data cards for a problem are that the first card must be the title card and the last card must be the only card with a minus sign in column 1. If more than one data card stores a quantity in a given location, the location will contain the last quantity read.

C. Output

The first page of the output produced by the IREKIN routine prints the name of the program, the title card, the date, and the time of day. Every page thereafter is headed by the title card and a page number. The time is also given at the end of processing a set of data to allow timing of the program. The input that is edited in the output or is obvious from the output are the quantities: INTGR(1) through INTGR(8); FLQAT(1) through FLQAT(12); FRACT(1) and DECAY(1) through FRACT(I) and DECAY(I) where I is the number of delay groups; CQNST, APQW, AENG, AMATRX, and WRK for the number of feedback equations. A subprogram, SPRINT, supplied by the user, can be used to print additional input data. The editing of the input edit produced by the IREKIN routine is labeled.

The output routines store the time dependent data until the results for 50 time steps have been stored. Then the time-dependent information for the 50 time values is printed in seven columns, the time column plus six columns across the page. At the top of each column is a label to identify the column. The first six time-dependent values printed are always the same quantities: Power, $\phi(t)$; reactivity, $\rho(t)$; instantaneous reciprocal period, $\frac{\phi(t)}{\phi(t)}$; average reciprocal period, $\frac{1}{h} \ln \frac{\phi(t+h)}{\phi(t)}$; the delayed sum $\sum_{i=1}^I f_i W_i$; and energy $E(t)$. The position of the remaining time-dependent information is dependent upon the number of delayed neutron groups, the number of feedback equations, and the number of derived results stored in DRV that are to be printed; these results are listed in the order just given. If INTGR(7) is zero, the delayed neutron variables are not given. The delayed neutron variable, W_i is labeled DELAY i; the feedback variables, X_j , are labeled FEEDBK j, and the quantity stored in DRV(q) are labeled DRVDV q.

When either the TEST subprogram, the check of the number of advancements, or an error terminates the time advancements, the remaining time-dependent information is printed, also the reason for the termination of

the advancements. If there are feedback equations, a check is made to determine whether any diagonal elements that were stated to be constant are now different from their values at the beginning of the calculation. The results of this check are printed. A list of the maximum and minimum values of all the time dependent information printed in the output is given.

D. Subprogram Specifications

All calls from the IREKIN routine to the subprograms supplied by the user are of the form, CALL XXXXXX; that is, there are no arguments transmitted in the calling sequence. The subprograms are described below in order of their first calling by IREKIN. Many of the requirements for subprograms such as RANAL, GETA, TEST, DRV, and SPSTRT have been mentioned in the description of COMMON storage. The other subprograms such as SPIN and SPRINT are called at (what is hoped to be) convenient times, for such uses as reading in extra data, setting input to certain values (rather than forcing the user to supply the quantities), performing preliminary calculations, and printing information about the particular reactor model. The main concern in writing these subprograms is knowing when the IREKIN routine has stored certain values in the COMMON storage, and when IREKIN expects other values to be stored. This timing will be described below, and the flow chart in Appendix A has been drawn primarily to show the relationship and the timing of the subprograms to the IREKIN routine. Note that only two subprograms must be furnished -- RANAL and TEST. If a subprogram is not needed, it is not necessary to furnish one. The IREKIN routine contains dummy subprograms to satisfy the BSS loader requirements.

1. SPIN. This subroutine is entered immediately after the standard input routine. The title of the program and the title card have been printed. The IREKIN routine expects to be able to print the input edits up to and including the printout of the delayed neutron parameters on the first page. If printing is done in this subprogram, such that this input edit will overflow the page, a statement, CALL HEADWR, can be used to restore the page, and print the title card and new page number. If the user wishes to set any of the INTGR(1), INTGR(2), INTGR(4), INTGR(5), and INTGR(8) quantities by programming rather than by input data, it should be done at this point, since index parameters are set at this point and branches are made depending upon the values of these parameters.

Also, the quantities FLOAT(1) through FLOAT(12), FRACT, DECAY, VINP, and WRK should be set either by this subprogram or by SPSTRT if it is used.

2. SPSTRT. This subroutine, if used, must compute and/or move from the input area the initial values of power, energy, and the delayed neutron variable, W_1 , and store them in their proper location in the T and X storage area. In addition, the subroutine should compute the initial values of the average reciprocal period and the instantaneous period to be stored in WAVG and W3, respectively. The IREKIN routine prints a statement indicating that SPSTRT has been used rather than a built-in routine. If this subroutine prints any information, this information precedes the statement that the subprogram SPSTRT was used. The same comments about page overflow described for the SPIN subprogram apply here.

3. SPRINT. This subroutine is entered just before the initial conditions are transferred to the output area and the solution of the differential equations is begun. There have been no entries to RANAL or GETA at this point, thus calculations which need to be made only once can be done here or in any of the previously entered subprograms. This subprogram can set the initial values of the feedback variables; but if done here, the initial conditions must be set in their proper location in the T and X common area, not in VINP. This subprogram is the best place to print out any information describing the reactor model, or referencing a description of the model. Any input data not printed by the standard edit routines should be printed here. The quantity, LINES, contains the number of lines remaining on the page to be printed as a negative number. A statement, CALL HEADWR, can be used to restore the page and print the title and new page number. It is not necessary to restore the printer after this printout since the IREKIN routine does this before printing any additional results.

4. RANAL. This subprogram must compute the current value of the reactivity, $\rho(t)$, and store the result in REAC2. If the source is time-dependent, the current value of $\frac{S\Lambda}{\beta}$ must be stored in SBØVL. The current values of the variables in the differential equations are stored in T. The current values of power and energy are also stored in PØWER and ENERGY. Quantities of interest that are calculated while computing the reactivity can be stored in DRV and printed by the output routine.

5. GETA. This subroutine must compute current values of the coefficients in Eq. 6, and store them in their proper locations in CONST, APØW, AENG, or AMATRIX. The time and the values of the variables of the differential equations are as described for RANAL. Quantities of interest can be stored in DRV for printing.

6. TEST. This subroutine must examine some criteria for determining whether a sufficient number of time advancements has been made. If the time advancements are to continue, TESTX must be set to zero. If the time advancements are not to be computed, TESTX must be set to a non-zero value. In FAP-coded subprograms, it is necessary only to set the accumulator to zero or non-zero, and return by TRA 2,4. The locations of the current time and the values of the variables of the differential equations are as described for RANAL.

7. FINPR. This subprogram is called immediately after a return from the TEST subprogram which indicates that the advancement of the solution of the differential equations is to be terminated. This routine can be used to print the reason that the TEST subroutine halted the computation and to perform final calculations. If no subprogram is furnished, a statement, "PROBLEM ENDED BY TEST SUBROUTINE" is printed.

E. Operating Instructions.

The IREKIN program has been written to operate under the current IBM FORTRAN Monitor system. Some care must be used in assembling the card decks. It is assumed that the user has a binary deck of the IREKIN routine. If an "assemble and execute" run is to be made, the card decks are arranged as outlined in the FORTRAN Monitor instructions. If any binary decks are available for the users subprograms, they must be placed in front of the binary deck of the IREKIN routine. If this is not done, transfers are set up to the dummy subprograms furnished by IREKIN, ignoring the subprograms supplied by the user.

Appendices C and D contain brief descriptions of two models of reactor behavior. The coding for the subprograms, one in FAP and the other in FORTRAN and listings of input and output data for a sample problem are given. The sample problem in Appendix C includes the solution to two feedback equations,

$$\dot{X}_1 = X_1, \quad \dot{X}_2 = X_1 + X_2$$

These are not part of the reactor model, but are included for illustrative purposes. These examples are only intended to illustrate the code, and the coding of the subprograms. While the coding does represent models of reactor behavior, these models are not the final versions, and the data in some cases are fictitious.

IV. REFERENCES

1. Schwartz, A., "Generalized Reactor Kinetics Code, AIREK II".
NAA-SR-MEMO 4980, (February 15, 1960).
2. Cohen, E. R., "Some topics in Reactor Kinetics", Second International Conference on Peaceful Uses of Atomic Energy, Geneva, Paper 629, (September 1958).

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Appendix A

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Appendix B

C	THE FOLLOWING DIMENSION AND COMMON STATEMENTS ARE REQUIRED IN	00
C	FORTRAN SUBPROGRAMS USED WITH IREKIN. OTHERS CAN BE ADDED.	05
	DIMENSION INTGR%300, FLOAT%2500, FRACT%480, DECAY%480, CONST%500	10
	1 , APOW%500, AENG%500, AMATRX%50,500, VINP%500, WRK%500, PLOT%1000	15
	2 , DRV%500, X%500, T%500, HEAD%140	20
	COMMON INTGR, FLOAT, FRACT, DECAY, CONST, APOW, AENG, AMATRX,	25
	1 VINP, WRK, PLOT, DRV, X, T, POWER, ENERGY, REAC, REACO, REAC2,	30
	2 W3, W1, WAVG, HUSED, TIME, TIMEA, SFW, HEAD, PAGE, FEO, LINES,	
	3 SBOVL, ICT, TESTX	
C	THE FOLLOWING EQUIVALENCE STATEMENT IS OPTIONAL. THE FIRST ENTRY	45
C	IS MERELY TO MAINTAIN THE ORDER SPECIFIED BY COMMON.	50
	EQUIVALENCE %INTGR%10, ZZZZZZ%, %FLOAT%10, TINP%, %FLOAT%20, HINP%,	55
	2 %FLOAT%30, HUP%, %FLOAT%40, HLOW%, %FLOAT%50, UPLIM%, %FLOAT%60, FLOLIM%	60
	3 , %FLOAT%70, BOVL%, %FLOAT%80, SOURCE%, %FLOAT%90, PO%, %FLOAT%100, EO%,	65
	4 %FLOAT%110, TAU%, %FLOAT%120, RO%	70
*	THE FOLLOWING EQUIVALENCE AND COMMON STATEMENTS ARE TO BE USED	
*	IN FAP CODED SUBPROGRAMS USED WITH IREKIN. OTHERS CAN BE ADDED.	
MAXVAR	EQU 50	
INTGR	COMMON 30	00000190
FLOAT	COMMON 250	00000200
FRACT	COMMON MAXVAR-2	157300
DECAY	COMMON MAXVAR-2	151100
CONST	COMMON MAXVAR	157500
APOW	COMMON MAXVAR	157600
AENG	COMMON MAXVAR	157700
AMATRX	COMMON MAXVAR*MAXVAR	157800
VINP	COMMON MAXVAR	157900
WRK	COMMON MAXVAR	158000
PLOT	COMMON 100	158100
DRV	COMMON MAXVAR	00000630
X	COMMON MAXVAR	158300
T	COMMON MAXVAR	158400
POWER	COMMON 1	158500
ENERGY	COMMON 1	158600
REAC	COMMON 1	158700
REACO	COMMON 1	158800
REAC2	COMMON 1	158900
W3	COMMON 1	159000
W1	COMMON 1	159100
WAVG	COMMON 1	159200
HUSED	COMMON 1	159300
TIME	COMMON 1	159400
TIMEA	COMMON 1	159500
SFW	COMMON 1	159600
HEAD	COMMON 14	159700
PAGE	COMMON 1	159800
FEO	COMMON 1	159900
LINES	COMMON 1	160000
SBOVL	COMMON 1	00000480
ICT	COMMON 1	
TESTX	COMMON 1	
*	THE FOLLOWING EQUIVALENCE STATEMENTS ARE OPTIONAL	
TINP	EQU FLOAT	160200
HINP	EQU FLOAT-1	160300
HUP	EQU FLOAT-2	160400
HLOW	EQU FLOAT-3	160500
UPLIM	EQU FLOAT-4	160600
LOLIM	EQU FLOAT-5	160700
ROVL	EQU FLOAT-6	160800
SOURCE	EQU FLOAT-7	160900
PO	EQU FLOAT-8	161000
EO	EQU FLOAT-9	161100
TAU	EQU FLOAT-10	161200
RO	EQU FLOAT-11	161300

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Appendix C

SAMPLE PROBLEM USING FAP

IREKIN Subprograms for SNAP-2/10A Reactor

These subprograms contain routines for representing various models for the reactivity feedback of the SNAP-2/10A reactor. The models classed in Model Series A are based upon a formulation by A. A. Wasserman and S. O. Johnson in a set of notes, entitled "Correlative Model for SNAP Reactor Kinetics", (September 10, 1962). In this formulation, the feedback reactivity is taken to be a function only of the energy released. The formulation includes expressions to represent the effects of axial fuel expansion, bound-hydrogen upscattering, zirconium hydride dissociation, and core disassembly.

The subprograms RANAL, TEST, SPRINT and FINPR describe the reactor feedback equation and print out the input which is not common to IREKIN.

The input reactivity function, $r_{in}(t)$, is given by

$$r_{in}(t) = r_0 + r_1 t; \quad [(r_0 + r_1 t) \leq r_2] \quad (1)$$

$$= r_2; \quad [(r_0 + r_1 t) > r_2] \quad (2)$$

The feedback reactivity function, $r_f(E)$, is given by

$$r_f(E) = -aE - bE^2; \quad [E \leq E_1] \quad (3)$$

$$= -aE - bE^2 + c + d(E - E_1); \quad [E_1 < E \leq E_2] \quad (4)$$

$$= aE_2 - bE_1^2 + c + d(E_2 - E_1) + f(E - E_2)^n; \quad [E > E_2] \quad (5)$$

The total reactivity function, $r(t, E)$ is given by

$$r(t, E) = r_{in}(t) + r_f(E) \quad (6)$$

The computation is ended when the power is reduced to a value less than a quantity, g , and has a negative slope. The parameters in the above equations are entered as follows:

FLØAT(21) r_0

FLØAT(22) r_1

FLØAT(23) r_2

FLØAT(24) a

FLØAT(25) b

FLØAT(26) c

FLØAT(27) d

FLØAT(28) f

FLØAT(29) g

FLØAT(30) E_1

FLØAT(31) E_2

FLØAT(32) n

REFERENCE

1. Waage, J. M., ed., "Safety Analysis Report--SNAPTRAN 2/10A-1 Safety Tests", IDO-16825, Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. (to be published)

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

```

PCC
REF
LBL      STEP,X
COUNT  150

```

0105
0110
0115
0120

00004
00104
00144
00123

ENTRY RANAL
ENTRY TEST
ENTRY SPRINT
ENTRY FINPR

0125
0130
0135
0140

REACTIVITY SUBROUTINE

014.5
015.0:

TRANSFER VECTOR

360
460
460
651

```
EXP(3
(STH)
(FIL)
HEADW
```

50
12
10
01
07
0530
0010

00004	0502.00	0	77366
00005	0300.00	0	71000
00006	0120.00	0	00024
00007	0560.00	0	77374
00010	0260.00	0	71000
00011	0760.00	0	00002
00012	0601.00	0	71226
00013	0560.00	0	71000
00014	0260.00	0	71000
00015	0131.00	0	00000
00016	0260.00	0	77373
00017	0760.00	0	00002
00020	0601.00	0	71225
00021	0600.00	0	71224
00022	0600.00	0	71223
00023	0020.00	0	00064

RANAL	CLS	FLOAT-29
	FAD	ENERGY
	TPL	AA2
	LDQ	FLOAT-23
	FMP	ENERGY
	CHS	
	STO	DRV-1
	LDQ	ENERGY
	FMP	ENERGY
	XCA	
	FMP	FLOAT-24
	CHS	
	STO	DRV-2
	STZ	DRV-3
	STZ	DRV-4
	TRA	AA1

0.155
0.160
0.165
0.170
0.175
0.180
0.185
0.190
0.195
0.200
0.205
0.210
0.215
0.220
0.225
0.230

77365
71000
00045
77374

AA2

000024	0502	00	0	77365
000025	0300	00	0	71000
000026	0120	00	0	00045
000027	0560	00	0	77374
000030	0260	00	0	71000
000031	0760	00	0	00002
000032	0601	00	0	71226
000033	0502	00	0	00466
000034	0601	00	0	71225
000035	0500	00	0	71000
000036	0302	00	0	77366
000037	0131	00	0	00000
000040	0260	00	0	77371
000041	0300	00	0	77372
000042	0601	00	0	71224
000043	0600	00	0	71223
000044	0020	00	0	00064

```

AA2      CLS      FLOAT-30
          FAD      ENERGY
          TPL      AA3
          LDQ      FLOAT-23
          FMP      ENERGY
          GHS
          STO      DRV-1
          CLS      BE12
          STO      DRV-2
          CLA      ENERGY
          FSB      FLOAT-29
          XCA
          FMP      FLOAT-26
          FAD      FLOAT-25
          STO      DRV-3
          STZ      DRV-4
          TRA      AA1

```

0235
0240
0245
0250
0255
0260
0265
0270
0275
0280
0285
0290
0295
0300
0305
0310
0315

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

PAGE 2

00045	0502	00	0	00467	AA3	CLS	AE2	0320
00046	0601	00	0	71226		STO	DRV-1	0325
00047	0502	00	0	00466		CLS	BE12	0330
BINARY CARD NO. STEP0003								
00050	0601	00	0	71225		STO	DRV-2	0335
00051	0500	00	0	00470		CLA	SET3	0340
00052	0601	00	0	71224		STO	DRV-3	0345
00053	0500	00	0	71000		CLA	ENERGY	0350
00054	0302	00	0	77365		FSB	FLOAT-30	0355
00055	0560	00	0	77364		LDQ	FLOAT-31	0360
00056	0634	00	4	00060		SXA	*+2,4	0365
00057	0074	00	4	00000		TSX	\$EXP13,4	0370
00060	0774	00	4	00000		AXT	**+4	0375
00061	0260	00	0	77370		FMP	FLOAT-27	0380
00062	0760	00	0	00002		CHS		0385
00063	0601	00	0	71223		STO	DRV-4	0390
00064	0560	00	0	77376	AA1	LDQ	FLOAT-21	0391
00065	0260	00	0	70767		FMP	TIMEA	0392
00066	0300	00	0	77377		FAD	FLOAT-20	0393
00067	0601	00	0	71227		STO	DRV	0394
00070	0302	00	0	77375		FSB	FLOAT-22	0395
00071	-0120	00	0	00074		TMI	*+3	0396
00072	0500	00	0	77375		CLA	FLOAT-22	0397
00073	0601	00	0	71227		STO	DRV	0398
BINARY CARD NO. STEP0004								
00074	0500	00	0	71226		CLA	DRV-1	0399
00075	0300	00	0	71225		FAD	DRV-2	0400
00076	0300	00	0	71224		FAD	DRV-3	0405
00077	0300	00	0	71223		FAD	DRV-4	0410
00100	0601	00	0	71222		STO	DRV-5	0415
00101	0300	00	0	71227		FAD	DRV	0420
00102	0601	00	0	70775		STO	REAC2	0425
00103	0020	00	4	00001		TRA	1,4	0430
00104	0500	00	0	77257		TEST	TEST SUBROUTINE	0435
00105	-0100	00	0	00114	TEST	CLA	FLOAT-100	00
00106	0500	00	0	71001		TNZ	*+7	05
00107	0302	00	0	77367		CLA	POWER	10
00110	-0120	00	0	00117		FSB	FLOAT-28	15
00111	0500	00	0	00111		TMI	*+7	20
00112	0601	00	0	77257		CLA	*	25
00113	0020	00	0	00117		STO	FLOAT-100	30
00114	0502	00	0	71001		TRA	*+4	35
00115	0300	00	0	77367		CLS	POWER	40
00116	0120	00	0	00121		FAD	FLOAT-28	
00117	-0754	00	0	00000		TPL	*+3	50
						ZAC		55
BINARY CARD NO. STEP0005								
00120	0020	00	4	00002		TRA	2,4	
00121	0500	00	0	00121		CLA	*	65
00122	0020	00	4	00002		TRA	2,4	
00123	0634	00	4	00132		END	PRINTING SUBROUTINE	0475
00124	0500	00	0	00472	FINPR	SXA	OUT,4	0480
						CLA	#06000000	0485

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

PAGE 3

00125	0074 00 4 00001	TSX	\$(STH),4	0490
00126	0 00001 0 00134		FMT1,,1	0495
00127	0560 00 0 77367	LDQ	FLOAT-28	
00130	-1 00000 0 00000	STR		0492
00131	0074 00 4 00002	TSX	\$(FIL),4	0496
00132	0774 00 4 00000	OUT AXT	**,4	0497
00133	0020 00 4 00001	TRA	1,4	0498
00134	740305300047	FMT1 BCI	8,(35H0PROBLEM ENDED--POWER DROPPED BELOW1PE14.6)	
00135	514622432544			
00136	602545242524			
00137	404047466625			
00140	516024514647			
00141	472524602225			
00142	434666014725			
00143	010433063460			

* PRELIMINAY CALCULATIONS AND INPUT EDIT

0505

BINARY CARD NO. STEP0006

00144	0634 00 4 00201	SPRINT SXA	OUT1,4	0510
00145	0074 00 4 00003	TSX	\$HEADWR,4	0515
00146	0500 00 0 00472	CLA	#06000000	0520
00147	0074 00 4 00001	TSX	\$(STH),4	0525
00150	0 00001 0 00203		FMT2,,1	0530
00151	0774 00 4 00001	AXT	1,4	
00152	0560 00 4 77400	LDQ	FLOAT-19,4	
00153	-1 00000 0 00000	STR		0545
00154	1 00001 4 00155	TXI	#+1,4,1	
00155	-3 00014 4 00152	TXL	*-3,4,12	
00156	0074 00 4 00002	TSX	\$(FIL),4	0555
00157	0560 00 0 77374	LDQ	FLOAT-23	0560
00160	0260 00 0 77365	FMP	FLOAT-30	0565
00161	0601 00 0 00467	STO	AE2	0570
00162	0560 00 0 77366	LDQ	FLOAT-29	0575
00163	0260 00 0 77366	FMP	FLOAT-29	0580
00164	0131 00 0 00000	XCA		0585
00165	0260 00 0 77373	FMP	FLOAT-24	0590
00166	0601 00 0 00466	STO	BE12	0595
00167	0500 00 0 77365	CLA	FLOAT-30	0600

BINARY CARD NO. STEP0007

00170	0302 00 0 77366	FSB	FLOAT-29	0605
00171	0131 00 0 00000	XCA		0610
00172	0260 00 0 77371	FMP	FLOAT-26	0615
00173	0300 00 0 77372	FAD	FLOAT-25	0620
00174	0601 00 0 00470	STO	SET3	0625
00175	0500 00 0 77365	CLA	FLOAT-30	0630
00176	0260 00 0 77367	FMP	FLOAT-28	0635
00177	0601 00 0 00471	STO	GE2	0640
00200	0600 00 0 77257	STZ	FLOAT-100	
00201	0774 00 4 00000	OUT1 AXT	**,4	0645
00202	0020 00 4 00001	TRA	1,4	0650
00203	746004103000	FMT2 BCI	9,(48H0REACTIVITY INPUT # R0 + R1+T UP TO MAXIMUM # R3/	0655
00204	512521236331			
00205	653163706031			
00206	454764636013			
00207	605100602060			

00210 510154636064
 00211 476063466044
 00212 216731446444
 00213 601360510361

BINARY CARD NO. STEP0008

00214 013000610202
 00215 300051252123
 00216 633165316370
 00217 602625252422
 00220 212342601361
 00221 013000010067
 00222 053021673121
 00223 430102670102
 00224 306447622321
 00225 636325513145
 00226 271067010230
 00227 243162624623
 00230 312163314645
 00231 601167053063
 00232 466321430200
 00233 670630254525
 00234 512770610130
 00235 600100670430
 00236 266425430103
 00237 671030624725

BCI 9,1H0/22H0REACTIVITY FEEDBACK #/1H010X5HAXIAL12X12HUPSCA 0660

BCI 9,TTERRING8X12HDISSOCIATION 9X5HTOTAL20X6HENERGY/1H 10X4H 0665

BCI 9,FUEL13X8HSPECTRAL12X12HOF ZRH AFTER9X4HCORE21X5HRANGE/ 0670

BINARY CARD NO. STEP0009

00240 236351214301
 00241 026701023046
 00242 266071513060
 00243 212663255111
 00244 670430234651
 00245 250201670530
 00246 512145272561
 00247 013060010067
 00250 113025674721
 00251 456231464510
 00252 670630252626
 00253 252363010467
 00254 010230234321
 00255 246051644763
 00256 545125116701
 00257 013024016221
 00260 626225442243
 00261 706101300001
 00262 056704304021
 00263 542501036707

BCI 9,1H 10X9HEXPANSIONEX6HEFFECT14X12HCLAD RUPTURE9X11HDISA 0675

BCI 9,SSEMBLY/1H015X4H-A-E13X7H-B-E**245X26HE LESS THAN OR E 0680

BINARY CARD NO. STEP0010

00264 304022542554
 00265 540204056702
 00266 663025604325
 00267 626260633021
 00270 456046516025
 00271 506421436063

BCI 9,QUAL TO E1/1H015X4H-A-E12X8H-B-E1**2 9X11H+C+D*(E-E1)2 0685

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

PAGE 5

00272 466025016101
 00273 300001056704
 00274 304021542501
 00275 026710304022
 00276 542501545402
 00277 601167010130
 00300 202320245474
 00301 254025013402
 00302 056703003025
 00303 602751252163
 00304 255160633021
 00305 456025017360
 00306 256043256262
 00307 606330214561

BCI 9,5X30HE GREATER THAN E1, E LESS THAN/85X14HOR EQUAL TO 0690

BINARY CARD NO. STEP0011

00310 100567010430
 00311 465160255064
 00312 214360634660
 00313 250261010567
 00314 053040215425
 00315 020102671030
 00316 402254250154
 00317 540210670102
 00320 302023202454
 00321 742502402501
 00322 341067010230
 00323 402654742540
 00324 250234545445
 00325 056701073025
 00326 602751252163
 00327 255160633021
 00330 456025026101
 00331 300061050630
 00332 004751462243
 00333 254460254524

BCI 9,E2/15X5H-A*E212X8H-B*E1**28X12H+C*D*(E2-E1)8X12H-F*(E- 0695

BCI 9,E2)**N5X17HE GREATER THAN E2/1H0/56H0PROBLEM ENDED WHE

BINARY CARD NO. STEP0012

00334 252460663025
 00335 456047466625
 00336 516024514647
 00337 626022254346
 00340 666027602126
 00341 632551604725
 00342 214260474666
 00343 255160610130
 00344 006106300066
 00345 302551256105
 00346 306051006013
 00347 014725010533
 00350 067306606060
 00351 670430510160
 00352 132501053306
 00353 730667043051
 00354 036013250105
 00355 330673076703

BCI 9,N POWER DROPS BELOW G AFTER PEAK POWER /1H0/6H0WHERE/5 0690

BCI 3,H R0 #1PE15.6,6

BCI 9,X4HR1 #E15.6,6X4HR3 #E15.6,7X3HA #E15.6/5H B # E15.6, 0700

0690

00356 302160132501
00357 053306610530

BINARY CARD NO. STEP0013

00360 606022601360
00361 250105330673
00362 076703302360
00363 132501053306
00364 730767033024
00365 601360250105
00366 330673076703
00367 302660132501
00370 053306610530
00371 606027601325
00372 010533067306
00373 670430250160
00374 132501053306
00375 730667043025
00376 026013250105
00377 330673076703
00400 304560132501
00401 053306610100
00402 306063603162
00403 606331442501

BCI 9,7X3HC #E15.6,7X3HD # E15.6,7X3HF #E15.6/5H G #E15.6,6 0705

BCI 9,X4HE1 #E15.6,CX4HE2 #E15.6,7X3HN #E15.6/10H T IS TIME1 0710

BINARY CARD NO. STEP0014

00404 006701013025
00405 603162602545
00406 255127706101
00407 300061030230
00410 002425263145
00411 316331464560
00412 462660245165
00413 246560676031
00414 456046646347
00415 646361020730
00416 002451652465
00417 600160136051
00420 252123633165
00421 316370603145
00422 476463610301
00423 306024516524
00424 656002601360
00425 216731214360
00426 266425436025
00427 674721456231

BCI 9,0X11HE IS ENERGY/ RH0/32H0DEFINITION OF DRVDV X IN' OUTP 0715

BCI 9,UT/27H0DRVDV. 1 # REACTIVITY INPUT/31H DRVDV 2 # AXIAL 0720

BCI 9,FUEL EXPANSION,39H DRVDV 3 # UPSCATTERING SPECTRAL EFF 0725

BINARY CARD NO. STEP0015

00430 464561031130
00431 602451652465
00432 600360136064
00433 476223216363
00434 255131452760
00435 624725236351
00436 214360252626
00437 252363610411

BCI 9,ECT/49H DRVDV 4 # DISSOCIATION OF ZRH AFTER CLAD RUPTU 0730

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

PAGE 7

00440 306024516524
 00441 656004601360
 00442 243162624623
 00443 312163314645
 00444 604626607151
 00445 306021266325
 00446 516023432124
 00447 605164476364
 00450 512561030330
 00451 602451652465
 00452 600560136063
 00453 466321436023

BCI 9,RE/33H DRVDV 5 * TOTAL CORE DISASSEMBLY/36H DRVDV 6 * 0735

BINARY CARD NO. STEP0016

00454 465125602431
 00455 622162622544
 00456 224370610306
 00457 306024516524
 00460 656006601360
 00461 634663214360
 00462 512521236331
 00463 653163796026
 00464 252524222123
 00465 423460606060

BCI 5,TOTAL REACTIVITY FEEDBACK)

0740

00466
 00467
 00470
 00471

BE12 BSS 1
 AE2 BSS 1
 SET3 BSS 1
 GE2 BSS 1

0745
 0750
 0755
 0760

* THE FOLLOWING EQUIVALENCE AND COMMON STATEMENTS ARE TO BE USED
 IN FAP CODED SUBPROGRAMS USED WITH IREKIN. OTHERS CAN BE ADDED.

00062	MAXVAR	EQU	50	
77461	INTGR	COMMON	30	00000190
77423	FLOAT	COMMON	250	00000200
77031	FRACT	COMMON	MAXVAR-2	157300
76751	DECAY	COMMON	MAXVAR-2	151100
76671	CONST	COMMON	MAXVAR	157500
76607	APOW	COMMON	MAXVAR	157600
76525	AEENG	COMMON	MAXVAR	157700
76443	AMATRX	COMMON	MAXVAR*MAXVAR	157800
71537	VINP	COMMON	MAXVAR	157900
71455	WRK	COMMON	MAXVAR	158000
71373	PLOT	COMMON	100	158100
71227	DRV	COMMON	MAXVAR	00000630
71145	X	COMMON	MAXVAR	158300
71063	T	COMMON	MAXVAR	158400
71001	POWER	COMMON	1	158500
71000	ENERGY	COMMON	1	158600
70777	REAC	COMMON	1	158700
70776	REAC0	COMMON	1	158800
70775	REAC2	COMMON	1	158900
70774	W3	COMMON	1	159000
70773	W1	COMMON	1	159100
70772	WAVG	COMMON	1	159200
70771	HUSED	COMMON	1	159300
70770	TIME	COMMON	1	159400
70767	TIMEA	COMMON	1	159500

SUBROUTINES FOR STEP TRANSIENTS AS PER AAW AND SOJ

PAGE 8

70766	SFW	COMMON	1	159600
70765	HEAD	COMMON	14	159700
70747	PAGE	COMMON	1	159800
70746	FEO	COMMON	1	159900
70745	LINES	COMMON	1	160000
70744	SBOVL	COMMON	1	00000480
70743	ICT	COMMON	1	
70742	TESTX	COMMON	1	
* THE FOLLOWING EQUIVALENCE STATEMENTS ARE OPTIONAL				
77423	TINF	EQU	FLOAT	160200
77422	HINF	EQU	FLOAT-1	160300
77421	HUP	EQU	FLOAT-2	160400
77420	HLOW	EQU	FLOAT-3	160500
77417	UPLIM	EQU	FLOAT-4	160600
77416	LOLIM	EQU	FLOAT-5	160700
77415	BOVL	EQU	FLOAT-6	160800
77414	SOURCE	EQU	FLOAT-7	160900
77413	P0	EQU	FLOAT-8	161000
77412	E0	EQU	FLOAT-9	161100
77411	TAU	EQU	FLOAT-10	161200
77410	R0	EQU	FLOAT-11	161300
		END		

LITERALS

BINARY CARD NO. STEP0017
00472 000006000000

Listing of input data (first card is monitor ID card)

#2960P RJWOUTA 5160				IREKIN				012863
SAMPLE FOR IREKIN PROGRAM DESCRIPTION								
0	1	7.0	0.0	5.0	1.0	6.0	0.0	
0	7	1.0	0.0	300.0	0.0			
1	1	0.0	.01	10.0	.0000001	.001	.0001	
1	7	1600.0	0.0	100.0	0.0	0.0	0.0	
1	21	-3.47	0.0	10.0	5.0	-84.0	-150.0	
1	27	0.0	0.0	1000.	1.0	820 0.0	0.0	
2	1		.0127		.0317		.115	
2	4		.311		1.40		3.87	
2	1	0.038		0.213			0.188	
2	4	0.407		0.128			0.026	
1	21	0.0						
2	7	8.47	10500.0					
0	2	2.0						
3	1	1 1.0	0.0					
3	2	1 1.0	1.0					
4	1	1.0	1.0					
-5	1	1.0	0.0					

Answers to input data of preceding page

PROGRAM FOR THE NUMERICAL SOLUTION OF THE REACTOR KINETIC EQUATIONS USING COHEN METHOD

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

DATE IS 01/28/63, TIME IS 02..38..29

TOTAL NUMBER OF EQUATIONS IS 11 NUMBER OF DELAY GROUPS IS 7 NUMBER OF FEEDBACK EQUATIONS IS 2

ORDER OF APPROXIMATION IS 5 NUMBER OF ADDITIONAL COMPUTED RESULTS IS 6

START CALCULATION IS FOR STEADY STATE CONDITIONS REACTIVITY IS 0.

DELAYED NEUTRON FRACTION OVER GENERATION TIME IS 1.600000E 03 SOURCE IS 0.

INITIAL TIME INCREMENT IS 10.000000E-03 MAX. INCRMT. IS 1.000000E 01 MIN. INCRMT. IS 10.000000E-08

Q UPPER LIMIT IS 10.000000E-04 Q LOWER LIMIT IS 10.000000E-05

DELAYED NEUTRON PARAMETERS

DELAY GROUP	FRACTION	DECAY CONSTANT	DELAY GROUP	FRACTION	DECAY CONSTANT
1	3.800000E-02	1.270000E-02	2	2.130000E-01	3.170000E-02
3	1.880000E-01	1.150000E-01	4	4.070000E-01	3.110000E-01
5	1.280000E-01	1.400000E 00	6	2.600000E-02	3.870000E 00
7	8.470000E 00	1.050000E 04			

SUM OF DELAYED FRACTIONS IS 9.470000E 00

Note: Although steady state conditions were called for, the steady state condition will not exist due to the sum of the fractions not being one. Also note that the solution of the feedback equations overflowed the floating point range of the computer.

SAMPLE FOR IREKIN PROGRAM DESCRIPTION
 CONSTANT TERM, POWER COEFFICIENT, AND ENERGY COEFFICIENT OF FEEDBACK EQUATIONS AT START OF PROBLEM

EQUATION	CONSTANT	POWER COEF.	ENERGY COEF.
1	0.	0.	0.
2	0.	0.	0.

AZI, JI- MATRIX OF FEEDBACK EQUATIONS AT START OF PROBLEM

I	J	ELEMENTS
1	1 THRU 2	1.000000E 00 0.
2	1 THRU 2	1.000000E 00 1.000000E 00

THE FOLLOWING DIAGONAL ELEMENTS ARE STATED TO BE CONSTANT

1

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

PAGE 3

REACTIVITY INPUT # R0 & R1* τ UP TO MAXIMUM # R3

REACTIVITY FEEDBACK #

AXIAL FUEL EXPANSION	UPSCATTERING SPECTRAL EFFECT	DISSOCIATION OF ZRH AFTER CLAD RUPTURE	TOTAL CORE DISASSEMBLY	ENERGY RANGE
-A*E	-B*E**2			E LESS THAN OR EQUAL TO E1
-A*E	-B*E1**2	&C&D*%E-E1		E GREATER THAN E1, E LESS THAN OR EQUAL TO E2
-A*E2	-B*E1**2	&C&D*%E2-E1	-F*%E-E2**N	E GREATER THAN E2

PROBLEM ENDED WHEN POWER DROPS BELOW G AFTER PEAK POWER

WHERE

R0 #	0.	R1 #	0.	R3 #	1.000000E 01	A #	5.000000E-08
B #	4.000000E-15	C #	0.	D #	0.	F #	0.
G #	1.000000E 03	E1 #	1.000000E 20	E2 #	0.	N #	0.

T IS TIME E IS ENERGY

DEFINITION OF DRVDV X IN OUTPUT

DRVDV 1 # REACTIVITY INPUT
 DRVDV 2 # AXIAL FUEL EXPANSION
 DRVDV 3 # UPSCATTERING SPECTRAL EFFECT
 DRVDV 4 # DISSOCIATION OF ZRH AFTER CLAD RUPTURE
 DRVDV 5 # TOTAL CORE DISASSEMBLY
 DRVDV 6 # TOTAL REACTIVITY FEEDBACK

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

PAGE 4

TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
0.	1.000000E 02	-0.	0.	0.	9.470000E 02	0.
1.525879E-07	1.002068E 02	-7.637282E-13	1.352076E 04	1.353624E 04	9.470013E 02	1.527456E-05
3.051758E-07	1.004135E 02	-1.529034E-12	1.348970E 04	1.350517E 04	9.470055E 02	3.058067E-05
6.103516E-07	1.008267E 02	-3.064375E-12	1.342811E 04	1.345880E 04	9.470223E 02	6.128750E-05
1.220703E-06	1.016527E 02	-6.153968E-12	1.330705E 04	1.336730E 04	9.470893E 02	1.230794E-04
2.441406E-06	1.033026E 02	-1.240872E-11	1.307310E 04	1.318917E 04	9.473556E 02	2.481744E-04
4.882812E-06	1.065951E 02	-2.521994E-11	1.263569E 04	1.285113E 04	9.484091E 02	5.043988E-04
9.765625E-06	1.131605E 02	-5.204588E-11	1.186806E 04	1.224082E 04	9.525325E 02	1.040918E-03
1.953125E-05	1.262841E 02	-1.105010E-10	1.066898E 04	1.123605E 04	9.683609E 02	2.210021E-03
2.929687E-05	1.395232E 02	-1.753865E-10	9.793297E 03	1.020896E 04	9.935183E 02	3.507730E-03
3.906250E-05	1.530146E 02	-2.467926E-10	9.141453E 03	9.451743E 03	1.027249E 03	4.935853E-03
5.859375E-05	1.812397E 02	-4.098206E-10	8.272063E 03	8.667520E 03	1.118256E 03	8.196413E-03
7.812500E-05	2.118533E 02	-6.015076E-10	7.753960E 03	7.990946E 03	1.238542E 03	1.203015E-02
9.765625E-05	2.456629E 02	-8.245845E-10	7.434113E 03	7.580982E 03	1.387091E 03	1.649169E-02
1.171875E-04	2.834427E 02	-1.082551E-09	7.230354E 03	7.324157E 03	1.564312E 03	2.165102E-02
1.562500E-04	3.740039E 02	-1.720426E-09	7.003822E 03	7.097758E 03	2.011164E 03	3.440853E-02
1.953125E-04	4.904198E 02	-2.559061E-09	6.892683E 03	6.937486E 03	2.603112E 03	5.118121E-02
2.343750E-04	6.409735E 02	-3.656699E-09	6.830002E 03	6.853793E 03	3.377130E 03	7.313398E-02
2.734375E-04	8.361122E 02	-5.089742E-09	6.790169E 03	6.803833E 03	4.384451E 03	1.017948E-01
3.125000E-04	1.089250E 03	-6.957734E-09	6.762645E 03	6.770726E 03	5.693130E 03	1.391547E-01
3.515625E-04	1.417725E 03	-9.390053E-09	6.742646E 03	6.747250E 03	7.392236E 03	1.878011E-01
3.906250E-04	1.844009E 03	-1.255470E-08	6.727706E 03	6.727944E 03	9.597728E 03	2.510941E-01
4.296875E-04	2.397248E 03	-1.666977E-08	6.716385E 03	6.716917E 03	1.246027E 04	3.333954E-01
4.687500E-04	3.115264E 03	-2.201832E-08	6.707742E 03	6.707006E 03	1.617551E 04	4.403664E-01
5.078125E-04	4.047139E 03	-2.896774E-08	6.701117E 03	6.699424E 03	2.099736E 04	5.793547E-01
5.468750E-04	5.256572E 03	-3.799484E-08	6.696029E 03	6.693606E 03	2.725542E 04	7.598967E-01
5.859375E-04	6.826236E 03	-4.971846E-08	6.692116E 03	6.689135E 03	3.537746E 04	9.943691E-01
6.250000E-04	8.863426E 03	-6.494176E-08	6.689106E 03	6.685695E 03	4.591868E 04	1.298835E 00
6.640625E-04	1.150740E 04	-8.470714E-08	6.686789E 03	6.683049E 03	5.959960E 04	1.694143E 00
7.031250E-04	1.493888E 04	-1.103674E-07	6.685004E 03	6.681011E 03	7.735541E 04	2.207348E 00
7.421875E-04	1.939243E 04	-1.436785E-07	6.683630E 03	6.679441E 03	1.003998E 05	2.873569E 00
7.812500E-04	2.517248E 04	-1.869191E-07	6.682572E 03	6.678234E 03	1.303080E 05	3.738381E 00
8.203125E-04	3.267412E 04	-2.430467E-07	6.681757E 03	6.677303E 03	1.691245E 05	4.860933E 00
8.593750E-04	4.241014E 04	-3.158999E-07	6.681129E 03	6.676586E 03	2.195024E 05	6.317994E 00
8.984375E-04	5.504605E 04	-4.104603E-07	6.680645E 03	6.676033E 03	2.848855E 05	8.209200E 00
9.375000E-04	7.144557E 04	-5.331934E-07	6.680272E 03	6.675608E 03	3.697430E 05	1.066386E 01
9.765625E-04	9.272973E 04	-6.924906E-07	6.679985E 03	6.675280E 03	4.798755E 05	1.384980E 01
1.015625E-03	1.203534E 05	-8.992427E-07	6.679763E 03	6.675027E 03	6.228111E 05	1.798483E 01
1.054687E-03	1.562048E 05	-1.167584E-06	6.679593E 03	6.674832E 03	8.083203E 05	2.335164E 01
1.093750E-03	2.027346E 05	-1.515860E-06	6.679461E 03	6.674682E 03	1.049084E 06	3.031712E 01
1.132812E-03	2.631234E 05	-1.967878E-06	6.679359E 03	6.674566E 03	1.361559E 06	3.935743E 01
1.171875E-03	3.414990E 05	-2.554539E-06	6.679281E 03	6.674476E 03	1.767105E 06	5.109057E 01
1.210937E-03	4.432189E 05	-3.315947E-06	6.679220E 03	6.674407E 03	2.293443E 06	6.631859E 01
1.250000E-03	5.752362E 05	-4.304152E-06	6.679172E 03	6.674353E 03	2.976552E 06	8.608245E 01
1.289062E-03	7.465749E 05	-5.586708E-06	6.679135E 03	6.674311E 03	3.863126E 06	1.117332E 02
1.328125E-03	9.689470E 05	-7.251290E-06	6.679105E 03	6.674278E 03	5.013766E 06	1.450241E 02
1.367187E-03	1.257553E 06	-9.411690E-06	6.679082E 03	6.674252E 03	6.507126E 06	1.882310E 02
1.406250E-03	1.632120E 06	-1.221560E-05	6.679062E 03	6.674230E 03	8.445284E 06	2.443072E 02
1.445312E-03	2.118252E 06	-1.585470E-05	6.679045E 03	6.674212E 03	1.096072E 07	3.170859E 02
1.484375E-03	2.749178E 06	-2.057777E-05	6.679030E 03	6.674196E 03	1.422539E 07	4.115419E 02

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

PAGE 5

TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
0.	1.000000E 02	1.000000E 02	1.000000E 02	1.000000E 02	1.000000E 02	1.000000E 02
1.525879E-07	1.000000E 02	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01
3.051758E-07	1.000000E 02	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01
6.103516E-07	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01
1.220703E-06	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01	10.000000E 01
2.441406E-06	10.000000E 01	9.999999E 01	9.999999E 01	9.999999E 01	1.000000E 02	1.000000E 02
4.882812E-06	10.000000E 01	9.999999E 01	9.999999E 01	10.000000E 01	1.000000E 02	1.000001E 02
9.765625E-06	9.999999E 01	9.999999E 01	10.000000E 01	1.000000E 02	1.000001E 02	1.000002E 02
1.953125E-05	10.000000E 01	1.000000E 02	1.000000E 02	1.000001E 02	1.000003E 02	1.000010E 02
2.929687E-05	1.000000E 02	1.000000E 02	1.000001E 02	1.000002E 02	1.000008E 02	1.000022E 02
3.906250E-05	1.000000E 02	1.000000E 02	1.000001E 02	1.000003E 02	1.000014E 02	1.000040E 02
5.859375E-05	1.000000E 02	1.000001E 02	1.000003E 02	1.000007E 02	1.000033E 02	1.000090E 02
7.812500E-05	1.000000E 02	1.000001E 02	1.000005E 02	1.000013E 02	1.000059E 02	1.000163E 02
9.765625E-05	1.000001E 02	1.000002E 02	1.000008E 02	1.000021E 02	1.000094E 02	1.000260E 02
1.171875E-04	1.000001E 02	1.000003E 02	1.000011E 02	1.000031E 02	1.000139E 02	1.000384E 02
1.562500E-04	1.000002E 02	1.000006E 02	1.000021E 02	1.000058E 02	1.000263E 02	1.000727E 02
1.953125E-04	1.000004E 02	1.000010E 02	1.000036E 02	1.000098E 02	1.000443E 02	1.001224E 02
2.343750E-04	1.000006E 02	1.000016E 02	1.000057E 02	1.000154E 02	1.000695E 02	1.001923E 02
2.734375E-04	1.000009E 02	1.000023E 02	1.000085E 02	1.000231E 02	1.001042E 02	1.002880E 02
3.125000E-04	1.000014E 02	1.000034E 02	1.000124E 02	1.000335E 02	1.001510E 02	1.004174E 02
3.515625E-04	1.000019E 02	1.000048E 02	1.000175E 02	1.000474E 02	1.002136E 02	1.005905E 02
3.906250E-04	1.000027E 02	1.000067E 02	1.000244E 02	1.000659E 02	1.002968E 02	1.008202E 02
4.296875E-04	1.000037E 02	1.000092E 02	1.000334E 02	1.000903E 02	1.004065E 02	1.011235E 02
4.687500E-04	1.000050E 02	1.000124E 02	1.000452E 02	1.001223E 02	1.005508E 02	1.015221E 02
5.078125E-04	1.000067E 02	1.000167E 02	1.000608E 02	1.001644E 02	1.007398E 02	1.020446E 02
5.468750E-04	1.000089E 02	1.000223E 02	1.000811E 02	1.002193E 02	1.009871E 02	1.027278E 02
5.859375E-04	1.000119E 02	1.000296E 02	1.001076E 02	1.002910E 02	1.013098E 02	1.036196E 02
6.250000E-04	1.000157E 02	1.000392E 02	1.001421E 02	1.003845E 02	1.017305E 02	1.047822E 02
6.640625E-04	1.000206E 02	1.000516E 02	1.001872E 02	1.005062E 02	1.022784E 02	1.062961E 02
7.031250E-04	1.000271E 02	1.000677E 02	1.002457E 02	1.006646E 02	1.029912E 02	1.082660E 02
7.421875E-04	1.000355E 02	1.000887E 02	1.003219E 02	1.008705E 02	1.039183E 02	1.108277E 02
7.812500E-04	1.000465E 02	1.001160E 02	1.004209E 02	1.011383E 02	1.051233E 02	1.141575E 02
8.203125E-04	1.000607E 02	1.001515E 02	1.005495E 02	1.014861E 02	1.066891E 02	1.184842E 02
8.593750E-04	1.000791E 02	1.001975E 02	1.007166E 02	1.019380E 02	1.087231E 02	1.241047E 02
8.984375E-04	1.001031E 02	1.002573E 02	1.009337E 02	1.025250E 02	1.113648E 02	1.314044E 02
9.375000E-04	1.001342E 02	1.003350E 02	1.012155E 02	1.032871E 02	1.147951E 02	1.408834E 02
9.765625E-04	1.001746E 02	1.004359E 02	1.015814E 02	1.042767E 02	1.192490E 02	1.531908E 02
1.015625E-03	1.002271E 02	1.005669E 02	1.020565E 02	1.055614E 02	1.250314E 02	1.691690E 02
1.054687E-03	1.002952E 02	1.007369E 02	1.026732E 02	1.072292E 02	1.325379E 02	1.899115E 02
1.093750E-03	1.003836E 02	1.009575E 02	1.034738E 02	1.093941E 02	1.422821E 02	2.168372E 02
1.132812E-03	1.004984E 02	1.012440E 02	1.045129E 02	1.122043E 02	1.549304E 02	2.517879E 02
1.171875E-03	1.006473E 02	1.016158E 02	1.058618E 02	1.158519E 02	1.713479E 02	2.971538E 02
1.210937E-03	1.008407E 02	1.020984E 02	1.076125E 02	1.205864E 02	1.926572E 02	3.560371E 02
1.250000E-03	1.010916E 02	1.027248E 02	1.098849E 02	1.267315E 02	2.203153E 02	4.324639E 02
1.289062E-03	1.014173E 02	1.035378E 02	1.128342E 02	1.347073E 02	2.562133E 02	5.316596E 02
1.328125E-03	1.018401E 02	1.045930E 02	1.166622E 02	1.450590E 02	3.028054E 02	6.604059E 02
1.367187E-03	1.023887E 02	1.059625E 02	1.216304E 02	1.584945E 02	3.632769E 02	8.275045E 02
1.406250E-03	1.031009E 02	1.077400E 02	1.280786E 02	1.759322E 02	4.417617E 02	1.044379E 03
1.445312E-03	1.040251E 02	1.109469E 02	1.364476E 02	1.985641E 02	5.436250E 02	1.325854E 03
1.484375E-03	1.052246E 02	1.130411E 02	1.473094E 02	2.279374E 02	6.758303E 02	1.691172E 03

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 7	FEEDBK 1	FEEDBK 2	DRVDV 1	DRVDV 2	DRVDV 3
0.	1.000000E 02	1.000000E 00	1.000000E 00	0.	-0.	-0.
1.525879E-07	1.000002E 02	1.000000E 00	1.000000E 00	0.	-7.637282E-13	-9.332492E-25
3.051758E-07	1.000007E 02	1.000000E 00	1.000001E 00	0.	-1.529034E-12	-3.740710E-24
6.103516E-07	1.000026E 02	1.000001E 00	1.000001E 00	0.	-3.064375E-12	-1.502463E-23
1.220703E-06	1.000105E 02	1.000001E 00	1.000002E 00	0.	-6.153968E-12	-6.059412E-23
2.441406E-06	1.000420E 02	1.000002E 00	1.000005E 00	0.	-1.240872E-11	-2.463622E-22
4.882812E-06	1.001664E 02	1.000005E 00	1.000010E 00	0.	-2.521994E-11	-1.017673E-21
9.765625E-06	1.006532E 02	1.000010E 00	1.000019E 00	0.	-5.204588E-11	-4.334038E-21
1.953125E-05	1.025219E 02	1.000019E 00	1.000039E 00	0.	-1.105010E-10	-1.953677E-20
2.929687E-05	1.054921E 02	1.000029E 00	1.000059E 00	0.	-1.753865E-10	-4.921669E-20
3.906250E-05	1.094745E 02	1.000039E 00	1.000078E 00	0.	-2.467926E-10	-9.745056E-20
5.859375E-05	1.202190E 02	1.000059E 00	1.000117E 00	0.	-4.098206E-10	-2.687247E-19
7.812500E-05	1.344203E 02	1.000078E 00	1.000156E 00	0.	-6.015076E-10	-5.788983E-19
9.765625E-05	1.519585E 02	1.000098E 00	1.000195E 00	0.	-8.245845E-10	-1.087903E-18
1.171875E-04	1.728817E 02	1.000117E 00	1.000234E 00	0.	-1.082551E-09	-1.875066E-18
1.562500E-04	2.256383E 02	1.000156E 00	1.000312E 00	0.	-1.720426E-09	-4.735788E-18
1.953125E-04	2.955252E 02	1.000195E 00	1.000391E 00	0.	-2.559061E-09	-1.047807E-17
2.343750E-04	3.864077E 02	1.000234E 00	1.000469E 00	0.	-3.656699E-09	-2.139431E-17
2.734375E-04	5.058346E 02	1.000273E 00	1.000547E 00	0.	-5.089742E-09	-4.144876E-17
3.125000E-04	6.603404E 02	1.000312E 00	1.000625E 00	0.	-6.957734E-09	-7.745609E-17
3.515625E-04	8.609409E 02	1.000351E 00	1.000703E 00	0.	-9.390053E-09	-1.410770E-16
3.906250E-04	1.121327E 03	1.000391E 00	1.000781E 00	0.	-1.255470E-08	-2.521929E-16
4.296875E-04	1.459286E 03	1.000430E 00	1.000859E 00	0.	-1.666977E-08	-4.446100E-16
4.687500E-04	1.897914E 03	1.000469E 00	1.000938E 00	0.	-2.201832E-08	-7.756903E-16
5.078125E-04	2.467193E 03	1.000508E 00	1.001016E 00	0.	-2.896774E-08	-1.342608E-15
5.468750E-04	3.206035E 03	1.000547E 00	1.001094E 00	0.	-3.799483E-08	-2.309772E-15
5.859375E-04	4.164942E 03	1.000586E 00	1.001172E 00	0.	-4.971845E-08	-3.955079E-15
6.250000E-04	5.409462E 03	1.000625E 00	1.001250E 00	0.	-6.494176E-08	-6.747891E-15
6.640625E-04	7.024663E 03	1.000664E 00	1.001329E 00	0.	-8.470713E-08	-1.148048E-14
7.031250E-04	9.120955E 03	1.000703E 00	1.001407E 00	0.	-1.103674E-07	-1.948955E-14
7.421875E-04	1.184163E 04	1.000742E 00	1.001485E 00	0.	-1.436785E-07	-3.302960E-14
7.812500E-04	1.537266E 04	1.000781E 00	1.001563E 00	0.	-1.869190E-07	-5.590196E-14
8.203125E-04	1.995542E 04	1.000820E 00	1.001641E 00	0.	-2.430466E-07	-9.451467E-14
8.593750E-04	2.590315E 04	1.000859E 00	1.001720E 00	0.	-3.158997E-07	-1.596682E-13
8.984375E-04	3.362243E 04	1.000899E 00	1.001798E 00	0.	-4.104600E-07	-2.695638E-13
9.375000E-04	4.364090E 04	1.000938E 00	1.001876E 00	0.	-5.331929E-07	-4.548715E-13
9.765625E-04	5.664340E 04	1.000977E 00	1.001954E 00	0.	-6.924899E-07	-7.672675E-13
1.015625E-03	7.351870E 04	1.001016E 00	1.002032E 00	0.	-8.992414E-07	-1.293816E-12
1.054687E-03	9.542033E 04	1.001055E 00	1.002111E 00	0.	-1.167582E-06	-2.181196E-12
1.093750E-03	1.238454E 05	1.001094E 00	1.002189E 00	0.	-1.515856E-06	-3.676511E-12
1.132812E-03	1.607369E 05	1.001133E 00	1.002267E 00	0.	-1.967871E-06	-6.196029E-12
1.171875E-03	2.086166E 05	1.001172E 00	1.002345E 00	0.	-2.554528E-06	-1.044098E-11
1.210937E-03	2.707573E 05	1.001211E 00	1.002424E 00	0.	-3.315929E-06	-1.759262E-11
1.250000E-03	3.514067E 05	1.001250E 00	1.002502E 00	0.	-4.304123E-06	-2.964075E-11
1.289062E-03	4.560776E 05	1.001290E 00	1.002580E 00	0.	-5.586658E-06	-4.993719E-11
1.328125E-03	5.919248E 05	1.001329E 00	1.002659E 00	0.	-7.251206E-06	-8.412798E-11
1.367187E-03	7.682343E 05	1.001368E 00	1.002737E 00	0.	-9.411549E-06	-1.417236E-10
1.406250E-03	9.970577E 05	1.001407E 00	1.002815E 00	0.	-1.221536E-05	-2.387440E-10
1.445312E-03	1.294036E 06	1.001446E 00	1.002893E 00	0.	-1.585429E-05	-4.021739E-10
1.484375E-03	1.679470E 06	1.001485E 00	1.002972E 00	0.	-2.057710E-05	-6.774671E-10

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DRVDV 4	DRVDV 5	DRVDV 6
0.	0.	0.	-0.
1.525879E-07	0.	0.	-7.637282E-13
3.051758E-07	0.	0.	-1.529034E-12
6.103516E-07	0.	0.	-3.064375E-12
1.220703E-06	0.	0.	-6.153968E-12
2.441406E-06	0.	0.	-1.240872E-11
4.882812E-06	0.	0.	-2.521994E-11
9.765625E-06	0.	0.	-5.204588E-11
1.953125E-05	0.	0.	-1.105010E-10
2.929687E-05	0.	0.	-1.753865E-10
3.906250E-05	0.	0.	-2.467926E-10
5.859375E-05	0.	0.	-4.098206E-10
7.812500E-05	0.	0.	-6.015076E-10
9.765625E-05	0.	0.	-8.245845E-10
1.171875E-04	0.	0.	-1.082551E-09
1.562500E-04	0.	0.	-1.720426E-09
1.953125E-04	0.	0.	-2.559061E-09
2.343750E-04	0.	0.	-3.656699E-09
2.734375E-04	0.	0.	-5.089742E-09
3.125000E-04	0.	0.	-6.957734E-09
3.515625E-04	0.	0.	-9.390053E-09
3.906250E-04	0.	0.	-1.255470E-08
4.296875E-04	0.	0.	-1.666977E-08
4.687500E-04	0.	0.	-2.201832E-08
5.078125E-04	0.	0.	-2.896774E-08
5.468750E-04	0.	0.	-3.799484E-08
5.859375E-04	0.	0.	-4.971846E-08
6.250000E-04	0.	0.	-6.494176E-08
6.640625E-04	0.	0.	-8.470714E-08
7.031250E-04	0.	0.	-1.103674E-07
7.421875E-04	0.	0.	-1.436785E-07
7.812500E-04	0.	0.	-1.869191E-07
8.203125E-04	0.	0.	-2.430467E-07
8.593750E-04	0.	0.	-3.158999E-07
8.984375E-04	0.	0.	-4.104603E-07
9.375000E-04	0.	0.	-5.331934E-07
9.765625E-04	0.	0.	-6.924906E-07
1.015625E-03	0.	0.	-8.992427E-07
1.054687E-03	0.	0.	-1.167584E-06
1.093750E-03	0.	0.	-1.515860E-06
1.132812E-03	0.	0.	-1.967878E-06
1.171875E-03	0.	0.	-2.554539E-06
1.210937E-03	0.	0.	-3.315947E-06
1.250000E-03	0.	0.	-4.304152E-06
1.289062E-03	0.	0.	-5.586708E-06
1.328125E-03	0.	0.	-7.251290E-06
1.367187E-03	0.	0.	-9.411690E-06
1.406250E-03	0.	0.	-1.221560E-05
1.445312E-03	0.	0.	-1.585470E-05
1.484375E-03	0.	0.	-2.057777E-05

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
1.523437E-03	3.568025E 06	-2.670774E-05	6.679015E 03	6.674181E 03	1.846243E 07	5.341319E 02
1.562500E-03	4.630763E 06	-3.466369E-05	6.679000E 03	6.674166E 03	2.396147E 07	6.932354E 02
1.601562E-03	6.010036E 06	-4.498963E-05	6.678984E 03	6.674151E 03	3.109839E 07	8.997279E 02
1.640625E-03	7.800120E 06	-5.839166E-05	6.678964E 03	6.674133E 03	4.036102E 07	1.167724E 03
1.679687E-03	1.012337E 07	-7.578632E-05	6.678941E 03	6.674111E 03	5.238250E 07	1.515543E 03
1.718750E-03	1.313858E 07	-9.836337E-05	6.678912E 03	6.674086E 03	6.798451E 07	1.966958E 03
1.757812E-03	1.705184E 07	-1.276673E-04	6.678876E 03	6.674053E 03	8.823347E 07	2.552825E 03
1.796875E-03	2.213061E 07	-1.657034E-04	6.678829E 03	6.674012E 03	1.145134E 08	3.313190E 03
1.835937E-03	2.872200E 07	-2.150751E-04	6.678769E 03	6.673959E 03	1.486204E 08	4.300023E 03
1.875000E-03	3.727647E 07	-2.791632E-04	6.678693E 03	6.673892E 03	1.928857E 08	5.580772E 03
1.914062E-03	4.837861E 07	-3.623585E-04	6.678594E 03	6.673804E 03	2.503343E 08	7.242973E 03
1.953125E-03	6.278705E 07	-4.703648E-04	6.678465E 03	6.673691E 03	3.248923E 08	9.400227E 03
1.992187E-03	8.148623E 07	-6.105934E-04	6.678298E 03	6.673544E 03	4.216543E 08	1.219996E 04
2.031250E-03	1.057536E 08	-7.926775E-04	6.678081E 03	6.673354E 03	5.472320E 08	1.583349E 04
2.070312E-03	1.372467E 08	-1.029144E-03	6.677800E 03	6.673106E 03	7.102044E 08	2.054911E 04
2.109375E-03	1.781162E 08	-1.336294E-03	6.677435E 03	6.672786E 03	9.217036E 08	2.666898E 04
2.148437E-03	2.311520E 08	-1.735350E-03	6.676961E 03	6.672369E 03	1.196173E 09	3.461116E 04
2.187500E-03	2.999733E 08	-2.253976E-03	6.676345E 03	6.671828E 03	1.552353E 09	4.491810E 04
2.226562E-03	3.892744E 08	-2.928271E-03	6.675544E 03	6.671124E 03	2.014551E 09	5.829357E 04
2.265625E-03	5.051419E 08	-3.805419E-03	6.674501E 03	6.670209E 03	2.614296E 09	7.565055E 04
2.304687E-03	6.554670E 08	-4.947218E-03	6.673144E 03	6.669017E 03	3.392476E 09	9.817332E 04
2.343750E-03	8.504756E 08	-6.434809E-03	6.671376E 03	6.667466E 03	4.402100E 09	1.273978E 05
2.382812E-03	1.103414E 09	-8.375082E-03	6.669069E 03	6.665443E 03	5.711872E 09	1.653153E 05
2.421875E-03	1.431432E 09	-1.090942E-02	6.666055E 03	6.662802E 03	7.410799E 09	2.145073E 05
2.460937E-03	1.856709E 09	-1.422578E-02	6.662109E 03	6.659347E 03	9.614123E 09	2.783186E 05
2.500000E-03	2.407911E 09	-1.857556E-02	6.656931E 03	6.654819E 03	1.247095E 10	3.610809E 05
2.539062E-03	3.122023E 09	-2.429762E-02	6.650114E 03	6.648869E 03	1.617401E 10	4.684005E 05
2.578125E-03	4.046677E 09	-3.185269E-02	6.641107E 03	6.641020E 03	2.097208E 10	6.075267E 05
2.617187E-03	5.243057E 09	-4.187373E-02	6.629148E 03	6.630625E 03	2.718573E 10	7.878217E 05
2.656250E-03	6.789469E 09	-5.524056E-02	6.613176E 03	6.616781E 03	3.522700E 10	1.021357E 06
2.695312E-03	8.785618E 09	-7.319161E-02	6.591698E 03	6.598228E 03	4.562374E 10	1.323665E 06
2.773437E-03	1.462788E 10	-1.303666E-01	6.509760E 03	6.525613E 03	7.604988E 10	2.214877E 06
2.851562E-03	2.416340E 10	-2.391986E-01	6.376840E 03	6.424441E 03	1.262471E 11	3.692945E 06
2.929687E-03	3.933529E 10	-4.555672E-01	6.115234E 03	6.237222E 03	2.075955E 11	6.117470E 06
3.007812E-03	6.216630E 10	-9.012073E-01	5.577851E 03	5.858444E 03	3.349125E 11	1.000928E 07
3.046875E-03	7.666486E 10	-1.282122E 00	5.132485E 03	5.366539E 03	4.208844E 11	1.271294E 07
3.085937E-03	9.257895E 10	-1.826379E 00	4.492453E 03	4.828631E 03	5.216049E 11	1.601336E 07
3.124999E-03	1.085403E 11	-2.587844E 00	3.609357E 03	4.071938E 03	6.342763E 11	1.994205E 07
3.164062E-03	1.222899E 11	-3.616085E 00	2.450403E 03	3.053388E 03	7.517880E 11	2.445967E 07
3.203124E-03	1.310017E 11	-4.934714E 00	1.032211E 03	1.761679E 03	8.619711E 11	2.942550E 07
3.242187E-03	1.322964E 11	-6.516325E 00	-5.480309E 02	2.517641E 02	9.490687E 11	3.459291E 07
3.281249E-03	1.255610E 11	-8.272101E 00	-2.114798E 03	-1.337675E 03	9.982545E 11	3.965303E 07
3.320312E-03	1.124923E 11	-1.007243E 01	-3.471548E 03	-2.813636E 03	1.001487E 12	4.431848E 07
3.359374E-03	9.620200E 10	-1.179043E 01	-4.485759E 03	-4.004718E 03	9.607535E 11	4.840044E 07
3.398437E-03	7.965115E 10	-1.333843E 01	-5.136918E 03	-4.833118E 03	8.863467E 11	5.183331E 07
3.437499E-03	6.468544E 10	-1.467742E 01	-5.495106E 03	-5.327880E 03	7.919427E 11	5.464678E 07
3.476562E-03	5.201654E 10	-1.580534E 01	-5.662035E 03	-5.580148E 03	6.900810E 11	5.691959E 07
3.515624E-03	4.165486E 10	-1.674016E 01	-5.724269E 03	-5.686877E 03	5.899368E 11	5.874310E 07
3.554687E-03	3.331477E 10	-1.750739E 01	-5.737443E 03	-5.719480E 03	4.971061E 11	6.020232E 07
3.593749E-03	2.664424E 10	-1.813325E 01	-5.731051E 03	-5.719754E 03	4.143537E 11	6.136934E 07

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
1.523437E-03	1.067815E 02	1.169270E 02	1.614065E 02	2.660598E 02	8.474148E 02	2.165305E 03
1.562500E-03	1.088020E 02	1.219704E 02	1.797027E 02	3.155375E 02	1.070108E 03	2.780664E 03
1.601562E-03	1.114244E 02	1.285161E 02	2.034484E 02	3.797525E 02	1.359131E 03	3.579312E 03
1.640625E-03	1.148279E 02	1.370114E 02	2.342670E 02	4.630942E 02	1.734242E 03	4.615841E 03
1.679687E-03	1.192452E 02	1.480371E 02	2.742650E 02	5.712595E 02	2.221080E 03	5.961104E 03
1.718750E-03	1.249781E 02	1.623467E 02	3.261764E 02	7.116419E 02	2.852923E 03	7.707054E 03
1.757812E-03	1.324185E 02	1.809185E 02	3.935496E 02	8.938370E 02	3.672960E 03	9.973032E 03
1.796875E-03	1.420751E 02	2.050218E 02	4.809895E 02	1.130298E 03	4.737242E 03	1.291392E 04
1.835937E-03	1.546078E 02	2.363042E 02	5.944729E 02	1.437188E 03	6.118513E 03	1.673074E 04
1.875000E-03	1.708732E 02	2.769036E 02	7.417561E 02	1.835481E 03	7.911180E 03	2.168435E 04
1.914062E-03	1.919831E 02	3.295950E 02	9.329055E 02	2.352400E 03	1.023777E 04	2.811333E 04
1.953125E-03	2.193801E 02	3.979795E 02	1.180985E 03	3.023273E 03	1.325728E 04	3.645704E 04
1.992187E-03	2.549366E 02	4.867305E 02	1.502948E 03	3.893949E 03	1.717608E 04	4.728572E 04
2.031250E-03	3.010823E 02	6.019129E 02	1.920797E 03	5.023924E 03	2.226196E 04	6.133933E 04
2.070312E-03	3.609705E 02	7.513969E 02	2.463083E 03	6.490410E 03	2.886243E 04	7.957816E 04
2.109375E-03	4.386926E 02	9.453958E 02	3.166855E 03	8.393600E 03	3.742844E 04	1.032483E 05
2.148437E-03	5.395581E 02	1.197162E 03	4.080190E 03	1.086350E 04	4.854516E 04	1.339667E 05
2.187500E-03	6.704559E 02	1.523890E 03	5.265467E 03	1.406881E 04	6.297185E 04	1.738315E 05
2.226562E-03	8.403239E 02	1.947890E 03	6.803619E 03	1.822838E 04	8.169356E 04	2.255645E 05
2.265625E-03	1.060757E 03	2.498104E 03	8.799637E 03	2.362615E 04	1.059882E 05	2.926971E 05
2.304687E-03	1.346796E 03	3.212072E 03	1.138971E 04	3.063041E 04	1.375135E 05	3.798096E 05
2.343750E-03	1.717945E 03	4.138482E 03	1.475046E 04	3.971878E 04	1.784191E 05	4.928426E 05
2.382812E-03	2.199497E 03	5.340462E 03	1.911090E 04	5.151059E 04	2.314925E 05	6.394984E 05
2.421875E-03	2.824235E 03	6.899842E 03	2.476789E 04	6.680859E 04	3.003469E 05	8.297611E 05
2.460937E-03	3.634636E 03	8.922650E 03	3.210606E 04	8.665297E 04	3.896639E 05	1.076567E 06
2.500000E-03	4.685716E 03	1.154620E 04	4.162356E 04	1.123908E 05	5.055068E 05	1.396672E 06
2.539062E-03	6.048672E 03	1.494822E 04	5.396510E 04	1.457657E 05	6.557227E 05	1.811757E 06
2.578125E-03	7.815570E 03	1.935849E 04	6.996433E 04	1.890319E 05	8.504583E 05	2.349863E 06
2.617187E-03	1.010531E 04	2.507382E 04	9.069789E 04	2.451010E 05	1.102818E 06	3.047199E 06
2.656250E-03	1.307121E 04	3.247687E 04	1.175540E 05	3.177272E 05	1.429699E 06	3.950456E 06
2.695312E-03	1.691051E 04	4.205997E 04	1.523188E 05	4.117405E 05	1.852841E 06	5.119705E 06
2.773437E-03	2.822888E 04	7.031125E 04	2.548064E 05	6.888943E 05	3.100272E 06	8.566669E 06
2.851562E-03	4.700030E 04	1.171658E 05	4.247812E 05	1.148552E 06	5.169125E 06	1.428341E 07
2.929687E-03	7.779171E 04	1.940228E 05	7.035966E 05	1.902543E 06	8.562724E 06	2.366070E 07
3.007812E-03	1.272177E 05	3.173927E 05	1.151147E 06	3.112837E 06	1.401005E 07	3.871277E 07
3.046875E-03	1.615540E 05	4.030982E 05	1.462062E 06	3.953631E 06	1.779430E 07	4.916930E 07
3.085937E-03	2.034693E 05	5.077210E 05	1.841603E 06	4.980009E 06	2.241380E 07	6.193357E 07
3.124999E-03	2.533635E 05	6.322598E 05	2.293393E 06	6.201763E 06	2.791259E 07	7.712711E 07
3.164062E-03	3.107371E 05	7.754673E 05	2.812907E 06	7.606658E 06	3.423556E 07	9.459733E 07
3.203124E-03	3.738030E 05	9.328830E 05	3.383963E 06	9.150929E 06	4.118566E 07	1.137994E 08
3.242187E-03	4.394290E 05	1.036689E 06	3.978200E 06	1.075787E 07	4.841759E 07	1.337786E 08
3.281249E-03	5.036921E 05	1.257093E 06	4.560094E 06	1.233143E 07	5.549891E 07	1.533395E 08
3.320312E-03	5.629431E 05	1.404986E 06	5.096599E 06	1.378223E 07	6.202732E 07	1.713702E 08
3.359374E-03	6.147838E 05	1.534383E 06	5.566001E 06	1.505154E 07	6.773852E 07	1.871403E 08
3.398437E-03	6.583808E 05	1.643202E 06	5.960754E 06	1.611897E 07	7.254069E 07	2.003961E 08
3.437499E-03	6.941116E 05	1.732387E 06	6.284276E 06	1.699376E 07	7.647548E 07	2.112531E 08
3.476562E-03	7.229760E 05	1.804433E 06	6.545621E 06	1.770040E 07	7.965314E 07	2.200163E 08
3.515624E-03	7.461342E 05	1.862236E 06	6.755295E 06	1.826729E 07	8.220163E 07	2.270395E 08
3.554687E-03	7.646658E 05	1.908491E 06	6.923074E 06	1.872088E 07	8.423997E 07	2.326519E 08
3.593749E-03	7.794866E 05	1.945483E 06	7.057249E 06	1.908359E 07	8.586914E 07	2.371327E 08

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 7	FEEDBK 1	FEEDBK 2	DRVDV 1	DRVDV 2	DRVDV 3
1.523437E-03	2.179704E 06	1.001524E 00	1.003050E 00	0.	-2.670659E-05	-1.141188E-09
1.562500E-03	2.828934E 06	1.001563E 00	1.003128E 00	0.	-3.466177E-05	-1.922301E-09
1.601562E-03	3.671535E 06	1.001602E 00	1.003207E 00	0.	-4.498640E-05	-3.238041E-09
1.640625E-03	4.765103E 06	1.001642E 00	1.003285E 00	0.	-5.838621E-05	-5.454319E-09
1.679687E-03	6.184386E 06	1.001681E 00	1.003363E 00	0.	-7.577713E-05	-9.187478E-09
1.718750E-03	8.026394E 06	1.001720E 00	1.003441E 00	0.	-9.834790E-05	-1.547569E-08
1.757812E-03	1.041703E 07	1.001759E 00	1.003520E 00	0.	-1.276413E-04	-2.606767E-08
1.796875E-03	1.351970E 07	1.001798E 00	1.003598E 00	0.	-1.656595E-04	-4.390891E-08
1.835937E-03	1.754645E 07	1.001837E 00	1.003676E 00	0.	-2.150011E-04	-7.396078E-08
1.875000E-03	2.277251E 07	1.001876E 00	1.003755E 00	0.	-2.790386E-04	-1.245801E-07
1.914062E-03	2.955502E 07	1.001915E 00	1.003833E 00	0.	-3.621487E-04	-2.098427E-07
1.953125E-03	3.835751E 07	1.001955E 00	1.003911E 00	0.	-4.700113E-04	-3.534571E-07
1.992187E-03	4.978146E 07	1.001994E 00	1.003990E 00	0.	-6.099980E-04	-5.953561E-07
2.031250E-03	6.460744E 07	1.002033E 00	1.004068E 00	0.	-7.916747E-04	-1.002798E-06
2.070312E-03	8.384833E 07	1.002072E 00	1.004147E 00	0.	-1.027455E-03	-1.689063E-06
2.109375E-03	1.088184E 08	1.002111E 00	1.004225E 00	0.	-1.333449E-03	-2.844937E-06
2.148437E-03	1.412230E 08	1.002150E 00	1.004303E 00	0.	-1.730558E-03	-4.791730E-06
2.187500E-03	1.832743E 08	1.002189E 00	1.004382E 00	0.	-2.245905E-03	-8.070544E-06
2.226562E-03	2.378424E 08	1.002229E 00	1.004460E 00	0.	-2.914678E-03	-1.359256E-05
2.265625E-03	3.086497E 08	1.002268E 00	1.004538E 00	0.	-3.782527E-03	-2.289202E-05
2.304687E-03	4.005234E 08	1.002307E 00	1.004617E 00	0.	-4.908666E-03	-3.855200E-05
2.343750E-03	5.197219E 08	1.002346E 00	1.004695E 00	0.	-6.369888E-03	-6.492076E-05
2.382812E-03	6.743566E 08	1.002385E 00	1.004774E 00	0.	-8.265765E-03	-1.093166E-04
2.421875E-03	8.749357E 08	1.002424E 00	1.004852E 00	0.	-1.072537E-02	-1.840536E-04
2.460937E-03	1.135065E 09	1.002463E 00	1.004930E 00	0.	-1.391593E-02	-3.098450E-04
2.500000E-03	1.472349E 09	1.002503E 00	1.005009E 00	0.	-1.805405E-02	-5.215177E-04
2.539062E-03	1.909540E 09	1.002542E 00	1.005087E 00	0.	-2.342003E-02	-8.775963E-04
2.578125E-03	2.476012E 09	1.002581E 00	1.005166E 00	0.	-3.037633E-02	-1.476355E-03
2.617187E-03	3.209609E 09	1.002620E 00	1.005244E 00	0.	-3.939108E-02	-2.482652E-03
2.656250E-03	4.158979E 09	1.002659E 00	1.005322E 00	0.	-5.106787E-02	-4.172684E-03
2.695312E-03	5.386442E 09	1.002698E 00	1.005401E 00	0.	-6.618325E-02	-7.008356E-03
2.773437E-03	8.978621E 09	1.002777E 00	1.005558E 00	0.	-1.107438E-01	-1.962272E-02
2.851562E-03	1.490502E 10	1.002855E 00	1.005715E 00	0.	-1.846472E-01	-5.455136E-02
2.929687E-03	2.450919E 10	1.002933E 00	1.005872E 00	0.	-3.058735E-01	-1.496938E-01
3.007812E-03	3.954051E 10	1.003012E 00	1.006029E 00	0.	-5.004642E-01	-4.007431E-01
3.046875E-03	4.969054E 10	1.003051E 00	1.006107E 00	0.	-6.356470E-01	-6.464754E-01
3.085937E-03	6.158181E 10	1.003090E 00	1.006186E 00	0.	-8.006681E-01	-1.025711E 00
3.124999E-03	7.488403E 10	1.003129E 00	1.006264E 00	0.	-9.971026E-01	-1.590742E 00
3.164062E-03	8.875766E 10	1.003168E 00	1.006342E 00	0.	-1.222983E 00	-2.393101E 00
3.203124E-03	1.017660E 11	1.003208E 00	1.006421E 00	0.	-1.471275E 00	-3.463439E 00
3.242187E-03	1.120488E 11	1.003247E 00	1.006499E 00	0.	-1.729646E 00	-4.786679E 00
3.281249E-03	1.178556E 11	1.003286E 00	1.006578E 00	0.	-1.982651E 00	-6.289450E 00
3.320312E-03	1.182370E 11	1.003325E 00	1.006656E 00	0.	-2.215924E 00	-7.856509E 00
3.359374E-03	1.134277E 11	1.003364E 00	1.006735E 00	0.	-2.420022E 00	-9.370412E 00
3.398437E-03	1.046428E 11	1.003404E 00	1.006813E 00	0.	-2.591665E 00	-1.074677E 01
3.437499E-03	9.349692E 10	1.003443E 00	1.006892E 00	0.	-2.732339E 00	-1.194508E 01
3.476562E-03	8.147063E 10	1.003482E 00	1.006971E 00	0.	-2.845980E 00	-1.295936E 01
3.515624E-03	6.964714E 10	1.003521E 00	1.007049E 00	0.	-2.937155E 00	-1.380301E 01
3.554687E-03	5.868712E 10	1.003560E 00	1.007128E 00	0.	-3.010116E 00	-1.449728E 01
3.593749E-03	4.891701E 10	1.003599E 00	1.007206E 00	0.	-3.068467E 00	-1.506478E 01

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DRVDV 4	DRVDV 5	DRVDV 6
1.523437E-03	0.	0.	-2.670774E-05
1.562500E-03	0.	0.	-3.466369E-05
1.601562E-03	0.	0.	-4.498963E-05
1.640625E-03	0.	0.	-5.839166E-05
1.679687E-03	0.	0.	-7.578632E-05
1.718750E-03	0.	0.	-9.836337E-05
1.757812E-03	0.	0.	-1.276673E-04
1.796875E-03	0.	0.	-1.657034E-04
1.835937E-03	0.	0.	-2.150751E-04
1.875000E-03	0.	0.	-2.791632E-04
1.914062E-03	0.	0.	-3.623585E-04
1.953125E-03	0.	0.	-4.703648E-04
1.992187E-03	0.	0.	-6.105934E-04
2.031250E-03	0.	0.	-7.926775E-04
2.070312E-03	0.	0.	-1.029144E-03
2.109375E-03	0.	0.	-1.336294E-03
2.148437E-03	0.	0.	-1.735350E-03
2.187500E-03	0.	0.	-2.253976E-03
2.226562E-03	0.	0.	-2.928271E-03
2.265625E-03	0.	0.	-3.805419E-03
2.304687E-03	0.	0.	-4.947218E-03
2.343750E-03	0.	0.	-6.434809E-03
2.382812E-03	0.	0.	-8.375082E-03
2.421875E-03	0.	0.	-1.090942E-02
2.460937E-03	0.	0.	-1.422578E-02
2.500000E-03	0.	0.	-1.857556E-02
2.539062E-03	0.	0.	-2.429762E-02
2.578125E-03	0.	0.	-3.185269E-02
2.617187E-03	0.	0.	-4.187373E-02
2.656250E-03	0.	0.	-5.524056E-02
2.695312E-03	0.	0.	-7.319161E-02
2.734375E-03	0.	0.	-1.303666E-01
2.851562E-03	0.	0.	-2.391986E-01
2.929687E-03	0.	0.	-4.555672E-01
3.007812E-03	0.	0.	-9.012073E-01
3.046875E-03	0.	0.	-1.282122E 00
3.085937E-03	0.	0.	-1.826379E 00
3.124999E-03	0.	0.	-2.587844E 00
3.164062E-03	0.	0.	-3.616085E 00
3.203124E-03	0.	0.	-4.934714E 00
3.242187E-03	0.	0.	-6.516325E 00
3.281249E-03	0.	0.	-8.272101E 00
3.320312E-03	0.	0.	-1.007243E 01
3.359374E-03	0.	0.	-1.179043E 01
3.398437E-03	0.	0.	-1.333843E 01
3.437499E-03	0.	0.	-1.467742E 01
3.476562E-03	0.	0.	-1.580534E 01
3.515624E-03	0.	0.	-1.674016E 01
3.554687E-03	0.	0.	-1.750739E 01
3.593749E-03	0.	0.	-1.813325E 01

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TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
3.632812E-03	2.131880E 10	-1.864175E 01	-5.718595E 03	-5.708386E 03	3.425425E 11	6.230290E 07
3.671874E-03	1.706714E 10	-1.905375E 01	-5.705520E 03	-5.694320E 03	2.813996E 11	6.305008E 07
3.710937E-03	1.367054E 10	-1.938690E 01	-5.693706E 03	-5.680937E 03	2.300525E 11	6.364841E 07
3.749999E-03	1.095491E 10	-1.965588E 01	-5.683609E 03	-5.669265E 03	1.873686E 11	6.412779E 07
3.789062E-03	8.782105E 09	-1.987280E 01	-5.675166E 03	-5.659430E 03	1.521572E 11	6.451201E 07
3.828124E-03	7.042507E 09	-2.004757E 01	-5.668150E 03	-5.651250E 03	1.232789E 11	6.482008E 07
3.867187E-03	5.648994E 09	-2.018830E 01	-5.662309E 03	-5.644459E 03	9.970110E 10	6.506716E 07
3.906249E-03	4.532221E 09	-2.030154E 01	-5.657399E 03	-5.638794E 03	8.051793E 10	6.526537E 07
3.945312E-03	3.636907E 09	-2.039263E 01	-5.653206E 03	-5.634010E 03	6.495290E 10	6.542441E 07
3.984374E-03	2.918926E 09	-2.046588E 01	-5.649540E 03	-5.629894E 03	5.235071E 10	6.555204E 07
4.023437E-03	2.343019E 09	-2.052477E 01	-5.646226E 03	-5.626258E 03	4.216469E 10	6.565449E 07
4.052499E-03	1.880983E 09	-2.057210E 01	-5.643111E 03	-5.622928E 03	3.394264E 10	6.573673E 07
4.101562E-03	1.510247E 09	-2.061015E 01	-5.640046E 03	-5.619748E 03	2.731299E 10	6.580275E 07
4.140624E-03	1.212732E 09	-2.064071E 01	-5.636884E 03	-5.616568E 03	2.197188E 10	6.585577E 07
4.179687E-03	9.739542E 08	-2.066528E 01	-5.633471E 03	-5.613234E 03	1.767178E 10	6.589834E 07
4.218749E-03	7.823013E 08	-2.068502E 01	-5.629647E 03	-5.609584E 03	1.421167E 10	6.593253E 07
4.257811E-03	6.284630E 08	-2.070088E 01	-5.625226E 03	-5.605448E 03	1.142867E 10	6.596000E 07
4.296874E-03	5.049719E 08	-2.071363E 01	-5.620000E 03	-5.600624E 03	9.191061E 09	6.598207E 07
4.335936E-03	4.058374E 08	-2.072388E 01	-5.613720E 03	-5.594885E 03	7.392453E 09	6.599980E 07
4.374999E-03	3.262529E 08	-2.073212E 01	-5.606090E 03	-5.587961E 03	5.947041E 09	6.601405E 07
4.414061E-03	2.623614E 08	-2.073875E 01	-5.596756E 03	-5.579524E 03	4.785674E 09	6.602551E 07
4.453124E-03	2.110672E 08	-2.074408E 01	-5.585280E 03	-5.569183E 03	3.852668E 09	6.603473E 07
4.492186E-03	1.698859E 08	-2.074837E 01	-5.571141E 03	-5.556462E 03	3.103205E 09	6.604214E 07
4.531249E-03	1.368233E 08	-2.075182E 01	-5.553702E 03	-5.540784E 03	2.501234E 09	6.604812E 07
4.570311E-03	1.102785E 08	-2.075460E 01	-5.532189E 03	-5.521446E 03	2.017764E 09	6.605293E 07
4.609374E-03	8.896640E 07	-2.075685E 01	-5.505672E 03	-5.497604E 03	1.629491E 09	6.605681E 07
4.648436E-03	7.185539E 07	-2.075866E 01	-5.473033E 03	-5.468238E 03	1.317685E 09	6.605994E 07
4.687499E-03	5.811727E 07	-2.076012E 01	-5.432947E 03	-5.432135E 03	1.067296E 09	6.606247E 07
4.726561E-03	4.708713E 07	-2.076131E 01	-5.383858E 03	-5.387859E 03	8.662334E 08	6.606451E 07
4.765624E-03	3.823114E 07	-2.076227E 01	-5.323964E 03	-5.333741E 03	7.047830E 08	6.606617E 07
4.804686E-03	3.112075E 07	-2.076305E 01	-5.251221E 03	-5.267860E 03	5.751436E 08	6.606752E 07
4.843748E-03	2.541185E 07	-2.076368E 01	-5.163368E 03	-5.188074E 03	4.710487E 08	6.606862E 07
4.882811E-03	2.082820E 07	-2.076420E 01	-5.057989E 03	-5.092042E 03	3.874661E 08	6.606952E 07
4.921873E-03	1.714799E 07	-2.076463E 01	-4.932619E 03	-4.977326E 03	3.203543E 08	6.607026E 07
4.960936E-03	1.419315E 07	-2.076498E 01	-4.784917E 03	-4.841512E 03	2.664680E 08	6.607087E 07
4.999998E-03	1.182070E 07	-2.076528E 01	-4.612897E 03	-4.682425E 03	2.232010E 08	6.607138E 07
5.039061E-03	9.915846E 06	-2.076552E 01	-4.415219E 03	-4.498381E 03	1.884607E 08	6.607180E 07
5.078123E-03	8.386424E 06	-2.076573E 01	-4.191524E 03	-4.288508E 03	1.605667E 08	6.607216E 07
5.117186E-03	7.158433E 06	-2.076590E 01	-3.942756E 03	-4.053071E 03	1.381698E 08	6.607246E 07
5.156248E-03	6.172460E 06	-2.076605E 01	-3.671395E 03	-3.793759E 03	1.201866E 08	6.607272E 07
5.195311E-03	5.380801E 06	-2.076618E 01	-3.381562E 03	-3.513863E 03	1.057473E 08	6.607294E 07
5.234373E-03	4.745155E 06	-2.076630E 01	-3.078878E 03	-3.218254E 03	9.415336E 07	6.607314E 07
5.273436E-03	4.234773E 06	-2.076640E 01	-2.770108E 03	-2.913140E 03	8.484401E 07	6.607332E 07
5.312498E-03	3.824963E 06	-2.076649E 01	-2.462576E 03	-2.605591E 03	7.736897E 07	6.607347E 07
5.351560E-03	3.495902E 06	-2.076657E 01	-2.163490E 03	-2.302907E 03	7.136671E 07	6.607362E 07
5.390623E-03	3.231675E 06	-2.076665E 01	-1.879290E 03	-2.011930E 03	6.654694E 07	6.607375E 07
5.429685E-03	3.019501E 06	-2.076672E 01	-1.615122E 03	-1.738465E 03	6.267659E 07	6.607387E 07
5.468748E-03	2.849122E 06	-2.076678E 01	-1.374560E 03	-1.486869E 03	5.956854E 07	6.607398E 07
5.507810E-03	2.712299E 06	-2.076685E 01	-1.159552E 03	-1.259887E 03	5.707254E 07	6.607409E 07
5.546873E-03	2.602418E 06	-2.076691E 01	-9.705688E 02	-1.058705E 03	5.506794E 07	6.607419E 07

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
3.632812E-03	7.913424E 05	1.975075E 06	7.164577E 06	1.937370E 07	8.717139E 07	2.407095E 08
3.671874E-03	8.008312E 05	1.998758E 06	7.250470E 06	1.960583E 07	8.821265E 07	2.435644E 08
3.710937E-03	8.084296E 05	2.017723E 06	7.319246E 06	1.979167E 07	8.904547E 07	2.458430E 08
3.749999E-03	8.145173E 05	2.032916E 06	7.374341E 06	1.994052E 07	8.971170E 07	2.476609E 08
3.789062E-03	8.193965E 05	2.045094E 06	7.418493E 06	2.005977E 07	9.024469E 07	2.491102E 08
3.828124E-03	8.233085E 05	2.054857E 06	7.453887E 06	2.015533E 07	9.067104E 07	2.502647E 08
3.867187E-03	8.264460E 05	2.062687E 06	7.482268E 06	2.023193E 07	9.101198E 07	2.511830E 08
3.906249E-03	8.289629E 05	2.068967E 06	7.505029E 06	2.029333E 07	9.128449E 07	2.519121E 08
3.945312E-03	8.309823E 05	2.074006E 06	7.523285E 06	2.034254E 07	9.150215E 07	2.524894E 08
3.984374E-03	8.326029E 05	2.078050E 06	7.537929E 06	2.038199E 07	9.167583E 07	2.529452E 08
4.023437E-03	8.339035E 05	2.081295E 06	7.549676E 06	2.041360E 07	9.181424E 07	2.533034E 08
4.062499E-03	8.349475E 05	2.083899E 06	7.559099E 06	2.043893E 07	9.192434E 07	2.535833E 08
4.101562E-03	8.357856E 05	2.085990E 06	7.566658E 06	2.045921E 07	9.201175E 07	2.538005E 08
4.140624E-03	8.364585E 05	2.087668E 06	7.572721E 06	2.047545E 07	9.208094E 07	2.539672E 08
4.179687E-03	8.369987E 05	2.089015E 06	7.577583E 06	2.048844E 07	9.213550E 07	2.540936E 08
4.218749E-03	8.374326E 05	2.090096E 06	7.581481E 06	2.049883E 07	9.217833E 07	2.541875E 08
4.257811E-03	8.377810E 05	2.090964E 06	7.584606E 06	2.050712E 07	9.221174E 07	2.542554E 08
4.296874E-03	8.380608E 05	2.091661E 06	7.587109E 06	2.051373E 07	9.223759E 07	2.543023E 08
4.335936E-03	8.382856E 05	2.092220E 06	7.589114E 06	2.051900E 07	9.225737E 07	2.543325E 08
4.374999E-03	8.384662E 05	2.092670E 06	7.590719E 06	2.052318E 07	9.227228E 07	2.543492E 08
4.414061E-03	8.386113E 05	2.093030E 06	7.592003E 06	2.052650E 07	9.228328E 07	2.543551E 08
4.453124E-03	8.387279E 05	2.093320E 06	7.593029E 06	2.052911E 07	9.229113E 07	2.543523E 08
4.492186E-03	8.388217E 05	2.093552E 06	7.593848E 06	2.053117E 07	9.229647E 07	2.543426E 08
4.531249E-03	8.388971E 05	2.093739E 06	7.594500E 06	2.053278E 07	9.229978E 07	2.543273E 08
4.570311E-03	8.389578E 05	2.093889E 06	7.595019E 06	2.053403E 07	9.230147E 07	2.543074E 08
4.609374E-03	8.390066E 05	2.094009E 06	7.595431E 06	2.053498E 07	9.230185E 07	2.542840E 08
4.648436E-03	8.390460E 05	2.094106E 06	7.595757E 06	2.053571E 07	9.230118E 07	2.542577E 08
4.687499E-03	8.390777E 05	2.094184E 06	7.596014E 06	2.053624E 07	9.229968E 07	2.542290E 08
4.726561E-03	8.391033E 05	2.094246E 06	7.596215E 06	2.053663E 07	9.229750E 07	2.541985E 08
4.765624E-03	8.391240E 05	2.094296E 06	7.596372E 06	2.053690E 07	9.229477E 07	2.541665E 08
4.804686E-03	8.391407E 05	2.094336E 06	7.596493E 06	2.053707E 07	9.229162E 07	2.541333E 08
4.843748E-03	8.391542E 05	2.094368E 06	7.596586E 06	2.053716E 07	9.228811E 07	2.540992E 08
4.882811E-03	8.391652E 05	2.094394E 06	7.596655E 06	2.053719E 07	9.228432E 07	2.540642E 08
4.921873E-03	8.391742E 05	2.094415E 06	7.596706E 06	2.053717E 07	9.228031E 07	2.540287E 08
4.960936E-03	8.391815E 05	2.094432E 06	7.596742E 06	2.053711E 07	9.227611E 07	2.539927E 08
4.999998E-03	8.391875E 05	2.094445E 06	7.596766E 06	2.053702E 07	9.227178E 07	2.539562E 08
5.039061E-03	8.391925E 05	2.094456E 06	7.596781E 06	2.053690E 07	9.226732E 07	2.539195E 08
5.078123E-03	8.391966E 05	2.094465E 06	7.596787E 06	2.053676E 07	9.226277E 07	2.538825E 08
5.117186E-03	8.392000E 05	2.094472E 06	7.596788E 06	2.053661E 07	9.225815E 07	2.538453E 08
5.156248E-03	8.392029E 05	2.094478E 06	7.596784E 06	2.053644E 07	9.225347E 07	2.538079E 08
5.195311E-03	8.392053E 05	2.094482E 06	7.596775E 06	2.053626E 07	9.224874E 07	2.537704E 08
5.234373E-03	8.392074E 05	2.094486E 06	7.596764E 06	2.053607E 07	9.224397E 07	2.537328E 08
5.273436E-03	8.392092E 05	2.094489E 06	7.596750E 06	2.053587E 07	9.223917E 07	2.536951E 08
5.312498E-03	8.392108E 05	2.094491E 06	7.596734E 06	2.053567E 07	9.223435E 07	2.536574E 08
5.351560E-03	8.392122E 05	2.094493E 06	7.596716E 06	2.053547E 07	9.222950E 07	2.536196E 08
5.390623E-03	8.392134E 05	2.094495E 06	7.596697E 06	2.053526E 07	9.222464E 07	2.535818E 08
5.429685E-03	8.392146E 05	2.094496E 06	7.596677E 06	2.053505E 07	9.221977E 07	2.535439E 08
5.468748E-03	8.392156E 05	2.094497E 06	7.596656E 06	2.053483E 07	9.221488E 07	2.535060E 08
5.507810E-03	8.392165E 05	2.094498E 06	7.596634E 06	2.053462E 07	9.220999E 07	2.534681E 08
5.546873E-03	8.392174E 05	2.094498E 06	7.596612E 06	2.053440E 07	9.220509E 07	2.534302E 08

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 7	FEEDBK 1	FEEDBK 2	DRVDV 1	DRVDV 2	DRVDV 3
3.632812E-03	4.043866E 10	1.003639E 00	1.007285E 00	0.	-3.115145E 00	-1.552660E 01
3.671874E-03	3.321986E 10	1.003678E 00	1.007363E 00	0.	-3.152504E 00	-1.590125E 01
3.710937E-03	2.715759E 10	1.003717E 00	1.007442E 00	0.	-3.182421E 00	-1.620448E 01
3.749999E-03	2.211815E 10	1.003756E 00	1.007520E 00	0.	-3.206389E 00	-1.644949E 01
3.789062E-03	1.796093E 10	1.003795E 00	1.007599E 00	0.	-3.225600E 00	-1.664720E 01
3.828124E-03	1.455145E 10	1.003835E 00	1.007677E 00	0.	-3.241004E 00	-1.680657E 01
3.867187E-03	1.176775E 10	1.003874E 00	1.007756E 00	0.	-3.253358E 00	-1.693494E 01
3.906249E-03	9.502899E 09	1.003913E 00	1.007835E 00	0.	-3.263268E 00	-1.703827E 01
3.945312E-03	7.665226E 09	1.003952E 00	1.007913E 00	0.	-3.271220E 00	-1.712141E 01
3.984374E-03	6.177358E 09	1.003991E 00	1.007992E 00	0.	-3.277602E 00	-1.718828E 01
4.023437E-03	4.974752E 09	1.004031E 00	1.008070E 00	0.	-3.282724E 00	-1.724205E 01
4.062499E-03	4.004022E 09	1.004070E 00	1.008149E 00	0.	-3.286836E 00	-1.728527E 01
4.101562E-03	3.221298E 09	1.004109E 00	1.008228E 00	0.	-3.290138E 00	-1.732001E 01
4.140624E-03	2.590703E 09	1.004148E 00	1.008306E 00	0.	-3.292788E 00	-1.734793E 01
4.179687E-03	2.083015E 09	1.004188E 00	1.008385E 00	0.	-3.294917E 00	-1.737036E 01
4.218749E-03	1.674500E 09	1.004227E 00	1.008463E 00	0.	-3.296627E 00	-1.738839E 01
4.257811E-03	1.345928E 09	1.004266E 00	1.008542E 00	0.	-3.298000E 00	-1.740289E 01
4.296874E-03	1.081746E 09	1.004305E 00	1.008621E 00	0.	-3.299103E 00	-1.741453E 01
4.335936E-03	8.693951E 08	1.004344E 00	1.008699E 00	0.	-3.299990E 00	-1.742389E 01
4.374999E-03	6.987438E 08	1.004384E 00	1.008778E 00	0.	-3.300703E 00	-1.743142E 01
4.414061E-03	5.616281E 08	1.004423E 00	1.008856E 00	0.	-3.301276E 00	-1.743747E 01
4.453124E-03	4.514736E 08	1.004462E 00	1.008935E 00	0.	-3.301736E 00	-1.744234E 01
4.492186E-03	3.629890E 08	1.004501E 00	1.009014E 00	0.	-3.302107E 00	-1.744626E 01
4.531249E-03	2.919179E 08	1.004541E 00	1.009092E 00	0.	-3.302406E 00	-1.744941E 01
4.570311E-03	2.348376E 08	1.004580E 00	1.009171E 00	0.	-3.302646E 00	-1.745196E 01
4.609374E-03	1.889966E 08	1.004619E 00	1.009250E 00	0.	-3.302840E 00	-1.745401E 01
4.648436E-03	1.521837E 08	1.004658E 00	1.009328E 00	0.	-3.302997E 00	-1.745566E 01
4.687499E-03	1.226219E 08	1.004698E 00	1.009407E 00	0.	-3.303123E 00	-1.745700E 01
4.726561E-03	9.888379E 07	1.004737E 00	1.009486E 00	0.	-3.303226E 00	-1.745808E 01
4.765624E-03	7.982248E 07	1.004776E 00	1.009564E 00	0.	-3.303309E 00	-1.745896E 01
4.804686E-03	6.451689E 07	1.004815E 00	1.009643E 00	0.	-3.303376E 00	-1.745967E 01
4.843748E-03	5.222722E 07	1.004855E 00	1.009722E 00	0.	-3.303431E 00	-1.746025E 01
4.882811E-03	4.235930E 07	1.004894E 00	1.009800E 00	0.	-3.303476E 00	-1.746073E 01
4.921873E-03	3.443600E 07	1.004933E 00	1.009879E 00	0.	-3.303513E 00	-1.746112E 01
4.960936E-03	2.807415E 07	1.004972E 00	1.009958E 00	0.	-3.303544E 00	-1.746144E 01
4.999998E-03	2.296607E 07	1.005012E 00	1.010037E 00	0.	-3.303569E 00	-1.746171E 01
5.039061E-03	1.886468E 07	1.005051E 00	1.010115E 00	0.	-3.303590E 00	-1.746193E 01
5.078123E-03	1.557160E 07	1.005090E 00	1.010194E 00	0.	-3.303608E 00	-1.746212E 01
5.117186E-03	1.292753E 07	1.005129E 00	1.010273E 00	0.	-3.303623E 00	-1.746228E 01
5.156248E-03	1.080456E 07	1.005169E 00	1.010351E 00	0.	-3.303636E 00	-1.746242E 01
5.195311E-03	9.099996E 06	1.005208E 00	1.010430E 00	0.	-3.303647E 00	-1.746254E 01
5.234373E-03	7.731369E 06	1.005247E 00	1.010509E 00	0.	-3.303657E 00	-1.746264E 01
5.273436E-03	6.632470E 06	1.005286E 00	1.010588E 00	0.	-3.303666E 00	-1.746273E 01
5.312498E-03	5.750138E 06	1.005326E 00	1.010666E 00	0.	-3.303674E 00	-1.746282E 01
5.351560E-03	5.041687E 06	1.005365E 00	1.010745E 00	0.	-3.303681E 00	-1.746289E 01
5.390623E-03	4.472847E 06	1.005404E 00	1.010824E 00	0.	-3.303687E 00	-1.746296E 01
5.429685E-03	4.016100E 06	1.005443E 00	1.010903E 00	0.	-3.303693E 00	-1.746302E 01
5.468748E-03	3.649353E 06	1.005483E 00	1.010981E 00	0.	-3.303699E 00	-1.746308E 01
5.507810E-03	3.354866E 06	1.005522E 00	1.011060E 00	0.	-3.303705E 00	-1.746314E 01
5.546873E-03	3.118397E 06	1.005561E 00	1.011139E 00	0.	-3.303710E 00	-1.746320E 01

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TIME	DRVDV 4	DRVDV 5	DRVDV 6
3.632812E-03	0.	0.	-1.864175E 01
3.671874E-03	0.	0.	-1.905375E 01
3.710937E-03	0.	0.	-1.938690E 01
3.749999E-03	0.	0.	-1.965588E 01
3.789062E-03	0.	0.	-1.987280E 01
3.828124E-03	0.	0.	-2.004757E 01
3.867187E-03	0.	0.	-2.018830E 01
3.906249E-03	0.	0.	-2.030154E 01
3.945312E-03	0.	0.	-2.039263E 01
3.984374E-03	0.	0.	-2.046588E 01
4.023437E-03	0.	0.	-2.052477E 01
4.062499E-03	0.	0.	-2.057210E 01
4.101562E-03	0.	0.	-2.061015E 01
4.140624E-03	0.	0.	-2.064071E 01
4.179687E-03	0.	0.	-2.066528E 01
4.218749E-03	0.	0.	-2.068502E 01
4.257811E-03	0.	0.	-2.070088E 01
4.296874E-03	0.	0.	-2.071363E 01
4.335936E-03	0.	0.	-2.072388E 01
4.374999E-03	0.	0.	-2.073212E 01
4.414061E-03	0.	0.	-2.073875E 01
4.453124E-03	0.	0.	-2.074408E 01
4.492186E-03	0.	0.	-2.074837E 01
4.531249E-03	0.	0.	-2.075182E 01
4.570311E-03	0.	0.	-2.075460E 01
4.609374E-03	0.	0.	-2.075685E 01
4.648436E-03	0.	0.	-2.075866E 01
4.687499E-03	0.	0.	-2.076012E 01
4.726561E-03	0.	0.	-2.076131E 01
4.765624E-03	0.	0.	-2.076227E 01
4.804686E-03	0.	0.	-2.076305E 01
4.843748E-03	0.	0.	-2.076368E 01
4.882811E-03	0.	0.	-2.076420E 01
4.921873E-03	0.	0.	-2.076463E 01
4.960936E-03	0.	0.	-2.076498E 01
4.999998E-03	0.	0.	-2.076528E 01
5.039061E-03	0.	0.	-2.076552E 01
5.078123E-03	0.	0.	-2.076573E 01
5.117186E-03	0.	0.	-2.076590E 01
5.156248E-03	0.	0.	-2.076605E 01
5.195311E-03	0.	0.	-2.076618E 01
5.234373E-03	0.	0.	-2.076630E 01
5.273436E-03	0.	0.	-2.076640E 01
5.312498E-03	0.	0.	-2.076649E 01
5.351560E-03	0.	0.	-2.076657E 01
5.390623E-03	0.	0.	-2.076665E 01
5.429685E-03	0.	0.	-2.076672E 01
5.468748E-03	0.	0.	-2.076678E 01
5.507810E-03	0.	0.	-2.076685E 01
5.546873E-03	0.	0.	-2.076691E 01

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
5.585935E-03	2.514168E 06	-2.076696E 01	-8.068893E 02	-8.831731E 02	5.345790E 07	6.607429E 07
5.624998E-03	2.443286E 06	-2.076702E 01	-7.321088E 02	-7.321088E 02	5.216464E 07	6.607439E 07
5.644529E-03	2.413183E 06	-2.076705E 01	-6.347554E 02	-6.347554E 02	5.161640E 07	6.607444E 07
5.664060E-03	2.386231E 06	-2.076707E 01	-5.750509E 02	-5.750509E 02	5.112498E 07	6.607448E 07
5.683591E-03	2.362088E 06	-2.076710E 01	-5.206452E 02	-5.206452E 02	5.068451E 07	6.607453E 07
5.703123E-03	2.340457E 06	-2.076713E 01	-4.710394E 02	-4.710394E 02	5.028970E 07	6.607458E 07
5.722654E-03	2.321072E 06	-2.076715E 01	-4.258356E 02	-4.258356E 02	4.993582E 07	6.607462E 07
5.742185E-03	2.303698E 06	-2.076718E 01	-3.846876E 02	-3.846876E 02	4.961862E 07	6.607467E 07
5.761716E-03	2.288126E 06	-2.076720E 01	-3.472764E 02	-3.472764E 02	4.933427E 07	6.607471E 07
5.781248E-03	2.274167E 06	-2.076723E 01	-3.133063E 02	-3.133063E 02	4.907936E 07	6.607475E 07
5.800779E-03	2.261653E 06	-2.076726E 01	-2.825012E 02	-2.825012E 02	4.885082E 07	6.607480E 07
5.820310E-03	2.250435E 06	-2.076728E 01	-2.545946E 02	-2.545946E 02	4.864592E 07	6.607484E 07
5.839841E-03	2.240377E 06	-2.076731E 01	-2.293438E 02	-2.293438E 02	4.846218E 07	6.607489E 07
5.859372E-03	2.231359E 06	-2.076733E 01	-2.065166E 02	-2.065166E 02	4.829742E 07	6.607493E 07
5.878904E-03	2.223272E 06	-2.076736E 01	-1.859020E 02	-1.859020E 02	4.814966E 07	6.607497E 07
5.917966E-03	2.209542E 06	-2.076741E 01	-1.585749E 02	-1.585749E 02	4.789840E 07	6.607506E 07
5.957029E-03	2.198480E 06	-2.076746E 01	-1.284938E 02	-1.284938E 02	4.769614E 07	6.607515E 07
5.996091E-03	2.189568E 06	-2.076751E 01	-1.039811E 02	-1.039811E 02	4.753319E 07	6.607523E 07
6.035154E-03	2.182386E 06	-2.076755E 01	-8.411427E 01	-8.411427E 01	4.740180E 07	6.607532E 07
6.074216E-03	2.176592E 06	-2.076760E 01	-6.805253E 01	-6.805253E 01	4.729574E 07	6.607540E 07
6.113278E-03	2.171913E 06	-2.076765E 01	-5.508749E 01	-5.508749E 01	4.721002E 07	6.607549E 07
6.152341E-03	2.168130E 06	-2.076770E 01	-4.463240E 01	-4.463240E 01	4.714063E 07	6.607557E 07
6.230466E-03	2.162623E 06	-2.076780E 01	-3.255295E 01	-3.255295E 01	4.703900E 07	6.607574E 07
6.308591E-03	2.158949E 06	-2.076790E 01	-2.176437E 01	-2.176437E 01	4.697135E 07	6.607591E 07
6.386716E-03	2.156477E 06	-2.076799E 01	-1.466245E 01	-1.466245E 01	4.692561E 07	6.607608E 07
6.542966E-03	2.153651E 06	-2.076819E 01	-8.394306E 00	-8.394306E 00	4.687231E 07	6.607641E 07
6.699216E-03	2.152120E 06	-2.076838E 01	-4.550312E 00	-4.550312E 00	4.684305E 07	6.607675E 07
7.011716E-03	2.150490E 06	-2.076877E 01	-2.424633E 00	-2.424633E 00	4.681013E 07	6.607742E 07
7.636716E-03	2.148306E 06	-2.076955E 01	-1.625605E 00	-1.625605E 00	4.676327E 07	6.607876E 07
8.886716E-03	2.144265E 06	-2.077110E 01	-1.506271E 00	-1.506271E 00	4.667473E 07	6.608144E 07
1.138672E-02	2.136258E 06	-2.077420E 01	-1.496515E 00	-1.496515E 00	4.649864E 07	6.608680E 07
1.638672E-02	2.120405E 06	-2.078036E 01	-1.489754E 00	-1.489754E 00	4.614974E 07	6.609744E 07
2.638672E-02	2.089311E 06	-2.079256E 01	-1.477241E 00	-1.477241E 00	4.546558E 07	6.611852E 07
4.638671E-02	2.029478E 06	-2.081646E 01	-1.452808E 00	-1.452808E 00	4.415022E 07	6.615979E 07
8.638671E-02	1.918537E 06	-2.086242E 01	-1.405386E 00	-1.405386E 00	4.171607E 07	6.623908E 07
1.663867E-01	1.726817E 06	-2.094768E 01	-1.316041E 00	-1.316041E 00	3.752526E 07	6.638596E 07
3.263867E-01	1.434599E 06	-2.109656E 01	-1.158716E 00	-1.158716E 00	3.117981E 07	6.664172E 07
4.863867E-01	1.211572E 06	-2.122125E 01	-1.056038E 00	-1.056038E 00	2.655100E 07	6.685523E 07
8.063867E-01	9.416790E 05	-2.142590E 01	-7.875308E-01	-7.875308E-01	2.068213E 07	6.720432E 07
1.126387E 00	7.610336E 05	-2.158785E 01	-6.655844E-01	-6.655844E-01	1.690614E 07	6.747941E 07
1.446387E 00	6.397113E 05	-2.172139E 01	-5.426893E-01	-5.426893E-01	1.433473E 07	6.770546E 07
2.086387E 00	4.932226E 05	-2.193928E 01	-4.063382E-01	-4.063382E-01	1.108152E 07	6.807282E 07
2.726387E 00	3.952335E 05	-2.211035E 01	-3.460684E-01	-3.460684E-01	8.979782E 06	6.835999E 07
3.366387E 00	3.279284E 05	-2.224998E 01	-2.916899E-01	-2.916899E-01	7.511996E 06	6.859356E 07
4.006387E 00	2.775593E 05	-2.236716E 01	-2.605632E-01	-2.605632E-01	6.399139E 06	6.878901E 07
4.646387E 00	2.379597E 05	-2.246713E 01	-2.405209E-01	-2.405209E-01	5.514930E 06	6.895535E 07
5.286387E 00	2.058987E 05	-2.255335E 01	-2.261206E-01	-2.261206E-01	4.792976E 06	6.909852E 07
6.566387E 00	1.601149E 05	-2.269683E 01	-1.964784E-01	-1.964784E-01	3.715115E 06	6.933618E 07
7.846386E 00	1.253116E 05	-2.280872E 01	-1.914755E-01	-1.914755E-01	2.927343E 06	6.952098E 07
9.126386E 00	1.004603E 05	-2.289734E 01	-1.726876E-01	-1.726876E-01	2.360030E 06	6.966704E 07

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
5.585935E-03	8.392183E 05	2.094499E 06	7.596589E 06	2.053418E 07	9.220019E 07	2.533923E 08
5.624998E-03	8.392191E 05	2.094499E 06	7.596566E 06	2.053396E 07	9.219528E 07	2.533543E 08
5.644529E-03	8.392195E 05	2.094500E 06	7.596555E 06	2.053385E 07	9.219283E 07	2.533354E 08
5.664060E-03	8.392199E 05	2.094500E 06	7.596543E 06	2.053374E 07	9.219037E 07	2.533164E 08
5.683591E-03	8.392203E 05	2.094500E 06	7.596531E 06	2.053363E 07	9.218792E 07	2.532974E 08
5.703123E-03	8.392206E 05	2.094500E 06	7.596519E 06	2.053352E 07	9.218546E 07	2.532785E 08
5.722654E-03	8.392210E 05	2.094500E 06	7.596507E 06	2.053341E 07	9.218300E 07	2.532595E 08
5.742185E-03	8.392213E 05	2.094500E 06	7.596496E 06	2.053330E 07	9.218055E 07	2.532405E 08
5.761716E-03	8.392217E 05	2.094500E 06	7.596484E 06	2.053319E 07	9.217809E 07	2.532216E 08
5.781248E-03	8.392221E 05	2.094501E 06	7.596472E 06	2.053308E 07	9.217563E 07	2.532026E 08
5.800779E-03	8.392224E 05	2.094501E 06	7.596460E 06	2.053297E 07	9.217317E 07	2.531836E 08
5.820310E-03	8.392228E 05	2.094501E 06	7.596448E 06	2.053286E 07	9.217071E 07	2.531647E 08
5.839841E-03	8.392231E 05	2.094501E 06	7.596435E 06	2.053274E 07	9.216825E 07	2.531457E 08
5.859372E-03	8.392234E 05	2.094501E 06	7.596423E 06	2.053263E 07	9.216579E 07	2.531267E 08
5.878904E-03	8.392238E 05	2.094501E 06	7.596411E 06	2.053252E 07	9.216333E 07	2.531078E 08
5.917966E-03	8.392245E 05	2.094501E 06	7.596387E 06	2.053230E 07	9.215841E 07	2.530698E 08
5.957029E-03	8.392251E 05	2.094501E 06	7.596363E 06	2.053208E 07	9.215349E 07	2.530319E 08
5.996091E-03	8.392258E 05	2.094501E 06	7.596339E 06	2.053185E 07	9.214857E 07	2.529940E 08
6.035154E-03	8.392265E 05	2.094501E 06	7.596314E 06	2.053163E 07	9.214365E 07	2.529561E 08
6.074216E-03	8.392271E 05	2.094502E 06	7.596290E 06	2.053141E 07	9.213873E 07	2.529182E 08
6.113278E-03	8.392278E 05	2.094502E 06	7.596266E 06	2.053118E 07	9.213381E 07	2.528803E 08
6.152341E-03	8.392285E 05	2.094502E 06	7.596241E 06	2.053096E 07	9.212889E 07	2.528424E 08
6.230466E-03	8.392298E 05	2.094502E 06	7.596192E 06	2.053051E 07	9.211905E 07	2.527666E 08
6.308591E-03	8.392311E 05	2.094502E 06	7.596143E 06	2.053007E 07	9.210921E 07	2.526908E 08
6.386716E-03	8.392324E 05	2.094502E 06	7.596095E 06	2.052962E 07	9.209938E 07	2.526151E 08
6.542966E-03	8.392350E 05	2.094503E 06	7.595997E 06	2.052873E 07	9.207970E 07	2.524637E 08
6.699216E-03	8.392376E 05	2.094503E 06	7.595899E 06	2.052784E 07	9.206003E 07	2.523124E 08
7.011716E-03	8.392428E 05	2.094503E 06	7.595703E 06	2.052605E 07	9.202070E 07	2.520100E 08
7.636716E-03	8.392532E 05	2.094504E 06	7.595312E 06	2.052248E 07	9.194210E 07	2.514064E 08
8.886716E-03	8.392739E 05	2.094506E 06	7.594528E 06	2.051533E 07	9.178509E 07	2.502035E 08
1.138672E-02	8.393152E 05	2.094510E 06	7.592961E 06	2.050105E 07	9.147188E 07	2.478151E 08
1.638672E-02	8.393971E 05	2.094516E 06	7.589820E 06	2.047251E 07	9.084867E 07	2.431068E 08
2.638672E-02	8.395581E 05	2.094520E 06	7.583519E 06	2.041548E 07	8.961494E 07	2.339582E 08
4.638671E-02	8.398691E 05	2.094500E 06	7.570838E 06	2.030169E 07	8.719751E 07	2.166866E 08
8.638671E-02	8.404492E 05	2.094358E 06	7.545189E 06	2.007520E 07	8.255659E 07	1.858949E 08
1.663867E-01	8.414601E 05	2.093703E 06	7.492903E 06	1.962700E 07	7.400358E 07	1.368861E 08
3.263867E-01	8.429967E 05	2.091197E 06	7.385430E 06	1.875180E 07	5.947187E 07	7.442694E 07
4.863867E-01	8.439943E 05	2.087368E 06	7.275104E 06	1.790627E 07	4.780372E 07	4.068024E 07
8.063867E-01	8.449953E 05	2.077309E 06	7.051632E 06	1.631317E 07	3.093227E 07	1.254606E 07
1.126387E 00	8.450546E 05	2.065018E 06	6.827889E 06	1.484914E 07	2.007072E 07	4.233700E 06
1.446387E 00	8.444921E 05	2.051305E 06	6.606699E 06	1.350933E 07	1.307670E 07	1.719895E 06
2.086387E 00	8.423016E 05	2.021630E 06	6.178574E 06	1.117428E 07	5.671089E 06	6.441558E 05
2.726387E 00	8.391149E 05	1.990037E 06	5.771958E 06	9.238203E 06	2.576111E 06	4.476283E 05
3.366387E 00	8.352762E 05	1.957397E 06	5.388265E 06	7.636530E 06	1.264550E 06	3.598713E 05
4.006387E 00	8.309865E 05	1.924217E 06	5.027579E 06	6.313233E 06	6.946797E 05	3.009662E 05
4.646387E 00	8.263633E 05	1.890791E 06	4.689263E 06	5.220592E 06	4.356179E 05	2.562735E 05
5.286387E 00	8.214845E 05	1.857308E 05	4.372387E 06	4.318640E 06	3.087755E 05	2.206983E 05
6.566387E 00	8.112313E 05	1.790832E 05	3.799237E 06	2.950904E 06	2.006111E 05	1.712067E 05
7.846386E 00	8.004778E 05	1.725358E 05	3.298906E 06	2.035597E 06	1.495114E 05	1.334229E 05
9.126386E 00	7.894098E 05	1.661285E 05	2.862933E 06	1.404322E 06	1.169799E 05	1.062800E 05

SAMPLE FOR TREKIN PROGRAM DESCRIPTION

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TIME	DELAY 7	FEEDBK 1	FEEDBK 2	DRVDV 1	DRVDV 2	DRVDV 3
5.5E5935E-03	2.928511E 06	1.005600E 00	1.011218E 00	0.	-3.303715E 00	-1.746325E 01
5.624998E-03	2.776025E 06	1.005640E 00	1.011296E 00	0.	-3.303719E 00	-1.746330E 01
5.644529E-03	2.711399E 06	1.005659E 00	1.011336E 00	0.	-3.303722E 00	-1.746332E 01
5.664060E-03	2.653481E 06	1.005679E 00	1.011375E 00	0.	-3.303724E 00	-1.746335E 01
5.683591E-03	2.601578E 06	1.005699E 00	1.011415E 00	0.	-3.303726E 00	-1.746337E 01
5.703123E-03	2.555067E 06	1.005718E 00	1.011454E 00	0.	-3.303729E 00	-1.746340E 01
5.722654E-03	2.513388E 06	1.005738E 00	1.011493E 00	0.	-3.303731E 00	-1.746342E 01
5.742185E-03	2.476038E 06	1.005758E 00	1.011533E 00	0.	-3.303733E 00	-1.746345E 01
5.751716E-03	2.442568E 06	1.005777E 00	1.011572E 00	0.	-3.303735E 00	-1.746347E 01
5.771248E-03	2.412573E 06	1.005797E 00	1.011612E 00	0.	-3.303738E 00	-1.746349E 01
5.800779E-03	2.385692E 06	1.005816E 00	1.011651E 00	0.	-3.303740E 00	-1.746352E 01
5.820310E-03	2.361601E 06	1.005836E 00	1.011690E 00	0.	-3.303742E 00	-1.746354E 01
5.839841E-03	2.340010E 06	1.005856E 00	1.011730E 00	0.	-3.303744E 00	-1.746356E 01
5.859372E-03	2.320659E 06	1.005875E 00	1.011769E 00	0.	-3.303746E 00	-1.746358E 01
5.878904E-03	2.303314E 06	1.005895E 00	1.011809E 00	0.	-3.303749E 00	-1.746361E 01
5.917966E-03	2.273851E 06	1.005934E 00	1.011887E 00	0.	-3.303753E 00	-1.746365E 01
5.957029E-03	2.250174E 06	1.005974E 00	1.011966E 00	0.	-3.303757E 00	-1.746370E 01
5.996091E-03	2.231138E 06	1.006013E 00	1.012045E 00	0.	-3.303762E 00	-1.746374E 01
6.035154E-03	2.215827E 06	1.006052E 00	1.012124E 00	0.	-3.303766E 00	-1.746379E 01
6.074216E-03	2.203507E 06	1.006091E 00	1.012203E 00	0.	-3.303770E 00	-1.746383E 01
6.113278E-03	2.193589E 06	1.006131E 00	1.012281E 00	0.	-3.303774E 00	-1.746388E 01
6.152341E-03	2.185599E 06	1.006170E 00	1.012360E 00	0.	-3.303778E 00	-1.746392E 01
6.230466E-03	2.174003E 06	1.006249E 00	1.012518E 00	0.	-3.303787E 00	-1.746401E 01
6.308591E-03	2.166420E 06	1.006327E 00	1.012676E 00	0.	-3.303795E 00	-1.746410E 01
6.386716E-03	2.161423E 06	1.006406E 00	1.012833E 00	0.	-3.303804E 00	-1.746419E 01
6.542966E-03	2.155937E 06	1.006563E 00	1.013149E 00	0.	-3.303821E 00	-1.746437E 01
6.599216E-03	2.153290E 06	1.006720E 00	1.013465E 00	0.	-3.303837E 00	-1.746455E 01
7.011716E-03	2.151016E 06	1.007035E 00	1.014096E 00	0.	-3.303871E 00	-1.746490E 01
7.636716E-03	2.148705E 06	1.007665E 00	1.015360E 00	0.	-3.303938E 00	-1.746561E 01
8.886716E-03	2.144677E 06	1.008925E 00	1.017891E 00	0.	-3.304072E 00	-1.746703E 01
1.138672E-02	2.136673E 06	1.011450E 00	1.022968E 00	0.	-3.304340E 00	-1.746986E 01
1.638672E-02	2.120793E 06	1.016520E 00	1.033178E 00	0.	-3.304872E 00	-1.747549E 01
2.638672E-02	2.089624E 06	1.026737E 00	1.053829E 00	0.	-3.305926E 00	-1.748663E 01
4.638671E-02	2.029627E 06	1.047478E 00	1.096067E 00	0.	-3.307990E 00	-1.750847E 01
8.638671E-02	1.918350E 06	1.090226E 00	1.184407E 00	0.	-3.311954E 00	-1.755046E 01
1.663867E-01	1.725971E 06	1.181028E 00	1.377535E 00	0.	-3.319298E 00	-1.762838E 01
3.263867E-01	1.432634E 06	1.385949E 00	1.838305E 00	0.	-3.332086E 00	-1.776447E 01
4.863867E-01	1.209231E 06	1.626427E 00	2.417498E 00	0.	-3.342761E 00	-1.787849E 01
8.063867E-01	9.394170E 05	2.239797E 00	4.045931E 00	0.	-3.360216E 00	-1.806568E 01
1.126387E 00	7.588904E 05	3.084487E 00	6.558789E 00	0.	-3.373971E 00	-1.821388E 01
1.446387E 00	6.383491E 05	4.247733E 00	1.039155E 01	0.	-3.385273E 00	-1.833612E 01
2.086387E 00	4.919421E 05	8.055743E 00	2.486214E 01	0.	-3.403641E 00	-1.853564E 01
2.726387E 00	3.940450E 05	1.527756E 01	5.692648E 01	0.	-3.418000E 00	-1.869235E 01
3.366387E 00	3.271605E 05	2.897361E 01	1.264998E 02	0.	-3.429678E 00	-1.882031E 01
4.006387E 00	2.770117E 05	5.494789E 01	2.750649E 02	0.	-3.439451E 00	-1.892771E 01
4.646387E 00	2.375450E 05	1.042076E 02	5.883364E 02	0.	-3.447768E 00	-1.901936E 01
5.286387E 00	2.055722E 05	1.976277E 02	1.242228E 03	0.	-3.454926E 00	-1.909842E 01
6.566387E 00	1.597836E 05	7.107958E 02	5.375012E 03	0.	-3.466809E 00	-1.923002E 01
7.846386E 00	1.249274E 05	2.556476E 03	2.259472E 04	0.	-3.476049E 00	-1.933267E 01
9.126386E 00	1.001950E 05	9.194724E 03	9.299999E 04	0.	-3.483352E 00	-1.941398E 01

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DRVDV 4	DRVDV 5	DRVDV 6
5.585935E-03	0.	0.	-2.076696E 01
5.624998E-03	0.	0.	-2.076702E 01
5.644529E-03	0.	0.	-2.076705E 01
5.664060E-03	0.	0.	-2.076707E 01
5.683591E-03	0.	0.	-2.076710E 01
5.703123E-03	0.	0.	-2.076713E 01
5.722654E-03	0.	0.	-2.076715E 01
5.742185E-03	0.	0.	-2.076718E 01
5.761716E-03	0.	0.	-2.076720E 01
5.781248E-03	0.	0.	-2.076723E 01
5.800779E-03	0.	0.	-2.076726E 01
5.820310E-03	0.	0.	-2.076728E 01
5.839841E-03	0.	0.	-2.076731E 01
5.859372E-03	0.	0.	-2.076733E 01
5.878904E-03	0.	0.	-2.076736E 01
5.917966E-03	0.	0.	-2.076741E 01
5.957029E-03	0.	0.	-2.076746E 01
5.996091E-03	0.	0.	-2.076751E 01
6.035154E-03	0.	0.	-2.076755E 01
6.074216E-03	0.	0.	-2.076760E 01
6.113278E-03	0.	0.	-2.076765E 01
6.152341E-03	0.	0.	-2.076770E 01
6.230466E-03	0.	0.	-2.076780E 01
6.308591E-03	0.	0.	-2.076790E 01
6.386716E-03	0.	0.	-2.076799E 01
6.542966E-03	0.	0.	-2.076819E 01
6.699216E-03	0.	0.	-2.076838E 01
7.011716E-03	0.	0.	-2.076877E 01
7.636716E-03	0.	0.	-2.076955E 01
8.886716E-03	0.	0.	-2.077110E 01
1.138672E-02	0.	0.	-2.077420E 01
1.638672E-02	0.	0.	-2.078036E 01
2.638672E-02	0.	0.	-2.079256E 01
4.638671E-02	0.	0.	-2.081646E 01
8.638671E-02	0.	0.	-2.086242E 01
1.663867E-01	0.	0.	-2.094768E 01
3.263867E-01	0.	0.	-2.109656E 01
4.863867E-01	0.	0.	-2.122125E 01
8.063867E-01	0.	0.	-2.142590E 01
1.126387E 00	0.	0.	-2.158785E 01
1.446387E 00	0.	0.	-2.172139E 01
2.086387E 00	0.	0.	-2.193928E 01
2.726387E 00	0.	0.	-2.211035E 01
3.366387E 00	0.	0.	-2.224998E 01
4.006387E 00	0.	0.	-2.236716E 01
4.646387E 00	0.	0.	-2.246713E 01
5.286387E 00	0.	0.	-2.255335E 01
6.566387E 00	0.	0.	-2.269683E 01
7.846386E 00	0.	0.	-2.280872E 01
9.126386E 00	0.	0.	-2.289734E 01

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
1.040639E 01	8.231642E 04	-2.296914E 01	-1.556191E-01	-1.556191E-01	1.943113E 06	6.978517E 07
1.168639E 01	6.883935E 04	-2.302855E 01	-1.396836E-01	-1.396836E-01	1.631669E 06	6.988278E 07
1.296639E 01	5.864255E 04	-2.307868E 01	-1.252462E-01	-1.252462E-01	1.394889E 06	6.996504E 07
1.552639E 01	4.529412E 04	-2.316097E 01	-1.008919E-01	-1.008919E-01	1.073051E 06	7.009989E 07
1.808639E 01	3.607167E 04	-2.322528E 01	-8.893335E-02	-8.893335E-02	8.596038E 05	7.020510E 07
2.064639E 01	2.978882E 04	-2.327735E 01	-7.475575E-02	-7.475575E-02	7.130333E 05	7.029018E 07
2.320639E 01	2.522929E 04	-2.332085E 01	-6.489360E-02	-6.489360E-02	6.060050E 05	7.036119E 07
2.832639E 01	1.935298E 04	-2.339184E 01	-5.178887E-02	-5.178887E-02	4.625631E 05	7.047693E 07
3.344639E 01	1.523701E 04	-2.344682E 01	-4.670294E-02	-4.670294E-02	3.659752E 05	7.056646E 07
3.856639E 01	1.236448E 04	-2.349071E 01	-4.080075E-02	-4.080075E-02	2.980624E 05	7.063784E 07
4.368639E 01	1.024013E 04	-2.352666E 01	-3.681900E-02	-3.681900E-02	2.475495E 05	7.069626E 07
4.880638E 01	8.504605E 03	-2.355664E 01	-3.398766E-02	-3.398766E-02	2.084666E 05	7.074495E 07
5.392639E 01	7.305271E 03	-2.358195E 01	-3.197294E-02	-3.197294E-02	1.772923E 05	7.078604E 07
5.904638E 01	6.248397E 03	-2.360352E 01	-3.052170E-02	-3.052170E-02	1.518529E 05	7.082103E 07
6.416638E 01	5.373770E 03	-2.362202E 01	-2.945220E-02	-2.945220E-02	1.307452E 05	7.085103E 07
6.928638E 01	4.640934E 03	-2.363797E 01	-2.863557E-02	-2.863557E-02	1.130222E 05	7.087687E 07
7.440638E 01	4.021455E 03	-2.365176E 01	-2.798278E-02	-2.798278E-02	9.801502E 04	7.089923E 07
7.952638E 01	3.494481E 03	-2.366373E 01	-2.743341E-02	-2.743341E-02	8.523078E 04	7.091862E 07
8.464638E 01	3.044130E 03	-2.367415E 01	-2.694720E-02	-2.694720E-02	7.429256E 04	7.093549E 07
8.976638E 01	2.657929E 03	-2.368323E 01	-2.649760E-02	-2.649760E-02	6.490311E 04	7.095020E 07
9.488638E 01	2.325843E 03	-2.369117E 01	-2.606737E-02	-2.606737E-02	5.682241E 04	7.096305E 07
1.000064E 02	2.039648E 03	-2.369813E 01	-2.564554E-02	-2.564554E-02	4.985324E 04	7.097431E 07
1.051264E 02	1.792522E 03	-2.370423E 01	-2.522531E-02	-2.522531E-02	4.383151E 04	7.098419E 07
1.102464E 02	1.578751E 03	-2.370960E 01	-2.480274E-02	-2.480274E-02	3.861950E 04	7.099288E 07
1.153664E 02	1.393516E 03	-2.371433E 01	-2.437574E-02	-2.437574E-02	3.410089E 04	7.100054E 07
1.204864E 02	1.232740E 03	-2.371852E 01	-2.394357E-02	-2.394357E-02	3.017705E 04	7.100731E 07
1.256064E 02	1.092956E 03	-2.372222E 01	-2.350638E-02	-2.350638E-02	2.676408E 04	7.101331E 07
1.307264E 02	9.712164E 02	-2.372551E 01	-2.306490E-02	-2.306490E-02	2.379045E 04	7.101862E 07

SAMPLE FOR IREWIN PROGRAM DESCRIPTION

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TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
1.040639E 01	7.731687E 05	1.598893E 06	2.483660E 06	9.732625E 05	9.419720E 04	8.657667E 04
1.168639E 01	7.658504E 05	1.538346E 06	2.154116E 06	6.785461E 05	7.760855E 04	7.201298E 04
1.296639E 01	7.555213E 05	1.479729E 06	1.868043E 06	4.767094E 05	6.524781E 04	6.105059E 04
1.552639E 01	7.330367E 05	1.368488E 06	1.405001E 06	2.434512E 05	4.964559E 04	4.692647E 04
1.808639E 01	7.109014E 05	1.265018E 06	1.057118E 06	1.320329E 05	3.900085E 04	3.713978E 04
2.064639E 01	6.892228E 05	1.169002E 06	7.959658E 05	7.756717E 04	3.180027E 04	3.052747E 04
2.320639E 01	6.680621E 05	1.080042E 06	6.000226E 05	5.004704E 04	2.669426E 04	2.577090E 04
2.832639E 01	6.274252E 05	9.216074E 05	3.429383E 05	2.757734E 04	2.034207E 04	1.970470E 04
3.344639E 01	5.890251E 05	7.861459E 05	1.980188E 05	1.911027E 04	1.590327E 04	1.546230E 04
3.856639E 01	5.528197E 05	6.704506E 05	1.160402E 05	1.469455E 04	1.283509E 04	1.252470E 04
4.368639E 01	5.187346E 05	5.717107E 05	6.943271E 04	1.185778E 04	1.059090E 04	1.036014E 04
4.880638E 01	4.866757E 05	4.874798E 05	4.273006E 04	9.816169E 03	8.876389E 03	8.697970E 03
5.392639E 01	4.565418E 05	4.156466E 05	2.725747E 04	8.254036E 03	7.522237E 03	7.380035E 03
5.904638E 01	4.282301E 05	3.543973E 05	1.814597E 04	7.013382E 03	6.425513E 03	6.309571E 03
6.416638E 01	4.016395E 05	3.021786E 05	1.265920E 04	6.003175E 03	5.520728E 03	5.424615E 03
6.928638E 01	3.766718E 05	2.576618E 05	9.256180E 03	5.166212E 03	4.764298E 03	4.683670E 03
7.440638E 01	3.532331E 05	2.197125E 05	7.066399E 03	4.464263E 03	4.125878E 03	4.057664E 03
7.952638E 01	3.312336E 05	1.873622E 05	5.595772E 03	3.870442E 03	3.583398E 03	3.525336E 03
8.464638E 01	3.105880E 05	1.597848E 05	4.561921E 03	3.364986E 03	3.120174E 03	3.070533E 03
8.976638E 01	2.912157E 05	1.362759E 05	3.801823E 03	2.932806E 03	2.723179E 03	2.680595E 03
9.488638E 01	2.730401E 05	1.162349E 05	3.219992E 03	2.562025E 03	2.381975E 03	2.345349E 03
1.000064E 02	2.559892E 05	9.914976E 04	2.759369E 03	2.243068E 03	2.088043E 03	2.056471E 03
1.051264E 02	2.399948E 05	8.458409E 04	2.384940E 03	1.968083E 03	1.834325E 03	1.807058E 03
1.102464E 02	2.249928E 05	7.216586E 04	2.074477E 03	1.730547E 03	1.614924E 03	1.591332E 03
1.153664E 02	2.109225E 05	6.157803E 04	1.813301E 03	1.524993E 03	1.424870E 03	1.404424E 03
1.204864E 02	1.977271E 05	5.255036E 04	1.591282E 03	1.346810E 03	1.259962E 03	1.242212E 03
1.256064E 02	1.853528E 05	4.485254E 04	1.401119E 03	1.192092E 03	1.116632E 03	1.101197E 03
1.307264E 02	1.737493E 05	3.828828E 04	1.237331E 03	1.057521E 03	9.918429E 02	9.783969E 02

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DELAY	7	FEEDBK	1	FEEDBK	2	DRVDV	1	DRVDV	2	DRVDV	3
1.040639E 01	8.212802E 04		3.307011E 04		3.766937E 05	0.			-3.489259E 00		-1.947988E 01	
1.168639E 01	6.870284E 04		1.189413E 05		1.506632E 06	0.			-3.494139E 00		-1.953441E 01	
1.296639E 01	5.854138E 04		4.277888E 05		5.964785E 06	0.			-3.498252E 00		-1.958043E 01	
1.552639E 01	4.520759E 04		5.533798E 06		9.057533E 07	0.			-3.504995E 00		-1.965598E 01	
1.808639E 01	3.597489E 04		7.158420E 07		1.345212E 09	0.			-3.510255E 00		-1.971503E 01	
2.064639E 01	2.972491E 04		9.260000E 08		1.964638E 10	0.			-3.514509E 00		-1.976284E 01	
2.320639E 01	2.518412E 04		1.197857E 10		2.831824E 11	0.			-3.518060E 00		-1.980279E 01	
2.832639E 01	1.931595E 04		2.004438E 12		4.321540E 13	0.			-3.523846E 00		-1.986799E 01	
3.344639E 01	1.519482E 04		3.354133E 14		6.533504E 15	0.			-3.528323E 00		-1.991850E 01	
3.856639E 01	1.233584E 04		5.612651E 16		9.764927E 17	0.			-3.531892E 00		-1.995882E 01	
4.368639E 01	1.021945E 04		9.391949E 18		1.438581E 20	0.			-3.534813E 00		-1.999185E 01	
4.880638E 01	8.589015E 03		1.571605E 21		2.080219E 22	0.			-3.537247E 00		-2.001939E 01	
5.392639E 01	7.293092E 03		2.629851E 23		2.933698E 24	0.			-3.539302E 00		-2.004265E 01	
5.904638E 01	6.238620E 03		4.400670E 25		3.993379E 26	0.			-3.541051E 00		-2.006247E 01	
6.416638E 01	5.365762E 03		7.363878E 27		5.149988E 28	0.			-3.542551E 00		-2.007947E 01	
6.928638E 01	4.634277E 03		1.232237E 30		6.053593E 30	0.			-3.543844E 00		-2.009412E 01	
7.440638E 01	4.015863E 03		2.061968E 32		5.839057E 32	0.			-3.544961E 00		-2.010680E 01	
7.952638E 01	3.489747E 03		3.450402E 34		2.590876E 34	0.			-3.545931E 00		-2.011780E 01	
8.464638E 01	3.040101E 03		5.773743E 36		-7.679113E 36	0.			-3.546774E 00		-2.012737E 01	
8.976638E 01	2.654486E 03		-1.643674E 38		-1.701412E 38	0.			-3.547510E 00		-2.013572E 01	
9.488638E 01	2.322890E 03		-1.701412E 38		-1.701412E 38	0.			-3.548153E 00		-2.014302E 01	
1.000064E 02	2.037110E 03		-1.701412E 38		-1.701412E 38	0.			-3.548715E 00		-2.014941E 01	
1.051264E 02	1.790335E 03		-1.701412E 38		-1.701412E 38	0.			-3.549210E 00		-2.015502E 01	
1.102464E 02	1.576862E 03		-1.701412E 38		-1.701412E 38	0.			-3.549644E 00		-2.015996E 01	
1.153664E 02	1.391882E 03		-1.701412E 38		-1.701412E 38	0.			-3.550027E 00		-2.016431E 01	
1.204864E 02	1.231324E 03		-1.701412E 38		-1.701412E 38	0.			-3.550366E 00		-2.016815E 01	
1.256064E 02	1.091728E 03		-1.701412E 38		-1.701412E 38	0.			-3.550665E 00		-2.017156E 01	
1.307264E 02	9.701477E 02		-1.701412E 38		-1.701412E 38	0.			-3.550931E 00		-2.017458E 01	

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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TIME	DRVDV 4	DRVDV 5	DRVDV 6
1.040639E 01	0.	0.	-2.296914E 01
1.168639E 01	0.	0.	-2.302855E 01
1.296639E 01	0.	0.	-2.307868E 01
1.552639E 01	0.	0.	-2.316097E 01
1.808639E 01	0.	0.	-2.322528E 01
2.064639E 01	0.	0.	-2.327735E 01
2.320639E 01	0.	0.	-2.332085E 01
2.832639E 01	0.	0.	-2.339184E 01
3.344639E 01	0.	0.	-2.344682E 01
3.856639E 01	0.	0.	-2.349071E 01
4.368639E 01	0.	0.	-2.352666E 01
4.880638E 01	0.	0.	-2.355664E 01
5.392639E 01	0.	0.	-2.358195E 01
5.904638E 01	0.	0.	-2.360352E 01
6.416638E 01	0.	0.	-2.362202E 01
6.928638E 01	0.	0.	-2.363797E 01
7.440638E 01	0.	0.	-2.365176E 01
7.952638E 01	0.	0.	-2.366373E 01
8.464638E 01	0.	0.	-2.367415E 01
8.976638E 01	0.	0.	-2.368323E 01
9.488638E 01	0.	0.	-2.369117E 01
1.000064E 02	0.	0.	-2.369813E 01
1.051264E 02	0.	0.	-2.370423E 01
1.102464E 02	0.	0.	-2.370960E 01
1.153664E 02	0.	0.	-2.371433E 01
1.204864E 02	0.	0.	-2.371852E 01
1.256064E 02	0.	0.	-2.372222E 01
1.307264E 02	0.	0.	-2.372551E 01

SAMPLE FOR IREKIN PROGRAM DESCRIPTION

PROBLEM ENDED--POWER DROPPED BELOW 1.000000E 03

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SAMPLE FOR IREKIN PROGRAM DESCRIPTION

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MAXIMUM AND MINIMUM VALUES OF RESULTS

	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
MAXIMUM	1.322964E 11	-0.	1.352076E 04	1.353624E 04	1.001487E 12	7.101862E 07
MINIMUM	1.000000E 02	-2.372551E 01	-5.737443E 03	-5.719754E 03	9.470000E 02	0.
	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
MAXIMUM	8.450546E 05	2.094520E 06	7.596788E 06	2.053719E 07	9.230185E 07	2.543551E 08
MINIMUM	9.999999E 01	9.999999E 01	9.999999E 01	9.999999E 01	10.000000E 01	10.000000E 01
	DELAY 7	FEEDBK 1	FEEDBK 2	DRVDV 1	DRVDV 2	DRVDV 3
MAXIMUM	1.182370E 11	5.773743E 36	2.590876E 34	0.	-0.	-0.
MINIMUM	1.000000E 02	-1.701412E 38	-1.701412E 38	0.	-3.550931E 00	-2.017458E 01
	DRVDV 4	DRVDV 5	DRVDV 6			
MAXIMUM	0.	0.	-0.			
MINIMUM	0.	0.	-2.372551E 01			

TIME IS 02..38..52

Appendix D

SAMPLE PROBLEM USING FORTRAN

Subprograms for IREKIN Code

Chris-1-62A-N

NOTEGRAM

To : J. H. Houghtaling
From: Wesley Christenson:jk

This letter describes the use of a set of subprograms for the IREKIN code which were programmed to your specifications. This letter assumes familiarity with the IREKIN program write-up. When referring to this program, reference should be made to Program no. 2950

The reactivity is given by:
$$r(t) = A - B \sqrt{1 - \frac{D \epsilon E}{C}}$$

where $\epsilon = f(E)$ and $C = f(\epsilon E)$.

The quantities B and D are input parameters, and A is made equal (by the subprograms) to REACO + B. The initial condition of the reactor is the asymptotic exponential rise condition, and thus REACO will be the reactivity corresponding to the initial period. The values of ϵ and C corresponding to some particular energy are determined by a table look-up routine. The calculations are halted when the power has dropped to 1/16 of the peak power. The quantities $-B \sqrt{1 - \frac{D \epsilon E}{C}}$ is stored in DRV(1), ϵ is stored in DRV(2), C is stored in DRV(3), and ϵE is stored in DRV(4). These can be obtained in the output if desired.

The number of E, ϵ pairs are entered in INTGR(20) and the number of ϵE , C pairs are entered in INTGR(21). These must be greater than 0 and equal to less than 50. The values of B and D are entered in FLOAT(49) and FLOAT(50) respectively. The tables are specified by entering the first E value in FLOAT(51) and the corresponding ϵ in FLOAT(52); the second E value is entered in FLOAT(53) and the corresponding ϵ value is entered in FLOAT(54). The remaining pairs of the table, are entered in similar fashion. The ϵE , C table is entered in a similar manner as the E, ϵ table, starting with FLOAT(151). If a constant value is desired instead of a table look-up, a 1 should be entered for the number of table entries (INTGR(20) or INTGR(21)), and only the constant value should be entered in FLOAT(51) or FLOAT(151).

The remainder of the input data is as described in the IREKIN program write-up.

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	SUBROUTINE TEST	0245
C	THE FOLLOWING DIMENSION AND COMMON STATEMENTS ARE REQUIRED IN	00
C	FORTRAN SUBPROGRAMS USED WITH IREKIN. OTHERS CAN BE ADDED.	05
	DIMENSION INTGR%30, FLOAT%250, FRACT%48, DECAY%48, CONST%50	10
	1, APOW%50, AENG%50, AMATRX%50,50, VINP%50, WRK%50, PLOT%100	15
	2, DRV%50, X%50, T%50, HEAD%14	20
	COMMON INTGR, FLOAT, FRACT, DECAY, CONST, APOW, AENG, AMATRX,	25
	1 VINP, WRK, PLOT, DRV, X, T, POWER, ENERGY, REAC, REACO, REAC2,	
	2 W3, W1, WAVG, HUSED, TIME, TIMEA, SFW, HEAD, PAGE, FEO, LINES,	
	3 SBOVL, ICT, TESTX	
C	THE FOLLOWING EQUIVALENCE STATEMENT IS OPTIONAL. THE FIRST ENTRY	45
C	IS MERELY TO MAINTAIN THE ORDER SPECIFIED BY COMMON.	50
	EQUIVALENCE %INTGR%1, %ZZZZZ%, %FLOAT%1, %TINP%, %FLOAT%2, %HINP%,	55
	2 %FLOAT%3, %HUP%, %FLOAT%4, %HLOW%, %FLOAT%5, %UPLIM%, %FLOAT%6, %FLOLIM%	60
	3, %FLOAT%7, %BOVL%, %FLOAT%8, %SOURCE%, %FLOAT%9, %PO%, %FLOAT%10, %EO%,	65
	4 %FLOAT%11, %TAU%, %FLOAT%12, %RO%	70
	COMMON J1, J2, J3, J4, TESTY, TESTZ	
	IF%TESTZ%30,19,30	0250
19	IF%POWER - TESTY%20,20,21	0255
21	TESTY # POWER	0260
	RETURN	
20	TEST Y # POWER/16.0	0265
	TEST Z #1.0	0270
35	RETURN	0280
30	IF%POWER -TESTY%31,31,35	0285
31	TESTX#1.0	0290
	RETURN	0291
	END%1,1,0,0,0,0,1,0,0,0,0,0,0,0,0,0	

SUBROUTINE SPRINT

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SUBROUTINE SPRINT                                0294
C THE FOLLOWING DIMENSION AND COMMON STATEMENTS ARE REQUIRED IN      00
C FORTRAN SUBPROGRAMS USED WITH IREKIN. OTHERS CAN BE ADDED.       05
  DIMENSION INTGR%300, FLOAT%2500, FRACT%480, DECAY%480, CONST%500 10
1, APOW%500, AENG%500, AMATRX%50,500, VINP%500, WRK%500, PLOT%1000 15
2, DRV%500, X%500, T%500, HEAD%140                                20
  COMMON INTGR, FLOAT, FRACT, DECAY, CONST, APOW, AENG, AMATRX,    25
1 VINP, WRK, PLOT, DRV, X, T, POWER, ENERGY, REAC, REACO, REAC2,
2 W3, W1, WAVG, HUSED, TIME, TIMEA, SFW, HEAD, PAGE, FE0, LINES,
3 SBOVL, ICT, TESTX
C THE FOLLOWING EQUIVALENCE STATEMENT IS OPTIONAL. THE FIRST ENTRY  45
C IS MERELY TO MAINTAIN THE ORDER SPECIFIED BY COMMON.            50
  EQUIVALENCE %INTGR%10, ZZZZZZ%, %FLOAT%10, TINP%, %FLOAT%20, HINP%, 55
2 %FLOAT%30, HUP%, %FLOAT%40, HLOW%, %FLOAT%50, UPLIM%, %FLOAT%60, FLOLIM% 60
3, %FLOAT%70, BOVL%, %FLOAT%80, SOURCE%, %FLOAT%90, PO%, %FLOAT%100, EO%, 65
4 %FLOAT%110, TAU%, %FLOAT%120, RO%                                70
  COMMON J1, J2, J3, J4, TESTY, TESTZ
  REACO#REACO&FLOAT%490
  J1#3
  J2#3
  IF%INTGR%200#40,40,41
  IF%INTGR%210#40,40,42
  IF%INTGR%200-500#43,43,40
  IF%INTGR%210-500#44,44,40
  TESTY#0.0
  TESTZ#0.0
  TESTX#0.0
  J3#INTGR%200#2-1
  J4#INTGR%210#2-1
  CALL HEADWR
  WRITE OUTPUT TAPE 6,101, FLJAT%490,FLOAT%500
  FORMAT % 44H0 SHUTDOWN MODEL AS DESCRIBED IN CHR-1-62A-N/ 3HOB#
1 IPE14.6, 10X 2HD#E14.6
  WRITE OUTPUT TAPE 6,102,%FLJAT%J&500,FLOAT%J&510, J#1,J3,2
102 FORMAT %1H048X23HTABLE LOOKUP PARAMETERS/18X6HENERGY17X7HEPSILON 0375
1 42X6HENERGY17X7HEPSILON/%1P2E24.6,24X2E24.6
  WRITE OUTPUT TAPE 6,103,%FLOAT%J&1500,FLOAT%J&1510, J#1,J4,2
103 FORMAT %1H09X14HEPSILON*ENERGY11X13HHEAT CAPACITY34X14HEPSILON*EN0390
  LERGY11X13HHEAT CAPACITY/%1P2E24.6,24X2E24.6
  RETURN
40 WRITE OUTPUT TAPE 6,104
104 FORMAT % 73H0EITHER INTGR%200 OR INTGR%210 CONTAINS AN INCORRECT 0405
  ITABLE CONTROL NUMBER
  CALL EXIT
  END%1,1,0,0,0,0,1,0,0,0,0,0,0,0,0

```

Listing of input data .

PROB.NO.1,RUN 74,PERIOD # 3.2 MSEC, A#.035729,B#.0206,D#.006406,B%EFF#.#.0074

0 1	6.0	0.0	5.0	2.0	1.0	0.0
0 7	1.0		300.0	0.0		
0 20	1.0	21.0				
1 1	0.0	0.00032	10.0	0.000032	0.001	0.0001
1 7	280.0	0.0	1.0	-6	0.0032	
1 49	2.71086	0.006406				
1 51	0.935					
2 1	0.0331	0.0127	0.1956	0.0317	0.1688	0.1160
2 4	0.4248	0.3130	0.1526	1.4000	0.0251	3.8800
1151	0.0	0.2128	5.0	0.2272	10.0	0.2300
1157	15.0	0.2334	20.0	0.2366	25.0	0.2395
1163	30.0	0.2423	35.0	0.2446	40.0	0.2468
1169	45.0	0.2489	50.0	0.2507	55.0	0.2525
1175	60.0	0.2540	65.0	0.2556	70.0	0.2570
1181	75.0	0.2585	80.0	0.2594	85.0	0.2606
0 5	4.0					
-1187	90.0	0.2618	95.0	0.2629	100.0	0.2639

Results of input of preceding page

PROGRAM FOR THE NUMERICAL SOLUTION OF THE REACTOR KINETIC EQUATIONS USING COHEN METHOD

PROB.NO.1,RUN 74,PERIOD # 3.2 MSEC, A#.035729,B#.0206,D#.006406,B%EFF#.0074 DATE IS 12/12/62, TIME IS 02.41.34
TOTAL NUMBER OF EQUATIONS IS 8 NUMBER OF DELAY GROUPS IS 6 NUMBER OF FEEDBACK EQUATIONS IS 0
ORDER OF APPROXIMATION IS 5 NUMBER OF ADDITIONAL COMPUTED RESULTS IS 4
START CALCULATION IS FOR ASYMPTOTIC PERIOD PERIOD IS 3.2000E-03 CORRESPONDING REACTIVITY IS 2.114574E 00
DELAYED NEUTRON FRACTION OVER GENERATION TIME IS 2.800000E 02 SOURCE IS 0.
INITIAL TIME INCREMENT IS 3.200000E-04 MAX. INCRMT. IS 1.000000E 01 MIN. INCRMT. IS 3.200000E-05
Q UPPER LIMIT IS 10.000000E-04 Q LOWER LIMIT IS 10.000000E-05

DELAYED NEUTRON PARAMETERS

DELAY GROUP	FRACTION	DECAY CONSTANT	DELAY GROUP	FRACTION	DECAY CONSTANT
1	3.310000E-02	1.270000E-02	2	1.956000E-01	3.170000E-02
3	1.683000E-01	1.160000E-01	4	4.248000E-01	3.130000E-01
5	1.526000E-01	1.400000E 00	6	2.510000E-02	3.880000E 00
SUM OF DELAYED FRACTIONS IS 10.000000E-01					

PROB.NO.1,RUN 74,PERIOD # 3.2 MSEC, A#.035729,B#.0206,D#.006406,B%EFF#.0074

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SHUTDOWN MODEL AS DESCRIBED IN CHR-1-62A-N

B# 2.710860E 00

D# 6.406C00E-03

TABLE LOOKUP PARAMETERS

ENERGY	EPSILON
9.350000E-01	0.
EPSILON*ENERGY	HEAT CAPACITY
0.	2.128000E-01
1.000000E 01	2.300000E-01
2.000000E 01	2.366000E-01
3.000000E 01	2.423000E-01
4.000000E 01	2.468000E-01
5.000000E 01	2.507000E-01
6.000000E 01	2.540000E-01
7.000000E 01	2.570000E-01
8.000000E 01	2.594000E-01
9.000000E 01	2.618000E-01
1.000000E 02	2.639000E-01

ENERGY	EPSILON
5.000000E 00	2.272000E-01
1.500000E 01	2.334000E-01
2.500000E 01	2.395000E-01
3.500000E 01	2.446000E-01
4.500000E 01	2.489000E-01
5.500000E 01	2.525000E-01
6.500000E 01	2.556000E-01
7.500000E 01	2.585000E-01
8.500000E 01	2.606000E-01
9.500000E 01	2.629000E-01

TIME	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
0.	1.000000E-06	2.114574E 00	3.125000E 02	3.125000E 02	1.497293E-09	3.200000E-09
3.200000E-04	1.105171E-06	2.114574E 00	3.125000E 02	3.125000E 02	1.654764E-09	3.536547E-09
9.600000E-04	1.349859E-06	2.114574E 00	3.125000E 02	3.125000E 02	2.021134E-09	4.319548E-09
2.240000E-03	2.013753E-06	2.114574E 00	3.125000E 02	3.125001E 02	3.015185E-09	6.444025E-09
4.800000E-03	4.481701E-06	2.114574E 00	3.125000E 02	3.125010E 02	6.710907E-09	1.434246E-08
9.920000E-03	2.219865E-05	2.114574E 00	3.125007E 02	3.125056E 02	3.329343E-08	7.115190E-08
2.016000E-02	5.445748E-04	2.114574E 00	3.125113E 02	3.124974E 02	8.374110E-07	1.788886E-06
3.040000E-02	1.335988E-02	2.114572E 00	3.125113E 02	3.125006E 02	2.056418E-05	4.392935E-05
5.088000E-02	7.937960E 00	2.113342E 00	3.122665E 02	3.122405E 02	1.515782E-02	3.231175E-02
5.600000E-02	3.949076E 01	2.109962E 00	3.112324E 02	3.118906E 02	6.249506E-02	1.335299E-01
5.856000E-02	8.745672E 01	2.104637E 00	3.097298E 02	3.105771E 02	1.347770E-01	2.880393E-01
6.112000E-02	1.925555E 02	2.092922E 00	3.064463E 02	3.082970E 02	2.943971E-01	6.292160E-01
6.368000E-02	4.185969E 02	2.067503E 00	2.993312E 02	3.033297E 02	6.435997E-01	1.375611E 00
6.496000E-02	6.117677E 02	2.045525E 00	2.931811E 02	2.964407E 02	9.486566E-01	2.027675E 00
6.624000E-02	8.856242E 02	2.013928E 00	2.843401E 02	2.890157E 02	1.392345E 00	2.976120E 00
6.752000E-02	1.264816E 03	1.969240E 00	2.718366E 02	2.784289E 02	2.030244E 00	4.339837E 00
6.880000E-02	1.772457E 03	1.907446E 00	2.545482E 02	2.636252E 02	2.932523E 00	6.269011E 00
7.008000E-02	2.420567E 03	1.824540E 00	2.313546E 02	2.434649E 02	4.180398E 00	8.937638E 00
7.136000E-02	3.195326E 03	1.717541E 00	2.014247E 02	2.169432E 02	5.855215E 00	1.252033E 01
7.264000E-02	4.041478E 03	1.585868E 00	1.645985E 02	1.835324E 02	8.018050E 00	1.714890E 01
7.391999E-02	4.855728E 03	1.432533E 00	1.217251E 02	1.435581E 02	1.068230E 01	2.285391E 01
7.519999E-02	5.509809E 03	1.264432E 00	7.474173E 01	9.842458E 01	1.378929E 01	2.951254E 01
7.647999E-02	5.875663E 03	1.091228E 00	2.636356E 01	5.050048E 01	1.720182E 01	3.683459E 01
7.775999E-02	5.896558E 03	9.231723E-01	-2.052761E 01	2.640435E 00	2.072547E 01	4.440742E 01
7.903999E-02	5.584624E 03	7.688369E-01	-6.351475E 01	-4.246228E 01	2.415169E 01	5.178749E 01
8.031999E-02	5.023031E 03	6.337354E-01	-1.010321E 02	-8.279971E 01	2.730339E 01	5.859736E 01
8.159999E-02	4.322916E 03	5.201108E-01	-1.324217E 02	-1.172683E 02	3.006399E 01	6.458765E 01
8.287999E-02	3.587904E 03	4.275547E-01	-1.577575E 02	-1.455951E 02	3.238321E 01	6.964967E 01
8.415999E-02	2.892857E 03	3.532268E-01	-1.777800E 02	-1.682216E 02	3.426516E 01	7.379026E 01
8.543999E-02	2.280796E 03	2.955183E-01	-1.928662E 02	-1.857190E 02	3.574911E 01	7.709121E 01
8.671999E-02	1.768694E 03	2.512743E-01	-2.038029E 02	-1.986586E 02	3.689199E 01	7.967203E 01
8.799999E-02	1.355418E 03	2.166813E-01	-2.115299E 02	-2.079151E 02	3.775490E 01	8.166137E 01
8.927999E-02	1.030443E 03	1.902515E-01	-2.162966E 02	-2.141570E 02	3.839494E 01	8.317961E 01
9.055999E-02	7.793942E 02	1.703405E-01	-2.183543E 02	-2.175453E 02	3.886157E 01	8.433112E 01
9.183999E-02	5.893217E 02	1.553561E-01	-2.178934E 02	-2.183329E 02	3.919562E 01	8.520210E 01
9.311999E-02	4.465869E 02	1.441602E-01	-2.149358E 02	-2.166335E 02	3.942961E 01	8.586123E 01
9.439999E-02	3.405820E 02	1.357734E-01	-2.094366E 02	-2.124012E 02	3.958881E 01	8.636190E 01

TIME	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
0.	4.063835E-11	1.014297E-10	3.710623E-10	1.000598E-09	4.460019E-09	1.226373E-08
3.200000E-04	4.491232E-11	1.120972E-10	4.100872E-10	1.105832E-09	4.929083E-09	1.355352E-08
9.600000E-04	5.485603E-11	1.369158E-10	5.008817E-10	1.350666E-09	6.020396E-09	1.655431E-08
2.240000E-03	8.183579E-11	2.042549E-10	7.472295E-10	2.014962E-09	8.981399E-09	2.469619E-08
4.800000E-03	1.821419E-10	4.546100E-10	1.663109E-09	4.484701E-09	1.998993E-08	5.496654E-08
9.920000E-03	9.035927E-10	2.255288E-09	8.250580E-09	2.224842E-08	9.917159E-08	2.727082E-07
2.016000E-02	2.271801E-08	5.670246E-08	2.074410E-07	5.594138E-07	2.494322E-06	6.863728E-06
3.040000E-02	5.578822E-07	1.392433E-06	5.094093E-06	1.373743E-05	6.125269E-05	1.685518E-04
5.088000E-02	4.103515E-04	1.024234E-03	3.747521E-03	1.010890E-02	4.514220E-02	1.246357E-01
5.600000E-02	1.695764E-03	4.232492E-03	1.548404E-02	4.175535E-02	1.861529E-01	5.120614E-01
5.856000E-02	3.657951E-03	9.129925E-03	3.340023E-02	9.006655E-02	4.014642E-01	1.103922E 00
6.112000E-02	7.990715E-03	1.994410E-02	7.296170E-02	1.967456E-01	8.769327E-01	2.411084E 00
6.368000E-02	1.746954E-02	4.360237E-02	1.595106E-01	4.301281E-01	1.917119E 00	5.270780E 00
6.496000E-02	2.575040E-02	6.427062E-02	2.351211E-01	6.340135E-01	2.825810E 00	7.768800E 00
6.624000E-02	3.779515E-02	9.433317E-02	3.450982E-01	9.305671E-01	4.147459E 00	1.140172E 01
6.752000E-02	5.511360E-02	1.375583E-01	5.032271E-01	1.356957E 00	6.047629E 00	1.662412E 01
6.880000E-02	7.961303E-02	1.987064E-01	7.269209E-01	1.960131E 00	8.735362E 00	2.400944E 01
7.008000E-02	1.135030E-01	2.832922E-01	1.036352E 00	2.794467E 00	1.245263E 01	3.422042E 01
7.136000E-02	1.590010E-01	3.968498E-01	1.451761E 00	3.914516E 00	1.744182E 01	4.791886E 01
7.264000E-02	2.177808E-01	5.435564E-01	1.988421E 00	5.361411E 00	2.388500E 01	6.559752E 01
7.391999E-02	2.902303E-01	7.243797E-01	2.649859E 00	7.144585E 00	3.182232E 01	8.735479E 01
7.519999E-02	3.747895E-01	9.354246E-01	3.421810E 00	9.225465E 00	4.107925E 01	1.126948E 02
7.647999E-02	4.677727E-01	1.167491E 00	4.270598E 00	1.151312E 01	5.124749E 01	1.404764E 02
7.775999E-02	5.639393E-01	1.407498E 00	5.148347E 00	1.387833E 01	6.174822E 01	1.690902E 02
7.903999E-02	6.576563E-01	1.641384E 00	6.003607E 00	1.618226E 01	7.196044E 01	1.968156E 02
8.031999E-02	7.441301E-01	1.857186E 00	6.792600E 00	1.830683E 01	8.135672E 01	2.221962E 02
8.159999E-02	8.201941E-01	2.046998E 00	7.486413E 00	2.017408E 01	8.958977E 01	2.442787E 02
8.287999E-02	8.844679E-01	2.207378E 00	8.072451E 00	2.175008E 01	9.650965E 01	2.626589E 02
8.415999E-02	9.370385E-01	2.338542E 00	8.551524E 00	2.303711E 01	1.021283E 02	2.773819E 02
8.543999E-02	9.789451E-01	2.443086E 00	8.933135E 00	2.406086E 01	1.065625E 02	2.887824E 02
8.671999E-02	1.011705E 00	2.524797E 00	9.231160E 00	2.485885E 01	1.099815E 02	2.973395E 02
8.799999E-02	1.036953E 00	2.587755E 00	9.460536E 00	2.547143E 01	1.125670E 02	3.035651E 02
8.927999E-02	1.056218E 00	2.635777E 00	9.635233E 00	2.593633E 01	1.144891E 02	3.079367E 02
9.055999E-02	1.070825E 00	2.672172E 00	9.767367E 00	2.628629E 01	1.158947E 02	3.108674E 02
9.183999E-02	1.081869E 00	2.699673E 00	9.866943E 00	2.654832E 01	1.169054E 02	3.126980E 02
9.311999E-02	1.090222E 00	2.720458E 00	9.941931E 00	2.674395E 01	1.176180E 02	3.136997E 02
9.439999E-02	1.096563E 00	2.736218E 00	9.998529E 00	2.688992E 01	1.181077E 02	3.140831E 02

TIME	DRVDV 1	DRVDV 2	DRVDV 3	DRVDV 4
0.	-2.710860E 00	9.350000E-01	2.128000E-01	2.992000E-09
3.200000E-04	-2.710860E 00	9.350000E-01	2.128000E-01	3.306671E-09
9.600000E-04	-2.710860E 00	9.350000E-01	2.128000E-01	4.038778E-09
2.240000E-03	-2.710860E 00	9.350000E-01	2.128000E-01	6.025163E-09
4.800000E-03	-2.710860E 00	9.350000E-01	2.128000E-01	1.341020E-08
9.920000E-03	-2.710860E 00	9.350000E-01	2.128000E-01	6.652703E-08
2.016000E-02	-2.710860E 00	9.350000E-01	2.128000E-01	1.672608E-06
3.040000E-02	-2.710862E 00	9.350000E-01	2.128001E-01	4.107394E-05
5.088000E-02	-2.712092E 00	9.350000E-01	2.128870E-01	3.021148E-02
5.600000E-02	-2.715472E 00	9.350000E-01	2.348399E-01	1.248504E-01
5.856000E-02	-2.720797E 00	9.350000E-01	2.348862E-01	2.693168E-01
6.112000E-02	-2.732512E 00	9.350000E-01	2.349882E-01	5.883170E-01
6.368000E-02	-2.757932E 00	9.350000E-01	2.352116E-01	1.286196E 00
6.496000E-02	-2.779909E 00	9.350000E-01	2.354067E-01	1.895876E 00
6.624000E-02	-2.811506E 00	9.350000E-01	2.356904E-01	2.782672E 00
6.752000E-02	-2.856194E 00	9.350000E-01	2.360985E-01	4.057748E 00
6.880000E-02	-2.917988E 00	9.350000E-01	2.366757E-01	5.861526E 00
7.008000E-02	-3.000894E 00	9.350000E-01	2.374741E-01	8.356691E 00
7.136000E-02	-3.107893E 00	9.350000E-01	2.385461E-01	1.170651E 01
7.264000E-02	-3.239566E 00	9.350000E-01	2.399309E-01	1.603422E 01
7.391999E-02	-3.392901E 00	9.350000E-01	2.416379E-01	2.136840E 01
7.519999E-02	-3.561002E 00	9.350000E-01	2.436301E-01	2.759422E 01
7.647999E-02	-3.734206E 00	9.350000E-01	2.458209E-01	3.444034E 01
7.775999E-02	-3.902262E 00	9.350000E-01	2.480867E-01	4.152094E 01
7.903999E-02	-4.056597E 00	9.350000E-01	2.502948E-01	4.842131E 01
8.031999E-02	-4.191699E 00	9.350000E-01	2.523323E-01	5.478853E 01
8.159999E-02	-4.305323E 00	9.350000E-01	2.541246E-01	6.038945E 01
8.287999E-02	-4.397879E 00	9.350000E-01	2.556343E-01	6.512244E 01
8.415999E-02	-4.472207E 00	9.350000E-01	2.567183E-01	6.899389E 01
8.543999E-02	-4.529916E 00	9.350000E-01	2.576241E-01	7.208028E 01
8.671999E-02	-4.574160E 00	9.350000E-01	2.583480E-01	7.449334E 01
8.799999E-02	-4.608753E 00	9.350000E-01	2.587436E-01	7.635338E 01
8.927999E-02	-4.635182E 00	9.350000E-01	2.589991E-01	7.777294E 01
9.055999E-02	-4.655094E 00	9.350000E-01	2.591929E-01	7.884959E 01
9.183999E-02	-4.670078E 00	9.350000E-01	2.593395E-01	7.966396E 01
9.311999E-02	-4.681274E 00	9.350000E-01	2.594673E-01	8.028025E 01
9.439999E-02	-4.689661E 00	9.350000E-01	2.595796E-01	8.074838E 01

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PROB.NO.1,RUN 74,PERIOD # 3.2 MSEC, A#.035729,B#.0206,D#.006406,B%EFF#.#.0074

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PROBLEM ENDED BY TEST SUBROUTINE.

PROB.NO.1,RUN 74,PERIOD # 3.2 MSEC, A#.035729,B#.0206,D#.006406,B%EFF#.#.0074

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MAXIMUM AND MINIMUM VALUES OF RESULTS

	POWER	REACTIVITY	INST.REC.PER.	AVG.REC.PER.	DELAYED SUM	ENERGY
MAXIMUM	5.896558E 03	2.114574E 00	3.125113E 02	3.125056E 02	3.958881E 01	8.636190E 01
MINIMUM	1.000000E-06	1.351734E-01	-2.183543E 02	-2.183329E 02	1.497293E-09	3.200000E-09
	DELAY 1	DELAY 2	DELAY 3	DELAY 4	DELAY 5	DELAY 6
MAXIMUM	1.096563E 00	2.736218E 00	9.998529E 00	2.688992E 01	1.181077E 02	3.140831E 02
MINIMUM	4.063835E-11	1.014297E-10	3.710623E-10	1.000598E-09	4.460019E-09	1.226373E-08
	DRVDV 1	DRVDV 2	DRVDV 3	DRVDV 4		
MAXIMUM	-2.710860E 00	9.350000E-01	2.595796E-01	8.074838E 01		
MINIMUM	-4.689661E 00	9.350000E-01	2.128000E-01	2.992000E-09		

2960P RJWOUTA 5160

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