PHD (Version I) Computer Code Documentation

G.A. Moses

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FUSION TECHNOLOGY INSTITUTE

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Abstract

Vital to the theoretical study of laser fusion plasmas is the plasma hydrodynamics computer code. These codes solve the coupled, highly non-linear equations of plasma hydrodynamics with the inclusion of plasma interaction with the electromagnetic field of incident laser radiation. Rate equations for thermonuclear burn and treatment of the thermonuclear reaction product transport may also be included. PHD (version I) is the first in a series of codes that will be made available for the purpose of laser fusion studies. It includes a straightforward solution of the plasma hydrodynamics equations in one dimension with ideal gas equations of state and a treatment of laser-plasma interaction. This code has purposefully been kept very simple, with no "bells or whistles." This will allow the user to add his own physics to it with little difficulty. It is designed to serve as a "test bench" for detailed studies of individual aspects of laser fusion physics (i.e. thermal conductivity, suprathermal electron transport, etc.).

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PHD Documentation

I. Introduction

The PHD computer code solves the one fluid-two temperature equations of plasma hydrodynamics using finite difference techniques. For the equation of motion, the plasma is treated as a single fluid (electrons and ions move with the same fluid velocity) hence there is charge neutrality. The energy transfer processes are computed for a two temperature (electron and ion) plasma, including: temperature diffusion through the electrons and ions, collisional energy exchange between the electrons and ions, PdV work on the electrons and ions, bremsstrahlung radiation loss from the electrons and an electron heat source due to inverse bremsstrahlung absorption of the external laser radiation. All transport coefficients are computed from their classical values (Spitzer) and ideal gas equations of state are used to close this set of hydrodynamic equations. The equations are posed in the one dimensional (cartesian, cylindrical, or spherical) Langrangian coordinate form. Artificial viscosity is added to the equation of motion and the equation is solved using a second order explicit finite difference technique. The coupled non linear temperature diffusion equations are solved simultaneously using a second order implicit finite difference scheme that allows for iteration of the non linear thermal conductivities.

The PHD code is written in standard FORTRAN IV with care taken to insure that the coding is unambiguous. The program itself contains 800 comment statements that should allow the user to follow the details of the coding. It is designed to execute on any large computer (IBM 360-370, UNIVAC 1108-1110, CDC 6600-7600).

PHD(VER001) is designed to serve as a "test-bench" for researchers wishing to study in detail a particular aspect of laser fusion physics. Its strength (as well as its weakness) lies in its simplicity. The physics embodied in this code is quite straightforward, with no "bells" or "whistles" attached. Although PHD does not contain sufficient physics to quantitatively treat a spherical pellet compression, it will reproduce the essential features of the laser-plasma dynamics and as such can be useful for studying the details of laser absorption or electron thermal conductivity for instance. Due to the simplicity of the code, new treatments of these processes (and others) can be added to the code in a straightforward manner, with a much smaller investment of time than would be required to develop an entire code. Cartesian or "slab" geometry calculations can be useful for "model calculations" and comparison with analytic results.

In a field that is changing as rapidly as laser-plasma physics, a simple code that can easily accomodate new additions and changes can be very useful, particularly to the researcher without access to the more sophisticated codes at the national laboratories.

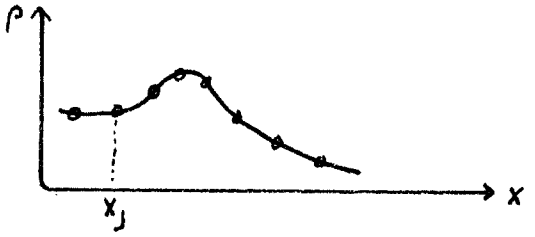
Part II of this report describes the methods of solution used by the computer code. This should be familiar to those acquainted with one fluid-two temperature Lagrangian plasma hydrodynamics. Part III is a discussion of the PHD code itself and will be of interest to someone wishing to make alterations or additions to the code. Part IV is a users manual and describes how to run the code.

II. Method of Solution

Finite Differences

The basic assumption in the numerical solution of partial differential equations by finite difference techniques is that the dependent variables can be accurately characterized by their values at a finite number of distinct points in space and time.

$\rho(x,t)$ $\quad\quad$ $\{\rho(x_j,t^n) \equiv \rho_j{}^n\}$

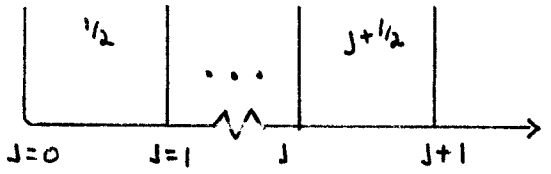


Derivatives of these functions can be represented by finite differences

$$\frac{\partial}{\partial X} \rightarrow \frac{1}{\Delta X_j} \qquad \Delta X_j = X_{j+1/2} - X_{j-1/2}$$

$$\frac{\partial}{\partial t} \rightarrow \frac{1}{\Delta t^n} \qquad \Delta t^n = t^{n+1/2} - t^{n-1/2}$$

Specifically, we divide a one dimensional space into a finite number of zones.



The zone boundaries or nodes are labelled with integer subscripts while the zone centers are labelled with half integer subscripts. For cylindrical or spherical geometry, the inner boundary at J = 0 is a line or a point respectively. For planar geometry it will be considered an immovable thermally insulated wall,

hence it serves as a reflection plane. Time is indexed with the superscript, n, and times will be advanced either from $t^{n-1/2}$ to $t^{n+1/2}$ or t^{n} to t^{n+1}. Space is indexed with subscripts j or $j \pm 1/2$.

Lagrangian Coordinates

The hydrodynamic description of a fluid can be expressed in two equivalent forms. In the Eulerian approach we center our attention at positions, $\underline{X}$, in a fixed reference frame and observe the change of macrocopic properties at the position. In other words, the coordinate system is stationary and the fluid flows through it. In the Lagrangian approach, the coordinate system is tied to the fluid at time t = 0 and moves with the fluid velocity, u(x,t). We observe a "cell" of fluid at t = 0 and follow its evolution for t > 0. As will be apparent later, the Lagrangian formulation is much more adaptable to the numerical treatment of fluid dynamics where large density changes (expansion or compression) occur.

In the Lagrangian form, a new independent variable is defined.

$$dm_o \equiv \rho r^{\delta-1} dr$$

where the units of m_o are given by

Coordinate System	δ	m_o (units)
Cartesian (r)	1	Grams/cm^2
Cylindrical (r)	2	Grams/cm-radian
Spherical (r)	3	Grams/Sterradian

It will be seen that the mass within each zone remains the same throughout the calculation.

Continuity Equation

The conservation of mass is given in one dimension as

$$\frac{\partial V}{\partial t} = V \frac{\partial u}{\partial r} = \frac{\partial}{\partial m_o} (r^{\delta-1} u) \tag{1}$$

where . $V = 1/\rho$ is the specific volume

. u is the fluid velocity

. m_o is the new independent Lagrangian variable

Equation of Motion

The conservation of momentum is given by

$$\frac{\partial u}{\partial t} = - V \frac{\partial}{\partial r} (P+q) = - r^{\delta-1} \frac{\partial}{\partial m_o} (P+q) \tag{2}$$

where . $P = P_e + P_i$ is the total fluid pressure

. q is the Von Neumann artificial viscosity

The difference equation used to approximate this P.D.E. is given by

$$\frac{u_j^{n+1/2} - u_j^{n-1/2}}{\Delta t^n} = -(r^{\delta-1})_j^n \, [\Delta P_j^n + \Delta q_j^{n-1/2}]/\Delta m_{o_j} \tag{3}$$

hence

$$u_j^{n+1/2} = u_j^{n-1/2} - (r^{\delta-1})_j^n [\Delta P_j^n + \Delta q_j^{n-1/2}] (\Delta t^n / \Delta m_{o_j}) \tag{4}$$

where

$$P_{j-1/2}^n = P_{e_{j-1/2}}^n + P_{i_{j-1/2}}^n \qquad \Delta P_j^n = P_{j+1/2}^n - P_{j-1/2}^n$$

$$\Delta m_{o_j} = (\Delta m_{o_{j+1/2}} + \Delta m_{o_{j-1/2}})/2 \qquad \Delta q_j^{n-1/2} = q_{j+1/2}^{n-1/2} - q_{j-1/2}^{n-1/2}$$

$$\Delta t^n = (\Delta t^{n+1/2} + \Delta t^{n-1/2})/2$$

$$q_{j-1/2}^{n-1/2} = 0 \qquad \frac{\partial V_{j-1/2}^{n-1/2}}{\partial t} > 0 \quad \text{expansion}$$

$$q_{j-1/2}^{n-1/2} = 2\,\frac{(u_j^{n-1/2} - u_{j-1}^{n-1/2})}{V_{j-1/2}^{n-1/2}} \qquad \frac{\partial V_{j-1/2}^{n-1/2}}{\partial t} < 0 \quad \text{compression}$$

The equation advances the velocities at the zone boundaries from $t^{n-1/2}$ to $t^{n+1/2}$. It is an explicit difference equation in that the unknown, $u_j^{n+1/2}$, is explicitly expressable in terms of known quantities at earlier times. For constant Δt, this equation is accurate to order Δx^2 and Δt^2. The numerical stability of this equation away from shocks is insured if

$$C_s\ \Delta t/\Delta x < 1$$

where C_s is the maximum sound speed in the system. This is known as the Courant condition and is derived from purely mathematical arguments, but has a physical interpretation as well. When this condition is maintained, a disturbance in the fluid cannot pass through more than one mesh interval in a time step, thus assuring that it will be resolved by the finite difference mesh.

Once the velocities of the boundaries at $t^{n+1/2}$ are known, one can calculate new boundary positions at t^{n+1}.

$$r_j^{n+1} = r_j^n + \Delta t^{n+1/2}\ u_j^{n+1/2}\ ;\ \Delta r_{j-1/2}^{n+1} = r_j^{n+1} - r_{j-1}^{n+1} \qquad (5)$$

With new boundary positions, new densities or specific volumes are also calculated. Cartesian ($\delta = 1$)

$$V_{j-1/2}^{n+1} = \Delta r_{j-1/2}^{n+1} / \Delta m_{o_{j-1/2}} \qquad (6)$$

Cylindrical ($\delta = 2$)

$$V^{n+1}_{j-1/2} = 1/2 \left(\Delta r^{n+1}_{j-1/2} / \Delta m_{o_{j-1/2}}\right)\left(r^{n+1}_{j} + r^{n+1}_{j-1}\right) \tag{7}$$

Spherical ($\delta = 3$)

$$V^{n+1}_{j-1/2} = \left(\Delta r^{n+1}_{j-1/2} / \Delta m_{o_{j-1/2}}\right)\left[r^{n+1}_{j}\, r^{n+1}_{j-1} + \frac{1}{3}\left(\Delta r^{n+1}_{j-1/2}\right)^2\right] \tag{8}$$

$$\dot{V}^{n+1/2}_{j-1/2} = \left(V^{n+1}_{j-1/2} - V^{n}_{j-1/2}\right)/\Delta t^{n+1/2} \tag{9}$$

Temperature Equations

Conservation of energy is expressed as

$$C_{v_e} \frac{\partial T_e}{\partial t} = \frac{V}{r^{\delta-1}} \frac{\partial}{\partial r} r^{\delta-1} K_e \frac{\partial T_e}{\partial r} - \omega_{ie} \left(T_e - T_i\right) - \left(P_e\right)_T \frac{\partial V}{\partial t} T_e \tag{10}$$

$$- \omega_r T_e + S_e$$

$$C_{v_i} \frac{\partial T_i}{\partial t} = \frac{V}{r^{\delta-1}} \frac{\partial}{\partial r} r^{\delta-1} K_i \frac{\partial T_i}{\partial r} + \omega_{ie} \left(T_e - T_i\right) - \left(P_i\right)_T \frac{\partial V}{\partial t} T_i + S_i \tag{11}$$

Using the Lagrangian variable m_o this becomes

$$C_{v_e} \frac{\partial T_e}{\partial t} = \frac{\partial}{\partial m_o}\left(r^{\delta-1} K_e \frac{\partial T_e}{\partial r}\right) - \omega_{ei} \left(T_e - T_i\right) - \left(P_e\right)_T \frac{\partial V}{\partial t} T_e - \omega_r T_e + S_e \tag{12}$$

$$C_{v_i} \frac{\partial T_i}{\partial t} = \frac{\partial}{\partial m_o}\left(r^{\delta-1} K_i \frac{\partial T_i}{\partial r}\right) + \omega_{ei} \left(T_e - T_i\right) - \left(P_i\right)_T \frac{\partial V}{\partial t} T_i + S_i - q \frac{\partial V}{\partial t} \tag{13}$$

where C_{v_e} and C_{v_i} are the electron and ion specific heats

K_e and K_i are the electron and ion thermal conductivities

$\omega_{ei} \left(T_e - T_i\right)$ is the electron ion-collisional coupling

$(P_e)_T \equiv \partial P_e / \partial T_e$

$(P_i)_T \equiv \partial P_i / \partial T_i$

$\omega_r T_e$ is a radiative loss term

S_e and S_i are source inputs to the electrons and ions.

These equations can be posed in a convenient matrix form for the purposes of numerical solution.

$$\alpha_{j-1/2} \frac{[\theta^{n+1}_{j-1/2} - \theta^{n}_{j-1/2}]}{\Delta t^{n+1/2}} = \frac{a_j}{2} (r^{\delta-1})_j \frac{[\Delta\theta^{n+1}_j + \Delta\theta^{n}_j]}{\Delta m_{o_{j-1/2}} * \Delta r_j}$$

$$- \frac{a_{j-1}}{2} (r^{\delta-1})_{j-1} \frac{[\Delta\theta^{n+1}_{j-1} + \Delta\theta^{n}_{j-1}]}{\Delta m_{o_{j-1/2}} * \Delta r_{j-1}} \qquad (14)$$

$$- \omega_{j-1/2} (\theta^{n+1}_{j-1/2} + \theta^{n}_{j-1/2}) - \gamma_{j-1/2} \frac{(\theta^{n+1}_{j-1/2} + \theta^{n}_{j-1/2})}{2} + \beta_{j-1/2}$$

where

$$\theta^{n}_{j-1/2} = \begin{pmatrix} T_i \\ T_e \end{pmatrix}^{n}_{j-1/2} \quad \Delta\theta^{n}_j = \theta^{n}_{j+1/2} - \theta^{n}_{j-1/2} \quad \beta_{j-1/2} = \begin{pmatrix} S_i - qV \\ S_e \end{pmatrix}_{j-1/2}$$

$$\alpha_{j-1/2} = \begin{pmatrix} C_{v_i} & 0 \\ 0 & C_{v_e} \end{pmatrix}_{j-1/2} \qquad \alpha_j = \begin{pmatrix} K_i & 0 \\ 0 & K_e \end{pmatrix}_j$$

$$\omega_{j-1/2} = \begin{pmatrix} \omega_{ei} & -\omega_{ei} \\ -\omega_{ei} & \omega_{ei} + \omega_r \end{pmatrix}_{j-1/2} \qquad \gamma_{j-1/2} = \begin{pmatrix} (P_i)_T & 0 \\ 0 & (P_e)_T \end{pmatrix}_{j-1/2} \dot{V}_{j-1/2}$$

rearranging we find

$$\alpha_{j-1/2}\,(\theta^{n+1}_{j-1/2} - \theta^{n}_{j-1/2}) = a_j\,(\Delta\theta^{n+1}_{j} + \Delta\theta^{n}_{j})$$

$$- a_{j-1}\,(\Delta\theta^{n+1}_{j-1} + \Delta\theta^{n}_{j-1}) \qquad (15)$$

$$- \omega_{j-1/2}(\theta^{n+1}_{j-1/2} + \theta^{n}_{j-1/2}) - \gamma_{j-1/2}\,(\theta^{n+1}_{j-1/2} + \theta^{n}_{j-1/2})$$

$$+ \beta_{j-1/2}$$

where

$$\alpha_{j-1/2} = \begin{pmatrix} C_{vi} & 0 \\ 0 & C_{ve} \end{pmatrix}_{j+1/2} \frac{\Delta m_{o\,j-1/2}}{\Delta t^{n+1/2}}$$

$$\beta_{j-1/2} = \begin{pmatrix} S_i - \dot{q}V \\ S_e \end{pmatrix}_{j-1/2} \Delta m_{o\,j-1/2}$$

$$a_j = \frac{1}{2}\begin{pmatrix} K_i & 0 \\ 0 & K_{e\,j} \end{pmatrix} \frac{(r^{\delta-1})_j}{\Delta r_j}$$

$$\omega_{j-1/2} = \frac{1}{2}\begin{pmatrix} \omega_{ei} & -\omega_{ei} \\ -\omega_{ei} & \omega_{ei}+\omega_r \end{pmatrix}_{j-1/2} \Delta m_{o\,j-1/2}$$

$$\gamma_{j-1/2} = \frac{1}{2}\begin{pmatrix} (P_i)_T & 0 \\ 0 & (P_e)_T \end{pmatrix}_{j-1/2} \dot{V}_{j-1/2}\,\Delta m_{o\,j-1/2}$$

Combining terms in identical values of θ we finally obtain:

$$-A_{j-1/2}\,\theta^{n+1}_{j+1/2} + B_{j-1/2}\,\theta^{n+1}_{j-1/2} - C_{j-1/2}\,\theta^{n+1}_{j-3/2} = D_{j-1/2} \qquad (16)$$

where $A_{j-1/2} = a_j$

$$B_{j-1/2} = \alpha_{j-1/2} + \omega_{j-1/2} + \gamma_{j-1/2} + a_j + a_{j-1}$$

$$C_{j-1/2} = a_{j-1} \qquad (17)$$

$$D_{j-1/2} = a_j(\theta^n_{j+1/2} - \theta^n_{j-1/2}) - a_{j-1}(\theta^n_{j-1/2} - \theta^n_{j-3/2})$$

$$- (\gamma_{j-1/2} + \omega_{j-1/2} - \alpha_{j-1/2})(\theta^n_{j-1/2}) + \beta_{j-1/2}$$

In the above difference equations, all coefficients are evaluated at $t^{n+1/2}$, hence $\alpha_{j-1/2} = \alpha^{n+1/2}_{j-1/2}$, etc. If we assume a solution to Eqn. 16 of the form

$$\theta^{n+1}_{j-1/2} = E_{j-1/2}\theta^{n+1}_{j+1/2} + F_{j-1/2} \qquad (18)$$

we find

$$E_{j-1/2} = (B_{j-1/2} - C_{j-1/2} \cdot E_{j-3/2})^{-1} \cdot A_{j-1/2} \qquad (19)$$

$$F_{j-1/2} = (B_{j-1/2} - C_{j-1/2} \cdot E_{j-3/2})^{-1} \cdot (D_{j-1/2} + C_{j-1/2} \cdot F_{j-3/2})$$

where the boundary conditions will determine $E_{1/2}$, $F_{1/2}$, and $\theta^{n+1}_{JMAX+1/2}$. At the inner boundary of the plasma we demand that there be no heat flux:

$$E_{1/2} = (B_{1/2})^{-1} \cdot A_{1/2} \qquad F_{1/2} = (B_{1/2})^{-1} \cdot D_{1/2} \qquad (20)$$

At the outer boundary we reserve the option of specifying a temperature boundary condition or a zero heat flux condition. For a temperature boundary condition

$$\theta^{n+1}_{JMAX+1/2} = \theta^{n+1}_{bc}$$

For zero heat flux we demand

$$\theta^{n+1}_{JMAX+1/2} = \theta^{n+1}_{JMAX-1/2}$$

hence we have two equations and two unknowns

$$\theta^{n+1}_{JMAX-1/2} = \theta^{n+1}_{JMAX+1/2}$$

$$\theta^{n+1}_{JMAX-1/2} = E_{JMAX-1/2}\theta^{n+1}_{bc} + F_{JMAX-1/2}$$

Solving for θ^{n+1}_{bc}

$$\theta^{n+1}_{bc} = F_{JMAX-1/2} \cdot (I - E_{JMAX-1/2})^{-1} \qquad (21)$$

This specification of θ^{n+1}_{bc} will insure no heat flux across the outer plasma boundary which is an appropriate condition for a plasma expanding into a vacuum. Since the boundary is moving in the Lagrangian scheme, it will always be a plasma-vacuum interface and no heat flux can be conducted across it.

The difference method used here is a backward substitution solution to the implicit Crank-Nicholson difference scheme. All values of $\underline{\theta}$ are evaluated at both t^n and t^{n+1} hence we cannot express θ^{n+1} in terms of only variables at t^n. This implicit numerical scheme requires the solution of a matrix equation. The matrix to be inverted is block tridiagonal with 2 x 2 blocks. For linear equations the Crank-Nicholson scheme is unconditionally stable and accurate to order $(\Delta t)^2$ and $(\Delta x)^2$ and will generally allow much

larger time steps for this diffusion equation than an explicit scheme. For this nonlinear problem, stability problems can arise, however, unless the time step is restricted as discussed in a later section.

Coefficients in the Temperature Equations

The electron thermal conductivity is given by

$$K_e = 20\left(\frac{2}{\pi}\right)^{3/2} \frac{(k_B T_e)^{5/2} k_B \varepsilon\delta_T}{m_e^{1/2} e^4 Z \ell n\Lambda_{ei}} \tag{22}$$

where $\cdot\ \varepsilon\delta_T = \dfrac{0.43\ Z}{(3.44 + Z + 0.26\ell nZ)}$

$\cdot\ \ell n\Lambda_{ei} = \max\{1,\ \ell n\ (\dfrac{3}{2e^3}(\dfrac{k_B^3 T_e^3}{\pi n_e})^{1/2}\ \dfrac{1}{Z}\}$

$\cdot\ n_e$ is the electron number density

The ion thermal conductivity is given by

$$K_i = 20\left(\frac{2}{\pi}\right)^{3/2} \frac{(k_B T_i)^{5/2} k_B}{m_i^{1/2} e^4 Z^4 \ell n\Lambda_{ii}} \tag{23}$$

where $\cdot\ \ell n\Lambda_{ii} = \max\{1,\ \ell n(\dfrac{3}{2e^3 Z^2}(\dfrac{k_B^3 T_i^3}{\pi n_e})^{1/2}\ \dfrac{1}{Z^{1/2}})\}$.

In finite difference form the thermal conductivities must be evaluated on the zone boundaries, hence we must use averaged quantities from the adjacent zone centers. This is done in the following manner.

$$r^{\delta-1} K_e \frac{\partial T_e}{\partial r} \cong \frac{r^{\delta-1}}{\dfrac{\Delta r_j^+}{K_{e_j}^+} + \dfrac{\Delta r_j^-}{K_{e_j}^-}}\ \Delta T_e \tag{24}$$

where

- $\Delta r_j^+ = r_{j+1} - r_j$
- $\Delta r_j^- = r_j - r_{j-1}$
- $K_{e_j}^+ = \dfrac{C_1 T_{e_j}^2 T_{e_{j+1/2}}^{1/2}}{(4 + Z_{j+1/2})(\ell n \Lambda_{ei})_{j+1/2}}$
- $K_{e_j}^- = \dfrac{C_1 T_{e_j}^2 T_{e_{j-1/2}}^{1/2}}{(4 + Z_{j-1/2})(\ell n \Lambda_{ei})_{j-1/2}}$ (25)

A similar expression is used for the ions, with

- $K_i^+ = \dfrac{C_2 T_{i_j}^2 T_{i_{j+1/2}}^{1/2}}{(A_{j+1/2})^{1/2} (Z_{j+1/2})^4 (\ell n \Lambda_{ii})_{j+1/2}}$
- $K_i^- = \dfrac{C_2 T_{i_j}^2 T_{i_{j-1/2}}^{1/2}}{(A_{j-1/2})^{1/2} (Z_{j-1/2})^4 (\ell n \Lambda_{ii})_{j-1/2}}$ (26)

These expressions will most heavily weight the <u>lowest</u> conductivity in the zone centered at j+1/2 or j-1/2.

The electron-ion collisional coupling is given by

$$\omega_{ei} = C_{v_e} \nu_{ei} \tag{27}$$

where

- $\nu_{ei} = \dfrac{8(2\pi)^{1/2}}{3} m_e^{1/2} e^4 N_A^2 \left(\dfrac{Z}{A}\right)^2 \dfrac{\ell n \Lambda_{ei}}{(k_B T_e)^{3/2}} \rho$
- $N_A = 6.023 \times 10^{23}$ is Avagadros Number
- A is the ion atomic weight
- Z is the ion charge
- C_{v_e} is the electron specific heat

In finite difference form we have

$$\omega_{ei_{j-1/2}} = C_8 C_{ve_{j-1/2}} \left(\frac{Z_{j-1/2}}{A_{j-1/2}}\right)^2 \frac{(\ell n \Lambda_{ei})_{j-1/2}}{V_{j-1/2}(T_{e_{j-1/2}})^{3/2}} \tag{28}$$

The radiation loss term is expressed as

$$\omega_r T_e$$

where

$$\omega_r = \left(\frac{2\pi}{3m_e}\right)^{1/2} \left(\frac{1}{k_B T_e}\right)^{1/2} \frac{2^5 \pi e^6}{3hm_3 c^3} Z^2 n_e n_i \tag{29}$$

and in finite difference form

$$\omega_{r_{j-1/2}} = C_7 (n_{e_{j-1/2}}^{n+1/2})^2 Z_{j-1/2}^{n+1/2} V_{j-1/2}^{n+1/2} / (T_{e_{j-1/2}}^{n+1/2})^{1/2} \tag{30}$$

This pure radiation loss approximation is only accurate for thin plasmas which is not necessarily true for laser driven implosions. In fact, the PHD code normally executes without radiation loss by setting a threshold temperature below which the plasma will not radiate. This value defaults to 1000 Kev, thus insuring that the plasma will not radiate. Future versions of the PHD code will include a more detailed treatment of radiation.

In actual fact there is also an optional electron thermal flux limiter added to the thermal conduction term to limit the thermal flux to physically plausible values in zones experiencing strong gradients. This is given by

$$q_{max} = \frac{3\sqrt{3}}{8} (n_e k_B T_e) \left(\frac{k_B T_e}{m_e}\right)^{1/2} \tag{31}$$

and in terms of the computer code variables

$$q_{max_j} = C_3(n_{e_{j-1/2}} + n_{e_{j+1/2}})\, T_{e_j}\, [(T_{e_{j-1/2}}^{n+1/2})^{1/2} + (T_{e_{j+1/2}}^{n+1/2})^{1/2}] \quad (32)$$

We average the "square roots" rather than calculating additional square roots on zone boundaries. The "a" matrix element is then calculated as

$$a_{22_j} = \frac{(r_j^{n+1/2})^{\delta-1}}{\frac{\Delta r_{j+1/2}}{K^+_{e_j}} + \frac{\Delta r_{j-1/2}}{K^-_{e_j}} + \frac{|T_{e_{j+1/2}}^{n+1/2} + T_{e_{j-1/2}}^{n+1/2}|}{q_{max_j}}} \quad . \quad (33)$$

Temperature Iteration or Extrapolation

Most of the terms appearing in the temperature equations are non-linear. For example:

$$K_{e,i} \sim T_{e,i}^{5/2}$$

$$\omega_{ei} \sim T_e^{-3/2}$$

$$\omega_r \sim T_e^{-1/2}$$

The numerical method used to solve the temperature equations requires temperature values for the time-dependent coefficients at time level (n+1/2). These temperatures are not available, however, because the temperature equations are being advanced fron t^n to t^{n+1}; only values up to t^n are known. To solve the temperature equations we must estimate values for $T_{e,i}^{n+1/2}$ and use these to advance from t^n to t^{n+1}. Then the calculated values at $t^{n+1/2}$

$$T_{e,i}^{n+1/2} = (T_{e,i}^{n+1} + T_{e,i}^{n})/2$$

can be compared to the estimated values. New values may then be obtained for $T_{e,i}^{n+1/2}$, coefficients recalculated, and the temperature equations again solved. This could continue until convergence is reached. Two possibilities for the initial estimate are; just using $T_{e,i}^{n}$ as the first try, or extrapolating to $T_{e,i}^{n+1/2}$ using a polynominal fit of previous values of $T_{e,i}$. Both of these options are allowed in the PHD hydrodynamics code.

A single iteration, using $T_{e,i}^{n}$ to calculate the coefficients gives results that compare well with analytic solutions and remains stable for more complex problems where no analytic solution is available. This is certainly not conclusive evidence that the more complex problems are correctly solved, but the agreement with simple analytic solutions adds a degree of confidence. This is also appealing because iterating until convergence can be a costly calculation, so iteration should be avoided if at all possible.

Equations of State

Ideal gas equations of state are used in PHD at this time. These are given by the familiar expressions

$$
\begin{aligned}
P_e &= n_e k_B T_e & P_i &= n_i k_B T_i \\
C_{ve} &= \frac{3}{2} Z k_B / m_i & C_{vi} &= \frac{3}{2} k_B / m_i \\
I_e &= \frac{3}{2} n_e k_B T_e / \rho & I_i &= \frac{3}{2} n_i k_B T_i / \rho \\
(P_e)_T &= n_e k_B & (P_i)_T &= n_i k_B
\end{aligned}
\tag{34}
$$

In finite difference form we have

$$
\begin{aligned}
P_{e_{j-1/2}} &= C_{10} n_{e_{j-1/2}} T_{e_{j-1/2}} & P_{i_{j-1/2}} &= C_9 n_{i_{j-1/2}} T_{i_{j-1/2}} \\
C_{ve_{j-1/2}} &= C_{13} n_{e_{j-1/2}} V_{j-1/2} & C_{vi_{j-1/2}} &= C_{14} n_{i_{j-1/2}} V_{j-1/2} \\
I_{e_{j-1/2}} &= C_{16} n_{e_{j-1/2}} T_{e_{j-1/2}} V_{j-1/2} & I_{i_{j-1/2}} &= C_{15} n_{i_{j-1/2}} T_{i_{j-1/2}} V_{j-1/2} \\
(P_e)_{T_{j-1/2}} &= C_{11} n_{e_{j-1/2}} & (P_i)_{T_{j-1/2}} &= C_{12} n_{i_{j-1/2}}
\end{aligned}
\tag{35}
$$

Laser-Plasma Interaction

The coupling of the coherent laser radiation to the plasma is one of the most important (and mysterious) aspects of laser fusion. The absorption of a photon by a free electron in the coulomb field of an ion, inverse bremsstrahlung, is the "classical" or conventional energy absorption mechanism of laser plasma interaction. Intense laser radiation may also couple to, and drive, collective plasma oscillations and hence "anomalous" absorption and scattering may occur at laser intensities greater than the threshold intensity necessary to excite plasma instabilities.

The absorption or emission of energy by a free electron in collision with another particle can be predicted both classically and quantum mechanically. In a highly ionized plasma this absorption is most probably for an electron colliding with an ion, hence inverse bremsstrahlung is sometimes called collisional absorption. While bremsstrahlung and inverse bremsstrahlung play a role in radiative transport as the emission and absorption terms, our concern here is with K_{IB} acting as an attenuation coefficient for the coherent incident laser radiation. If ψ is the laser radiation intensity then

$$\frac{d\psi}{dx} = - K_{IB} \psi \tag{36}$$

where one estimate of K_{IB} is

$$K_{IB} = \frac{8\pi e^6 \ell n\Lambda n_e \langle Z^2 \rangle}{3cZ(\omega/2\pi)^2 (2\pi m_e k_B T_e)^{3/2}} \left(\frac{1}{1 - \omega_{pe}^2/\omega^2}\right)^{1/2} \tag{37}$$

In finite difference form

$$K_{IB_{j-1/2}} = \frac{C_{20} \lambda^2 n_{e_{j-1/2}} n_{i_{j-1/2}} \langle Z^2 \rangle_{j-1/2} (\ell n\Lambda_{ei})_{j-1/2}}{T_{e_{j-1/2}}^{3/2}} \tag{38}$$

where λ is the laser wavelength.

Looking at the dispersion relation for plane wave propagation in a uniform plasma in the absence of magnetic fields we find that

$$\frac{\omega}{k} = \frac{c}{\sqrt{1 - \omega_{pe}^2/\omega^2}}$$

where $\omega_{pe}^2 = \frac{4\pi n_e e^2}{m_e}$ is the plasma frequency.

Evidently the phase velocity is imaginary for $\omega < \omega_{pe}$ and the plane wave will decay rather than propagate. Since the density gradient is negative near the surface of a laser fusion plasma, there will be an electron density where $\omega = \omega_{pe}$ and the electromagnetic plane wave radiation from the laser will not propagate beyond this point. Exactly what happens at this resonance point is still an open question and much theoretical work has been done to predict the interaction of the intense laser radiation field at this point. For the

purposes of a hydrodynamics simulation however, this behavior must be modelled as some simple absorption or reflection of the laser beam. Again, the level of description is not sufficient to administer a fully consistent calculation of the laser plasma interaction. Thus the incident intensity at any point up to the critical electron density (where $\omega = \omega_{pe}$) is given by

$$\psi^{-}(r,t) = \psi_{bd}(t) e^{\int_{r_{bd}}^{r} K_{IB}(X';t)dX'} \tag{39}$$

where r_{bd} is the outer boundary of the plasma, while the reflected intensity is given by

$$\psi^{+}(r,t) = \psi^{+}(r_c,t) e^{\int_{r}^{r_c} K_{IB}(r',t)dr'} \tag{40}$$

where r_c is the position of the critical density. The attenuation of the laser flux across a region of plasma determines the amount of energy deposited in that region and serves as the source to the electron temperature equation.

A simple attenuation formula is used to calculate the energy absorbed by the electrons from the incident laser light. Light is allowed to penetrate to the first overdense zone, where a specified fraction of its energy is deposited. The remainder is reflected and attenuated on its way back out.

$$\psi_j^{n+1/2} = \psi_{j+1}^{n+1/2} \exp[-K_{IB}{}_{j+1/2}^{n+1/2} \Delta r_{j+1/2}^{n+1/2}] \quad j = JMAX-1, JCRIT \tag{41}$$

$\psi_{JMAX}^{-n+1/2}$ is given

$$\psi_{j+1}^{+n+1/2} = \psi_j^{+n+1/2} \exp[-K_{IB}{}_{j+1/2}^{n+1/2} \Delta r_{j+1/2}^{n+1/2}] \quad j = JCRIT, JMAX \tag{42}$$

Since $\psi+_{JCRIT-1} = \psi-_{JCRIT-1} = 0$ because the light is effectively reflected in zone JCRIT-1/2, the energy dumped into zone JCRIT-1/2 is totally specified by the value we choose for $\psi+_{JCRIT}$. Hence

$$\psi+_{JCRIT} = (1-f)\psi-_{JCRIT}$$

will effectively dump the fraction f of the unattenuated energy in the first overdense zone.

The energy/unit mass-unit time inputted to the electrons is given by

$$S_{e_{j-1/2}}^{n+1/2} = [\psi-_{j+1/2}^{n+1/2} + \psi+_{j-1/2}^{n+1/2} - \psi-_{j-1/2}^{n+1/2} - \psi+_{j+1/2}^{n+1/2}]/(C*\Delta m_{o_{j-1/2}}) \quad (43)$$

where the value of C is given by

Geometry	δ	C
Cartesian	1	1
Cylindrical	2	2π
Spherical	3	4π

This is needed because $m_{o_{j-1/2}} \neq m_{j-1/2}$ where $m_{j-1/2}$ is the mass of plasma in a zone. In fact, for cylindrical and cartesian geometry, only mass/unit length and mass/unit area can be defined.

Thermonuclear Reactions

Thermonuclear reactions and subsequent reaction product transport are not treated in PHD(Ver001), but will be treated in detail in PHD(Ver002). Since this is such a complex calculation in itself, it is appropriate that PHD(Ver001) will not be burdened with this overhead.

Energy Conservation

In order to insure that a calculation is proceeding in a consistent manner, the conservation of energy (kinetic and internal) is checked. This gives a general idea of how the energy in the system is partitioned among the various mechanisms. We start by writing the temperature equations as

$$\dot{U}_i + P_i \dot{v} = S_i + R_{ei} + \dot{Q}_{Di} \tag{44}$$

$$\dot{U}_e + P_e \dot{v} = S_e - R_{ei} + \dot{Q}_{De} - \dot{Q}_r \tag{45}$$

where

$$R_{ei} = \omega_{ei}(T_e - T_i)$$

$$\dot{Q}_{De,i} = \frac{\partial}{\partial m_o} r^{\delta-1} K_{e,i} \frac{\partial T_{e,i}}{\partial r}$$

$$\dot{Q}_r = \omega_r T_e$$

$$\dot{U}_{e,i} = \text{internal energy/unit mass}\cdot\text{time}$$

Summing the two equations gives

$$\dot{U} + P\dot{v} = S + \dot{Q}_D - \dot{Q}_r \tag{46}$$

From Eqn. 1 we have

$$u \frac{\partial u}{\partial t} = - u r^{\delta-1} \frac{\partial P}{\partial m_o} = \frac{\partial}{\partial t}(u^2/2) \tag{47}$$

Integrating this with respect to m_o gives

$$\dot{T} = - \int_0^{r_{MAX}} u^{\delta-1} \frac{\partial P}{\partial m_o} dm_o \tag{48}$$

where T is the total kinetic energy of the fluid motion. Integrating the right hand side by parts gives

$$\dot{T} = -[ur^{\delta-1}P]_{JMAX} + \int_0^{r_{JMAX}} Pd(ur^{\delta-1}) \tag{49}$$

Recall, from the continuity equation

$$\dot{v}dm_o = d(ur^{\delta-1}) \tag{50}$$

hence

$$\int_0^{r_{JMAX}} P\dot{v}dm_o = \dot{T} + [ur^{\delta-1}P]_{JMAX} \tag{51}$$

If we now add and subtract $P_e\dot{v}$ from the ion energy equation we obtain

$$\dot{U}_i + P = S_i + \dot{Q}_{Di} + R_{ei} + P_e \tag{52}$$

We integrate this, along with the electron energy equation to obtain

$$\dot{e}_i + \int_0^{JMAX} P\dot{v}dm_o = s_i + e_{ei} + \int_0^{JMAX.} Q_{Di}dm_o + \int_0^{JMAX} P_e\dot{v}dm_o \tag{53}$$

$$\dot{e}_e + \int_0^{JMAX} P_e\dot{v}dm_o = s_e - e_{ei} + \int_0^{JMAX.} Q_{De}dm_o - \dot{e}_r \tag{54}$$

where

$$\dot{e}_{e,i} = \int_0^{JMAX} \dot{U}_{e,i}dm_o \qquad e_r = \int_0^{JMAX} \dot{Q}_r dm_o$$

$$s_{e,i} = \int_0^{JMAX} S_{e,i}dm_o \qquad e_{ei} = \int_0^{JMAX} R_{ei}dm_o$$

We know from Eqn. 50 that

$$\int_0^{JMAX} P_x\dot{v}dm_o = -\int_0^{JMAX} P_x d(ur^{\delta-1}) = [P_x r^{\delta-1}u]_{JMAX} - \int_0^{JMAX} ur^{\delta-1}dP_x \tag{55}$$

Substituting into Eqn. 53 and 54

$$\dot{e}_i + (P_i ur^{\delta-1})_{JMAX} + \int_0^{JMAX} ur^{\delta-1}dP_e = s_i + e_{ei} + \int_0^{JMAX.} Q_{Di}dm_o \tag{56}$$

$$\dot{e}_e + (P_e ur^{\delta-1})_{JMAX} - \int_0^{JMAX} ur^{\delta-1}dP_e = s_e - e_{ei} - \dot{e}_r + \int_0^{JMAX.} Q_{De}dm_o \tag{57}$$

$$\int_o^{Jmax} Q_{Dx}\, d\, m_o = (K_x r^{\delta-1} \frac{\partial T_x}{\partial r})_{JMAX} = (f_x r^{\delta-1})_{JMAX} \tag{58}$$

This substitution gives us

$$\dot{e}_i + \dot{T} + (u r^{\delta-1} P_i)_{JMAX} = s_i + e_{ei} - (f_i\, r^{\delta-1})_{JMAX} - \int_o^{JMAX} U\, r^{\delta-1}\, d\, P_e \tag{59}$$

$$\dot{e}_e + (u r^{\delta-1} P_e)_{JMAX} = s_e - e_{ei} - \dot{e}_r - (f_e\, r^{\delta-1})_{JMAX} + \int_o^{JMAX} u r^{\delta-1}\, dP_e \tag{60}$$

Adding these together gives

$$\dot{e} + \dot{T} + (u\, r^{\delta-1} P)_{JMAX} = s - \dot{e}_r - (f\, r^{\delta-1})_{JMAX} \tag{61}$$

We now integrate Eqn. 59 - 61 with respect to time and define

$$e_x^{n+1} = \sum_{j=1}^{JMAX} (U_X)_{j-1/2}^{n+1} \Delta m_o \tag{62}$$

$$T^{n+1} = \frac{1}{4} \Delta m_{o_{JMAX-1/2}} (u_{JMAX}^{n+1/2})^2 + \frac{1}{2} \sum_{j=1}^{JMAX} \Delta m_{o_j} (u_j^{n+1/2})^2$$

$$H_x^{n+1} = \int_o^{t^{n+1}} s_x\, dt = H_x^n + \Delta t^{n+1/2} \sum_{j=1}^{JMAX} (S_x)_{j-1/2}^{n+1/2} \Delta m_{o_{j=1/2}}$$

$$E_{ei}^{n+1} = \int_o^{t^{n+1}} e_{ei}\, dt = E_{ei}^n + \Delta t^{n+1/2} \sum_{j=1}^{JMAX} (R_{ei})_{j-1/2}^{n+1/2} \Delta m_{o_{j-1/2}}$$

$$G_e^{n+1} = \int_o^{t^{n+1}} \int_o^{JMAX} u\, r^{\delta-1} d\, P_e dt = G_e^n + \Delta t^{n+1/2} \sum_{j=1}^{JMAX-1} u_j^{n+1/2} (r^{\delta-1})_j^{n+1/2} (*)$$

$$[P_{e_{j+1/2}}^{n+1/2} - P_{e_{j-1/2}}^{n+1/2}] + \Delta t^{n+1/2} u_{JMAX}^{n+1/2} (r^{\delta-1})_{JMAX}^{n+1/2} [P_{e_{JMAX+1}} - P_{e_{JMAX-1}}]/2$$

where X = e or i

$$E_r^{n+1} = \int_o^{t^{n+1}} e_r dt = E_r^n + \Delta t^{n+1/2} \sum_{j=1}^{JMAX} (\dot{Q}_r)_{j-1/2}^{n+1/2} \Delta m_{o_{j-1/2}}$$

$$W_x^{n+1} = \int_o^{t^{n+1}} (ur^{\delta-1}P_x)_{JMAX} dt = W_x^n + \Delta t^{n+1/2} (u_{JMAX}^{n+1/2} (r^{\delta-1})_{JMAX}^{n+1/2} P_{xJMAX}^{n+1/2})$$

$$F_x^{n+1} = \int_o^{t^{n+1}} (f_x r^{\delta-1})_{JMAX} dt = F_x^n + \Delta t^{n+1/2} a_{x_{JMAX}}^{n+1/2} (T_{x_{JMAX+1/2}}^{n+1/2} - T_{x_{JMAX-1/2}}^{n+1/2})$$

The integrated equations then take the form

$$e_i^{n+1} + T^{n+1} = e_i^o + T^o + H_i^{n+1} + E_{ei}^{n+1} - F_i^{n+1} - W_i^{n+1} - G_e^{n+1} \tag{63}$$

$$e_e^{n+1} = e_e^o + H_e^{n+1} - E_{ei}^{n+1} - F_e^{n+1} - W_e^{n+1} + G_e^{n+1} - E_r^{n+1} \tag{64}$$

$$e^{n+1} + T^{n+1} = e^o + T^o + H^{n+1} - F^{n+1} - W^{n+1} - E_r^{n+1} \tag{65}$$

Equation 63 states that the total internal plus fluid kinetic energy at a given time (t^{n+1}) must equal

a) the initial internal and kinetic energy plus all source energy up to this time minus

b) all heat lost across the outer boundary, all work done on the outer boundary, and all energy lost to radiation up to this time.

The term, G_e, appears because the electrons and ions each have their own temperature and pressure but are constrained to move together at the same fluid velocity. This is the total work done by the ions on the electrons to maintain this constraint.

Time Steps

Due to the nature of these complex hydrodynamics simulations a new time step size must be estimated for every time cycle. During much of the simulation

the plasma may be evolving quite slowly while for a very short time it may change very rapidly. To choose a constant time step for all time that adequately resolves the large changes would be prohibitively expensive. Thus a time step must be estimated that will allow the plasma to evolve to some new state that is not too different from its previous state. Also the Courant condition must be met. To accomplish this, we use the formula

$$\Delta t^{n+3/2} = \text{Max}[\Delta t_{min}, \text{Min}(\Delta t_{max}, K_1/R_1^{n+1}, K_2\Delta t^{n+1/2}/R_2^{n+1}, K_3\Delta t^{n+1/2}/R_3^{n+1})] \quad (66)$$

where

$$R_1^{n+1} = \underset{j}{\text{MAX}} \left[(v_{j-1/2}^{n+1} \; P_{j-1/2}^{n+1})/\Delta r_{j-1/2}^{n+1}\right]$$

$$R_2^{n+1} = \underset{j}{\text{MAX}} \left[(V_{j-1/2}^{n+1} - V_{j-1/2}^{n})/V_{j-1/2}^{n+1/2}\right] \quad (67)$$

$$R_3^{n+1} = \underset{j}{\text{MAX}} \left[(T_{x_{j-1/2}}^{n+1} - T_{x_{j-1/2}}^{n})/T_{x_{j-1/2}}^{n+1/2}\right] \quad x = e,i$$

and K_1, K_2, K_3 are specified parameters. Good results are usually achieved for

$$K_1 = K_2 = K_3 = .25$$

Values of $K_3 = .5$ can lead to severe accuracy problems and possible instability in the non-linear temperature equations. These numbers must be treated carefully, however, since execution time is linearly dependent on the number of time steps and not their duration. By halving these limits, twice as many time steps are required to reach the same time limit. A minimum and maximum time step are also specified as well as a maximum percentage that a time step can increase. It is found that for a free expanding plasma the above criteria will estimate time steps that are far too large unless the percentage criteria is used. This is not generally a problem because this hydrodynamic code is used to study the implosion of a plasma.

III. PHD Computer Code Structure

III-A. Introduction

The structure of the PHD computer code is top-down organized and block structured where possible. These state of the art programming concepts are proving to be very valuable in guiding the design and construction of large computer codes. Not only is it important that large codes give accurate answers and execute efficiently, but they must also be developed in an efficient and error free manner. These structuring concepts serve to meet this end and also serve to produce a code that is easily understood and consequently, easily modified. The flow diagram in Fig. 1 illustrates the top-down nature of the subroutine organization.

GOTO less structural programming is nearly impossible to implement using FORTRAN IV but we find that coding is much less ambiguous if only forward branches are used. Errors in logic most often arise when a section of in-line code is executed under varying circumstances that are determined by conditional branches. When necessary, certain sections of in-line codes have been repeated in different places to alleviate such logic problems as mentioned above. This slightly increases the size of the object program but this is usually a small percentage since more storage is required for variables than for object program.

III-B. Subroutines

In this section, all subroutines and functions are described in general. The many comments in the code listing should provide guidance in understanding the specific coding. With only a few exceptions, all information is passed between subroutines through the COMMON blocks.

MAIN

The main program provides the flow through each time step. It consists of just 8 subroutine calls and 1 logical function reference.

Called from: N.A.

Calls to: INITIA, HYDRO, ENERGY, PRESS, ECHECK, OUT, TIMING, QUIT, SHIFT.

COMMON blocks: N.A.

INITIA

This subroutine is executed only once, at the beginning of a calculation. It zeroes the COMMON blocks, sets up all of the default value variables, reads NAMELIST input from unit 5 and initializes all other variables that must be initialized for the calculation. It then prints out a summary of the inputted and default information before the calculation starts. If there is a lack of memory space, this routine could be overlayed at the beginning and then swapped out of memory for the remainder of the calculation.

Called from: MAIN

Calls to: CLEAR, PRESS, QUE, INTENE

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF, COEFF1, COEFF2, ECKCOM.

CLEAR

This subroutine sets all of the COMMON blocks to zero. It uses double precision zeroes (0.D0) for all variables so the COMMON blocks must be an even number of single precision words long.

Called from: INITIA

Calls to: N.A.

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF, COEFF1, COEFF2, ESKCOM*

*These COMMON blocks are defined as only one double precision vector for each.

QUIT

This subroutine is called once the calculation is over. It prints out any information related to the results of the whole simulation. It calls OUTLST if the last time cycle was not one that was printed out by OUT. This insures that a summary of the last time cycle is always included in the output. It also calls DUMP to save the COMMON blocks for a possible restart of the calculation.

Called from: MAIN

Calls to: OUTLST, DUMP

COMMON blocks: CNTROL, HYDROD

OUT, OUTLST

This is the primary output subroutine. It prints out a summary of information on specified time steps. It also determines the primary and secondary time step limitations used on the last time cycle. It calls WBIN on specified time cycles to route out binary information to be used for post processing. OUTLST is an ENTRY point in OUT.

Called from: MAIN (OUT), QUIT (OUTLST)

Calls to: WBIN

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF, COEFF1, COEFF2, ECKCOM

HYDRO

This subroutine calculates the fluid velocity at time (n + 1/2). It then calculates new zone boundary positions (i.e., radii) and zone widths. It then uses the new zone volumes to calculate specific volumes at times (n + 1) and (n + 1/2). It calculates the time rate of change of specific volume at (n + 1/2) and calls NUMDEN to get the new electron and ion member densities at (n + 1/2) due to zone volume change. It calls QUE to get the artificial viscosity to be used on the next time cycle.

Called from: MAIN

Calls to: NUMDEN, QUE

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD

ENERGY

This subroutine calculates electron and ion temperatures at time (n + 1) using the technique described by Richtmyer and Morton, Difference Method for Initial-Value Problems, (Wiley, 2nd Ed.), p. 200. The "E" and "F" terms are obtained by calling ABCDEF and temperature boundary conditions at the outer boundary are obtained by calling TEMPBC. This is also the fundamental "looping" routine for the iterative solution of these non-linear temperature diffusion equations. The iteration loop is initialized before the temperature calculation, and new temperatures at (n + 1/2) are calculated after the temperatures at (n + 1) are obtained. A logical function, CONV, is then invoked to determine whether the temperatures have point-wise converged. If not, a cycle counter is incremented and the temperature equations are again solved using the new estimates of temperatures at (n + 1/2) to calculate the non-linear coefficients.

Called from: MAIN

Calls to: ABCDEF, TEMPBC, CONV

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, COEFF, COEFF1, COEFF2

ECHECK

This subroutine calculates all of the energy contributions and losses of the plasma and compares them to measure the degree to which the calculation is conserving energy. This is done for electrons, ions and their total contribution.

Called from: MAIN

Calls to: INTENE

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF, COEFF1, ECKCOM

TIMING

This logical function determines whether the calculation should be terminated because the maximum time or the maximum number of time steps has been exceeded. If neither of these conditions is true, it determines the time step to be used for the next cycle. To do this it uses the minimum time step determined from (i) per cent change in electron or ion temperature, (ii) per cent change in specific volume, or (iii) Courant condition. This time step value must then fall in a window between a Δt_{min} and Δt_{max} or else one of these limiting values is used as the "primary" condition but the physical condition is also saved and printed by OUT as the secondary condition.

Called from: MAIN

Calls to: N.A.

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD

SHIFT

This subroutine shifts values of variables at (n + 1) or (n + 1/2) back to (n) or (n - 1/2) at the end of a time cycle in preparation for the next cycle.

Called from: MAIN

Calls to: N.A.

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD

QUE

This subroutine calculates the Von Neumann artificial viscosity.

Called from: HYDRO

Calls to: N.A.

COMMON blocks: CNTROL, HYDROD

DUMP

This subroutine writes out all of the COMMON blocks to unit 2 using FORTRAN unformatted write statements. The PHD code is designed such that the COMMON blocks contain all information necessary to the calculation. Thus, once the COMMON blocks have been saved, the calculation can be restarted by reading them back into core and starting again as if the calculation never stopped.

Called from: QUIT

Calls to: N.A.

COMMON blocks: TIME, TEMPER, ECKCOM, HYDROD, CNTROL, ESCOM, COEFF, COEFF1, COEFF2*

* Each COMMON block is defined as one double precision vector.

TEMPBC

This subroutine calculates the electron and ion temperature boundary conditions at the outer plasma boundary. It either uses a constant temperature boundary value or a zero flux boundary value.

Called from: ENERGY

Calls to: N.A.

COMMON blocks: TEMPER, CNTROL, COEFF2

CONV

This logical function determines whether the temperature iteration has converged. If the maximum allowed number of iterations have been exceeded then it stops the iteration process. If the maximum has not been exceeded it checks the difference between values of electron temperature at (n + 1/2)

on this iteration and the previous iteration. If this percentage difference meets the convergence criterion then it stops the iteration process by returning a .TRUE. value.

Called from: ENERGY

Calls to: N.A.

COMMON blocks: TEMPER, CNTROL

ABCDEF

This subroutine calculates the "E" and "F" terms from the "A", "B", "C", and "D" terms, in the notation of Richtmyer and Morton. It also assembles the "B" and "D" terms. In the PHD treatment the "A", "B", "C", and "E" terms are 2 x 2 matrices and the "D" and "F" terms are 2 component vectors. It gets the physical quantities that comprise the matrix and vector elements by calling MATRIX.

Called from: ENERGY

Calls to: MATRIX

COMMON blocks: TEMPER, CNTROL, COEFF1, COEFF2

MATRIX

This subroutine puts together intermediate matrices and vectors for use by ABCDEF. The physical coefficients of the problem are the constituents of these intermediate matrices and vector elements.

Called from: ABCDEF

Calls to: TXTRAP, TDERIV, OMEGAR, OMEGAC, KAPPA, EM, TNBURN, ARBENE

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF, COEFF1

EOS

This is really just a dummy subroutine for 3 ENTRY points to calculate pressures, specific heats, and internal energies of electrons and ions.

PRESS

This ENTRY point calculates electron and ion pressures at (n + 1) using ideal gas laws.

TDERIV

This ENTRY point calculates specific heats of electrons and ions using ideal gas relations. It also calculates the temperature derivative of the pressures using ideal gas relations.

INTENE

This ENTRY point calculates internal energies of electrons and ions using ideal gas laws.

Called from: MAIN (PRESS), MATRIX (TDERIV), ECHECK (INTENE)

Calls to: NUMDEN (PRESS), PRESBC (PRESS)

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM

PRESBC

This function returns the time dependent pressure boundary condition at the outer boundary. It is either a constant or a piece-wise linear polynomial function of time.

Called from: PRESS

Calls to: N.A.

COMMON blocks: CNTROL, HYDROD

NUMDEN

This subroutine calculates the ion and electron number density at either (n + 1/2) or (n + 1).

Called from: HYDRO, PRESS

Calls to: N.A.

COMMON blocks: CNTROL, HYDROD, ESCOM, COEFF

TXTRAP

This subroutine extrapolates electron and ion temperatures to (n + 1/2) using a quadratic fit to previous values at (n), (n - 1), and (n - 2). It is called only if the temperature extrapolation option for solving the temperature diffusion equations is used.

Called from: MATRIX

Calls to: N.A.

COMMON blocks: TIME, TEMPER, CNTROL

OMEGAC

This subroutine calculates the coefficient used in the electron-ion coupling terms in the electron and ion temperature equations. It calculates the non-temperature dependent part of this coefficient only on the first temperature iteration and saves it for later iterations since it will remain constant. It then calculates the coefficient by combining the non-dependent part with the temperature dependent part.

Called from: MATRIX

Calls to: LLAM

COMMON blocks: TEMPER, CNTROL, HYDROD, ESCOM, COEFF

OMEGAR

This subroutine calculates the coefficient for the bremsstrahlung radiation loss terms in the electron temperature equation. This term is taken as zero unless the electron termperature exceeds a specified threshold. This threshold has a default value of 1000 KEV eliminating radiation loss from the code in the default case.

Called from: MATRIX

Calls to: N.A.

COMMON blocks: TEMPER, CNTROL, HYDROD, ESCOM, COEFF

KAPPA

This routine calculates the electron and ion thermal conductivities. If the flux limit option is on, it also calculates the electron thermal flux limit. It also has a special option that allows PHD to model a slab with both surfaces treated independently (remember the inner boundary condition is always reflecting). This option sets the thermal conductivity of the first zone to a specified small value. Then, by making the first zone a near void, a slab defined in zones 2-JMAX will expand in both directions.

Called from: MATRIX

Calls to: LLAM

COMMON blocks: TEMPER, CNTROL, HYDROD, ESCOM, COEFF

EM

This subroutine calculates the laser light attenuation coefficient and laser energy flux as determined by its attenuation and finally it calculates the energy source to the electrons in each zone as a result of the attenuation. To do this it must get the laser flux at the outer plasma boundary and then calculate the zone boundary corresponding to the plasma critical density. The laser flux is attenuated in to this point and then a specified fraction of the remaining energy is dumped at the critical density and the remainder is reflected and attenuated on its way back out.

Called from: MATRIX

Calls to: XLIGHT

COMMON blocks: TIME, TEMPER, CNTROL, HYDROD, ESCOM, COEFF

XLIGHT

This function calculates the time dependent laser light flux at the outer boundary of the plasma. Three options currently exist for the function dependence of the flux on time-(i) piece-wise linear polynomial, (ii) Gaussian, (iii) power dependent rapid rise pulse characteristic of that necessary for isentropic implosions. Additional options can be added to this function in order to easily include any functional dependence. Actually, the light flux is not a correct term because the units of the laser contribution vary dependin g on the geometry option specified.

Called from: EM

Calls to: N.A.

COMMON blocks: COEFF

LLAM

This subroutine calculates Spitzer's log lambda for electron-ion or ion-ion collisions. This is accomplished using a table look-up procedure in order to avoid expensive logarithm calculations.

Called from: OMEGAC, KAPPA

Calls to: N.A.

COMMON blocks: CNTROL

TNBURN

This subroutine contains only a RETURN statement but is included for the purpose of a thermonuclear burn calculation. This is implemented using a detailed charged particle transport calculation in PHD (VER002).

Called from: MATRIX

ARBENE

This subroutine contains only a RETURN statement but is included for

the purpose of introducing an arbitrary energy source. This is useful for model calculations that may not exactly conform to physical reality.

Called from: MATRIX

WBIN

This subroutine contains only a RETURN statement but is included to provide the option to write out binary information into a file on specified time cycles for the purposes of post-processing using another code (for example, to generate graphs of density and temperature).

Called from: OUT

UNREAD

This subroutine reads the COMMON blocks from Unit 4 using unformatted FORTRAN read statements for the purposes of a restart calculation.

Called from: INITIA

Calls to: N.A.

COMMON blocks: TIME, TEMPER, ECKCOM, HYDROD, CNTROL, ESCOM, COEFF, COEFF1, COEFF2*

*Each COMMON block is defined as one double precision vector.

III-C. PHD Computer Code Variables

All PHD real variables are implicit double precision giving about 14 decimal places of accuracy on an IBM or UNIVAC computer. It is important to note that all real constants are specified with the "D" scientific notation (i.e. 1. → 1.D0). This is necessary to insure that all calculations are performed in double precision since the IBM FORTRAN G and H compilers will not define constants as double precision unless the "D" notation is used. This seriously affects calculations that are expected to be in double precision.

Variable names are designed to correspond to this documentation with the following conventions used to identify their meanings.

i) The last two letters indicate whether the variable is zone centered or on a zone boundary and also indicate the time level.

1 -- zone boundary

2 -- zone center

A -- t^{n+1}

B -- $t^{n+1/2}$

C -- t^{n}

D -- $t^{n-1/2}$

E -- t^{n-1}

F -- $t^{n-3/2}$

G -- t^{n-2}

H -- $t^{n-5/2}$

I -- t^{n-3}

ii) The first 4 or less letters indicate the physical quantity being represented.

E -- electron quantity

N -- ion quantity

Thus TE2B(J) is the electron temperature in the center of the J^{th} zone at time $t^{n+1/2}$, and U1D(J) is the fluid velocity on the J^{th} zone boundary at time $t^{n-1/2}$. All variables necessary to the computation are contained in named common blocks. The variables are grouped such that a subroutine will find most of the variables that it needs in fewer than all of the common's. We now list all of the variables (by common block) along with their meanings and units. All vectors have dimension of 53 which allows for 50 spatial zones.

COMMON/TIME/

1) TA t^{n+1}(sh)
2) TB $t^{n+1/2}$(sh)
3) TC t^{n} (sh)
4) TD $t^{n-1/2}$(sh)
5) DTB* $\Delta t^{n+1/2}$(sh)
6) DTC $\Delta t^{n} = (\Delta t^{n+1/2} + \Delta t^{n-1/2})/2$ (sh)
7) DTD $\Delta t^{n-1/2}$ (sh)
8) DTE $\Delta t^{n-1} = (\Delta t^{n-1/2} + \Delta t^{n-3/2})/2$ (sh)
9) DTF $\Delta t^{n-3/2}$(sh)
10) DTG $\Delta t^{n-2}(\Delta t^{n-3/2} + \Delta t^{n-5/2})/2$ (sh)
11) DTH $\Delta t^{n-5/2}$ (sh)
12) DT $\Delta t^{n+3/2}$, the new time step (sh)
13) TMAX* Max problem time for the simulation (sh)
14) DTMIN** Min allowed time step (sh)
15) DTMAX**Max allowed time step (sh)

COMMON/TEMPER/

1) TN2A $(T_i)^{n+1}_{j-1/2}$

2) TN2B $(T_i)^{n+1/2}_{j-1/2}$

3) TN2C* $(T_i)^{n}_{j-1/2}$

4) TN2E $(T_i)^{n-1}_{j-1/2}$ Ion temperatures (Kev)

5) TN2G $(T_i)^{n-2}_{j-1/2}$

6) TN2I $(T_i)^{n-3}_{j-1/2}$

7) TN1B $(T_i)^{n+1/2}_{j}$

8) TNSQ2B $\sqrt{(T_i)^{n+1/2}_{j-1/2}}$ $(\text{Kev})^{1/2}$

9) TE2A $(T_e)^{n+1}_{j-1/2}$

10) TE2B $(T_e)^{n+1/2}_{j-1/2}$

11) TE2C* $(T_e)^{n}_{j-1/2}$ Electron temperatures (Kev)

12) TE2E $(T_e)^{n-1}_{j-1/2}$

13) TE2G $(T_e)^{n-2}_{j-1/2}$

14) TE2I $(T_e)^{n-3}_{j-1/2}$

15) TE1B $(T_e)^{n+1/2}_{j}$

16) TESQ2B $\sqrt{(T_e)^{n+1/2}_{j-1/2}}$ $(\text{Kev})^{1/2}$

17) TBC** temperature boundary condition (Kev)

18)

19)

20)

21)

COMMON/CNTROL/

1) CON** - real constants used in PHD

2) TGROW** - max percentage that Δt can increase in one cycle

3) TEDIT** - time at which output freq. switches from IEDIT(1) to IEDIT(2) (sh)

4) GEOFAC - a geometry factor; 1, 2π, 4π

5) K1** - Courant condition time step control

6) K2** - $\Delta V/V$ time step control

7) K3** - $\Delta T/T$ time step control

8) R1 - worst case for courant condition

9) R2 - worst case for $\Delta V/V$

10) R3E - worst case for $\Delta T_e/T_e$

11) R3N - worst case for $\Delta T_i/T_i$

12) T1
13) T2
14) T3
15) T4

} temporary vectors to be used for any purpose within a subroutine

16) IDELTA* - 1 - cartesian 2 = cylindrical 3 - spherical

17) IDELM1 - 0 = cartesian 1 = cylindrical 2 = spherical

18) NCYCLE - time cycle index

19) NMAX* - max number of time steps

20) JMAX- max number of spatial zones

21) JMAXM1* - JMAX-1
22) JMAXP1 - JMAX+1
23) JMAXP2 - JMAX+2

} used for indexing

24) ISW** - control switches

25) JCOUR - zone # of Courant condition worst case

26) JSPVOL - zone # of $\Delta V/V$ worst case

27) JETEMP - zone # of $\Delta T_e/T_e$ worst case

28) JNTEMP - zone # of $\Delta T_i/T_e$ worst case

29) INDEX - a vector used for output indexing

30) IZONE - zone # of worst case of Courant, $\Delta V/V$, $\Delta T/T$

31) ITYPE - 1 = constant 2 = $\Delta V/V$ 3 = $\Delta T/T$ worst restriction

32) IITYPE - 0 = physical -1 = minΔt 1 = maxΔt

33) IEDIT** - output cycle frequencies

34) LASER** - chooses laser pulse option

35) ITN** - chooses thermonuclear burn option (not operational)

36) IIZONE - zone # of worst case if the Δt is Δt_{max} or Δt_{min}

37) ICOND - principle time step constraint

38) ICOND2 - secondary time step constraint if primary is Δt_{min} or Δt_{max}

39) JTSTEP - max zone # to assess when calculating new time step

40) ITERA - temperature iteration counter

41) ITERMX** - max number of temperature iterations

42) JVVOM - zone # of maximum compression

43) NVVOM - time cycle of maximum compression

44) IUNIT - cm^2, radian-cm, sterradian for δ = 1, 2, 3

COMMON/HYDROD/

1) U1D $U_j^{n-1/2}$ fluid velocity (cm/sh)

2) U1B** $U_j^{n+1/2}$

3) DR2C* $\Delta r_{j-1/2}^{n}$

4) DR2B $\Delta r_{j-1/2}^{n+1/2}$ zone widths (cm)

5) DR2A $\Delta r_{j-1/2}^{n+1}$

6) R1C r_j^n

7) R1B $r_j^{n+1/2}$ radius (cm)

8) R1A r_j^{n+1}

9) RS1C $(r_j^n)^{\delta-1}$

10) RS1B $(r_j^{n+1/2})^{\delta-1}$

11) RS1A $(r_j^{n+1})^{\delta-1}$

12) PE2C $(P_e)_{j-1/2}^{n}$

13) PE2B $(P_e)_{j-1/2}^{n+1/2}$ electron pressure (JK/cm^3)

14) PE2A $(P_e)_{j-1/2}^{n+1}$

15) PN2C $(P_i)_{j-1/2}^{n}$

16) PN2B $(P_i)_{j-1/2}^{n+1/2}$ ion pressure (JK/cm^3)

17) PN2A $(P_i)_{j-1/2}^{n+1}$

18) P2C $P_{j-1/2}^{n}$ total pressure (JK/cm^3)

19) P2A $P_{j-1/2}^{n+1}$

20) PBCP** pressure and time points to make up (JK/cm^3)

21) PBCT** piece wise linear pressure boundary condition (sh)

22) V2D $V^{n-1/2}_{j-1/2}$

23) V2C $V^{n}_{j-1/2}$

24) V2B $V^{n+1/2}_{j-1/2}$

25) V2A $V^{n+1/2}_{j-1/2}$

26) VO initial specific volume

27) VVO VO/V compression

28) VDOT2B $\dot{V}^{n+1/2}_{j-1/2}$ time derivative of sp. volume (cm^3/g-sh)

29) DMASS2 $\Delta m_{o_{j-1/2}}$ Lagrangian mass

30) DMASS1 $\Delta m_{o_j} = (\Delta m_{o_{j-1/2}} + \Delta m_{o_{j+1/2}})/2$

31) Q2D $q^{n-1/2}_{j-1/2}$ artificial viscosity (JK/cm^3)

32) Q2B $q^{n+1/2}_{j-1/2}$

33) VVOMIN max compression

34) TEVVOM electron temperature at max compression (Kev)

35) TNVVOM ion temperature at max compression (Kev)

36) TAVVOM time of max compression (sh)

COMMON/ESCOM/

1) EET2B - $(C_V)_{e\ j-1/2}^{n+1/2}$ electron specific heat (JK/Kev-g)

2) ENT2B - $(C_V)_{i\ j-1/2}^{n+1/2}$ ion specific heat (JK/Kev-g)

3) PET2B - $(P_e)_{T\ j-1/2}^{n+1/2}$ temperature derivative of electron pressure (JK/cm^3-Kev)

4) PNT2B - $(P_i)_{T\ j-1/2}^{n+1/2}$ temperature derivative of ion pressure (JK/cm^2-Kev)

5) EE2A - $(U_e)_{j-1/2}^{n+1}$ electron internal energy (JK/g- □)

6) EN2A - $(U_i)_{j-1/2}^{n+1}$ ion internal ring (JK/g- □)

7) DE2A - $(n_e)_{j-1/2}^{n+1}$ electron number density ($1/cm^3$)

8) DN2A - $(n_i)_{j-1/2}^{n+1}$ ion number density

9) DE2B* - $(n_e)_{j-1/2}^{n+1/2}$ electron number density

10) DN2B* - $(n_i)_{j-1/2}^{n+1/2}$ ion number density

11) ATW2B* - $A_{j-1/2}^{n+1/2}$ average ion atomic weight (AMU)

12) Z2B* - $A_{j-1/2}^{n+1/2}$ average charge (ESU)

13) ZSQ2B - $(Z_{j-1/2}^{n+1/2})^2$ average squared charge $(ESU)^2$

14) ATWQ2B - $\sqrt{A_{j-1/2}^{n+1/2}}$ $(AMU)^{1/2}$

COMMON/COEFF/

1) KIB2B - $(K_{IB})_{j-1/2}^{n+1/2}$ inverse bremsstrahlung attenuation (cm^{-1})

2) KANM1B - $(K_i^-)_j^{n+1/2}$ ion thermal conductivity (JK/cm-Kev-sh)

3) KANP1B - $(K_i^+)_j^{n+1/2}$

4) KAEM1B - $(K_e^-)_j^{n+1/2}$ electron thermal conductivity (JK/cm-Kev-sh)

5) KAEP1B - $(K_e^+)_j^{n+1/2}$

6) OMC2B - $(\omega_c)_{j-1/2}^{n+1/2}$ collision coupling coefficient (JK/Kev-g-sh)

7) OMR2B - $(\omega_r)_{j-1/2}^{n+1/2}$ bremsstrahlung radiation coefficient (JK/Kev-g-sh)

8) SNTN2B - ion source from thermonuclear energy (JK/g-sh)

9) FLUXF** - laser power and times for piece wise (JK/□-sh)

10) FLUXT** - linear laser source (sh)

11) SETN2B - electron source from thermonuclear reactions (JK/g-sh)

12) SEL2B - electron source from laser absorption (JK/g-sh)

13) SHϕK2B - ion source from shock heating (JK/g-sh)

14) PSIM1B - $(\psi^-)_j^{n+1/2}$ inward laser power for flux (JK/□ - sh)

15) PSIB1B - $(\psi^+)_j^{n+1/2}$ outward laser power or flux (JK/□-sh)

16) CRITD - n_{crit} plasma critical density ($1/cm^3$)

17) OMCC2B - non-temperature dependent part of $(\omega_c)_{j-1/2}^{n+1/2}$

18) OMRC2B - non-temperature dependent part of $(\omega_r)_{j-1/2}^{n+1/2}$

19) FLIM1B - electron thermal flux limit (JK/cm^2-sh)

20) FLD1B - diffusion flux w/o fluid limit (JK/cm^3-sh)

21) LAME - $(\ell n\Lambda_{ei})_{j-1/2}^{n+1/2}$ Spitzer log Λ

22) LAMN - $(\ell n\Lambda_{ii})_{j-1/2}^{n+1/2}$

23) WAVEL** - laser wavelength (cm)

COMMON/COEFF1/

1) BET12B - $(\beta_i)^{n+1/2}_{j-1/2}$

2) BET22B - $(\beta_e)^{n+1/2}_{j-1/2}$

Beta Vector

3) AL112B - $(\alpha_{11})^{n+1/2}_{j-1/2}$

4) A1222B - $(\alpha_{22})^{n+1/2}_{j-1/2}$

Diagonal Elements of Alpha Matrix

5) OM112B - $(\omega_{11})^{n+1/2}_{j-1/2}$

6) OM222B - $(\omega_{22})^{n+1/2}_{j-1/2}$

Diagonal Elements of Omega Matrix

7) GM112B - $(\gamma_{11})^{n+1/2}_{j-1/2}$

8) GM222B - $(\gamma_{22})^{n+1/2}_{j-1/2}$

Diagonal Elements of Gamma Matrix

9) AA111B - $(a_{11})^{n+1/2}_{j}$

10) AA221B - $(a_{22})^{n+1/2}_{j}$

Diagonal Elements of "A" Matrix

11) OM122B - $(\omega_{12})^{n+1/2}_{j-1/2}$

12) OM212B - $(\omega_{21})^{n+1/2}_{j-1/2}$

OFF Diagonal Elements of Omega Matrix

COMMON/COEFF2/

1) E11 - (E_{11})
2) E12 - (E_{12}) — All Elements of the "E" Matrix
3) E21 - (E_{21})
4) E22 - (E_{22})
5) F1 - (F_1) — Both Components of the "F" Vector
6) F2 - (F_2)
7) B11 - (B_{11}) — All Elements of the "B" Matrix
8) B12 - (B_{12})
9) B21 - (B_{21})
10) B22 - (B_{22})
11) D1 - (D_1) — Both Elements of the "D" Vector
12) D2 - (D_2)
13) EXTRA - An extra vector to make this common block long enough to store the information that must be used in order to do a binary write.

COMMON/ECKCOM/

1) T1A - $(T)_j^{n+1}$ kinetic energy of fluid (JK/□)

2) GGGE2A - $(G_e)_{j-1/2}^{n+1}$ electron-ion work to maintain charge neutrality (JK/□)

3) HHHE2B - $(H_e)_{j-1/2}^{n+1/2}$ electron heat source (JK/□)

4) HHHN2B - $(H_i)_{j-1/2}^{n+1/2}$ ion heat source (JK/□)

5) EEEC2A - $(E_c)_{j-1/2}^{n+1}$ electron ion collisional energy exchange (JK/□)

6) EEER2A - $(E_r)_{j-1/2}^{n+1}$ electron energy lost to radiation (JK/□)

7) EEEEEO - E_{e_o} total initial electron internal energy (JK/□)

8) EEEENO - E_{i_o} total initial ion internal energy (JK/□)

9) EEEEEE - $(E_e)^{n+1}$ total electron internal energy (JK/□)

10) EEEEEN - $(E_i)^{n+1}$ total ion internal energy (JK/□)

11) TTTTTTT - $(T)^{n+1}$ total fluid kinetic energy (JK/□)

12) HHHHHE - $(H_e)^{n+1}$ total electron heat source (JK/□)

13) HHHHHN - $(H_i)^{n+1}$ total ion heat source (JK/□)

14) EEEEEC - $(E_c)^{n+1}$ total electron-ion energy exchanged (JK/□)

15) GGGGGE - $(G_e)^{n+1}$ total work done to maintain neutrality (JK/□)

16) EEEEER - $(E_R)^{n+1}$ total energy lost to radiation (JK/□)

17) WWWWWE - $(W_e)^{n+1}$ total work done on electrons (JK/□)

18) WWWWWN - $(W_i)^{n+1}$ total work done on ions (JK/□)

19) FFFFE - $(F_e)^{n+1}$ total electron heat flux across outer boundary (JK/cm^2-sh)

20) FFFFFN - $(F_i)^{n+1}$ total ion heat flux across outer boundary (JK/cm^2-sh)

21) EEEER - $(e_R)^{n+1}$ total energy lost to radiation on last cycle (JK/□)

22) WWWWE - $(w_e)^{n+1}$ total work done on electrons on last cycle (JK/□)

23) WWWWN - $(w_i)^{n+1}$ total work done on ions on last cycle (JK/□)

24) FFFFE - $(f_e)^{n+1}$ total electron flux at outer bd. on last cycle (JK/cm^2-sh)

25) FFFFN - $(f_i)^{n+1}$ total ion flux at outer bd. on last cycle (JK/cm^2-sh)

26) HHHHE - $(h_e)^{n+1}$ total electron heat source on last cycle (JK/□)

27) HHHHN - $(h_i)^{n+1}$ total ion heat source on last cycle (JK/□)

28) EEEEC - $(e_c)^{n+1}$ total electron-ion heat exchange on last cycle (JK/□)

29) GGGGE - $(g_e)^{n+1}$ total work to maintain neutrality on last cycle (JK/□)

30) ENLHS - left side of ion energy balance equation (JK/□)

31) ETLHS - left side of total energy balance equation (JK/□)

32) EERHS - right side of electron energy balance equation (JK/□)

33) ENRHS - right side of ion energy balance equation (JK/□)

34) ETRHS - right side of total energy balance equation (JK/□)

where □ is	δ	□
	1	cm^2
	2	cm-radian
	3	sterradian

where * means mandatory input variable

** means input variable with a default value

III-D. List of Namelist Input Variables

1) IDELTA
2) JMAXM1
3) NMAX
4) TMAX
5) DTB
6) DE2B
7) DN2B
8) DR2C
9) ATW2B
10) TE2C
11) TN2C
12) IEDIT(1),(2),(3)
13) Z2B
14) IEDIT(20), . . .
15) DTMIN
16) DTMAX
17) K1
18) K2
19) K3
20) PBCT
21) PBCP
22) TBC
23) TEDIT
24) TGROW
25) CON
26) LASER
27) FLUXT
28) FLUXF
29) WAVEL
30) U1B
31) ITN
32) JTSTEP
33) ITERMX
34) ISW
35) IRS

(1)-(13) are required as input.

(14)-(34) have present default values which may be changed if they are included as input.

III-E. Adding a Subroutine to PHD

A subroutine can easily be added to PHD almost anywhere but should contain an implicit double precision statement at the beginning to insure that all floating point variables are double precision.

```
IMPLICIT REAL*8 (A-H, O-Z)
```

III-F. Adding a Variable to PHD

To add a variable to PHD requires changing several subroutines.

(1) The variable should preferably be added to the end of one of the named common blocks. If the variable is an integer, then one should keep in mind that the common blocks should be an even number of words long so that CLEAR can set them to zero by using double precision zeroes.

(2) The common block length in CLEAR should be changed so that the new variable will be zeroed at the beginning.

(3) The common block length in DUMP should be changed so that the new variable will be dumped at the end of the PHD calculation for the purposes of a possible restart.

(4) If it is an inputted variable, it must be added to the NAMELIST statement in INITIA.

IV. Users Manual

IV-A. Implementing the PHD Code

PHD uses a modest amount of memory and CPU time as compared to more sophisticated hydrodynamics codes. It uses 11000 words for variable storage and about an equal amount for object code, depending on the particular computer. In a typical pellet implosion calculation, it executed at the rate of .0028 CPU seconds/zone-cycle on a UNIVAC 1110 computer. These are well within the computer budgets of most university researchers.

For Input/Output PHD reads NAMELIST input from logical I/Ø unit 5 and writes BCD output to logical unit 6. DUMP does a binary write using unformatted FORTRAN write statements to logical I/Ø unit 2. This is read back into the common blocks by INITIA from logical I/Ø unit 4 using FORTRAN unformatted read. Units 2 and 4 must accomodate a record length as long as the longest common block, 3228 words.

There should be no language compatibility problems but the implicit double precision statements should be removed from all subroutines and the lengths of the common blocks must be adjusted when using a CDC6600 or 7600. The code was developed on a IBM/370/68 and a UNIVAC 1110, using the IBM FORTRAN G and H compiler and the UNIVAC FORTRAN V compiler. PHD includes approximately 3300 card images.

IV-B. Using the PHD Code

Units

The PHD code uses a modified CGS system of units. They are summarized in the following table.

length	centimeter
time	shake = 10^{-8} seconds
mass	gram
energy	jerk = 10^{16} ergs
temperature	Kev
k_B	.1602 x 10^{-24} Jerks/Kev

The input for PHD (VER001) is quite simple. It is in the FORTRAN NAMELIST form and the user should be familiar with this format before proceeding. The NAMELIST name is INPUT. The input variables follow, with their FORTRAN type and default values.

NAMELIST INPUT DESCRIPTION &INPUT

1- IDELTA (I*4) Default -none

Selects the type of geometry option

= 1 planar

= 2 cylindrical

= 3 spherical

2- JMAXM1 (I*4) Default - none

Number of spatial zones $3 \leq$ JMAXM1 ≤ 50

3- NMAX (I*4) Default - none

Maximum number of time steps

4- TMAX (R*8) Default - none

Maximum time limit of simulation units - Shakes = 10^{-8} seconds

5- DTB (R*8) Default - none

Initial time step

Units - Shake

6- DR2C (R*8 vector) Default - none

Δr for each spatial zone

units - centimeter

7- DN2B (R*8 vectors) Default - none

DE2B

Ion and electron number density for each zone

units - cm^{-3}

8- Z2B (R*8 vector) Default - none

Effective charge in each zone

units - electron charge unit

9- ATW2B (R*8 vector) Default - none

Effective atomic weight of ions in each zone

units - amu

10- TN2C (R*8 vectors) Default - none

TE2C

Ion and electron temperature in each zone

units - Kev

11- IEDIT (1), (2), (3), (I*4) Default - none

Output frequency for BCD output before time TEDIT, output frequency for BCD output after time TEDIT, and output frequency for binary output.

12- DTMIN (R*8) Default = 10^{-1}xDTB

Minimum allowable time step.

units - shake

13- DTMAX (R*8) Default = 10^{6}*DTB

Maximum allowable time step.

units - shake

14- PBCT (R*8 vectors) Default PBCP(1) = -10^{-14}

PBCP

Pressure boundary condition. If PBCP(1) < 0 then - PBCP(1) will be used as a constant pressure boundary condition throughout the calculation. Otherwise PBCT and PBCP can be used to set a piecewise linear pressure profile as a function of time where (PBCT(J), PBCP(J)) are sets of time-pressure points. Each of these vectors is 10 elements long.

units - Jerks/cm^3

15- TBC (R*8) Default = 0

Temperature boundary condition. If TBC = 0. then $\partial T/\partial r = 0.$ is the boundary condition maintained by the code. If TBC $\neq$ 0. then TBC is the constant temperature boundary condition used throughout the calculation.

units - Kev

16- K1 K2 K3 (R*8) Default .5

Multipliers for time step controls governing the Courant condition, change in specific volume, and change in temperature respectively.

17- TEDIT (R*8) Default - 0.

Before time TEDIT, IEDIT(1) is the BCD output cycle frequency and after time TEDIT, IEDIT(2) is the output frequency.

units - shakes

18- TGROW (R*8) Default - 1.5

Δt is allowed to increase by no more than this factor for any time step cycle.

19 - LASER (I*4) Default - 0

A switch to specify laser input. LASER = 0 means no laser input.
LASER = 1 means piece-wise linear laser pulse profile
LASER = 2 means Gaussian laser pulse profile
LASER = 3 means isentropic implosion pulse profile (see 20 for the laser pulse parameters).

20 - FLUXT (R*8) Default - 0
FLUXF

20 element vectors to specify the laser pulse parameters
for LASER = 1

FLUXT and FLUXF are time and power pairs making up a piece-wise profile
FLUXT(1) must be 0.DO.

units FLUXT (Jerks/cm^2-Shake)planar
FLUXF (Jerks/cm-Shake) cylindrical
(Jerks/Shake) spherical

for LASER = 2

$$\psi(t) = \psi(o)e^{\frac{-(t - t_o)^2}{2\sigma^2}}$$

FLUXT(1) = t_o
FLUXT(2) = $2\sigma^2$
FLUXF(1) = $\Psi(o)$

for LASER = 3

$$\Psi(t) = \Psi(o)\ (1 - t/t_o)^{-P}$$

FLUXT(1) t_o
FLUXT(2) P
FLUXF(1) $\psi(0)$
FLUXF(2) ψ_{MAX}

The pulse is turned off after a maximum power or intensity given by FLUXF(2) has been exceeded.

21 - WAVEL (R*8) Default - 1.06 D-4

Laser wavelength

units - centimeters

22- ITN (I*4) Default - 0

Switch to control thermonuclear burn calculation

= 0 off = 1 on.

(Thermonuclear burn has not been implemented yet).

23- U1B (R*8 vector) Default - 0.

The plasma's initial fluid velocity profile.

units - cm/shake

24- ITERMX (I*4) Default - 1

Maximum number of temperature iterations to perform. For ITERMX = 0 the temperature extrapolation procedure is used.

25- JTSTEP (I*4) Default (JMAX)

Maximum zone number to apply the time step control to. In some situations one wants to exclude the outer zones from this determination of the next time step.

26- IEDIT(20).n (I*4 vector) Default - -1

Output frequencies for intermediate variables.

IEDIT(20) Output frequency of A11, A22, B11, B12, B21, B22, C11, C22, D1, D2, E11, E12, E21, E22, F1, F2 in ABCDEF

IEDIT(21) Output frequency of AL112B, AL222B in MATRIX

IEDIT(22) " " " OM112B, OM122B, OM212B, OM222B in MATRIX

IEDIT(23) " " " GM112B, GM222B in MATRIX

IEDIT(24) " " " AA111B, AA221B in MATRIX

IEDIT(25) " " " BET12B, BET22B in MATRIX

IEDIT(26) " " " PET2B, PNT2B, EET2B, ENT2B in TDERIV

IEDIT(27) " " " TE2B, TN2B in TXTRAP

IEDIT(28) " " " OMC2B, LAME in OMEGAC

IEDIT(29) Output frequency of OMR2B in OMEGAR

IEDIT(30) " " " KAEM1B, KAEP1B, KANM1B, KANP1B, LAME, LAMN in KAPPA

IEDIT(31) " " " Y, EPS, EABS in EM

IEDIT(32) " " " TE, TE2A, TE2C in CONV

IEDIT(33) " " " U1B, R1A, R1B, DR2A, DR2B, RS1A, RS1B, V2A, V2B, VDOT2B in HYDRO

IEDIT(34) " " " not currently used

IEDIT(35) " " " Q2B in QUE

IEDIT(36) " " " T1(1) - T1(9), TE2A(JMAXP1), TN2A(JMAXP1) in TEMPBC

IEDIT(37) " " " DE2B, DN2B in NUMDEN

IEDIT(38) " " " DE2A, DN2A in NUMDEN

27- CON (R*8 vector) Default - see below

Constants used in the PHD code.

		Default
CON(1)	Coefficient for KANM1B, KANP1B	2.444D-5
CON(2)	" " KAEM1B, KAEP1B	4.923D-4
CON(3)	" " FLIM1B	.3445D-24
CON(4)	Lower temperature limit for allowed brem. radiation loss	1,000.DO
CON(5)	$\ln\Lambda$ = CON(5) if $\neq$ 0.	0.DO
CON(6)	Value of KAEM1B(2), KANM1B(2) if ISW(7) = 1	1.D-50
CON(7)	Coefficient for OMR2B	2.42D-48
CON(8)	" " OMC2B	605.9DO
CON(9)	" " PN2A	.1602D-24

Constants used in the PHD code		Default
CON(10)	Coefficient for PE2A	.1602D-24
CON(11)	" " PET2B	"
CON(12)	" " PNT2B	"
CON(13)	" " EET2B	.2403D-24
CON(14)	" " ENT2B	"
CON(15)	" " EN2A	"
CON(16)	" " EE2A	"
CON(17)	Convergence criteria for temperature iteration	.05D0
CON(18)	Coefficient for ion shock heating	1.D0
CON(19)	Fraction of laser energy dumped into first overdense zone	1.D0
CON(20)	Coefficient for KIB2B	1.34D-34
CON(21)	" " Q2B	1.414D0

28- ISW (I*4 vector) Default - see below

A vector of control switches that determine calculational options used in PHD.

ISW(1) = 0* Cv_e, Cv_i are constant, ≠ 0 not constant

ISW(2) Number of constant time steps at the beginning of the simulation = 10*

ISW(3) Treatment of laser absorption at the critical density = 1* dump the fraction, CON(19), in the first overdense zone and reflect the remaining light.

ISW(4) = 0* No electron thermal flux limit

= 1 Use conventional flux limit

ISW(5) Maximum zone # to look for maximum compression = 10*

ISW(6) = 0* Hydro motion is calculated =1 No hydro motion

ISW(7) = 0* Normal = 1 Always set KAEMIB(2) = KANMIB(2) = CON(6) for the purposes of simulating the back side of a slab.

(*) means the default value.

29 - IRS (I*4) Default - 0

For IRS = 1 we do a Restart calculation. INITIA reads the COMMON blocks back into core from UNIT 4 before reading NAMELIST input. See next section for an example.

List of NAMELIST Input Variables

(1) IDELTA
(2) JMAXM1
(3) NMAX
(4) TMAX
(5) DTB
(6) DE2B
(7) DN2B
(8) DR2C
(9) ATW2B
(10) Z2B
(11) TE2C
(12) TN2C
(13) IEDIT(1), (2), (3)
(14) IEDIT(20),n
(15) DTMIN
(16) DTMAX
(17) K1
(18) K2
(19) K3
(20) PBCT
(21) PBCP
(22) TBC
(23) TEDIT
(24) TGROW
(25) CON
(26) LASER
(27) FLUXT
(28) FLUXF
(29) WAVEL
(30) UIB
(31) ITN
(32) JTSTEP
(33) ITERMX
(34) ISW
(35) IRS

Running the PHD Code

To run the PHD code, the NAMELIST input typically takes the following form:

```
&INPUT IDELTA=3, JMAXM1=50, NMAX=500, TMAX=3.D0, DTB=1.D-5,
  DE2B=40*4.8184D22,5*9.637D20,5*1.927D20,
  DN2B=40*4.8184D22,5*9.637D20,5*1.927D20,
  ATW2B=50*2.5D0, Z2B=50*1.D0,
  TE2C=50*.0001D0, TN2C=50*.0001D0,
  DR2C=.0118,.0031,.0022,.0017,.0014,.0013,.0011,.0011,.0009,.0009,
       .0008,.0008,.0007,.0007,.0007,.0006,.0006,.0006,.0006,.0006,
       .0005,.0005,.0005,.0004,.0005,.0005,..0004,.0004,.0005,.0004,
       .0004,.0004,.0004,.0004,.0004,.0004,.0003,.0004,.0003,.0003,
       .0127,.0083,.0066,.0055,.0048,.0110,.0180,.0128,.0104,.0089,
  IEDIT=100,100,100,
  LASER=3, WAVEL=2.D-4,
  FLUXT(1)=2.9292929D0, FLUXT(2)=2.D0,
  FLUXF(1)=1.D-7, FLUXF(2)=8.D-3,
&END
```

To restart a PHD calculation, use the following input form:

(i) Presumably the previous calculation has stored the COMMON blocks in a file or tape attached to I/Ø unit 2. This file must now be attached to unit 4 and another file attached to unit 2. PHD reads this information from unit 4.

(ii) The BCD input read from unit 5 should be

&INPUT IRS = 1, &END

&INPUT NMAX = 800, TMAX = 5.DO, . . ., &END

INITIA will read the first NAMELIST input and will see that this is a restart calculation so it will call UNREAD to read the COMMON blocks from unit 4. Then it will do the second NAMELIST read from unit 5 to get the updated input values. Either NMAX or TMAX must be updated since at least one of these was exceeded on the previous calculation thus causing its termination.

Sample output takes the following form:

```
*************************************************************
*                                                           *
* PHC - A PLASMA HYDRODYNAMICS CODE(VER001) - G.A. MOSES    *
*                                                           *
*************************************************************
```

(1) SPHERICAL GEOMETRY - ENERGY QUANTITIES ARE PER STERRADIAN

NO. OF ZONES	50
OUTER RADIUS(CM)	1.3950-001
NO. OF TIME CYCLES	500
(2) MAX. PROBLEM TIME(SH)	3.0000+000
TIME STEP FOR FIRST 10 CYCLES(SH)	1.0000-005
MIN. TIME STEP(SH)	1.0000-006
MAX. TIME STEP(SH)	1.0000+001
TIME STEP GROWTH LIMIT	1.5000+000
TIME STEP CONTROL PARAMETERS	
COURANT	5.0000-001
PERCENT V CHANGE	5.0000-001
PERCENT T CHANGE	5.0000-001
OUTER LIMIT ZONE NO.	50

(3) ZERO TEMPERATURE GRADIENT AT THE OUTER BOUNDARY

PRESSURE BC.(JK/CM3)	1.0000-014

LASER OPTION = 3 COMPRESSION PULSE

TC(SH)	2.9293+000
P	2.0000+000
(4) SOURCE(0)(JK/STER-SH)	1.0000-007
SOURCE(MAX)(JK/STER-SH)	8.0000-003

LASER WAVELENGTH(CM) = 2.0000-004 CRITICAL DENSITY(1/CM3) = 2.7924+020

(5) CYCLE SUMMARY FREQUENCY = 100 UP TO TIME(SH) 0.0000-001
AFTER THIS TIME FREQ. = 100
BINARY SUMMARY FREQUENCY = 100

INTERMEDIATE VARIABLE FREQUENCIES

A11,ETC.	-1	AL112B,ETC.	-1	OM112B,ETC.	-1	GM112B,ETC.	-1	AA112B,ETC.	-1	BET12B,ETC.	-1
PET2B,ETC.	-1	YE2B,ETC.	-1	OMC2B	-1	OMR2B	-1	KAEMIB,ETC.	-1	Y,ETC.	-1
TE,ETC.	-1	UIB,ETC.	-1		-1	Q2B	-1	T1-T9,ETC.	-1	DE2B,ETC.	-1
DE2A,ETC.	-1										

(6)

*	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	MASS (G/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E TEMP (KEV)	ION TEMP (KEV)	ATOMIC WT (AMU)	CHARGE (ESU)
1	1.1800-002	1.1800-002	5.0000+000	1.0954-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000

2	1.4900-002	3.1000-003	5.0000+000	1.1099-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
3	1.7100-002	2.2000-003	5.0000+000	1.1282-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
4	1.8800-002	1.7000-003	5.0000+000	1.0963-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
5	2.0200-002	1.4000-003	5.0000+000	1.0652-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
6	2.1500-002	1.3000-003	5.0000+000	1.1306-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
7	2.2600-002	1.1000-003	5.0000+000	1.0699-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
8	2.3700-002	1.1000-003	5.0000+000	1.1793-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
9	2.4600-002	9.0000-004	5.0000+000	1.0499-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
10	2.5500-002	9.0000-004	5.0000+000	1.1296-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
11	2.6300-002	8.0000-004	5.0000+000	1.0734-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
12	2.7100-002	8.0000-004	5.0000+000	1.1407-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
13	2.7800-002	7.0000-004	5.0000+000	1.0550-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
14	2.8500-002	7.0000-004	5.0000+000	1.1094-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
15	2.9200-002	7.0000-004	5.0000+000	1.1653-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
16	2.9800-002	6.0000-004	5.0000+000	1.0443-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
17	3.0400-002	6.0000-004	5.0000+000	1.0872-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
18	3.1000-002	6.0000-004	5.0000+000	1.1310-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
19	3.1600-002	6.0000-004	5.0000+000	1.1757-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
20	3.2200-002	6.0000-004	5.0000+000	1.2212-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
21	3.2700-002	5.0000-004	5.0000+000	1.0530-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
22	3.3200-002	5.0000-004	5.0000+000	1.0857-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
23	3.3700-002	5.0000-004	5.0000+000	1.1189-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
24	3.4100-002	4.0000-004	5.0000+000	9.1938-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
25	3.4600-002	5.0000-004	5.0000+000	1.1799-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
26	3.5100-002	5.0000-004	5.0000+000	1.2145-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
27	3.5500-002	4.0000-004	5.0000+000	9.9688-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
28	3.5900-002	4.0000-004	5.0000+000	1.0196-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
29	3.6400-002	5.0000-004	5.0000+000	1.3068-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
30	3.6800-002	4.0000-004	5.0000+000	1.0717-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
31	3.7200-002	4.0000-004	5.0000+000	1.0952-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
32	3.7600-002	4.0000-004	5.0000+000	1.1190-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
33	3.8000-002	4.0000-004	5.0000+000	1.1431-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
34	3.8400-002	4.0000-004	5.0000+000	1.1674-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
35	3.8800-002	4.0000-004	5.0000+000	1.1920-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
36	3.9200-002	4.0000-004	5.0000+000	1.2168-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
37	3.9500-002	3.0000-004	5.0000+000	9.2906-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
38	3.9900-002	4.0000-004	5.0000+000	1.2409-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
39	4.0200-002	3.0000-004	5.0000+000	9.6241-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
40	4.0500-002	3.0000-004	5.0000+000	9.7688-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
41	5.3200-002	1.2700-002	2.4999+002	1.1219-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
42	6.1500-002	8.3000-003	2.4999+002	1.0939-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
43	6.8100-002	6.6000-003	2.4999+002	1.1095-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
44	7.3600-002	5.5000-003	2.4999+002	1.1049-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
45	7.8400-002	4.8000-003	2.4999+002	1.1094-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
46	8.9400-002	1.1000-002	1.2502+003	6.2022-008	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
47	1.0740-001	1.8000-002	1.2502+003	1.3979-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
48	1.2020-001	1.2800-002	1.2502+003	1.3273-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
49	1.3060-001	1.0400-002	1.2502+003	1.3088-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
50	1.3950-001	8.9000-003	1.2502+003	1.2988-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000

#	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	E INT ENE (JK/STER)	ION INT ENE (JK/STER)	VELOCITY (CM/SH)
1	7.7191-007	7.7191-007	6.3413-013	6.3413-013	0.0000-001
2	7.7191-007	7.7191-007	6.4258-013	6.4258-013	0.0000-001
3	7.7191-007	7.7191-007	6.5314-013	6.5314-013	0.0000-001
4	7.7191-007	7.7191-007	6.3469-013	6.3469-013	0.0000-001

5	7.7191-007	7.7191-007	6.1665-013	6.1665-013	0.0000-001
6	7.7191-007	7.7191-007	6.5456-013	6.5456-013	0.0000-001
7	7.7191-007	7.7191-007	6.1938-013	6.1938-013	0.0000-001
8	7.7191-007	7.7191-007	6.8270-013	6.8270-013	0.0000-001
9	7.7191-007	7.7191-007	6.0783-013	6.0783-013	0.0000-001
10	7.7191-007	7.7191-007	6.5398-013	6.5398-013	0.0000-001
11	7.7191-007	7.7191-007	6.2141-013	6.2141-013	0.0000-001
12	7.7191-007	7.7191-007	6.6039-013	6.6039-013	0.0000-001
13	7.7191-007	7.7191-007	6.1075-013	6.1075-013	0.0000-001
14	7.7191-007	7.7191-007	6.4229-013	6.4229-013	0.0000-001
15	7.7191-007	7.7191-007	6.7463-013	6.7463-013	0.0000-001
16	7.7191-007	7.7191-007	6.0460-013	6.0460-013	0.0000-001
17	7.7191-007	7.7191-007	6.2944-013	6.2944-013	0.0000-001
18	7.7191-007	7.7191-007	6.5478-013	6.5478-013	0.0000-001
19	7.7191-007	7.7191-007	6.8063-013	6.8063-013	0.0000-001
20	7.7191-007	7.7191-007	7.0697-013	7.0697-013	0.0000-001
21	7.7191-007	7.7191-007	6.0963-013	6.0963-013	0.0000-001
22	7.7191-007	7.7191-007	6.2856-013	6.2856-013	0.0000-001
23	7.7191-007	7.7191-007	6.4778-013	6.4778-013	0.0000-001
24	7.7191-007	7.7191-007	5.3226-013	5.3226-013	0.0000-001
25	7.7191-007	7.7191-007	6.8311-013	6.8311-013	0.0000-001
26	7.7191-007	7.7191-007	7.0314-013	7.0314-013	0.0000-001
27	7.7191-007	7.7191-007	5.7713-013	5.7713-013	0.0000-001
28	7.7191-007	7.7191-007	5.9028-013	5.9028-013	0.0000-001
29	7.7191-007	7.7191-007	7.5657-013	7.5657-013	0.0000-001
30	7.7191-007	7.7191-007	6.2042-013	6.2042-013	0.0000-001
31	7.7191-007	7.7191-007	6.3405-013	6.3405-013	0.0000-001
32	7.7191-007	7.7191-007	6.4783-013	6.4783-013	0.0000-001
33	7.7191-007	7.7191-007	6.6177-013	6.6177-013	0.0000-001
34	7.7191-007	7.7191-007	6.7585-013	6.7585-013	0.0000-001
35	7.7191-007	7.7191-007	6.9007-013	6.9007-013	0.0000-001
36	7.7191-007	7.7191-007	7.0445-013	7.0445-013	0.0000-001
37	7.7191-007	7.7191-007	5.3786-013	5.3786-013	0.0000-001
38	7.7191-007	7.7191-007	7.2996-013	7.2996-013	0.0000-001
39	7.7191-007	7.7191-007	5.5717-013	5.5717-013	0.0000-001
40	7.7191-007	7.7191-007	5.6554-013	5.6554-013	0.0000-001
41	1.5438-008	1.5438-008	6.4949-013	6.4949-013	0.0000-001
42	1.5438-008	1.5438-008	6.3328-013	6.3328-013	0.0000-001
43	1.5438-008	1.5438-008	6.4234-013	6.4234-013	0.0000-001
44	1.5438-008	1.5438-008	6.3967-013	6.3967-013	0.0000-001
45	1.5438-008	1.5438-008	6.4226-013	6.4226-013	0.0000-001
46	3.0871-009	3.0871-009	3.5907-013	3.5907-013	0.0000-001
47	3.0871-009	3.0871-009	8.0930-013	8.0930-013	0.0000-001
48	3.0871-009	3.0871-009	7.6840-013	7.6840-013	0.0000-001
49	3.0871-009	3.0871-009	7.5773-013	7.5773-013	0.0000-001
50	3.0871-009	3.0871-009	7.5192-013	7.5192-013	0.0000-001

(7)

COEFFICIENTS USED IN PHD

ION THERMAL COND.....	2.4440-005	E THERMAL COND.....	4.9210-004
E FLUX LIMIT.....	3.4450-025	BREM RAD LOSS TEMP(KEV)..	1.0000+003
CONST LOG LAMBDA.....	0.0000-001	THERMAL COND OF 1ST ZONE.	1.0000-050
RAD LOSS TERM.....	2.4200-048	E-ION EXCHANGE TERM.....	6.0590+002
ION PRESS(I.GAS).....	1.6020-025	E PRESS(I.GAS).....	1.6020-025
E PRESS DERIV.....	1.6020-025	ION PRESS DERIV.....	1.6020-025
E SP HEAT.....	2.4030-025	ION SP HEAT.....	2.4030-025

ION INT ENERGY(I.GAS)....	2.4030-025	E INT ENERGY(I.GAS).....	2.4030-025
TEMP ITERATION CONVERGENCE	5.0000-002	ION SHOCK HEATING.....	1.0000+000
FRACTION OF LASER DUMPED.	1.0000+000	INVERSE BREMSSTRAHLUNG...	1.3700-034
ARTIFICIAL VISCOSITY.....	1.4140+000		

(8) CALCULATION OPTIONS USED IN PHD

NO. OF TEMP ITERATIONS...	1	CONSTANT SP HEAT.....	0
NO. OF CONST TIME STEPS..	10	LASER ABS. AT N-CRIT....	1
FLUX LIMITING.....	0	MAX ZONE FOR COMPRESSION.	11
HYDRODYNAMIC MOTION.....	0	ALTER TH COND IN 1ST ZONE	0

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (40) OTHERWISE (COUR) IN ZONE (40)
100	1.1581+000	8.5055-003	

*	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.1800-002	1.1800-002	5.0000+000	1.0000+000	-4.4420-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	7.8902-030
2	1.4900-002	3.1000-003	5.0000+000	1.0000+000	-1.5838-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	5.1934-029
3	1.7100-002	2.2000-003	5.0000+000	1.0000+000	1.7342-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
4	1.8800-002	1.7000-003	5.0000+000	1.0000+000	4.6621-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
5	2.0200-002	1.4000-003	5.0000+000	1.0000+000	-3.9955-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.9972-029
6	2.1500-002	1.3000-003	5.0000+000	1.0000+000	-3.3199-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
7	2.2600-002	1.1000-003	5.0000+000	1.0000+000	-3.6910-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	5.5078-032
8	2.3700-002	1.1000-003	5.0000+000	1.0000+000	8.0993-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
9	2.4600-002	9.0000-004	5.0000+000	1.0000+000	1.3544-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
10	2.5500-002	9.0000-004	5.0000+000	1.0000+000	5.9701-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.2940-029
11	2.6300-002	8.0000-004	5.0000+000	1.0000+000	-8.1817-017	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.4646-029
12	2.7100-002	8.0000-004	5.0000+000	1.0000+000	-5.1173-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.0139-029
13	2.7800-002	7.0000-004	5.0000+000	1.0000+000	-5.8988-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.4428-031
14	2.8500-002	7.0000-004	5.0000+000	1.0000+000	-7.8190-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.4744-030
15	2.9200-002	7.0000-004	5.0000+000	1.0000+000	-4.1480-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
16	2.9800-002	6.0000-004	5.0000+000	1.0000+000	-3.8684-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
17	3.0400-002	6.0000-004	5.0000+000	1.0000+000	-1.3185-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
18	3.1000-002	6.0000-004	5.0000+000	1.0000+000	3.2850-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
19	3.1600-002	6.0000-004	5.0000+000	1.0000+000	1.2526-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
20	3.2200-002	6.0000-004	5.0000+000	1.0000+000	4.0333-013	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
21	3.2700-002	5.0000-004	5.0000+000	1.0000+000	9.0120-012	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
22	3.3200-002	5.0000-004	5.0000+000	1.0000+000	1.6188-010	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
23	3.3700-002	5.0000-004	5.0000+000	1.0000+000	2.4881-009	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
24	3.4100-002	4.0000-004	5.0000+000	1.0000+000	2.4056-008	1.0000-004	1.0000-004	7.7190-007	7.7190-007	0.0000-001
25	3.4600-002	5.0001-004	5.0001+000	9.9998-001	2.4216-007	9.9998-005	9.9998-005	7.7188-007	7.7188-007	0.0000-001
26	3.5100-002	5.0011-004	5.0011+000	9.9978-001	2.0949-006	9.9985-005	9.9985-005	7.7162-007	7.7162-007	0.0000-001
27	3.5501-002	4.0060-004	5.0077+000	9.9847-001	1.0775-005	9.9898-005	9.9898-005	7.6994-007	7.6994-007	0.0000-001
28	3.5903-002	4.0254-004	5.0323+000	9.9358-001	4.0886-005	9.9572-005	9.9572-005	7.6367-007	7.6367-007	0.0000-001
29	3.6415-002	5.1145-004	5.1170+000	9.7713-001	1.4639-004	9.8470-005	9.8470-005	7.4271-007	7.4271-007	0.0000-001
30	3.6842-002	4.2704-004	5.3463+000	9.3523-001	3.2046-004	9.5634-005	9.5634-005	6.9039-007	6.9039-007	0.0000-001
31	3.7295-002	4.5347-004	5.6894+000	8.7682-001	5.6669-004	9.1749-005	9.1749-005	6.2239-007	6.2239-007	0.0000-001
32	3.7786-002	4.9087-004	6.1821+000	8.0876-001	8.6593-004	8.6807-005	8.6807-005	5.4194-007	5.4194-007	0.0000-001
33	3.8326-002	5.3979-004	6.8391+000	7.3109-001	1.2069-003	8.1155-005	8.1155-005	4.5798-007	4.5798-007	0.0000-001
34	3.8927-002	6.0269-004	7.7031+000	6.4909-001	1.5885-003	7.4967-005	7.4967-005	3.7561-007	3.7561-007	0.0000-001
35	3.9613-002	6.8490-004	8.8617+000	5.6423-001	1.9747-003	6.8282-005	6.8282-005	2.9739-007	2.9739-007	0.0000-001
36	4.0361-002	7.4709-004	9.9175+000	5.0330-001	-6.9399-004	6.7918-005	6.7918-005	2.6701-007	2.6701-007	1.4289-006

42	4.3377-004	0.0000-001	4.1169-004
43	4.3377-004	0.0000-001	3.0730-004
44	4.3378-004	0.0000-001	2.8396-004
45	4.3378-004	0.0000-001	1.9497-004
46	4.3378-004	0.0000-001	1.4053-004
47	4.3378-004	0.0000-001	8.3707-005
48	4.3378-004	0.0000-001	4.7713-005
49	4.3378-004	0.0000-001	1.3296-005
50	4.3378-004	0.0000-001	8.7144-007

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	7.8646-007	1.5188-006	8.9357-016	-8.3763-023	0.0000-001	-1.5204-007	1.3645-008	6.1018-019	-7.3502-024	0.0000-001
I	2.6533-008	0.0000-001	8.9357-016	4.2256-025	-5.8921-007	7.0377-007	0.0000-001	6.1018-019	7.0670-034	-8.5748-010

	EI WORK	INT ENE(0)
E	-4.2805-009	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	7.8646-007	7.7757-007
ION	7.3030-007	7.4128-007
TOTAL	1.5168-006	1.5188-006

(9) CYCLE 700 (10) TIME(SH) 2.9094+000 (11) DELTA T(SH) 1.7446-004 (12) CRITERION(COUR) IN ZONE (17) OTHERWISE (COUR) IN ZONE (17) (13)

#	(14) RADIUS (CM)	(15) ZONE WIDTH (CM)	(16) SP VOLUME (CM3/G)	(17) COMPRESSION (VO/V)	(18) VELOCITY (CM/SH)	(19) E TEMP (KEV)	(20) ION TEMP (KEV)	(21) E PRESS (JK/CM3)	(22) ION PRESS (JK/CM3)	(23) ART VISC (JK/CM3)
1	3.5463-003	3.5463-003	1.3573-001	3.6839+001	-8.7457-002	1.1222-001	1.1245-001	3.1912-002	3.1977-002	1.1195-001
2	3.6911-003	1.4482-004	1.7088-002	2.9260+002	-1.0485-001	7.0655-002	7.0658-002	1.5958-001	1.5959-001	3.4853-002
3	3.7863-003	9.5120-005	1.1786-002	4.2424+002	-1.0268-001	6.4330-002	6.4330-002	2.1066-001	2.1066-001	7.9682-004
4	3.8581-003	7.1858-005	9.5759-003	5.2214+002	-1.0079-001	6.2846-002	6.2846-002	2.5330-001	2.5330-001	7.4075-004
5	3.9158-003	5.7716-005	8.1868-003	6.1074+002	-1.0626-001	5.9502-002	5.9502-002	2.8051-001	2.8051-001	7.2012-003
6	3.9700-003	5.4186-005	7.4508-003	6.7107+002	-1.0851-001	6.0979-002	6.0979-002	3.1587-001	3.1587-001	1.3575-003
7	4.0139-003	4.3837-005	6.5295-003	7.6576+002	-1.0950-001	6.0999-002	6.0999-002	3.6056-001	3.6056-001	2.9454-004
8	4.0594-003	4.5493-005	6.2861-003	7.9541+002	-1.1417-001	6.6970-002	6.6970-002	4.1119-001	4.1119-001	6.8582-003
9	4.0947-003	3.5376-005	5.6008-003	8.9273+002	-1.1700-001	6.6520-002	6.6520-002	4.5840-001	4.5840-001	2.8222-003
10	4.1322-003	3.7455-005	5.6104-003	8.9120+002	-1.1756-001	7.0791-002	7.0791-002	4.8699-001	4.8699-001	1.0841-004
11	4.1650-003	3.3589-005	5.3868-003	9.2819+002	-1.1720-001	6.9892-002	6.9892-002	5.0076-001	5.0076-001	4.7188-005
12	4.2019-003	3.6115-005	5.5419-003	9.0221+002	-1.1681-001	7.2863-002	7.2863-002	5.0744-001	5.0744-001	5.3227-005
13	4.2327-003	3.0837-005	5.1989-003	9.6174+002	-1.1738-001	7.0209-002	7.0208-002	5.2121-001	5.2121-001	1.2375-004
14	4.2648-003	3.2057-005	5.2160-003	9.5859+002	-1.1984-001	7.5083-002	7.5084-002	5.5557-001	5.5557-001	2.2917-003
15	4.2976-003	3.2807-005	5.1601-003	9.6897+002	-1.2317-001	7.9985-002	7.9986-002	5.9825-001	5.9825-001	4.2297-003
16	4.3243-003	2.6731-005	4.7568-003	1.0511+003	-1.2532-001	7.7609-002	7.7609-002	6.2970-001	6.2970-001	1.9248-003
17	4.3510-003	2.6708-005	4.6220-003	1.0818+003	-1.2632-001	7.7752-002	7.7752-002	6.4925-001	6.4925-001	4.2560-004
18	4.3787-003	2.7701-005	4.6663-003	1.0715+003	-1.2637-001	7.9658-002	7.9658-002	6.5886-001	6.5886-001	1.2389-006
19	4.4080-003	2.9265-005	4.8046-003	1.0407+003	-1.2627-001	8.2167-002	8.2167-002	6.6005-001	6.6005-001	4.3058-006
20	4.4391-003	3.1117-005	4.9862-003	1.0028+003	-1.2604-001	8.5202-002	8.5202-002	6.5950-001	6.5949-001	2.1508-005
21	4.4753-003	3.6209-005	6.8315-003	7.3191+002	-1.0991-001	1.1872-001	1.1849-001	6.7076-001	6.6941-001	0.0000-001
22	4.9165-003	4.4121-004	8.9680-002	5.5754+001	1.7934-001	1.5575+000	1.2432+000	6.7032-001	5.3502-001	0.0000-001
23	6.7493-003	1.8327-003	5.6186-001	8.8990+000	6.5784-001	5.4903+000	1.8058+000	3.7714-001	1.2404-001	0.0000-001

24	9.3945-003	2.6452-003	1.8914+000	2.6435+000	8.9414-001	7.4924+000	1.4154+000	1.5288-001	2.8882-002	0.0000-001
25	1.4355-002	4.9607-003	6.0146+000	8.3131-001	1.1790+000	8.8583+000	9.2897-001	5.6844-002	5.9611-003	0.0000-001
26	2.1592-002	7.2368-003	1.9509+001	2.5629-001	1.3435+000	9.7590+000	5.6044-001	1.9307-002	1.1087-003	0.0000-001
27	2.8582-002	6.9896-003	4.4412+001	1.1258-001	1.4194+000	1.0232+001	3.9798-001	8.8922-003	3.4586-004	0.0000-001
28	3.7226-002	8.6448-003	9.2323+001	5.4158-002	1.4708+000	1.0541+001	3.0005-001	4.4066-003	1.2544-004	0.0000-001
29	5.5398-002	1.8172-002	3.0206+002	1.6553-002	1.4988+000	1.0865+001	1.6154-001	1.3882-003	2.0640-005	0.0000-001
30	7.1516-002	1.6118-002	6.0691+002	8.2114-003	1.5165+000	1.1060+001	1.2629-001	7.0103-004	8.0051-006	0.0000-001
31	9.5817-002	2.4301-002	1.5641+003	3.1966-003	1.4363+000	1.0970+001	8.0901-002	2.7068-004	1.9962-006	0.0000-001
32	1.2416-001	2.8341-002	3.0809+003	1.6229-003	1.3053+000	1.0906+001	6.2343-002	1.3662-004	7.8099-007	0.0000-001
33	1.5547-001	3.1307-002	5.3760+003	9.3006-004	1.1889+000	1.0864+001	5.2204-002	7.7996-005	3.7478-007	0.0000-001
34	1.8987-001	3.4407-002	8.8163+003	5.6713-004	1.1001+000	1.0836+001	4.5708-002	4.7436-005	2.0010-007	0.0000-001
35	2.2926-001	3.9390-002	1.4556+004	3.4350-004	9.8753-001	1.0815+001	3.9528-002	2.8677-005	1.0481-007	0.0000-001
36	2.6664-001	3.7380-002	1.8922+004	2.6424-004	8.7547-001	1.0802+001	4.0324-002	2.2032-005	8.2248-008	0.0000-001
37	2.9712-001	3.0482-002	2.6095+004	1.9161-004	8.3997-001	1.0794+001	3.8221-002	1.5964-005	5.6529-008	0.0000-001
38	3.3572-001	3.8596-002	3.0686+004	1.6294-004	6.5795-001	1.0787+001	3.9500-002	1.3568-005	4.9682-008	0.0000-001
39	3.6160-001	2.5881-002	3.2706+004	1.5288-004	5.7911-001	1.0783+001	4.3697-002	1.2725-005	5.1566-008	0.0000-001
40	3.8322-001	2.1618-002	3.0700+004	1.6287-004	5.2395-001	1.0780+001	5.3379-002	1.3553-005	6.7108-008	0.0000-001
41	4.0622-001	2.2998-002	3.1948+004	7.8250-003	4.4927-001	1.0778+001	7.1113-002	1.3021-005	8.5909-008	3.4898-007
42	4.2685-001	2.0633-002	3.2732+004	7.6377-003	4.6507-001	1.0777+001	6.5837-002	1.2707-005	7.7631-008	0.0000-001
43	4.4849-001	2.1642-002	3.7372+004	6.6894-003	4.3531-001	1.0775+001	6.2249-002	1.1128-005	6.4287-008	0.0000-001
44	4.7012-001	2.1626-002	4.1299+004	6.0534-003	4.8366-001	1.0774+001	6.1046-002	1.0069-005	5.7050-008	0.0000-001
45	4.9276-001	2.2641-002	4.7313+004	5.2839-003	4.8656-001	1.0774+001	5.9034-002	8.7886-006	4.8157-008	0.0000-001
46	5.0743-001	1.4669-002	5.9156+004	2.1134-002	4.9999-001	1.0773+001	5.2623-002	7.0287-006	3.4333-008	0.0000-001
47	5.4385-001	3.6417-002	7.2006+004	1.7363-002	4.6526-001	1.0772+001	4.7087-002	5.7741-006	2.5239-008	0.0000-001
48	5.8541-001	4.1564-002	9.9879+004	1.2518-002	5.2009-001	1.0772+001	4.0811-002	4.1625-006	1.5770-008	0.0000-001
49	6.4956-001	6.4156-002	1.8707+005	6.6834-003	5.4190-001	1.0771+001	2.8457-002	2.2223-006	5.8712-009	0.0000-001
50	8.2619-001	1.7662-001	7.4394+005	1.6806-003	5.6419-001	1.0771+001	1.1962-002	5.5879-007	6.2061-010	0.0000-001
						1.0771+001	1.1962-002	1.0000-014		

#	(24) E ENERGY (JK/STER)	(25) ION ENERGY (JK/STER)	(26) KIN ENERGY (JK/STER)	(27) E SOURCE (JK/STER)	(28) ION SOURCE (JK/STER)	(29) E-ION EX (JK/STER)	(30) E DENSITY (1/CM3)	(31) ION DENSITY (1/CM3)	(32) E FLUX (JK/CM2-SH)	(33) FLUX LIMIT (JK/CM2-SH)
1	7.1165-010	7.1310-010	4.2169-010	0.0000-001	0.0000-001	1.0702-011	1.7751+024	1.7751+024	2.5205-006	0.0000-001
2	4.5402-010	4.5403-010	6.1508-010	0.0000-001	0.0000-001	1.0122-012	1.4099+025	1.4099+025	5.3069-006	0.0000-001
3	4.2016-010	4.2016-010	5.8629-010	0.0000-001	0.0000-001	-4.4778-016	2.0442+025	2.0442+025	1.7413-006	0.0000-001
4	3.9887-010	3.9887-010	5.4895-010	0.0000-001	0.0000-001	5.6203-015	2.5159+025	2.5159+025	5.1113-006	0.0000-001
5	3.6692-010	3.6692-010	6.1979-010	0.0000-001	0.0000-001	7.3112-014	2.9428+025	2.9428+025	-2.4680-006	0.0000-001
6	3.9915-010	3.9915-010	6.4780-010	0.0000-001	0.0000-001	1.2251-014	3.2335+025	3.2335+025	-1.5199-007	0.0000-001
7	3.7781-010	3.7781-010	6.7417-010	0.0000-001	0.0000-001	-1.3000-014	3.6897+025	3.6897+025	-1.2241-005	0.0000-001
8	4.5721-010	4.5721-010	7.2648-010	0.0000-001	0.0000-001	8.6381-014	3.8326+025	3.8326+025	9.6522-007	0.0000-001
9	4.0433-010	4.0433-010	7.4593-010	0.0000-001	0.0000-001	8.6867-016	4.3016+025	4.3016+025	-1.4457-005	0.0000-001
10	4.6296-010	4.6296-010	7.6111-010	0.0000-001	0.0000-001	2.1923-014	4.2942+025	4.2942+025	2.8341-006	0.0000-001
11	4.3432-010	4.3432-010	7.6030-010	0.0000-001	0.0000-001	-1.7895-014	4.4724+025	4.4724+025	-1.1259-005	0.0000-001
12	4.8118-010	4.8118-010	7.4903-010	0.0000-001	0.0000-001	2.8861-014	4.3472+025	4.3472+025	1.0941-005	0.0000-001
13	4.2880-010	4.2860-010	7.4558-010	0.0000-001	0.0000-001	-3.9915-014	4.6340+025	4.6340+025	-1.9688-005	0.0000-001
14	4.8226-010	4.8226-010	8.1677-010	0.0000-001	0.0000-001	1.0901-014	4.6189+025	4.6189+025	-2.2751-005	0.0000-001
15	5.3961-010	5.3961-010	8.3805-010	0.0000-001	0.0000-001	8.2836-014	4.6689+025	4.6689+025	1.2354-005	0.0000-001
16	4.6922-010	4.6922-010	8.3695-010	0.0000-001	0.0000-001	-7.9474-015	5.0647+025	5.0647+025	-1.9652-006	0.0000-001
17	4.8940-010	4.8940-010	8.8489-010	0.0000-001	0.0000-001	-1.3118-014	5.2124+025	5.2124+025	-1.2575-005	0.0000-001
18	5.2159-010	5.2159-010	9.2094-010	0.0000-001	0.0000-001	-5.0200-015	5.1630+025	5.1630+025	-1.5954-005	0.0000-001
19	5.5925-010	5.5925-010	9.5539-010	0.0000-001	0.0000-001	-5.4993-015	5.0144+025	5.0144+025	-1.9584-005	0.0000-001
20	6.0235-010	6.0235-010	9.0317-010	0.0000-001	0.0000-001	-3.1057-013	4.8317+025	4.8317+025	-2.3261-004	0.0000-001
21	7.2377-010	7.2232-010	6.4566-010	0.0000-001	0.0000-001	-8.3236-011	3.5266+025	3.5266+025	-5.2418-002	0.0000-001
22	9.7901-009	7.8141-009	1.7727-009	0.0000-001	0.0000-001	-1.3370-009	2.6865+024	2.6865+024	-8.5758-001	0.0000-001
23	3.5565-008	1.1698-008	2.2052-008	0.0000-001	0.0000-001	-5.5942-010	4.2879+023	4.2879+023	-9.2630-001	0.0000-001
24	3.9879-008	7.5337-009	4.1960-008	0.0000-001	0.0000-001	-1.4681-010	1.2737+023	1.2737+023	-6.2678-001	0.0000-001
25	6.0512-008	6.3458-009	8.3216-008	0.0000-001	0.0000-001	-6.5192-011	4.0056+022	4.0056+022	-3.3759-001	0.0000-001

26	6.8619-008	3.9407-009	9.9784-008	0.0000-001	0.0000-001	-2.1483-011	1.2349+022	1.2349+022	-1.7325-001	0.0000-001
27	5.9053-008	2.2968-009	1.0156-007	0.0000-001	0.0000-001	-8.1252-012	5.4247+021	5.4247+021	-1.0809-001	0.0000-001
28	6.2221-008	1.7711-009	1.2582-007	0.0000-001	0.0000-001	-4.1048-012	2.6095+021	2.6095+021	-6.8454-002	0.0000-001
29	8.2198-008	1.2222-009	1.3357-007	0.0000-001	0.0000-001	-1.6644-012	7.9758+020	7.9758+020	-3.3130-002	0.0000-001
30	6.8618-008	7.8355-010	1.2458-007	2.9810-008	0.0000-001	-7.0088-013	3.9566+020	3.9566+020	1.2697-002	0.0000-001
31	6.9554-008	5.1295-010	1.1420-007	3.6482-011	0.0000-001	-2.8708-013	1.5403+020	1.5403+020	6.6157-003	0.0000-001
32	7.0653-008	4.0388-010	9.6355-008	1.1312-011	0.0000-001	-1.5297-013	7.8199+019	7.8199+019	3.6888-003	0.0000-001
33	7.1895-008	3.4547-010	8.1643-008	4.2492-012	0.0000-001	-9.2466-014	4.4814+019	4.4814+019	2.1998-003	0.0000-001
34	7.3233-008	3.0891-010	7.1379-008	1.7691-012	0.0000-001	-5.8576-014	2.7327+019	2.7327+019	1.3746-003	0.0000-001
35	7.4635-008	2.7277-010	5.8727-008	7.5161-013	0.0000-001	-3.6607-014	1.6551+019	1.6551+019	8.7595-004	0.0000-001
36	7.6094-008	2.8406-010	4.1117-008	4.2405-013	0.0000-001	-2.8848-014	1.2732+019	1.2732+019	5.9893-004	0.0000-001
37	5.8055-008	2.0557-010	3.8628-008	1.8340-013	0.0000-001	-1.6103-014	9.2324+018	9.2324+018	4.5228-004	0.0000-001
38	7.8742-008	2.8633-010	2.4062-008	1.6999-013	0.0000-001	-1.8801-014	7.8512+018	7.8512+018	3.2456-004	0.0000-001
39	6.0078-008	2.4347-010	1.6259-008	1.0081-013	0.0000-001	-1.3517-014	7.3663+018	7.3663+018	2.6008-004	0.0000-001
40	6.0967-008	3.0188-010	1.4404-008	9.5207-014	0.0000-001	-1.4546-014	7.8476+018	7.8476+018	2.1380-004	0.0000-001
41	7.0003-008	4.6187-010	1.1181-008	9.3781-014	0.0000-001	-1.6067-014	7.5410+018	7.5410+018	1.7246-004	0.0000-001
42	6.8247-008	4.1694-010	1.1914-008	8.0317-014	0.0000-001	-1.5327-014	7.3604+018	7.3604+018	1.3954-004	0.0000-001
43	6.9215-008	3.9905-010	1.0490-008	6.5123-014	0.0000-001	-1.3724-014	6.4465+018	6.4465+018	1.1161-004	0.0000-001
44	6.8921-008	3.9049-010	1.2950-008	5.3586-014	0.0000-001	-1.2437-014	5.8336+018	5.8336+018	8.7438-005	0.0000-001
45	6.9194-008	3.7915-010	1.0237-008	4.3007-014	0.0000-001	-1.0968-014	5.0921+018	5.0921+018	6.7063-005	0.0000-001
46	3.8682-008	1.8095-010	1.2613-008	1.7978-014	0.0000-001	-4.9492-015	4.0726+018	4.0726+018	5.6564-005	0.0000-001
47	8.7181-008	3.8108-010	1.4748-008	3.0300-014	0.0000-001	-9.2226-015	3.3458+018	3.3458+018	3.6532-005	0.0000-001
48	8.2771-008	3.1359-010	1.7826-008	1.8116-014	0.0000-001	-6.3663-015	2.4121+018	2.4121+018	2.0764-005	0.0000-001
49	8.1617-008	2.1562-010	1.9144-008	8.0441-015	0.0000-001	-3.3862-015	1.2879+018	1.2879+018	8.3720-006	0.0000-001
50	8.0989-008	8.9948-011	1.0335-008	1.4785-015	0.0000-001	-8.9349-016	3.2384+017	3.2384+017	0.0000-001	0.0000-001

#	(34) PSI -	(35) PSI +	(36) KIB(I/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	1.0849+009
2	0.0000-001	0.0000-001	5.8181+010
3	0.0000-001	0.0000-001	1.4034+011
4	0.0000-001	0.0000-001	2.2016+011
5	0.0000-001	0.0000-001	3.2703+011
6	0.0000-001	0.0000-001	3.8048+011
7	0.0000-001	0.0000-001	4.9522+011
8	0.0000-001	0.0000-001	4.6445+011
9	0.0000-001	0.0000-001	5.9103+011
10	0.0000-001	0.0000-001	5.3643+011
11	0.0000-001	0.0000-001	5.9327+011
12	0.0000-001	0.0000-001	5.2649+011
13	0.0000-001	0.0000-001	6.3268+011
14	0.0000-001	0.0000-001	5.6820+011
15	0.0000-001	0.0000-001	5.2792+011
16	0.0000-001	0.0000-001	6.5015+011
17	0.0000-001	0.0000-001	6.8675+011
18	0.0000-001	0.0000-001	6.4973+011
19	0.0000-001	0.0000-001	5.8501+011
20	0.0000-001	0.0000-001	5.1494+011
21	0.0000-001	0.0000-001	2.0676+011
22	0.0000-001	0.0000-001	1.7761+008
23	0.0000-001	0.0000-001	8.3802+005
24	0.0000-001	0.0000-001	4.6903+004
25	0.0000-001	0.0000-001	3.8712+003
26	0.0000-001	0.0000-001	3.2653+002
27	0.0000-001	0.0000-001	6.1544+001
28	0.0000-001	0.0000-001	1.4003+001
29	0.0000-001	0.0000-001	1.2918+000

30	2.1472-003	0.0000-001	3.2161-001
31	2.1498-003	0.0000-001	5.0316-002
32	2.1506-003	0.0000-001	1.3364-002
33	2.1509-003	0.0000-001	4.5441-003
34	2.1510-003	0.0000-001	1.7214-003
35	2.1511-003	0.0000-001	6.3877-004
36	2.1511-003	0.0000-001	3.7976-004
37	2.1511-003	0.0000-001	2.0145-004
38	2.1512-003	0.0000-001	1.4742-004
39	2.1512-003	0.0000-001	1.3039-004
40	2.1512-003	0.0000-001	1.4743-004
41	2.1512-003	0.0000-001	1.3650-004
42	2.1512-003	0.0000-001	1.3035-004
43	2.1512-003	0.0000-001	1.0074-004
44	2.1512-003	0.0000-001	8.2982-005
45	2.1512-003	0.0000-001	6.3602-005
46	2.1512-003	0.0000-001	4.1037-005
47	2.1512-003	0.0000-001	2.7856-005
48	2.1512-003	0.0000-001	1.4596-005
49	2.1512-003	0.0000-001	4.1984-006
50	2.1512-003	0.0000-001	2.8028-007

	(37) INT ENE	(38) I SOURCE	(39) BDWORK T	(40) BDFLUX T	(41) BREM/EIW T	(42) EIX/KE T	(43) SOURCE	(44) BDWORK	(45) BDFLUX	(46) BREM/EIX
E	1.9074-006	3.4106-006	9.3538-016	-7.5791-022	0.0000-001	-2.9042-007	2.9866-008	3.3589-019	-2.0124-023	0.0000-001
I	5.9995-008	0.0000-001	9.3538-016	4.2256-025	-1.2251-006	1.4379-006	0.0000-001	3.3589-019	9.1331-034	-2.2170-009

	(47) EI WORK	(48) INT LNE(0)
E	-1.0066-008	3.2292-011
I		3.2292-011

ENERGY CONSERVATION (49)

ELECTRON	1.9074-006	1.8951-006
ION	1.4979-006	1.5155-006
TOTAL	3.4053-006	3.4106-006

CYCLE 800 TIME(SH) 2.9210+000 DELTA T(SH) 9.4522-005 CRITERION(COUR) IN ZONE (7) OTHERWISE (COUR) IN ZONE (7)

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.6466-003	1.6466-003	1.3587-002	3.6800+002	-2.3908-001	3.1645+000	3.2235+000	8.9893+000	9.1568+000	8.2393+000
2	1.7009-003	5.4296-005	1.3706-003	3.6481+003	-2.3748-001	4.6098-001	4.6089-001	1.2981+001	1.2979+001	3.6803-003
3	1.7401-003	3.9144-005	1.0271-003	4.8680+003	-2.4154-001	3.3584-001	3.3584-001	1.2620+001	1.2620+001	3.1442-002
4	1.7733-003	3.3193-005	9.3436-004	5.3512+003	-2.4380-001	3.0017-001	3.0017-001	1.2399+001	1.2399+001	1.0790-002
5	1.8019-003	2.8614-005	8.5844-004	5.8245+003	-2.4408-001	2.7159-001	2.7159-001	1.2211+001	1.2211+001	1.7788-004
6	1.8310-003	2.9074-005	8.4884-004	5.8932+003	-2.4226-001	2.6039-001	2.6039-001	1.1845+001	1.1845+001	7.7519-003
7	1.8572-003	2.6205-005	8.3294-004	6.0028+003	-2.3842-001	2.4384-001	2.4384-001	1.1299+001	1.1299+001	3.5063-002
8	1.8875-003	3.0332-005	9.0170-004	5.5451+003	-2.2997-001	2.4297-001	2.4297-001	1.0400+001	1.0400+001	0.0000-001
9	1.9139-003	2.6379-005	9.0768-004	5.5180+003	-2.2413-001	2.2663-001	2.2663-001	9.6364+000	9.6364+000	7.5043-002
10	1.9439-003	2.9993-005	9.8787-004	5.0614+003	-2.1650-001	2.2406-001	2.2406-001	8.7536+000	8.7536+000	0.0000-001
11	1.9730-003	2.9083-005	1.0392-003	4.8114+003	-2.0857-001	2.1130-001	2.1130-001	7.8477+000	7.8477+000	0.0000-001

The first 8 descriptions are for the summary of the input.

(1) Indicate the geometry option and reminds the user that energy is measured per sterradian.

(2) Summarizes the number of spatial zones, time steps, initial time step, and other time step limiting parameters.

(3) Summarizes the outer boundary conditions for pressure and temperature.

(4) Summarizes the laser pulse option and the parameters for this pulse shape.

(5) Summarizes the cycle frequency of the primary output summaries and also the frequencies for intermediate variable output.

(6) Gives the values for the initial hydrodynamic variables and the finite difference mesh. Note that mass is measured in grams/sterradian.

(7) Gives the values of the physics constants used to calculate transport parameters, equations of state, etc. This is the CON vector.

(8) Summarizes the calculational options used. Except for "NO. OF TEMP ITERATIONS" this is the ISW vector.

(9) This is the cycle number to which this output pertains.

(10) This is the instantaneous time at the end of this cycle measured in shakes.

(11) This is the time step used on this cycle measured in shakes.

(12) This is the condition and zone limiting the time step on this cycle. This can be COUR $\Delta T/T$, $\Delta V/V$, MAX, or MIN.

(13) If the first constraint given in (12) was MAX or MIN, then this will give the most severe physical condition limiting the time step.

(14) This is the radius of the Langrangian zone boundaries on this cycle measured in centimeters.

(15) This is the zone width of the Lagrangian zones on this cycle measured in centimeters.

(16) This is the specific volume of each zone measured in cm^3/gram.

(17) This is the compression of each zone as compared to its initial density.

(18) This is the fluid velocity of each zone boundary measured in centimeters/shake.

(19) This is the electron temperature in each zone measured in KEV.

(20) This is the ion temperature in each zone measured in KEV.

(21) This is the electron pressure in each zone measured in Jerks/cm^3.

(22) This is the ion pressure in each zone measured in Jerks/cm^3.

(23) This is the Von Neumann artificial viscosity in each zone measured in Jerks/cm^3.

(24) This is the electron internal energy in each zone measured in Jerks/sterrandian for this spherical example problem.*

(25) This is the ion internal energy in each zone measured in Jerks/sterradian.*

(26) This is the kinetic energy due to fluid motion for each zone boundary measured in Jerks/sterradian.

(27) This is the energy source to the electrons in each zone measured in Jerks/ster.*

(28) This is the energy source to the ions in each zone measured in Jerks/ster.*

(29) This is the energy exchanged between electrons and ions in each zone measured in Jerks/ster.*

(30) This is the electron number density in each zone measured in cm^{-3}.

(31) This is the ion number density in each zone measured in cm^{-3}.

(32) This is the electron heat flux across each zone boundary measured in Jerks/cm^2/Shake.

(33) This is the electron heat flux limit on each zone boundary measured in Jerks/cm^2/Shake.

(34) This is the inward directed laser power on each zone boundary measured in Jerks/Shake for this spherical example problem.**

(35) This is the reflected, outward directed, laser power on each zone boundary measured in Jerks/Shake.**

(36) This is the inverse bremsstrahlung attenuation coefficient for each zone measured in inverse centimeters.

(37) This is the total internal energy of electrons/ions at this time measured in Jerks/ster for this spherical example problem.*

(38) This is the total source to electrons/ions up to this time measured in Jerks/ster.*

(39) This is the total work done by the electrons/ions on the outer boundary up to this time measured in Jerks/ster.* Since the pressure boundary condition is very small there is very little work done.

(40) This is the total electron/ion energy lost by their heat flux across the outer boundary up to this time, measured in Jerks/ster.*

(41) This is the bremsstrahlung radiation energy lost by the electrons up to this time and the work done on the electrons by the ions to maintain the one fluid approximation. Both are measured in Jerks/ster.*

(42) This is the total energy exchanged between electrons and ions up to this time and the total fluid kinetic energy at this time. Both are measured in Jerks/ster.

(43) This is the electron/ion source on this cycle measured in Jerks/ster.*

(44) This is the electron/ion work on the outer boundary on this cycle measured in Jerks/ster.*

(45) This is the electron/ion energy lost across the outer boundary on this cycle measured in Jerks/ster.*

(46) This is the bremsstrahlung loss and electron-ion energy exchange on this cycle measured in Jerks/ster.*

(47) This is the work done on electrons by the ions to maintain charge neutrality on this cycle measured in Jerks/ster.*

(48) This is the initial internal energy of electron/ion measured in Jerks/ster.

(49) This is the energy balance for electrons, ions and their sum. For proper energy conservation, the left and right numbers should be equal. They are measured in Jerks/ster.*

* For planar geometry these units are Jerks/cm^2

For cylindrical geometry these units are Jerks/cm·radian

** For planar geometry these units are Jerks/cm^2·Shake

For cylindrical geometry these units are Jerks/cm·Shake

EXAMPLE PROBLEM #1 - COMPRESSION OF SOLID SPHERE OF DT

The first example is the compression of a 400 μm radius solid sphere of DT. This example demonstrates the ability of PHD(VER001) to simulate the essential features of a laser driven compression. The maximim compression was 8879 times solid density and occurred at 29.239 nsec with a central ion temperature of 5.5997 Kev. Approximately 40% of the pellet mass remained in the compressed core and the total laser energy delivered was 82.4 kilojoules. The pellet initial conditions are summarized in the following table.

Pellet Initial Conditions

Region	I	II	III
Radii (μm)	0-405	405-784	784-1395
Density (cm^{-3})	4.8184×10^{22}	9.637×10^{20}	1.927×10^{20}
Temperature (Kev)	10^{-4}	10^{-4}	10^{-4}
Atomic Wt. (AMU)	2.5	2.5	2.5
Charge	1	1	1

The characteristic "isentropic implosion" laser pulse parameters are given in the following table.

Laser Pulse Parameters

$$\psi(t) = \psi(0)[1 - t/t_o]^{-P}$$

$$\psi(0) = 10^{-7} \text{Jerks/Shake} = 10^{-2} \text{ Terawatts}$$

$$t_o = 2.9293 \text{ Shakes} = 29.293 \text{ nanoseconds}$$

$$P = 2$$

$$\psi(MAX) = 8 \times 10^{-3} \text{ Jerks/Shake} = 800 \text{ Terawatts}$$

The laser power is cut off after the specified maximum power is reached. The actual input for this problem is reported on the next page.

```
&INPUT IDELTA=3, JMAXM1=50, NMAX=500, TMAX=3.D0, DTB=1.D-5,
  DE2B=40*4.8184D22,5*9.637D20,5*1.927D20,
  DN2B=40*4.8184D22,5*9.637D20,5*1.927D20,
  ATW2B=50*2.5D0, Z2B=50*1.D0,
  TE2C=50*.0001D0, TN2C=50*.0001D0,
  DR2C=.0118,.0031,.0022,.0017,.0014,.0013,.0011,.0011,.0009,.0009,
       .0008,.0008,.0007,.0007,.0007,.0006,.0006,.0006,.0006,.0006,
       .0005,.0005,.0005,.0004,.0005,.0005,..0004,.0004,.0005,.0004,
       .0004,.0004,.0004,.0004,.0004,.0004,.0003,.0004,.0003,.0003,
       .0127,.0083,.0066,.0055,.0048,.0110,.0180,.0128,.0104,.0089,
  IEDIT=100,100,100,
  LASER=3, WAVEL=2.D-4,
  FLUXT(1)=2.9292929D0, FLUXT(2)=2.D0,
  FLUXF(1)=1.D-7, FLUXF(2)=8.D-3,
&END
```

The output of selected cycles follows.

```
*************************************************************
*                                                           *
* LHE - A PLASMA HYDRODYNAMICS CODE(VERSION 1) - G.A. MOSES *
*                                                           *
*************************************************************
```

(1) SPHERICAL GEOMETRY - ENERGY QUANTITIES ARE PER STERRADIAN

NO. OF ZONES	50
OUTER RADIUS(CM)	1.3950-001

(2)

NO. OF TIME CYCLES	500
MAX. PROBLEM TIME(SH)	3.0000+000
TIME STEP FOR FIRST 10 CYCLES(SH)	1.0000-005
MIN. TIME STEP(SH)	1.0000-006
MAX. TIME STEP(SH)	1.0000+001
TIME STEP GROWTH LIMIT	1.5000+000
TIME STEP CONTROL PARAMETERS	
COURANT	5.0000-001
PERCENT V CHANGE	5.0000-001
PERCENT T CHANGE	5.0000-001
OUTER LIMIT ZONE NO.	50

(3) ZERO TEMPERATURE GRADIENT AT THE OUTER BOUNDARY

PRESSURE BC.(JK/CM3)	1.0000-014

LASER OPTION = 3 COMPRESSION PULSE

(4)

TC(SH)	2.9293+000
P	2.0000+000
SOURCE(0)(JK/STER-SH)	1.0000-007
SOURCE(MAX)(JK/STER-SH)	8.0000-003

LASER WAVELENGTH(CM) = 2.0000-004 CRITICAL DENSITY(I/CM3) = 2.7924+020

(5) CYCLE SUMMARY FREQUENCY = 100 UP TO TIME(SH) 0.0000-001
AFTER THIS TIME FREQ. = 100
BINARY SUMMARY FREQUENCY = 100

INTERMEDIATE VARIABLE FREQUENCIES

A11,ETC.	-1	AL112B,ETC.	-1	QM112B,ETC.	-1	GM112B,ETC.	-1	AA112B,ETC.	-1	BET12B,ETC.	-1
PET2B,ETC.	-1	TE2B,ETC.	-1	QMC2B	-1	QVR2B	-1	KAEM1B,ETC.	-1	Y,ETC.	-1
TE,ETC.	-1	U1B,ETC.	-1		-1	Q2B	-1	T1-T9,ETC.	-1	DE2B,ETC.	-1
DE2A,ETC.	-1										

(6)

*	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	MASS (G/STER)	E DENSITY (I/CM3)	ION DENSITY	E TEMP (KEV)	ION TEMP (KEV)	ATOMIC WT (AMU)	CHARGE (ESU)
1	1.1800-002	1.1800-002	5.0000+000	1.0954-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000

2	1.4900-002	3.1000-003	5.0000+000	1.1099-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
3	1.7100-002	2.2000-003	5.0000+000	1.1282-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
4	1.8800-002	1.7000-003	5.0000+000	1.0663-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
5	2.0200-002	1.4000-003	5.0000+000	1.0653-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
6	2.1500-002	1.3000-003	5.0000+000	1.1306-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
7	2.2600-002	1.1000-003	5.0000+000	1.0699-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
8	2.3700-002	1.1000-003	5.0000+000	1.1793-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
9	2.4600-002	9.0000-004	5.0000+000	1.0499-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
10	2.5500-002	9.0000-004	5.0000+000	1.1296-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
11	2.6300-002	8.0000-004	5.0000+000	1.0734-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
12	2.7100-002	8.0000-004	5.0000+000	1.1407-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
13	2.7800-002	7.0000-004	5.0000+000	1.0550-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
14	2.8500-002	7.0000-004	5.0000+000	1.1094-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
15	2.9200-002	7.0000-004	5.0000+000	1.1653-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
16	2.9800-002	6.0000-004	5.0000+000	1.0443-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
17	3.0400-002	6.0000-004	5.0000+000	1.0872-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
18	3.1000-002	6.0000-004	5.0000+000	1.1318-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
19	3.1600-002	6.0000-004	5.0000+000	1.1757-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
20	3.2200-002	6.0000-004	5.0000+000	1.2212-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
21	3.2700-002	5.0000-004	5.0000+000	1.0530-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
22	3.3200-002	5.0000-004	5.0000+000	1.0857-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
23	3.3700-002	5.0000-004	5.0000+000	1.1189-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
24	3.4100-002	4.0000-004	5.0000+000	9.1938-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
25	3.4600-002	5.0000-004	5.0000+000	1.1799-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
26	3.5100-002	5.0000-004	5.0000+000	1.2145-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
27	3.5500-002	4.0000-004	5.0000+000	9.9688-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
28	3.5900-002	4.0000-004	5.0000+000	1.0196-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
29	3.6400-002	5.0000-004	5.0000+000	1.3068-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
30	3.6800-002	4.0000-004	5.0000+000	1.0717-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
31	3.7200-002	4.0000-004	5.0000+000	1.0952-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
32	3.7600-002	4.0000-004	5.0000+000	1.1190-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
33	3.8000-002	4.0000-004	5.0000+000	1.1431-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
34	3.8400-002	4.0000-004	5.0000+000	1.1674-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
35	3.8800-002	4.0000-004	5.0000+000	1.1920-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
36	3.9200-002	4.0000-004	5.0000+000	1.2168-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
37	3.9500-002	3.0000-004	5.0000+000	9.2906-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
38	3.9900-002	4.0000-004	5.0000+000	1.2609-007	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
39	4.0200-002	3.0000-004	5.0000+000	9.6241-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
40	4.0500-002	3.0000-004	5.0000+000	9.7688-008	4.8184+022	4.8184+022	1.0000-004	1.0000-004	2.5000+000	1.0000+000
41	5.3200-002	1.2700-002	2.4999+002	1.1219-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
42	6.1500-002	8.3000-003	2.4999+002	1.0939-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
43	6.8100-002	6.6000-003	2.4999+002	1.1095-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
44	7.3600-002	5.5000-003	2.4999+002	1.1049-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
45	7.8400-002	4.8000-003	2.4999+002	1.1094-007	9.6370+020	9.6370+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
46	8.9400-002	1.1000-002	1.2502+003	6.2022-008	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
47	1.0740-001	1.8000-002	1.2502+003	1.3979-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
48	1.2020-001	1.2800-002	1.2502+003	1.3273-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
49	1.3060-001	1.0400-002	1.2502+003	1.3080-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000
50	1.3950-001	8.9000-003	1.2502+003	1.2985-007	1.9270+020	1.9270+020	1.0000-004	1.0000-004	2.5000+000	1.0000+000

#	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	E INT ENE (JK/STER)	ION INT ENE (JK/STER)	VELOCITY (CM/SH)
1	7.7191-007	7.7191-007	6.3413-013	6.3413-013	0.0000-001
2	7.7191-007	7.7191-007	6.4258-013	6.4258-013	0.0000-001
3	7.7191-007	7.7191-007	6.5314-013	6.5314-013	0.0000-001
4	7.7191-007	7.7191-007	6.3469-013	6.3469-013	0.0000-001

5	7.7191-007	7.7191-007	6.1665-013	6.1665-013	0.0000-001
6	7.7191-007	7.7191-007	6.5456-013	6.5456-013	0.0000-001
7	7.7191-007	7.7191-007	6.1938-013	6.1938-013	0.0000-001
8	7.7191-007	7.7191-007	6.8270-013	6.8270-013	0.0000-001
9	7.7191-007	7.7191-007	6.0783-013	6.0783-013	0.0000-001
10	7.7191-007	7.7191-007	6.5398-013	6.5398-013	0.0000-001
11	7.7191-007	7.7191-007	6.2141-013	6.2141-013	0.0000-001
12	7.7191-007	7.7191-007	6.6039-013	6.6039-013	0.0000-001
13	7.7191-007	7.7191-007	6.1075-013	6.1075-013	0.0000-001
14	7.7191-007	7.7191-007	6.4229-013	6.4227-013	0.0000-001
15	7.7191-007	7.7191-007	6.7463-013	6.7463-013	0.0000-001
16	7.7191-007	7.7191-007	6.0460-013	6.0460-013	0.0000-001
17	7.7191-007	7.7191-007	6.2944-013	6.2944-013	0.0000-001
18	7.7191-007	7.7191-007	6.5478-013	6.5478-013	0.0000-001
19	7.7191-007	7.7191-007	6.8063-013	6.8063-013	0.0000-001
20	7.7191-007	7.7191-007	7.0697-013	7.0697-013	0.0000-001
21	7.7191-007	7.7191-007	6.0963-013	6.0963-013	0.0000-001
22	7.7191-007	7.7191-007	6.2856-013	6.2856-013	0.0000-001
23	7.7191-007	7.7191-007	6.4778-013	6.4778-013	0.0000-001
24	7.7191-007	7.7191-007	5.3226-013	5.3226-013	0.0000-001
25	7.7191-007	7.7191-007	6.8311-013	6.8311-013	0.0000-001
26	7.7191-007	7.7191-007	7.0314-013	7.0314-013	0.0000-001
27	7.7191-007	7.7191-007	5.7713-013	5.7713-013	0.0000-001
28	7.7191-007	7.7191-007	5.9028-013	5.9028-013	0.0000-001
29	7.7191-007	7.7191-007	7.5657-013	7.5657-013	0.0000-001
30	7.7191-007	7.7191-007	6.2042-013	6.2042-013	0.0000-001
31	7.7191-007	7.7191-007	6.3405-013	6.3405-013	0.0000-001
32	7.7191-007	7.7191-007	6.4783-013	6.4783-013	0.0000-001
33	7.7191-007	7.7191-007	6.6177-013	6.6177-013	0.0000-001
34	7.7191-007	7.7191-007	6.7585-013	6.7585-013	0.0000-001
35	7.7191-007	7.7191-007	6.9007-013	6.9007-013	0.0000-001
36	7.7191-007	7.7191-007	7.0445-013	7.0445-013	0.0000-001
37	7.7191-007	7.7191-007	5.3786-013	5.3786-013	0.0000-001
38	7.7191-007	7.7191-007	7.2996-013	7.2996-013	0.0000-001
39	7.7191-007	7.7191-007	5.5717-013	5.5717-013	0.0000-001
40	7.7191-007	7.7191-007	5.6554-013	5.6554-013	0.0000-001
41	1.5438-008	1.5438-008	6.4949-013	6.4949-013	0.0000-001
42	1.5438-008	1.5438-008	6.3328-013	6.3328-013	0.0000-001
43	1.5438-008	1.5438-008	6.4234-013	6.4234-013	0.0000-001
44	1.5438-008	1.5438-008	6.3967-013	6.3967-013	0.0000-001
45	1.5438-008	1.5438-008	6.4226-013	6.4226-013	0.0000-001
46	3.0871-009	3.0871-009	3.5907-013	3.5907-013	0.0000-001
47	3.0871-009	3.0871-009	8.0930-013	8.0930-013	0.0000-001
48	3.0871-009	3.0871-009	7.6940-013	7.6840-013	0.0000-001
49	3.0871-009	3.0871-009	7.5773-013	7.5773-013	0.0000-001
50	3.0871-009	3.0871-009	7.5192-013	7.5192-013	0.0000-001

(7)

COEFFICIENTS USED IN RHD

ION THERMAL COND.....	2.4440-005	E THERMAL COND.....	4.9230-004
E FLUX LIMIT.....	3.4450-025	BREM RAD LOSS TEMP(KEV)..	1.0000+003
CONST LOG LAMBDA.....	0.0000-001	THERMAL COND OF 1ST ZONE.	1.0000-050
RAD LOSS TERM.....	2.4200-048	E-ION EXCHANGE TERM.....	6.0590+002
ION PRESS(I.GAS).....	1.6020-025	E PRESS(I.GAS).....	1.6020-025
E PRESS DERIV.....	1.6020-025	ION PRESS DERIV.....	1.6020-025
E SP HEAT.....	2.4030-025	ION SP HEAT.....	2.4030-025

ION INT ENERGY(I.GAS)....	2.4030-025	E INT ENERGY(I.GAS).....	2.4030-025
TEMP ITERATION CONVERGENCE	5.0000-002	ION SHOCK HEATING.....	1.0000+000
FRACTION OF LASER DUMPED.	1.0000+000	INVERSE BREMSSTRAHLUNG...	1.3700-034
ARTIFICIAL VISCOSITY.....	1.4E-0+000		

(8)

CALCULATION OPTIONS USED IN PHD

NO. OF TEMP ITERATIONS...	1	CONSTANT SP HEAT.....	0
NO. OF CONST TIME STEPS..	10	LASER ABS. AT N-CRIT.....	1
FLUX LIMITING.....	0	MAX ZONE FOR COMPRESSION.	11
HYDRODYNAMIC MOTION.....	0	ALTER TH COND IN 1ST ZONE	0

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (40)	OTHERWISE (COUR) IN ZONE (40)
100	1.1581+000	8.5055-003		

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.1800-002	1.1800-002	5.0000+000	1.0000+000	-4.4420-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	7.8902-030
2	1.4900-002	3.1000-003	5.0000+000	1.0000+000	-1.5838-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	5.1934-029
3	1.7100-002	2.2000-003	5.0000+000	1.0000+000	1.7342-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
4	1.8800-002	1.7000-003	5.0000+000	1.0000+000	4.6621-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
5	2.0200-002	1.4000-003	5.0000+000	1.0000+000	-3.9955-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.9972-029
6	2.1500-002	1.3000-003	5.0000+000	1.0000+000	-3.3199-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
7	2.2600-002	1.1000-003	5.0000+000	1.0000+000	-3.6910-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	5.5078-032
8	2.3700-002	1.1000-003	5.0000+000	1.0000+000	8.0993-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
9	2.4600-002	9.0000-004	5.0000+000	1.0000+000	1.3644-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
10	2.5500-002	9.0000-004	5.0000+000	1.0000+000	5.9701-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.2940-029
11	2.6300-002	8.0000-004	5.0000+000	1.0000+000	-8.1817-017	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.4646-029
12	2.7100-002	8.0000-004	5.0000+000	1.0000+000	-5.1173-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.0139-029
13	2.7800-002	7.0000-004	5.0000+000	1.0000+000	-5.8988-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	2.4428-031
14	2.8500-002	7.0000-004	5.0000+000	1.0000+000	-7.8190-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	1.4744-030
15	2.9200-002	7.0000-004	5.0000+000	1.0000+000	-4.1480-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
16	2.9800-002	6.0000-004	5.0000+000	1.0000+000	-3.8684-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
17	3.0400-002	6.0000-004	5.0000+000	1.0000+000	-1.3185-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
18	3.1000-002	6.0000-004	5.0000+000	1.0000+000	3.2850-015	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
19	3.1600-002	6.0000-004	5.0000+000	1.0000+000	1.2526-014	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
20	3.2200-002	6.0000-004	5.0000+000	1.0000+000	4.0333-013	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
21	3.2700-002	5.0000-004	5.0000+000	1.0000+000	9.0120-012	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
22	3.3200-002	5.0000-004	5.0000+000	1.0000+000	1.6188-010	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
23	3.3700-002	5.0000-004	5.0000+000	1.0000+000	2.4681-009	1.0000-004	1.0000-004	7.7191-007	7.7191-007	0.0000-001
24	3.4100-002	4.0000-004	5.0000+000	1.0000+000	2.4056-008	1.0000-004	1.0000-004	7.7190-007	7.7190-007	0.0000-001
25	3.4600-002	5.0001-004	5.0001+000	9.9998-001	2.4216-007	9.9998-005	9.9998-005	7.7188-007	7.7188-007	0.0000-001
26	3.5100-002	5.0011-004	5.0011+000	9.9978-001	2.0949-006	9.9985-005	9.9985-005	7.7162-007	7.7162-007	0.0000-001
27	3.5501-002	4.0060-004	5.0077+000	9.9847-001	1.0775-005	9.9898-005	9.9898-005	7.6994-007	7.6994-007	0.0000-001
28	3.5903-002	4.0254-004	5.0323+000	9.9356-001	4.0886-005	9.9572-005	9.9572-005	7.6367-007	7.6367-007	0.0000-001
29	3.6415-002	5.1145-004	5.1170+000	9.7713-001	1.4639-004	9.8470-005	9.8470-005	7.4271-007	7.4271-007	0.0000-001
30	3.6842-002	4.2704-004	5.3363+000	9.3523-001	3.2046-004	9.5634-005	9.5634-005	6.9039-007	6.9039-007	0.0000-001
31	3.7295-002	4.5347-004	5.6699+000	8.7685-001	5.6669-004	9.1749-005	9.1749-005	6.2239-007	6.2239-007	0.0000-001
32	3.7786-002	4.9087-004	6.1821+000	8.0878-001	8.6593-004	8.6307-005	8.6307-005	5.4194-007	5.4194-007	0.0000-001
33	3.8326-002	5.3979-004	6.8391+000	7.3109-001	1.2069-003	8.1156-005	8.1156-005	4.5798-007	4.5798-007	0.0000-001
34	3.8927-002	6.0269-004	7.7031+000	6.4907-001	1.5885-003	7.4967-005	7.4967-005	3.7561-007	3.7561-007	0.0000-001
35	3.9613-002	6.8490-004	8.8617+000	5.6423-001	1.9747-003	6.8282-005	6.8282-005	2.9739-007	2.9739-007	0.0000-001
36	4.0361-002	7.4709-004	9.9175+000	5.0330-001	-6.9399-004	6.7916-005	6.7916-005	2.6701-007	2.6701-007	1.4289-006

37	4.0776-002	4.1579-004	7.3657+000	6.7382-001	-7.9335-003	4.0409-004	4.0410-004	2.1174-006	2.1174-006	1.3233-005
38	4.1235-002	4.5842-004	6.1133+000	8.1789-001	-1.4761-002	1.0535-003	1.0535-003	6.6510-006	6.6510-006	1.4302-005
39	4.1436-002	2.0029-004	3.5558+000	1.4061+000	-1.6684-002	1.7492-003	1.7493-003	1.8986-005	1.8987-005	1.9904-006
40	4.1637-002	2.0396-004	3.6023+000	1.3860+000	-1.7041-002	1.9572-003	1.9571-003	2.0969-005	2.0969-005	7.0166-008
41	4.5085-002	3.4456-003	5.7778+001	4.3268+000	-3.7256-002	2.3351-002	2.3390-002	1.5599-005	1.5624-005	1.3722-005
42	4.7350-002	2.2651-003	4.4240+001	5.6509+000	-3.8792-002	2.0991-002	2.0992-002	1.8312-005	1.8314-005	1.3473-007
43	4.9775-002	2.4248-003	5.1550+001	4.8496+000	-3.4945-002	1.8090-002	1.8091-002	1.3544-005	1.3544-005	0.0000-001
44	5.2491-002	2.7162-003	6.4287+001	3.9887+000	-3.1752-002	1.6961-002	1.6939-002	1.0183-005	1.0169-005	3.1692-007
45	6.8950-002	1.6459-002	5.5036+002	4.5424-001	6.6639-002	1.1937-001	9.3975-002	8.3714-006	6.5903-006	0.0000-001
46	8.5336-002	1.6386-002	1.5782+003	7.9219-001	7.9540-002	1.5249-001	1.1659-001	3.7291-006	2.8513-006	0.0000-001
47	1.2657-001	4.1230-002	3.3627+003	3.7291-001	1.3879-001	1.2913-001	9.5155-002	1.4865-006	1.0954-006	0.0000-001
48	1.6422-001	3.7657-002	6.0313+003	2.0729-001	1.4136-001	1.0726-001	8.3628-002	6.8636-007	5.3515-007	0.0000-001
49	2.1860-001	5.4372-002	1.5322+004	8.1595-002	1.6594-001	7.3687-002	5.3619-002	1.8561-007	1.3506-007	0.0000-001
50	3.3087-001	1.1229-001	6.6170+004	1.8394-002	2.3995-001	3.4202-002	2.4052-002	1.9949-008	1.4029-008	0.0000-001
						3.4202-002	2.4052-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION Ex (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	6.3413-013	6.3413-013	1.0379-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-3.6789-028	0.0000-001
2	6.4258-013	6.4258-013	1.4036-035	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-4.5901-027	0.0000-001
3	6.5314-013	6.5314-013	1.6724-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	8.9453-028	0.0000-001
4	6.3469-013	6.3469-013	1.1745-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	3.0137-027	0.0000-001
5	6.1665-013	6.1665-013	8.7633-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-3.6263-027	0.0000-001
6	6.5456-013	6.5456-013	6.0634-037	0.0000-001	0.0000-001	1.1429-025	4.8184+022	4.8184+022	5.7399-027	0.0000-001
7	6.1938-013	6.1938-013	7.6604-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-1.4559-026	0.0000-001
8	6.8270-013	6.8270-013	3.6558-036	0.0000-001	0.0000-001	-1.1921-025	4.8184+022	4.8184+022	1.0286-026	0.0000-001
9	6.0783-013	6.0783-013	9.9956-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	8.3995-027	0.0000-001
10	6.5398-013	6.5398-013	1.9630-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	7.2294-028	0.0000-001
11	6.2141-013	6.2141-013	3.7053-040	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-9.7828-027	0.0000-001
12	6.6039-013	6.6039-013	1.4374-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	1.0193-026	0.0000-001
13	6.1075-013	6.1075-013	1.8828-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-3.3260-027	0.0000-001
14	6.4229-013	6.4229-013	3.4768-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-1.7710-026	0.0000-001
15	6.7463-013	6.7463-013	9.5045-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	1.2661-026	0.0000-001
16	6.0460-013	6.0460-013	7.9744-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	2.3261-027	0.0000-001
17	6.2944-013	6.2944-013	9.6416-038	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-3.0590-027	0.0000-001
18	6.5478-013	6.5478-013	6.2231-037	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	-5.3796-027	0.0000-001
19	6.8063-013	6.8063-013	9.4014-036	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	1.0786-026	0.0000-001
20	7.0697-013	7.0697-013	9.2490-033	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	6.7853-025	0.0000-001
21	6.0963-013	6.0963-013	4.3425-030	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	1.3675-023	0.0000-001
22	6.2856-013	6.2856-013	1.4444-027	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	2.2536-022	0.0000-001
23	6.4778-013	6.4778-013	3.1545-025	0.0000-001	0.0000-001	0.0000-001	4.8184+022	4.8184+022	3.1371-021	0.0000-001
24	5.3226-013	5.3226-013	3.0372-023	0.0000-001	0.0000-001	9.2936-026	4.8184+022	4.8184+022	2.7444-020	0.0000-001
25	6.8309-013	6.8309-013	3.5105-021	0.0000-001	0.0000-001	9.5420-025	4.8183+022	4.8183+022	2.4320-019	0.0000-001
26	7.0303-013	7.0303-013	2.4262-019	0.0000-001	0.0000-001	6.9980-024	4.8173+022	4.8173+022	1.7898-018	0.0000-001
27	5.7654-013	5.7654-013	5.3528-018	0.0000-001	0.0000-001	2.6399-023	4.8110+022	4.8110+022	7.5840-018	0.0000-001
28	5.8775-013	5.8775-013	9.7226-017	0.0000-001	0.0000-001	6.9445-023	4.7875+022	4.7875+022	2.2441-017	0.0000-001
29	7.4499-013	7.4499-013	1.2743-015	0.0000-001	0.0000-001	1.5574-022	4.7082+022	4.7082+022	5.4546-017	0.0000-001
30	5.9333-013	5.9333-013	5.5633-015	0.0000-001	0.0000-001	1.0046-022	4.5063+022	4.5063+022	7.3935-017	0.0000-001
31	5.8173-013	5.8173-013	1.7777-014	0.0000-001	0.0000-001	3.1034-023	4.2345+022	4.2345+022	7.8360-017	0.0000-001
32	5.6237-013	5.6237-013	4.2405-014	0.0000-001	0.0000-001	-2.8765-023	3.8970+022	3.8970+022	7.0723-017	0.0000-001
33	5.3705-013	5.3705-013	8.4133-014	0.0000-001	0.0000-001	-5.5417-023	3.5227+022	3.5227+022	5.8240-017	0.0000-001
34	5.0666-013	5.0666-013	1.4684-013	0.0000-001	0.0000-001	-6.1768-023	3.1276+022	3.1276+022	4.5080-017	0.0000-001
35	4.7119-013	4.7119-013	2.3483-013	0.0000-001	0.0000-001	-1.6561-022	2.7187+022	2.7187+022	1.4044-017	0.0000-001
36	4.7845-013	4.7845-013	2.5837-014	0.0000-001	0.0000-001	2.5694-014	2.4540+022	2.4540+022	-7.2105-015	0.0000-001
37	2.1734-012	2.1735-012	3.4459-012	0.0000-001	0.0000-001	6.7995-013	3.2708+022	3.2708+022	-7.0669-013	0.0000-001
38	7.6900-012	7.6901-012	1.2111-011	0.0000-001	0.0000-001	7.2761-013	3.9409+022	3.9409+022	-1.0302-011	0.0000-001

39	9.7460-012	9.7462-012	1.3495-011	0.0000-001	0.0000-001	2.9989-014	6.7753+022	6.7753+022	-1.4898-011	0.0000-001
40	1.1069-011	1.1069-011	1.5237-011	0.0000-001	0.0000-001	-4.4045-014	6.6880+022	6.6880+022	-7.1358-009	0.0000-001
41	1.5166-010	1.5191-010	7.6689-011	0.0000-001	0.0000-001	2.7389-012	4.1697+021	4.1697+021	1.4102-009	0.0000-001
42	1.3293-010	1.3294-010	8.3750-011	0.0000-001	0.0000-001	5.8659-015	5.4458+021	5.4458+021	2.1736-009	0.0000-001
43	1.1620-010	1.1620-010	6.7606-011	0.0000-001	0.0000-001	-1.8962-014	4.6735+021	4.6735+021	7.2906-010	0.0000-001
44	1.0850-010	1.0835-010	5.5812-011	0.0000-001	0.0000-001	-2.3145-012	3.7476+021	3.7476+021	-2.1342-007	0.0000-001
45	7.6669-010	6.0356-010	1.9202-010	1.0327-010	0.0000-001	-4.0938-011	4.3775+020	4.3775+020	-1.9483-007	0.0000-001
46	5.4752-010	4.1865-010	3.1920-010	3.2302-011	0.0000-001	-8.6381-012	1.5266+020	1.5266+020	7.5017-008	0.0000-001
47	1.0450-009	7.7008-010	1.3123-009	2.9219-011	0.0000-001	-1.1190-011	7.1859+019	7.1859+019	3.4532-008	0.0000-001
48	8.2416-010	6.4259-010	1.3170-009	1.2567-011	0.0000-001	-5.5038-012	3.9945+019	3.9945+019	2.2574-008	0.0000-001
49	5.5835-010	4.0629-010	1.7950-009	5.1449-012	0.0000-001	-3.1513-012	1.5723+019	1.5723+019	3.8037-009	0.0000-001
50	2.5717-010	1.8085-010	1.8695-009	1.7691-012	0.0000-001	-1.1111-012	3.6409+018	3.6409+018	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	1.2723+010
2	0.0000-001	0.0000-001	1.2723+010
3	0.0000-001	0.0000-001	1.2723+010
4	0.0000-001	0.0000-001	1.2723+010
5	0.0000-001	0.0000-001	1.2723+010
6	0.0000-001	0.0000-001	1.2723+010
7	0.0000-001	0.0000-001	1.2723+010
8	0.0000-001	0.0000-001	1.2723+010
9	0.0000-001	0.0000-001	1.2723+010
10	0.0000-001	0.0000-001	1.2723+010
11	0.0000-001	0.0000-001	1.2723+010
12	0.0000-001	0.0000-001	1.2723+010
13	0.0000-001	0.0000-001	1.2723+010
14	0.0000-001	0.0000-001	1.2723+010
15	0.0000-001	0.0000-001	1.2723+010
16	0.0000-001	0.0000-001	1.2723+010
17	0.0000-001	0.0000-001	1.2723+010
18	0.0000-001	0.0000-001	1.2723+010
19	0.0000-001	0.0000-001	1.2723+010
20	0.0000-001	0.0000-001	1.2723+010
21	0.0000-001	0.0000-001	1.2723+010
22	0.0000-001	0.0000-001	1.2723+010
23	0.0000-001	0.0000-001	1.2723+010
24	0.0000-001	0.0000-001	1.2723+010
25	0.0000-001	0.0000-001	1.2723+010
26	0.0000-001	0.0000-001	1.2720+010
27	0.0000-001	0.0000-001	1.2703+010
28	0.0000-001	0.0000-001	1.2641+010
29	0.0000-001	0.0000-001	1.2432+010
30	0.0000-001	0.0000-001	1.1899+010
31	0.0000-001	0.0000-001	1.1181+010
32	0.0000-001	0.0000-001	1.0290+010
33	0.0000-001	0.0000-001	9.3015+009
34	0.0000-001	0.0000-001	8.2592+009
35	0.0000-001	0.0000-001	7.1785+009
36	0.0000-001	0.0000-001	6.1068+009
37	0.0000-001	0.0000-001	5.0940+009
38	0.0000-001	0.0000-001	4.1975+008
39	0.0000-001	0.0000-001	3.4487+008
40	0.0000-001	0.0000-001	2.8545+008
41	0.0000-001	0.0000-001	2.3979+008
42	0.0000-001	0.0000-001	1.5035+008

43	0.0000-001	0.0000-001	1.3606+005
44	0.0000-001	0.0000-001	1.0155+005
45	1.5257-007	0.0000-001	1.9164-002
46	2.0029-007	0.0000-001	1.6665+001
47	2.4346-007	0.0000-001	4.7632+000
48	2.6201-007	0.0000-001	1.9508+000
49	2.6961-007	0.0000-001	5.2698-001
50	2.7221-007	0.0000-001	8.5671-002

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	4.5612-009	1.5241-008	5.5855-017	2.6920-024	0.0000-001	-6.1990-009	1.8425-010	1.1104-018	2.6202-030	0.0000-001
I	3.5844-009	0.0000-001	5.5855-017	4.2255-025	-6.2689-009	7.1340-009	0.0000-001	1.1104-018	1.4166-031	-6.8701-011

	EI WORK	INT ENE(0)
E	-8.4282-011	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	4.5612-009	2.8056-009
ION	1.0718-008	1.2500-008
TOTAL	1.5280-008	1.5306-008

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (30) OTHERWISE (COUR) IN ZONE (30)
300	2.2887+000	3.8922-003	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.1763-002	1.1763-002	4.9533+000	1.0094+000	-1.2758-003	1.0074-004	1.0074-004	7.8498-007	7.8498-007	6.5663-007
2	1.4396-002	2.6326-003	4.0713+000	1.2281+000	-8.8085-003	2.2763-004	2.2763-004	2.1579-006	2.1579-006	2.7669-005
3	1.5515-002	1.1193-003	2.2201+000	2.2521+000	-1.5529-002	1.0753-003	1.0753-003	1.8694-005	1.8694-005	4.0073-005
4	1.6086-002	5.7106-004	1.3006+000	3.8444+000	-1.4701-002	1.6246-003	1.6248-003	4.8216-005	4.8216-005	1.0513-006
5	1.6629-002	5.4314-004	1.3645+000	3.6643+000	-1.4695-002	1.4614-003	1.4614-003	4.1337-005	4.1337-005	6.8132-011
6	1.7194-002	5.6433-004	1.4276+000	3.5023+000	-1.2792-002	1.4133-003	1.4133-003	3.8209-005	3.8209-005	0.0000-001
7	1.7672-002	4.7814-004	1.3983+000	3.6612+000	-1.2684-002	1.3955-003	1.3955-003	3.9652-005	3.9652-005	1.7188-008
8	1.8219-002	5.4775-004	1.4960+000	3.3423+000	-1.2499-002	1.3733-003	1.3733-003	3.5430-005	3.5430-005	5.0864-008
9	1.8635-002	4.1578-004	1.3448+000	3.7180+000	-1.4569-002	1.4011-003	1.4011-003	4.0211-005	4.0211-005	6.3522-006
10	1.8990-002	3.5447-004	1.1106+000	4.5021+000	-1.9078-002	1.7459-003	1.7459-003	6.0675-005	6.0675-005	3.5603-005
11	1.9235-002	2.4516-004	8.3432-001	5.9529+000	-2.1077-002	2.1061-003	2.1061-003	9.7428-005	9.7428-005	9.3869-006
12	1.9493-002	2.5796-004	8.4796-001	5.8965+000	-1.9961-002	2.2004-003	2.2004-003	1.0015-004	1.0015-004	0.0000-001

13	1.9722-002	2.2937-004	8.3500-001	5.9816+000	-2.0443-002	2.0744-003	2.0744-003	9.5778-005	9.5778-005	5.5122-007
14	1.9967-002	2.4456-004	8.6608-001	5.7598+000	-1.9606-002	2.1586-003	2.1586-003	9.5961-005	9.5961-005	0.0000-001
15	2.0212-002	2.4528-004	8.4949-001	5.8859+000	-2.1543-002	2.2690-003	2.2690-003	1.0309-004	1.0309-004	8.6678-006
16	2.0385-002	1.7333-004	6.8389-001	7.3111+000	-2.3136-002	2.4372-003	2.4372-003	1.3754-004	1.3754-004	7.2515-006
17	2.0546-002	1.6091-004	6.1990-001	8.0658+000	-2.3776-002	2.5283-003	2.5283-003	1.5742-004	1.5742-004	1.3036-006
18	2.0717-002	1.7105-004	6.4376-001	7.7669+000	-2.2918-002	2.5009-003	2.5009-003	1.4994-004	1.4994-004	0.0000-001
19	2.0902-002	1.8481-004	6.8072-001	7.3452+000	-2.2406-002	2.4799-003	2.4799-003	1.4060-004	1.4060-004	0.0000-001
20	2.1092-002	1.8953-004	6.8427-001	7.3071+000	-2.2495-002	2.5776-003	2.5778-003	1.4540-004	1.4540-004	2.2698-008
21	2.1253-002	1.6122-004	6.8633-001	7.2651+000	-2.1818-002	2.3717-003	2.3717-003	1.3337-004	1.3337-004	0.0000-001
22	2.1420-002	1.6674-004	6.9914-001	7.1517+000	-2.1555-002	2.3675-003	2.3675-003	1.3070-004	1.3070-004	1.9689-007
23	2.1594-002	1.7443-004	7.2107-001	6.9341+000	-2.1245-002	2.3741-003	2.3741-003	1.2707-004	1.2707-004	2.6696-007
24	2.1725-002	1.3062-004	6.6649-001	7.5020+000	-2.1045-002	2.1592-003	2.1592-003	1.2504-004	1.2504-004	1.1979-007
25	2.1907-002	1.8269-004	7.3691-001	6.7851+000	-2.0292-002	2.3247-003	2.3247-003	1.2175-004	1.2175-004	0.0000-001
26	2.2105-002	1.9712-004	7.8595-001	6.3617+000	-1.9798-002	2.4437-003	2.4437-003	1.2000-004	1.2000-004	0.0000-001
27	2.2249-002	1.4412-004	7.1098-001	7.0325+000	-2.0335-002	2.2848-003	2.2848-003	1.2403-004	1.2403-004	8.0187-007
28	2.2375-002	1.2660-004	6.1811-001	8.0892+000	-2.2768-002	2.4335-003	2.4335-003	1.5195-004	1.5195-004	1.8361-005
29	2.2538-002	1.6318-004	6.2941-001	7.9940+000	-2.5623-002	3.0748-003	3.0748-003	1.6855-004	1.6855-004	2.4928-005
30	2.2659-002	1.2049-004	5.7422-001	8.7075+000	-2.5986-002	3.2212-003	3.2212-003	2.1651-004	2.1651-004	4.5531-007
31	2.2788-002	1.2928-004	6.0952-001	8.2032+000	-2.4881-002	3.2556-003	3.2556-003	2.0615-004	2.0615-004	0.0000-001
32	2.2926-002	1.3808-004	6.4469-001	7.7557+000	-2.4413-002	3.3534-003	3.3534-003	2.0076-004	2.0076-004	0.0000-001
33	2.3074-002	1.4756-004	6.8289-001	7.3218+000	-2.4071-002	3.4894-003	3.4894-003	1.9721-004	1.9721-004	0.0000-001
34	2.3234-002	1.6019-004	7.3564-001	6.7968+000	-2.3368-002	3.5896-003	3.5896-003	1.8833-004	1.8833-004	0.0000-001
35	2.3406-002	1.7446-004	7.9605-001	6.2810+000	-2.3171-002	3.7729-003	3.7729-003	1.8293-004	1.8293-004	9.7735-008
36	2.3605-002	1.9608-004	8.9042-001	5.6153+000	-2.2507-002	4.0429-003	4.0429-003	1.7524-004	1.7524-004	0.0000-001
37	2.3749-002	1.4440-004	8.7131-001	6.7385+000	-2.1876-002	3.6929-003	3.6929-003	1.6358-004	1.6358-004	0.0000-001
38	2.6332-002	2.5830-003	1.2856+001	3.8891-001	4.3485-002	5.1386-002	5.0690-002	1.5426-004	1.5217-004	0.0000-001
39	4.7265-002	2.0933-002	3.0247+002	1.6531-002	2.9869-001	6.1411-001	2.1809-001	7.8361-005	2.7828-005	0.0000-001
40	9.0594-002	4.3330-002	2.1768+003	2.2969-003	3.8017-001	4.0940-001	1.2105-001	7.2587-006	2.1462-006	0.0000-001
41	1.4286-001	5.2262-002	6.4530+003	3.8741-002	3.8458-001	2.9166-001	8.7212-002	1.7444-006	5.2162-007	0.0000-001
42	1.9034-001	4.7480-002	1.2128+004	2.0613-002	3.6291-001	2.2987-001	7.4849-002	7.3151-007	2.3819-007	0.0000-001
43	2.3550-001	4.5163-002	1.8522+004	1.3497-002	3.1545-001	1.8803-001	6.8597-002	3.9182-007	1.4294-007	0.0000-001
44	2.6685-001	3.1347-002	1.7922+004	1.3949-002	2.7881-001	1.5903-001	7.4912-002	3.4247-007	1.6133-007	0.0000-001
45	2.9962-001	3.2769-002	2.3722+004	1.0538-002	2.7409-001	1.3514-001	6.5553-002	2.1987-007	1.0665-007	0.0000-001
46	3.1389-001	1.4278-002	2.1666+004	5.7704-002	2.7168-001	1.2160-001	6.8433-002	2.1662-007	1.2190-007	0.0000-001
47	3.5120-001	3.7306-002	2.9543+004	4.2318-002	2.5672-001	1.0638-001	6.1643-002	1.3898-007	8.0530-008	0.0000-001
48	4.0262-001	5.1424-002	5.5126+004	2.2680-002	2.5279-001	8.5063-002	4.4389-002	5.9556-008	3.1078-008	0.0000-001
49	4.6144-001	5.8813-002	8.4001+004	1.4684-002	2.5633-001	6.5782-002	3.5957-002	3.0225-008	1.6521-008	0.0000-001
50	6.2911-001	1.6767-001	3.8686+005	3.2318-003	2.8235-001	3.3942-002	1.4574-002	3.3862-009	1.4540-009	0.0000-001
						3.3942-002	1.4574-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	6.3885-013	6.3885-013	8.7742-014	0.0000-001	0.0000-001	2.2569-016	4.8638+022	4.8638+022	-4.0266-016	0.0000-001
2	1.4627-012	1.4627-012	4.3414-012	0.0000-001	0.0000-001	8.9017-014	5.9176+022	5.9176+022	-2.8218-013	0.0000-001
3	7.0233-012	7.0233-012	1.3410-011	0.0000-001	0.0000-001	1.4995-013	1.0852+023	1.0852+023	-3.9994-012	0.0000-001
4	1.0312-011	1.0312-011	1.1679-011	0.0000-001	0.0000-001	1.3602-016	1.8524+023	1.8524+023	2.7184-012	0.0000-001
5	9.0120-012	9.0120-012	1.1854-011	0.0000-001	0.0000-001	-7.5614-019	1.7656+023	1.7656+023	5.8101-013	0.0000-001
6	9.2511-012	9.2511-012	9.0022-012	0.0000-001	0.0000-001	-1.9981-020	1.6876+023	1.6876+023	3.2740-013	0.0000-001
7	8.6432-012	8.6432-012	9.0461-012	0.0000-001	0.0000-001	5.6958-018	1.7737+023	1.7737+023	2.9583-013	0.0000-001
8	9.3756-012	9.3756-012	8.6919-012	0.0000-001	0.0000-001	1.7960-017	1.6104+023	1.6104+023	-2.4208-013	0.0000-001
9	8.5162-012	8.5162-012	1.1685-011	0.0000-001	0.0000-001	1.1344-014	1.7915+023	1.7915+023	-6.9316-012	0.0000-001
10	1.1418-011	1.1418-011	2.0047-011	0.0000-001	0.0000-001	1.2694-013	2.1693+023	2.1693+023	-1.7234-011	0.0000-001
11	1.3088-011	1.3088-011	2.4591-011	0.0000-001	0.0000-001	1.6696-014	2.8876+023	2.8876+023	-1.0587-011	0.0000-001
12	1.4531-011	1.4531-011	2.1872-011	0.0000-001	0.0000-001	1.4602-017	2.8412+023	2.8412+023	1.2183-011	0.0000-001
13	1.2669-011	1.2669-011	2.2615-011	0.0000-001	0.0000-001	3.8128-016	2.8822+023	2.8822+023	-8.4843-012	0.0000-001
14	1.3866-011	1.3866-011	2.1860-011	0.0000-001	0.0000-001	2.0072-018	2.7753+023	2.7753+023	-6.8037-012	0.0000-001

15	1.5308-011	1.5308-011	2.5638-011	0.0000-001	0.0000-001	1.6713-014	2.8361+023	2.8361+023	-1.8375-011	0.0000-001
16	1.4735-011	1.4735-011	2.8524-011	0.0000-001	0.0000-001	1.1564-014	3.5228+023	3.5228+023	-1.7742-011	0.0000-001
17	1.5914-011	1.5914-011	3.1348-011	0.0000-001	0.0000-001	1.0912-015	3.8864+023	3.8864+023	-3.9269-013	0.0000-001
18	1.6376-011	1.6376-011	3.0288-011	0.0000-001	0.0000-001	3.5845-018	3.7424+023	3.7424+023	4.9407-012	0.0000-001
19	1.6879-011	1.6879-011	3.0083-011	0.0000-001	0.0000-001	-1.3725-017	3.5392+023	3.5392+023	-1.4630-011	0.0000-001
20	1.8225-011	1.8225-011	2.8769-011	0.0000-001	0.0000-001	4.4079-017	3.5208+023	3.5208+023	3.2840-011	0.0000-001
21	1.4458-011	1.4458-011	2.5952-011	0.0000-001	0.0000-001	-2.3799-017	3.5103+023	3.5103+023	2.0073-012	0.0000-001
22	1.4881-011	1.4881-011	2.5609-011	0.0000-001	0.0000-001	1.4507-017	3.4460+023	3.4460+023	-1.1588-012	0.0000-001
23	1.5379-011	1.5379-011	2.3000-011	0.0000-001	0.0000-001	1.9887-017	3.3411+023	3.3411+023	3.4147-011	0.0000-001
24	1.1493-011	1.1493-011	2.3245-011	0.0000-001	0.0000-001	-3.5263-017	3.6147+023	3.6147+023	-2.6418-011	0.0000-001
25	1.5880-011	1.5880-011	2.4648-011	0.0000-001	0.0000-001	-1.0047-018	3.2693+023	3.2693+023	-1.6745-011	0.0000-001
26	1.7182-011	1.7182-011	2.1670-011	0.0000-001	0.0000-001	4.9903-017	3.0653+023	3.0653+023	2.7431-011	0.0000-001
27	1.3186-011	1.3186-011	2.0846-011	0.0000-001	0.0000-001	5.6495-016	3.3885+023	3.3885+023	-1.6989-011	0.0000-001
28	1.4364-011	1.4364-011	3.0149-011	0.0000-001	0.0000-001	4.7910-014	3.8977+023	3.8977+023	-1.3889-010	0.0000-001
29	2.3263-011	2.3263-011	3.9038-011	0.0000-001	0.0000-001	7.9100-014	3.8277+023	3.8277+023	-6.9572-011	0.0000-001
30	1.9985-011	1.9985-011	3.6581-011	0.0000-001	0.0000-001	3.1613-016	4.1956+023	4.1956+023	-3.9940-011	0.0000-001
31	2.0642-011	2.0642-011	3.4268-011	0.0000-001	0.0000-001	-6.7573-018	3.9526+023	3.9526+023	-3.6510-011	0.0000-001
32	2.1725-011	2.1725-011	3.3705-011	0.0000-001	0.0000-001	-2.0343-017	3.7370+023	3.7370+023	-6.2695-011	0.0000-001
33	2.3091-011	2.3091-011	3.3469-011	0.0000-001	0.0000-001	5.5623-018	3.5279+023	3.5279+023	-5.3550-011	0.0000-001
34	2.4260-011	2.4260-011	3.2210-011	0.0000-001	0.0000-001	-2.0490-017	3.2750+023	3.2750+023	-8.2162-011	0.0000-001
35	2.6036-011	2.6036-011	3.2332-011	0.0000-001	0.0000-001	-7.4932-017	3.0265+023	3.0265+023	-1.4406-010	0.0000-001
36	2.8480-011	2.8480-011	2.7176-011	0.0000-001	0.0000-001	4.5691-016	2.7057+023	2.7057+023	1.9645-010	0.0000-001
37	1.9862-011	1.9863-011	2.6200-011	0.0000-001	0.0000-001	-1.0912-013	2.7650+023	2.7650+023	-1.1632-007	0.0000-001
38	3.7510-010	3.7002-010	1.0510-010	0.0000-001	0.0000-001	-5.3522-011	1.8739+022	1.8739+022	-4.0767-005	0.0000-001
39	3.4216-009	1.2151-009	4.3254-009	5.4783-010	0.0000-001	-5.2236-011	7.9651+020	7.9651+020	1.1661-005	0.0000-001
40	2.3153-009	6.8460-010	7.5831-009	6.1287-011	0.0000-001	-1.0008-011	1.1067+020	1.1067+020	1.7979-006	0.0000-001
41	1.8943-009	5.6643-010	8.1927-009	1.5341-011	0.0000-001	-4.7685-012	3.7334+019	3.7334+019	4.3846-007	0.0000-001
42	1.4557-009	4.7400-010	7.2550-009	5.7255-012	0.0000-001	-2.6941-012	1.9865+019	1.9865+019	1.8833-007	0.0000-001
43	1.2078-009	4.4063-010	5.5088-009	3.0443-012	0.0000-001	-1.7887-012	1.3007+019	1.3007+019	1.0391-007	0.0000-001
44	1.0172-009	4.7919-010	4.3032-009	2.7636-012	0.0000-001	-1.5800-012	1.3443+019	1.3443+019	6.9903-008	0.0000-001
45	8.6794-010	4.2102-010	3.2404-009	2.0425-012	0.0000-001	-1.2222-012	1.0156+019	1.0156+019	3.9635-008	0.0000-001
46	4.3664-010	2.4572-010	3.7241-009	1.2226-012	0.0000-001	-6.5249-013	1.1120+019	1.1120+019	2.9830-008	0.0000-001
47	8.6094-010	4.9867-010	4.4901-009	2.1113-012	0.0000-001	-1.1136-012	8.1548+018	8.1548+018	1.5453-008	0.0000-001
48	6.5363-010	3.4109-010	4.2114-009	1.2052-012	0.0000-001	-7.4174-013	4.3704+018	4.3704+018	6.1560-009	0.0000-001
49	4.9845-010	2.7246-010	4.2834-009	8.7263-013	0.0000-001	-5.1662-013	2.8681+018	2.8681+018	1.6473-009	0.0000-001
50	2.5522-010	1.0958-010	2.5885-009	3.0153-013	0.0000-001	-1.8585-013	6.2276+017	6.2276+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(I/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	1.2628+010
2	0.0000-001	0.0000-001	6.1420+009
3	0.0000-001	0.0000-001	1.8905+009
4	0.0000-001	0.0000-001	2.8711+009
5	0.0000-001	0.0000-001	3.0576+009
6	0.0000-001	0.0000-001	2.9372+009
7	0.0000-001	0.0000-001	3.3074+009
8	0.0000-001	0.0000-001	2.7927+009
9	0.0000-001	0.0000-001	3.3599+009
10	0.0000-001	0.0000-001	3.5931+009
11	0.0000-001	0.0000-001	4.7349+009
12	0.0000-001	0.0000-001	4.2658+009
13	0.0000-001	0.0000-001	4.0182+009
14	0.0000-001	0.0000-001	4.2081+009
15	0.0000-001	0.0000-001	4.6832+009
16	0.0000-001	0.0000-001	5.6562+009
17	0.0000-001	0.0000-001	6.5105+009
18	0.0000-001	0.0000-001	6.1364+009

19	0.0000-001	0.0000-001	5.5582+009
20	0.0000-001	0.0000-001	5.1901+009
21	0.0000-001	0.0000-001	5.8463+009
22	0.0000-001	0.0000-001	5.6468+009
23	0.0000-001	0.0000-001	5.2803+009
24	0.0000-001	0.0000-001	7.1367+009
25	0.0000-001	0.0000-001	5.2256+009
26	0.0000-001	0.0000-001	4.2626+009
27	0.0000-001	0.0000-001	5.7613+009
28	0.0000-001	0.0000-001	6.9599+009
29	0.0000-001	0.0000-001	4.7271+009
30	0.0000-001	0.0000-001	5.2761+009
31	0.0000-001	0.0000-001	4.6083+009
32	0.0000-001	0.0000-001	3.9409+009
33	0.0000-001	0.0000-001	3.3090+009
34	0.0000-001	0.0000-001	2.7329+009
35	0.0000-001	0.0000-001	2.1659+009
36	0.0000-001	0.0000-001	1.5606+009
37	0.0000-001	0.0000-001	1.0879+009
38	0.0000-001	0.0000-001	8.1098+005
39	1.7687-006	0.0000-001	7.0632+001
40	1.9666-006	0.0000-001	2.4564+000
41	2.0161-006	0.0000-001	4.7604-001
42	2.0346-006	0.0000-001	1.9206-001
43	2.0444-006	0.0000-001	1.0649-001
44	2.0534-006	0.0000-001	1.3860-001
45	2.0600-006	0.0000-001	9.7619-002
46	2.0639-006	0.0000-001	1.3403-001
47	2.0707-006	0.0000-001	8.8317-002
48	2.0746-006	0.0000-001	3.6501-002
49	2.0774-006	0.0000-001	2.3078-002
50	2.0784-006	0.0000-001	2.7950-003

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.5811-008	8.3284-008	4.1045-016	2.6924-024	0.0000-001	-2.8274-008	6.4375-010	2.1709-018	2.5281-030	0.0000-001
I	6.6701-009	0.0000-001	4.1045-016	4.2256-025	-4.2698-008	6.0674-008	0.0000-001	2.1709-018	1.4138-032	-1.3059-010

	EI WORK	INT ENE(0)
E	-3.6239-010	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	1.5811-008	1.2343-008
ION	6.7344-008	7.1005-008
TOTAL	8.3156-008	8.3348-008

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (24) OTHERWISE (COUR) IN ZONE (24)
500	2.8018+000	1.1324-003	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (V0/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PPESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	4.1778-003	4.1778-003	2.2191-001	2.2531+001	-1.6674-002	7.2450-002	7.2451-002	1.2601-002	1.2601-002	2.4881-003
2	4.5298-003	3.5199-004	6.0147-002	8.3129+001	-1.2873-002	2.2764-002	2.2764-002	1.4607-002	1.4607-002	0.0000-001
3	4.8215-003	2.9167-004	5.6539-002	8.8434+001	-1.0812-002	1.7784-002	1.7784-002	1.2140-002	1.2140-002	0.0000-001
4	5.0597-003	2.3816-004	5.3037-002	9.4274+001	-9.5836-003	1.6522-002	1.6522-002	1.2023-002	1.2023-002	0.0000-001
5	5.2669-003	2.0718-004	5.1862-002	9.6409+001	-6.5670-003	1.5218-002	1.5218-002	1.1325-002	1.1325-002	0.0000-001
6	5.4742-003	2.0733-004	5.2895-002	9.4527+001	-5.2304-003	1.4457-002	1.4457-002	1.0549-002	1.0549-002	0.0000-001
7	5.6537-003	1.7953-004	5.1952-002	9.6243+001	-4.8798-003	1.3761-002	1.3761-002	1.0223-002	1.0223-002	0.0000-001
8	5.8491-003	1.9542-004	5.4821-002	9.1207+001	-6.2939-003	1.4192-002	1.4192-002	9.9915-003	9.9915-003	7.2554-005
9	5.9975-003	1.4836-004	4.9579-002	1.0085+002	-1.0939-002	1.4113-002	1.4113-002	1.0987-002	1.0987-002	8.5344-004
10	6.1422-003	1.4477-004	4.7219-002	1.0589+002	-1.4993-002	1.5575-002	1.5575-002	1.2730-002	1.2730-002	6.8342-004
11	6.2674-003	1.2519-004	4.4906-002	1.1134+002	-1.5722-002	1.5608-002	1.5608-002	1.3415-002	1.3415-002	2.3498-005
12	6.4075-003	1.4002-004	4.9303-002	1.0141+002	-1.4118-002	1.5592-002	1.5592-002	1.2206-002	1.2206-002	0.0000-001
13	6.5358-003	1.2832-004	5.0943-002	9.8149+001	-1.4101-002	1.4205-002	1.4205-002	1.0762-002	1.0762-002	1.0549-008
14	6.6763-003	1.4051-004	5.5272-002	9.0462+001	-1.4576-002	1.4447-002	1.4447-002	1.0088-002	1.0088-002	8.1307-006
15	6.8281-003	1.5180-004	5.9394-002	8.4183+001	-1.3224-002	1.4495-002	1.4495-002	9.4189-003	9.4189-003	0.0000-001
16	6.9596-003	1.3152-004	5.9851-002	8.3641+001	-1.2385-002	1.3226-002	1.3226-002	8.5287-003	8.5287-003	0.0000-001
17	7.0966-003	1.3698-004	6.2232-002	8.0345+001	-1.1761-002	1.2646-002	1.2646-002	7.8427-003	7.8427-003	0.0000-001
18	7.2417-003	1.4516-004	6.5965-002	7.5797+001	-1.1440-002	1.2424-002	1.2424-002	7.2688-003	7.2688-003	3.1257-006
19	7.3994-003	1.5767-004	7.1673-002	6.9567+001	-1.0695-002	1.2269-002	1.2269-002	6.5883-003	6.5883-003	0.0000-001
20	7.5655-003	1.6607-004	7.6143-002	6.5666+001	-1.2475-002	1.2548-002	1.2548-002	6.3605-003	6.3606-003	8.2568-005
21	7.6831-003	1.1759-004	6.4914-002	7.7025+001	-1.9377-002	1.2842-002	1.2842-002	7.6354-003	7.6354-003	1.4166-003
22	7.7868-003	1.0369-004	5.7136-002	8.7508+001	-2.5180-002	1.4446-002	1.4446-002	9.7580-003	9.7580-003	1.1386-003
23	7.8865-003	9.9736-005	5.4741-002	9.1338+001	-2.6980-002	1.5625-002	1.5625-002	1.1016-002	1.1016-002	1.1671-004
24	7.9617-003	7.5195-005	5.1357-002	9.7358+00.	-2.5584-002	1.3561-002	1.3561-002	1.0192-002	1.0192-002	0.0000-001
25	8.0739-003	1.1222-004	6.1138-002	8.1783+001	-2.2955-002	1.4881-002	1.4881-002	9.3944-003	9.3944-003	0.0000-001
26	8.2003-003	1.2642-004	6.8922-002	7.2545+001	-2.2317-002	1.5704-002	1.5704-002	8.7939-003	8.7939-003	1.1815-005
27	8.2970-003	9.6624-005	6.5950-002	7.5815+001	-2.1219-002	1.3443-002	1.3443-002	7.8675-003	7.8674-003	0.0000-001
28	8.3971-003	1.0015-004	6.8433-002	7.3064+001	-2.0411-002	1.2779-002	1.2779-002	7.2071-003	7.2071-003	0.0000-001
29	8.5659-003	1.6876-004	9.2899-002	5.3822+001	-1.9112-002	1.4728-002	1.4728-002	6.1190-003	6.1190-003	0.0000-001
30	8.7008-003	1.3491-004	9.3833-002	5.3286+001	-1.9338-002	1.4025-002	1.4024-002	5.7687-003	5.7685-003	1.0863-006
31	9.6864-003	9.8559-004	7.6135-001	6.5673+000	5.9379-002	1.0866-001	1.0741-001	5.5084-003	5.4452-003	0.0000-001
32	2.0669-002	1.0983-002	2.3595+001	2.1191-001	4.8918-001	1.5666+000	5.4504-001	2.5626-003	8.9153-004	0.0000-001
33	5.0247-002	2.9578-002	3.4419+002	1.4527-002	7.6822-001	2.5253+000	2.0553-001	2.8318-004	2.3047-005	0.0000-001
34	8.9491-002	3.9245-002	1.6642+003	2.9687-003	8.1035-001	2.0479+000	1.0576-001	4.6930-005	2.4236-006	0.0000-001
35	1.3322-001	4.3728-002	4.6074+003	1.0852-003	8.1739-001	1.7814+000	7.1490-002	1.4923-005	5.9886-007	0.0000-001
36	1.8201-001	4.8787-002	1.0040+004	4.9602-004	7.4431-001	1.6108+000	5.4535-002	6.1923-006	2.0965-007	0.0000-001
37	2.1304-001	3.1036-002	1.3061+004	3.8283-004	7.1664-001	1.5219+000	5.5445-002	4.4973-006	1.6384-007	0.0000-001
38	2.6916-001	5.6120-002	2.5990+004	1.9238-004	6.1967-001	1.4447+000	4.0559-002	2.1454-006	6.0232-008	0.0000-001
39	2.9766-001	2.8497-002	2.3803+004	2.1006-004	5.8437-001	1.3973+000	5.0579-002	2.2656-006	8.2010-008	0.0000-001
40	3.2763-001	2.9975-002	3.0016+004	1.6658-004	5.1610-001	1.3705+000	5.0332-002	1.7622-006	6.4719-008	0.0000-001
41	3.5949-001	3.1857-002	3.3542+004	7.4532-003	4.2776-001	1.3476+000	5.5352-002	1.5507-006	6.3691-008	4.6522-007
42	3.8393-001	2.4434-002	3.0873+004	8.0975-003	3.7286-001	1.3313+000	6.7574-002	1.6643-006	8.4477-008	1.9517-007
43	4.0492-001	2.0999-002	2.9451+004	8.4885-003	3.8437-001	1.3206+000	6.8858-002	1.7307-006	9.0238-008	0.0000-001
44	4.2718-001	2.2259-002	3.4880+004	7.1673-003	3.5097-001	1.3125+000	6.8097-002	1.4523-006	7.5350-008	0.0000-001
45	4.5081-001	2.3625-002	4.1050+004	6.0699-003	3.5299-001	1.3055+000	6.2276-002	1.2274-006	5.8551-008	0.0000-001

46	4.6479-001	1.3978-002	4.7235+004	2.6468-002	3.3265-001	1.3011+000	6.0829-002	1.0631-006	4.9703-008	0.0000-001
47	5.0217-001	3.7379-002	6.2534+004	1.9493-002	3.4937-001	1.2959+000	4.9316-002	7.9983-007	3.0438-008	0.0000-001
48	5.4328-001	4.1112-002	8.4678+004	1.4765-002	3.2517-001	1.2908+000	4.4776-002	5.8835-007	2.0408-008	0.0000-001
49	6.0566-001	6.2384-002	1.5745+005	7.9405-003	3.3874-001	1.2869+000	3.0857-002	3.1546-007	7.5638-009	0.0000-001
50	7.8102-001	1.7536-001	6.5250+005	1.9161-003	3.4612-001	1.2831+000	1.2816-002	7.5897-008	7.5805-010	0.0000-001
						1.2831+000	1.2816-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	4.5943-010	4.5944-010	1.5329-011	0.0000-001	0.0000-001	4.1721-013	1.0857+024	1.0857+024	6.6023-007	0.0000-001
2	1.4628-010	1.4628-010	9.2718-012	0.0000-001	0.0000-001	-4.6355-015	4.0055+024	4.0055+024	9.0710-008	0.0000-001
3	1.1615-010	1.1615-010	6.5015-012	0.0000-001	0.0000-001	-6.8217-016	4.2611+024	4.2611+024	1.8312-008	0.0000-001
4	1.0486-010	1.0486-010	4.9631-012	0.0000-001	0.0000-001	7.5191-018	4.5425+024	4.5425+024	1.7825-008	0.0000-001
5	9.3844-011	9.3844-011	2.3674-012	0.0000-001	0.0000-001	-7.7501-017	4.6454+024	4.6454+024	1.0490-008	0.0000-001
6	9.4629-011	9.4629-011	1.5050-012	0.0000-001	0.0000-001	-1.3363-017	4.5547+024	4.5547+024	8.7122-009	0.0000-001
7	8.5232-011	8.5232-011	1.3390-012	0.0000-001	0.0000-001	-1.9529-016	4.6374+024	4.6374+024	-4.5687-009	0.0000-001
8	9.6889-011	9.6889-011	2.2076-012	0.0000-001	0.0000-001	2.5566-015	4.3947+024	4.3947+024	2.7476-009	0.0000-001
9	8.5784-011	8.5784-011	6.5199-012	0.0000-001	0.0000-001	8.5876-014	4.8593+024	4.8593+024	-2.3852-008	0.0000-001
10	1.0186-010	1.0186-010	1.2380-011	0.0000-001	0.0000-001	6.7279-014	5.1022+024	5.1022+024	-3.3452-009	0.0000-001
11	9.6993-011	9.6993-011	1.3681-011	0.0000-001	0.0000-001	7.2303-016	5.3650+024	5.3650+024	-1.9735-009	0.0000-001
12	1.0297-010	1.0297-010	1.0940-011	0.0000-001	0.0000-001	6.1005-016	4.8866+024	4.8866+024	2.9050-008	0.0000-001
13	8.6754-011	8.6754-011	1.0759-011	0.0000-001	0.0000-001	-6.5953-016	4.7292+024	4.7292+024	-3.9507-009	0.0000-001
14	9.2789-011	9.2789-011	1.2083-011	0.0000-001	0.0000-001	2.6944-016	4.3588+024	4.3588+024	-1.9794-009	0.0000-001
15	9.7786-011	9.7786-011	9.6608-012	0.0000-001	0.0000-001	4.7914-016	4.0563+024	4.0563+024	2.0433-008	0.0000-001
16	7.9963-011	7.9963-011	8.1736-012	0.0000-001	0.0000-001	-3.5193-016	4.0253+024	4.0253+024	8.2680-009	0.0000-001
17	7.9597-011	7.9597-011	7.6705-012	0.0000-001	0.0000-001	-1.9202-016	3.8713+024	3.8713+024	2.8554-009	0.0000-001
18	8.1347-011	8.1347-011	7.5465-012	0.0000-001	0.0000-001	-5.1259-017	3.6522+024	3.6522+024	1.5685-009	0.0000-001
19	8.3506-011	8.3506-011	6.8533-012	0.0000-001	0.0000-001	-1.0419-016	3.3520+024	3.3520+024	-2.1207-009	0.0000-001
20	8.8714-011	8.8714-011	8.9476-012	0.0000-001	0.0000-001	6.0562-015	3.1640+024	3.1640+024	-4.7594-010	0.0000-001
21	7.8289-011	7.8289-011	2.0075-011	0.0000-001	0.0000-001	3.4547-013	3.7114+024	3.7114+024	-2.5378-008	0.0000-001
22	9.0802-011	9.0802-011	3.4946-011	0.0000-001	0.0000-001	2.4827-013	4.2165+024	4.2165+024	-3.2645-008	0.0000-001
23	1.0121-010	1.0121-010	3.7094-011	0.0000-001	0.0000-001	1.2691-014	4.4010+024	4.4010+024	5.3238-008	0.0000-001
24	7.2182-011	7.2182-011	3.4351-011	0.0000-001	0.0000-001	-2.6549-015	4.6911+024	4.6911+024	-3.6212-008	0.0000-001
25	1.0166-010	1.0166-010	3.1543-011	0.0000-001	0.0000-001	5.3369-016	3.9406+024	3.9406+024	-1.7588-008	0.0000-001
26	1.1042-010	1.1042-010	2.7534-011	0.0000-001	0.0000-001	2.3227-015	3.4955+024	3.4955+024	5.1137-008	0.0000-001
27	7.7586-011	7.7586-011	2.2697-011	0.0000-001	0.0000-001	-1.0891-015	3.6531+024	3.6531+024	1.3592-008	0.0000-001
28	7.5431-011	7.5431-011	2.4229-011	0.0000-001	0.0000-001	-1.4492-015	3.5205+024	3.5205+024	-3.2373-008	0.0000-001
29	1.1143-010	1.1143-010	2.1720-011	0.0000-001	0.0000-001	1.6472-015	2.5934+024	2.5934+024	1.2356-008	0.0000-001
30	8.7012-011	8.7010-011	2.0259-011	0.0000-001	0.0000-001	-1.7602-013	2.5675+024	2.5675+024	-4.8712-006	0.0000-001
31	6.8896-010	6.8106-010	1.9518-010	0.0000-001	0.0000-001	-1.0511-010	3.1644+023	3.1644+023	-2.0329-003	0.0000-001
32	1.0149-008	3.5309-009	1.3533-009	0.0000-001	0.0000-001	-1.4823-010	1.0211+022	1.0211+022	-2.8094-003	0.0000-001
33	1.6712-008	1.3601-009	3.9089-008	4.6096-009	0.0000-001	-1.3661-011	6.9997+020	6.9997+020	9.5067-004	0.0000-001
34	1.3841-008	7.1477-010	3.3733-008	8.2163-011	0.0000-001	-3.3805-012	1.4304+020	1.4304+020	2.7017-004	0.0000-001
35	1.2293-008	4.9333-010	4.0234-008	1.5834-011	0.0000-001	-1.4274-012	5.2290+019	5.2290+019	1.1025-004	0.0000-001
36	1.1347-008	3.9417-010	2.9720-008	4.4269-012	0.0000-001	-7.2381-013	2.3997+019	2.3997+019	5.3935-005	0.0000-001
37	8.1855-009	2.9821-010	2.8118-008	1.8167-012	0.0000-001	-4.3703-013	1.8446+019	1.8446+019	3.6697-005	0.0000-001
38	1.0546-008	2.9607-010	2.1343-008	9.0743-013	0.0000-001	-3.1224-013	9.2698+018	9.2698+018	2.0914-005	0.0000-001
39	7.7850-009	2.8181-010	1.6556-008	5.7323-013	0.0000-001	-2.6044-013	1.0121+019	1.0121+019	1.5832-005	0.0000-001
40	7.7509-009	2.8465-010	1.3976-008	3.9735-013	0.0000-001	-2.1537-013	8.0264+018	8.0264+018	1.2072-005	0.0000-001
41	8.7527-009	3.5950-010	1.0136-008	3.4953-013	0.0000-001	-2.2394-013	7.1826+018	7.1826+018	9.1191-006	0.0000-001
42	8.4308-009	4.2794-010	7.6584-009	3.2011-013	0.0000-001	-2.3467-013	7.8036+018	7.8036+018	7.2128-006	0.0000-001
43	8.4830-009	4.4230-010	8.1792-009	3.0517-013	0.0000-001	-2.4746-013	8.1804+018	8.1804+018	5.6783-006	0.0000-001
44	8.3955-009	4.3559-010	6.8188-009	2.3560-013	0.0000-001	-2.1301-013	6.9071+018	6.9071+018	4.4441-006	0.0000-001
45	8.3847-009	3.9997-010	5.3877-009	1.8407-013	0.0000-001	-1.8511-013	5.8689+018	5.8689+018	3.3559-006	0.0000-001
46	4.6719-009	2.1842-010	5.5828-009	8.3241-014	0.0000-001	-9.9805-014	5.1004+018	5.1004+018	2.8458-006	0.0000-001
47	1.0483-008	3.9911-010	8.3160-009	1.2952-013	0.0000-001	-1.5846-013	3.8526+018	3.8526+018	1.7848-006	0.0000-001

48	9.9188-009	3.4406-010	6.9683-009	7.8887-014	0.0000-001	-1.1277-013	2.8451+018	2.8451+018	1.0191-006	0.0000-001
49	9.7514-009	2.3381-010	7.4802-009	3.5246-014	0.0000-001	-6.1378-014	1.5301+018	1.5301+018	4.0587-007	0.0000-001
50	9.6481-009	9.6365-011	3.8899-009	6.1745-015	0.0000-001	-1.5912-014	3.6922+017	3.6922+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(I/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	6.4814+008
2	0.0000-001	0.0000-001	2.5601+010
3	0.0000-001	0.0000-001	4.1957+010
4	0.0000-001	0.0000-001	5.3244+010
5	0.0000-001	0.0000-001	6.2938+010
6	0.0000-001	0.0000-001	6.5401+010
7	0.0000-001	0.0000-001	7.3005+010
8	0.0000-001	0.0000-001	6.2601+010
9	0.0000-001	0.0000-001	7.7269+010
10	0.0000-001	0.0000-001	7.3441+010
11	0.0000-001	0.0000-001	8.0887+010
12	0.0000-001	0.0000-001	6.7205+010
13	0.0000-001	0.0000-001	7.2397+010
14	0.0000-001	0.0000-001	5.9961+010
15	0.0000-001	0.0000-001	5.1668+010
16	0.0000-001	0.0000-001	5.8378+010
17	0.0000-001	0.0000-001	5.7756+010
18	0.0000-001	0.0000-001	5.2787+010
19	0.0000-001	0.0000-001	4.5309+010
20	0.0000-001	0.0000-001	3.9030+010
21	0.0000-001	0.0000-001	5.2159+010
22	0.0000-001	0.0000-001	5.6283+010
23	0.0000-001	0.0000-001	5.4342+010
24	0.0000-001	0.0000-001	7.6364+010
25	0.0000-001	0.0000-001	4.6870+010
26	0.0000-001	0.0000-001	3.4024+010
27	0.0000-001	0.0000-001	4.6918+010
28	0.0000-001	0.0000-001	4.7018+010
29	0.0000-001	0.0000-001	2.0619+010
30	0.0000-001	0.0000-001	2.1842+010
31	0.0000-001	0.0000-001	6.1080+007
32	0.0000-001	0.0000-001	2.9701+003
33	5.1152-005	0.0000-001	7.6978+000
34	5.2064-005	0.0000-001	4.5046-001
35	5.2240-005	0.0000-001	7.7054-002
36	5.2289-005	0.0000-001	1.9250-002
37	5.2309-005	0.0000-001	1.2414-002
38	5.2319-005	0.0000-001	3.4265-003
39	5.2325-005	0.0000-001	4.2633-003
40	5.2330-005	0.0000-001	2.8076-003
41	5.2334-005	0.0000-001	2.3229-003
42	5.2337-005	0.0000-001	2.7744-003
43	5.2341-005	0.0000-001	3.0821-003
44	5.2343-005	0.0000-001	2.2421-003
45	5.2345-005	0.0000-001	1.6518-003
46	5.2346-005	0.0000-001	1.2614-003
47	5.2348-005	0.0000-001	7.3474-004
48	5.2349-005	0.0000-001	4.0663-004
49	5.2349-005	0.0000-001	1.1978-004
50	5.2349-005	0.0000-001	7.4641-006

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.8940-007	5.1239-007	7.8950-016	4.0270-024	0.0000-001	-8.4383-008	4.7174-009	1.1948-018	8.4331-026	0.0000-001
I	1.4864-008	0.0000-001	7.8950-016	4.2256-025	-2.4411-007	3.0735-007	0.0000-001	1.1948-018	4.2418-033	-2.7430-010

	EI WORK	INT ENE(0)
E	-1.8043-009	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	1.8940-007	1.8393-007
ION	3.2221-007	3.2853-007
TOTAL	5.1161-007	5.1246-007

(9) CYCLE 700 (10) TIME(SH) 2.9094+000 (11) DELTA T(SH) 1.7446-004 (12) CRITERION(COUR) IN ZONE (17) (13) OTHERWISE (COUR) IN ZONE (17)

*	(14) RADIUS (CM)	(15) ZONE WIDTH (CM)	(16) SP VOLUME (CM3/G)	(17) COMPRESSION (VO/V)	(18) VELOCITY (CM/SH)	(19) E TEMP (KEV)	(20) ION TEMP (KEV)	(21) E PRESS (JK/CM3)	(22) ION PRESS (JK/CM3)	(23) ART VISC (JK/CM3)
1	3.5463-003	3.5463-003	1.3573-001	3.6839+001	-8.7457-002	1.1222-001	1.1245-001	3.1912-002	3.1977-002	1.1195-001
2	3.6911-003	1.4482-004	1.7088-002	2.9260+002	-1.0485-001	7.0655-002	7.0658-002	1.5958-001	1.5959-001	3.4853-002
3	3.7863-003	9.5120-005	1.1786-002	4.2424+002	-1.0268-001	6.4330-002	6.4330-002	2.1066-001	2.1066-001	7.9682-004
4	3.8581-003	7.1858-005	9.5759-003	5.2214+002	-1.0079-001	6.2846-002	6.2846-002	2.5330-001	2.5330-001	7.4075-004
5	3.9158-003	5.7716-005	8.1868-003	6.1074+002	-1.0626-001	5.9502-002	5.9502-002	2.8051-001	2.8051-001	7.2012-003
6	3.9700-003	5.4186-005	7.4508-003	6.7107+002	-1.0851-001	6.0979-002	6.0979-002	3.1587-001	3.1587-001	1.3575-003
7	4.0139-003	4.3837-005	6.5295-003	7.6576+002	-1.0950-001	6.0999-002	6.0999-002	3.6056-001	3.6056-001	2.9454-004
8	4.0594-003	4.5493-005	6.2061-003	7.9541+002	-1.1417-001	6.6970-002	6.6970-002	4.1119-001	4.1119-001	6.8582-003
9	4.0947-003	3.5376-005	5.6008-003	8.9273+002	-1.1700-001	6.6520-002	6.6520-002	4.5840-001	4.5840-001	2.8222-003
10	4.1322-003	3.7455-005	5.6104-003	8.9120+002	-1.1756-001	7.0791-002	7.0791-002	4.8699-001	4.8699-001	1.0841-004
11	4.1650-003	3.3589-005	5.3868-003	9.2819+002	-1.1720-001	6.9892-002	6.9892-002	5.0076-001	5.0076-001	4.7188-005
12	4.2019-003	3.6115-005	5.5419-003	9.0221+002	-1.1681-001	7.2863-002	7.2863-002	5.0744-001	5.0744-001	5.3227-005
13	4.2327-003	3.0837-005	5.1989-003	9.6174+002	-1.1738-001	7.0209-002	7.0208-002	5.2121-001	5.2121-001	1.2375-004
14	4.2648-003	3.2057-005	5.2160-003	9.5859+002	-1.1984-001	7.5083-002	7.5084-002	5.5557-001	5.5557-001	2.2917-003
15	4.2976-003	3.2807-005	5.1601-003	9.6897+002	-1.2317-001	7.9985-002	7.9986-002	5.9825-001	5.9825-001	4.2297-003
16	4.3243-003	2.6731-005	4.7568-003	1.0511+003	-1.2532-001	7.7609-002	7.7609-002	6.2970-001	6.2970-001	1.9248-003
17	4.3510-003	2.6708-005	4.6220-003	1.0818+003	-1.2632-001	7.7752-002	7.7752-002	6.4925-001	6.4925-001	4.2560-004
18	4.3787-003	2.7701-005	4.6663-003	1.0715+003	-1.2637-001	7.9658-002	7.9658-002	6.5886-001	6.5886-001	1.2389-006
19	4.4080-003	2.9265-005	4.8046-003	1.0407+003	-1.2627-001	8.2167-002	8.2167-002	6.6005-001	6.6005-001	4.3058-006
20	4.4391-003	3.1117-005	4.9862-003	1.0026+003	-1.2604-001	8.5202-002	8.5202-002	6.5950-001	6.5949-001	2.1508-005
21	4.4753-003	3.6209-005	6.8315-003	7.3191+002	-1.0991-001	1.1872-001	1.1849-001	6.7075-001	6.6941-001	0.0000-001
22	4.9165-003	4.4121-004	8.9680-002	5.5754+001	1.7934-001	1.5575+000	1.2432+000	6.7032-001	5.3502-001	0.0000-001
23	6.7493-003	1.8327-003	5.6186-001	8.8990+000	6.5784-001	5.4903+000	1.8058+000	3.7714-001	1.2404-001	0.0000-001

24	9.3945-003	2.6452-003	1.0914+000	2.6435+000	8.9414-001	7.4924+000	1.4154+000	1.5288-001	2.8882-002	0.0000-001
25	1.4355-002	4.9607-003	6.0146+000	8.3131-001	1.1790+000	8.8583+000	9.2897-001	5.6844-002	5.9611-003	0.0000-001
26	2.1592-002	7.2366-003	1.9509+001	2.5629-001	1.3435+000	9.7590+000	5.6044-001	1.9307-002	1.1087-003	0.0000-001
27	2.8582-002	6.9896-003	4.4412+001	1.1258-001	1.4194+000	1.0232+001	3.9798-001	8.8922-003	3.4586-004	0.0000-001
28	3.7226-002	8.6448-003	9.2323+001	5.4158-002	1.4708+000	1.0541+001	3.0005-001	4.4066-003	1.2544-004	0.0000-001
29	5.5398-002	1.8172-002	3.0206+002	1.6553-002	1.4988+000	1.0865+001	1.6154-001	1.3882-003	2.0640-005	0.0000-001
30	7.1516-002	1.6118-002	6.0891+002	8.2114-003	1.5165+000	1.1060+001	1.2629-001	7.0103-004	8.0051-006	0.0000-001
31	9.5817-002	2.4301-002	1.5641+003	3.1966-003	1.4363+000	1.0970+001	8.0901-002	2.7068-004	1.9962-006	0.0000-001
32	1.2416-001	2.8341-002	3.0809+003	1.6229-003	1.3053+000	1.0906+001	6.2343-002	1.3662-004	7.8099-007	0.0000-001
33	1.5547-001	3.1307-002	5.3760+003	9.3006-004	1.1889+000	1.0864+001	5.2204-002	7.7996-005	3.7478-007	0.0000-001
34	1.8987-001	3.4407-002	8.8163+003	5.6713-004	1.1001+000	1.0836+001	4.5708-002	4.7436-005	2.0010-007	0.0000-001
35	2.2926-001	3.9390-002	1.4556+004	3.4350-004	9.8753-001	1.0815+001	3.9528-002	2.8677-005	1.0481-007	0.0000-001
36	2.6664-001	3.7300-002	1.8522+004	2.6424-004	8.7547-001	1.0802+001	4.0324-002	2.2032-005	8.2248-008	0.0000-001
37	2.9712-001	3.0482-002	2.6095+004	1.9161-004	8.3997-001	1.0794+001	3.8221-002	1.5964-005	5.6529-008	0.0000-001
38	3.3572-001	3.8596-002	3.0686+004	1.6294-004	6.5795-001	1.0787+001	3.9500-002	1.3568-005	4.9682-008	0.0000-001
39	3.6160-001	2.5881-002	3.2706+004	1.5288-004	5.7911-001	1.0783+001	4.3697-002	1.2725-005	5.1566-008	0.0000-001
40	3.8322-001	2.1618-002	3.0700+004	1.6287-004	5.2395-001	1.0780+001	5.3379-002	1.3553-005	6.7108-008	0.0000-001
41	4.0622-001	2.2998-002	3.1948+004	7.8250-003	4.4927-001	1.0778+001	7.1113-002	1.3021-005	8.5909-008	3.4898-007
42	4.2685-001	2.0633-002	3.2732+004	7.6377-003	4.6507-001	1.0777+001	6.5837-002	1.2707-005	7.7631-008	0.0000-001
43	4.4849-001	2.1642-002	3.7372+004	6.6894-003	4.3531-001	1.0775+001	6.2249-002	1.1128-005	6.4287-008	0.0000-001
44	4.7012-001	2.1626-002	4.1299+004	6.0534-003	4.8366-001	1.0774+001	6.1046-002	1.0069-005	5.7050-008	0.0000-001
45	4.9276-001	2.2641-002	4.7313+004	5.2839-003	4.8656-001	1.0774+001	5.9034-002	8.7886-006	4.8157-008	0.0000-001
46	5.0743-001	1.4669-002	5.9156+004	2.1134-002	4.9999-001	1.0773+001	5.2623-002	7.0287-006	3.4333-008	0.0000-001
47	5.4385-001	3.6417-002	7.2006+004	1.7363-002	4.6526-001	1.0772+001	4.7087-002	5.7741-006	2.5239-008	0.0000-001
48	5.8541-001	4.1564-002	9.9879+004	1.2518-002	5.2009-001	1.0772+001	4.0811-002	4.1625-006	1.5770-008	0.0000-001
49	6.4956-001	6.4156-002	1.8707+005	6.6834-003	5.4190-001	1.0771+001	2.8457-002	2.2223-006	5.8712-009	0.0000-001
50	8.2619-001	1.7662-001	7.4394+005	1.6606-003	5.6419-001	1.0771+001	1.1962-002	5.5879-007	6.2061-010	0.0000-001
						1.0771+001	1.1962-002	1.0000-014		

#	(24) E ENERGY (JK/STER)	(25) ION ENERGY (JK/STER)	(26) KIN ENERGY (JK/STER)	(27) E SOURCE (JK/STER)	(28) ION SOURCE (JK/STER)	(29) E-ION EX (JK/STER)	(30) E DENSITY (1/CM3)	(31) ION DENSITY (1/CM3)	(32) E FLUX (JK/CM2-SH)	(33) FLUX LIMIT (JK/CM2-SH)
1	7.1165-010	7.1310-010	4.2169-010	0.0000-001	0.0000-001	1.0702-011	1.7751+024	1.7751+024	2.5205-006	0.0000-001
2	4.5402-010	4.5403-010	6.1508-010	0.0000-001	0.0000-001	1.0122-012	1.4099+025	1.4099+025	5.3069-006	0.0000-001
3	4.2016-010	4.2016-010	5.8629-010	0.0000-001	0.0000-001	-4.4778-016	2.0442+025	2.0442+025	1.7413-006	0.0000-001
4	3.9887-010	3.9887-010	5.4895-010	0.0000-001	0.0000-001	5.6203-015	2.5159+025	2.5159+025	5.1113-006	0.0000-001
5	3.6692-010	3.6692-010	6.1979-010	0.0000-001	0.0000-001	7.3112-014	2.9428+025	2.9428+025	-2.4680-006	0.0000-001
6	3.9915-010	3.9915-010	6.4780-010	0.0000-001	0.0000-001	1.2251-014	3.2335+025	3.2335+025	-1.5199-007	0.0000-001
7	3.7781-010	3.7781-010	6.7417-010	0.0000-001	0.0000-001	-1.3000-014	3.6897+025	3.6897+025	-1.2241-005	0.0000-001
8	4.5721-010	4.5721-010	7.2648-010	0.0000-001	0.0000-001	8.6381-014	3.8326+025	3.8326+025	9.6522-007	0.0000-001
9	4.0433-010	4.0433-010	7.4593-010	0.0000-001	0.0000-001	8.6867-016	4.3016+025	4.3016+025	-1.4457-005	0.0000-001
10	4.6296-010	4.6296-010	7.6111-010	0.0000-001	0.0000-001	2.1923-014	4.2942+025	4.2942+025	2.8341-006	0.0000-001
11	4.3432-010	4.3432-010	7.6030-010	0.0000-001	0.0000-001	-1.7695-014	4.4724+025	4.4724+025	-1.1259-005	0.0000-001
12	4.8118-010	4.8118-010	7.4903-010	0.0000-001	0.0000-001	2.8861-014	4.3472+025	4.3472+025	1.0941-005	0.0000-001
13	4.2880-010	4.2880-010	7.4558-010	0.0000-001	0.0000-001	-3.9915-014	4.6340+025	4.6340+025	-1.9688-005	0.0000-001
14	4.8226-010	4.8226-010	8.1677-010	0.0000-001	0.0000-001	1.0901-014	4.6189+025	4.6189+025	-2.2751-005	0.0000-001
15	5.3961-010	5.3961-010	8.3805-010	0.0000-001	0.0000-001	8.2836-014	4.6689+025	4.6689+025	1.2354-005	0.0000-001
16	4.6922-010	4.6922-010	8.3695-010	0.0000-001	0.0000-001	-7.9474-015	5.0647+025	5.0647+025	-1.9652-006	0.0000-001
17	4.8940-010	4.8940-010	8.8469-010	0.0000-001	0.0000-001	-1.3118-014	5.2124+025	5.2124+025	-1.2575-005	0.0000-001
18	5.2159-010	5.2159-010	9.2094-010	0.0000-001	0.0000-001	-5.0200-015	5.1630+025	5.1630+025	-1.5954-005	0.0000-001
19	5.5925-010	5.5925-010	9.5539-010	0.0000-001	0.0000-001	-5.4993-015	5.0144+025	5.0144+025	-1.9584-005	0.0000-001
20	6.0235-010	6.0235-010	9.0317-010	0.0000-001	0.0000-001	-3.1057-013	4.8317+025	4.8317+025	-2.3261-004	0.0000-001
21	7.2377-010	7.2232-010	6.4566-010	0.0000-001	0.0000-001	-8.3236-011	3.5266+025	3.5266+025	-5.2418-002	0.0000-001
22	9.7901-009	7.8141-009	1.7727-009	0.0000-001	0.0000-001	-1.3370-009	2.6865+024	2.6865+024	-8.5758-001	0.0000-001
23	3.5565-008	1.1698-008	2.2052-008	0.0000-001	0.0000-001	-5.5942-010	4.2879+023	4.2879+023	-9.2630-001	0.0000-001
24	3.9879-008	7.5337-009	4.1960-008	0.0000-001	0.0000-001	-1.4651-010	1.2737+023	1.2737+023	-6.2678-001	0.0000-001
25	6.0512-008	6.3458-009	8.3216-008	0.0000-001	0.0000-001	-6.5192-011	4.0056+022	4.0056+022	-3.3759-001	0.0000-001

26	6.8619-008	3.9407-009	9.9784-008	0.0000-001	0.0000-001	-2.1483-011	1.2349+022	1.2349+022	-1.7325-001	0.0000-001
27	5.9053-008	2.2968-009	1.0156-007	0.0000-001	0.0000-001	-8.1252-012	5.4247+021	5.4247+021	-1.0809-001	0.0000-001
28	6.2221-008	1.7711-009	1.2582-007	0.0000-001	0.0000-001	-4.1048-012	2.6095+021	2.6095+021	-6.8454-002	0.0000-001
29	8.2198-008	1.2222-009	1.3357-007	0.0000-001	0.0000-001	-1.6644-012	7.9758+020	7.9758+020	-3.3130-002	0.0000-001
30	6.8626-008	7.8355-010	1.2458-007	2.9610-008	0.0000-001	-7.0088-013	3.9566+020	3.9566+020	1.2697-002	0.0000-001
31	6.9554-008	5.1295-010	1.1420-007	3.6482-011	0.0000-001	-2.8708-013	1.5403+020	1.5403+020	6.6157-003	0.0000-001
32	7.0653-008	4.0368-010	9.6355-008	1.1312-011	0.0000-001	-1.5297-013	7.8199+019	7.8199+019	3.6888-003	0.0000-001
33	7.1895-008	3.4547-010	8.1643-008	4.2492-012	0.0000-001	-9.2466-014	4.4814+019	4.4814+019	2.1998-003	0.0000-001
34	7.3233-008	3.0891-010	7.1379-008	1.7691-012	0.0000-001	-5.8576-014	2.7327+019	2.7327+019	1.3746-003	0.0000-001
35	7.4635-008	2.7277-010	5.8727-008	7.5161-013	0.0000-001	-3.6607-014	1.6551+019	1.6551+019	8.7595-004	0.0000-001
36	7.6094-008	2.8406-010	4.1117-008	4.2405-013	0.0000-001	-2.8848-014	1.2732+019	1.2732+019	5.9893-004	0.0000-001
37	5.8055-008	2.0557-010	3.8628-008	1.8340-013	0.0000-001	-1.6103-014	9.2324+018	9.2324+018	4.5228-004	0.0000-001
38	7.8742-008	2.8633-010	2.9062-008	1.6299-013	0.0000-001	-1.8801-014	7.8512+018	7.8512+018	3.2456-004	0.0000-001
39	6.0078-008	2.4347-010	1.6259-008	1.0081-013	0.0000-001	-1.3517-014	7.3663+018	7.3663+018	2.6008-004	0.0000-001
40	6.0967-008	3.0188-010	1.4404-008	9.5207-014	0.0000-001	-1.4546-014	7.8476+018	7.8476+018	2.1380-004	0.0000-001
41	7.0003-008	4.6187-010	1.1181-008	9.3781-014	0.0000-001	-1.6067-014	7.5410+018	7.5410+018	1.7246-004	0.0000-001
42	6.8247-008	4.1694-010	1.1914-008	8.0317-014	0.0000-001	-1.5327-014	7.3604+018	7.3604+018	1.3954-004	0.0000-001
43	6.9215-008	3.9985-010	1.0490-008	6.5123-014	0.0000-001	-1.3724-014	6.4465+018	6.4465+018	1.1161-004	0.0000-001
44	6.8921-008	3.9049-010	1.2950-008	5.3586-014	0.0000-001	-1.2437-014	5.8336+018	5.8336+018	8.7438-005	0.0000-001
45	6.9194-008	3.7915-010	1.0237-008	4.3007-014	0.0000-001	-1.0966-014	5.0921+018	5.0921+018	6.7063-005	0.0000-001
46	3.8682-008	1.8895-010	1.2613-008	1.7978-014	0.0000-001	-4.9492-015	4.0726+018	4.0726+018	5.6564-005	0.0000-001
47	8.7181-008	3.8108-010	1.4748-008	3.0300-014	0.0000-001	-9.2226-015	3.3458+018	3.3458+018	3.6532-005	0.0000-001
48	8.2771-008	3.1359-010	1.7826-008	1.8116-014	0.0000-001	-6.3663-015	2.4121+018	2.4121+018	2.0764-005	0.0000-001
49	8.1617-008	2.1562-010	1.9144-008	8.0441-015	0.0000-001	-3.3862-015	1.2879+018	1.2879+018	8.3720-006	0.0000-001
50	8.0989-008	8.9948-011	1.0335-008	1.4785-015	0.0000-001	-8.9349-016	3.2384+017	3.2384+017	0.0000-001	0.0000-001

#	(34) PSI -	(35) PSI +	(36) KIB(I/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	1.0849+009
2	0.0000-001	0.0000-001	5.8181+010
3	0.0000-001	0.0000-001	1.4034+011
4	0.0000-001	0.0000-001	2.7016+011
5	0.0000-001	0.0000-001	3.2703+011
6	0.0000-001	0.0000-001	3.8048+011
7	0.0000-001	0.0000-001	4.9522+011
8	0.0000-001	0.0000-001	4.6445+011
9	0.0000-001	0.0000-001	5.9103+011
10	0.0000-001	0.0000-001	5.3643+011
11	0.0000-001	0.0000-001	5.9327+011
12	0.0000-001	0.0000-001	5.2649+011
13	0.0000-001	0.0000-001	6.3268+011
14	0.0000-001	0.0000-001	5.6820+011
15	0.0000-001	0.0000-001	5.2792+011
16	0.0000-001	0.0000-001	6.8015+011
17	0.0000-001	0.0000-001	6.8675+011
18	0.0000-001	0.0000-001	6.4973+011
19	0.0000-001	0.0000-001	5.8501+011
20	0.0000-001	0.0000-001	5.1494+011
21	0.0000-001	0.0000-001	2.0676+011
22	0.0000-001	0.0000-001	1.7761+008
23	0.0000-001	0.0000-001	8.3802+005
24	0.0000-001	0.0000-001	4.6903+004
25	0.0000-001	0.0000-001	3.8712+003
26	0.0000-001	0.0000-001	3.2653+002
27	0.0000-001	0.0000-001	6.1544+001
28	0.0000-001	0.0000-001	1.4003+001
29	0.0000-001	0.0000-001	1.2918+000

30	2.1472-003	0.0000-001	3.2161-001
31	2.1498-003	0.0000-001	5.0316-002
32	2.1506-003	0.0000-001	1.3364-002
33	2.1509-003	0.0000-001	4.5941-003
34	2.1510-003	0.0000-001	1.7214-003
35	2.1511-003	0.0000-001	6.3677-004
36	2.1511-003	0.0000-001	3.7976-004
37	2.1511-003	0.0000-001	2.0145-004
38	2.1512-003	0.0000-001	1.4742-004
39	2.1512-003	0.0000-001	1.3039-004
40	2.1512-003	0.0000-001	1.4743-004
41	2.1512-003	0.0000-001	1.3650-004
42	2.1512-003	0.0000-001	1.3035-004
43	2.1512-003	0.0000-001	1.0074-004
44	2.1512-003	0.0000-001	8.2962-005
45	2.1512-003	0.0000-001	6.3602-005
46	2.1512-003	0.0000-001	4.1037-005
47	2.1512-003	0.0000-001	2.7856-005
48	2.1512-003	0.0000-001	1.4596-005
49	2.1512-003	0.0000-001	4.1984-006
50	2.1512-003	0.0000-001	2.8026-007

	(37) INT ENE	(38) T SOURCE	(39) BDWORK T	(40) BDFLUX T	(41) BREM/EIW T	(42) EIX/KE T	(43) SOURCE	(44) BDWORK	(45) BDFLUX	(46) BREM/EIX
E	1.9074-006	3.4106-006	9.3538-016	-7.5791-022	0.0000-001	-2.9042-007	2.9866-008	3.3589-019	-2.0124-023	0.0000-001
I	5.9995-008	0.0000-001	9.3538-016	4.2256-025	-1.2251-006	1.4379-006	0.0000-001	3.3589-019	9.1331-034	-2.2170-009

	(47) EI WORK	(48) INT ENE(0)
E	-1.0066-008	3.2292-011
I		3.2292-011

ENERGY CONSERVATION (49)

ELECTRON	1.9074-006	1.8951-006
ION	1.4979-006	1.5155-006
TOTAL	3.4053-006	3.4106-006

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (7) OTHERWISE (COUR) IN ZONE (7)
800	2.9210+000	9.4522-005	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (V0/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.6466-003	1.6466-003	1.3587-002	3.6600+002	-2.3908-001	3.1645+000	3.2235+000	8.9893+000	9.1568+000	8.2393+000
2	1.7009-003	5.4296-005	1.3706-003	3.6481+003	-2.3748-001	4.6098-001	4.6089-001	1.2981+001	1.2979+001	3.6803-003
3	1.7401-003	3.9144-005	1.0271-003	4.8680+003	-2.4154-001	3.3584-001	3.3584-001	1.2620+001	1.2620+001	3.1442-002
4	1.7733-003	3.3193-005	9.3436-004	5.3512+003	-2.4380-001	3.0017-001	3.0017-001	1.2399+001	1.2399+001	1.0790-002
5	1.8019-003	2.8614-005	8.5864-004	5.8245+003	-2.4408-001	2.7159-001	2.7159-001	1.2211+001	1.2211+001	1.7788-004
6	1.8310-003	2.9074-005	8.4884-004	5.8932+003	-2.4226-001	2.6039-001	2.6039-001	1.1845+001	1.1845+001	7.7519-003
7	1.8572-003	2.6205-005	8.3294-004	6.0028+003	-2.3842-001	2.4384-001	2.4384-001	1.1299+001	1.1299+001	3.5063-002
8	1.8875-003	3.0332-005	9.0170-004	5.5451+003	-2.2997-001	2.4297-001	2.4297-001	1.0400+001	1.0400+001	0.0000-001
9	1.9139-003	2.6379-005	9.0768-004	5.5085+003	-2.2413-001	2.2663-001	2.2663-001	9.6364+000	9.6364+000	7.5043-002
10	1.9439-003	2.9993-005	9.8787-004	5.0614+003	-2.1650-001	2.2406-001	2.2406-001	8.7536+000	8.7536+000	0.0000-001
11	1.9730-003	2.9083-005	1.0392-003	4.8114+003	-2.0857-001	2.1130-001	2.1130-001	7.8477+000	7.8477+000	0.0000-001

12	2.0060-003	3.3096-005	1.1484-003	4.3539+003	-1.9963-001	2.0589-001	2.0589-001	6.9197+000	6.9197+000	0.0000-001
13	2.0372-003	3.1126-005	1.2058-003	4.1465+003	-1.9137-001	1.8903-001	1.8903-001	6.0502+000	6.0502+000	0.0000-001
14	2.0728-003	3.5635-005	1.3564-003	3.6861+003	-1.8018-001	1.8435-001	1.8435-001	5.2455+000	5.2455+000	0.0000-001
15	2.1156-003	4.2764-005	1.6025-003	3.1066+003	-1.6341-001	1.8714-001	1.8712-001	4.4876+000	4.4873+000	0.0000-001
16	2.3372-003	2.2158-004	1.0526-002	4.7503+002	4.5907-002	1.0287+000	1.0048+000	3.7721+000	3.6844+000	0.0000-001
17	3.5506-003	1.2135-003	9.8095-002	5.0971+002	7.4609-001	6.3672+000	3.2315+000	2.5052+000	1.2715+000	0.0000-001
18	5.5312-003	1.9806-003	3.6681-001	1.3631+001	1.2180+000	9.9547+000	2.5183+000	1.0474+000	2.6497-001	0.0000-001
19	8.0838-003	2.5526-003	1.0180+000	4.9117+000	1.4961+000	1.1736+001	1.7746+000	4.4496-001	6.7283-002	0.0000-001
20	1.1285-002	3.2008-003	2.4805+000	2.0157+000	1.6695+000	1.2779+001	1.2290+000	1.9883-001	1.9122-002	0.0000-001
21	1.4335-002	3.0508-003	4.7750+000	1.0471+000	1.7818+000	1.3375+001	9.4259-001	1.0811-001	7.6187-003	0.0000-001
22	1.8031-002	3.6962-003	8.9539+000	5.5841-001	1.8491+000	1.3788+001	7.1392-001	5.9430-002	3.0773-003	0.0000-001
23	2.2241-002	4.2105-003	1.5313+001	3.2653-001	1.8892+000	1.4096+001	5.7226-001	3.5528-002	1.4424-003	0.0000-001
24	2.6318-002	4.0773-003	2.6205+001	1.9080-001	1.9572+000	1.4308+001	4.5509-001	2.1073-002	6.7026-004	0.0000-001
25	3.2643-002	6.3249-003	4.6766+001	1.0691-001	1.9301+000	1.4501+001	3.5023-001	1.1967-002	2.8904-004	0.0000-001
26	4.0415-002	7.7717-003	8.5707+001	5.8338-002	1.8909+000	1.4671+001	2.6696-001	6.6066-003	1.2021-004	0.0000-001
27	4.7846-002	7.4307-003	1.4551+002	3.4362-002	1.9030+000	1.4793+001	2.1364-001	3.9239-003	5.6667-005	0.0000-001
28	5.7106-002	9.2607-003	2.5076+002	1.9939-002	1.9565+000	1.4891+001	1.7303-001	2.2919-003	2.6631-005	0.0000-001
29	7.4238-002	1.7132-002	5.6859+002	8.7937-003	1.7541+000	1.4973+001	1.1438-001	1.0164-003	7.7637-006	0.0000-001
30	9.0698-002	1.6459-002	1.0480+003	4.7709-003	1.7923+000	1.5064+001	9.2358-002	5.5478-004	3.4013-006	0.0000-001
31	1.1338-001	2.2686-002	2.1656+003	2.3088-003	1.5949+000	1.5123+001	6.7292-002	2.6951-004	1.1993-006	0.0000-001
32	1.3997-001	2.6588-002	3.8267+003	1.3066-003	1.4231+000	1.5163+001	5.5164-002	1.5293-004	5.5637-007	0.0000-001
33	1.6980-001	2.9832-002	6.2802+003	7.9615-004	1.2850+000	1.5195+001	4.7811-002	9.3381-005	2.9383-007	0.0000-001
34	2.0312-001	3.3319-002	9.9495+003	5.0254-004	1.1856+000	1.5219+001	4.2641-002	5.9036-005	1.6541-007	0.0000-001
35	2.4097-001	3.7852-002	1.5675+004	3.1858-004	1.0307+000	1.5237+001	3.7901-002	3.7469-005	9.3202-008	0.0000-001
36	2.7715-001	3.6180-002	1.9987+004	2.5016-004	9.3799-001	1.5249+001	3.9108-002	2.9446-005	7.5517-008	0.0000-001
37	3.0696-001	2.9810-002	2.7392+004	1.8253-004	8.5310-001	1.5257+001	3.7191-002	2.1497-005	5.2401-008	0.0000-001
38	3.4350-001	3.6539-002	3.0645+004	1.6275-004	6.8100-001	1.5264+001	3.9703-002	1.9198-005	4.9938-008	1.9299-006
39	3.6826-001	2.4763-002	3.2602+004	1.5337-004	5.6940-001	1.5268+001	4.5572-002	1.8075-005	5.3951-008	7.6379-007
40	3.8933-001	2.1064-002	3.0948+004	1.6156-004	5.2811-001	1.5270+001	5.3616-002	1.9044-005	6.6865-008	0.0000-001
41	4.1154-001	2.2207-002	3.1748+004	7.8743-003	4.6914-001	1.5272+001	7.1977-002	1.8566-005	8.7500-008	2.1900-007
42	4.3245-001	2.0917-002	3.4060+004	7.3399-003	5.0052-001	1.5274+001	6.4381-002	1.7308-005	7.2955-008	0.0000-001
43	4.5373-001	2.1281-002	3.7664+004	6.6375-003	4.7180-001	1.5275+001	6.2084-002	1.5653-005	6.3619-008	0.0000-001
44	4.7594-001	2.2204-002	4.3429+004	5.7563-003	5.2000-001	1.5276+001	5.9157-002	1.3576-005	5.2572-008	0.0000-001
45	4.9882-001	2.2385-002	4.9009+004	5.1010-003	5.6209-001	1.5277+001	5.7618-002	1.2031-005	4.5375-008	0.0000-001
46	5.1350-001	1.4674-002	6.0617+004	2.0625-002	5.4747-001	1.5278+001	5.2030-002	9.7273-006	3.3128-008	0.0000-001
47	5.4955-001	3.6059-002	7.2894+004	1.7151-002	5.2163-001	1.5278+001	4.6796-002	8.0894-006	2.4777-008	0.0000-001
48	5.9187-001	4.2316-002	1.0389+005	1.2034-002	5.9675-001	1.5279+001	3.9808-002	5.6761-006	1.4789-008	0.0000-001
49	6.5631-001	6.4440-002	1.9193+005	6.5139-003	6.2471-001	1.5279+001	2.8043-002	3.0725-006	5.6391-009	0.0000-001
50	8.3323-001	1.7692-001	7.5913+005	1.6469-003	6.5456-001	1.5280+001	1.1818-002	7.7685-007	6.0087-010	0.0000-001
						1.5280+001	1.1818-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	2.0067-008	2.0441-008	3.1513-009	0.0000-001	0.0000-001	2.8416-010	1.7732+025	1.7732+025	2.6164-001	0.0000-001
2	2.9622-009	2.9616-009	3.1556-009	0.0000-001	0.0000-001	-2.6883-011	1.7578+026	1.7578+026	1.2163-002	0.0000-001
3	2.1935-009	2.1935-009	3.2444-009	0.0000-001	0.0000-001	-9.9854-013	2.3456+026	2.3456+026	2.9112-003	0.0000-001
4	1.9051-009	1.9051-009	3.2119-009	0.0000-001	0.0000-001	-5.4702-014	2.5784+026	2.5784+026	2.2291-003	0.0000-001
5	1.6748-009	1.6748-009	3.2703-009	0.0000-001	0.0000-001	-1.7910-013	2.8065+026	2.8065+026	7.9038-004	0.0000-001
6	1.7044-009	1.7044-009	3.2286-009	0.0000-001	0.0000-001	5.6700-014	2.8396+026	2.8396+026	1.1318-003	0.0000-001
7	1.5103-009	1.5103-009	3.1763-009	0.0000-001	0.0000-001	-1.3905-013	2.8924+026	2.8924+026	-1.8366-005	0.0000-001
8	1.6588-009	1.6588-009	2.9474-009	0.0000-001	0.0000-001	1.4943-013	2.6718+026	2.6718+026	1.0222-003	0.0000-001
9	1.3775-009	1.3775-009	2.7373-009	0.0000-001	0.0000-001	-1.2379-013	2.6542+026	2.6542+026	1.2398-004	0.0000-001
10	1.4653-009	1.4653-009	2.5815-009	0.0000-001	0.0000-001	7.5388-014	2.4388+026	2.4388+026	6.1563-004	0.0000-001
11	1.3131-009	1.3131-009	2.4079-009	0.0000-001	0.0000-001	-5.7444-014	2.3183+026	2.3183+026	2.3108-004	0.0000-001
12	1.3597-009	1.3597-009	2.1875-009	0.0000-001	0.0000-001	7.6637-014	2.0979+026	2.0979+026	6.9658-004	0.0000-001
13	1.1545-009	1.1545-009	1.9816-009	0.0000-001	0.0000-001	-8.4214-014	1.9979+026	1.9979+026	1.7101-004	0.0000-001

14	1.1841-009	1.1841-009	1.8462-009	0.0000-001	0.0000-001	-4.3069-014	1.7761+026	1.7761+026	-8.4618-005	0.0000-001
15	1.2625-009	1.2624-009	1.4751-009	0.0000-001	0.0000-001	-7.9746-012	1.4969+026	1.4969+026	-4.4041-002	0.0000-001
16	6.2196-009	6.0749-009	1.1230-010	0.0000-001	0.0000-001	-6.3052-010	2.2889+025	2.2889+025	-2.5832+000	0.0000-001
17	4.0078-008	2.0341-008	3.0670-008	0.0000-001	0.0000-001	-1.0316-009	2.4560+024	2.4560+024	-4.6349+000	0.0000-001
18	6.5132-008	1.6489-008	8.5550-008	0.0000-001	0.0000-001	-3.8214-010	6.5681+023	6.5681+023	-3.0926+000	0.0000-001
19	7.9879-008	1.2079-008	1.3412-007	0.0000-001	0.0000-001	-1.6057-010	2.3666+023	2.3666+023	-1.8442+000	0.0000-001
20	9.0349-008	8.6886-009	1.5847-007	0.0000-001	0.0000-001	-7.1518-011	9.7124+022	9.7124+022	-1.0871+000	0.0000-001
21	8.1540-008	5.7463-009	1.6975-007	0.0000-001	0.0000-001	-3.4192-011	5.0455+022	5.0455+022	-7.2757-001	0.0000-001
22	8.6663-008	4.4874-009	1.8845-007	0.0000-001	0.0000-001	-1.9442-011	2.6907+022	2.6907+022	-4.8283-001	0.0000-001
23	9.1309-008	3.7070-009	1.8137-007	0.0000-001	0.0000-001	-1.1889-011	1.5733+022	1.5733+022	-3.2689-001	0.0000-001
24	7.6155-008	2.4222-009	2.0104-007	0.0000-001	0.0000-001	-5.8015-012	9.1936+021	9.1936+021	-2.3759-001	0.0000-001
25	9.9056-008	2.3925-009	2.2300-007	0.0000-001	0.0000-001	-4.3591-012	5.1516+021	5.1516+021	-1.5472-001	0.0000-001
26	1.0316-007	1.8771-009	1.9767-007	0.0000-001	0.0000-001	-2.5092-012	2.8110+021	2.8110+021	-9.9851-002	0.0000-001
27	8.5376-008	1.2330-009	1.8257-007	0.0000-001	0.0000-001	-1.2283-012	1.6557+021	1.6557+021	-7.0535-002	0.0000-001
28	8.7896-008	1.0214-009	2.2264-007	0.0000-001	0.0000-001	-7.3588-013	9.6076+020	9.6076+020	-4.9086-002	0.0000-001
29	1.1328-007	8.6534-010	1.8295-007	0.0000-001	0.0000-001	-4.3707-013	4.2372+020	4.2372+020	-2.7643-002	0.0000-001
30	9.3462-008	5.7301-010	1.7411-007	0.0000-001	0.0000-001	-1.9820-013	2.2988+020	2.2988+020	-1.8027-002	0.0000-001
31	9.5885-008	4.2667-010	1.9080-007	0.0000-001	0.0000-001	-9.9034-014	1.1125+020	1.1125+020	-1.1116-002	0.0000-001
32	9.8229-008	3.5737-010	1.1453-007	0.0000-001	0.0000-001	-5.9085-014	6.2957+019	6.2957+019	-6.9561-003	0.0000-001
33	1.0055-007	3.1640-010	9.5378-008	0.0000-001	0.0000-001	-3.7543-014	3.8362+019	3.8362+019	-4.4794-003	0.0000-001
34	1.0286-007	2.8819-010	8.2906-008	0.0000-001	0.0000-001	-2.4485-014	2.4214+019	2.4214+019	-2.9497-003	0.0000-001
35	1.0515-007	2.6154-010	6.3972-008	0.0000-001	0.0000-001	-1.5962-014	1.5350+019	1.5350+019	-1.9598-003	0.0000-001
36	1.0742-007	2.7549-010	4.7200-008	0.0000-001	0.0000-001	-1.2825-014	1.2054+019	1.2054+019	-1.3762-003	0.0000-001
37	8.2063-008	2.0003-010	3.9845-008	0.0000-001	0.0000-001	-7.2187-015	8.7952+018	8.7952+018	-1.0555-003	0.0000-001
38	1.1142-007	2.8982-010	2.5777-008	0.0000-001	0.0000-001	-8.8097-015	7.8514+018	7.8514+018	-7.6901-004	0.0000-001
39	8.5067-008	2.5391-010	1.5719-008	0.0000-001	0.0000-001	-6.3495-015	7.3898+018	7.3898+018	-6.1968-004	0.0000-001
40	8.6360-008	3.0322-010	1.4633-008	0.0000-001	0.0000-001	-6.7643-015	7.7847+018	7.7847+018	-5.1039-004	0.0000-001
41	9.9191-008	4.6748-010	1.2192-008	0.0000-001	0.0000-001	-7.5748-015	7.5884+018	7.5884+018	-4.1112-004	0.0000-001
42	9.6726-008	4.0772-010	1.3800-008	0.0000-001	0.0000-001	-6.9178-015	7.0735+018	7.0735+018	-3.3338-004	0.0000-001
43	9.8118-008	3.9879-010	1.2323-008	0.0000-001	0.0000-001	-6.3800-015	6.3966+018	6.3966+018	-2.6605-004	0.0000-001
44	9.7717-008	3.7841-010	1.4969-008	0.0000-001	0.0000-001	-5.5496-015	5.5474+018	5.5474+018	-2.0952-004	0.0000-001
45	9.8117-008	3.7006-010	1.3662-008	0.0000-001	0.0000-001	-4.9629-015	4.9158+018	4.9158+018	-1.6118-004	0.0000-001
46	5.4856-008	1.8682-010	1.5122-008	0.0000-001	0.0000-001	-2.2606-015	3.9745+018	3.9745+018	-1.3610-004	0.0000-001
47	1.2365-007	3.7871-010	1.8538-008	0.0000-001	0.0000-001	-4.2609-015	3.3051+018	3.3051+018	-8.7392-005	0.0000-001
48	1.1740-007	3.0588-010	2.3469-008	0.0000-001	0.0000-001	-2.8622-015	2.3190+018	2.3190+018	-5.0163-005	0.0000-001
49	1.1578-007	2.1249-010	2.5441-008	0.0000-001	0.0000-001	-1.5415-015	1.2552+018	1.2552+018	-2.0363-005	0.0000-001
50	1.1489-007	8.8865-011	1.3912-008	0.0000-001	0.0000-001	-4.0800-016	3.1736+017	3.1736+017	0.0000-001	0.0000-001

*	PSI -	PSI +	KIB(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	1.9287+009
2	0.0000-001	0.0000-001	1.1821+012
3	0.0000-001	0.0000-001	2.7567+012
4	0.0000-001	0.0000-001	3.7082+012
5	0.0000-001	0.0000-001	4.8436+012
6	0.0000-001	0.0000-001	5.1979+012
7	0.0000-001	0.0000-001	5.8101+012
8	0.0000-001	0.0000-001	5.0768+012
9	0.0000-001	0.0000-001	5.4590+012
10	0.0000-001	0.0000-001	4.7601+012
11	0.0000-001	0.0000-001	4.6319+012
12	0.0000-001	0.0000-001	3.7731+012
13	0.0000-001	0.0000-001	3.1446+012
14	0.0000-001	0.0000-001	2.4955+012
15	0.0000-001	0.0000-001	1.8719+012
16	0.0000-001	0.0000-001	1.6056+010
17	0.0000-001	0.0000-001	1.9792+007

18	0.0000-001	0.0000-001	7.7002+005
19	0.0000-001	0.0000-001	8.2656+004
20	0.0000-001	0.0000-001	1.2496+004
21	0.0000-001	0.0000-001	3.3165+003
22	0.0000-001	0.0000-001	9.2451+002
23	0.0000-001	0.0000-001	3.0935+002
24	0.0000-001	0.0000-001	1.0470+002
25	0.0000-001	0.0000-001	3.3545+001
26	0.0000-001	0.0000-001	1.0082+001
27	0.0000-001	0.0000-001	3.4841+000
28	0.0000-001	0.0000-001	1.1731+000
29	0.0000-001	0.0000-001	2.3676-001
30	0.0000-001	0.0000-001	7.0579-002
31	0.0000-001	0.0000-001	1.6591-002
32	0.0000-001	0.0000-001	5.4602-003
33	0.0000-001	0.0000-001	2.0636-003
34	0.0000-001	0.0000-001	8.3012-004
35	0.0000-001	0.0000-001	3.3542-004
36	0.0000-001	0.0000-001	2.0715-004
37	0.0000-001	0.0000-001	1.1135-004
38	0.0000-001	0.0000-001	8.7347-005
39	0.0000-001	0.0000-001	7.9412-005
40	0.0000-001	0.0000-001	8.7840-005
41	0.0000-001	0.0000-001	8.3578-005
42	0.0000-001	0.0000-001	7.2940-005
43	0.0000-001	0.0000-001	5.9952-005
44	0.0000-001	0.0000-001	4.5410-005
45	0.0000-001	0.0000-001	3.5836-005
46	0.0000-001	0.0000-001	2.3593-005
47	0.0000-001	0.0000-001	1.6401-005
48	0.0000-001	0.0000-001	8.1382-006
49	0.0000-001	0.0000-001	2.4038-006
50	0.0000-001	0.0000-001	1.6192-007

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	3.2338-006	6.5576-006	9.5962-016	-2.5041-021	0.0000-001	-5.9018-007	0.0000-001	2.1476-019	-2.6692-023	0.0000-001
I	1.3733-007	0.0000-001	9.5962-016	4.2256-025	-2.7497-006	3.1780-006	0.0000-001	2.1476-019	4.8724-034	-2.1095-009

	EI WORK	INT ENE(0)
E	-1.7912-008	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	3.2338-006	3.2177-006
ION	3.3153-006	3.3399-006
TOTAL	6.5491-006	6.5577-006

ELECTRON	2.9459-006	2.9280-006
ION	3.6043-006	3.6286-006
TOTAL	6.5501-006	6.5577-006

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (5) OTHERWISE (COUR) IN ZONE (5)
520	2.9231+000	9.8803-005	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.2740-003	1.2740-003	6.2920-003	7.9467+002	-8.9023-002	5.5622+000	5.5945+000	3.4119+001	3.4317+001	2.4924+000
2	1.3459-003	7.1995-005	1.1133-007	4.4911+003	-7.4492-002	9.1247-001	9.1163-001	3.1433+001	3.1610+001	0.0000-001
3	1.3851-003	3.9105-005	6.4636-004	7.7357+003	-7.4832-002	4.7367-001	4.7366-001	2.8284+001	2.8263+001	3.5453-004
4	1.4194-003	3.4303-005	6.1523-004	8.1270+003	-7.8380-002	3.9786-001	3.9786-001	2.4959+001	2.4959+001	4.0489-002
5	1.4509-003	3.1552-005	6.1012-004	8.1751+003	-8.1940-002	3.4250-001	3.4250-001	2.1666+001	2.1666+001	3.8795-002
6	1.4852-003	3.4247-005	6.5261-004	7.6591+003	-8.4713-002	3.1019-001	3.1019-001	1.8339+001	1.8339+001	2.5037-002
7	1.5180-003	3.2859-005	6.9254-004	7.2198+003	-8.7885-002	2.7663-001	2.7663-001	1.5417+001	1.5417+001	2.8755-002
8	1.5573-003	3.9305-005	7.8811-004	6.3443+003	-8.6989-002	2.6542-001	2.6542-001	1.2996+001	1.2996+001	2.5098-003
9	1.5931-003	3.5786-005	8.4577-004	5.9118+003	-8.9949-002	2.3806-001	2.3806-001	1.0863+001	1.0863+001	2.1931-002
10	1.6357-003	4.2617-005	9.8333-004	5.0848+003	-8.7460-002	2.2457-001	2.2457-001	8.8143+000	8.8143+000	1.2563-002
11	1.6764-003	4.2640-005	1.0908-003	4.5837+003	-8.4927-002	2.0477-001	2.0477-001	7.2450+000	7.2450+000	1.1737-002
12	1.7264-003	5.0026-005	1.2726-003	3.9291+003	-7.9849-002	1.9207-001	1.9207-001	5.8253+000	5.8253+000	0.0000-001
13	1.7779-003	4.8582-005	1.4147-003	3.5343+003	-7.2892-002	1.7016-001	1.7016-001	4.8421+000	4.8421+000	0.0000-001
14	1.8350-003	5.6018-005	1.7058-003	2.9312+003	-6.1585-002	1.5852-001	1.5852-001	3.5867+000	3.5867+000	0.0000-001
15	1.9251-003	9.0117-005	2.7339-003	1.8289+003	-2.7890-002	1.8680-001	1.8674-001	2.6371+000	2.6363+000	0.0000-001
16	2.8423-003	9.1716-004	5.0516-002	9.8979+001	4.3268-001	2.3501+000	1.9912+000	1.7955+000	1.5213+000	0.0000-001
17	5.5607-003	2.7184-003	4.5676-001	1.0947+001	1.1670+000	8.1096+000	2.2509+000	6.8524-001	1.9020-001	0.0000-001
18	8.3767-003	2.8175-003	1.2265+000	4.0768+000	1.5358+000	9.8487+000	1.6245+000	3.0993-001	5.1122-002	0.0000-001
19	1.1415-002	3.0383-003	2.5492+000	1.9614+000	1.7491+000	1.0732+001	1.2129+000	1.8248-001	1.8363-002	0.0000-001
20	1.4691-002	3.4761-003	4.9529+000	1.0095+000	1.8595+000	1.1313+001	9.0153-001	8.8155-002	7.0797-003	0.0000-001
21	1.8149-002	3.2570-003	8.4674+000	5.9050-001	1.9536+000	1.1691+001	7.2234-001	5.3287-002	3.2925-003	0.0000-001
22	2.1432-002	3.7846-003	1.4041+001	3.5611-001	1.9800+000	1.1985+001	5.7744-001	3.2891-002	1.5873-003	0.0000-001
23	2.6225-002	4.2927-003	2.2302+001	2.2420-001	2.0221+000	1.2183+001	4.7531-001	2.1034-002	8.2257-004	0.0000-001
24	3.0415-002	4.1902-003	3.6620+001	1.3654-001	2.0662+000	1.2347+001	3.8324-001	1.3013-002	4.0391-004	0.0000-001
25	3.6662-002	6.2466-003	5.9720+001	8.3725-002	2.0196+000	1.2500+001	3.0938-001	8.0784-003	1.9994-004	0.0000-001
26	4.4337-002	7.6758-003	1.0397+002	4.8090-002	1.9661+000	1.2640+001	2.4155-001	4.6921-003	8.9669-005	0.0000-001
27	5.1767-002	7.4496-003	1.7297+002	2.8907-002	1.9731+000	1.2742+001	1.9452-001	2.8433-003	4.3405-005	0.0000-001
28	6.1152-002	9.3853-003	2.9357+002	1.7031-002	2.0225+000	1.2829+001	1.5823-001	1.8965-003	2.0803-005	0.0000-001
29	7.7845-002	1.6693-002	6.1992+002	8.0656-003	1.7952+000	1.2916+001	1.0920-001	8.0415-004	6.7869-006	0.0000-001
30	9.4383-002	1.6538-002	1.1479+003	4.3559-003	1.8330+000	1.2992+001	8.7579-002	4.3683-004	2.9447-006	0.0000-001
31	1.1065-001	2.2268-002	2.2721+003	2.2006-003	1.6204+000	1.3046+001	6.5514-002	2.2162-004	1.1129-006	0.0000-001
32	1.4268-001	2.6232-002	3.9609+003	1.2623-003	1.4426+000	1.3089+001	5.4109-002	1.2754-004	5.2724-007	0.0000-001
33	1.7243-001	2.9548-002	6.4438+003	7.7594-004	1.3012+000	1.3122+001	4.7122-002	7.8595-005	2.8224-007	0.0000-001
34	2.0554-001	3.3114-002	1.0157+004	4.9226-004	1.1998+000	1.3146+001	4.2136-002	4.9954-005	1.6011-007	0.0000-001
35	2.4307-001	3.7529-002	1.5879+004	3.1489-004	1.0780+000	1.3165+001	3.7660-002	3.1999-005	9.1538-008	0.0000-001
36	2.7907-001	3.5995-002	2.0194+004	2.4760-004	9.4875-001	1.3179+001	3.6879-002	2.5165-005	7.4306-008	0.0000-001
37	3.1870-001	3.9627-002	2.7565+004	1.8139-004	8.5442-001	1.3190+001	3.7067-002	1.9462-005	5.1700-008	0.0000-001
38	3.4489-001	3.6192-002	3.0665+004	1.6295-004	6.8439-001	1.3192+001	3.9738-002	1.6593-005	4.9983-008	1.8838-006
39	3.8942-001	2.4532-002	3.2529+004	1.5371-004	5.6914-001	1.3196+001	4.0680-002	1.5457-005	5.5386-008	8.1635-007
40	3.9640-001	2.0981-002	3.1008+004	1.6125-004	5.2970-001	1.3198+001	5.3844-002	1.6423-005	6.6771-008	0.0000-001
41	4.1249-001	2.2092-002	3.1743+004	7.6755-003	4.7365-001	1.3201+001	7.1907-002	1.6050-005	8.7429-008	0.0000-001
42	4.3348-001	2.0982-002	3.4325+004	7.2831-003	5.0572-001	1.3202+001	6.4106-002	1.4845-005	7.2060-008	0.0000-001
43	4.5477-001	2.1225-002	3.7734+004	6.6252-003	5.7931-001	1.3204+001	6.2025-002	1.3505-005	6.3441-008	0.0000-001
44	4.7700-001	2.2300-002	4.3808+004	5.7066-003	5.2599-001	1.3205+001	5.8842-002	1.1633-005	5.1840-008	0.0000-001
45	4.9998-001	2.2977-002	4.9432+004	5.0574-003	5.7452-001	1.3206+001	5.7284-002	1.0311-005	4.4726-008	0.0000-001

46	5.1462-001	1.4639-002	6.0747+004	2.0581-002	5.5562-001	1.3206+001	5.1993-002	8.3905-006	3.3034-008	0.0000-001
47	5.5062-001	3.6004-002	7.3092+004	1.7105-002	5.3185-001	1.3207+001	4.6726-002	6.9737-006	2.4673-008	0.0000-001
48	5.9309-001	4.2472-002	1.0464+005	1.1942-002	6.0984-001	1.3207+001	3.9614-002	4.3690-006	1.4604-008	0.0000-001
49	6.5759-001	6.4498-002	1.9288+005	6.4820-003	6.3907-001	1.3208+001	2.7963-002	2.6429-006	5.5954-009	0.0000-001
50	6.3455-001	1.7698-001	7.6207+005	1.6406-003	6.7028-001	1.3208+001	1.1791-002	6.6895-007	5.9715-010	0.0000-001
						1.3208+001	1.1791-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	3.5272-008	3.5477-008	4.3693-010	0.0000-001	0.0000-001	1.7344-010	3.6290+025	3.8290+025	2.2321+000	0.0000-001
2	5.2603-009	5.2593-009	3.1049-010	0.0000-001	0.0000-001	-1.4343-010	2.1640+026	2.1640+026	1.0290-001	0.0000-001
3	3.0937-009	3.0936-009	3.1142-010	0.0000-001	0.0000-001	-6.7309-012	3.7274+026	3.7274+026	1.3336-002	0.0000-001
4	2.5252-009	2.5252-009	3.3197-010	0.0000-001	0.0000-001	-3.8168-013	3.9159+026	3.9159+026	7.8770-003	0.0000-001
5	2.1121-009	2.1121-009	3.6767-010	0.0000-001	0.0000-001	-3.2710-013	3.9487+026	3.9487+026	3.5114-003	0.0000-001
6	2.0304-009	2.0304-009	3.9479-010	0.0000-001	0.0000-001	-2.7046-014	3.6905+026	3.6905+026	2.3613-003	0.0000-001
7	1.7134-009	1.7134-009	4.3429-010	0.0000-001	0.0000-001	-1.7801-013	3.4788+026	3.4788+026	6.6269-004	0.0000-001
8	1.6120-009	1.6120-009	4.2073-010	0.0000-001	0.0000-001	8.8025-014	3.0569+026	3.0569+026	1.4864-003	0.0000-001
9	1.4470-009	1.4470-009	4.4088-010	0.0000-001	0.0000-001	-7.8175-014	2.8485+026	2.8485+026	5.0639-004	0.0000-001
10	1.4066-009	1.4066-009	4.2129-010	0.0000-001	0.0000-001	2.3204-014	2.4500+026	2.4500+026	6.5566-004	0.0000-001
11	1.2724-009	1.2724-009	3.9924-010	0.0000-001	0.0000-001	-2.9026-014	2.2086+026	2.2086+026	3.5142-004	0.0000-001
12	1.2684-009	1.2684-009	3.4998-010	0.0000-001	0.0000-001	2.7030-014	1.8932+026	1.8932+026	5.4726-004	0.0000-001
13	1.0392-009	1.0392-009	2.8759-010	0.0000-001	0.0000-001	-3.7372-014	1.7029+026	1.7029+026	2.3464-004	0.0000-001
14	1.0102-009	1.0102-009	2.1569-010	0.0000-001	0.0000-001	-8.4547-014	1.4124+026	1.4124+026	-3.8062-004	0.0000-001
15	1.2602-009	1.2595-009	4.2969-011	0.0000-001	0.0000-001	-2.5083-011	8.8123+025	8.8123+025	-1.5167-001	0.0000-001
16	1.4208-008	1.2039-008	9.9763-009	0.0000-001	0.0000-001	-7.5974-010	4.7692+024	4.7692+024	-2.3705+000	0.0000-001
17	5.1045-008	1.4168-008	7.5523-008	0.0000-001	0.0000-001	-3.2947-010	5.2745+023	5.2745+023	-1.5507+000	0.0000-001
18	8.4488-008	1.0637-008	1.3602-007	0.0000-001	0.0000-001	-1.4166-010	1.9643+023	1.9643+023	-1.0003+000	0.0000-001
19	7.3046-008	6.2551-009	1.8333-007	0.0000-001	0.0000-001	-7.3497-011	9.4507+022	9.4507+022	-6.7532-001	0.0000-001
20	7.9578-008	6.4231-009	1.9659-007	0.0000-001	0.0000-001	-4.2069-011	4.8642+022	4.8642+022	-4.5194-001	0.0000-001
21	7.1269-008	4.4036-009	2.5466-007	0.0000-001	0.0000-001	-2.1944-011	2.8453+022	2.8453+022	-3.2500-001	0.0000-001
22	7.5208-008	3.6296-009	2.1608-007	0.0000-001	0.0000-001	-1.3901-011	1.7159+022	1.7159+022	-2.3640-001	0.0000-001
23	7.8620-008	3.0769-009	2.0837-007	0.0000-001	0.0000-001	-9.0341-012	1.0803+022	1.0803+022	-1.7117-001	0.0000-001
24	8.5716-008	2.6398-009	2.2406-007	0.0000-001	0.0000-001	-4.6988-012	6.5790+021	6.5790+021	-1.2775-001	0.0000-001
25	8.5368-008	2.1134-009	2.4417-007	0.0000-001	0.0000-001	-3.7989-012	4.0342+021	4.0342+021	-8.9779-002	0.0000-001
26	8.8876-008	1.6964-009	2.1372-007	0.0000-001	0.0000-001	-2.2873-012	2.3172+021	2.3172+021	-6.0967-002	0.0000-001
27	7.3539-008	1.1226-009	1.9626-007	0.0000-001	0.0000-001	-1.1397-012	1.3928+021	1.3928+021	-4.4273-002	0.0000-001
28	7.5725-008	9.3402-010	2.3790-007	0.0000-001	0.0000-001	-7.0108-013	8.2064+020	8.2064+020	-3.1465-002	0.0000-001
29	6.7721-008	6.2621-010	1.9162-007	0.0000-001	0.0000-001	-4.4324-013	3.8863+020	3.8863+020	-1.8666-002	0.0000-001
30	8.0603-008	5.4336-010	1.8201-007	0.0000-001	0.0000-001	-1.9967-013	2.0988+020	2.0988+020	-1.2365-002	0.0000-001
31	8.2721-008	4.1539-010	1.4536-007	0.0000-001	0.0000-001	-1.0399-013	1.0603+020	1.0603+020	-7.7822-003	0.0000-001
32	8.4793-008	3.5054-010	1.1769-007	0.0000-001	0.0000-001	-6.3026-014	6.0824+019	6.0824+019	-4.9449-003	0.0000-001
33	8.8836-008	3.1134-010	9.7834-008	0.0000-001	0.0000-001	-4.0374-014	3.7388+019	3.7388+019	-3.2202-003	0.0000-001
34	8.8850-008	2.8478-010	8.4908-008	0.0000-001	0.0000-001	-2.6459-014	2.3719+019	2.3719+019	-2.1360-003	0.0000-001
35	9.0847-008	2.5988-010	6.4865-008	0.0000-001	0.0000-001	-1.7401-014	1.5173+019	1.5173+019	-1.4308-003	0.0000-001
36	9.2525-008	2.7389-010	4.8269-008	0.0000-001	0.0000-001	-1.3999-014	1.1930+019	1.1930+019	-1.0093-003	0.0000-001
37	7.0920-008	1.9937-010	3.9968-008	0.0000-001	0.0000-001	-7.9149-015	8.7400+018	8.7400+018	-7.7628-004	0.0000-001
38	9.0796-008	2.4008-010	2.6034-008	0.0000-001	0.0000-001	-9.7164-015	7.8514+018	7.8514+018	-5.6748-004	0.0000-001
39	7.3525-008	2.6008-010	1.5764-008	0.0000-001	0.0000-001	-7.0170-015	7.4064+018	7.4064+018	-4.5799-004	0.0000-001
40	7.4645-008	3.0338-010	1.4666-008	0.0000-001	0.0000-001	-7.4456-015	7.7697+018	7.7697+018	-3.7751-004	0.0000-001
41	8.5737-008	4.6702-010	1.2427-008	0.0000-001	0.0000-001	-8.3526-015	7.5896+018	7.5896+018	-3.0433-004	0.0000-001
42	8.3608-008	4.0597-010	1.4088-008	0.0000-001	0.0000-001	-7.5728-015	7.0187+018	7.0187+018	-2.4686-004	0.0000-001
43	8.4812-008	3.9841-010	1.2719-008	0.0000-001	0.0000-001	-7.0237-015	6.3847+018	6.3847+018	-1.9708-004	0.0000-001
44	8.4467-008	3.7640-010	1.5315-008	0.0000-001	0.0000-001	-6.3767-015	5.4994+018	5.4994+018	-1.5522-004	0.0000-001
45	8.4814-008	3.6791-010	1.4272-008	0.0000-001	0.0000-001	-5.4299-015	4.8738+018	4.8738+018	-1.1950-004	0.0000-001
46	4.7419-008	1.8669-010	1.5576-008	0.0000-001	0.0000-001	-2.4890-015	3.9660+018	3.9660+018	-1.0089-004	0.0000-001
47	1.0668-007	3.7615-010	1.9271-008	0.0000-001	0.0000-001	-4.8594-015	3.2961+018	3.2961+018	-6.4760-005	0.0000-001

48	1.0149-007	3.0439-010	2.4510-008	0.0000-001	0.0000-001	-3.1353-015	2.3012+018	2.3012+018	-3.7218-005	0.0000-001
49	1.0009-007	2.1168-010	2.6625-008	0.0000-001	0.0000-001	-1.6936-015	1.2491+018	1.2491+018	-1.5120-005	0.0000-001
50	9.9317-009	8.8657-011	1.4568-008	0.0000-001	0.0000-001	-4.4925-016	3.1614+017	3.1614+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	4.3676+009
2	0.0000-001	0.0000-001	1.0778+012
3	0.0000-001	0.0000-001	4.5564+012
4	0.0000-001	0.0000-001	5.7776+012
5	0.0000-001	0.0000-001	6.7961+012
6	0.0000-001	0.0000-001	6.7194+012
7	0.0000-001	0.0000-001	6.8970+012
8	0.0000-001	0.0000-001	5.7922+012
9	0.0000-001	0.0000-001	5.8170+012
10	0.0000-001	0.0000-001	4.7835+012
11	0.0000-001	0.0000-001	4.0441+012
12	0.0000-001	0.0000-001	2.8785+012
13	0.0000-001	0.0000-001	2.2643+012
14	0.0000-001	0.0000-001	1.7323+012
15	0.0000-001	0.0000-001	7.5010+011
16	0.0000-001	0.0000-001	2.4940+008
17	0.0000-001	0.0000-001	6.7507+005
18	0.0000-001	0.0000-001	7.3122+004
19	0.0000-001	0.0000-001	1.5051+004
20	0.0000-001	0.0000-001	3.1933+003
21	0.0000-001	0.0000-001	1.2940+003
22	0.0000-001	0.0000-001	4.5916+002
23	0.0000-001	0.0000-001	1.7133+002
24	0.0000-001	0.0000-001	6.7206+001
25	0.0000-001	0.0000-001	2.5425+001
26	0.0000-001	0.0000-001	8.3851+000
27	0.0000-001	0.0000-001	3.0234+000
28	0.0000-001	0.0000-001	1.0609+000
29	0.0000-001	0.0000-001	2.4465-001
30	0.0000-001	0.0000-001	7.2076-002
31	0.0000-001	0.0000-001	1.5426-002
32	0.0000-001	0.0000-001	6.2413-003
33	0.0000-001	0.0000-001	2.3981-003
34	0.0000-001	0.0000-001	9.7391-004
35	0.0000-001	0.0000-001	4.3049-004
36	0.0000-001	0.0000-001	2.4795-004
37	0.0000-001	0.0000-001	1.3440-004
38	0.0000-001	0.0000-001	1.0916-004
39	0.0000-001	0.0000-001	9.7444-005
40	0.0000-001	0.0000-001	1.0691-004
41	0.0000-001	0.0000-001	1.0213-004
42	0.0000-001	0.0000-001	.7776-005
43	0.0000-001	0.0000-001	7.2982-005
44	0.0000-001	0.0000-001	5.4553-005
45	0.0000-001	0.0000-001	4.3062-005
46	0.0000-001	0.0000-001	2.8713-005
47	0.0000-001	0.0000-001	1.9939-005
48	0.0000-001	0.0000-001	9.7980-006
49	0.0000-001	0.0000-001	2.9103-006
50	0.0000-001	0.0000-001	1.9665-007

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	2.8598-006	6.5576-006	9.6430-016	-2.6280-021	0.0000-001	-6.2448-007	0.0000-001	2.3062-019	0.0000-001	0.0000-001
I	1.4144-007	0.0000-001	9.6430-016	4.2256-025	-3.0903-006	3.5498-006	0.0000-001	2.3062-019	3.3851-034	-1.4075-009

	EI WORK	INT ENE(O)
E	-1.4968-008	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	2.8598-006	2.8429-006
ION	3.6910-006	3.7148-006
TOTAL	6.5508-006	6.5577-006

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (5) OTHERWISE (COUR) IN ZONE (5)
825	2.9235+000	9.2439-005	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.2486-003	1.2486-003	5.8955-003	8.4910+002	-3.7972-002	5.6477+000	5.6773+000	3.6973+001	3.7167+001	4.8692-001
2	1.3256-003	7.8963-005	1.1771-003	4.2478+003	-2.2344-002	1.0291+000	1.0284+000	3.3744+001	3.3719+001	0.0000-001
3	1.3646-003	3.9026-005	6.2592-004	7.9883+003	-2.1870-002	4.9216-001	4.9215-001	3.0348+001	3.0347+001	7.1464-004
4	1.3983-003	3.3713-005	5.8690-004	8.5194+003	-2.3667-002	4.1105-001	4.1105-001	2.7031+001	2.7031+001	1.0952-002
5	1.4288-003	3.0504-005	5.7226-004	8.7373+003	-2.5190-002	3.5787-001	3.5787-001	2.4136+001	2.4136+001	8.0698-003
6	1.4612-003	3.2354-005	5.9753-004	8.3677+003	-2.7246-002	3.2910-001	3.2910-001	2.1257+001	2.1257+001	1.4089-002
7	1.4919-003	3.0753-005	6.2671-004	7.9751+003	-3.1742-002	2.9593-001	2.9593-001	1.8224+001	1.8224+001	6.6781-002
8	1.5291-003	3.7134-005	7.1850-004	6.9590+003	-3.8931-002	2.8229-001	2.8229-001	1.5164+001	1.5164+001	1.3834-001
9	1.5640-003	3.4977-005	7.9685-004	6.2747+003	-4.2876-002	2.4783-001	2.4783-001	1.2003+001	1.2003+001	3.8741-002
10	1.6055-003	4.1438-005	9.2133-004	5.4260+003	-4.6465-002	2.3453-001	2.3453-001	9.8245+000	9.8245+000	2.7776-002
11	1.6483-003	4.2823-005	1.0560-003	4.7349+003	-4.8724-002	2.0929-001	2.0929-001	7.6492+000	7.6492+000	9.6083-003
12	1.6997-003	5.1441-005	1.2638-003	3.9562+003	-4.7163-002	1.9293-001	1.9293-001	5.8917+000	5.8917+000	3.8491-003
13	1.7510-003	5.1254-005	1.4464-003	3.4560+003	-4.2741-002	1.6771-001	1.6771-001	4.4750+000	4.4750+000	0.0000-001
14	1.8136-003	6.2553-005	1.7912-003	2.7915+003	-3.4413-002	1.5353-001	1.5353-001	3.3081+000	3.3081+000	0.0000-001
15	1.9207-003	1.0716-004	3.2068-003	1.5592+003	-2.9667-003	1.9045-001	1.9037-001	2.2921+000	2.2912+000	0.0000-001
16	3.0715-003	1.1508-003	6.9575-002	7.1556+001	5.1955-001	2.6549+000	2.1310+000	1.4930+000	1.1771+000	0.0000-001
17	6.1309-003	3.0593-003	6.1766-001	8.0951+000	1.2312+000	8.2224+000	2.0308+000	5.1379-001	1.2690-001	0.0000-001
18	9.1183-003	2.9874-003	1.5552+000	3.2151+000	1.5851+000	9.7326+000	1.4724+000	2.4154-001	3.6540-002	0.0000-001
19	1.2253-002	3.1351-003	3.0668+000	1.6304+000	1.7914+000	1.0504+001	1.1177+000	1.3220-001	1.4067-002	0.0000-001
20	1.5779-002	3.5260-003	5.7025+000	8.7680-001	1.8942+000	1.1020+001	8.5303-001	7.4587-002	5.7734-003	0.0000-001
21	1.9580-002	3.8004-003	9.5501+000	5.2356-001	1.9848+000	1.1362+001	6.8250-001	4.5916-002	2.7562-003	0.0000-001
22	2.2875-002	3.7954-003	1.5425+001	3.2414-001	2.0055+000	1.1612+001	5.5233-001	2.7055-002	1.3720-003	0.0000-001
23	2.7189-002	4.3129-003	2.4212+001	2.0651-001	2.0488+000	1.1814+001	4.5629-001	1.8933-002	7.2736-004	0.0000-001
24	3.1394-002	4.2094-003	3.9355+001	1.2705-001	2.0972+000	1.1969+001	3.6943-001	1.1737-002	3.6230-004	0.0000-001
25	3.7021-002	5.6239-003	6.2988+001	7.9382-002	2.0780+000	1.2113+001	3.0110-001	7.4222-003	1.8456-004	0.0000-001
26	4.5271-002	7.6498-003	1.0550+002	4.6062-002	1.9519+000	1.2247+001	2.3632-001	4.3564-003	8.4060-005	0.0000-001
27	5.2724-002	7.4526-003	1.7982+002	2.7905-002	1.9978+000	1.2347+001	1.9048-001	2.6500-003	4.0883-005	0.0000-001
28	6.2112-002	9.3883-003	3.0424+002	1.6434-002	2.0359+000	1.2425+001	1.5508-001	1.5762-003	1.9873-005	0.0000-001
29	7.8696-002	1.6584-002	6.3192+002	7.9125-003	1.8041+000	1.2520+001	1.0810-001	7.6466-004	6.6026-006	0.0000-001
30	9.5161-002	1.6465-002	1.1721+003	4.2659-003	1.8413+000	1.2587+001	8.6522-002	4.1447-004	2.8490-006	0.0000-001
31	1.1742-001	2.2266-002	2.2965+003	2.1770-003	1.6259+000	1.2642+001	6.5124-002	2.1244-004	1.0044-006	0.0000-001
32	1.4357-001	2.6148-002	3.9922+003	1.2524-003	1.4468+000	1.2687+001	5.3873-002	1.2265-004	5.2083-007	0.0000-001
33	1.7305-001	2.9481-002	6.4620+003	7.7137-004	1.3047+000	1.2719+001	4.6966-002	7.5733-005	2.7965-007	0.0000-001

34	2.0011-001	3.3066-002	1.0206+004	4.8992-004	1.2029+000	1.2743+001	4.2021-002	4.8192-005	1.5891-007	0.0000-001
35	2.4357-001	3.7453-002	1.5921+004	3.1406-004	1.0396+000	1.2762+001	3.7606-002	3.0937-005	9.1166-008	0.0000-001
36	2.7452-001	3.5957-002	2.0243+004	2.4700-004	9.5105-001	1.2774+001	3.3826-002	2.4356-005	7.4025-008	0.0000-001
37	3.0917-001	2.9562-002	2.7603+004	1.8114-004	6.5471-001	1.2783+001	3.7041-002	1.7573-005	5.1792-008	0.0000-001
38	3.4521-001	3.6112-002	3.0665+004	1.6295-004	6.8501-001	1.2789+001	3.9747-002	1.6086-005	4.9994-008	1.8764-006
39	3.6969-001	2.4478-002	3.2510+004	1.5380-004	5.6918-001	1.2793+001	4.0471-002	1.5188-005	5.5763-009	8.2520-007
40	3.9685-001	2.0962-002	3.1022+004	1.6118-004	5.2994-001	1.2796+001	5.3651-002	1.5920-005	6.6749-008	0.0000-001
41	4.1272-001	2.2066-002	3.1744+004	7.8754-003	4.7454-001	1.2798+001	7.1884-002	1.5560-005	8.7400-008	0.0000-001
42	4.3372-001	2.0997-002	3.4388+004	7.2698-003	5.0679-001	1.2799+001	6.4042-002	1.4366-005	7.1978-008	0.0000-001
43	4.5499-001	2.1213-002	3.7751+004	6.6221-003	4.8097-001	1.2801+001	6.2010-002	1.3087-005	6.3396-008	0.0000-001
44	4.7725-001	2.2322-002	4.3896+004	5.6951-003	5.2727-001	1.2802+001	5.6770-002	1.1256-005	5.1673-008	0.0000-001
45	5.0025-001	2.3000-002	4.9535+004	5.0469-003	5.7717-001	1.2803+001	5.7204-002	9.6754-006	4.4571-008	0.0000-001
46	5.1488-001	1.4630-002	6.0773+004	2.0572-002	5.5738-001	1.2803+001	5.1986-002	8.1311-006	3.3015-008	0.0000-001
47	5.5087-001	3.5993-002	7.3140+004	1.7094-002	5.3406-001	1.2804+001	4.6709-002	6.7565-006	2.4648-008	0.0000-001
48	5.9338-001	4.2509-002	1.0488+005	1.1920-002	6.1264-001	1.2805+001	3.9569-002	4.7119-006	1.4561-008	0.0000-001
49	6.5789-001	6.4512-002	1.9310+005	6.4744-003	6.4216-001	1.2805+001	2.7944-002	2.5594-006	5.5851-009	0.0000-001
50	8.3489-001	1.7700-001	7.6277+005	1.6391-003	6.7365-001	1.2806+001	1.1764-002	6.4796-007	5.9627-010	0.0000-001
						1.2806+001	1.1764-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	3.5814-009	3.6002-008	7.9492-011	0.0000-001	0.0000-001	1.5297-010	4.0865+025	4.0865+025	2.4751+000	0.0000-001
2	6.6130-009	6.6081-009	2.7934-011	0.0000-001	0.0000-001	-1.3998-010	2.0467+026	2.0467+026	1.4070-001	0.0000-001
3	3.2145-009	3.2144-009	2.6600-011	0.0000-001	0.0000-001	-8.5077-012	3.8491+026	3.8491+026	1.5893-002	0.0000-001
4	2.6089-009	2.6089-009	3.0267-011	0.0000-001	0.0000-001	-4.8396-013	4.1050+026	4.1050+026	8.7562-003	0.0000-001
5	2.2068-009	2.2068-009	3.4832-011	0.0000-001	0.0000-001	-3.5769-013	4.2100+026	4.2100+026	3.6717-003	0.0000-001
6	2.1542-009	2.1542-009	4.0840-011	0.0000-001	0.0000-001	2.7409-016	4.0319+026	4.0319+026	3.6518-003	0.0000-001
7	1.8329-009	1.8329-009	5.7009-011	0.0000-001	0.0000-001	-1.6673-013	3.8442+026	3.8442+026	1.1339-003	0.0000-001
8	1.9272-009	1.9272-009	8.4466-011	0.0000-001	0.0000-001	2.2190-013	3.3531+026	3.3531+026	2.0891-003	0.0000-001
9	1.5064-009	1.5064-009	1.0017-010	0.0000-001	0.0000-001	-1.0797-013	3.0234+026	3.0234+026	6.0607-004	0.0000-001
10	1.5337-009	1.5337-009	1.1891-010	0.0000-001	0.0000-001	4.9665-014	2.6149+026	2.6149+026	8.7752-004	0.0000-001
11	1.3005-009	1.3005-009	1.3141-010	0.0000-001	0.0000-001	-3.5965-014	2.2814+026	2.2814+026	4.4117-004	0.0000-001
12	1.2741-009	1.2741-009	1.2210-010	0.0000-001	0.0000-001	2.0596-014	1.9062+026	1.9062+026	5.9172-004	0.0000-001
13	1.0243-009	1.0243-009	9.8848-011	0.0000-001	0.0000-001	-3.6513-014	1.6657+026	1.6657+026	2.5290-004	0.0000-001
14	9.8608-010	9.8608-010	6.7348-011	0.0000-001	0.0000-001	-7.9559-014	1.3450+026	1.3450+026	-3.8355-004	0.0000-001
15	1.2848-009	1.2843-009	4.8620-013	0.0000-001	0.0000-001	-2.8368-011	7.5129+025	7.5129+025	-1.8108-001	0.0000-001
16	1.6233-008	1.2884-008	1.4384-008	0.0000-001	0.0000-001	-6.8674-010	3.4479+024	3.4479+024	-2.1293+000	0.0000-001
17	5.1755-009	1.2783-008	8.4062-009	0.0000-001	0.0000-001	-2.3975-010	3.9005+023	3.9005+023	-1.2163+000	0.0000-001
18	8.3727-009	9.6409-009	1.4490-007	0.0000-001	0.0000-001	-1.0697-010	1.5491+023	1.5491+023	-7.9604-001	0.0000-001
19	7.1495-008	7.6077-009	1.9229-007	0.0000-001	0.0000-001	-5.9122-011	7.8557+022	7.8557+022	-5.4535-001	0.0000-001
20	7.7911-008	6.0307-009	2.0399-007	0.0000-001	0.0000-001	-3.4851-011	4.2248+022	4.2248+022	-3.7402-001	0.0000-001
21	6.9264-008	4.1607-009	2.1064-007	0.0000-001	0.0000-001	-1.8399-011	2.5227+022	2.5227+022	-2.7667-001	0.0000-001
22	7.2990-008	3.4717-009	2.2167-007	0.0000-001	0.0000-001	-1.1905-011	1.5618+022	1.5618+022	-2.0204-001	0.0000-001
23	7.6529-008	2.9557-009	2.1390-007	0.0000-001	0.0000-001	-7.8816-012	9.9505+021	9.9505+021	-1.4928-001	0.0000-001
24	8.3750-008	1.9663-009	2.2863-007	0.0000-001	0.0000-001	-4.1578-012	6.1217+021	6.1217+021	-1.1344-001	0.0000-001
25	8.2743-008	2.0575-009	2.4962-007	0.0000-001	0.0000-001	-3.4160-012	3.8250+021	3.8250+021	-7.9455-002	0.0000-001
26	8.6113-008	1.6616-009	2.1716-007	0.0000-001	0.0000-001	-2.0766-012	2.2204+021	2.2204+021	-5.4575-002	0.0000-001
27	7.1257-008	1.0993-009	1.9919-007	0.0000-001	0.0000-001	-1.0384-012	1.3397+021	1.3397+021	-3.9952-002	0.0000-001
28	7.3344-008	9.1539-010	2.4107-007	0.0000-001	0.0000-001	-6.4190-013	7.9187+020	7.9187+020	-2.8408-002	0.0000-001
29	9.4720-008	8.1788-010	1.9353-007	0.0000-001	0.0000-001	-4.1219-013	3.8125+020	3.8125+020	-1.7132-002	0.0000-001
30	7.8691-008	5.3688-010	1.8367-007	0.0000-001	0.0000-001	-1.8517-013	2.0555+020	2.0555+020	-1.1359-002	0.0000-001
31	8.0157-008	4.1292-010	1.4634-007	0.0000-001	0.0000-001	-9.7402-014	1.0490+020	1.0490+020	-7.1713-003	0.0000-001
32	8.2191-008	3.4901-010	1.1837-007	0.0000-001	0.0000-001	-5.9253-014	6.0348+019	6.0348+019	-4.5427-003	0.0000-001
33	8.4171-008	3.1080-010	9.8327-008	0.0000-001	0.0000-001	-3.8021-014	3.7168+019	3.7168+019	-2.9940-003	0.0000-001
34	8.6125-008	2.6480-010	8.5337-008	0.0000-001	0.0000-001	-2.4941-014	2.3606+019	2.3606+019	-1.9914-003	0.0000-001
35	8.8065-008	2.5951-010	6.5082-008	0.0000-001	0.0000-001	-1.6437-014	1.5133+019	1.5133+019	-1.3346-003	0.0000-001

36	8.9995-009	2.7351-010	4.8523-009	0.0000-001	0.0000-001	-1.3227-014	1.1901+019	1.1901+019	-9.4219-004	0.0000-001
37	6.8757-009	1.9923-010	3.9996-008	0.0000-001	0.0000-001	-7.4870-015	8.7280+018	8.7280+018	-7.2501-004	0.0000-001
38	9.3355-009	2.9014-010	2.6062-008	0.0000-001	0.0000-001	-9.2031-015	7.8514+018	7.8514+018	-5.3030-004	0.0000-001
39	7.1[illegible]	2.6170-010	1.5706-008	0.0000-001	0.0000-001	-6.6496-015	7.4107+018	7.4107+018	-4.2807-004	0.0000-001
40	7.2366-009	3.0342-010	1.4680-008	0.0000-001	0.0000-001	-7.0489-015	7.7661+018	7.7661+018	-3.5268-004	0.0000-001
41	8.3120-009	4.0669-010	1.2474-008	0.0000-001	0.0000-001	-7.9107-015	7.5896+018	7.5896+018	-2.8448-004	0.0000-001
42	8.1057-009	4.0557-010	1.4148-008	0.0000-001	0.0000-001	-7.1600-015	7.0059+018	7.0059+018	-2.3075-004	0.0000-001
43	8.2224-009	3.9831-010	1.2807-008	0.0000-001	0.0000-001	-6.6496-015	6.3817+018	6.3817+018	-1.8422-004	0.0000-001
44	8.1890-009	3.7594-010	1.5390-009	0.0000-001	0.0000-001	-5.7390-015	5.4884+018	5.4884+018	-1.4508-004	0.0000-001
45	8.2226-009	3.6739-010	1.4403-008	0.0000-001	0.0000-001	-5.1330-015	4.8637+018	4.8637+018	-1.1171-004	0.0000-001
46	4.5977-008	1.6667-010	1.5675-008	0.0000-001	0.0000-001	-2.3567-015	3.9643+018	3.9643+018	-9.4306-005	0.0000-001
47	1.0362-007	3.7802-010	1.9432-008	0.0000-001	0.0000-001	-4.4393-015	3.2939+018	3.2939+018	-6.0558-005	0.0000-001
48	9.8391-008	3.6404-010	2.4735-008	0.0000-001	0.0000-001	-2.9648-015	2.2970+018	2.2970+018	-3.4792-005	0.0000-001
49	9.7829-008	2.1174-010	2.6883-008	0.0000-001	0.0000-001	-1.6026-015	1.2476+018	1.2476+018	-1.4136-005	0.0000-001
50	9.6288-008	8.8608-011	1.4735-008	0.0000-001	0.0000-001	-4.2532-016	3.1585+017	3.1585+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KI=(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	4.9437+009
2	0.0000-001	0.0000-001	8.9308+011
3	0.0000-001	0.0000-001	4.6842+012
4	0.0000-001	0.0000-001	6.0721+012
5	0.0000-001	0.0000-001	7.2475+012
6	0.0000-001	0.0000-001	7.3356+012
7	0.0000-001	0.0000-001	7.5765+012
8	0.0000-001	0.0000-001	6.3273+012
9	0.0000-001	0.0000-001	6.1554+012
10	0.0000-001	0.0000-001	5.0727+012
11	0.0000-001	0.0000-001	4.3458+012
12	0.0000-001	0.0000-001	2.9146+012
13	0.0000-001	0.0000-001	2.2139+012
14	0.0000-001	0.0000-001	1.6483+012
15	0.0000-001	0.0000-001	6.1795+011
16	0.0000-001	0.0000-001	1.1184+005
17	0.0000-001	0.0000-001	3.6535+005
18	0.0000-001	0.0000-001	4.6171+004
19	0.0000-001	0.0000-001	1.0784+004
20	0.0000-001	0.0000-001	3.0517+003
21	0.0000-001	0.0000-001	1.0598+003
22	0.0000-001	0.0000-001	3.9650+002
23	0.0000-001	0.0000-001	1.5783+002
24	0.0000-001	0.0000-001	6.0983+001
25	0.0000-001	0.0000-001	2.3[illegible]+001
26	0.0000-001	0.0000-001	8.0523+000
27	0.0000-001	0.0000-001	2.9235+000
28	0.0000-001	0.0000-001	1.0342+000
29	0.0000-001	0.0000-001	2.4629-001
30	0.0000-001	0.0000-001	7.2222-002
31	0.0000-001	0.0000-001	1.5937-002
32	0.0000-001	0.0000-001	6.4227-003
33	0.0000-001	0.0000-001	2.4765-003
34	0.0000-001	0.0000-001	1.0079-003
35	0.0000-001	0.0000-001	4.1420-004
36	0.0000-001	0.0000-001	2.5778-004
37	0.0000-001	0.0000-001	1.4503-004
38	0.0000-001	0.0000-001	1.1404-004
39	0.0000-001	0.0000-001	1.0191-004

40	0.0000-001	0.0000-001	1.1159-004
41	0.0000-001	0.0000-001	1.0669-004
42	0.0000-001	0.0000-001	9.1373-005
43	0.0000-001	0.0000-001	7.6178-005
44	0.0000-001	0.0000-001	5.6768-005
45	0.0000-001	0.0000-001	4.4805-005
46	0.0000-001	0.0000-001	2.9973-005
47	0.0000-001	0.0000-001	2.0805-005
48	0.0000-001	0.0000-001	1.0200-005
49	0.0000-001	0.0000-001	3.0337-006
50	0.0000-001	0.0000-001	2.0513-007

	INT ENE T	SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/RE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	2.7834-006	6.5576-006	9.6541-016	-2.6642-021	0.0000-001	-6.3086-007	0.0000-001	2.1702-019	-1.7132-023	0.0000-001
I	1.4019-007	0.0000-001	9.6541-016	4.2256-025	-3.1604-006	3.6279-006	0.0000-001	2.1702-019	4.7471-034	-1.2027-009

	EI WORK	INT ENE(C)
E	-1.3552-009	3.2292-011
I		3.2292-011

6.5576×10^{-6} x cm

ENERGY CONSERVATION

ELECTRON	2.7834-006	2.7663-006
ION	3.7680-006	3.7913-006
TOTAL	6.5515-006	6.5577-006

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(COUR) IN ZONE (5) OTHERWISE (COUR) IN ZONE (5)
529	2.9239+000	9.0166-005	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)	PR
1	1.2411-003	1.2411-003	5.8183-003	8.5936+002	-1.3178-003	5.5721+000	5.5997+000	3.6962+001	3.7146+001	5.9664-004	.21
2	1.3261-003	8.4966-005	1.2618-003	3.9627+003	1.5106-002	1.0955+000	1.0946+000	3.3509+001	3.3483+001	0.0000-001	.28
3	1.3657-003	3.9167-005	6.2874-004	7.9524+003	1.5361-002	4.9967-001	4.9865-001	3.0611+001	3.0610+001	0.0000-001	.34
4	1.3986-003	3.3335-005	5.8073-004	8.6099+003	1.5517-002	4.1437-001	4.1437-001	2.7539+001	2.7539+001	0.0000-001	.4
5	1.4286-003	3.0015-005	5.6313-004	8.8769+003	1.4290-002	3.6206-001	3.6206-001	2.4814+001	2.4814+001	5.3420-003	.45
6	1.4607-003	3.1695-005	5.8492-004	8.5481+003	1.1010-002	3.3383-001	3.3383-001	2.2027+001	2.2027+001	1.9302-002	.5
7	1.4902-003	2.9908-005	6.0545-004	8.2177+003	1.1035-002	3.0201-001	3.0201-001	1.9157+001	1.9157+001	2.5166-003	.557
8	1.5295-003	3.9301-005	6.8068-004	7.3456+003	6.4564-003	2.9259-001	2.9259-001	1.6590+001	1.6590+001	6.1250-002	.609
9	1.5579-003	3.2247-005	7.3000-004	6.8493+003	6.4599-004	2.6294-001	2.6294-001	1.3901+001	1.3901+001	9.1740-002	.65
10	1.5971-003	3.9362-005	8.6713-004	5.7662+003	-8.3902-003	2.4424-001	2.4424-001	1.0871+001	1.0871+001	1.8630-001	.693
11	1.6362-003	4.1099-005	1.0021-003	4.9897+003	-1.3962-002	2.1679-001	2.1679-001	8.3498+000	8.3498+000	6.1535-002	.74
12	1.6698-003	5.0763-005	1.2317-003	4.0593+003	-1.8363-002	1.9426-001	1.9426-001	6.1497+000	6.1497+000	3.1294-002	.78
13	1.7416-003	5.2033-005	1.4505-003	3.4463+003	-1.7904-002	1.6740-001	1.6740-001	4.4531+000	4.4531+000	2.9141-004	.816
14	1.8000-003	6.4928-005	1.8409-003	2.7160+003	-1.2577-002	1.5081-001	1.5081-001	3.1618+000	3.1618+000	0.0000-001	.85
15	1.9271-003	1.2116-004	3.6238-003	1.3798+003	2.6472-002	1.4557-001	1.4569-001	2.0851+000	2.0841+000	0.0000-001	.885
16	3.2753-003	1.3481-003	8.9302-002	5.5990+001	5.8409-001	2.9610+000	2.2076+000	1.2797+000	9.5410-001	0.0000-001	
17	6.5867-003	3.3134-003	7.6917-001	6.5005+000	1.2741+000	8.2591+000	1.8764+000	4.1442-001	9.4151-002	0.0000-001	
18	9.7027-003	3.1140-003	1.8491+000	2.7040+000	1.6154+000	9.6204+000	1.3679+000	2.0097-001	2.9553-002	0.0000-001	
19	1.2912-002	3.2091-003	3.5134+000	1.4231+000	1.8205+000	1.0329+001	1.0520+000	1.1347-001	1.1557-002	0.0000-001	
20	1.6474-002	3.5624-003	6.3287+000	7.9006-001	1.9189+000	1.1803+001	6.1395-001	6.5883-002	4.9639-003	0.0000-001	
21	1.9807-002	3.3328-003	1.0445+001	4.7871-001	2.0069+000	1.1120+001	6.5419-001	4.1090-002	2.4174-003	0.0000-001	

22	2.3609-002	3.6021-003	1.6545+001	3.0221-001	2.0240+000	1.1354+001	5.3434-001	2.6487-002	1.2465-003	0.0000-001
23	2.7436-002	4.3289-003	2.5760+001	1.9410-001	2.0680+000	1.1545+001	4.4244-001	1.7296-002	6.6290-004	0.0000-001
24	3.2160-002	4.2224-003	4.1538+001	1.2037-001	2.1023+000	1.1693+001	3.5943-001	1.0864-002	3.3397-004	0.0000-001
25	3.8366-002	6.2055-003	6.5566+001	7.6259-002	2.0514+000	1.1831+001	2.9518-001	6.9646-003	1.7376-004	0.0000-001
26	4.5995-002	7.6290-003	1.1206+002	4.4618-002	1.9936+000	1.1961+001	2.3244-001	4.1195-003	8.0056-005	0.0000-001
27	5.5459-002	7.4546-003	1.8522+002	2.6995-002	1.9987+000	1.2058+001	1.8747-001	2.5126-003	3.9064-005	0.0000-001
28	6.6259-002	9.4056-003	3.1263+002	1.5993-002	2.0457+000	1.2136+001	1.5272-001	1.4982-003	1.8853-005	0.0000-001
29	7.9354-002	1.6499-002	6.4116+002	7.7984-003	1.8107+000	1.2227+001	1.0728-001	7.3605-004	6.4560-006	0.0000-001
30	9.5923-002	1.6569-002	1.1910+003	4.1962-003	1.8475+000	1.2295+001	8.5722-002	3.9842-004	2.7779-006	0.0000-001
31	1.1501-001	2.2089-002	2.3157+003	2.1592-003	1.6700+000	1.2349+001	6.4830-002	2.0582-004	1.0905-006	0.0000-001
32	1.4409-001	2.6082-002	4.0163+003	1.2449-003	1.4499+000	1.2394+001	5.3694-002	1.1910-004	5.1599-007	0.0000-001
33	1.7352-001	2.9429-002	6.5115+003	7.6768-004	1.3073+000	1.2426+001	4.6847-002	7.3652-005	2.7767-007	0.0000-001
34	2.0655-001	3.3029-002	1.0243+004	4.8812-004	1.2051+000	1.2450+001	4.1933-002	4.6910-005	1.5800-007	0.0000-001
35	2.4394-001	3.7393-002	1.5953+004	3.1342-004	1.0408+000	1.2468+001	3.7565-002	3.0165-005	9.0963-008	0.0000-001
36	2.7988-001	3.5921-002	2.0261+004	2.4654-004	9.5276-001	1.2481+001	3.8765-002	2.3752-005	7.3808-008	0.0000-001
37	3.0941-001	2.9547-002	2.7631+004	1.8095-004	8.5483-001	1.2489+001	3.7022-002	1.7445-005	5.1712-008	0.0000-001
38	3.4546-001	3.6050-002	3.0665+004	1.6295-004	6.8559-001	1.2494+001	3.9754-002	1.5717-005	5.0003-008	1.8664-006
39	3.8699-001	2.4436-002	3.2495+004	1.5367-004	5.6923-001	1.2500+001	4.7203-002	1.4847-005	5.6064-008	8.3302-007
40	3.9084-001	2.0948-002	3.1033+004	1.6112-004	5.2912-001	1.2503+001	5.3657-002	1.5549-005	6.6733-008	0.0000-001
41	4.1269-001	2.2046-002	3.1744+004	7.8753-003	4.7522-001	1.2505+001	7.1966-002	1.5204-005	8.7377-008	0.0000-001
42	4.3390-001	2.1009-002	3.4436+004	7.2596-003	5.0758-001	1.2506+001	6.3993-002	1.4017-005	7.1722-008	0.0000-001
43	4.5510-001	2.1203-002	3.7765+004	6.6197-003	4.8222-001	1.2508+001	6.1997-002	1.2782-005	6.3360-008	0.0000-001
44	4.7744-001	2.2339-002	4.3964+004	5.6964-003	5.2823-001	1.2509+001	5.8715-002	1.0961-005	5.1545-008	0.0000-001
45	5.0044-001	2.3019-002	4.9615+004	5.0387-003	5.7907-001	1.2510+001	5.7141-002	9.7312-006	4.4450-008	0.0000-001
46	5.1525-001	1.4623-002	6.0792+004	2.0566-002	5.5570-001	1.2510+001	5.1982-002	7.9424-006	3.3002-008	0.0000-001
47	5.5107-001	3.5985-002	7.3178+004	1.7065-002	5.3572-001	1.2511+001	4.8696-002	6.5984-006	2.4628-008	0.0000-001
48	5.9381-001	4.2538-002	1.0503+005	1.1904-002	6.1473-001	1.2512+001	3.9533-002	4.5976-006	1.4527-008	0.0000-001
49	6.5213-001	6.4523-002	1.9328+005	6.4686-003	6.4446-001	1.2512+001	2.7929-002	2.4985-006	5.5772-009	0.0000-001
50	6.8514-001	1.7701-001	7.6331+005	1.6379-003	6.7617-001	1.2513+001	1.1779-002	6.3266-007	5.9560-010	0.0000-001
						1.2513+001	1.1779-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	3.5335-009	3.5510-008	9.5737-014	0.0000-001	0.0000-001	1.4345-010	4.1407+025	4.1407+025	2.4248+000	0.0000-001
2	7.6393-009	7.0339-009	1.2767-011	0.0000-001	0.0000-001	-1.3019-010	1.9094+026	1.9094+026	1.6824-001	0.0000-001
3	3.2577-009	3.2569-009	1.3123-011	0.0000-001	0.0000-001	-1.0035-011	3.8318+026	3.8318+026	1.6958-002	0.0000-001
4	2.6300-009	2.6300-009	1.3010-011	0.0000-001	0.0000-001	-5.1655-013	4.1486+026	4.1486+026	9.2013-003	0.0000-001
5	2.2326-009	2.2326-009	1.1209-011	0.0000-001	0.0000-001	-3.6705-013	4.2782+026	4.2782+026	4.0784-003	0.0000-001
6	2.1851-009	2.1851-009	7.8038-012	0.0000-001	0.0000-001	-1.3022-014	4.1188+026	4.1188+026	3.7024-003	0.0000-001
7	1.8706-009	1.8706-009	6.8468-012	0.0000-001	0.0000-001	-2.1854-013	3.9596+026	3.9596+026	9.6407-004	0.0000-001
8	1.9975-009	1.9975-009	2.3230-012	0.0000-001	0.0000-001	1.4403-013	3.5394+026	3.5394+026	2.2519-003	0.0000-001
9	1.5962-009	1.5962-009	2.2738-014	0.0000-001	0.0000-001	-4.5612-014	3.3003+026	3.3003+026	1.0578-003	0.0000-001
10	1.5973-009	1.5973-009	3.9770-012	0.0000-001	0.0000-001	1.9452-013	2.7784+026	2.7784+026	1.0272-003	0.0000-001
11	1.3471-009	1.3471-009	1.0791-011	0.0000-001	0.0000-001	4.1395-015	2.4043+026	2.4043+026	5.7967-004	0.0000-001
12	1.2961-009	1.2961-009	1.8510-011	0.0000-001	0.0000-001	3.4079-014	1.9559+026	1.9559+026	6.6651-004	0.0000-001
13	1.0224-009	1.0224-009	1.7344-011	0.0000-001	0.0000-001	-4.0366-014	1.6606+026	1.6606+026	2.7705-004	0.0000-001
14	9.6867-010	9.6867-010	8.9959-012	0.0000-001	0.0000-001	-8.0872-014	1.3087+026	1.3087+026	-3.9421-004	0.0000-001
15	1.3203-009	1.3201-009	3.9712-011	0.0000-001	0.0000-001	-3.2406-011	6.6483+025	6.6483+025	-2.0781-001	0.0000-001
16	1.7902-009	1.3347-009	1.8160-009	0.0000-001	0.0000-001	-6.4054-010	2.6978+024	2.6978+024	-1.9405+000	0.0000-001
17	5.1984-009	1.1611-009	9.0026-008	0.0000-001	0.0000-001	-1.9394-010	3.1322+023	3.1322+023	-1.0205+000	0.0000-001
18	2.3549-009	8.9571-009	1.5105-007	0.0000-001	0.0000-001	-8.9224-011	1.3029+023	1.3029+023	-6.7121-001	0.0000-001
19	7.0305-009	7.1602-009	1.9459-007	0.0000-001	0.0000-001	-5.1504-011	6.6573+022	6.6573+022	-4.2675-001	0.0000-001
20	7.0275-009	5.7544-009	2.0935-007	0.0000-001	0.0000-001	-3.1063-011	3.8068+022	3.8068+022	-3.2554-001	0.0000-001
21	6.7789-009	3.9881-009	2.1535-007	0.0000-001	0.0000-001	-1.6598-011	2.3066+022	2.3066+022	-2.4347-001	0.0000-001
22	7.1368-009	3.3586-009	2.2579-007	0.0000-001	0.0000-001	-1.0933-011	1.4562+022	1.4562+022	-1.7764-001	0.0000-001
23	7.4787-009	2.8868-009	2.1797-007	0.0000-001	0.0000-001	-7.3061-012	9.3525+021	9.3525+021	-1.3324-001	0.0000-001

24	8.2235-008	1.9131-009	2.3195-007	0.0000-001	0.0000-001	-3.1793-013	5.3000+021	5.3000+021	-1.0202-001	0.0000-001
25	8.0821-008	2.0164-009	2.5192-007	0.0000-001	0.0000-001	-3.2339-013	3.6745+021	3.6745+021	-7.2547-002	0.0000-001
26	8.4102-008	1.6344-009	2.1974-007	0.0000-001	0.0000-001	-1.9798-013	2.1499+021	2.1499+021	-5.0223-002	0.0000-001
27	8.9591-008	1.0820-009	2.0138-007	0.0000-001	0.0000-001	-9.9236-013	1.3007+021	1.3007+021	-3.6946-002	0.0000-001
28	7.1634-008	9.0146-010	2.4341-007	0.0000-001	0.0000-001	-6.1603-013	7.7062+020	7.7062+020	-2.6390-002	0.0000-001
29	9.2506-008	8.1166-010	1.9496-007	0.0000-001	0.0000-001	-3.9999-013	3.7576+020	3.7576+020	-1.6023-002	0.0000-001
30	7.6279-008	5.8183-010	1.9492-007	0.0000-001	0.0000-001	-1.7941-013	2.0223+020	2.0223+020	-1.0657-002	0.0000-001
31	7.8350-008	4.1105-010	1.4707-007	0.0000-001	0.0000-001	-9.5087-014	1.0404+020	1.0404+020	-6.7586-003	0.0000-001
32	8.6490-008	3.4785-010	1.1988-007	0.0000-001	0.0000-001	-5.7990-014	5.9986+019	5.9986+019	-4.3310-003	0.0000-001
33	8.2237-008	3.1002-010	9.8719-008	0.0000-001	0.0000-001	-3.7260-014	3.6999+019	3.6999+019	-2.8349-003	0.0000-001
34	8.4143-008	2.8340-010	8.5657-008	0.0000-001	0.0000-001	-2.4463-014	2.3520+019	2.3520+019	-1.8860-003	0.0000-001
35	8.6041-008	2.5923-010	8.5230-008	0.0000-001	0.0000-001	-1.6148-014	1.5102+019	1.5102+019	-1.2668-003	0.0000-001
36	8.7924-008	2.7322-010	4.8695-008	0.0000-001	0.0000-001	-1.2596-014	1.1879+019	1.1879+019	-8.9496-004	0.0000-001
37	8.7175-008	1.9913-010	4.0006-008	0.0000-001	0.0000-001	-7.3628-015	8.7190+018	8.7190+018	-6.8897-004	0.0000-001
38	9.1214-008	2.9019-010	2.6125-008	0.0000-001	0.0000-001	-9.0593-015	7.8515+018	7.8515+018	-5.0421-004	0.0000-001
39	8.9646-008	2.6300-010	1.5709-008	0.0000-001	0.0000-001	-6.5483-015	7.4140+018	7.4140+018	-4.0711-004	0.0000-001
40	7.0708-008	3.0345-010	1.4669-008	0.0000-001	0.0000-001	-6.9363-015	7.7634+018	7.7634+018	-3.3563-004	0.0000-001
41	8.1216-008	4.6676-010	1.2510-008	0.0000-001	0.0000-001	-7.7565-015	7.5894+018	7.5894+018	-2.7060-004	0.0000-001
42	7.9200-008	4.0526-010	1.4192-008	0.0000-001	0.0000-001	-7.0386-015	6.9961+018	6.9961+018	-2.1950-004	0.0000-001
43	8.0341-008	3.9823-010	1.2873-008	0.0000-001	0.0000-001	-6.5432-015	6.3794+018	6.3794+018	-1.7525-004	0.0000-001
44	8.0814-008	3.7558-010	1.5446-008	0.0000-001	0.0000-001	-5.6410-015	5.4799+018	5.4799+018	-1.3802-004	0.0000-001
45	8.0344-008	3.6699-010	1.4499-008	0.0000-001	0.0000-001	-5.0450-015	4.8558+018	4.8558+018	-1.0629-004	0.0000-001
46	4.4920-008	1.6665-010	1.5749-008	0.0000-001	0.0000-001	-2.3192-015	3.9630+018	3.9630+018	-8.9722-005	0.0000-001
47	1.0125-007	3.7791-010	1.9553-008	0.0000-001	0.0000-001	-4.3660-015	3.2922+018	3.2922+018	-5.7615-005	0.0000-001
48	9.6138-008	3.0377-010	2.4904-008	0.0000-001	0.0000-001	-2.9147-015	2.2938+018	2.2938+018	-3.3106-005	0.0000-001
49	9.4807-008	2.1163-010	2.7076-008	0.0000-001	0.0000-001	-1.5763-015	1.2465+018	1.2465+018	-1.3453-005	0.0000-001
50	9.4884-008	8.8570-011	1.4846-008	0.0000-001	0.0000-001	-4.1851-016	3.1563+017	3.1563+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	5.0670+009
2	0.0000-001	0.0000-001	7.1198+011
3	0.0000-001	0.0000-001	4.6066+012
4	0.0000-001	0.0000-001	6.1724+012
5	0.0000-001	0.0000-001	7.3669+012
6	0.0000-001	0.0000-001	7.4943+012
7	0.0000-001	0.0000-001	7.5004+012
8	0.0000-001	0.0000-001	6.6771+012
9	0.0000-001	0.0000-001	6.6927+012
10	0.0000-001	0.0000-001	5.3970+012
11	0.0000-001	0.0000-001	4.9233+012
12	0.0000-001	0.0000-001	3.0769+012
13	0.0000-001	0.0000-001	2.2565+012
14	0.0000-001	0.0000-001	1.6027+012
15	0.0000-001	0.0000-001	5.2234+011
16	0.0000-001	0.0000-001	6.1249+007
17	0.0000-001	0.0000-001	2.3525+005
18	0.0000-001	0.0000-001	3.3143+004
19	0.0000-001	0.0000-001	8.5752+003
20	0.0000-001	0.0000-001	2.5557+003
21	0.0000-001	0.0000-001	9.1378+002
22	0.0000-001	0.0000-001	3.5565+002
23	0.0000-001	0.0000-001	1.4458+002
24	0.0000-001	0.0000-001	5.6696+001
25	0.0000-001	0.0000-001	2.2921+001
26	0.0000-001	0.0000-001	7.8035+000
27	0.0000-001	0.0000-001	2.6479+000

28	0.0000-001	0.0000-001	1.0140+000
29	0.0000-001	0.0000-001	2.4731-001
30	0.0000-001	0.0000-001	7.2294-002
31	0.0000-001	0.0000-001	1.9148-002
32	0.0000-001	0.0000-001	6.5586-003
33	0.0000-001	0.0000-001	2.5359-003
34	0.0000-001	0.0000-001	1.0339-003
35	0.0000-001	0.0000-001	4.2926-004
36	0.0000-001	0.0000-001	2.6532-004
37	0.0000-001	0.0000-001	1.4435-004
38	0.0000-001	0.0000-001	1.1782-004
39	0.0000-001	0.0000-001	1.0538-004
40	0.0000-001	0.0000-001	1.1520-004
41	0.0000-001	0.0000-001	1.1022-004
42	0.0000-001	0.0000-001	9.4139-005
43	0.0000-001	0.0000-001	7.3842-005
44	0.0000-001	0.0000-001	5.8471-005
45	0.0000-001	0.0000-001	4.6141-005
46	0.0000-001	0.0000-001	3.6946-005
47	0.0000-001	0.0000-001	2.1473-005
48	0.0000-001	0.0000-001	1.0509-005
49	0.0000-001	0.0000-001	3.1285-006
50	0.0000-001	0.0000-001	2.1167-007

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	2.7264-006	0.5576-006	9.6626-016	-2.6642-021	0.0000-001	-6.3537-007	0.0000-001	2.1260-019	0.0000-001	0.0000-001
I	1.3812-007	0.0000-001	9.6626-016	4.2256-025	-3.2131-006	3.6872-006	0.0000-001	2.1260-019	3.0952-034	-1.0931-009

	ET WORK	INT ENE(O)
E	-1.2943-009	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	2.7264-006	2.7092-006
ION	3.8253-006	3.8485-006
TOTAL	6.5517-006	6.5577-006

MAX COMPRESSION= 8.8789+003 TIME= 2.9239+000 CYCLE= 829 ZONE= 5 TE= 3.6206-001 TN= 3.6206-001

*FIN

CYCLE 900 TIME(SH) 2.9426+000 DELTA T(SH) 5.9517-004 CRITERION(COUR) IN ZONE (1) OTHERWISE (COUR) IN ZONE (1)

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)

1	5.7092-003	5.7092-003	5.6631-001	8.6290+000	7.8517-001	2.2240-001	2.2240-001	1.5157-002	1.5157-002	0.0000-001
2	6.3022-003	5.9297-004	1.9265-001	2.5927+001	3.1738-001	6.7881-002	6.7880-002	1.3585-002	1.3585-002	0.0000-001
3	6.5135-003	2.1131-004	7.6915-002	6.5007+001	3.2847-001	2.6006-002	2.6006-002	1.3050-002	1.3050-002	0.0000-001
4	6.6631-003	1.4960-004	5.9234-002	8.4412+001	3.3512-001	1.9422-002	1.9422-002	1.2655-002	1.2655-002	0.0000-001
5	6.7913-003	1.2817-004	5.4458-002	9.1813+001	3.3992-001	1.7367-002	1.7367-002	1.2308-002	1.2308-002	0.0000-001
6	6.9161-003	1.2480-004	5.1648-002	9.6436+001	3.4356-001	1.6821-002	1.6821-002	1.2521-002	1.2521-002	0.0000-001
7	7.0040-003	8.7949-005	3.9823-002	1.2556+002	3.2804-001	1.8834-002	1.8834-002	1.8253-002	1.8253-002	9.0383-003
8	7.0801-003	7.6103-005	3.2004-002	1.5623+002	3.2018-001	2.2506-002	2.2506-002	2.7142-002	2.7142-002	3.8537-003
9	7.1347-003	5.4608-005	2.6274-002	1.9030+002	3.1813-001	2.4325-002	2.4325-002	3.5732-002	3.5732-002	0.0000-001
10	7.1939-003	5.9186-005	2.6893-002	1.8592+002	3.2007-001	2.4752-002	2.4752-002	3.5523-002	3.5523-002	0.0000-001
11	7.2473-003	5.3320-005	2.5699-002	1.9306+002	3.2031-001	2.4902-002	2.4902-002	3.7110-002	3.7110-002	0.0000-001
12	7.3039-003	5.6620-005	2.6274-002	1.9030+002	3.2050-001	2.5588-002	2.5588-002	3.7588-002	3.7588-002	0.0000-001
13	7.4125-003	1.0865-004	5.5761-002	8.9668+001	3.4651-001	5.8826-002	5.8690-002	4.0717-002	4.0623-002	0.0000-001
14	9.4160-003	2.0035-003	1.2645+000	3.8924+000	7.1928-001	1.2729+000	8.0317-001	3.8245-002	2.4132-002	0.0000-001
15	1.7641-002	8.2246-003	1.3315+001	3.7552-001	1.3557+000	3.7328+000	5.4288-001	1.0820-002	1.5736-003	0.0000-001
16	2.8826-002	1.1186-002	5.8932+001	8.4844-002	1.6264+000	4.5601+000	2.8221-001	2.9865-003	1.8482-004	0.0000-001
17	3.7123-002	8.2966-003	8.3409+001	5.9946-002	1.7785+000	4.8628+000	2.4193-001	2.2502-003	1.1195-004	0.0000-001
18	4.5027-002	7.9048-003	1.1828+002	4.2272-002	1.9741+000	5.0200+000	1.9457-001	1.6380-003	6.3488-005	0.0000-001
19	5.1723-002	6.6958-003	1.3349+002	3.7455-002	2.1556+000	5.1229+000	1.8483-001	1.4811-003	5.3438-005	0.0000-001
20	5.7595-002	5.8720-003	1.4380+002	3.4771-002	2.2962+000	5.1950+000	1.8229-001	1.3943-003	4.8927-005	0.0000-001
21	6.2004-002	4.4084-003	1.4977+002	3.3384-002	2.3839+000	5.2458+000	1.8416-001	1.3518-003	4.7457-005	0.0000-001
22	6.6665-002	4.6612-003	1.7777+002	2.8127-002	2.4513+000	5.2864+000	1.7043-001	1.1477-003	3.7002-005	0.0000-001
23	7.1446-002	4.7817-003	2.0387+002	2.5626-002	2.4990+000	5.3243+000	1.6279-001	1.0080-003	3.0819-005	0.0000-001
24	7.5360-002	3.9134-003	2.2940+002	2.1796-002	2.4361+000	5.3553+000	1.5849-001	9.0101-004	2.6666-005	0.0000-001
25	8.0817-002	5.4567-003	2.8211+002	1.7724-002	2.4119+000	5.3857+000	1.4605-001	7.3682-004	1.9981-005	0.0000-001
26	8.7299-002	6.4829-003	3.7734+002	1.3251-002	2.3714+000	5.4201+000	1.2887-001	5.5438-004	1.3182-005	0.0000-001
27	9.4403-002	7.1032-003	5.8843+002	8.4973-003	2.3266+000	5.4541+000	1.0363-001	3.5774-004	6.7973-006	0.0000-001
28	1.0378-001	9.3818-003	9.0421+002	5.5297-003	2.2662+000	5.4896+000	8.6259-002	2.3432-004	3.6819-006	0.0000-001
29	1.1579-001	1.2005-002	1.1083+003	4.5114-003	2.0661+000	5.5272+000	8.2801-002	1.9248-004	2.8835-006	0.0000-001
30	1.3229-001	1.6499-002	2.3723+003	2.1077-003	2.0047+000	5.5660+000	5.8276-002	9.0556-005	9.4812-007	0.0000-001
31	1.4991-001	1.7623-002	3.2076+003	1.5588-003	1.7649+000	5.6010+000	5.5039-002	6.7393-005	6.6225-007	0.0000-001
32	1.7228-001	2.2371-002	5.1965+003	9.6218-004	1.5518+000	5.6320+000	4.7035-002	4.1830-005	3.4933-007	0.0000-001
33	1.9887-001	2.6567-002	8.0237+003	6.2315-004	1.3926+000	5.6598+000	4.1940-002	2.7225-005	2.0174-007	0.0000-001
34	2.2984-001	3.0972-002	1.2212+004	4.0945-004	1.2753+000	5.6832+000	3.8077-002	1.7962-005	1.2034-007	0.0000-001
35	2.6382-001	3.3980-002	1.7396+004	2.8743-004	1.0811+000	5.7019+000	3.6009-002	1.2651-005	7.9093-008	0.0000-001
36	2.9826-001	3.4434-002	2.2379+004	2.2343-004	1.0059+000	5.7158+000	3.6737-002	9.8577-006	6.3358-008	0.0000-001
37	3.2538-001	2.7122-002	2.8403+004	1.7604-004	8.5128-001	5.7250+000	3.6710-002	7.7795-006	4.9883-008	0.0000-001
38	3.5844-001	3.3065-002	3.0680+004	1.6297-004	7.0045-001	5.7321+000	4.0382-002	7.2110-006	5.0801-008	1.4824-006
39	3.8066-001	2.2219-002	3.1539+004	1.5853-004	5.8541-001	5.7370+000	6.2837-002	7.0206-006	7.6896-008	8.3862-007
40	4.0079-001	2.0125-002	3.1457+004	1.5894-004	5.3382-001	5.7401+000	5.4324-002	7.0425-006	6.6651-008	0.0000-001
41	4.2207-001	2.1287-002	3.2127+004	7.7815-003	5.0571-001	5.7425+000	7.0450-002	6.8988-006	8.4635-008	0.0000-001
42	4.4362-001	2.1551-002	3.6921+004	6.7712-003	5.2830-001	5.7446+000	6.1728-002	6.0052-006	6.4529-008	0.0000-001
43	4.6460-001	2.0979-002	3.8999+004	6.4105-003	5.2948-001	5.7463+000	6.0808-002	5.6868-006	6.0178-008	0.0000-001
44	4.8766-001	2.3058-002	4.7320+004	5.2831-003	5.6134-001	5.7477+000	5.6215-002	4.6880-006	4.5851-008	0.0000-001
45	5.1189-001	2.4228-002	5.4560+004	4.5820-003	6.3193-001	5.7489+000	5.3727-002	4.0667-006	3.8006-008	0.0000-001
46	5.2601-001	1.4119-002	6.1312+004	2.0391-002	6.0496-001	5.7497+000	5.1849-002	3.6193-006	3.2638-008	0.0000-001
47	5.6169-001	3.5679-002	7.5518+004	1.6555-002	5.9351-001	5.7505+000	4.5896-002	2.9389-006	2.3456-008	0.0000-001
48	6.0582-001	4.4133-002	1.1336+005	1.1029-002	6.8210-001	5.7514+000	3.7691-002	1.9581-006	1.2832-008	0.0000-001
49	6.7099-001	6.5165-002	2.0310+005	6.1559-003	7.2041-001	5.7520+000	2.7129-002	1.0931-006	5.1555-009	0.0000-001
50	8.4867-001	1.7768-001	7.9342+005	1.5758-003	7.5950-001	5.7527+000	1.1507-002	2.7984-007	5.5973-010	0.0000-001
						5.7527+000	1.1507-002	1.0000-014		

#	E ENERGY (JK/STER)	ION ENERGY (JK/STER)	KIN ENERGY (JK/STER)	E SOURCE (JK/STER)	ION SOURCE (JK/STER)	E-ION EX (JK/STER)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	1.4103-009	1.4103-009	4.4836-009	0.0000-001	0.0000-001	1.0285-013	4.2542+023	4.2542+023	1.2767-005	0.0000-001

2	4.3619-010	4.3619-010	5.6361-009	0.0000-001	0.0000-001	-6.2864-014	1.2493+024	1.2493+024	3.9725-006	0.0000-001
3	1.6985-010	1.6985-010	6.0000-009	0.0000-001	0.0000-001	-3.3363-014	3.1323+024	3.1323+024	3.5196-007	0.0000-001
4	1.2327-010	1.2327-010	6.0686-009	0.0000-001	0.0000-001	-2.4500-015	4.0673+024	4.0673+024	8.3759-008	0.0000-001
5	1.0710-010	1.0710-010	6.3429-009	0.0000-001	0.0000-001	-6.2195-016	4.4239+024	4.4239+024	2.2728-008	0.0000-001
6	1.1010-010	1.1010-010	6.4180-009	0.0000-001	0.0000-001	-9.0165-016	4.6467+024	4.6467+024	-5.5134-008	0.0000-001
7	1.1665-010	1.1665-010	6.0508-009	0.0000-001	0.0000-001	5.7181-013	6.0498+024	6.0498+024	-2.6211-007	0.0000-001
8	1.5365-010	1.5365-010	5.7131-009	0.0000-001	0.0000-001	3.0144-014	7.5279+024	7.5279+024	-2.6734-007	0.0000-001
9	1.4786-010	1.4786-010	5.5145-009	0.0000-001	0.0000-001	1.4998-015	9.1695+024	9.1695+024	-1.4315-007	0.0000-001
10	1.6187-010	1.6187-010	5.6422-009	0.0000-001	0.0000-001	2.2245-016	8.9585+024	8.9585+024	-8.4610-010	0.0000-001
11	1.5475-010	1.5475-010	5.6792-009	0.0000-001	0.0000-001	-2.0476-015	9.3023+024	9.3023+024	-1.3803-007	0.0000-001
12	1.6898-010	1.6898-010	5.6336-009	0.0000-001	0.0000-001	-1.1316-013	9.1694+024	9.1694+024	-8.8155-006	0.0000-001
13	3.5928-010	3.5845-010	6.4768-009	0.0000-001	0.0000-001	-8.3506-011	4.3206+024	4.3206+024	-5.5355-003	0.0000-001
14	8.1757-009	5.1587-009	2.9422-008	0.0000-001	0.0000-001	-7.9326-010	1.8755+023	1.8755+023	-5.4509-002	0.0000-001
15	2.5183-008	3.6625-009	1.0153-007	0.0000-001	0.0000-001	-1.3889-010	1.8094+022	1.8094+022	-2.8965-002	0.0000-001
16	2.7570-008	1.7062-009	1.4097-007	0.0000-001	0.0000-001	-3.1280-011	4.0881+021	4.0881+021	-1.3476-002	0.0000-001
17	3.0609-008	1.5228-009	1.7541-007	0.0000-001	0.0000-001	-2.2660-011	2.8884+021	2.8884+021	-9.3729-003	0.0000-001
18	3.2870-008	1.2740-009	2.2474-007	0.0000-001	0.0000-001	-1.6696-011	2.0369+021	2.0369+021	-7.2094-003	0.0000-001
19	3.4868-008	1.2580-009	2.7843-007	0.0000-001	0.0000-001	-1.5297-011	1.8047+021	1.8047+021	-6.1021-003	0.0000-001
20	3.6727-008	1.2887-009	2.9978-007	0.0000-001	0.0000-001	-1.4661-011	1.6754+021	1.6754+021	-5.4054-003	0.0000-001
21	3.1980-008	1.1227-009	3.0387-007	0.0000-001	0.0000-001	-1.2067-011	1.6086+021	1.6086+021	-4.9838-003	0.0000-001
22	3.3223-008	1.0712-009	3.3120-007	0.0000-001	0.0000-001	-1.0480-011	1.3553+021	1.3553+021	-4.5510-003	0.0000-001
23	3.4490-008	1.0545-009	3.0563-007	0.0000-001	0.0000-001	-9.3687-012	1.1817+021	1.1817+021	-4.0854-003	0.0000-001
24	2.8504-008	8.4359-010	3.1146-007	0.0000-001	0.0000-001	-6.8249-012	1.0502+021	1.0502+021	-3.7373-003	0.0000-001
25	3.6790-008	7.9764-010	3.4822-007	0.0000-001	0.0000-001	-7.2035-012	8.5400+020	8.5400+020	-3.2994-003	0.0000-001
26	3.8110-008	9.0615-010	3.1089-007	0.0000-001	0.0000-001	-5.6635-012	6.3848+020	6.3848+020	-2.8462-003	0.0000-001
27	3.1477-008	5.9809-010	2.7288-007	0.0000-001	0.0000-001	-3.0538-012	4.0943+020	4.0943+020	-2.4330-003	0.0000-001
28	3.2409-008	5.0917-010	2.9871-007	0.0000-001	0.0000-001	-2.0597-012	2.6644+020	2.6644+020	-2.0002-003	0.0000-001
29	4.1817-008	6.2645-010	2.5383-007	0.0000-001	0.0000-001	-2.1485-012	2.1738+020	2.1738+020	-1.5566-003	0.0000-001
30	3.4533-008	3.6155-010	2.1771-007	0.0000-001	0.0000-001	-8.3520-013	1.0156+020	1.0156+020	-1.1694-003	0.0000-001
31	3.5513-008	3.4898-010	1.7243-007	0.0000-001	0.0000-001	-6.4116-013	7.5108+019	7.5108+019	-8.7477-004	0.0000-001
32	3.6486-008	3.0471-010	1.3619-007	0.0000-001	0.0000-001	-4.1482-013	4.6362+019	4.6362+019	-6.3308-004	0.0000-001
33	3.7455-008	2.7754-010	1.1202-007	0.0000-001	0.0000-001	-2.7816-013	3.0026+019	3.0026+019	-4.5220-004	0.0000-001
34	3.8410-008	2.5734-010	9.5934-008	0.0000-001	0.0000-001	-1.8813-013	1.9729+019	1.9729+019	-3.2057-004	0.0000-001
35	3.9347-008	2.4849-010	7.9385-008	0.0000-001	0.0000-001	-1.3523-013	1.3849+019	1.3849+019	-2.2757-004	0.0000-001
36	4.0265-008	2.5879-010	5.4277-008	0.0000-001	0.0000-001	-1.0752-013	1.0766+019	1.0766+019	-1.6602-004	0.0000-001
37	3.0792-008	1.9745-010	3.9675-008	0.0000-001	0.0000-001	-6.5380-014	8.4823+018	8.4823+018	-1.3079-004	0.0000-001
38	4.1842-008	2.9477-010	2.7271-008	0.0000-001	0.0000-001	-8.2499-014	7.8527+018	7.8527+018	-9.8006-005	0.0000-001
39	3.1965-008	3.5011-010	1.6615-008	0.0000-001	0.0000-001	-6.1082-014	7.6388+018	7.6388+018	-8.0052-005	0.0000-001
40	3.2463-008	3.0723-010	1.4952-008	0.0000-001	0.0000-001	-6.2260-014	7.6586+018	7.6586+018	-6.6228-005	0.0000-001
41	3.7297-008	4.5756-010	1.4167-008	0.0000-001	0.0000-001	-6.9917-014	7.4991+018	7.4991+018	-5.3650-005	0.0000-001
42	3.6380-008	3.9092-010	1.5374-008	0.0000-001	0.0000-001	-5.9948-014	6.5254+018	6.5254+018	-4.3492-005	0.0000-001
43	3.6911-008	3.9059-010	1.5520-008	0.0000-001	0.0000-001	-5.7724-014	6.1775+018	6.1775+018	-3.4841-005	0.0000-001
44	3.6766-008	3.5959-010	1.7443-008	0.0000-001	0.0000-001	-4.7874-014	5.0913+018	5.0913+018	-2.7410-005	0.0000-001
45	3.6923-008	3.4506-010	1.7268-008	0.0000-001	0.0000-001	-4.1966-014	4.4157+018	4.4157+018	-2.1193-005	0.0000-001
46	2.0645-008	1.9617-010	1.8465-008	0.0000-001	0.0000-001	-2.0942-014	3.9294+018	3.9294+018	-1.7876-005	0.0000-001
47	4.6539-008	3.7143-010	2.3999-008	0.0000-001	0.0000-001	-3.8616-014	3.1902+018	3.1902+018	-1.1481-005	0.0000-001
48	4.4193-008	2.8962-010	3.0662-008	0.0000-001	0.0000-001	-2.4695-014	2.1252+018	2.1252+018	-6.6329-006	0.0000-001
49	4.3585-008	2.0557-010	3.3834-008	0.0000-001	0.0000-001	-1.3719-014	1.1862+018	1.1862+018	-2.7132-006	0.0000-001
50	4.3256-008	8.6520-011	1.8730-008	0.0000-001	0.0000-001	-3.6979-015	3.0365+017	3.0365+017	0.0000-001	0.0000-001

#	PSI -	PSI +	KIB(1/CM)
0	0.0000-001	0.0000-001	
1	0.0000-001	0.0000-001	4.4967+007
2	0.0000-001	0.0000-001	9.3146+008
3	0.0000-001	0.0000-001	1.2799+010
4	0.0000-001	0.0000-001	3.1431+010
5	0.0000-001	0.0000-001	4.6781+010

6	0.0000-001	0.0000-001	5.4176+010
7	0.0000-001	0.0000-001	7.8167+010
8	0.0000-001	0.0000-001	9.2003+010
9	0.0000-001	0.0000-001	1.2141+011
10	0.0000-001	0.0000-001	1.1279+011
11	0.0000-001	0.0000-001	1.2058+011
12	0.0000-001	0.0000-001	1.1263+011
13	0.0000-001	0.0000-001	1.3685+010
14	0.0000-001	0.0000-001	1.3864+006
15	0.0000-001	0.0000-001	2.8653+003
16	0.0000-001	0.0000-001	1.1756+002
17	0.0000-001	0.0000-001	5.2967+001
18	0.0000-001	0.0000-001	2.5283+001
19	0.0000-001	0.0000-001	1.9272+001
20	0.0000-001	0.0000-001	1.6226+001
21	0.0000-001	0.0000-001	1.4693+001
22	0.0000-001	0.0000-001	1.0290+001
23	0.0000-001	0.0000-001	7.6699+000
24	0.0000-001	0.0000-001	5.7890+000
25	0.0000-001	0.0000-001	3.9655+000
26	0.0000-001	0.0000-001	2.2376+000
27	0.0000-001	0.0000-001	9.3072-001
28	0.0000-001	0.0000-001	3.9484-001
29	0.0000-001	0.0000-001	2.5886-001
30	0.0000-001	0.0000-001	5.6777-002
31	0.0000-001	0.0000-001	3.1176-002
32	0.0000-001	0.0000-001	1.2093-002
33	0.0000-001	0.0000-001	5.1094-003
34	0.0000-001	0.0000-001	2.2119-003
35	0.0000-001	0.0000-001	1.0375-003
36	0.0000-001	0.0000-001	6.5722-004
37	0.0000-001	0.0000-001	4.1112-004
38	0.0000-001	0.0000-001	3.5363-004
39	0.0000-001	0.0000-001	3.3452-004
40	0.0000-001	0.0000-001	3.3633-004
41	0.0000-001	0.0000-001	3.2289-004
42	0.0000-001	0.0000-001	2.9676-004
43	0.0000-001	0.0000-001	2.2160-004
44	0.0000-001	0.0000-001	1.5200-004
45	0.0000-001	0.0000-001	1.1508-004
46	0.0000-001	0.0000-001	9.1232-005
47	0.0000-001	0.0000-001	6.0553-005
48	0.0000-001	0.0000-001	2.7146-005
49	0.0000-001	0.0000-001	8.5156-006
50	0.0000-001	0.0000-001	5.9033-007

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.2900-006	6.5576-006	1.0142-015	-3.2924-021	0.0000-001	-7.1784-007	0.0000-001	1.6270-018	-8.3388-024	0.0000-001
I	3.3510-008	0.0000-001	1.0142-015	4.2256-025	-4.5726-006	5.2256-006	0.0000-001	1.6270-018	2.9670-033	-1.1779-009

	EI WORK	INT ENE(J)
E	-2.0504-008	3.2292-011
I		3.2292-011

ENERGY CONSERVATION

ELECTRON	1.2900-006	1.2672-006
ION	5.2591-006	5.2905-006
TOTAL	6.5491-006	6.5577-006

Example Problem #2 - Pure Temperature Diffusion

Analytic solutions to relevant problems in nonlinear hydrodynamics are difficult to find. One particular equation that can be solved exactly, however, is the following nonlinear temperature diffusion equation:

$$\rho C_v \frac{\partial T}{\partial t} = \frac{\partial}{\partial x} \frac{K \partial T}{\partial x} + Q' \delta(t) \delta(x)$$

where $K = K_o T^{5/2}$ and we define $\alpha = \frac{K_o}{\rho C_v}$ and $Q = Q'/\rho C_v$.
For constant density the equation becomes

$$\frac{\partial T}{\partial t} = \frac{\alpha \partial}{\partial x} T^{5/2} \frac{\partial T}{\partial x} + Q \delta(t) \delta(x).$$

The solution to this equation is

$$T(x,t) = \left(\frac{5}{18}\right)^{2/5} \left(\frac{Q^2}{\alpha t}\right)^{2/9} \left(1 - \S^2\right)^{2/5} \qquad \S < 1$$

$$= 0 \qquad \S > 1$$

where $\S = x/(\alpha Q^{5/2} t)^{2/9}$.

We solve this equation using PHD(VER001) for Q = .1 Kev-cm and α = .443 which corresponds to $n_e = 10^{21} cm^{-3}$, $C_{v_e} = .0579$, $\ell n \lambda = 4.4$. To do this we turn off the hydrodynamic motion, turn off electron-ion coupling and start the problem with an initial electron temperature distribution which is the same as the solution of this model equation at 10^{-15} seconds. The code specifications are given in the following table:

30 spatial zones

$\Delta x = 10^{-3}$ cm.

T_e initial - 9.3, 9.1, 8.7, 8.1, 7.1, 5.5, 10^{-20}, 10^{-20}, . . .

PHD input -

```
&INPUT IDELTA=1, JMAXM1=30, NMAX=2000,
      TMAX=35.D-6, DTB=1.D-9,
      DE2B=30*1.D21, DN2B=30*1.D21,
      DR2C=30*.001D0, ATW2B=30*2.5D0, Z2B=30*1.D0,
      TE2C=9.3D0, 9.1D0, 8.7D0, 8.1D0, 7.1D0, 5.5D0, 24*1.D-20,
      TN2C=30*1.D-20,
     IEDIT=100,100,100,
    CON(2)=2.34D-3, CON(5)=4.4D0, ISW(6)=1,
    CON(8)=0.D0, CON(11)=0.D0, CON(12)=0.D0,
    &END
```

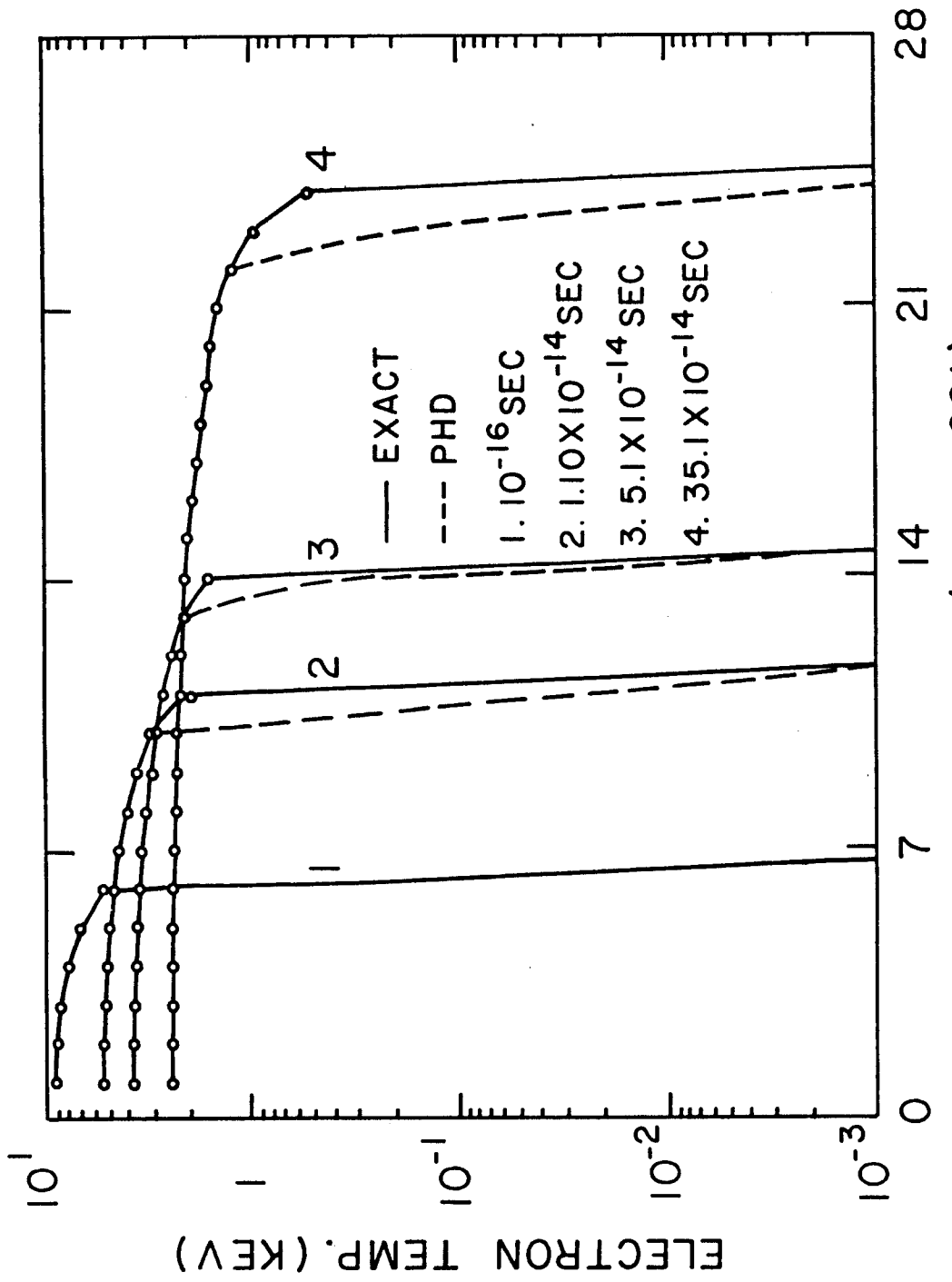


FIGURE 2 EXACT AND PHD TEMPERATURE COMPARISON

****

* PHD - A PLASMA HYDRODYNAMICS CODE(VER001) - G.A. MOSES *

****

PLANAR GEOMETRY - ENERGY QUANTITIES ARE PER CENTIMETER SQUARED

NO. OF ZONES	30
OUTER RADIUS(CM)	3.0000-002
NO. OF TIME CYCLES	3000
MAX. PROBLEM TIME(SH)	3.5000-005
TIME STEP FOR FIRST 10 CYCLES(SH)	1.0000-009
MIN. TIME STEP(SH)	1.0000-010
MAX. TIME STEP(SH)	1.0000-003
TIME STEP GROWTH LIMIT	1.5000+000
TIME STEP CONTROL PARAMETERS	
COURANT	5.0000-001
PERCENT V CHANGE	5.0000-001
PERCENT T CHANGE	5.0000-001
OUTER LIMIT ZONE NO.	30

ZERO TEMPERATURE GRADIENT AT THE OUTER BOUNDARY

PRESSURE BC.(JK/CM3) 1.0000-014

NO LASER SOURCE

CYCLE SUMMARY FREQUENCY = 100 UP TO TIME(SH) 0.0000-001
AFTER THIS TIME FREQ. = 100
BINARY SUMMARY FREQUENCY = 100

INTERMEDIATE VARIABLE FREQUENCIES

A11,ETC.	-1	AL112B,ETC.	-1	OM112B,ETC.	-1	GM112B,ETC.	-1	AA112B,ETC.	-1	BET12B,ETC.	-1
BET2B,ETC.	-1	TE2B,ETC.	-1	OMC2B	-1	OMR2B	-1	KAPM1B,ETC.	-1	Y,ETC.	-1
TE,ETC.	-1	U1B,ETC.	-1		-1	G2B	-1	T1-T9,ETC.	-1	DE2B,ETC.	-1
DE2A,ETC.	-1										

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	MASS (G/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E TEMP (KEV)	ION TEMP (KEV)	ATOMIC WT (AMU)	CHARGE (ESU)
1	1.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	9.3000+000	1.0000-020	2.5000+000	1.0000+000
2	2.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	9.1000+000	1.0000-020	2.5000+000	1.0000+000
3	3.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	8.7000+000	1.0000-020	2.5000+000	1.0000+000
4	4.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	8.1000+000	1.0000-020	2.5000+000	1.0000+000
5	5.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	7.1000+000	1.0000-020	2.5000+000	1.0000+000
6	6.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	5.5000+000	1.0000-020	2.5000+000	1.0000+000
7	7.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000

8	8.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
9	9.0000-003	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
10	1.0000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
11	1.1000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
12	1.2000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
13	1.3000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
14	1.4000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
15	1.5000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
16	1.6000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
17	1.7000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
18	1.8000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
19	1.9000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
20	2.0000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
21	2.1000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
22	2.2000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
23	2.3000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
24	2.4000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
25	2.5000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
26	2.6000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
27	2.7000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
28	2.8000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
29	2.9000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000
30	3.0000-002	1.0000-003	2.4092+002	4.1508-006	1.0000+021	1.0000+021	1.0000-020	1.0000-020	2.5000+000	1.0000+000

#	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	E INT ENE (JK/CM2)	ION INT ENE (JK/CM2)	VELOCITY (CM/SH)	T DENSITY	D DENSITY	O DENSITY
1	1.4899-003	1.6020-024	2.2348-006	2.4030-027	0.0000-001			
2	1.4579-003	1.6020-024	2.1867-006	2.4030-027	0.0000-001			
3	1.3937-003	1.6020-024	2.0906-006	2.4030-027	0.0000-001			
4	1.2976-003	1.6020-024	1.9464-006	2.4030-027	0.0000-001			
5	1.1374-003	1.6020-024	1.7061-006	2.4030-027	0.0000-001			
6	8.8110-004	1.6020-024	1.3216-006	2.4030-027	0.0000-001			
7	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
8	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
9	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
10	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
11	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
12	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
13	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
14	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
15	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
16	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
17	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
18	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
19	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
20	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
21	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
22	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
23	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
24	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
25	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
26	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
27	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
28	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
29	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			
30	1.6020-024	1.6020-024	2.4030-027	2.4030-027	0.0000-001			

COEFFICIENTS USED IN PHD

E THERMAL COND.....	2.4440-005	ION THERMAL COND.....	2.3400-003
E FLUX LIMIT.....	3.4450-025	BREM RAD LOSS TEMP(KEV)..	1.0000+003
CONST LOG LAMBDA.....	4.4000+000	THERMAL COND OF 1ST ZONE.	1.0000-050
RAD LOSS TERM.....	2.4200-048	E-ION EXCHANGE TERM.....	0.0000-001
ION PRESS(I.GAS).....	1.6020-025	E PRESS(I.GAS).....	1.6020-025
E PRESS DERIV.....	0.0000-001	ION PRESS DERIV.....	0.0000-001
E SP HEAT.....	2.4030-025	ION SP HEAT.....	2.4030-025
ION INT ENERGY(I.GAS)....	2.4030-025	E INT ENERGY(I.GAS).....	2.4030-025
TEMP ITERATION CONVERGENCE	5.0000-002	ION SHOCK HEATING.....	1.0000+000
FRACTION OF LASER DUMPED.	1.0000+000	INVERSE BREMSSTRAHLUNG...	1.3700-034
ARTIFICIAL VISCOSITY.....	1.4140+000		

CALCULATION OPTIONS USED IN PHD

NO. OF TEMP ITERATIONS...	1	CONSTANT SP HEAT.....	0
NO. OF CONST TIME STEPS..	10	LASER ABS. AT N-CRIT.....	1
FLUX LIMITING.....	0	MAX ZONE FOR COMPRESSION.	11
HYDRODYNAMIC MOTION.....	1	ALTER TH COND IN 1ST ZONE	0

CYCLE 100 TIME(SH) 1.0709-007 DELTA T(SH) 7.8161-010 CRITERION(T/T) IN ZONE (9) OTHERWISE (T/T) IN ZONE (9)

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.9950+000	1.0000-020	1.2792-003	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.8823+000	1.0000-020	1.2627-003	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.6665+000	1.0000-020	1.2282-003	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.3128+000	1.0000-020	1.1715-003	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	6.7671+000	1.0000-020	1.0841-003	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.9003+000	1.0000-020	9.4522-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.2605+000	1.0000-020	6.8253-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5521-002	1.0000-020	4.0884-006	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2054-017	1.0000-020	3.5331-021	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001

28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.6020-024	1.6020-024	0.0000-001

27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	1.9158-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.9430+000	0.0000-001
2	1.8941-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.8767+000	0.0000-001
3	1.8423-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.7902+000	0.0000-001
4	1.7573-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.6518+000	0.0000-001
5	1.6221-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	9.3240+000	0.0000-001
6	1.4179-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.0042+001	0.0000-001
7	1.0239-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.8057-001	0.0000-001
8	6.1328-009	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.6693-015	0.0000-001
9	5.2996-024	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6411-062	0.0000-001
10	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
11	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
12	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
13	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
14	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
15	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
16	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
17	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
18	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
19	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
20	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
21	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
22	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
23	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-081	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(0)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(T/T) IN ZONE (12) OTHERWISE (T/T) IN ZONE (12)
400	1.3322-006	1.8639-008	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.1805+000	1.0000-020	8.2991-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.1503+000	1.0000-020	8.2508-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.0842+000	1.0000-020	8.1523-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.9955+000	1.0000-020	8.0027-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.8664+000	1.0000-020	7.7960-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.6974+000	1.0000-020	7.5252-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.4805+000	1.0000-020	7.1778-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.2012+000	1.0000-020	6.7303-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.8288+000	1.0000-020	6.1338-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.2841+000	1.0000-020	5.2611-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.0226+000	1.0000-020	3.2402-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.5681-003	1.0000-020	5.7161-007	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.8079-020	1.0000-020	2.8962-024	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	1.2446-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.9744-001	0.0000-001
2	1.2376-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.9069-001	0.0000-001
3	1.2229-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.7640-001	0.0000-001
4	1.2004-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.5016-001	0.0000-001
5	1.1694-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	9.0868-001	0.0000-001
6	1.1284-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.0505+000	0.0000-001
7	1.0767-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.1753+000	0.0000-001

8	1.0095-006	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.2872+000	0.0000-001
9	9.2007-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.3904+000	0.0000-001
10	7.8917-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.4583+000	0.0000-001
11	4.8634-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.7402-002	0.0000-001
12	3.5742-010	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.1970-020	0.0000-001
13	4.3443-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.3907-072	0.0000-001
14	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
15	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
16	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
17	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
18	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
19	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
20	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
21	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
22	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
23	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-081	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(0)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(T/T) IN ZONE (16) OTHERWISE (T/T) IN ZONE (16)
700	5.1315-006	3.6040-008	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)

1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.8653+000	1.0000-020	6.1923-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.8524+000	1.0000-020	6.1716-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.8264+000	1.0000-020	6.1299-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.7869+000	1.0000-020	6.0666-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.7332+000	1.0000-020	5.9806-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.6644+000	1.0000-020	5.8703-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.5791+000	1.0000-020	5.7338-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.4759+000	1.0000-020	5.5683-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.3523+000	1.0000-020	5.3703-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.2052+000	1.0000-020	5.1348-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.0303+000	1.0000-020	4.8545-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8199+000	1.0000-020	4.5175-004	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5583+000	1.0000-020	4.0983-004	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.1981+000	1.0000-020	3.5214-004	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	8.5215-001	1.0000-020	1.3651-004	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.1617-005	1.0000-020	1.1473-008	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	9.2884-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.0423-002	0.0000-001
2	9.2574-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.0458-002	0.0000-001
3	9.1949-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.1970-001	0.0000-001
4	9.0999-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.5770-001	0.0000-001
5	8.9708-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.9393-001	0.0000-001
6	8.8054-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.2776-001	0.0000-001
7	8.6007-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.5841-001	0.0000-001
8	8.3525-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.8490-001	0.0000-001
9	8.0555-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.0608-001	0.0000-001
10	7.7022-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.2073-001	0.0000-001
11	7.2819-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.2917-001	0.0000-001
12	6.7763-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.2971-001	0.0000-001
13	6.1475-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.3271-001	0.0000-001
14	5.2821-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.6091-001	0.0000-001
15	2.0477-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.8404-004	0.0000-001
16	1.7210-011	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.9566-025	0.0000-001
17	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.4550-077	0.0000-001
18	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
19	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
20	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
21	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
22	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

23	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-061	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(O)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

CYCLE 700 TIME(SH) 7.5660-006 DELTA T(SH) 1.3863-008 CRITERION(T/T) IN ZONE (18) OTHERWISE (T/T) IN ZONE (18)

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.5456+000	1.0000-020	5.6801-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.5357+000	1.0000-020	5.6641-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.5156+000	1.0000-020	5.6319-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.4851+000	1.0000-020	5.5832-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.4439+000	1.0000-020	5.5171-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.3913+000	1.0000-020	5.4329-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.3266+000	1.0000-020	5.3292-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.2487+000	1.0000-020	5.2044-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.1559+000	1.0000-020	5.0558-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.0463+000	1.0000-020	4.8802-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.9185+000	1.0000-020	4.6753-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.7715+000	1.0000-020	4.4398-004	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6045+000	1.0000-020	4.1721-004	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4169+000	1.0000-020	3.8717-004	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2086+000	1.0000-020	3.5386-004	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.9806+000	1.0000-020	3.1732-004	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.7352+000	1.0000-020	2.7799-004	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.4772+000	1.0000-020	2.3662-004	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.2150+000	1.0000-020	1.9463-004	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	9.6000-001	1.0000-020	1.5377-004	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.3000-001	1.0000-020	1.1693-004	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.4000-001	1.0000-020	8.6490-005	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.9000-001	1.0000-020	6.2460-005	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8000-001	1.0000-020	4.4856-005	1.6020-024	0.0000-001

25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	8.5032-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.5068-002	0.0000-001
2	8.4962-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.9955-002	0.0000-001
3	8.4479-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.4378-002	0.0000-001
4	8.3747-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	9.8121-002	0.0000-001
5	8.2757-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.2094-001	0.0000-001
6	8.1494-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.4257-001	0.0000-001
7	7.9939-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6276-001	0.0000-001
8	7.8069-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.8123-001	0.0000-001
9	7.5857-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.9774-001	0.0000-001
10	7.3283-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.1209-001	0.0000-001
11	7.0334-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.2413-001	0.0000-001
12	6.6959-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.3367-001	0.0000-001
13	6.3114-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.4012-001	0.0000-001
14	5.8659-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.4035-001	0.0000-001
15	4.8225-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.1683-001	0.0000-001
16	3.8000-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.8875-002	0.0000-001
17	3.5136-009	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6672-015	0.0000-001
18	5.8645-023	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.2300-059	0.0000-001
19	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
20	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
21	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
22	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
23	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BD.ORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-031	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI .ORK	INT ENE(O)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(T/T) IN ZONE (22) OTHERWISE (T/T) IN ZONE (22)
1100	2.0010-005	2.7216-008	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8529+000	1.0000-020	4.5704-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8477+000	1.0000-020	4.5620-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8371+000	1.0000-020	4.5451-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.8212+000	1.0000-020	4.5195-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.7997+000	1.0000-020	4.4851-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.7725+000	1.0000-020	4.4416-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.7394+000	1.0000-020	4.3884-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6999+000	1.0000-020	4.3252-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6537+000	1.0000-020	4.2512-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6002+000	1.0000-020	4.1656-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5389+000	1.0000-020	4.0673-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4697+000	1.0000-020	3.9549-004	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.3886+000	1.0000-020	3.8265-004	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2969+000	1.0000-020	3.6796-004	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.1911+000	1.0000-020	3.5102-004	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.0677+000	1.0000-020	3.3124-004	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.9200+000	1.0000-020	3.0758-004	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.7355+000	1.0000-020	2.7803-004	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.4853+000	1.0000-020	2.3795-004	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0752+000	1.0000-020	1.7224-004	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	7.8022-003	1.0000-020	1.2499-006	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.1768-017	1.0000-020	3.4873-021	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	6.8556-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.6762-003	0.0000-001
2	6.8430-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.5310-002	0.0000-001
3	6.8176-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.2860-002	0.0000-001
4	6.7792-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.0280-002	0.0000-001
5	6.7277-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.7525-002	0.0000-001

6	6.6624-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.4542-002	0.0000-001
7	6.5527-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1278-002	0.0000-001
8	6.4578-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.7672-002	0.0000-001
9	6.3768-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.3657-002	0.0000-001
10	6.2484-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.9161-002	0.0000-001
11	6.1009-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.4107-002	0.0000-001
12	5.9323-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.8416-002	0.0000-001
13	5.7398-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.2019-002	0.0000-001
14	5.5197-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.4861-002	0.0000-001
15	5.2653-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.6915-002	0.0000-001
16	4.9687-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.8179-002	0.0000-001
17	4.6137-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.8574-002	0.0000-001
18	4.1704-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.7415-002	0.0000-001
19	3.5697-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.9829-002	0.0000-001
20	2.5837-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1194-003	0.0000-001
21	1.8749-009	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.5697-017	0.0000-001
22	5.2307-024	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.5766-062	0.0000-001
23	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-081	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(O)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(T/T) IN ZONE (23) OTHERWISE (T/T) IN ZONE (23)
1200	2.5777-005	5.0923-008	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6956+000	1.0000-020	4.3184-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6912+000	1.0000-020	4.3113-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6823+000	1.0000-020	4.2970-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6688+000	1.0000-020	4.2754-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6507+000	1.0000-020	4.2464-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6279+000	1.0000-020	4.2098-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5999+000	1.0000-020	4.1651-004	1.6020-024	0.0000-001

8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5668+000	1.0000-020	4.1121-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5232+000	1.0000-020	4.0502-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4837+000	1.0000-020	3.9888-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4327+000	1.0000-020	3.8972-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.3747+000	1.0000-020	3.8043-004	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.3089+000	1.0000-020	3.6988-004	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2340+000	1.0000-020	3.5789-004	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.1437+000	1.0000-020	3.4422-004	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.0507+000	1.0000-020	3.2852-004	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.9367+000	1.0000-020	3.1026-004	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.8017+000	1.0000-020	2.8964-004	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.6381+000	1.0000-020	2.6242-004	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.4352+000	1.0000-020	2.2991-004	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.1965+000	1.0000-020	1.9163-004	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	4.7010-002	1.0000-020	7.5309-006	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	3.6886-012	1.0000-020	5.9092-016	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	6.4775-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.6351-003	0.0000-001
2	6.4669-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.1242-002	0.0000-001
3	6.4455-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6793-002	0.0000-001
4	6.4132-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.2259-002	0.0000-001
5	6.3697-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.7609-002	0.0000-001
6	6.3148-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.2811-002	0.0000-001
7	6.2477-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.7832-002	0.0000-001
8	6.1681-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.2636-002	0.0000-001
9	6.0757-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.7184-002	0.0000-001
10	5.9683-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1436-002	0.0000-001
11	5.8458-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.5349-002	0.0000-001
12	5.7065-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.8879-002	0.0000-001
13	5.5452-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.1980-002	0.0000-001
14	5.3694-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.4601-002	0.0000-001
15	5.1633-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.6677-002	0.0000-001
16	4.9277-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.8095-002	0.0000-001
17	4.6539-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.8601-002	0.0000-001
18	4.3294-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.7541-002	0.0000-001
19	3.9389-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.3106-002	0.0000-001
20	3.4467-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.0103-002	0.0000-001
21	2.8752-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6213-002	0.0000-001
22	1.1297-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	6.8426-012	0.0000-001
23	8.8638-019	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	7.8977-047	0.0000-001
24	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-081	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(O)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

CYCLE	TIME(SH)	DELTA T(SH)	CRITERION(T/T) IN ZONE (24) OTHERWISE (T/T) IN ZONE (24)
1700	3.3566-005	1.1332-007	

#	RADIUS (CM)	ZONE WIDTH (CM)	SP VOLUME (CM3/G)	COMPRESSION (VO/V)	VELOCITY (CM/SH)	E TEMP (KEV)	ION TEMP (KEV)	E PRESS (JK/CM3)	ION PRESS (JK/CM3)	ART VISC (JK/CM3)
1	1.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5408+000	1.0000-020	4.0703-004	1.6020-024	0.0000-001
2	2.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5370+000	1.0000-020	4.0643-004	1.6020-024	0.0000-001
3	3.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5296+000	1.0000-020	4.0524-004	1.6020-024	0.0000-001
4	4.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5183+000	1.0000-020	4.0343-004	1.6020-024	0.0000-001
5	5.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.5031+000	1.0000-020	4.0100-004	1.6020-024	0.0000-001
6	6.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4840+000	1.0000-020	3.9794-004	1.6020-024	0.0000-001
7	7.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4607+000	1.0000-020	3.9421-004	1.6020-024	0.0000-001
8	8.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4331+000	1.0000-020	3.8979-004	1.6020-024	0.0000-001
9	9.0000-003	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.4010+000	1.0000-020	3.8464-004	1.6020-024	0.0000-001
10	1.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.3641+000	1.0000-020	3.7873-004	1.6020-024	0.0000-001
11	1.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.3220+000	1.0000-020	3.7198-004	1.6020-024	0.0000-001
12	1.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2742+000	1.0000-020	3.6433-004	1.6020-024	0.0000-001
13	1.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.2203+000	1.0000-020	3.5570-004	1.6020-024	0.0000-001
14	1.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.1595+000	1.0000-020	3.4595-004	1.6020-024	0.0000-001
15	1.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.0909+000	1.0000-020	3.3497-004	1.6020-024	0.0000-001
16	1.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.0134+000	1.0000-020	3.2254-004	1.6020-024	0.0000-001
17	1.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.9253+000	1.0000-020	3.0844-004	1.6020-024	0.0000-001
18	1.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.8249+000	1.0000-020	2.9234-004	1.6020-024	0.0000-001
19	1.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.7095+000	1.0000-020	2.7385-004	1.6020-024	0.0000-001
20	2.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.5759+000	1.0000-020	2.5246-004	1.6020-024	0.0000-001
21	2.1000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.4196+000	1.0000-020	2.2741-004	1.6020-024	0.0000-001
22	2.2000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.2294+000	1.0000-020	1.9696-004	1.6020-024	0.0000-001
23	2.3000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	2.6338-001	1.0000-020	4.2193-005	1.6020-024	0.0000-001
24	2.4000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	5.9362-007	1.0000-020	5.5093-011	1.6020-024	0.0000-001
25	2.5000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
26	2.6000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
27	2.7000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
28	2.8000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
29	2.9000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
30	3.0000-002	1.0000-003	2.4092+002	1.0000+000	0.0000-001	1.0000-020	1.0000-020	1.6020-024	1.6020-024	0.0000-001
						1.0000-020	1.0000-020	1.0000-014		

#	E ENERGY (JK/CM2)	ION ENERGY (JK/CM2)	KIN ENERGY (JK/CM2)	E SOURCE (JK/CM2)	ION SOURCE (JK/CM2)	E-ION EX (JK/CM2)	E DENSITY (1/CM3)	ION DENSITY (1/CM3)	E FLUX (JK/CM2-SH)	FLUX LIMIT (JK/CM2-SH)
1	6.1055-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.0937-003	0.0000-001
2	6.0965-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	8.1495-003	0.0000-001
3	6.0786-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.2179-002	0.0000-001
4	6.0515-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.6155-002	0.0000-001
5	6.0150-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.0057-002	0.0000-001
6	5.9690-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.3867-002	0.0000-001
7	5.9131-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	2.7564-002	0.0000-001
8	5.8468-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.1127-002	0.0000-001
9	5.7697-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.4533-002	0.0000-001
10	5.6809-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.7756-002	0.0000-001
11	5.5797-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.0769-002	0.0000-001
12	5.4650-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.3538-002	0.0000-001
13	5.3354-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.6022-002	0.0000-001
14	5.1893-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.8166-002	0.0000-001
15	5.0245-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.9891-002	0.0000-001
16	4.8381-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1079-002	0.0000-001
17	4.6266-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1548-002	0.0000-001
18	4.3851-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	5.1025-002	0.0000-001
19	4.1078-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.9132-002	0.0000-001
20	3.7869-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.5499-002	0.0000-001
21	3.4112-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.0458-002	0.0000-001
22	2.9544-007	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.3098-002	0.0000-001
23	6.3289-008	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	4.9002-007	0.0000-001
24	1.4265-013	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	3.3419-031	0.0000-001
25	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	1.3113-082	0.0000-001
26	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
27	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
28	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
29	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001
30	2.4030-027	2.4030-027	0.0000-001	0.0000-001	0.0000-001	0.0000-001	1.0000+021	1.0000+021	0.0000-001	0.0000-001

	INT ENE	T SOURCE	BDWORK T	BDFLUX T	BREM/EIW T	EIX/KE T	SOURCE	BDWORK	BDFLUX	BREM/EIX
E	1.1486-005	0.0000-001	0.0000-001	1.3295-081	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001
I	7.2090-026	0.0000-001	0.0000-001	4.3913-083	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001	0.0000-001

	EI WORK	INT ENE(C)
E	0.0000-001	1.1486-005
I		7.2090-026

ENERGY CONSERVATION

ELECTRON	1.1486-005	1.1486-005
ION	7.2090-026	7.2090-026
TOTAL	1.1486-005	1.1486-005

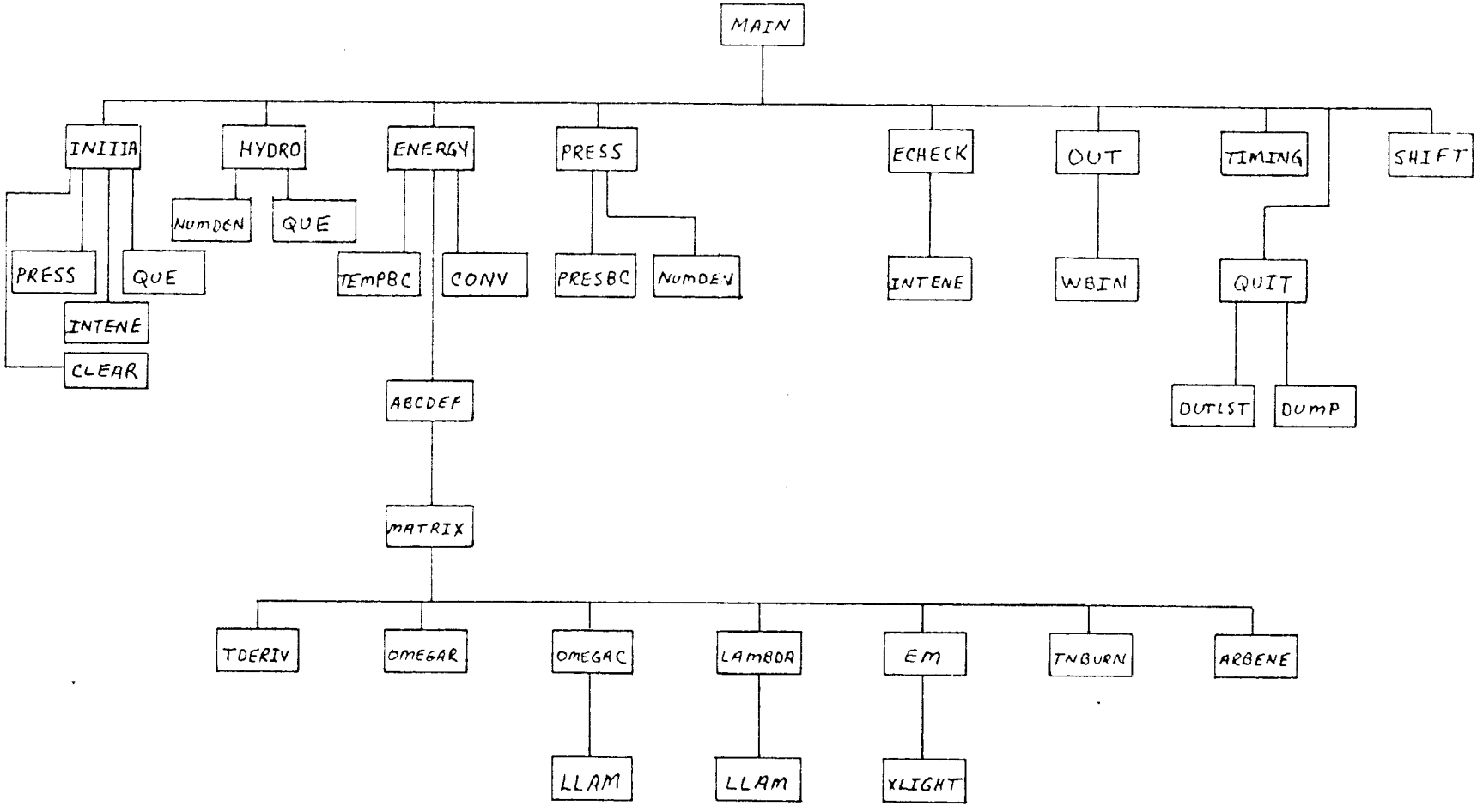


Figure 1 - Global Flow Diagram