FEB 5 1965

UNCLASSIFIED

CLASSIFICATION LEVEL
(S, C OR U)

5
MASTER

ATOMICS INTERNATIONAL
A Division of North American Aviation Inc.

NAA-SR-MEMO COVER SHEET

REPORT TITLE AIREK-KEWB A Program for the Numerical Solution of the
Space Independent Reactor Kinetics Equations for KEWB

AUTHOR L.R.Blue, M.Hoffman
and M.Dunenfeld

NAA-SR-MEMO -10632

(This Document Contains 50 Pages.)
(This is Copy of Series)

UNCLASSIFIED

CLASSIFICATION TYPE
(RD OR DI)

*NAA-SR-MEMOs are working papers and may be expanded,
modified, or withdrawn at any time, and are intended for
internal use only.*

THIS REPORT MAY NOT BE PUBLISHED WITHOUT THE APPROVAL OF THE PATENT BRANCH, AEC.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

UNCLASSIFIED

CLASSIFICATION LEVEL
(S, C OR U)

DO NOT REMOVE THIS SHEET

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

October, 1964

NAA-SR-MEMO-10632 *

AIREK-KEWB

**A Program for the Numerical Solution of the
Space Independent Reactor Kinetics Equations for KEWB**

by

L. R. Blue and M. Hoffman

Mathematics & Computer Applications Group

and

M. Dunenfeld

Reactor Physics

ATOMICS INTERNATIONAL

a division of North American Aviation, Inc.

* Previously published as AMTD-132, November, 1962.

ABSTRACT

The AIREK-KEWB Program is written in Fortran II to solve space independent reactor kinetics equations. The equations solved are:

$$\dot{N} = \frac{\beta}{\ell} \left[\{r(t) - 1\} N(t) + \sum_{i=1}^n f_i W_i(t) + S^* \right] \quad (1)$$

$$\dot{W}_i = \lambda_i [N(t) - W_i(t)] \quad (2)$$

$$\dot{F}_i = P_i N(t) + \Lambda_i N(0) + Y_i F_i(t) \quad (3)$$

$$\text{where } \rho(t) = \rho(0) + a_1 T + b_1 T^2 + g f(P) \quad (4)$$

Equation 4 represents the reactivity feedback equation, containing quadratic temperature and special void feedback for water boiler reactors, as developed in the KEWB program. This code has graphical output as one of its products.

TABLE OF CONTENTS

	<u>Page</u>
I. IDENTIFICATION.	3
II. PURPOSE	3
III. METHOD.	4
IV. SPECIAL FEATURES AND RESTRICTIONS . .	.11
V. INPUT DATA DESCRIPTION.	.13
VI. USE	.14
 APPENDIX I	 .18
APPENDIX II	.19

I. IDENTIFICATION

This report is a description of the mathematical model used in a special version of the AIREK¹ code called AIREK-KEWB. This document is further intended to describe in detail how to use this Fortran II program. The program deck is on file at Department 792 at Atomics International and is identified as Deck No. 3W-579.

This code solves the basic space independent reactor kinetics equations in addition to special applications for the KEWB reactor². The two main features are:

1. A Cathode Ray Tube (CRT) display of the output.
2. Special analytical functions describing water boiler reactor short period void growth and resultant reactivity feedback.

II. PURPOSE

The AIREK-KEWB program solves for reactor power level, $N(t)$; delayed neutron precursor concentration, $C_i(t)$; and the value of feedback variables, $F_j(t)$; with reactivity $\rho(t)$ as the driving function.

The basic equations are:*

$$\left. \begin{aligned} \dot{N} &= \frac{\rho(t) - \beta}{\ell} N(t) + \sum_i \lambda_i C_i(t) + S_0 \\ \dot{C}_i &= \frac{\beta \lambda_i}{\ell} N(t) - \lambda_i C_i(t) \\ \dot{F}_j &= P_j N(t) + L_j N(0) + Y_j F_j(t) \end{aligned} \right\} \quad (1)$$

where $\rho(t) = \rho(0) + \beta a_1 T + \beta b_1 T^2 + \beta g f(P)$

The first two equations in set (1) are the conventional reactor kinetics equations. The third equation is a generalized feedback equation. The fourth equation defines the reactivity feedback.

¹A. Schwartz, NAA-SR-MEMO-4980, "Generalized Reactor Kinetics Code, AIREK-II", February, 1960.

²M. Duenefeld and R. K. Stitt, "Summary Review of the Kinetics Experiments on Water Boilers", NAA-SR-7087, in publication.

*Note: See Appendix I for definition of symbols.

III. METHOD

The numerical method³ used for the solution of equation set (1) is described in detail to facilitate program use.

Simplify equation set (1) by the following substitutions:

$$\begin{aligned}\lambda(t) &\equiv \rho(t)/\beta \\ W_i(t) &\equiv \ell \lambda_i C_i(t) / \beta \beta_i \\ S^* &\equiv \ell S_0 / \beta\end{aligned}$$

obtaining equations (2)

$$\begin{aligned}\dot{N} &= \beta / \ell \left[(\lambda(t) - 1.0) N(t) + \sum_i \beta_i W_i(t) + S^* \right] \\ \dot{W}_i &= \lambda_i [N(t) - W_i(t)] \\ \dot{F}_j &= P_j N(t) + U_j N(t=0) + Y_j F_j(t)\end{aligned} \quad (2)$$

where $\lambda(t) = \lambda(0) + a_1 T + b_1 T^2 + g f(P)$

Equation set (2) are the equations actually solved by the AIREK-KEWB Code.

³ E. R. Cohen, "Some Topics in Reactor Kinetics", Second Geneva Conference Proceedings, p. 629, September, 1958.

Equation set (2) may be rewritten as:

$$\left. \begin{aligned} \dot{N} &= \alpha_N N(t) + R_N(N(t), t) \\ \dot{W}_i &= \alpha_{W_i} W_i(t) + R_{W_i}(N(t), t) \\ \dot{F}_j &= \alpha_{F_j} F_j(t) + R_{F_j}(N(t), t) \end{aligned} \right\} \quad (3)$$

where

$$\begin{aligned} \alpha_N &= \beta/l(\lambda(t)-1); \quad \alpha_{W_i} = -\lambda_i; \quad \alpha_{F_j} = Y_j \\ R_N &= \beta/l \left[(\lambda(t+z) - \lambda(t)) N(t+z) + \sum_i \beta_i W_i(t) + S \right] \\ R_{W_i} &= \lambda_i N(t); \quad R_{F_j} = P_j N(t) + U_j N_0 \end{aligned}$$

and $0 \leq z \leq h$ over the time interval h .

We now define the function $D_i(x)$ as follows: For $x < 1$

$$\left. \begin{aligned} D_3(x) &= ((((((\frac{x}{10} + 1)^{\frac{x}{9}} + 1)^{\frac{x}{8}} + 1)^{\frac{x}{7}} + 1)^{\frac{x}{6}} + 1)^{\frac{x}{5}} + 1)^{\frac{x}{4}} + 1)/3 \\ D_2(x) &= (x D_3(x) + 1)/2 \\ D_1(x) &= x D_2(x) + 1 \end{aligned} \right\} \quad (4)$$

For $X \geq 1$

$$\left. \begin{aligned} D_1(x) &= (e^x - 1)/x \\ D_2(x) &= (D_1(x) - 1)/x \\ D_3(x) &= (2D_2(x) - 1)/x \end{aligned} \right\} \quad (5)$$

In order to show the numerical procedure used to go from time t to time $(t+h)$, the process will be written first for the single equation $\frac{dn}{dt} = \alpha N + R(N, t)$ (given initial conditions at time t) and then expanded for equation set (3). For the equations above we have

$$\left. \begin{aligned} N_0 &= N(t), \quad R_0 = R(N_0, t) \\ \delta_1 &= \frac{1}{2}h D_1\left(\frac{\alpha h}{2}\right) [R_0 + \alpha N_0] \end{aligned} \right\} \quad (6.0)$$

$$\left. \begin{aligned} N_1 &= N_0 + \delta_1, \quad R_1 = R(N_1, t + \frac{1}{2}h) \\ \delta_2 &= \frac{1}{2}h D_2\left(\frac{\alpha h}{2}\right) [R_1 - R_0] \end{aligned} \right\} \quad (6.1)$$

$$\left. \begin{aligned} N_2 &= N_1 + \delta_2, \quad R_2 = R(N_2, t + \frac{1}{2}h) \\ \delta_3 &= h D_1(\alpha h) [R_0 + \alpha N_0] + 2h D_2(\alpha h) [R_2 - R_0] \end{aligned} \right\} \quad (6.2)$$

$$\left. \begin{aligned} N_3 &= N_0 + \delta_3, \quad R_3 = R(N_3, t + h) \\ \delta_4 &= h [2D_3(\alpha h) - D_2(\alpha h)] [R_0 - 2R_2 + R_3] \end{aligned} \right\} \quad (6.3)$$

$$\left. \begin{aligned} N_4 &= N_3 + \delta_3, \quad R_4 = R(N_4, t + h) \\ \delta_5 &= h [2D_3(\alpha h) - D_2(\alpha h)] [R_4 - R_3] \end{aligned} \right\} \quad (6.4)$$

$$N(t+h) = N(t) + \delta_3 + \delta_4 + \delta_5 \quad (6.5)$$

Given $N(t)$, $W_i(t)$ and $F_j(t)$, the equations defining the function values $N(t+h)$, $W_i(t+h)$, and $F_j(t+h)$ are as follows:

$$\begin{aligned}
 N_0 &= N(t), \quad W_{i0} = W_i(t), \quad F_{j0} = F_j(t) \\
 R_{N0} &= \beta/\ell [\sum_i f_i W_{i0} + S^*], \quad R_{W_{i0}} = \lambda_i N_0 \\
 R_{F_{j0}} &= P_j N_0 + U_j N(0) \\
 \delta N_1 &= \frac{1}{2} h D_1 \left(\frac{h}{2} \alpha_N \right) (R_{N0} + \alpha_{N1} N_0) \\
 \delta W_{i1} &= \frac{1}{2} h D_1 \left(\frac{h}{2} \alpha_{W_i} \right) (R_{W_{i0}} - \alpha_{W_i} W_{i0}) \\
 \delta F_{j1} &= \frac{1}{2} h D_1 \left(\frac{h}{2} \alpha_{F_j} \right) (R_{F_{j0}} + \alpha_{F_j} F_{j0})
 \end{aligned}
 \tag{7.0}$$

$$\begin{aligned}
 N_1 &= N_0 + \delta N_1, \quad W_{i1} = W_{i0} + \delta W_{i1}, \quad F_{j1} = F_{j0} + \delta F_{j1} \\
 R_{N1} &= \beta/\ell [(\lambda(t+h/2) - \lambda(t)) N_1 + \sum_i f_i W_{i1} + S^*] \\
 R_{W_{i1}} &= \lambda_i N_1, \quad R_{F_{j1}} = P_j N_1 + U_j N(0) \\
 \delta N_2 &= \frac{1}{2} h D_2 \left(\frac{h}{2} \alpha_N \right) (R_{N1} - R_{N0}) \\
 \delta W_{i2} &= \frac{1}{2} h D_2 \left(\frac{h}{2} \alpha_{W_i} \right) (R_{W_{i1}} - R_{W_{i0}}) \\
 \delta F_{j2} &= \frac{1}{2} h D_2 \left(\frac{h}{2} \alpha_{F_j} \right) (R_{F_{j1}} - R_{F_{j0}})
 \end{aligned}
 \tag{7.1}$$

$$\begin{aligned}
 N_2 &= N_1 + \delta N_2, \quad W_{i2} = W_{i1} + \delta W_{i2}, \quad F_{j2} = F_{j1} + \delta F_{j2} \\
 R_{W_{i2}} &= \lambda_i N_2, \quad R_{F_{j2}} = P_j N_2 + U_j N(0) \\
 \delta N_3 &= h D_1 (\alpha_N h) (R_{N0} + \alpha_N N_0) + 2h D_2 (\alpha_N h) (R_{N2} - R_{N0}) \\
 \delta W_{i3} &= h D_1 (\alpha_{W_i} h) (R_{W_{i0}} + \alpha_{W_i} W_{i0}) + 2h D_2 (\alpha_{W_i} h) (R_{W_{i2}} - R_{W_{i0}}) \\
 \delta F_{j3} &= h D_1 (\alpha_{F_j} h) (R_{F_{j0}} + \alpha_{F_j} F_{j0}) + 2h D_2 (\alpha_{F_j} h) (R_{F_{j2}} - R_{F_{j0}})
 \end{aligned}
 \tag{7.2}$$

$$N_3 = N_0 + \delta N_3, \quad W_{i,3} = W_{i,0} + \delta W_{i,3}, \quad F_{j,3} = F_{j,0} + \delta F_{j,3}$$

$$R_{N,3} = \beta/e \left[(\lambda(t+h) - \lambda(t)) N_3 + \sum_i f_i W_{i,3} + S^* \right]$$

$$R_{W,3} = \lambda_i N_3, \quad R_{F,3} = P_j N_3 + U_j N(0)$$

$$\delta N_4 = h \left[2D_3(\alpha_{N,h}) - D_2(\alpha_{N,h}) \right] [R_{N,0} - 2R_{N,2} + R_{N,3}]$$

$$\delta W_{i,4} = h \left[2D_3(\alpha_{W_i,h}) - D_2(\alpha_{W_i,h}) \right] [R_{W,0} - 2R_{W,2} + R_{W,3}]$$

$$\delta F_{j,4} = h \left[2D_3(\alpha_{F_j,h}) - D_2(\alpha_{F_j,h}) \right] [R_{F,0} - 2R_{F,2} + R_{F,3}]$$

7.3

$$N_4 = N_3 + \delta N_3, \quad W_{i,4} = W_{i,3} + \delta W_{i,3}, \quad F_{j,4} = F_{j,3} + \delta F_{j,3}$$

$$R_{N,4} = \beta/e \left[(\lambda(t+h) - \lambda(t)) N_4 + \sum_i f_i W_{i,4} + S^* \right]$$

$$R_{W,4} = \lambda_i N_4, \quad R_{F,4} = P_j N_4 + U_j N(0)$$

$$\delta N_5 = h \left[2D_3(\alpha_{N,h}) - D_2(\alpha_{N,h}) \right] [R_{N,4} - R_{N,3}]$$

$$\delta W_{i,5} = h \left[2D_3(\alpha_{W_i,h}) - D_2(\alpha_{W_i,h}) \right] [R_{W,4} - R_{W,3}]$$

$$\delta F_{j,5} = h \left[2D_3(\alpha_{F_j,h}) - D_2(\alpha_{F_j,h}) \right] [R_{F,4} - R_{F,3}]$$

7.4

$$N(t+h) = N(t) + \delta N_3 + \delta N_4 + \delta N_5$$

$$W_i(t+h) = W_i(t) + \delta W_{i,3} + \delta W_{i,4} + \delta W_{i,5}$$

$$F_j(t+h) = F_j(t) + \delta F_{j,3} + \delta F_{j,4} + \delta F_{j,5}$$

7.5

Equation set (7.5) completes the numerical integration across the time step h from t to $(t+h)$, thus yielding the values of all variables at $(t+h)$. Now the process may be repeated for the next time interval h with the value of the variables from above as initial conditions.

In the AIREK-KEWB code the time interval h is continually adjusted to give a desired accuracy with a minimum of computer time. At the end of each time step integration, the following quantities are calculated.

$$\bar{\omega} = 1/h \ln \left[\frac{N(t+h)}{N(t)} \right]$$

$$\omega_0 = 1/N(t) \left[\frac{B}{L} ((\lambda(t) - 1.0)N(t) + \sum_i f_i W_i(t) + S^*) \right]$$

$$\omega_1 = 1/N(t+h) \left[\frac{B}{L} ((\lambda(t+h) - 1.0)N(t+h) + \sum_i f_i W_i(t+h) + S^*) \right]$$

$$Q = \frac{h C_2(x_{2N})}{1 + C_1(x_{2N})} \left[|\omega_0 - 2\bar{\omega} + \omega_1| \right]$$

The quantity Q is then compared to two input quantities, AU and AL , and the interval h is adjusted according to the following three part rule:

1. If $0 \leq Q \leq AL$, then the interval is doubled for the next interval.
2. If $AL < Q < AU$, then the interval h is kept the same for the next interval.
3. If $AU < Q$, then the interval h is halved and the interval is recalculated.

This method is used to guarantee accuracy of results. Further restrictions upon the size of h have been placed in the program to insure no waste of computer time. These restrictions are governed by the input quantities HU and HL which are the upper and lower limits on the magnitude of the time interval h . Another restriction is that no more than 1,000 intervals of time can be calculated normally; however, if the 5/5 option (explained below) is used, 5,000 intervals can be calculated. If the 5/5 option is chosen, every 5th value will be printed, and if the punched card output option is chosen, every 25th value will be punched.

Any attempt during a run to extend h beyond the limits of HU and HL as a result of the Q test will result in termination of the run. When the run or case is terminated, the data block and all points previously calculated are printed.

The numerical integration procedure continues until one of the following conditions is met:

1. $t \geq \text{DATA (18)}$; the maximum time for which calculations are desired.
2. The number of time intervals calculated exceeds 1,000 values or 5,000 values if the 5/5 option is used.

At this point, all input data are printed as well as the values of N , F_j , ρ or r , ω , P , R_v and $\ln N$ as a function of time. At this time, selected functions of the output can be plotted on the SC-4020 (ref: NAA Engineer's Computing Manual, pp. 99.04.01 to 99.04.15) which will result in either or both of 9 x 9 inch photographic paper copies or 35 mm film copies of the graphs.

It is also possible at this time to plot on the same graph the respective test data as obtained from the AIRCOMP⁴ code or any other data in the same card format. If this option is desired, Data Location 481 (DATA 481) must contain the time in seconds of peak power obtained from the AIRCOMP run. This input is to enable the code to align the arbitrary time scales of the power curves to place the peak power of both curves at the same time point. The time scale normalization thus selected by the code is then used for the other comparative curve plots specified. See Appendix II (Input Description) for selection of variables for SC-4020 plotting.

⁴ NAA Program Description, "AIRCOMP II", H. R. Richardson, Dec., 1960.

IV. SPECIAL FEATURES AND RESTRICTIONS

Selection of initial conditions, $N(0)$, $W_i(0)$, and $F_j(0)$ (Data 19 - Data 68) determines the transient pre-history. For example, appropriate choice of the $F_j(0)$ depending upon the form of the feedback equations, and equating the $W_i(0)$ with $N(0)$, by the second equation in set (2), places the relative delayed neutron precursor concentrations in equilibrium. Physically this defines the situation of reactor operation at a constant power $N(0)$ for sufficient time to allow precursor equilibrium to be reached preceeding the conditions initiated in the code.

A case of frequent interest in reactor kinetics is that of reactor response when placed upon a constant period. In this situation it is desirable from the viewpoint of computer economy to start the code problem at a power level which is high relative to realistic starting power levels but negligible relative to the peak power expected. The code has been constructed to make this case very convenient to initiate. This is done by inserting the desired reciprocal reactor period, ω_0 , in DATA 7. The code then solves the inhour equation

$$r = \frac{\ell \omega_0}{\beta} + \sum_{i=1}^n \frac{\beta_i \omega_0}{\omega_0 + \lambda_i}$$

Since the power rise is assumed exponential, the delayed neutron precursor relative concentrations at a power level $N(0)$ are given by:

$$W_i(0) = \frac{\lambda_i N(0)}{\lambda_i + \omega_0}$$

The calculated values $W_i(t = 0)$ and $r(t = 0)$, or ρ if the reactivity unit option is chosen, are automatically set by the program as the initial conditions for W_i and r ; thus no value need be read in for these quantities.

The number of delayed neutron precursor groups and feedback equations must be ≤ 25 .

SC-4020 output is a mandatory output. At least one plot must be requested. A maximum number of plots would be each function plotted against all other functions, or 36 plots each containing a maximum of 1,000 points.

A formulation of the radiolytic gas void formation model for short period transients in water boiler reactors⁵ is included in this version of AIREK. In this model, there is no inertial pressure, or consequent void formation, until an energy E_0 has been released in the reactor. Following the time t_0 of E_0 entered in DATA 493, the code computes

$$P(t) = \frac{aN_0}{V_{CORE}} \left(1 - e^{-\left(\frac{t-t_0}{\tau_0}\right)} \right);$$

when $t_0 \leq t \leq (C\tau_0 + t_0)$

and
$$P(t) = \frac{aN_0}{V_{CORE}} \left(1 - e^{-1.5} \right) e^{-\left(\frac{t-t_0}{\tau_1}\right)};$$

when $t > (C\tau_0 + t_0)$

where t_0 is the time of E_0 , which is data location 493. (See Appendix I for other symbols). The pressure is calculated at the end of each sub-interval. It is placed into the output block (core locations of data to be printed) if and only if the total interval has been traversed and the best possible values for the end point of the interval have been obtained.

⁵P. Spiegler, C. F. Bumpus, Jr., and A. Norman, "Production of Void and Pressure by Fission Track Nucleation of Radiolytic Gas Bubbles During Power Bursts in a Solution Reactor", NAA-SR-7086, in publication. (See also Reference 2, pg. 3.

From the pressure, the gas void volume, v , and void compensated reactivity, R_v , are computed by

$$R_v = gV = g \int_0^{t-t_0} (t-t_0-t') P(t') dt'$$

where

g is an input design parameter
 t is the current time
 t_0 is the time of E_0
 t' is a dummy variable of integration.

The integration is done for the complete time interval (i.e., $t - t_0$) each time it is calculated. This is done because of the ability of the code to increase and decrease the interval, and obvious difficulties would result if this algorithm were not used. It should be noted that the R_v term is in dollars, but the output is in six group dollars even if there are more than six groups.

Due to the addition of the special features incorporated into AIREK-KEWB, it was necessary to decrease the size of the output block. Previously, the code had the ability to print eight delayed groups of neutron precursors. Due to the curtailment of available core storage, the AIREK-KEWB code currently does not have the ability to print delayed neutron precursors.

V. INPUT DATA DESCRIPTION

Each case in a set of problems must begin with a title card; which card can contain any combination of 54 Hollerith symbols. This title will be printed on the first page of output for the case and as a title for each SC-4020 plot requested. Next in sequence is a card containing the indices I_1 and I_2 of consecutive ($I_1 = I_2$ is permissible) data locations to be specified. The values to be entered in these locations must follow at six values per card. If the last value does not complete a card, the remainder of that card is left blank. Further groups of cards specify indices of other data locations and the values to be entered therein.

If it is desired to change the value in any particular data location, it is permissible merely to place that data location twice on a card followed by the value on another card. This must be done after the original specification for the location as the last assignment of a value to a location is the one which will be used for the calculation. To terminate data reading and start the calculation, the sign of I_2 is made negative for the last piece of data being placed in the data block.

If the option to plot an experiment in comparison with the theoretical results of the AIREK case has been selected through insertion of the time of the experimental peak power in DATA 481, then the experimental data deck follows the last data entry. The number of cards in the AIRCOMP deck is not input data because the code reads cards until the time field, which is normalized to 9.9994, reaches that number. Following this are placed the cards containing instructions for the SC-4020 CRT plots. Since the units of the AIREK case are determined by those of the reactivity feedback coefficients (and consistent feedback variable units) choices other than those shown in the sample plots may be encountered. In such event, the labels for the curve axes may be altered appropriately.

The values stored in the various data locations remain there upon completion of the calculation. Additional cases with changes in some of the parameters are thus very conveniently initiated. Only those data locations requiring changes need be specified. The rules concerning title card, negative data location index, experimental deck and CRT instructions, explained above, must, of course, be observed.

Table 2, page 16, shows the locations in the data block, DD, for the various input parameters. A sample problem is also given which shows the exact card layouts. (See Appendix II).

IV. USE

The program deck 3W-579 is on file at Department 792 and is run as a standard Fortran II job. About 100 time points are calculated for each second of 7090 time, and each CRT plot, for either paper or film, requires about five seconds.

The number of CRT frames of output should be indicated on the run request. Loss of machine time will probably result if this is not done. This is because the 7090 operator, not knowing this job is to have CRT output, will not ready the CRT tape module (A7), and the run will stop on a Read/Write select until the tape module is placed into a ready state.

TABLE 2

Locations of Input Parameters in Data Block**

Data Location	Fortran Symbol	Definition
1	DATA(1)	Number of kinetics equations = one neutron equation + number of delayed neutron groups + number of feedback equations treated as third equation of equation set (1). (The equations for energy and temperature are generally in this category).
2	DATA(2)	Number of delayed neutron groups being considered
3	DATA(3)	Not used
4	DATA(4)	Not used
5 ****	DATA(5)	1.0, + or - if reactivity units are dollars or reactivity, respectively
6	DATA(6)	0 if h is not fixed; +T if h is fixed until T in secs. (The second option can lead to large calculational errors if it causes the program to violate the requirements set by DATA 11).
7	DATA(7)	$\omega(0) = \omega_0$. This location should be used only when ω_0 it is desired to simulate the case of constant reactor period pre-history preceding N(0), DATA 19. The entry in DATA 244 will be changed by the code to a value consistent with ω_0 and the inhour equation.
8 ***	DATA(8)	Initial internal (h)
9	DATA(9)	Minimum interval (HL)
10 ****	DATA(10)	Not used
11 ***	DATA(11)	Q upper value (AU)
12 ***	DATA(12)	Q lower value (AL)
13	DATA(13)	β total
14	DATA(14)	Neutron lifetime (ℓ)
15	DATA(15)	Normalized source term (S^*)
16 ****	DATA(16)	0
17 ****	DATA(17)	0
18	DATA(18)	Problem will stop at value of (problem) time entered here. 20 to 30 times the reactor period is sufficient to cover step reactivity input bursts.

TABLE 2 (Continued)

Data Location	Fortran Symbol	Definition
19-68	DATA(19)*	Initial conditions $N(0)$, $W_1(0)$, ..., $F_j(0)$, ..., respectively. $N(0)$ should be at least four decades less than peak power expected. In the constant reactor period case controlled by DATA 7; $W_1(0)$ may be omitted. If feedback variables, such as energy and temperature, are taken as initially zero, these may also be omitted.
69-93	DATA(69)*	f_i
94-143	DATA(94)*	P_j . These are the coefficients of $N(t)$ in the feedback equations. For the delayed neutron equations, the coefficients are k in $E = k Ndt$. In the energy equation, if the heat capacity is constant, t is ak in $T = ak Ndt$.
144-193	DATA(144)*	U_j . Coefficients of $N(0)$
194-243	DATA(194)*	Y_j . Coefficients of $F_j(t)$. For the delayed neutron equations the coefficients are
244	DATA(244)	$r(0)$ or $\rho(0)$. Replaced by inhour equation value if DATA 7 $\neq 0$.
245-249	DATA(245)*	$\frac{dr}{dt}$, a_1, b_1 , $t(r_f) \neq r_f$, respectively, in $r(t) = r(0) + \frac{dr}{dt} t + a_1 T + b_1 T^2, t \leq t(r_f)$ $r(t) = r_f + a_1 T + b_1 T^2, t \geq t(r_f), r(0), \frac{dr}{dt}, t(r_f) \neq r_f$ <p>permit a wide variety of step and/or ramp reactivity functions. If the r_f option is not desired, be sure to enter a value much larger than expected problem time for Be sure to use correct sign (usually negative) for a_1 and b_1.</p>
250-459	DATA(250)	Not used
460	DATA(460)	a power density void coefficient
461	DATA(461)	C Set = 1.5
462	DATA(462)	V_{core}
463	DATA(463)	$\tau_0 = \omega_0^{-1}$ This permits use of the void model when case is started up through DATA 244 rather than DATA 7.
464-480	DATA(464)*	Not used
481	DATA(481)	Time of peak power from AIRCOMP if experimental-theoretical plot option is used.
482-485	DATA(482)*	Not used
486	DATA(486)	= DATA(18) for special save features

TABLE 2 (Continued)

Data Location	Fortran Symbol	Definition
487	DATA(487)	Number of points calculated
488	DATA(488)	$\int \int P dt'$
489-492	DATA(489)*	Not used
493	DATA(493)	E_0
494	DATA(494)	Void coefficient of reactivity, g, usually negative.
495	DATA(495)	Not used
496	DATA(496)	1 if 5/5 option is requested; 0 if not.
497	DATA(497)	Not used
498	DATA(498)	Use 1.0 here always for 4th order Runge-Kutta. Avoid lower order option obtained when this location = 0.
499	DATA(499)	Not used
500	DATA(500)	Cards of the code output will be punched if $\neq 0$.

*First location of block required for function.

**All data in E12.8 format.

***See sample case, Appendix II, for typical values for these quantities.

****There are other versions of AIREK containing functions controlled by variations of the entry in this location which are inoperative in this code.

APPENDIX I

Quantity	Definition
t	Time
$N(t)$	Reactor power level at time t
$\rho(t)$	Total reactivity
β	Effective fraction of delayed neutrons
ℓ	Neutron lifetime
f_i	Fraction of delayed neutrons in group i
λ_i	Decay constant for delayed neutron precursor group i
C_i	Concentration of delayed neutron precursor group i
S_0	Source term
F_j	Feedback variables
P_j, U_j, Y_j	Coefficients of $N_j(t)$, $N_j(0)$, and $F_j(t)$ in feedback equations, j respectively.
$r(t)$	Reactivity in dollars
$W_i(t)$	Normalized delayed neutron precursor groups i concentrations
S^*	Normalized source term
a	Power density void coefficient
N_0	Power at E_0
V_{core}	Core volume
ω_0	Initial reciprocal reactor period
τ_1	Inertial pressure relaxation period
C	Input constant which peaks the pressure C reactor periods after its inception. Set = 1.5
b_1	Second order term in the temperature coefficient of reactivity
T_0	Initial reactor temperature
a_2	First order term in the temperature coefficient
a_1	$= a_2 + b_1 T_0$
g	Void coefficient of reactivity

APPENDIX II

This section contains instructions for deck set up and a sample run of AIREK-KEWB, which has the following Inputs and Outputs.

A. Inputs

1. Input data as outlined in Table 2.
2. Test data for plotting if desired.
3. SC-4020 input requests. This data does not appear in the data block.

B. Outputs

1. Data block as it appears after completion of run.
2. The listing of the output block. This contains all the functions of time.
3. CRT displays, if requested.

Diagram of Set Up

The deck, No. 3W-579, is on file at Department 792 and need not be enclosed when the run is submitted.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	P D V Ø I D		
13	M Ø D E L R E F .		
25	1 1 4 9 B 0		
37			
49			
61		73 80	
		1 0	
1			
13			
25			
37			
49			
61		73 80	
		2 0	
1	1 + 0 2		
13	7 + 0 1		
25	0 + 0 0		
37	0 + 0 0		
49	1 + 0 1		
61	0 + 0 0	73 80	
		3 0	
1	2 1 3 + 0 3		
13	1 - 0 4		
25	5 - 0 5		
37	1 + 0 2		
49	1 - 0 4		
61	2 5 - 0 5	73 80	
		4 0	

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	3 0 8 - 0 1		
13	2 1 0 - 0 4		
25	0 + 0 0		
37	0 + 0 0		
49	0 + 0 0		
61	8 - 0 1		
1	1 - 0 2		
13	5 8 4 0 0 3 4 3 - 0 7		
25	1 4 3 1 7 1 9 8 - 0 6		
37	5 2 2 7 3 1 2 9 - 0 6		
49	1 4 1 1 1 5 1 3 - 0 5		
61	5 3 2 3 6 1 9 8 - 0 5		
1	1 3 9 3 4 5 3 9 - 0 4		
13	7 0 1 2 6 2 2 5 - 0 3		
25			
37			
49			
61			
1			
13			
25			
37			
49			
61			
1			
13			
25			
37			
49			
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	8 5 7 1 4 2 8 4 - 0 2		
13	5 6 8 8 3 1 1 5 - 0 1		
25	5 0 9 0 9 0 8 9 - 0 1		
37	1 0 2 5 9 7 3 9 - 0 0		
49	2 9 8 7 0 1 2 9 - 0 1		
61	1 0 9 0 9 0 8 9 - 0 1	73 80	9 0
1	7 4 0 2 5 9 7 4 + 0 0		
13			
25			
37			
49			
61		73 80	1 0 0
1			
13	9 4		
25	1 0 2		
37			
49			
61		73 80	1 1 0
1	1 2 4 4 - 0 1		
13	3 0 5 - 0 1		
25	1 1 1 4 + 0 0		
37	3 0 1 + 0 0		
49	1 1 4 + 0 1		
61	3 0 1 + 0 1	73 80	1 2 0

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	5 + . 0 . 3		
13	1 + 0 1		
25	1 3 6 + 0 2		
37			
49		73 80	
61		 1 3 0	
1	 1 9 4		
13	 2 0 0		
25			
37			
49		73 80	
61		 1 4 0	
1	- 1 2 4 4 - 0 1		
13	- 3 0 5 - 0 1		
25	- 1 1 1 4 + 0 0		
37	- 3 0 1 + 0 0		
49	- 1 1 4 + 0 1	73 80	
61	- 3 0 1 + 0 1	 1 5 0	
1	- 5 + 0 3		
13			
25			
37			
49		73 80	
61		 1 6 0	

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	2 4 4		
13	2 4 8		
25			
37			
49			
61		73 .80	
		1 7 0	
1	6 2 5 6 1 9 9 6 + 0 0		
13	0 + 0 0		
25	- 1 0 1 - 0 1		
37	- 5 9 4 0 3 - 0 4		
49	1 + 0 4		
61		73 .80	
		1 8 0	
1	4 6 0		
13	4 6 4		
25			
37			
49			
61		73 .80	
		1 9 0	
1	8 3 + 0 4		
13	1 5 + 0 1		
25	1 8 + 0 5		
37	4 8 - 0 2		
49	0 + 0 0		
61		73 .80	
		2 0 0	

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1			
13			
25			
37			
49			
61			
1	3 6 3 0 3 - 0 1		
13			
25			
37			
49			
61			
1			
13			
25			
37			
49			
61			
1			
13			
25			
37			
49			
61			
1			
13			
25			
37			
49			
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	4 9 3	73 80	
13	4 9 4		
25			
37			
49			
61		2 1 0	
1	9 + 0 0	73 80	
13	- 1 + 0 4		
25			
37			
49			
61		2 2 0	
1	4 9 8	73 80	
13	- 4 9 8		
25			
37			
49			
61		2 3 0	
1	1 + 0 1	73 80	
13			
25			
37			
49			
61		2 4 0	

Appendix II

Note: At this point in data, place AIRCOMP output deck.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1 13 25 37 49 61	4 73 80	Number of plots
1 13 25 37 49 61	73 80	X - Title TIME (SEC)
1 13 25 37 49 61	73 80	Y - Title POWER (ME GAWATTS)
1 13 25 37 49 61	1 3 0 0 73 80	X - Number column in Output Block Y - Number column in Output Block Linear in X Linear in Y

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	1	Interval at which points are to be plotted
13	1	Do no join points 2- join points
25	3 8	Plot values pictorially. As points advance
37	1	film frame before plotting.
49	1 73 80	Use full cycle when plotting lob plots.
61		
1		
13	T I M E (S E	
25	C)	
37		
49	73 80	
61		
1		
13	P O W E R (M	
25	E G A W A T T S)	
37		
49	73 80	
61		
1	1	
13	3	
25	0	
37	1	Log in y
49	73 80	
61		

NAA-SR-MEMO-10632

Appendix II, p. 29

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1		1		
13		1		
25		3 8		
37		1		
49		1 73 80		
61				
1				
13				
25	E C)			
37				
49		73 80		
61				
1				
13				
25	P R V (6 G R			
37	D O L L A R S)			
49		73 80		
61				
1		1		
13		8		
25		0		
37		0		
49		73 80		
61				

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1		1		
13		1		
25		3 8		
37		1		
49		1	73	80
61				
1				
13				
25	E C)			
37				
49			73	80
61				
1				
13				
25	E (P S I)			
37				
49			73	80
61				
1		1		
13		9		
25		0		
37		0		
49			73	80
61				

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	1	
13	1	
25	3 8	
37	1	
49	1 73 80	
61		
1		
13		
25		
37		
49	73 80	
61		
1		
13		
25		
37		
49	73 80	
61		
1		
13		
25		
37		
49	73 80	
61		

BEGIN EXECUTION 27

10-13-3=

02/38/23

* DATA

NAME	LOAD	ENTRY	NAME	LOAD	ENTRY	NAME	LOAD	ENTRY	NAME	LOAD	ENTRY
000000	00200	00217	PPP	01571	01600	INTER	02444	02456	INHOUR	03413	03417
RTABL	03515	03521	DIREC	03606	03614	TEST	04004	04010	CNFBT	04034	04041
RNFBT	04226	04232	RANAL	04322	04327	ARCRT	04772	05003	AICRT	13406	13425
SORT	14464	14470	CRV	*14602*	14613	DXDYV	15241	15247	APRNTV*	16111*	16117
HOLLV	16231	16231	CHARHV	16270	16271	TITLIV	16407	16436	TITL2V*	16407*	16412
BCD1	*16616*	16621	BCD	*16616*	16616	PICK	*16616*	16652	BCD1V	16616	16621
BCDV	16616	16616	PICKV	*16616*	16652	SIG6	16757	16757	SIG6V	*16757*	16757
GRIDIV	17117	17142	POINTV*	20132*	20135	(PLOT)	20264	20300	(CLEAN	20264	20311
(4020)	20264	20346	NOFRV	*20264*	20351	(P..1)	20264	20302	(P..2)	20264	20312
(P..3)	20264	20314	(P..4)	20264	20344	LABLV	21415	21417	SETCIV*	21603*	21603
SETCOV	21603	21611	XSCALV	21623	21625	YSCALV	21623	21630	NXV	21623	21752
NYV	21623	21755	UXV	*21623*	22032	UYV	*21623*	22035	SCERRV	21623	22011
SERSAV	21623	22016	SERREV	21623	22023	(XXXX)	21623	22047	(YYYY)	21623	22050
CAMRAV	22071	22210	FRAMEV	22071	22076	RESETV*	22071*	22177	FORMV	*22071*	22202
LINEV	22273	22274	APLOTV	22426	22434	LINRV	22644	22655	NONLNV	23366	23401
PRINTV	23764	23765	SETMIV*	24117*	24117	SETMOV	24117	24125	ERRLNV	24141	24142
PLOTV	24222	24223	BRITEV	24250	24251	FAINTV*	24250*	24253	XAXISV*	24302*	24304
YAXISV*	24302*	24306	SETUPV*	24327*	24334	(SMXV)*	24375*	24375	(SMYV)*	24375*	24375
SMXYV	24376	24402	MSXYV	24376	24407	(SMXV)	24376	24414	(SMYV)	24376	24422
XMODV	24430	24431	YMODV	24430	24431	STOPTV	24433	24434	ERMVKV	24442	24443
ERRNLV	24457	24460	HOLDIV*	24544*	24544	HOLD0V	24544	24547			

SUBROUTINES LOADED FROM LIBRARY.

(FPT)	24553	24554	EXP12	24613	24613	LOG10	24661	24666	LOGE	24661	24670
LOG2	*24661*	24670	LOG	*24661*	24670	ECL0G	*24661*	24775	EPL0G	25001	25001
EXP	25004	25011	ECEXP	*25004*	25125	EPEXP	25131	25131	SQRT	25134	25141
ECSQRT*	25134*	25237	EPSQRT	25243	25243	ESCORT	25245	25261	ESCSWT*	25245*	25601
PAKUP)	25245	25463	ERRG0	*25245*	25604	(ESOUT	25613	25615	(ESCFI	25613	25616
(SESC)	25617	25617	(ESC0)	25620	25620	TRAPEX	25621	25622	(TSH)	25623	25631
(STH)	25653	25665	(SCH)	25775	26010	(SL0)	26336	26336	(SLI)	26353	26353
(WER)	26370	26403	(WTC)	26370	26433	(RER)	26511	26523	(RDC)	26511	26560
(IOH)	26656	26664	(FIL)	26656	30302	(RTN)	26656	30313	EXIT	30616	30622
DUMP	30645	30672	PDUMP	*30645*	30662	XDUMP	30645	30654	DDUMP	*30645*	30666
(KEYS)	30645	30652	(TES)	31513	31513	(SFT)	31513	31550	(WFT)	31513	31551
(CDIN)	31513	31526	(LOUT)	31513	31531	(CDXQ)	31513	31530	(TAPU)	31513	31520
(CTES)	31513	31514	(TCRT)*	31513*	31516	(IDCD)	31513	31521	(WDCT)	31513	31525
(CTJB)	31513	31527	(NUSE)*	31513*	31532	(DATE)*	31513*	31517	(TIME)*	31513*	31515

Appendix III
p. 33

NAA-SR-MEMO-10632

(JOBN) 31513 31522	(BOXN)*31513*31523	(USEC)*31513*31524	(T0CSA*31513*31533
(T0CSB*31513*31534	PRINT) 31636 31636	(IOS) 32114 32120	(RDS) 32114 32226
(WRS) 32114 32227	(BSR) 32114 32230	(WEF) 32114 32231	(REW) 32114 32232
(ETT) 32114 32237	(RCH) 32114 32241	(TEF) 32114 32242	(TC0) 32114 32243
(TRC) 32114 32244	(RUN) 32114 32233	(BTI) *32114*32240	(STC) *32114*32245
(LCH) *32114*32246	(BSF) *32114*32234	(SDH) *32114*32235	(SDL) 32114 32236
(UBCD)*32114*32247	(IOU) 32324 32327		

LOWEST COMMON LOC. (41704)8 HIGHEST PROGRAM LOC.(32347)8 STORAGE NOT USED BY PROGRAM. (07334)8

P D VOID MODEL REF.114980

INPUT COEFFICIENTS FOR FEEDBACK EQUATIONS

0.12440000E-01	0.	-0.12440000E-01
0.30499999E-01	0.	-0.30499999E-01
0.11139999E-00	0.	-0.11139999E-00
0.30100000E-00	0.	-0.30100000E-00
0.11399999E 01	0.	-0.11399999E 01
0.30100000E 01	0.	-0.30100000E 01
0.50000000E 03	0.	-0.50000000E 03
0.09999999E 01	0.	0.
0.13599999E 02	0.	0.

INIT.OMEGA	INIT. INTERVAL	MIN. INTERVAL	MAX. INTERVAL	LOWEST ACCURACY	UPPER ACCURACY
0.21300000E 03	0.99999999E-05	0.49999999E-05	0.09999999E 02	0.99999999E-05	0.24999999E-05

BETA EFFECTIVE	NEUTRON LIFETIME	SOURCE TERM	SUM FI*WI
0.30800000E-01	0.20999999E-04	0.	0.51960726E-03

1	0.09999999E 02	0.70000000E 01	0.	0.	0.09999999E 01	0.
7	0.21300000E 03	0.99999999E-05	0.49999999E-05	0.09999999E 02	0.99999999E-05	0.24999999E-05
13	0.30800000E-01	0.20999999E-04	0.	0.	0.	0.79999999E-01
19	0.99999999E-03	0.58400343E-07	0.14317198E-06	0.52273129E-06	0.14111513E-05	0.53236198E-05
25	0.13934539E-04	0.70126225E-03	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.
37	0.	0.	0.	0.	0.	0.
43	0.	0.	0.	0.	0.	0.
49	0.	0.	0.	0.	0.	0.
55	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.
67	0.	0.	0.85714284E-02	0.56883115E-01	0.50909089E-01	0.10259739E-00
73	0.29870129E-01	0.10909089E-01	0.74025974E 00	0.	0.	0.
79	0.	0.	0.	0.	0.	0.
85	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.12440000E-01	0.30499999E-01	0.11139999E-00
97	0.30100000E-00	0.11399999E 01	0.30100000E 01	0.50000000E 03	0.09999999E 01	0.13599999E 02
103	0.	0.	0.	0.	0.	0.
109	0.	0.	0.	0.	0.	0.
115	0.	0.	0.	0.	0.	0.
121	0.	0.	0.	0.	0.	0.
127	0.	0.	0.	0.	0.	0.
133	0.	0.	0.	0.	0.	0.
139	0.	0.	0.	0.	0.	0.

145 0.	0.	0.	0.	0.	0.
151 0.	0.	0.	0.	0.	0.
157 0.	0.	0.	0.	0.	0.
163 0.	0.	0.	0.	0.	0.
169 0.	0.	0.	0.	0.	0.
175 0.	0.	0.	0.	0.	0.
181 0.	0.	0.	0.	0.	0.
187 0.	0.	0.	0.	0.	0.
193 0.	-0.12440000E-01	-0.30499999E-01	-0.11139999E-00	-0.30100000E-00	-0.11399999E 01
199-0.30100000E 01	-0.50000000E 03	0.	0.	0.	0.
205 0.	0.	0.	0.	0.	0.
211 0.	0.	0.	0.	0.	0.
217 0.	0.	0.	0.	0.	0.
223 0.	0.	0.	0.	0.	0.
229 0.	0.	0.	0.	0.	0.
235 0.	0.	0.	0.	0.	0.
241 0.	0.	0.	0.62561996E 00	0.	-0.10100000E-01
247-0.59402999E-04	0.09999999E 04	0.	0.	0.	0.
253 0.	0.	0.	0.	0.	0.
259 0.	0.	0.	0.	0.	0.
265 0.	0.	0.	0.	0.	0.
271 0.	0.	0.	0.	0.	0.
277 0.	0.	0.	0.	0.	0.
283 0.	0.	0.	0.	0.	0.
289 0.	0.	0.	0.	0.	0.
295 0.	0.	0.	0.	0.	0.
301 0.	0.	0.	0.	0.	0.
307 0.	0.	0.	0.	0.	0.
313 0.	0.	0.	0.	0.	0.
319 0.	0.	0.	0.	0.	0.
325 0.	0.	0.	0.	0.	0.
331 0.	0.	0.	0.	0.	0.
337 0.	0.	0.	0.	0.	0.
343 0.	0.	0.	0.	0.	0.
349 0.	0.	0.	0.	0.	0.
355 0.	0.	0.	0.	0.	0.
361 0.	0.	0.	0.	0.	0.
367 0.	0.	0.	0.	0.	0.
373 0.	0.	0.	0.	0.	0.
379 0.	0.	0.	0.	0.	0.
385 0.	0.	0.	0.	0.	0.
391 0.	0.	0.	0.	0.	0.
397 0.	0.	0.	0.	0.	0.
403 0.	0.	0.	0.	0.	0.

409 0.	0.	0.	0.	0.	0.
415 0.	0.	0.	0.	0.	0.
421 0.	0.	0.	0.	0.	0.
427 0.	0.	0.	0.	0.	0.
433 0.	0.	0.	0.	0.	0.
439 0.	0.	0.	0.	0.	0.
445 0.09999999E 01	0.	0.	0.	0.	0.
451 0.	0.	0.	0.	0.	0.
457 0.	0.	0.	0.83000000E 04	0.15000000E 01	0.18000000E 05
463 0.48000000E-02	0.	0.64410566E-02	0.	0.23933309E 01	0.
469 0.	0.	0.	0.	0.	0.
475 0.	0.	0.	0.	0.	0.
481 0.36302999E-01	0.61589959E-01	0.	0.	0.	0.79999999E-01
487 0.31699999E 03	0.64410566E-02	0.09999999E 01	0.	0.	0.
493 0.90000000E 00	0.09999999E 04	0.	0.	0.	0.09999999E 01
499 0.	0.				

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
0.	2.1300E 02	10.0000E-04	-6.9078E 00	0.	2.4086E 00	0.	-0.	0.
10.0000E-06	2.1300E 02	1.0021E-03	-6.9056E 00	1.0011E-08	2.4086E 00	1.3614E-07	-0.	0.
3.0000E-05	2.1300E 02	1.0064E-03	-6.9014E 00	3.0096E-08	2.4086E 00	4.0931E-07	-0.	0.
7.0000E-05	2.1300E 02	1.0150E-03	-6.8928E 00	7.0524E-08	2.4086E 00	9.5913E-07	-0.	0.
1.5000E-04	2.1300E 02	1.0325E-03	-6.8758E 00	1.5242E-07	2.4086E 00	2.0729E-06	-0.	0.
3.1000E-04	2.1299E 02	1.0683E-03	-6.8417E 00	3.2046E-07	2.4086E 00	4.3583E-06	-0.	0.
6.3000E-04	2.1295E 02	1.1436E-03	-6.7736E 00	6.7420E-07	2.4086E 00	9.1691E-06	-0.	0.
9.5000E-04	2.1295E 02	1.2242E-03	-6.7054E 00	1.0529E-06	2.4086E 00	1.4319E-05	-0.	0.
1.2700E-03	2.1295E 02	1.3106E-03	-6.6373E 00	1.4583E-06	2.4086E 00	1.9832E-05	-0.	0.
1.5900E-03	2.1295E 02	1.4030E-03	-6.5692E 00	1.8922E-06	2.4086E 00	2.5734E-05	-0.	0.
1.9100E-03	2.1295E 02	1.5019E-03	-6.5010E 00	2.3568E-06	2.4086E 00	3.2053E-05	-0.	0.
2.2300E-03	2.1295E 02	1.6078E-03	-6.4329E 00	2.8541E-06	2.4086E 00	3.8816E-05	-0.	0.
2.5500E-03	2.1295E 02	1.7212E-03	-6.3647E 00	3.3865E-06	2.4086E 00	4.6057E-05	-0.	0.
2.8700E-03	2.1295E 02	1.8426E-03	-6.2966E 00	3.9565E-06	2.4086E 00	5.3808E-05	-0.	0.
3.1900E-03	2.1295E 02	1.9725E-03	-6.2284E 00	4.5666E-06	2.4086E 00	6.2106E-05	-0.	0.
3.5100E-03	2.1295E 02	2.1116E-03	-6.1603E 00	5.2198E-06	2.4086E 00	7.0989E-05	-0.	0.
3.8300E-03	2.1295E 02	2.2605E-03	-6.0921E 00	5.9190E-06	2.4086E 00	8.0499E-05	-0.	0.
4.1500E-03	2.1295E 02	2.4200E-03	-6.0240E 00	6.6676E-06	2.4086E 00	9.0679E-05	-0.	0.
4.4700E-03	2.1295E 02	2.5906E-03	-5.9559E 00	7.4689E-06	2.4086E 00	1.0158E-04	-0.	0.
4.7900E-03	2.1295E 02	2.7733E-03	-5.8877E 00	8.3267E-06	2.4086E 00	1.1324E-04	-0.	0.
5.1100E-03	2.1295E 02	2.9689E-03	-5.8196E 00	9.2451E-06	2.4086E 00	1.2573E-04	-0.	0.
5.4300E-03	2.1295E 02	3.1782E-03	-5.7514E 00	1.0228E-05	2.4086E 00	1.3910E-04	-0.	0.
5.7500E-03	2.1295E 02	3.4023E-03	-5.6833E 00	1.1281E-05	2.4086E 00	1.5342E-04	-0.	0.
6.0700E-03	2.1295E 02	3.6423E-03	-5.6151E 00	1.2407E-05	2.4086E 00	1.6874E-04	-0.	0.
6.3900E-03	2.1295E 02	3.8991E-03	-5.5470E 00	1.3613E-05	2.4086E 00	1.8514E-04	-0.	0.
6.7100E-03	2.1295E 02	4.1741E-03	-5.4789E 00	1.4904E-05	2.4086E 00	2.0270E-04	-0.	0.
7.0300E-03	2.1295E 02	4.4684E-03	-5.4107E 00	1.6287E-05	2.4086E 00	2.2150E-04	-0.	0.
7.3500E-03	2.1295E 02	4.7835E-03	-5.3426E 00	1.7766E-05	2.4086E 00	2.4162E-04	-0.	0.
7.6700E-03	2.1295E 02	5.1209E-03	-5.2744E 00	1.9350E-05	2.4086E 00	2.6316E-04	-0.	0.
7.9900E-03	2.1295E 02	5.4820E-03	-5.2063E 00	2.1046E-05	2.4086E 00	2.8622E-04	-0.	0.
8.3100E-03	2.1295E 02	5.8686E-03	-5.1381E 00	2.2861E-05	2.4086E 00	3.1091E-04	-0.	0.
8.6300E-03	2.1295E 02	6.2824E-03	-5.0700E 00	2.4804E-05	2.4086E 00	3.3734E-04	-0.	0.
8.9500E-03	2.1295E 02	6.7254E-03	-5.0019E 00	2.6885E-05	2.4086E 00	3.6563E-04	-0.	0.
9.2700E-03	2.1295E 02	7.1997E-03	-4.9337E 00	2.9112E-05	2.4086E 00	3.9592E-04	-0.	0.
9.5900E-03	2.1295E 02	7.7074E-03	-4.8656E 00	3.1496E-05	2.4086E 00	4.2834E-04	-0.	0.
9.9100E-03	2.1295E 02	8.2509E-03	-4.7974E 00	3.4048E-05	2.4086E 00	4.6305E-04	-0.	0.
1.0230E-02	2.1294E 02	8.8327E-03	-4.7293E 00	3.6780E-05	2.4086E 00	5.0021E-04	-0.	0.
1.0550E-02	2.1294E 02	9.4556E-03	-4.6611E 00	3.9705E-05	2.4086E 00	5.3999E-04	-0.	0.
1.0870E-02	2.1294E 02	1.0122E-02	-4.5930E 00	4.2836E-05	2.4086E 00	5.8257E-04	-0.	0.
1.1190E-02	2.1294E 02	1.0836E-02	-4.5249E 00	4.6188E-05	2.4086E 00	6.2815E-04	-0.	0.

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
1.1510E-02	2.1294E 02	1.1600E-02	-4.4567E 00	4.9776E-05	2.4086E 00	6.7695E-04	-0.	0.
1.1830E-02	2.1294E 02	1.2418E-02	-4.3886E 00	5.3617E-05	2.4086E 00	7.2919E-04	-0.	0.
1.2150E-02	2.1294E 02	1.3294E-02	-4.3204E 00	5.7729E-05	2.4086E 00	7.8512E-04	-0.	0.
1.2470E-02	2.1294E 02	1.4232E-02	-4.2523E 00	6.2131E-05	2.4086E 00	8.4499E-04	-0.	0.
1.2790E-02	2.1294E 02	1.5235E-02	-4.1842E 00	6.6844E-05	2.4086E 00	9.0908E-04	-0.	0.
1.3110E-02	2.1294E 02	1.6309E-02	-4.1160E 00	7.1889E-05	2.4086E 00	9.7769E-04	-0.	0.
1.3430E-02	2.1294E 02	1.7459E-02	-4.0479E 00	7.7289E-05	2.4086E 00	1.0511E-03	-0.	0.
1.3750E-02	2.1294E 02	1.8691E-02	-3.9797E 00	8.3071E-05	2.4086E 00	1.1298E-03	-0.	0.
1.4070E-02	2.1294E 02	2.0009E-02	-3.9116E 00	8.9260E-05	2.4086E 00	1.2139E-03	-0.	0.
1.4390E-02	2.1294E 02	2.1420E-02	-3.8435E 00	9.5885E-05	2.4086E 00	1.3040E-03	-0.	0.
1.4710E-02	2.1294E 02	2.2930E-02	-3.7753E 00	1.0298E-04	2.4086E 00	1.4005E-03	-0.	0.
1.5030E-02	2.1294E 02	2.4547E-02	-3.7072E 00	1.1057E-04	2.4086E 00	1.5038E-03	-0.	0.
1.5350E-02	2.1294E 02	2.6278E-02	-3.6390E 00	1.1870E-04	2.4086E 00	1.6143E-03	-0.	0.
1.5670E-02	2.1294E 02	2.8131E-02	-3.5709E 00	1.2740E-04	2.4086E 00	1.7326E-03	-0.	0.
1.5990E-02	2.1293E 02	3.0114E-02	-3.5028E 00	1.3672E-04	2.4086E 00	1.8593E-03	-0.	0.
1.6310E-02	2.1293E 02	3.2238E-02	-3.4346E 00	1.4669E-04	2.4086E 00	1.9949E-03	-0.	0.
1.6630E-02	2.1293E 02	3.4511E-02	-3.3665E 00	1.5736E-04	2.4086E 00	2.1401E-03	-0.	0.
1.6950E-02	2.1293E 02	3.6945E-02	-3.2983E 00	1.6879E-04	2.4085E 00	2.2955E-03	-0.	0.
1.7270E-02	2.1293E 02	3.9550E-02	-3.2302E 00	1.8102E-04	2.4085E 00	2.4619E-03	-0.	0.
1.7590E-02	2.1293E 02	4.2338E-02	-3.1621E 00	1.9412E-04	2.4085E 00	2.6400E-03	-0.	0.
1.7910E-02	2.1293E 02	4.5324E-02	-3.0939E 00	2.0814E-04	2.4085E 00	2.8307E-03	-0.	0.
1.8230E-02	2.1292E 02	4.8519E-02	-3.0258E 00	2.2315E-04	2.4085E 00	3.0348E-03	-0.	0.
1.8550E-02	2.1292E 02	5.1941E-02	-2.9577E 00	2.3921E-04	2.4085E 00	3.2533E-03	-0.	0.
1.8870E-02	2.1292E 02	5.5603E-02	-2.8895E 00	2.5641E-04	2.4085E 00	3.4872E-03	-0.	0.
1.9190E-02	2.1292E 02	5.9523E-02	-2.8214E 00	2.7482E-04	2.4085E 00	3.7376E-03	-0.	0.
1.9510E-02	2.1292E 02	6.3720E-02	-2.7533E 00	2.9453E-04	2.4085E 00	4.0057E-03	-0.	0.
1.9830E-02	2.1292E 02	6.8213E-02	-2.6851E 00	3.1563E-04	2.4085E 00	4.2926E-03	-0.	0.
2.0150E-02	2.1291E 02	7.3022E-02	-2.6170E 00	3.3822E-04	2.4085E 00	4.5998E-03	-0.	0.
2.0470E-02	2.1291E 02	7.8171E-02	-2.5489E 00	3.6240E-04	2.4084E 00	4.9287E-03	-0.	0.
2.0790E-02	2.1291E 02	8.3682E-02	-2.4807E 00	3.8829E-04	2.4084E 00	5.2807E-03	-0.	0.
2.1110E-02	2.1290E 02	8.9582E-02	-2.4126E 00	4.1600E-04	2.4084E 00	5.6575E-03	-0.	0.
2.1430E-02	2.1290E 02	9.5898E-02	-2.3445E 00	4.4566E-04	2.4084E 00	6.0610E-03	-0.	0.
2.1750E-02	2.1290E 02	1.0266E-01	-2.2763E 00	4.7741E-04	2.4084E 00	6.4928E-03	-0.	0.
2.2070E-02	2.1289E 02	1.0990E-01	-2.2082E 00	5.1141E-04	2.4084E 00	6.9551E-03	-0.	0.
2.2390E-02	2.1289E 02	1.1764E-01	-2.1401E 00	5.4780E-04	2.4083E 00	7.4500E-03	-0.	0.
2.2710E-02	2.1289E 02	1.2594E-01	-2.0720E 00	5.8675E-04	2.4083E 00	7.9798E-03	-0.	0.
2.3030E-02	2.1288E 02	1.3482E-01	-2.0038E 00	6.2845E-04	2.4083E 00	8.5470E-03	-0.	0.
2.3350E-02	2.1288E 02	1.4432E-01	-1.9357E 00	6.7310E-04	2.4083E 00	9.1541E-03	-0.	0.
2.3670E-02	2.1287E 02	1.5449E-01	-1.8676E 00	7.2088E-04	2.4083E 00	9.8040E-03	-0.	0.
2.3990E-02	2.1287E 02	1.6538E-01	-1.7995E 00	7.7204E-04	2.4082E 00	1.0500E-02	-0.	0.

Appendix II
p. 39

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
2.4310E-02	2.1286E 02	1.7704E-01	-1.7314E 00	8.2680E-04	2.4082E 00	1.1245E-02	-0.	0.
2.4630E-02	2.1285E 02	1.8952E-01	-1.6633E 00	8.8543E-04	2.4082E 00	1.2042E-02	-0.	0.
2.4950E-02	2.1285E 02	2.0288E-01	-1.5951E 00	9.4818E-04	2.4081E 00	1.2895E-02	-0.	0.
2.5270E-02	2.1284E 02	2.1718E-01	-1.5270E 00	1.0154E-03	2.4081E 00	1.3809E-02	-0.	0.
2.5590E-02	2.1283E 02	2.3248E-01	-1.4589E 00	1.0873E-03	2.4081E 00	1.4787E-02	-0.	0.
2.5910E-02	2.1282E 02	2.4887E-01	-1.3908E 00	1.1643E-03	2.4080E 00	1.5834E-02	-0.	0.
2.6230E-02	2.1282E 02	2.6641E-01	-1.3227E 00	1.2467E-03	2.4080E 00	1.6955E-02	-0.	0.
2.6550E-02	2.1281E 02	2.8518E-01	-1.2546E 00	1.3349E-03	2.4079E 00	1.8154E-02	-0.	0.
2.6870E-02	2.1280E 02	3.0528E-01	-1.1865E 00	1.4293E-03	2.4079E 00	1.9439E-02	-0.	0.
2.7190E-02	2.1279E 02	3.2679E-01	-1.1184E 00	1.5304E-03	2.4078E 00	2.0813E-02	-0.	0.
2.7510E-02	2.1277E 02	3.4981E-01	-1.0504E 00	1.6386E-03	2.4078E 00	2.2285E-02	-0.	0.
2.7830E-02	2.1276E 02	3.7446E-01	-9.8227E-01	1.7544E-03	2.4077E 00	2.3860E-02	-0.	0.
2.8150E-02	2.1275E 02	4.0084E-01	-9.1419E-01	1.8784E-03	2.4076E 00	2.5547E-02	-0.	0.
2.8470E-02	2.1273E 02	4.2908E-01	-8.4612E-01	2.0111E-03	2.4076E 00	2.7352E-02	-0.	0.
2.8790E-02	2.1272E 02	4.5930E-01	-7.7805E-01	2.1532E-03	2.4075E 00	2.9284E-02	-0.	0.
2.9110E-02	2.1270E 02	4.9165E-01	-7.0998E-01	2.3053E-03	2.4074E 00	3.1352E-02	-0.	0.
2.9430E-02	2.1269E 02	5.2628E-01	-6.4192E-01	2.4681E-03	2.4073E 00	3.3566E-02	-0.	0.
2.9750E-02	2.1267E 02	5.6334E-01	-5.7387E-01	2.6424E-03	2.4072E 00	3.5936E-02	-0.	0.
3.0070E-02	2.1265E 02	6.0301E-01	-5.0582E-01	2.8289E-03	2.4071E 00	3.8473E-02	-0.	0.
3.0390E-02	2.1263E 02	6.4547E-01	-4.3778E-01	3.0286E-03	2.4070E 00	4.1188E-02	-0.	0.
3.0710E-02	2.1260E 02	6.9091E-01	-3.6975E-01	3.2423E-03	2.4069E 00	4.4095E-02	-0.	0.
3.1030E-02	2.1258E 02	7.3954E-01	-3.0172E-01	3.4711E-03	2.4068E 00	4.7206E-02	-0.	0.
3.1350E-02	2.1255E 02	7.9159E-01	-2.3371E-01	3.7159E-03	2.4067E 00	5.0537E-02	-0.	0.
3.1670E-02	2.1252E 02	8.4730E-01	-1.6570E-01	3.9780E-03	2.4065E 00	5.4101E-02	-0.	0.
3.1990E-02	2.1249E 02	9.0692E-01	-9.7702E-02	4.2586E-03	2.4064E 00	5.7917E-02	-0.	0.
3.2310E-02	2.1246E 02	9.7072E-01	-2.9714E-02	4.5589E-03	2.4062E 00	6.2001E-02	-0.	0.
3.2630E-02	2.1243E 02	1.0390E 00	3.8263E-02	4.8803E-03	2.4061E 00	6.6372E-02	-0.	0.
3.2950E-02	2.1239E 02	1.1121E 00	1.0623E-01	5.2243E-03	2.4059E 00	7.1050E-02	-0.	0.
3.3270E-02	2.1235E 02	1.1903E 00	1.7418E-01	5.5925E-03	2.4057E 00	7.6058E-02	-0.	0.
3.3590E-02	2.1231E 02	1.2739E 00	2.4212E-01	5.9866E-03	2.4055E 00	8.1418E-02	-0.	0.
3.3910E-02	2.1226E 02	1.3635E 00	3.1004E-01	6.4084E-03	2.4052E 00	8.7154E-02	-0.	0.
3.4230E-02	2.1222E 02	1.4593E 00	3.7795E-01	6.8598E-03	2.4050E 00	9.3294E-02	-0.	0.
3.4550E-02	2.1216E 02	1.5618E 00	4.4585E-01	7.3430E-03	2.4048E 00	9.9865E-02	-0.	0.
3.4870E-02	2.1211E 02	1.6715E 00	5.1372E-01	7.8601E-03	2.4045E 00	1.0690E-01	-0.	0.
3.5190E-02	2.1205E 02	1.7889E 00	5.8158E-01	8.4135E-03	2.4042E 00	1.1442E-01	-0.	0.
3.5510E-02	2.1199E 02	1.9144E 00	6.4941E-01	9.0058E-03	2.4039E 00	1.2248E-01	-0.	0.
3.5830E-02	2.1192E 02	2.0487E 00	7.1723E-01	9.6396E-03	2.4035E 00	1.3110E-01	-0.	0.
3.6150E-02	2.1185E 02	2.1924E 00	7.8502E-01	1.0318E-02	2.4032E 00	1.4032E-01	-0.	0.
3.6470E-02	2.1177E 02	2.3462E 00	8.5279E-01	1.1044E-02	2.4028E 00	1.5019E-01	-0.	0.
3.6790E-02	2.1169E 02	2.5106E 00	9.2053E-01	1.1820E-02	2.4024E 00	1.6076E-01	-0.	0.

Appendix II
p. 40

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
3.7110E-02	2.1160E 02	2.6865E 00	9.8824E-01	1.2652E-02	2.4019E 00	1.7206E-01	-0.	0.
3.7430E-02	2.1150E 02	2.8746E 00	1.0559E 00	1.3541E-02	2.4015E 00	1.8416E-01	-0.	0.
3.7750E-02	2.1140E 02	3.0758E 00	1.1236E 00	1.4493E-02	2.4010E 00	1.9710E-01	-0.	0.
3.8070E-02	2.1129E 02	3.2910E 00	1.1912E 00	1.5511E-02	2.4004E 00	2.1095E-01	-0.	0.
3.8390E-02	2.1118E 02	3.5210E 00	1.2588E 00	1.6600E-02	2.3998E 00	2.2576E-01	-0.	0.
3.8710E-02	2.1105E 02	3.7671E 00	1.3263E 00	1.7766E-02	2.3992E 00	2.4162E-01	-0.	0.
3.9030E-02	2.1092E 02	4.0301E 00	1.3938E 00	1.9013E-02	2.3986E 00	2.5857E-01	-0.	0.
3.9350E-02	2.1078E 02	4.3113E 00	1.4612E 00	2.0347E-02	2.3979E 00	2.7672E-01	-0.	0.
3.9670E-02	2.1062E 02	4.6119E 00	1.5286E 00	2.1774E-02	2.3971E 00	2.9613E-01	-0.	0.
3.9990E-02	2.1046E 02	4.9332E 00	1.5960E 00	2.3301E-02	2.3963E 00	3.1689E-01	-0.	0.
4.0310E-02	2.1029E 02	5.2766E 00	1.6633E 00	2.4933E-02	2.3954E 00	3.3909E-01	-0.	0.
4.0630E-02	2.1010E 02	5.6435E 00	1.7305E 00	2.6680E-02	2.3945E 00	3.6285E-01	-0.	0.
4.0950E-02	2.0990E 02	6.0356E 00	1.7977E 00	2.8548E-02	2.3935E 00	3.8825E-01	-0.	0.
4.1270E-02	2.0969E 02	6.4545E 00	1.8648E 00	3.0545E-02	2.3924E 00	4.1541E-01	-0.	0.
4.1590E-02	2.0946E 02	6.9019E 00	1.9318E 00	3.2681E-02	2.3913E 00	4.4446E-01	-0.	0.
4.1910E-02	2.0921E 02	7.3798E 00	1.9987E 00	3.4965E-02	2.3901E 00	4.7553E-01	-0.	0.
4.2230E-02	2.0895E 02	7.8901E 00	2.0656E 00	3.7407E-02	2.3888E 00	5.0874E-01	-0.	0.
4.2550E-02	2.0867E 02	8.4350E 00	2.1324E 00	4.0018E-02	2.3874E 00	5.4425E-01	-0.	0.
4.2870E-02	2.0837E 02	9.0166E 00	2.1991E 00	4.2809E-02	2.3859E 00	5.8221E-01	-0.	0.
4.3190E-02	2.0806E 02	9.6373E 00	2.2656E 00	4.5793E-02	2.3843E 00	6.2278E-01	-0.	0.
4.3510E-02	2.0771E 02	1.0300E 01	2.3321E 00	4.8981E-02	2.3826E 00	6.6615E-01	-0.	0.
4.3830E-02	2.0735E 02	1.1006E 01	2.3985E 00	5.2389E-02	2.3808E 00	7.1249E-01	-0.	0.
4.4150E-02	2.0696E 02	1.1760E 01	2.4647E 00	5.6030E-02	2.3789E 00	7.6201E-01	-0.	0.
4.4470E-02	2.0654E 02	1.2563E 01	2.5308E 00	5.9920E-02	2.3768E 00	8.1491E-01	-0.	0.
4.4790E-02	2.0610E 02	1.3420E 01	2.5967E 00	6.4076E-02	2.3746E 00	8.7143E-01	-0.	0.
4.5110E-02	2.0562E 02	1.4333E 01	2.6625E 00	6.8514E-02	2.3722E 00	9.3179E-01	-0.	0.
4.5430E-02	2.0512E 02	1.5305E 01	2.7282E 00	7.3254E-02	2.3697E 00	9.9626E-01	-0.	0.
4.5750E-02	2.0457E 02	1.6340E 01	2.7936E 00	7.8315E-02	2.3670E 00	1.0651E 00	-0.	0.
4.6070E-02	2.0400E 02	1.7443E 01	2.8589E 00	8.3719E-02	2.3641E 00	1.1386E 00	-0.	0.
4.6390E-02	2.0338E 02	1.8616E 01	2.9240E 00	8.9486E-02	2.3610E 00	1.2170E 00	-0.	0.
4.6710E-02	2.0272E 02	1.9863E 01	2.9889E 00	9.5640E-02	2.3577E 00	1.3007E 00	-0.	0.
4.7030E-02	2.0201E 02	2.1190E 01	3.0535E 00	1.0221E-01	2.3541E 00	1.3900E 00	-0.	0.
4.7350E-02	2.0126E 02	2.2599E 01	3.1179E 00	1.0921E-01	2.3504E 00	1.4852E 00	-0.	0.
4.7670E-02	2.0046E 02	2.4097E 01	3.1821E 00	1.1668E-01	2.3464E 00	1.5868E 00	-0.	0.
4.7990E-02	1.9961E 02	2.5686E 01	3.2459E 00	1.2464E-01	2.3421E 00	1.6951E 00	-0.	0.
4.8310E-02	1.9870E 02	2.7372E 01	3.3095E 00	1.3313E-01	2.3375E 00	1.8105E 00	-0.	0.
4.8630E-02	1.9773E 02	2.9160E 01	3.3728E 00	1.4217E-01	2.3326E 00	1.9335E 00	-0.	0.
4.8950E-02	1.9669E 02	3.1054E 01	3.4357E 00	1.5180E-01	2.3274E 00	2.0645E 00	-0.	0.
4.9270E-02	1.9559E 02	3.3060E 01	3.4983E 00	1.6205E-01	2.3218E 00	2.2039E 00	-0.	0.
4.9590E-02	1.9442E 02	3.5182E 01	3.5605E 00	1.7297E-01	2.3159E 00	2.3524E 00	-0.	0.

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
4.9910E-02	1.9317E 02	3.7426E 01	3.6224E 00	1.8458E-01	2.3096E 00	2.5103E 00	-0.	0.
5.0230E-02	1.9184E 02	3.9795E 01	3.6837E 00	1.9693E-01	2.3029E 00	2.6783E 00	-0.	0.
5.0550E-02	1.9043E 02	4.2296E 01	3.7447E 00	2.1006E-01	2.2957E 00	2.8569E 00	-0.	0.
5.0870E-02	1.8893E 02	4.4932E 01	3.8051E 00	2.2401E-01	2.2880E 00	3.0466E 00	-0.	0.
5.1190E-02	1.8733E 02	4.7707E 01	3.8651E 00	2.3883E-01	2.2799E 00	3.2481E 00	-0.	0.
5.1510E-02	1.8564E 02	5.0627E 01	3.9245E 00	2.5456E-01	2.2713E 00	3.4620E 00	-0.	0.
5.1830E-02	1.8384E 02	5.3695E 01	3.9833E 00	2.7125E-01	2.2621E 00	3.6890E 00	-0.	0.
5.2150E-02	1.8193E 02	5.6914E 01	4.0415E 00	2.8894E-01	2.2523E 00	3.9296E 00	-0.	0.
5.2470E-02	1.7991E 02	6.0287E 01	4.0991E 00	3.0769E-01	2.2419E 00	4.1845E 00	-0.	0.
5.2790E-02	1.7777E 02	6.3815E 01	4.1560E 00	3.2754E-01	2.2309E 00	4.4545E 00	-0.	0.
5.3110E-02	1.7550E 02	6.7502E 01	4.2122E 00	3.4854E-01	2.2192E 00	4.7402E 00	-0.	0.
5.3430E-02	1.7310E 02	7.1347E 01	4.2675E 00	3.7075E-01	2.2068E 00	5.0422E 00	-0.	0.
5.3750E-02	1.7057E 02	7.5349E 01	4.3221E 00	3.9422E-01	2.1936E 00	5.3614E 00	-0.	0.
5.4070E-02	1.6789E 02	7.9508E 01	4.3759E 00	4.1899E-01	2.1796E 00	5.6983E 00	-0.	0.
5.4390E-02	1.6507E 02	8.3821E 01	4.4287E 00	4.4512E-01	2.1649E 00	6.0536E 00	-0.	0.
5.4710E-02	1.6209E 02	8.8283E 01	4.4805E 00	4.7265E-01	2.1492E 00	6.4280E 00	-0.	0.
5.5030E-02	1.5896E 02	9.2890E 01	4.5314E 00	5.0163E-01	2.1327E 00	6.8222E 00	-0.	0.
5.5350E-02	1.5566E 02	9.7634E 01	4.5812E 00	5.3211E-01	2.1153E 00	7.2367E 00	-0.	0.
5.5670E-02	1.5220E 02	1.0251E 02	4.6299E 00	5.6413E-01	2.0968E 00	7.6721E 00	-0.	0.
5.5990E-02	1.4857E 02	1.0750E 02	4.6775E 00	5.9772E-01	2.0774E 00	8.1291E 00	-0.	0.
5.6310E-02	1.4476E 02	1.1260E 02	4.7238E 00	6.3294E-01	2.0570E 00	8.6079E 00	-0.	0.
5.6630E-02	1.4078E 02	1.1778E 02	4.7688E 00	6.6979E-01	2.0354E 00	9.1092E 00	-0.	0.
5.6950E-02	1.3662E 02	1.2305E 02	4.8126E 00	7.0832E-01	2.0128E 00	9.6332E 00	-0.	0.
5.7270E-02	1.3228E 02	1.2837E 02	4.8549E 00	7.4854E-01	1.9891E 00	1.0180E 01	-0.	0.
5.7590E-02	1.2776E 02	1.3372E 02	4.8958E 00	7.9048E-01	1.9642E 00	1.0750E 01	-0.	0.
5.7910E-02	1.2306E 02	1.3909E 02	4.9352E 00	8.3413E-01	1.9381E 00	1.1344E 01	-0.	0.
5.8230E-02	1.1818E 02	1.4446E 02	4.9730E 00	8.7949E-01	1.9108E 00	1.1961E 01	-1.6365E-04	2.5166E 00
5.8550E-02	1.1311E 02	1.4978E 02	5.0092E 00	9.2657E-01	1.8822E 00	1.2601E 01	-1.5155E-04	2.4836E 00
5.8710E-02	1.0914E 02	1.5242E 02	5.0266E 00	9.5075E-01	1.8671E 00	1.2930E 01	-5.1624E-04	4.6366E 00
5.8870E-02	1.0629E 02	1.5503E 02	5.0436E 00	9.7534E-01	1.8513E 00	1.3265E 01	-1.3344E-03	6.7175E 00
5.9030E-02	1.0322E 02	1.5761E 02	5.0602E 00	1.0004E 00	1.8345E 00	1.3605E 01	-2.8111E-03	8.7287E 00
5.9190E-02	9.9884E 01	1.6015E 02	5.0761E 00	1.0258E 00	1.8165E 00	1.3951E 01	-5.1449E-03	1.0672E 01
5.9350E-02	9.6232E 01	1.6264E 02	5.0915E 00	1.0516E 00	1.7972E 00	1.4302E 01	-8.5273E-03	1.2551E 01
5.9510E-02	9.2228E 01	1.6506E 02	5.1063E 00	1.0778E 00	1.7764E 00	1.4658E 01	-1.3144E-02	1.4367E 01
5.9670E-02	8.7842E 01	1.6739E 02	5.1203E 00	1.1044E 00	1.7538E 00	1.5020E 01	-1.9173E-02	1.6122E 01
5.9830E-02	8.3044E 01	1.6963E 02	5.1336E 00	1.1314E 00	1.7294E 00	1.5387E 01	-2.6788E-02	1.7818E 01
5.9990E-02	7.7813E 01	1.7176E 02	5.1461E 00	1.1587E 00	1.7029E 00	1.5758E 01	-3.6157E-02	1.9457E 01
6.0150E-02	7.2129E 01	1.7375E 02	5.1576E 00	1.1863E 00	1.6743E 00	1.6134E 01	-4.7441E-02	2.1041E 01
6.0310E-02	6.5976E 01	1.7559E 02	5.1682E 00	1.2143E 00	1.6433E 00	1.6514E 01	-6.0795E-02	2.2572E 01
6.0470E-02	5.9342E 01	1.7727E 02	5.1777E 00	1.2425E 00	1.6099E 00	1.6898E 01	-7.6372E-02	2.4052E 01

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
6.0630E-02	5.2217E 01	1.7876E 02	5.1860E 00	1.2710E 00	1.5738E 00	1.7286E 01	-9.4317E-02	2.5483E 01
6.0790E-02	4.4596E 01	1.8004E 02	5.1932E 00	1.2997E 00	1.5351E 00	1.7676E 01	-1.1477E-01	2.6865E 01
6.0950E-02	3.6474E 01	1.8109E 02	5.1990E 00	1.3286E 00	1.4935E 00	1.8069E 01	-1.3787E-01	2.8201E 01
6.1110E-02	2.7852E 01	1.8190E 02	5.2035E 00	1.3576E 00	1.4489E 00	1.8464E 01	-1.6375E-01	2.9492E 01
6.1270E-02	1.8733E 01	1.8245E 02	5.2065E 00	1.3868E 00	1.4014E 00	1.8860E 01	-1.9253E-01	3.0741E 01
6.1430E-02	9.1223E 00	1.8271E 02	5.2079E 00	1.4160E 00	1.3506E 00	1.9258E 01	-2.2434E-01	3.1947E 01
6.1590E-02	-9.7209E-01	1.8268E 02	5.2078E 00	1.4452E 00	1.2967E 00	1.9655E 01	-2.5930E-01	3.3113E 01
6.1750E-02	-1.1538E 01	1.8235E 02	5.2059E 00	1.4745E 00	1.2394E 00	2.0053E 01	-2.9751E-01	3.4239E 01
6.1910E-02	-2.2562E 01	1.8169E 02	5.2023E 00	1.5036E 00	1.1788E 00	2.0449E 01	-3.3910E-01	3.5328E 01
6.2070E-02	-3.4025E 01	1.8070E 02	5.1969E 00	1.5326E 00	1.1146E 00	2.0843E 01	-3.8418E-01	3.6381E 01
6.2230E-02	-4.5910E 01	1.7938E 02	5.1895E 00	1.5614E 00	1.0470E 00	2.1235E 01	-4.3283E-01	3.7398E 01
6.2390E-02	-5.8193E 01	1.7772E 02	5.1802E 00	1.5900E 00	9.7570E-01	2.1623E 01	-4.8517E-01	3.8381E 01
6.2550E-02	-7.0849E 01	1.7572E 02	5.1689E 00	1.6182E 00	9.0079E-01	2.2008E 01	-5.4129E-01	3.9331E 01
6.2710E-02	-8.3851E 01	1.7337E 02	5.1554E 00	1.6462E 00	8.2217E-01	2.2388E 01	-6.0128E-01	4.0250E 01
6.2870E-02	-9.7168E 01	1.7070E 02	5.1399E 00	1.6737E 00	7.3978E-01	2.2762E 01	-6.6524E-01	4.1137E 01
6.3030E-02	-1.1077E 02	1.6770E 02	5.1222E 00	1.7008E 00	6.5359E-01	2.3131E 01	-7.3326E-01	4.1995E 01
6.3190E-02	-1.2462E 02	1.6439E 02	5.1022E 00	1.7273E 00	5.6353E-01	2.3492E 01	-8.0541E-01	4.2824E 01
6.3350E-02	-1.3869E 02	1.6078E 02	5.0800E 00	1.7534E 00	4.6957E-01	2.3846E 01	-8.8178E-01	4.3626E 01
6.3510E-02	-1.5294E 02	1.5690E 02	5.0556E 00	1.7788E 00	3.7166E-01	2.4191E 01	-9.6245E-01	4.4400E 01
6.3670E-02	-1.6732E 02	1.5275E 02	5.0288E 00	1.8036E 00	2.6976E-01	2.4528E 01	-1.0475E 00	4.5149E 01
6.3830E-02	-1.8181E 02	1.4837E 02	4.9997E 00	1.8277E 00	1.6383E-01	2.4856E 01	-1.1370E 00	4.5872E 01
6.3990E-02	-1.9635E 02	1.4378E 02	4.9683E 00	1.8510E 00	5.3816E-02	2.5174E 01	-1.2310E 00	4.6572E 01
6.4150E-02	-2.1092E 02	1.3901E 02	4.9346E 00	1.8737E 00	-6.0315E-02	2.5482E 01	-1.3296E 00	4.7247E 01
6.4310E-02	-2.2546E 02	1.3409E 02	4.8985E 00	1.8955E 00	-1.7861E-01	2.5779E 01	-1.4329E 00	4.7901E 01
6.4470E-02	-2.3995E 02	1.2904E 02	4.8601E 00	1.9166E 00	-3.0111E-01	2.6065E 01	-1.5408E 00	4.8532E 01
6.4630E-02	-2.5433E 02	1.2389E 02	4.8194E 00	1.9368E 00	-4.2787E-01	2.6340E 01	-1.6536E 00	4.9142E 01
6.4790E-02	-2.6857E 02	1.1868E 02	4.7764E 00	1.9562E 00	-5.5893E-01	2.6604E 01	-1.7712E 00	4.9732E 01
6.4950E-02	-2.8263E 02	1.1343E 02	4.7312E 00	1.9748E 00	-6.9434E-01	2.6857E 01	-1.8937E 00	5.0302E 01
6.5110E-02	-2.9648E 02	1.0818E 02	4.6838E 00	1.9925E 00	-8.3415E-01	2.7098E 01	-2.0212E 00	5.0852E 01
6.5270E-02	-3.1008E 02	1.0294E 02	4.6342E 00	2.0094E 00	-9.7841E-01	2.7328E 01	-2.1536E 00	5.1385E 01
6.5590E-02	-3.2975E 02	9.2632E 01	4.5286E 00	2.0407E 00	-1.2801E 00	2.7753E 01	-2.4334E 00	4.9700E 01
6.5910E-02	-3.5480E 02	8.2690E 01	4.4151E 00	2.0687E 00	-1.5988E 00	2.8134E 01	-2.7324E 00	4.6495E 01
6.6230E-02	-3.7785E 02	7.3273E 01	4.2942E 00	2.0937E 00	-1.9338E 00	2.8474E 01	-3.0498E 00	4.3496E 01
6.6550E-02	-3.9858E 02	6.4499E 01	4.1666E 00	2.1157E 00	-2.2840E 00	2.8773E 01	-3.3844E 00	4.0691E 01
6.6870E-02	-4.1684E 02	5.6444E 01	4.0333E 00	2.1350E 00	-2.6484E 00	2.9036E 01	-3.7351E 00	3.8067E 01
6.7190E-02	-4.3264E 02	4.9147E 01	3.8948E 00	2.1519E 00	-3.0261E 00	2.9266E 01	-4.1008E 00	3.5612E 01
6.7350E-02	-4.4326E 02	4.5782E 01	3.8239E 00	2.1595E 00	-3.2198E 00	2.9369E 01	-4.2891E 00	3.4444E 01
6.7510E-02	-4.4943E 02	4.2605E 01	3.7520E 00	2.1665E 00	-3.4165E 00	2.9465E 01	-4.4808E 00	3.3315E 01
6.7670E-02	-4.5510E 02	3.9613E 01	3.6792E 00	2.1731E 00	-3.6162E 00	2.9554E 01	-4.6758E 00	3.2223E 01
6.7830E-02	-4.6029E 02	3.6801E 01	3.6055E 00	2.1792E 00	-3.8187E 00	2.9638E 01	-4.8740E 00	3.1166E 01

App. II
p. 43

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
6.7990E-02	-4.6503E 02	3.4162E 01	3.5311E 00	2.1849E 00	-4.0240E 00	2.9715E 01	-5.0752E 00	3.0145E 01
6.8150E-02	-4.6936E 02	3.1690E 01	3.4560E 00	2.1902E 00	-4.2320E 00	2.9786E 01	-5.2794E 00	2.9156E 01
6.8310E-02	-4.7330E 02	2.9379E 01	3.3803E 00	2.1951E 00	-4.4425E 00	2.9853E 01	-5.4865E 00	2.8201E 01
6.8470E-02	-4.7689E 02	2.7221E 01	3.3040E 00	2.1996E 00	-4.6556E 00	2.9914E 01	-5.6964E 00	2.7276E 01
6.8630E-02	-4.8015E 02	2.5208E 01	3.2272E 00	2.2038E 00	-4.8712E 00	2.9971E 01	-5.9090E 00	2.6382E 01
6.8790E-02	-4.8311E 02	2.3333E 01	3.1499E 00	2.2077E 00	-5.0891E 00	3.0024E 01	-6.1241E 00	2.5517E 01
6.8950E-02	-4.8579E 02	2.1588E 01	3.0721E 00	2.2112E 00	-5.3094E 00	3.0073E 01	-6.3418E 00	2.4680E 01
6.9110E-02	-4.8822E 02	1.9966E 01	2.9940E 00	2.2146E 00	-5.5319E 00	3.0118E 01	-6.5619E 00	2.3871E 01
6.9270E-02	-4.9042E 02	1.8459E 01	2.9156E 00	2.2176E 00	-5.7565E 00	3.0160E 01	-6.7844E 00	2.3089E 01
6.9430E-02	-4.9241E 02	1.7061E 01	2.8368E 00	2.2205E 00	-5.9833E 00	3.0199E 01	-7.0091E 00	2.2332E 01
6.9590E-02	-4.9420E 02	1.5763E 01	2.7577E 00	2.2231E 00	-6.2121E 00	3.0234E 01	-7.2361E 00	2.1600E 01
6.9750E-02	-4.9581E 02	1.4561E 01	2.6784E 00	2.2255E 00	-6.4430E 00	3.0267E 01	-7.4651E 00	2.0892E 01
6.9910E-02	-4.9726E 02	1.3448E 01	2.5988E 00	2.2278E 00	-6.6757E 00	3.0298E 01	-7.6963E 00	2.0207E 01
7.0070E-02	-4.9855E 02	1.2417E 01	2.5190E 00	2.2298E 00	-6.9103E 00	3.0326E 01	-7.9294E 00	1.9544E 01
7.0230E-02	-4.9970E 02	1.1463E 01	2.4391E 00	2.2318E 00	-7.1467E 00	3.0352E 01	-8.1645E 00	1.8903E 01
7.0390E-02	-5.0073E 02	1.0580E 01	2.3590E 00	2.2335E 00	-7.3849E 00	3.0376E 01	-8.4014E 00	1.8284E 01
7.0550E-02	-5.0163E 02	9.7641E 00	2.2787E 00	2.2351E 00	-7.6248E 00	3.0398E 01	-8.6401E 00	1.7684E 01
7.0710E-02	-5.0241E 02	9.0099E 00	2.1983E 00	2.2366E 00	-7.8663E 00	3.0418E 01	-8.8806E 00	1.7105E 01
7.0870E-02	-5.0309E 02	8.3131E 00	2.1178E 00	2.2380E 00	-8.1095E 00	3.0437E 01	-9.1227E 00	1.6544E 01
7.1030E-02	-5.0367E 02	7.6694E 00	2.0372E 00	2.2393E 00	-8.3542E 00	3.0455E 01	-9.3665E 00	1.6001E 01
7.1190E-02	-5.0415E 02	7.0751E 00	1.9566E 00	2.2405E 00	-8.6004E 00	3.0471E 01	-9.6119E 00	1.5477E 01
7.1350E-02	-5.0455E 02	6.5264E 00	1.8758E 00	2.2416E 00	-8.8481E 00	3.0485E 01	-9.8587E 00	1.4969E 01
7.1510E-02	-5.0486E 02	6.0199E 00	1.7951E 00	2.2426E 00	-9.0972E 00	3.0499E 01	-1.0107E 01	1.4479E 01
7.1670E-02	-5.0509E 02	5.5525E 00	1.7143E 00	2.2435E 00	-9.3476E 00	3.0512E 01	-1.0357E 01	1.4004E 01
7.1830E-02	-5.0524E 02	5.1214E 00	1.6334E 00	2.2444E 00	-9.5994E 00	3.0523E 01	-1.0608E 01	1.3545E 01
7.1990E-02	-5.0531E 02	4.7236E 00	1.5526E 00	2.2451E 00	-9.8525E 00	3.0534E 01	-1.0861E 01	1.3101E 01
7.2150E-02	-5.0531E 02	4.3567E 00	1.4717E 00	2.2459E 00	-1.0107E 01	3.0544E 01	-1.1114E 01	1.2671E 01
7.2310E-02	-5.0524E 02	4.0184E 00	1.3909E 00	2.2465E 00	-1.0362E 01	3.0553E 01	-1.1369E 01	1.2256E 01
7.2470E-02	-5.0510E 02	3.7064E 00	1.3101E 00	2.2472E 00	-1.0619E 01	3.0561E 01	-1.1626E 01	1.1854E 01
7.2630E-02	-5.0489E 02	3.4188E 00	1.2293E 00	2.2477E 00	-1.0877E 01	3.0569E 01	-1.1883E 01	1.1466E 01
7.2790E-02	-5.0461E 02	3.1536E 00	1.1485E 00	2.2482E 00	-1.1136E 01	3.0576E 01	-1.2142E 01	1.1090E 01
7.2950E-02	-5.0426E 02	2.9092E 00	1.0679E 00	2.2487E 00	-1.1396E 01	3.0583E 01	-1.2401E 01	1.0726E 01
7.3110E-02	-5.0384E 02	2.6838E 00	9.8725E-01	2.2492E 00	-1.1657E 01	3.0589E 01	-1.2662E 01	1.0374E 01
7.3270E-02	-5.0335E 02	2.4762E 00	9.0671E-01	2.2496E 00	-1.1919E 01	3.0594E 01	-1.2924E 01	1.0034E 01
7.3430E-02	-5.0279E 02	2.2848E 00	8.2627E-01	2.2500E 00	-1.2182E 01	3.0600E 01	-1.3186E 01	9.7054E 00
7.3590E-02	-5.0216E 02	2.1084E 00	7.4592E-01	2.2503E 00	-1.2446E 01	3.0604E 01	-1.3450E 01	9.3872E 00
7.3750E-02	-5.0145E 02	1.9458E 00	6.6569E-01	2.2506E 00	-1.2711E 01	3.0609E 01	-1.3715E 01	9.0795E 00
7.3910E-02	-5.0067E 02	1.7960E 00	5.8558E-01	2.2509E 00	-1.2976E 01	3.0613E 01	-1.3980E 01	8.7818E 00
7.4070E-02	-4.9982E 02	1.6580E 00	5.0561E-01	2.2512E 00	-1.3243E 01	3.0617E 01	-1.4247E 01	8.4939E 00
7.4230E-02	-4.9888E 02	1.5308E 00	4.2579E-01	2.2515E 00	-1.3510E 01	3.0620E 01	-1.4514E 01	8.2154E 00

App. II
p. 44

TIME, SEC	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY	TEMP	RV	PRESSURE
7.4390E-02	-4.9786E 02	1.4136E 00	3.4613E-01	2.2517E 00	-1.3778E 01	3.0623E 01	-1.4782E 01	7.9461E 00
7.4550E-02	-4.9675E 02	1.3056E 00	2.6665E-01	2.2519E 00	-1.4047E 01	3.0626E 01	-1.5051E 01	7.6856E 00
7.4710E-02	-4.9556E 02	1.2061E 00	1.8736E-01	2.2521E 00	-1.4317E 01	3.0629E 01	-1.5320E 01	7.4336E 00
7.4870E-02	-4.9427E 02	1.1144E 00	1.0828E-01	2.2523E 00	-1.4588E 01	3.0632E 01	-1.5591E 01	7.1899E 00
7.5030E-02	-4.9288E 02	1.0299E 00	2.9420E-02	2.2525E 00	-1.4859E 01	3.0634E 01	-1.5862E 01	6.9542E 00
7.5190E-02	-4.9140E 02	9.5199E-01	-4.9203E-02	2.2526E 00	-1.5130E 01	3.0636E 01	-1.6133E 01	6.7262E 00
7.5350E-02	-4.8980E 02	8.8023E-01	-1.2757E-01	2.2528E 00	-1.5403E 01	3.0638E 01	-1.6406E 01	6.5057E 00
7.5510E-02	-4.8810E 02	8.1410E-01	-2.0567E-01	2.2529E 00	-1.5676E 01	3.0640E 01	-1.6679E 01	6.2924E 00
7.5670E-02	-4.8628E 02	7.5316E-01	-2.8347E-01	2.2531E 00	-1.5950E 01	3.0642E 01	-1.6952E 01	6.0861E 00
7.5830E-02	-4.8434E 02	6.9700E-01	-3.6097E-01	2.2532E 00	-1.6224E 01	3.0643E 01	-1.7226E 01	5.8866E 00
7.5990E-02	-4.8227E 02	6.4524E-01	-4.3813E-01	2.2533E 00	-1.6499E 01	3.0645E 01	-1.7501E 01	5.6936E 00
7.6150E-02	-4.8008E 02	5.9753E-01	-5.1494E-01	2.2534E 00	-1.6774E 01	3.0646E 01	-1.7776E 01	5.5070E 00
7.6310E-02	-4.7774E 02	5.5356E-01	-5.9138E-01	2.2535E 00	-1.7050E 01	3.0647E 01	-1.8052E 01	5.3264E 00
7.6470E-02	-4.7525E 02	5.1303E-01	-6.6742E-01	2.2536E 00	-1.7327E 01	3.0648E 01	-1.8329E 01	5.1518E 00
7.6630E-02	-4.7262E 02	4.7567E-01	-7.4304E-01	2.2536E 00	-1.7604E 01	3.0649E 01	-1.8606E 01	4.9829E 00
7.6790E-02	-4.6983E 02	4.4122E-01	-8.1821E-01	2.2537E 00	-1.7881E 01	3.0650E 01	-1.8883E 01	4.8196E 00
7.6950E-02	-4.6688E 02	4.0946E-01	-8.9291E-01	2.2538E 00	-1.8159E 01	3.0651E 01	-1.9161E 01	4.6616E 00
7.7110E-02	-4.6375E 02	3.8018E-01	-9.6711E-01	2.2538E 00	-1.8438E 01	3.0652E 01	-1.9439E 01	4.5087E 00
7.7270E-02	-4.6045E 02	3.5318E-01	-1.0408E 00	2.2539E 00	-1.8716E 01	3.0653E 01	-1.9718E 01	4.3609E 00
7.7430E-02	-4.5697E 02	3.2828E-01	-1.1139E 00	2.2540E 00	-1.8996E 01	3.0654E 01	-1.9997E 01	4.2180E 00
7.7590E-02	-4.5329E 02	3.0531E-01	-1.1864E 00	2.2540E 00	-1.9275E 01	3.0654E 01	-2.0277E 01	4.0797E 00
7.7750E-02	-4.4942E 02	2.8413E-01	-1.2583E 00	2.2540E 00	-1.9555E 01	3.0655E 01	-2.0557E 01	3.9459E 00
7.7910E-02	-4.4535E 02	2.6459E-01	-1.3296E 00	2.2541E 00	-1.9836E 01	3.0656E 01	-2.0838E 01	3.8166E 00
7.8070E-02	-4.4108E 02	2.4656E-01	-1.4002E 00	2.2541E 00	-2.0117E 01	3.0656E 01	-2.1118E 01	3.6914E 00
7.8230E-02	-4.3659E 02	2.2992E-01	-1.4700E 00	2.2542E 00	-2.0398E 01	3.0657E 01	-2.1400E 01	3.5704E 00
7.8390E-02	-4.3189E 02	2.1457E-01	-1.5391E 00	2.2542E 00	-2.0679E 01	3.0657E 01	-2.1681E 01	3.4534E 00
7.8550E-02	-4.2698E 02	2.0040E-01	-1.6074E 00	2.2542E 00	-2.0961E 01	3.0658E 01	-2.1963E 01	3.3402E 00
7.8710E-02	-4.2184E 02	1.8732E-01	-1.6749E 00	2.2543E 00	-2.1244E 01	3.0658E 01	-2.2245E 01	3.2307E 00
7.8870E-02	-4.1648E 02	1.7525E-01	-1.7416E 00	2.2543E 00	-2.1526E 01	3.0658E 01	-2.2528E 01	3.1247E 00
7.9030E-02	-4.1089E 02	1.6409E-01	-1.8073E 00	2.2543E 00	-2.1809E 01	3.0659E 01	-2.2810E 01	3.0223E 00
7.9190E-02	-4.0509E 02	1.5380E-01	-1.8721E 00	2.2544E 00	-2.2092E 01	3.0659E 01	-2.3094E 01	2.9232E 00
7.9350E-02	-3.9906E 02	1.4428E-01	-1.9360E 00	2.2544E 00	-2.2376E 01	3.0660E 01	-2.3377E 01	2.8274E 00
7.9510E-02	-3.9281E 02	1.3549E-01	-1.9988E 00	2.2544E 00	-2.2659E 01	3.0660E 01	-2.3661E 01	2.7347E 00
7.9670E-02	-3.8635E 02	1.2737E-01	-2.0606E 00	2.2544E 00	-2.2943E 01	3.0660E 01	-2.3945E 01	2.6450E 00
7.9830E-02	-3.7968E 02	1.1986E-01	-2.1214E 00	2.2544E 00	-2.3227E 01	3.0660E 01	-2.4229E 01	2.5583E 00
7.9990E-02	-3.7281E 02	1.1292E-01	-2.1810E 00	2.2545E 00	-2.3512E 01	3.0661E 01	-2.4513E 01	2.4745E 00
8.0150E-02	-3.6575E 02	1.0651E-01	-2.2396E 00	2.2545E 00	-2.3797E 01	3.0661E 01	-2.4798E 01	2.3933E 00

	TIME	OMEGA	POWER	LN POWER	ENERGY	REACTIVITY
MINIMUM	0.	-5.0531E 02	10.0000E-04	-6.9078E 00	0.	-2.3797E 01
MAXIMUM	8.0150E-02	2.1300E 02	1.8271E 02	5.2079E 00	2.2545E 00	2.4086E 00
SCALE FACTOR	8.0155E-02	5.0534E 02	1.8272E 02	6.9082E 00	2.2546E 00	2.3797E 01

CORE 3, REACTOR PERIOD = 4.70 MS

CORE 3, REACTOR PERIOD = 4.70 MS

CORE 3, REACTOR PERIOD = 4.70 MS

7723-15
905 909

CORE 3, REACTOR PERIOD = 4.70 MS