Section VIII

Appendix C

Thermal Stress Analysis

Cool-Down Transient Conditions

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1.0 Summary

A thermal stress analysis was performed on the PWR 10/24 Rail Cask for the cool-down transient conditions. The initial temperature distribution was based on the normal operating steady state thermal condition with auxiliary cooling.

The elastic-plastic stress analysis of the basket indicate that the plastic strain was within the allowable strain to failure limit of 1180 aluminum.

The inner stainless steel shell remained elastic throughout the cool-down transient and within the allowable stress levels. The gap between the basket and the inner shell was not closed, therefore no structural interference between the basket and inner shell was experienced.

The absorber sleeve stresses were found to be within the material allowable stress at the appropriate temperatures.

No structural interference was experienced between the absorber sleeves and the aluminum basket.

The low cycle high temperature fatigue analysis indicates the aluminum basket, inner shell, and absorber sleeves will have a life cycles to failure in excess of 400 cycles, the design life of the system.

2.0 Introduction

The thermal stress analysis was performed for the 10/24 rail cask with PWR loading and a decay heat load of 97.2 kw. The analysis was completed prior to the September 18, 1974 AEC letter which resulted in a reduction in the decay heat load to 70 kw. Since the thermal stress evaluation based on 97.2 kw shows that the cask system will satisfactorily sustain repeated cycles of the prescribed cooldown procedure at the elevated temperatures associated with 70 kw decay heat load will result in less severe thermal stresses. For this reason the analysis was not performed for the reduced decay heat load.

The analysis described in sect. XI-3.4 indicated that the BWR cask arrangement was subjected to a lower state of stress than the PWR cask. This conclusion was based on the results of the steady state thermal analysis without auxiliary cooling, the post fire steady state analysis, and the lower heat generation rate for the BWR cask.

It was therefore decided to analyse only the PWR Cask during the cool-down transient. In order to do this effectively the steady state thermal condition with auxiliary cooling had to be determined.

This report describes the detailed thermal, stress, and fatigue evaluations performed to establish the structural integrity of the inner stainless-steel primary containment shell, the absorber sleeves, and the adaquacy of the aluminum basket design for the cool-down thermal transient condition.

The nature of the cool-down transient imposes a three dimensional heat transfer condition resulting in corresponding three dimensional stresses. To eleminate the necessity of performing a questionable three dimensional thermal-stress solution, a planar two dimensional approach was taken based on conservative assumptions described in more detail in Sections 3.1 and 3.3.

The cooldown of the cask occurs in four phases, described as follows:

Phase I - 400°F pressurized water is introduced into the cask. This water cools the cask by boiling and becoming superheated to initially around 800°F. As cooling occurs, the exhaust steam will drop in temperature and the cask will fill with 400°F pressurized water. When the cask is full, phase II begins.

Phase II - During phase II the cask is depressurized and the water is allowed to boil, cooling the cask in the process. As the steam leaves the cask, it is condensed and injected back into the cask to maintain a constant water level. When the steam exhaust during phase II

reaches 220°F, phase III begins.

Phase III - During phase III, the feed water is circulated and cooled until the water leaving the cask reaches 180°F. When this occurs phase III and cooldown is complete and the cask is ready for unloading.

3.0 Analysis

The general approach of this analysis of the PWR 10/24 Rail Cask was to reduce a three-dimensional cool-down process to a conservative two dimensional solution within the present day state-of-the-art of thermal-stress analyses. This analysis was also performed with the intent of utilizing all applicable data, thermal-stress models, material and thermal properties, etc, that was generated for the analysis in Sect. XI-3.4.

The following sections describe in detail the assumptions, modifications, and approaches taken in this analysis.

3.1 Conditions Analyzed

Because of high boiling heat transfer coefficients, it is apparent that the Phase I condition will produce the most severe thermal stress condition on the aluminum basket, absorber sleeve corners, and the inner shell.

The injection of saturated water at 400°F (247 psi) will first generate steam. As the water level reaches the bottom of the basket, absorber, and fuel elements, those portions above 400°F will also generate steam. The heat flow in the vertical direction will be appreciable, to the extent that the boiling water in the absorber sleeve will effectively cool down a large portion of the sleeve ahead of the water-steam interface. The condition selected to be analysed assumed the conservative approach that at the level which nucleate boiling was taking place, only radial heat flow existed. Also that the initial temperature distribution in the cask at the start of this transient, was steady state with auxiliary cooling. Section 3.3 indicates that the nucleate boiling coefficients far exceed those of free convection and conduction in water. The area of the cask affected by the boiling heat transfer will experience the most severe thermal-gradients and result in the largest stresses. The results in sections 4.1 and 4.2 assumed the cask system is exposed to the boiling water conditions in the fuel element cavities and the rectangular ports. Due to the very large heat transfer coefficient, conservatively high

thermal gradients were produced along with the most severe stressed condition the cask will ever experience in actual operation.

The other Phases II, III, develop a less severe thermal-stress state in the fuel cask than Phase I. On this basis they were not investigated.

3.2 Model Changes

The finite element models used in this analysis were essentially the same as those used in Section XI-3.4. Changes were made to accommodate the difference in the steady state normal operating condition with auxiliary cooling, and the increased concern with the structural integrity of the absorber sleeve and the primary containment inner shell.

The following sections indicate these specific changes in more detail.

3.2.1 Thermal Analysis

The steady state thermal analysis model of Section XI-3.4 was changed in the area of the auxiliary cooling ducts. A convection link was placed in duct representing the cooling water at 181 °F and the appropriate forced convection coefficient.

For the cool-down transient use the fuel generation elements (equivalent conducting solids) were eliminated and replaced by convection links to simulate the nucleate boiling coefficient for 400° F saturated water.

When the wall temperature was initially less than 400° F a natural convection coefficient was used.

The properties of the helium in the absorber sleeve to aluminum basket gap of .015" were retained since that area was sealed off from the water by virtue of the design of the assembly.

The water filled gap between the basket and the inner stainless steel shell, during the cool down transient, was represented as a conducting solid since the Grashof number did not indicate that natural or forced convection would take place.

The triangular and rectangular parts had additional nodes at their centers with convection links to the walls to represent the nucleate boiling or natural convection coefficients, depending on the initial wall temperature.

The new element model is shown in figure 1.

3.2.2 Stress Model

The stress model was changed in the representation of the inner shell. Two isoparametric elements through the thickness of the shell replaced the single element of the model in Section XI-3.4. This new change will compute the bending stress as a function of circumferential location. The model is shown in figure 2.

A separate model of the absorber sleeve was developed to more adequately describe the extensional and bending stresses in the stainless steel inner and outer cans. These models are shown in figures 3 and 4.

3.3 Heat Transfer

The purpose of the 10/24 Rail Cask cool-down process is to reduce the temperature of the fuel cask and the fuel rods to a suitable temperature to insure a safe immersion into the spent fuel pool.

The following analysis treats the heat transfer in a typical spent fuel rod bundle during the first phase of the cool-down process. This phase occurs during that period of time in which superheated steam is initially generated by 400°F feedwater at 247 psi pressure, flowing into the cask system at a rate of 6000 lb/hr. By the end of this phase the fuel elements will be covered with water and the cask completly filled.

The analysis contained herein determines the heat transfered to or from the inner wall of the absorber sleeve from saturated water at 400°F and to determine the heat transfer model for heat transfered across the gap between the aluminum basket and stainless steel inner shell.

The heat transfer analysis is divided into two parts. The analysis in the first part is concerned with the heat transfered into or out of the inside wall of the absorber sleeve, while the analysis in the second part is concerned with the heat transfer across the gap mentioned above.

3.3.1 Heat Transfer Between Water and Inside Wall of Absorber Sleeve.

During the cool-down, the heat transfer process is unsteady. However, in order to ascertain the structural integrity of the

of the shipping cask during cool-down, upper limits for the heat transfer are obtained utilizing a quasi-steady solution based on steady state heat transfer relations.

The most highly stressed condition on the system was assumed to be the case of instantaneous filling of the system with water at 400°F. This would result in producing the largest temperature differences and thermal gradients in the absorber sleeves, aluminum basket, and inner shell.

The inside absorber wall is idealized as an infinite flat plate. The bounding medium is taken to be saturated water at 400°F, 247 psi. Using water as the bounding medium for the total vertical distance along the inner sleeve wall results in conservative heat transfer rates. In the actual case initially the cooling medium will be segmented into a steam layer above a saturated water layer. Due to the infusion of saturated water at 6000 lb/hr. the average vertical velocity of supersaturated steam is 7.6 in./sec. (Section 5) while that of the satured water is .076 in./sec. These results will be used later to establish that forced convection is neglible compared to free convection heat transfer.

Since the water, during the nucleate boiling process, yields a much higher wall heat transfer coefficient, it is assumed that the total height of the absorber sleeve cavity, which contains the fuel elements, is filled with satured water at 400°F, This assumption will allow a planer two-dimensional

analysis to be performed. Also, it will insure that the thermal gradients in this plane are the most severe as compared to a three-dimensional heat flow solution where heat is supplied longitudinally to this plane. The longitudinal heat flow would have the affect of maintaining the plane at the initial temperature distribution and producing the appearance of lesser radial thermal gradients.

3.3.1.1 Nucleate Boiling

When a surface of temperature T_w is submerged in a liquid at saturation temperature and pressure, boiling occurs if T_w is greater than the saturation temperature. Roshenow (Ref. 3) correlated experimental data for nucleate pool boiling. From this correlation a free convection heat transfer coefficient h can be obtained and is given by

$$h \doteq K(\Delta T)^2 \qquad (1)$$

Where $\Delta T = T_w - T_\infty$, and K is a coefficient depending solely on the properties of the saturated liquid and the properties of the fluid-heating surface combination. Specifically,

$$K = \left[\frac{C_\ell}{C_{sf}\, h_{fg}\, P_{r\ell}^{1.7}}\right]^3 \left[\frac{\rho_\ell - \rho_v}{\sigma}\right]^{1/2} \mu_\ell\, h_{fg} \qquad (2)$$

where

C_ℓ = specific heat of saturated liquid, Btu/lb-°F

ΔT = temperature excess = $T_w - T_{SAT}$, °F

h_{fg} = enthalpy of vaporization, Btu/lb.

$P_{r\ell}$ = Prandtl number of saturated liquid

VIII-C12

μ_L = liquid viscosity, lb/hr-ft

σ = surface tension of liquid-vapor interface, lb/ft

ρ_L = density of saturated liquid, lb/ft^3

ρ_v = density of saturated vapor, lb/ft^3

C_{sf} = const. determined from experimental data

while Roshenow's result is based on boiling heat transfer correlations from long horizontal wires Eqs. (1) and (2) are valid for all geometries for pool boiling. That is, geometry does not significantly influence the heat transfer coefficient for pool boiling (Ref. 4). This would be expected since the heat transfer is primarily dependent on bubble formation and agitation, which is dependent on surface area not on surface shape. The value for the constant C_{sf} depends on the fluid-surface combination. A number of investigators have obtained values of C_{sf} from experiments (Ref. 5). Most values lie between 0.0027 and 0.13. The larger value 0.13 represents water-platinum and water-copper combinations and is used in this investigation for the water-stainless steel combination. Evaluating the coefficient K from Eq. (2) for boiling water at 400°F yields

$$K = 63 \frac{BTU}{FT^2\text{-}hr\text{-}(°F)^3} \tag{3}$$

so that the boiling heat transfer coefficient recommended is

$$h = 63 (T_w - T_\infty)^2 \frac{BTU}{FT^2\text{-}hr\text{-}°F} \tag{4}$$

VIII-C13

where

$$\frac{q}{A} = h\,(T_w - T_\infty)\,\frac{BTU}{FT^2 - hr} \qquad (5)$$

It should be noted that Eq. (4) represents an upper bound for the boiling heat transfer coefficient. If $T_w - T_\infty$ is sufficiently large, bubbles are formed so rapidly that they blanket the heating surface and coalesce, thus forming a vapor film which decreases the heat transfer coefficient.

3.3.1.2 Free Convection

For the case where the wall temperature is less than the ambient water temperature, T_∞, free convection heat transfer through the saturated water represents an upper bound for the heat transfer coefficient. In general, it is found that the average free convection heat transfer coefficient can be represented by the following relationship:

$$\overline{Nu_f} = C\left[Gr_f\,,\ Pr_f\right]^m, \qquad (6)$$

where the subscript f indicates that the Nusselt, Grashof, and Prandtl numbers are evaluated at the film temperature

$$T_f = \frac{T_w + T_\infty}{2} \qquad (7)$$

The average Nusselt number, $\overline{Nu_f} = h\,\ell/k_f$, Grashof number, $Gr_f = \frac{g\beta(\Delta T)L^3}{\nu_f^2}$ and the Prandtl number, $Pr_f = \frac{C_{p_f}\mu_f}{k_f}$.

In the relation for Gr_f, g represents the gravitational constant, β the coefficient of volume expansion, $\frac{1}{v}\left(\frac{\partial v}{\partial T}\right)_p$, $\Delta T = T_m - T_w$, L; the length of the fully developed boundary layer and ν_f the kinematic viscosity. In the relation for Pr_f, C_{pf} represents the specific heat capacity, k_f the thermal conductivity and μ_f the dynamic viscosity. Note again that these properties must be evaluated at the film temperature T_f for Eq. (8) to be valid.

The average heat transfer coefficient obtained from Eq. (6) is

$$h = \frac{k_f C}{L}\left[\frac{Gr_f}{(\Delta T)^m} P_{r_f}\right]^m (\Delta T)^m \qquad (8)$$

where $\Delta T = T_\infty - T_w$.

For T_∞ = 400 °F and for 300 °F $\leq T_w \leq$ 375 °F $Gr_f P_{r_f} > 10^9$, values of C and m which correlate well with experiment are 0.10 and 1/3 respectively (Ref. 6, 7) Hence the average heat transfer coefficient h can be put into the form

$$h = A\,(\Delta T)^{1/3} \qquad (9)$$

where the coefficient A depends on the film temperature and hence on the wall temperature. For the temperature range 300 °F $\leq T_w \leq$ 375 °F pertinent data for h are

given in the table below (for properties of saturated water at 400 °F see Ref. 4).

$h = A(\Delta T)^{1/3}$			
T_w	T_f	A	ΔT
300 °F	350 °F	65.0	100 °F
325 °F	363 °F	70.7	75 °F
350 °F	375 °F	70.4	50 °F
375 °F	388 °F	75.5	25 °F

Table 1. - Coefficients A and h ($T_w < T_\infty$)

It was previously stated that heat transfer due to forced convection is negligible compared to free convection. An order of magnitude analysis of the boundary layer equations shows that the forced convection heat transfer is neglegible compared to free convection heat transfer whenever

$$\frac{Gr}{Re^2} >> 1$$

where $Re = \frac{UL}{\nu}$ is the Reynolds number of the ambient fluid. For saturated water at 400 °F and a plate length of 12 ft. the above ratio is 1×10^5.

Also, although the process is transient, steady state heat transfer coefficients are extremely reliable. Only for very high

velocity flows must the steady state heat transfer coefficients be modified (see also Ref. 5).

Finally, the heat transferred from the 800 °F fuel rods to the pressurized saturated water is used to change the volume fraction of saturated steam in the water while its temperature is maintained at 400 °F.

Since the water is opaque to thermal radiation, the heat transfer due to radiation from the spent fuel rods to the absorber wall has been neglected.

3.3.2 Inner Shell to Basket Gap

If a fluid is contained between two vertical plates at different temperatures and at a distance δ apart, various models of heat transfer between the walls are possible (Ref. 9, and 10) depending "gap" Grashof number, Gr_δ, where

$$Gr_\delta = g\beta \frac{(T_1 - T_2)\delta^3}{\nu^2}$$

For $Gr_\delta \sim < 2 \times 10^3$, conduction across the fluid layer is the predominate mode of heat transfer and is appropriate for the .020" gap between the inner shell and aluminum basket. There is only one location in this gap (nodes 119, 120) near a cooling duct that has a maximum temperature difference of 72 °F across the gap. The Grashof number for this single point is

$$Gr_\delta = 2.1 \times 10^3$$

VIII-C17

based on upper value of β/ν^2 for saturated water at 400 °F. All other locations in the gap were at lower temperatures. Therefore, it was reasonable to assume that in the gap the predominate mechanism of heat transfer is conduction in view of the fact that the Grashof number for steam is much less than 1×10^3. Also, the effect of heat transfer due to radiation was found neglegible to be compared with conduction. For radiative heat transfer equation between two plates at different temperatures T_1 and T_2 is,

$$\frac{q_R}{A} = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} \qquad (10)$$

where the walls are assumed gray (absorbtion and emittance are independent of wavelength of radiation). The water is a radiatively non-participating media which tends to overestimate the calculated value q_R in Eq.(10). Considering a worst-case steady state wall temperatures in the 0.020 in. gap of

$T_{Al.} = 298$ °F and $T_{s.s.} = 226$°F, $\sigma = .1714 \times 10^{-8}$, $\varepsilon_1 = .25$(AL), $\varepsilon_2 = .5$ (stainless steel) Eq. (10) yields

$$\frac{q_R}{A} = 1.81 \ \frac{BTU}{hr.\ FT^2}$$

The conduction in the 0.020" gap with the same wall-to-wall temperature difference of 72 °F is

$$\frac{q_c}{A} = \frac{\bar{k}_{H_2O}}{\delta}\left(T_{AL} - T_{SS}\right) = 15{,}550 \ \frac{BTU}{hr\ FT^2}$$

Therefore conduction appears to be the only significant form of heat transfer that need be considered.

For the cool-down transient case for which a numerical solution is obtained for heat conduction through the gap medium, appropriate values of density, specific heat and conductivity must be chosen. Each of these properties do not depend strongly on temperature at the saturation conditions. More specifically, for saturated water between 220 °F and 400 °F, the change in heat capacity is -6%, the change in density is - 10% and the change in thermal conductivity -3% Therefore the assumption that they remain constant throughout the cool-down transient does not significantly degrade the solution.

3.4 Stress

The elastic-plastic stress-strain solution in the ANSYS program is based on initial yielding taking place in accordance with the von Mises-Hencky yield criterion as defined by

$$\sigma_1^2 - \sigma_1 \sigma_2 + \sigma_2^2 = \sigma_y^2 \tag{1}$$

where σ_1, σ_2 are principal stresses and σ_y is the yield point in simple tension.

The kinematic hardening rule is used in conjunction with Eq. (1) above. This is the acceptable choice in comparison with isotropic hardening when load reversals and large changes in load orientation take place.

The inelastic solution in ANSYS is based on the Prandl-Reuss flow relationship,

$$\left.\begin{aligned} d\varepsilon_x^p &= \frac{d\bar{\varepsilon}_p}{\bar{\sigma}}\left[\sigma_x - \frac{1}{2}(\sigma_y + \sigma_x)\right] \\ &\vdots \\ d\varepsilon_{xy}^p &= \frac{3}{2}\,\frac{d\bar{\varepsilon}_p}{\bar{\sigma}}\,\sigma_{xy} \end{aligned}\right\} \tag{2}$$

With this formulation and the above considerations of yield surface and hardening rule, the load dependence and material nonlinearity are considered by solving for the strain in small steps along the load path.

3.4.1 Basket

The finite element model of the aluminum basket consisted of an elastic-plastic, two dimensional, plane stress element.

3.4.2 Absorber Sleeve

The absorber cans were modeled as axisymetric plate elements having a nearly infinite radius of curvature. This type of element is theoretically "between" a plane stress and plane strain finite element. The stress solution for the absorber was elastic.

3.4.3 Inner Shell

The stress analysis of the inner shell was based on a plane stress solution to be compatable with the aluminum basket, since they were part of the same model (see figure 2). The element represented an elastic element without the inelastic option. This was justified since the resultant stresses (see section 4.3) were within the elastic range.

3.5 Fatigue Evaluation

The basket aluminum experiences plastic deformations during its heat-up and cool-down cycles. The Rail Cask has an operating life that includes 400 of these cool-down transients. Therefore, estimates of the high-temperature, low cycle fatigue behavior of the aluminum were made based on the work of Halford and Manson (Ref. 12).

Essentially the approach that was developed by the above mentioned authors, is to first estimate the life cycles, N_f, by the universal slopes equation (Ref. 11) which is

$$\Delta \varepsilon_t = \frac{3.5\,\sigma_u}{E} N_f + D^{0.6} N_f^{-0.6} \qquad (1)$$

where σ_u = ultimate tensile strength; $\Delta \varepsilon_t$ = total strain range; and D= true tensile ductility. Experimental data indicates that $N_f/10$ is a reasonable estimate of the fatigue life.

The second estimate is based on considering creep affects directly under severe elevated temperatures by the following relationship.

$$N_f' = \frac{N_f}{1 + (k/AF)(N_f)^{(m+.12)/m}} \qquad (2)$$

where N_f' = actual life cycles; N_f =life cycles in the absences of creep effects; k = factor related to time of stress/cycle; A= the time intercept on the stress rupture curve; F = test

frequency; m = exponent in the stress-rupture relationship.

The approach for estimating the lower bound fatigue life resolves itself by selecting the lowest number of cycles between $N_f/10$, from Eq. (1) or N_f', from Eq. (2) above.

The comparison of this method with experimental data is shown in figure 5, for nearly the same aluminum as 1180 and temperatures of 300 °F and 600 °F. This data was used in this analysis and is discussed further in section 4.6.

The fatigue evaluation of the stainless- steel inner shell will be performed using the curve in ASME Section III, Appendix I, figure I - 9.2, page 434. For completness, a copy of this curve is included in this report as figure 6.

3.6 Computer Code

The ANSYS (Engineering ANalysis SYStem) Computer code was used exclusively in the cool-down transient thermal-stress and deformation solution and evaluations of the 10/24 PWR Rail Cask. The elements selected for this analysis were plane stress triangles and quadrilaterals. The thermal solution utilized conducting solids, radiation and convection links. Interference or gap elements were used between the Inner Stainless-Steel Shell and the Aluminum Basket.

3.6.1 Description

The ANSYS (Engineering ANalysis SYStem) computer program is a large scale general purpose computer program for the solution of several classes of Engineering Analysis problems. Analysis capabilities include static and dynamic; plastic, creep and swelling; small and large deflections; steady state and transient heat transfer and steady state fluid flow.

The matrix displacement method of analysis based upon finite element idealization is employed throughout the program. The library of finite elements available numbers more than thirty for static and dynamic analyses, and more than ten for heat transfer and fluid flow analyses. This variety of elements gives the ANSYS program the capability of analyzing frame structures (two dimensional frames, grids and three dimensional frames), piping systems, two dimensional plane and axisymmetric solids, flat plates, three dimensional solids, axisymmetric and three dimensional shells and non-linear problems including interfaces and cables.

Loading on the structure may be forces, displacements, pressures, temperatures or response spectrums. Loadings may be arbitrary time functions for linear and non-linear dynamic analyses. Loadings for heat transfer analyses include internal heat generation, convection and radiation boundries, and specified temperatures or heat flows.

The ANSYS program uses the wave front (or "Frontal") direct solution method for the system of simultaneous linear equations developed by the matrix displacement method, and gives results of high accuracy in a minimum of computer time. The program has the capability of solving large structures. There is no limit on the number of elements used in a problem. The number of nodes can be in excess of 2500 for three dimensional problems, and 5000 for two dimensional problems. This solution method places a "wave front" restriction on the problem definition. The "wave front" restriction depends on the amount of core storage available for a given problem. Up to 500 degrees of freedom on the wave front can be handled in a large core. The wave front limitation tends to be restrictive only for analysis of arbitrary three dimensional solids or in the use of ANSYS on a small computer.

Geometry plotting is available for all elements in the ANSYS library, including isometric and perspective views of three dimensional structures. Plotting subroutines are also available for the plotting of stress and displacements from two and three dimensional solid or shell analyses, mode shapes

from dynamic analyses, distorted geometries from static analyses, transient forces and displacements vs. time curves from transient dynamic analyses, and stress-strain plots from plastic and creep analyses. Velocities and accelerations may also be plotted from dynamic analyses.

The input data for the ANSYS program has been designed to make it as easy as possible to define the problem to the computer. Options for multiple coordinate systems in cartesian, cylindrical, or spherical coordinates are available, as well as multiple region generation capabilities to minimize the input data for repeating regions.

Sophisticated geometry generation capabilities are included for two dimensional plane and axisymmetric structures and for intersection three dimensional shell structures.

3.6.2 Verification

The ANSYS computer program is a large-scale general purpose computer program employing finite element technology for the solution of several classes of Engineering Analysis problems. The program has been used for production analyses since early 1970. The program has been used by the structura, nuclear, mining, chemical and automotive industries, as well as by many consulting firms.

The ANSYS program is based on classical engineering concepts and documented finite element and numerical analysis techniques. The primary sources of information are the following manuals: the ANSYS User's Manual, which provides the instructions for the use of the program and gives a brief descrip

tion and/or references for the theory of the methods used, and the ANSYS Examples Manual, which is a collection of demonstration problems and solutions.

The ANSYS program is continuously being verified by new users, governmental agencies, and engineering committees. The following is a partial list of publications certifying the validity of ANSYS analyses:

1) "Symposium on Engineering Computer Software - Verification, Qualification, Certification", from presentations at the ASME First National Congress on Pressure Vessels and Piping, San Francisco, California, May 1971. Published by ASME, New York, 1971.

2) "Thermal Structural Analysis Programs - A Survey and Evaluation", from presentations at the Third Annual Pressure Vessels and Piping Conference, and the 27th Annual Petroleum-Mechanical Engineering Conference, New Orleans, La., September 1972. Published by ASME, New York, 1972.

3) "Pressure Vessels and Piping 1972 Computer Programs Verification - An Aid to Developers and Users", sponsored by the Committee on Computer Technology, the Pressure Vessel and Piping Division, ASME. Published by ASME, New York, 1972.

4) "Three Dimensional Continuum Computer Programs for Structural Analysis", from presentations at the Winter Annual Meeting of the American Society of Mechanical Engineers, New York, N.Y., Nov. 1972 Published by ASME, New York, 1972.

5) "Guidelines and Procedures for Design of Nuclear System Components at Elevated Temperatures", RDT Standard F9-5T, Published by the Division of Reactor R&D, A.E.C., Oak Ridge National Laboratory, March 1974.

6) Reimers, Carl, "Evaluation of Three Dimensional Structural Analysis Capabilities", Report No. 8716-01 (13) ER, Aerojet Manufacturing Company, Fullerton, California, 1973.

7) "Structural Mechanics Computer Programs - Surveys, Assessments, and Availability", edited by W. Pilkey, et al., University Press of Virginia, Charlottesville, 1974, Pps. 15, 63, 116, 140, 146, 153, 219, 266, 533, 687, etc.

Published results of analyses using the ANSY program appear in many engineering journals, including the ASME Transactions and Machine Design.

4.0 Results and Conclusions

The results contained in the following sections have been extracted from the data found in Section 6. The results for the most part have been exhibited in graphical form for ease of review and assessment.

4.1 Transient Thermal Analyses.

Figures 7 thru 15 show the iso-thermal lines for the cool-down transient. Figure 7 indicates the temperature distribution in the aluminum basket for the initial steady state temperature condition. Figures 8 thru 15 show the temperature variation as a function of time from zero time to 0.15 hours (9.0 minutes). The larger gradients in the vicinity of the cooling ducts is clearly indicated.

In order to limit the number of stress solutions, the temperatures at selected locations were plotted. Also temperature differences were examined and the times of greatest difference were considered as possible time points to generate stress solutions. The locations selected in the cask are shown in figure 16. The temperatures and temperature differences can be found in figures 16A thru 29.

The steady state temperature solution for the absorber sleeves are plotted in figures 30 thru 32. These temperatures were used in the steady state and transient stress solution and the results are described in Section 4.4.

The temperature distribution and implied temperature gradi-

ents are shown in figures 33 thru 37 for the steady state initial condition and the selected time points for the stress analysis. Figure 37 shows that even after .15 hrs. (9 min.) a stady state condition is nearly reached.

4.2 Basket Stresses

From the analysis of the thermal solution the times of interest in the cool-down transient for stress solutions, were determined. These solution times are:

1) time = 0.0 hr. (Isothermal 400 °F)
2) time = 0.0 hr. (Steady-state Auxiliary Cooling)
3) time = 0.00050 hr. (1.8 sec.)
4) time = 0.002 hr. (7.2 sec.)
5) time = 0.004 hr. (14.4 sec.)
6) time = 0.020 hr. (72 sec.)
7) time = 0.15 hr. (540 sec.)
8) time = 1.0 hr. (Isothermal 400 °F)

The isothermal temperature states are included to simulate a cycle of operation. (Note that after plastic deformation, an isothermal state is no longer a stress-free state and must be included)

At each of the indicated times, an elastic-plastic plane-stress solution for the aluminum basket was completed. The resulting stress intensity contours for each of these times are presented in Figs. 38 - 43. These curves point-out the regions of stress concentration in the cross-section. In the area of most severe concentration (Elem. 247, also Figure 52) the strain range experienced in the indicated loading cycle was determined. For Elem. 247 the plot of σ_y vs. ε_y is shown in Figure 44. In this figure, the indicated strain range is

approximately 0.21%. However, since σ_y and ε_y are not necessarily principal stresses, the equivalent stress should be used to determine the required strain range needed in the fatigue analysis. The computer output (Section 6) indicates that the maximum equivalent strain reached is 0.24%. Since Figure 44 indicated that there is very little stress reversal, the maximum strain range will be taken as 0.24%.

Since the stress model was too coarse to accurately indicate the surface stresses caused by the initial thermal shock, the surface strains were conservatively estimated by

$$\varepsilon_s = \alpha \Delta T$$

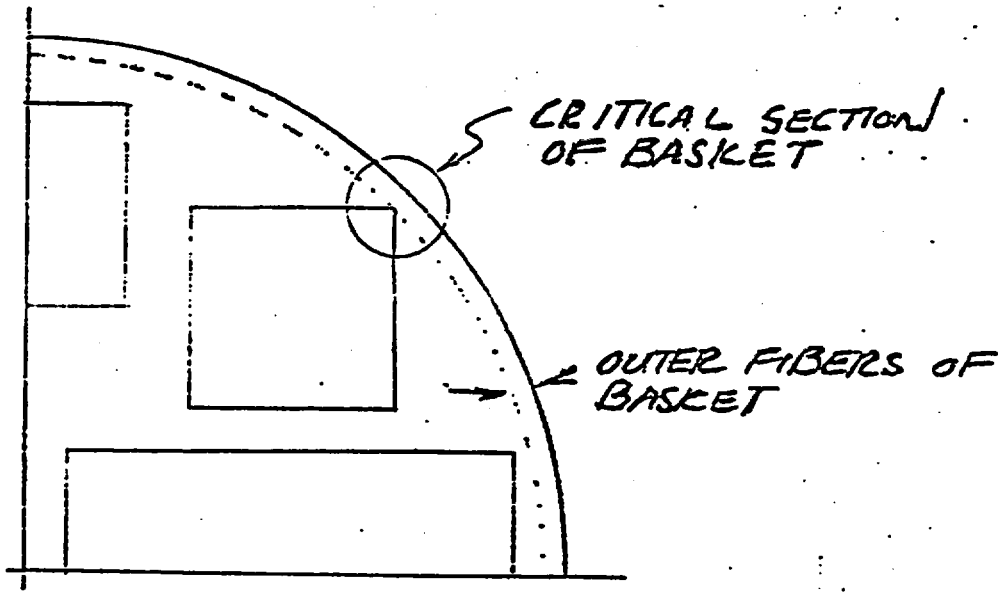
The maximum ΔT that the aluminum will experience where there will be the very high boiling heat transfer taking place is inside the most central rectangular port, (thermal model node 96) and is $\Delta T = 456 - 400 = 56\ ^\circ F$. This ΔT results in a strain of less than 0.1% and is therefore much less than the strain determined in Elem. 247 of the basket model.

The plot of the stress-strain loop, Figure 44, indicates that for the thermal cycle, the strains do not appear to be accumulating, i.e., ratchetting is not taking place as indicated by the element returning to zero strain at the end of the cycle. This is expected since there is no steady pressure type driving load.

From Fig. 44 the aluminum response may be estimated for the case in which creep would be included in the analysis. For the

case of aluminum creep, the longest hold period would be at the isothermal 400°F point in the cycle. Since there is no driving force, the stresses in the aluminum relax by exchanging creep strain for elastic strain. Thus there is probably very little or no additional total strain. On Figure 44 the relaxation would be indicated by the stress moving toward zero, with no strain change from the 400°F isothermal point. This would not affect the ratchetting since with the relaxation the residual stress would be removed, and the material would appear more like the original, stress-free, aluminum. Therefore, it is concluded that the thermal cycle applied to the aluminum basket does not result in ratchetting that would cause the diameter of the basket to increase. The following discussion investigates ratchetting in what is considered the most critical section of the basket. The analysis is conservative in that it is based on temperatures associated with a decay heat load of 97.2kw and that the strain acts over a full one inch of the basket periphery.

The first step in the description of the Simplified Basket Model is to note that the critical section of the Basket is the small section at the tip of the 45° Absorber Port. (see sketch below)

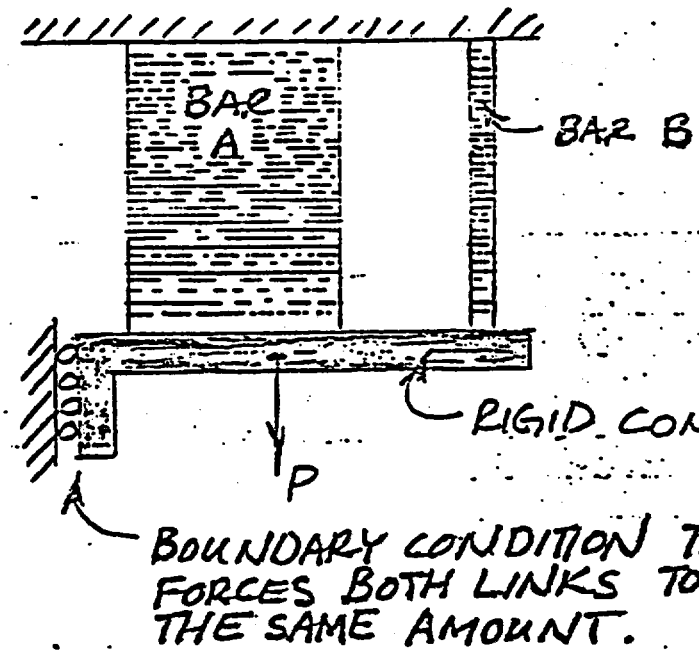


The essential features of the response of the critical section and the rest of the Basket to the thermal gradients may be simulated by a two bar mechanism, one massive bar and one weak link bar. The massive bar simulates the bulk of the basket and the small bar simulates the critical section and outer fibers of the basket.

In the two bar model, the stress-strain conditions that exist at the critical section will be used but any ratcheting strain that is found will be assumed to

Ratcheting of the Aluminum Basket (Cont.)

exist over a larger section of the outer fibers. Thus, a conservative value for the radial growth due to ratcheting will be obtained.



The two bar assembly will be used to simulate the ratcheting by imposing different temperatures on the bars which produce strains in the smaller bar to the same level as was seen in the basket finite element analysis. In the two bar simulation, the average force across the bars (P) will be zero since there is no pressure drop across the basket assembly.

Simple elastic-plastic ratcheting studies [Miller, Ref. 13] have shown that systems like the two bar mechanism with zero P force will not ratchet but are cases of cyclic plastic strain. However, when temperature dependent material properties, cyclic hardening, and creep are considered, some accumulated strain may develop before the cycle stabilizes. Since the tolerances between the aluminu basket and the stainless steel are small. It is important

Ratcheting of the Aluminum Basket (Cont.)

to assess the potential for this type of growth.

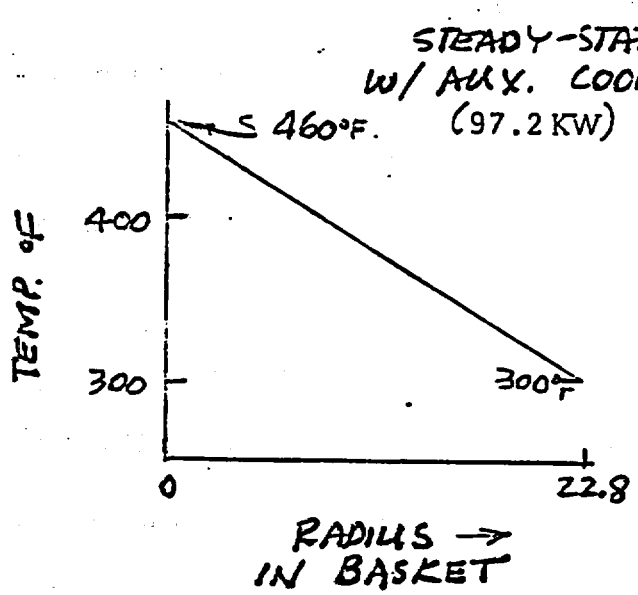
From the previous finite element analysis of the basket, the strain range observed at the critical section was approximately 0.2%. To induce this strain on the smaller bar, the bars will be forced to different temperatures. The ΔT between the bars is:

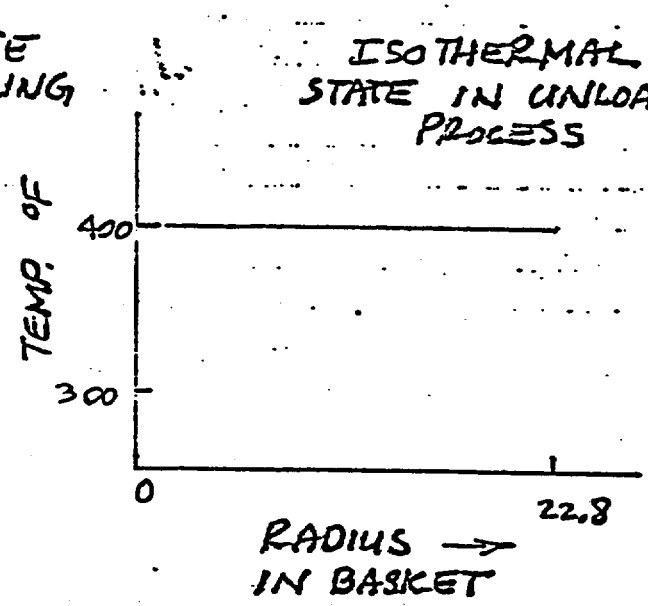
$$0.0021 = d\,\Delta T = 13.7(10)^{-6}\,\Delta T$$

$$\Delta T = 156^{\circ}F$$

by alternately placing this ΔT between the bars and taking them to the isothermal condition the smaller bar will go through the prescribed strain range.

To determine the levels of temperature, the temperature distributions of the basket for normal operation will be examined. Linear approximations to these distributions are given below.*





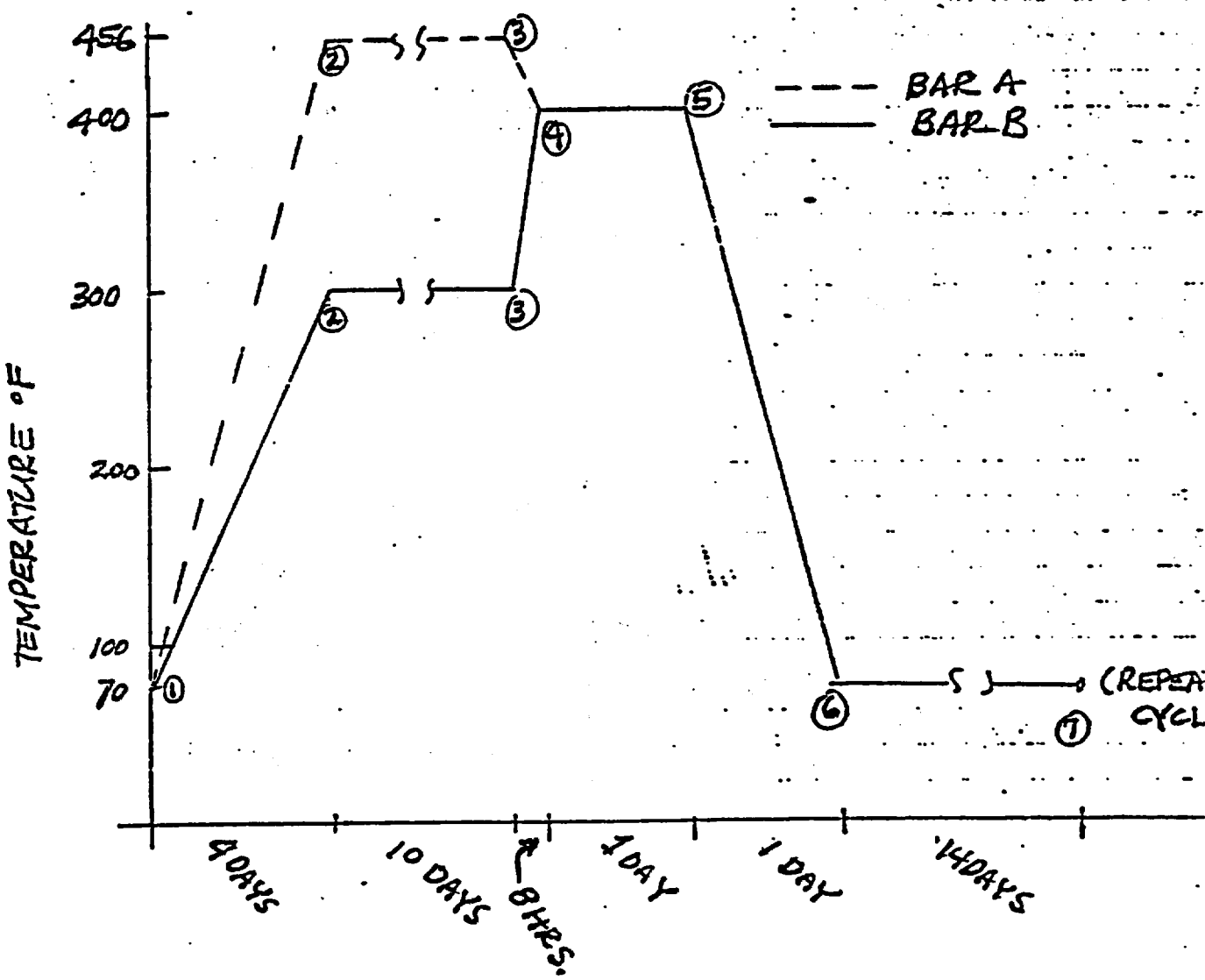
* To be consistent with the earlier work, the old 97.2 kw Heat Load was used.

Ratcheting of the Aluminum Basket (Cont.)

From the sketches of the limiting temperature distributions, a reasonable approximation for the bar model temperatures is:

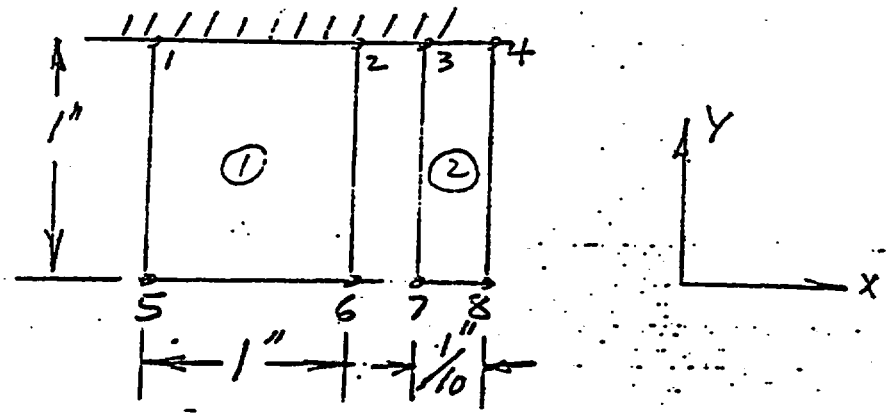
Steady-state	Bar A	456°F
	Bar B	300
Isothermal	Bar A	400
	Bar B	400

Considering the expected 14 day cycle time of the cask the following temperature Histograms were selected.



Ratcheting of the Aluminum Basket (Cont.)

The two bar assembly will be modeled with the ANSYS Program (Ref. 1). The simple two element model is shown below:



The relative thickness of the critical section beam was representatively selected as 10% that of the heavy beam. The Nodes of the Y = 0 face will be constrained to displace equal amounts in the Y direction. This type of constraint does not restrain the Y-Direction growth but forces the two elements to always have the same Y strain.

Material properties for the aluminum were taken from SAR Section XI. Additionally, creep properties for the aluminum were needed. Since the 1060 Alloy is not used for structures, creep properties were not available. Attempts to find creep data of similar Alloys were also very sketchy. The final data used were for Alloy 5052S-0 and Alloy 1060-0. The conversion to a suitable creep expression is given on the following pages. Note that only the steady-state creep rates were used.

CREEP EXPRESSION FOR ALUMINUM

THE CREEP DATA FOR ALUMINUM WAS TAKEN FROM TWO SOURCES. THE RAW DATA IS TABULATED BELOW.

TEMP. °F	$\epsilon_c = 1\%$ 10 HRS.(1)	$\epsilon_c = 3\%$ 10 HRS.(1)	$\epsilon_c = 3\%$ 20 HRS.(1)	$\epsilon_c = 3\%$ 30 HRS.(1)	$\epsilon_c = 5\%$ 10 HRS.(1)
400	6500	7750	7100	6350	7950
475	3200	4550	3250	—	4900
525	2300	2950	2650	2550	3450

	$\epsilon_c = 5\%$ 20 HRS.(1)	$\epsilon_c = 5\%$ 30 HRS.(1)		$\epsilon_c = 1.0\%$ 1000 HRS.(2)	$\epsilon_c = 0.5\%$ 1000 HRS.(2)
400	7800	7100		900	800
475	4400	3900		—	—
525	2950	2750		—	—

(1) REF. 14 Al ALLOY 5052S-O
(2) REF. 15 Al ALLOY 1060-O

THE RESULTS OF TRANSLATING THIS DATA TO STEADY CREEP RATE IS GIVEN IN THE TABLE BELOW.

TEMP. °F	σ	$\dot{\epsilon}_c$
400	6350	$1.0(10)^{-3}$
	7100	$1.67(10)^{-3}$
	900	$1.0(10)^{-5}$
	800	$5.0(10)^{-6}$
475	3200	$1.0(10)^{-3}$
	4900	$5.0(10)^{-3}$
525	2300	$1.0(10)^{-3}$
	2950	$2.5(10)^{-3}$

THE EMPIRICAL EXPRESSION SELECTED FOR THE STEADY-CREEP OF ALUMINUM:

$$\dot{\epsilon} = A e^{-Q/RT} \sigma^M$$

Creep Expression For Aluminum (Cont.)

$\dot{\epsilon}$ = Creep Rate in in./in./Hr.

A, k, & m = Empirical constants determined from experimental data

T_r = Absolute Temperature

σ = Stress (psi)

On the following page the creep rate data is plotted ($\dot{\epsilon}$ vs. σ). The slope of lines gives the m parameter of the empirical expression. (Note the data for 575°F was not used.)

The slopes of the two lines is:

Temp °F	Slope $\dot{\epsilon}$ vs. σ
400	2.65
475	2.52

The average slope is taken as the m parameter.

$$\underline{m = 2.59}$$

Computing the intercept at σ = 1.0 using the average slope yields:

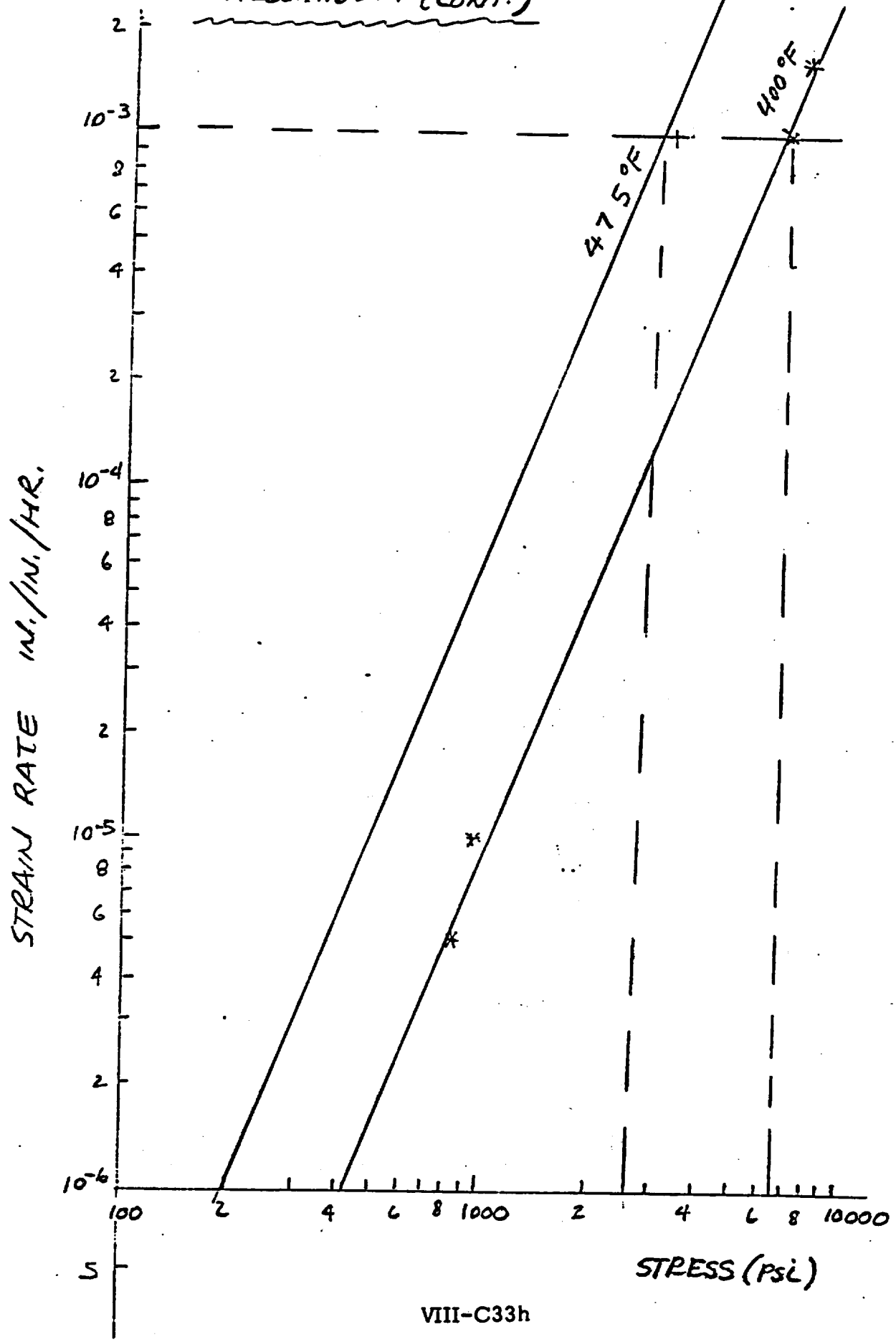
Temp °F	$Ae - k/T_r$ (= The σ = 1.0 intercept)
400	$1.61\ (10)^{-13}$
475	$1.10\ (10)^{-12}$

Writing the creep expression as

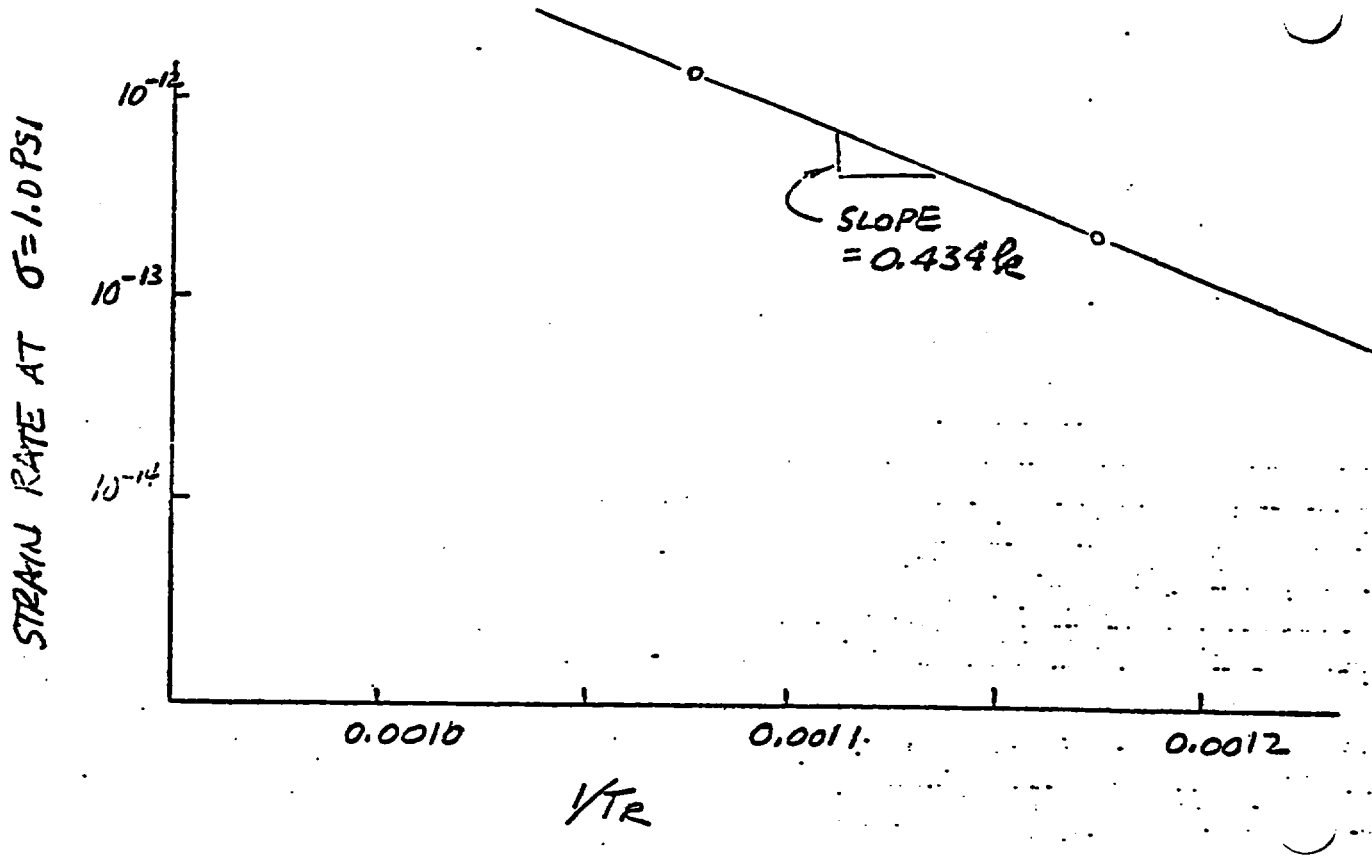
$$\log \dot{\epsilon}/1.0 = -0.434\ k\left(\frac{1}{T_r}\right) + m \log 1.0 + \log A$$

and plotting strain rate vs. $1/T_r$ will yield the required remaining constants.

CREEP EXPRESSION FOR ALUMINUM (CONT.)



Creep Expression For Aluminum (Cont.)



From the slope, the constant is found:

$$\underline{k = 20617.}$$

Including the k parameter in the creep rate expression for

$\sigma = 1.0$

$$\log \dot{\epsilon}_{1.0} = (-0.434)\ (20617)\ \frac{1}{T_r} + \log A$$

Taking the 400°F Data Point

$$\log \left(1.61\ (10)^{-13}\right) = (-0.434)\ (20617)\ \frac{1}{860} + \log A$$

$$\underline{A = 4.07\ (10)^{-3}}$$

Creep Expression For Aluminum (Cont.)

The final expression selected for aluminum is therefore:

$$\dot{\epsilon} = 4.07\ (10)^{-3}\ e^{-\frac{20617}{T_4}}\ \sigma^{2.59}\ \text{in/in/Hr}$$

Checking this data against the data extracted from the references yields the following table.

TEMP, °F	σ	$\dot{\epsilon}_c$ (EXP)	$\dot{\epsilon}_c$ (EQN)
400	6350	$1.0\ (10)^{-3}$	$1.1\ (10)^{-3}$
	7100	$1.67\ (10)^{-3}$	$1.49\ (10)^{-3}$
	900	$1.0\ (10)^{-5}$	$7.07\ (10)^{-6}$
	800	$5.0\ (10)^{-6}$	$5.21\ (10)^{-6}$
475	3200	$1.0\ (10)^{-3}$	$1.29\ (10)^{-3}$
	4900	$5.0\ (10)^{-3}$	$3.89\ (10)^{-3}$
525	2300	$1.0\ (10)^{-3}$	—
	2950	$2.5\ (10)^{-3}$	—

Racheting of the Aluminum Basket (Cont.)

Results

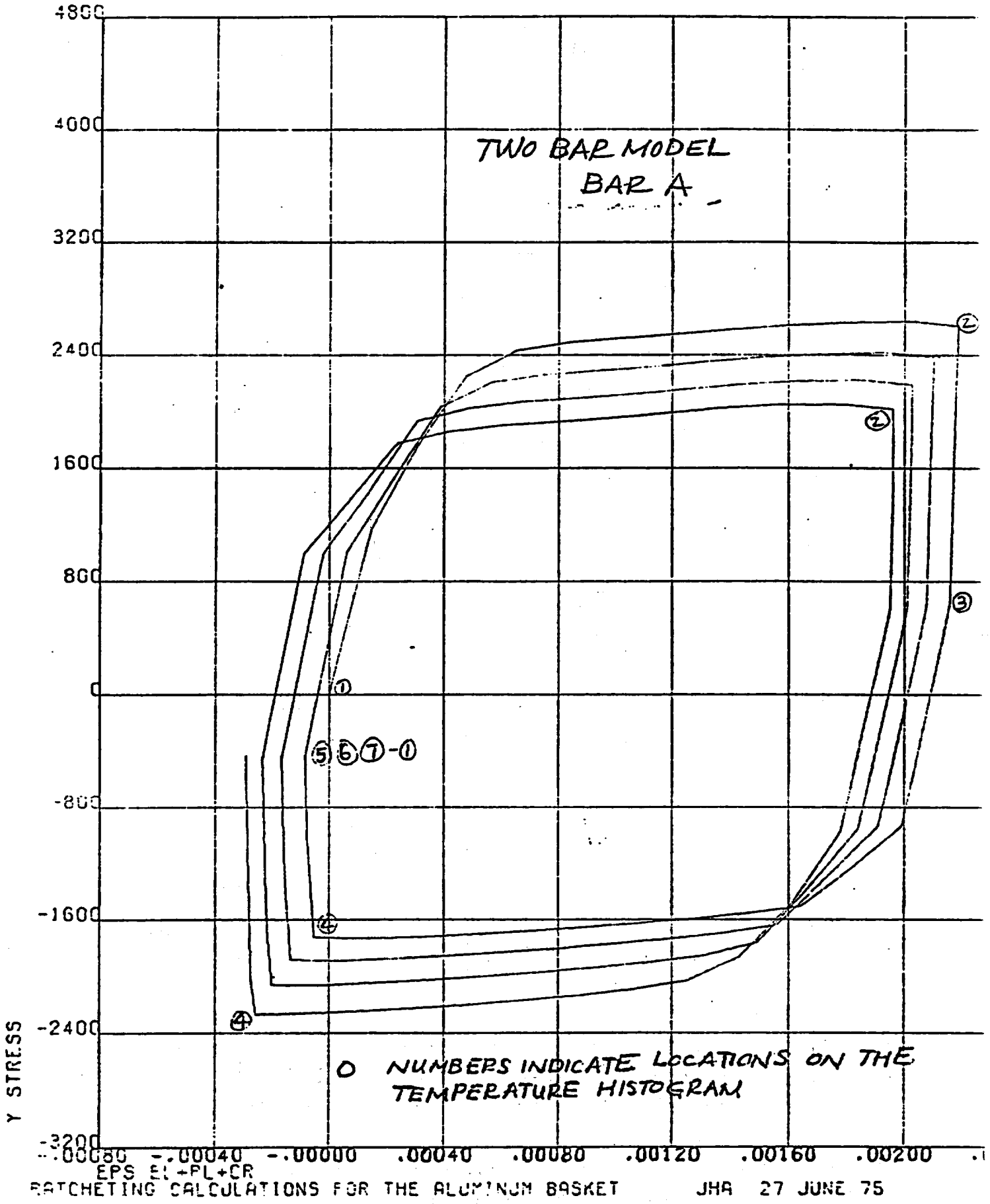
The solution for the temperature Histogram was carried for four cycles. Plots of Y-stress vs. Elastic + Plastic + Creep Strain are shown for the two bars of the model on the following pages.

The results indicate the critical section of the basket is incrementally compressed during the cycling. It is believed that this incremental compression is a result of the compressive creep occuring in the heavy member of the two bar structure. The heavy member is not stressed highly but does reach higher temperatures during the cycle; therefore the significant compressive creep, Further it is believed that this type of response is representative of the basket structure.

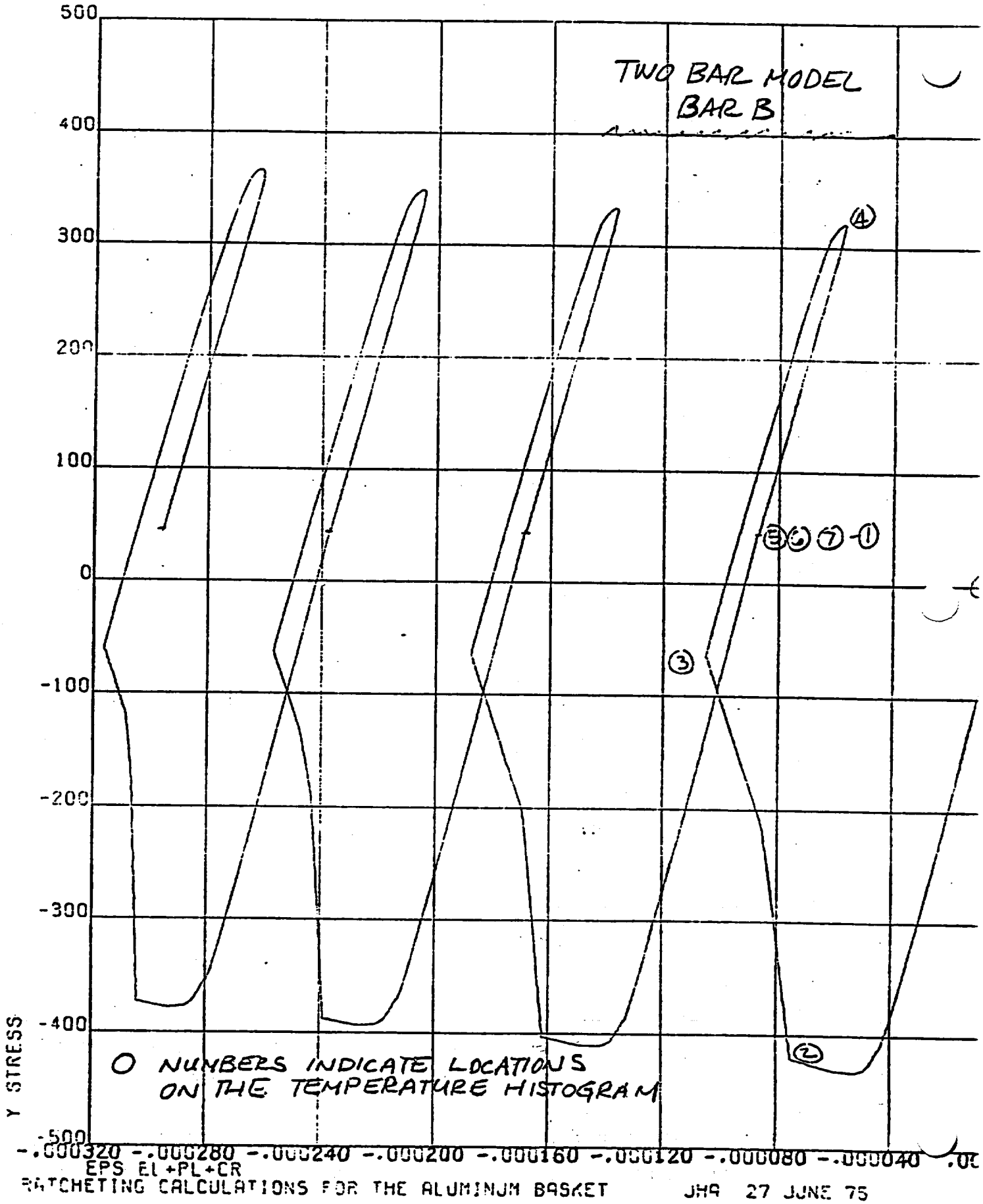
The magnitude of the calculated incremental strain is found to be approximately 4.0 $(10)^{-5}$ in/in per cycle, (see plot below). If it is assumed that this incremental growth would continue over the life of the cask and would not be retarded due to cyclic plastic and creep hardening, the final accumulated strain would be approximately 2.0%.

If this strain were assumed to act over an inch of outer radius of the disc the change in dimension of the fuel port would be about 20 mil on one of the outer sides. This dimensional change will not interfere with the operation of the cask.

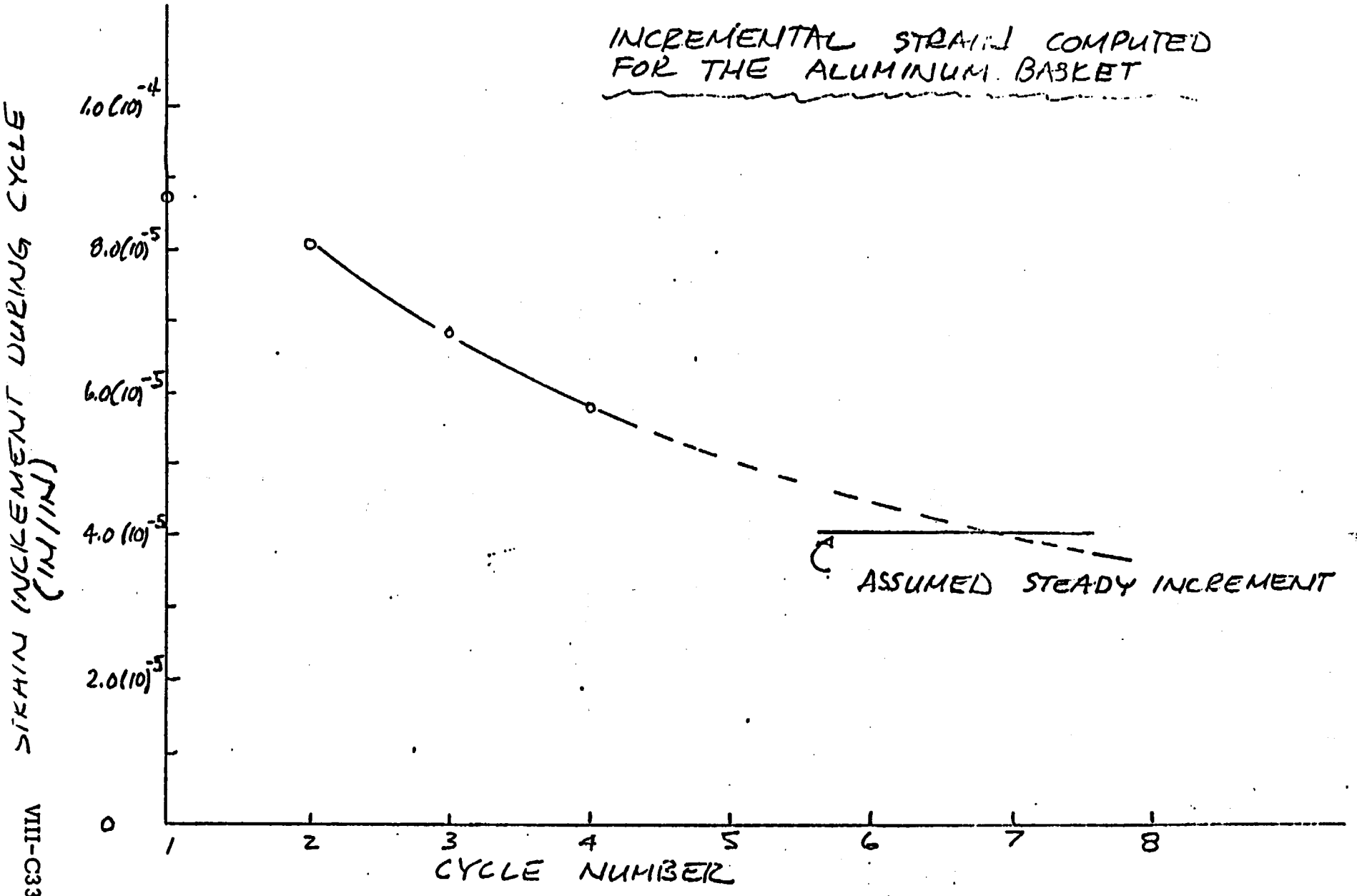
Note also that this calculation indicates that the average diameter of the aluminum discs will decrease very slightly during operation. Further note again that the temperature cycle used was based on the old heat load of 90 kw. With the newer heat load and reduced temperatures, the incremental strains would be significantly reduced.



RATCHETING CALCULATIONS FOR THE ALUMINUM BASKET JHR 27 JUNE 75



RATCHETING CALCULATIONS FOR THE ALUMINUM BASKET JHA 27 JUNE 75


INCREMENTAL STRAIN COMPUTED FOR THE ALUMINUM BASKET
STRAIN INCREMENT DURING CYCLE (IN/IN)
1.0(10)^-4
8.0(10)^-5
6.0(10)^-5
4.0(10)^-5
2.0(10)^-5
0
1
2
3
4
5
6
7
8
CYCLE NUMBER
ASSUMED STEADY INCREMENT

4.3 Inner Shell Stresses

The maximum thermal stress in the inner shell is shown in figure 46 to be 3047 psi. The circumferential stress due to the 247 psi saturation pressure is 7533 psi resulting in a total stress of 9970 psi. The longitudinal stress is 3767 psi assuming the inner shell reacts all the pressure load. The evaluation is based on the Von Mises - Hencky failure criterion as follows:

$\sigma_1 = 9970$ psi, $\sigma_2 = 3767$ psi

$\sigma_o = 23250$ psi (from Sect. XI -1 of this report)

$$\sigma_o = \sqrt{\sigma_1^2 - \sigma_1\sigma_2 + \sigma_2^2} = 8720 \text{ psi}$$

Therefore the structural integrity of the inner shell is maintained. In reviewing the operating range of normal conditions it is found that the cool-down and unloading operation is a less severe condition in the range since there are no external loads present in this case.

4.4 Absorber Sleeve Stresses

The maximum stress in the absorber sleeve located at 45° occurs in element #113, see figure 52. The stress intensity is 37,100 psi from the data in Section 6. This stress is under the 3 x S_m code allowable for shake-down and is 47,100 psi for 304 stainless steel at 400°F.

The maximum stress intensity in the double fuel element absorber sleeve is 43940 psi occurring in the spacer between the 2 sleeves, see figure 52. This stress is also below the 3 x S_m code allowable stress.

The membrane compressive loading in the inside of the double fuel element sleeve on the outer most face of the can, will produce an elastic buckle. This buckle will disappear as the cool-down continues and will not exist at the end of the transient.

4.5 Deflections

The clearance between the aluminum basket and the inner stainless steel shell as shown in figure 50, indicates that no interference takes place. The average clearance is slightly less than .055" with a maximum of .076" and a minimum of .047"

During the cool-down, the clearance at nodes 6 and 7 ($\theta = 0$) was plotted in figure 51, as a function of time. This indicates that the gap decreases initially and then increases monotonically. The reason for this is that the ports in the aluminum basket and the peripheral sections of the fuel element cavities are causing the aluminum to increase in temperature in the presents of 400 °F water. Since the aluminum has a larger expansion coefficient than the stainless steel inner shell, the gap decreases at first. As the inner shell heats up and expands, and the mean temperature of the aluminum basket decreases, the gap tends to increase.

The conclusion is that, under no circumstance during the cool-down transient, will the aluminum basket interfere or interact with the stainless steel inner shell.

4.6 Fatigue Evaluation

The maximum basket strain in element #247 is .24% from section 4.2. The low cycle fatigue life for 400 cycles is 1.15% at 300 °F. Therefore the basket aluminum is structurally adequate for its intended use.

The maximum peak stress in the absorber sleeve is 86,924 psi in element #67 (sleeve spacer, see Figure 52). This stress is based on a stress concentration factor of 5 for the weld. According to Figure 6, the fatigue life at this stress level is almost 2000 cycles. Therefore, the absorber sleeve is structurally adequate.

Due to the low stress level in the inner shell (section 4.3), a fatigue evaluation was not considered significant in this analysis.

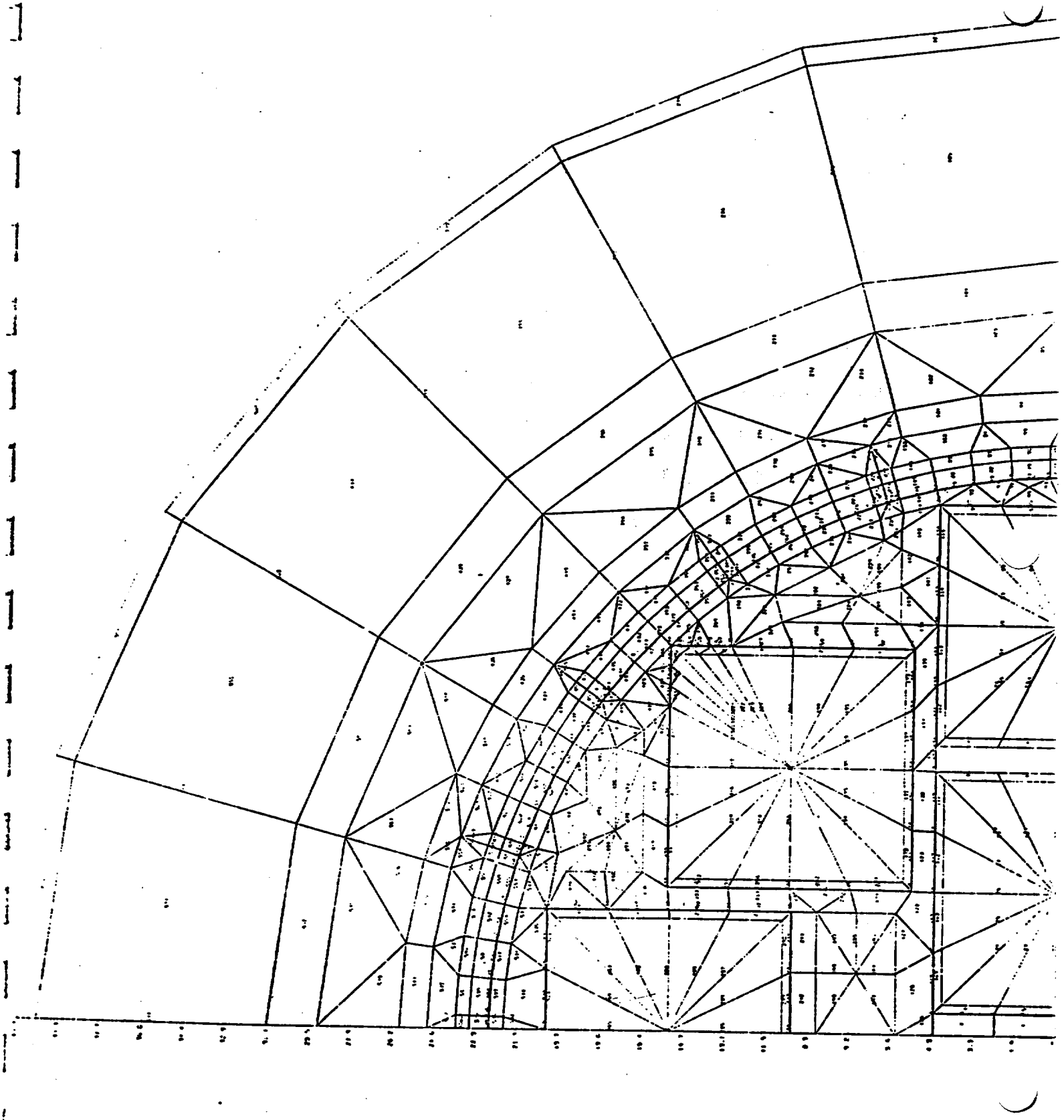


FIGURE 1

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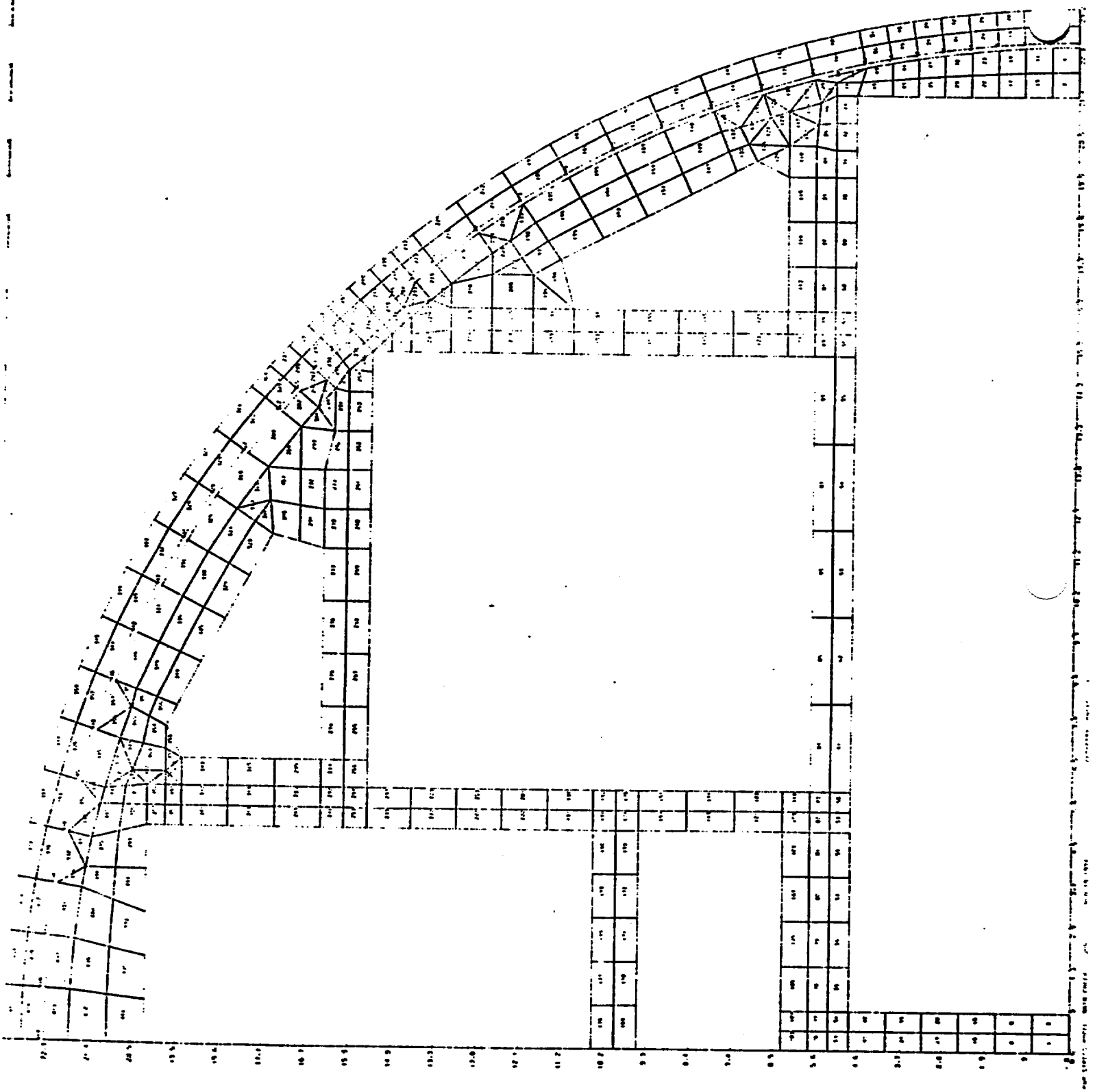


FIGURE 2A

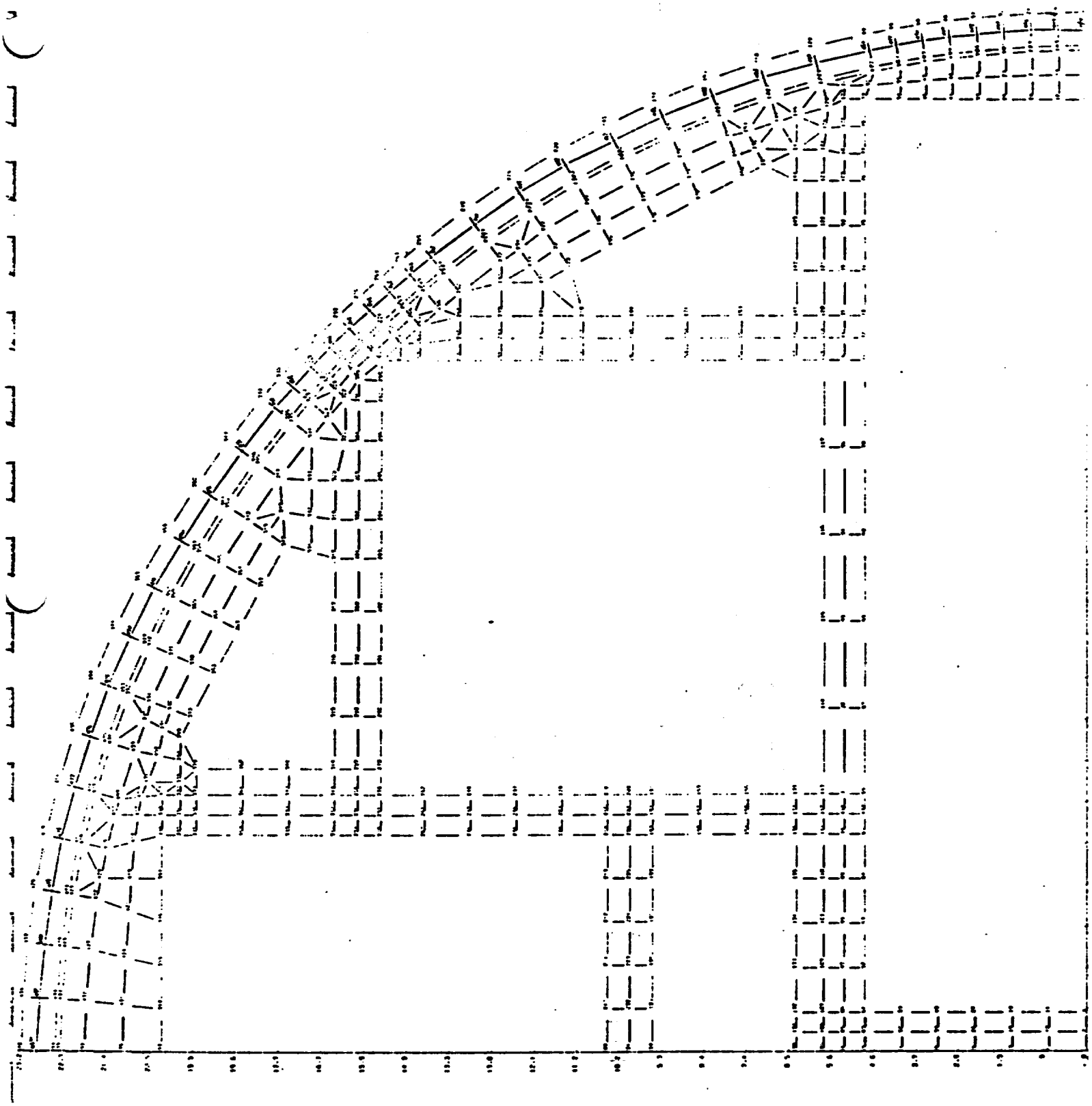


FIGURE 2

STAINLESS STEEL CAN OF ABSORBER ASSEMBLY @ 45°

NODES OF SHELL MODEL

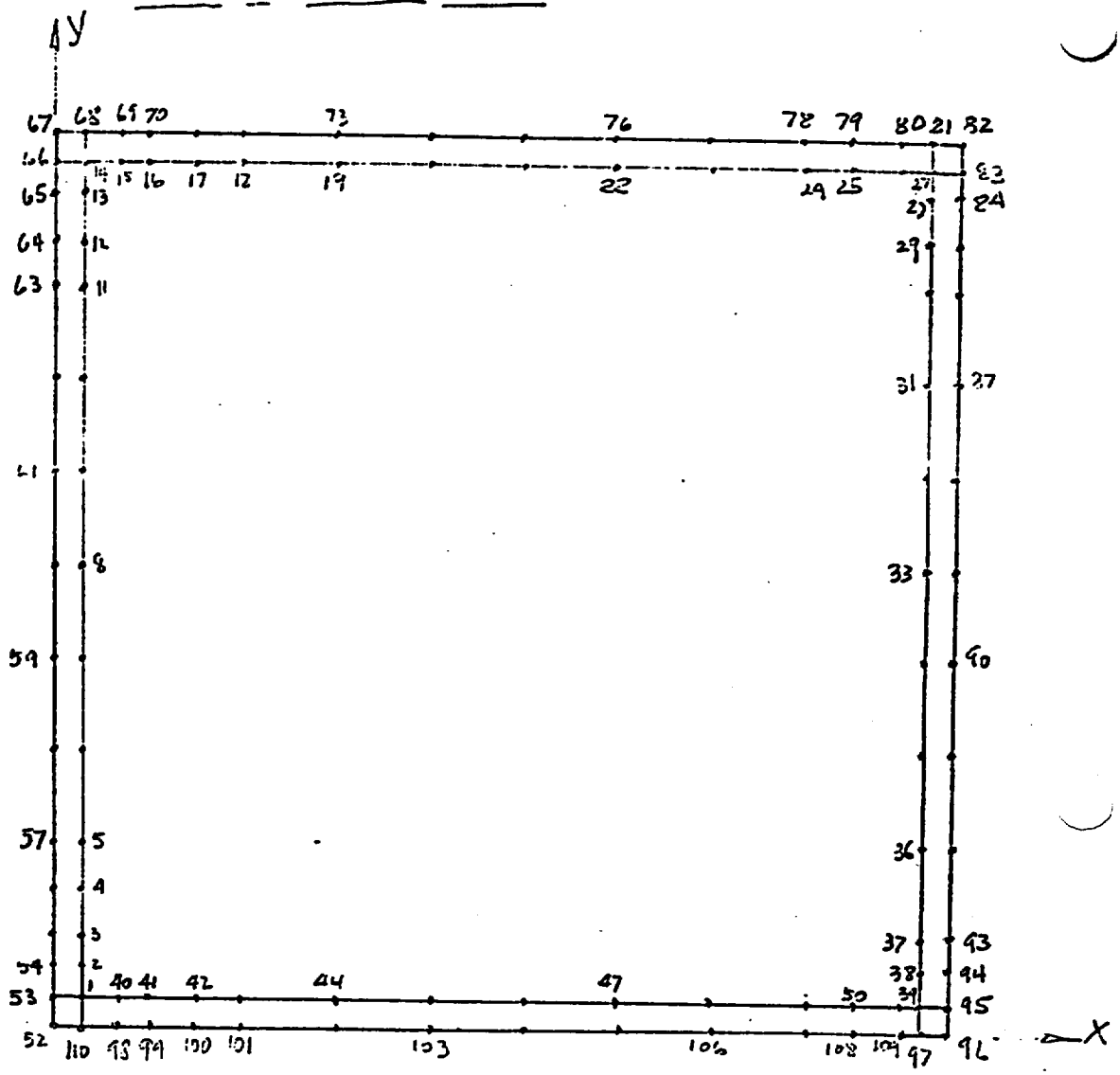


FIGURE 3

STAINLESS STEEL CAN OF ABSORBER ASSEMBLY @ 45°

ELEMENTS OF SHELL MODEL

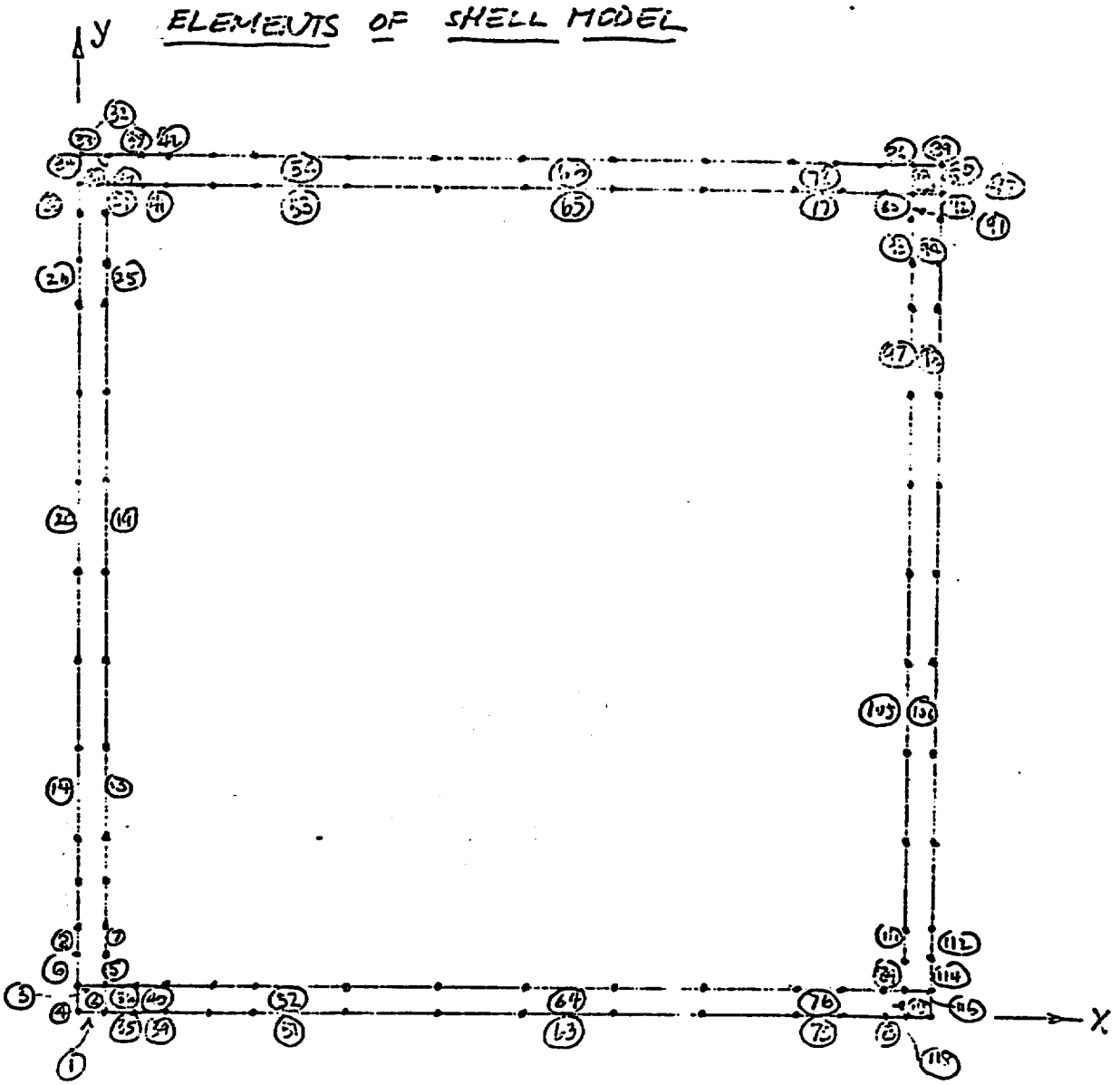
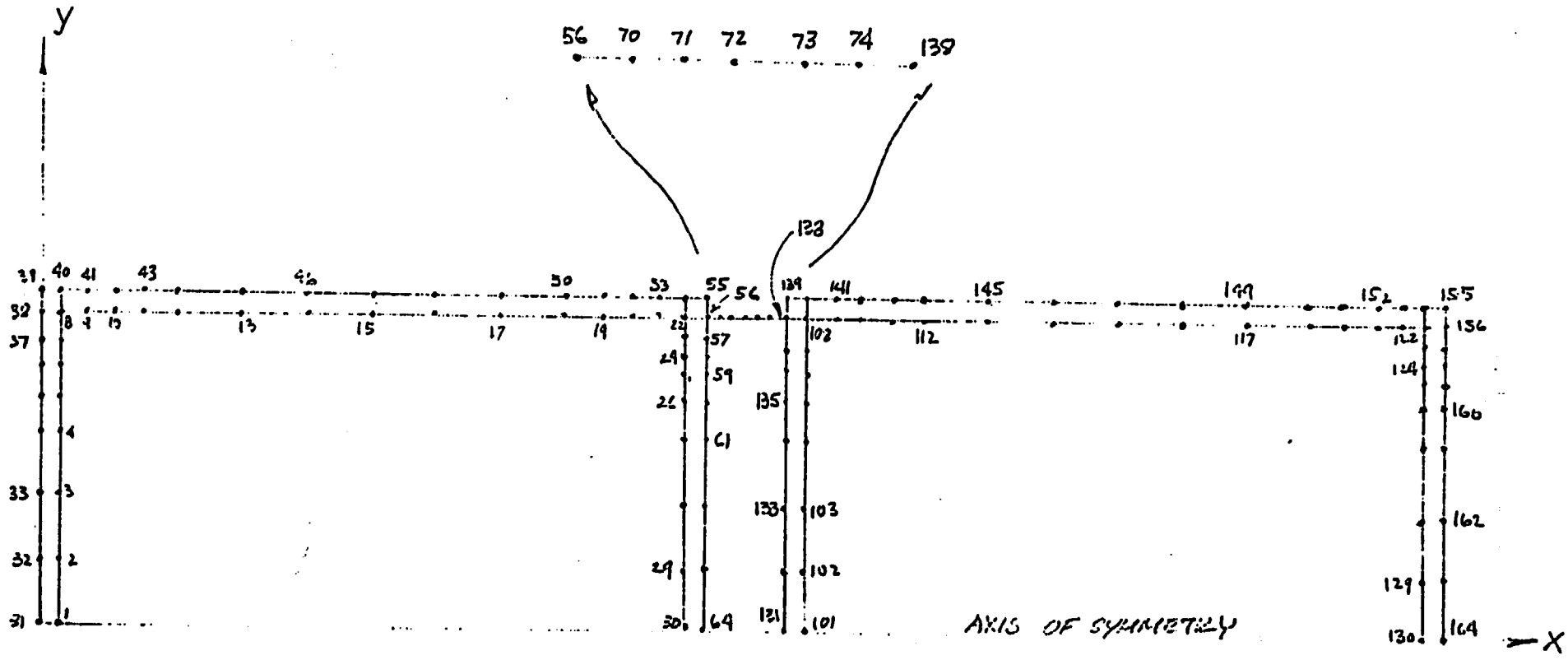


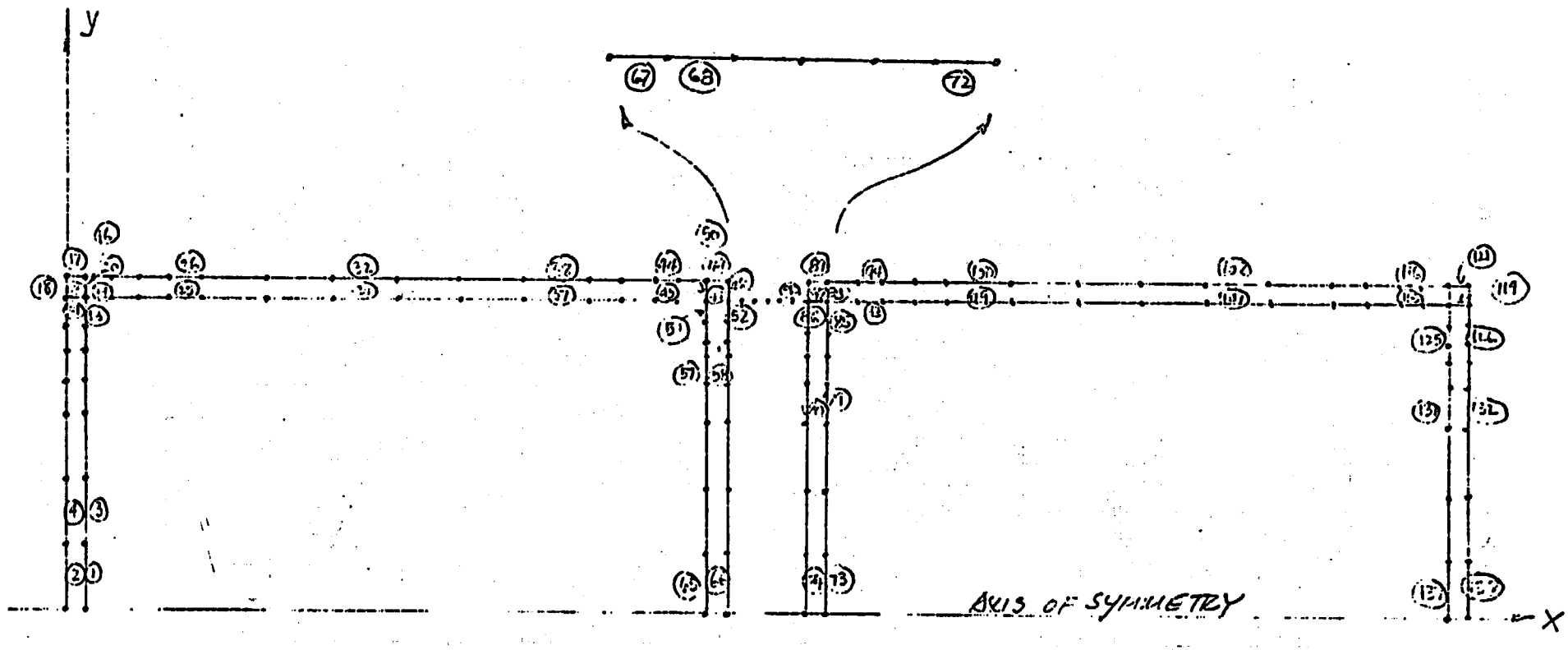
FIGURE 3A



STAINLESS STEEL LINER OF DOUBLE CAN ASSEMBLY

NODES OF SHELL MODEL

FIGURE 4



STAINLESS STEEL LINER OF DOUBLE CAN ASSEMBLY

ELEMENTS OF SHELL MODEL

FIGURE 44

1197 ALUMINUM (REF. 16)
LOW CYCLE HIGH TEMPERATURE
FATIGUE LIFE

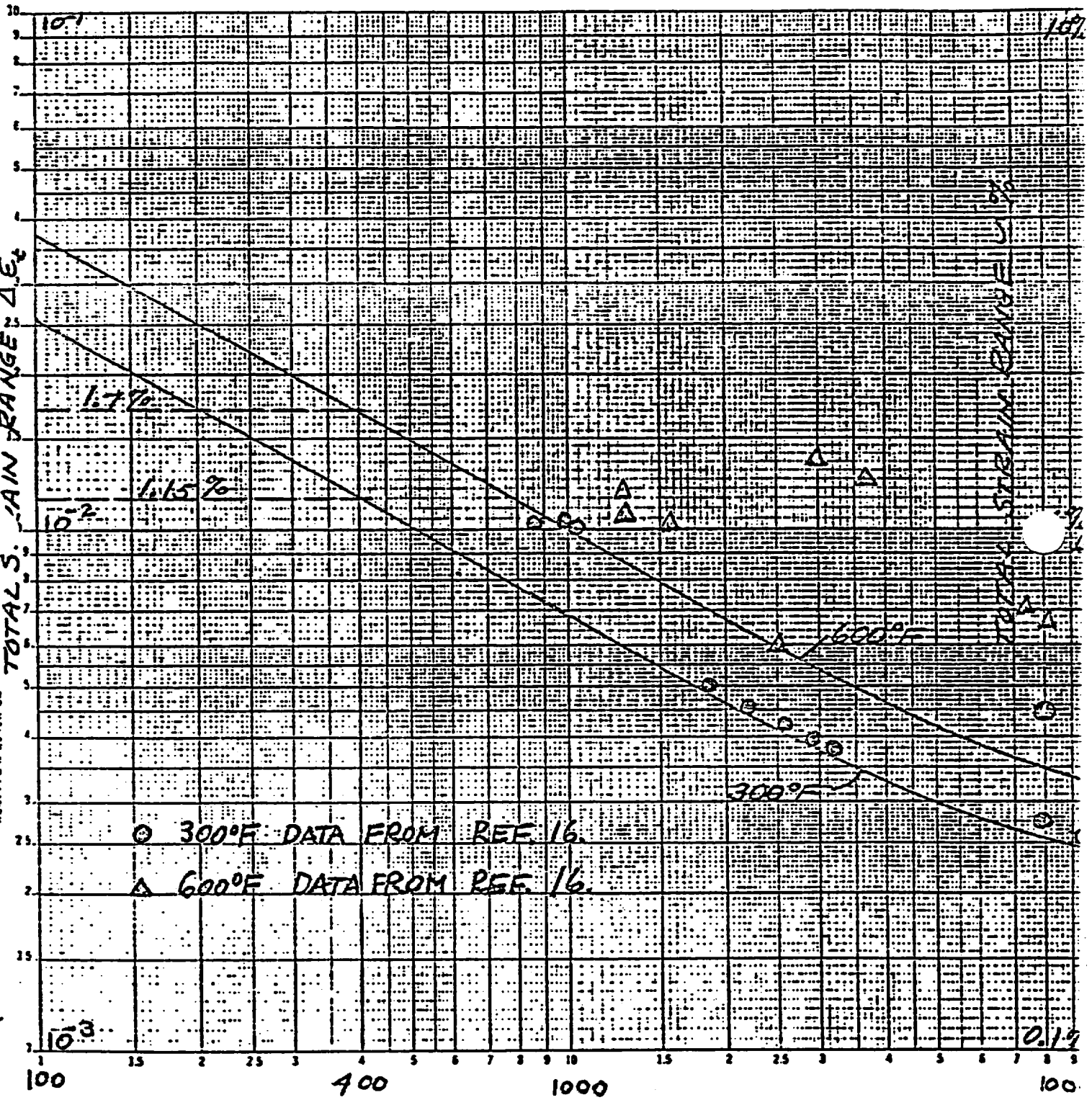
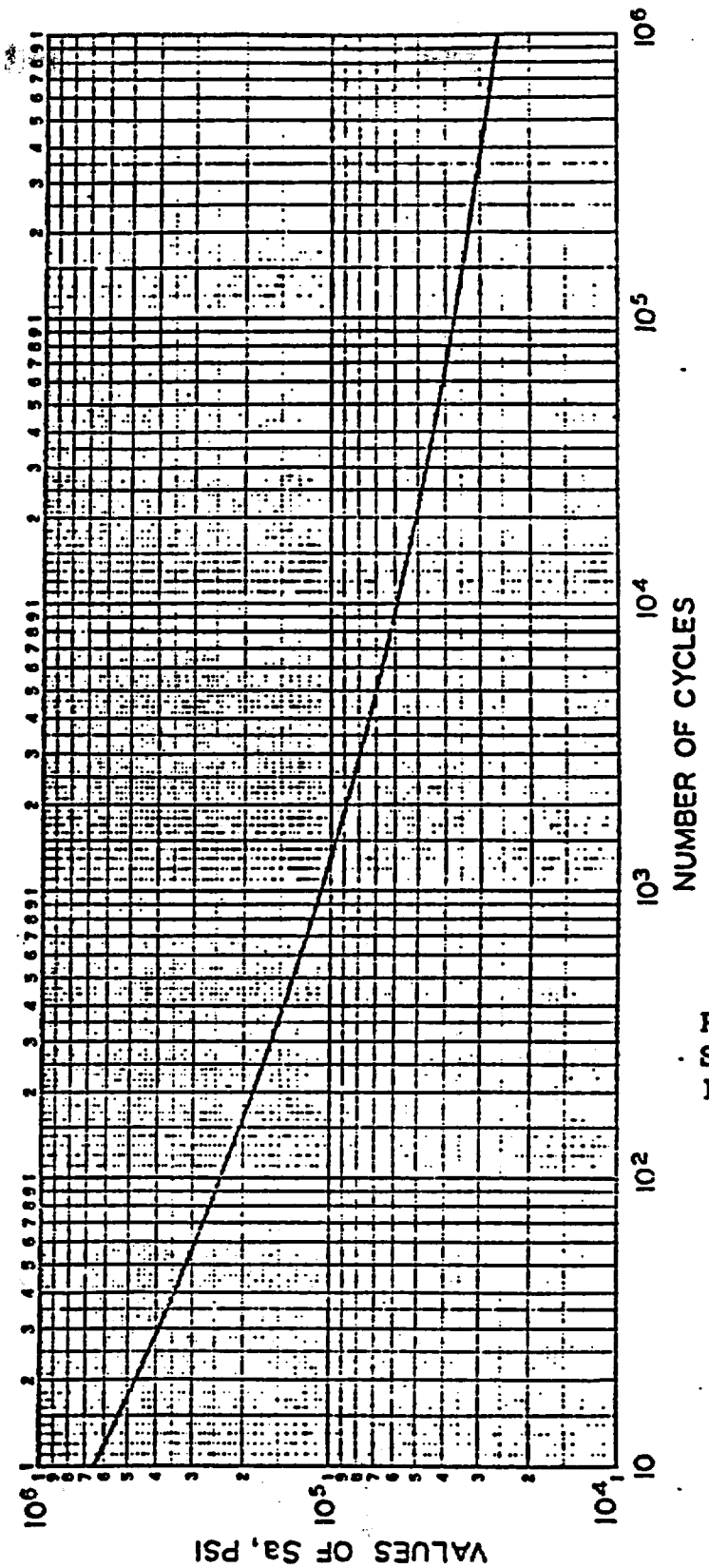


FIGURE 5

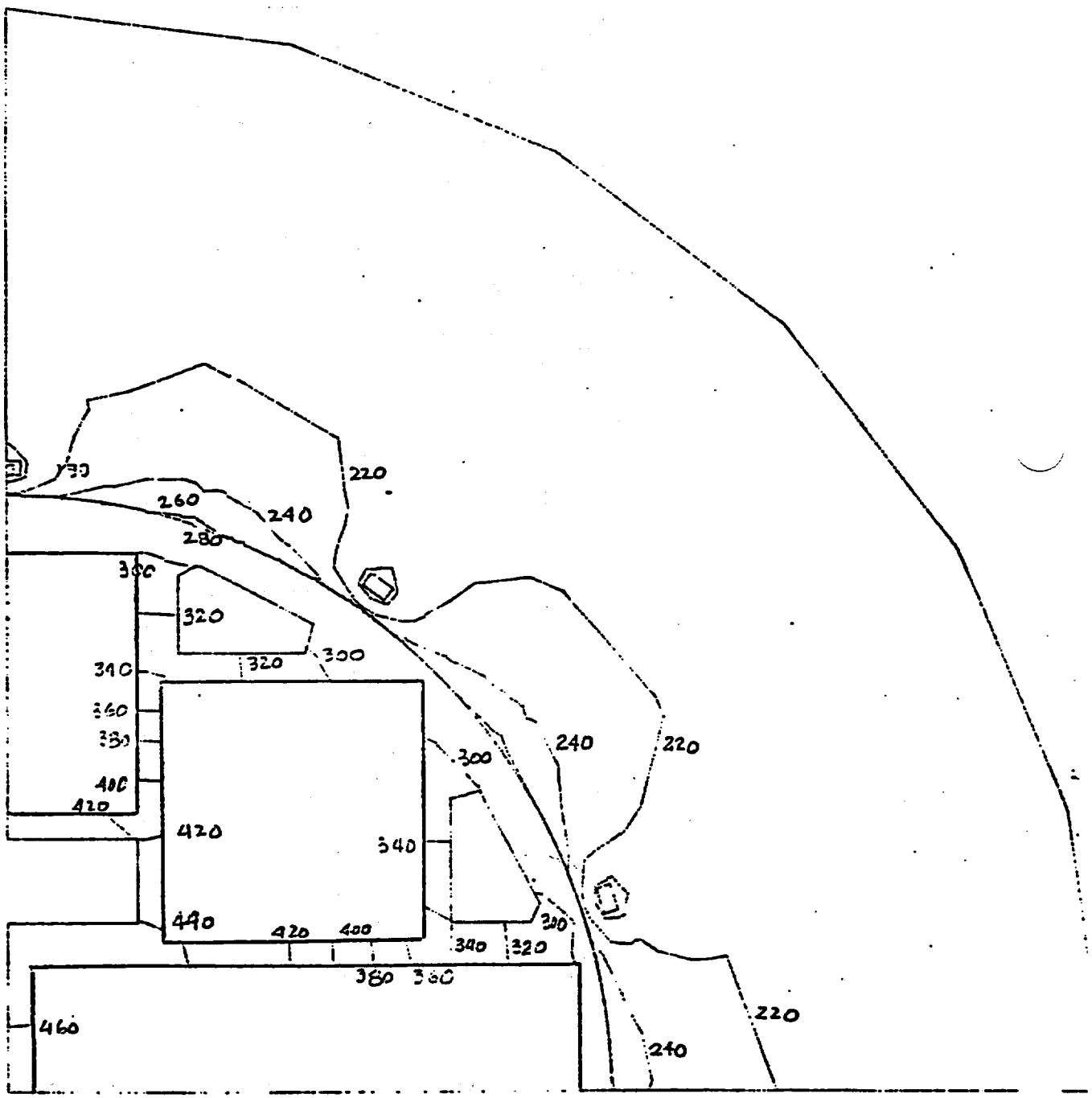


Ref. ASME Code
Section III
1973 Edition

DESIGN FATIGUE CURVE FOR AUSTENITIC STEELS NICKEL-CHROMIUM-IRON ALLOY, NICKEL-IRON-CHROMIUM ALLOY AND NICKEL-COPPER ALLOY

FIGURE 6

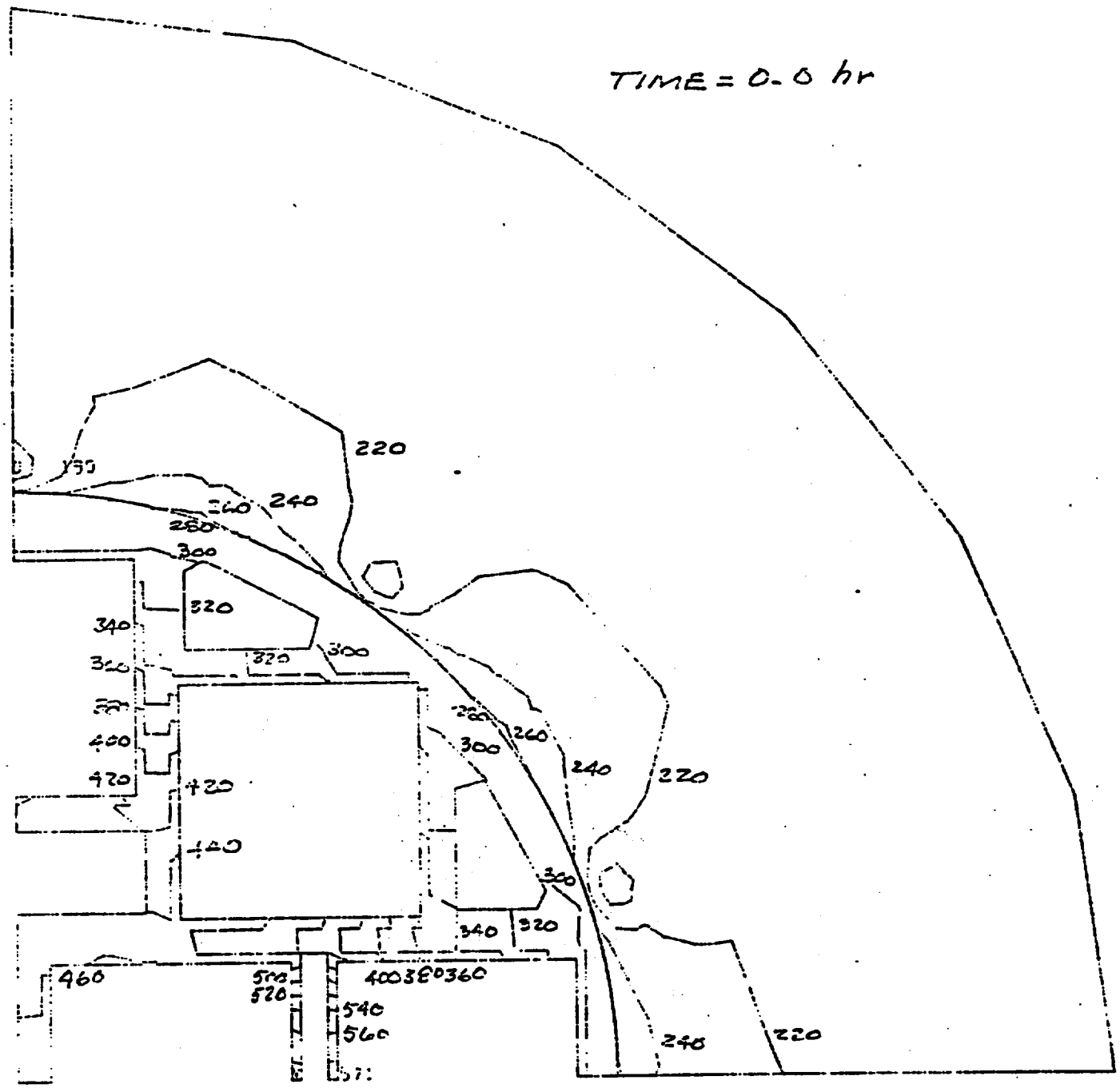
STEP= 2 ITERATION= 2



P 21 THERM MODEL SS SOLN WITH AUX COOLING JHS AUG 15 1974 TEMP

FIGURE 7

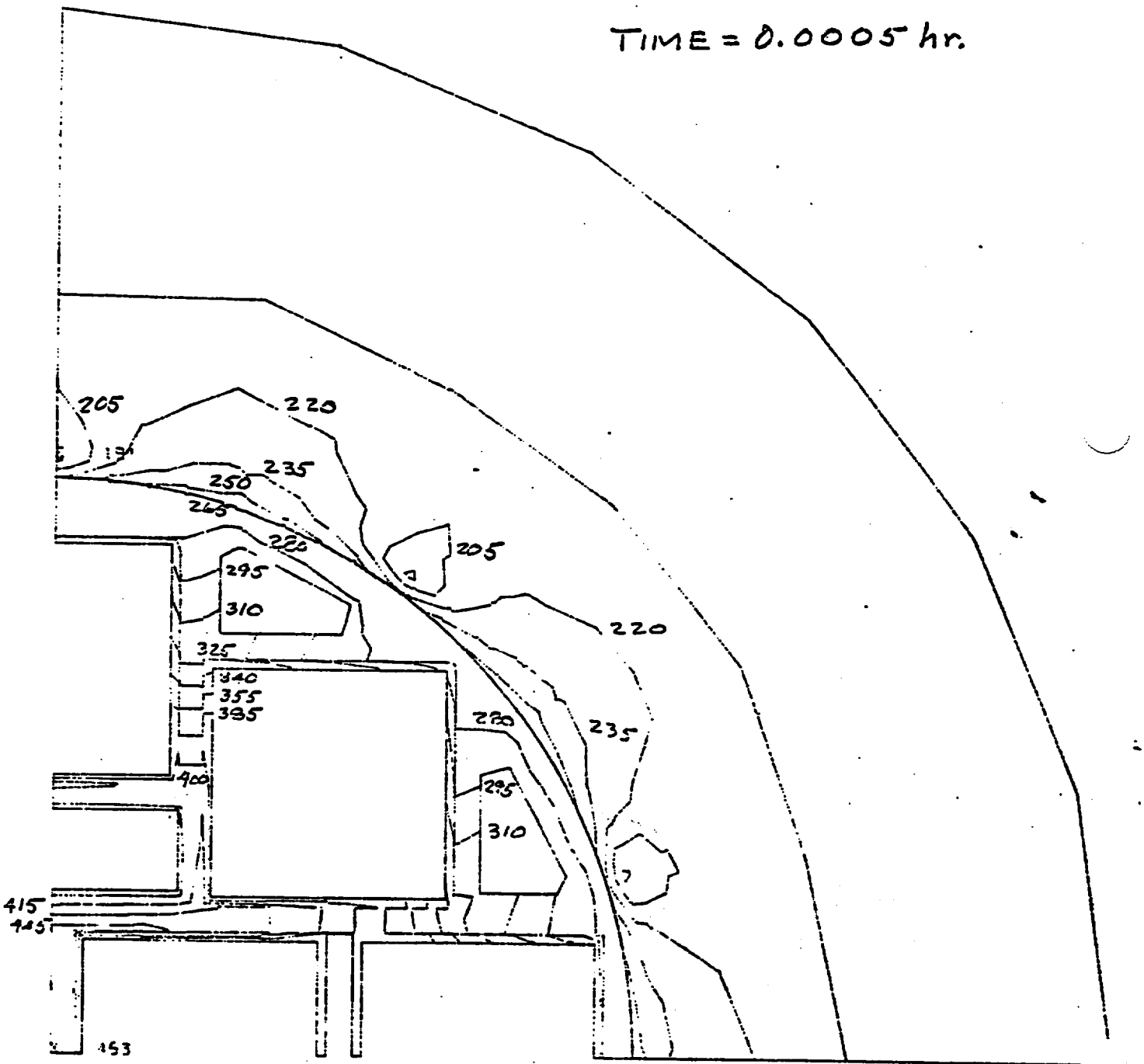
STEP= 1 ITERATION= 1



COOL-DOWN TRANS TIME 0.0 TO 0.004 HR. JHG AUG 28 1971 TEMPERATURE

FIGURE 8

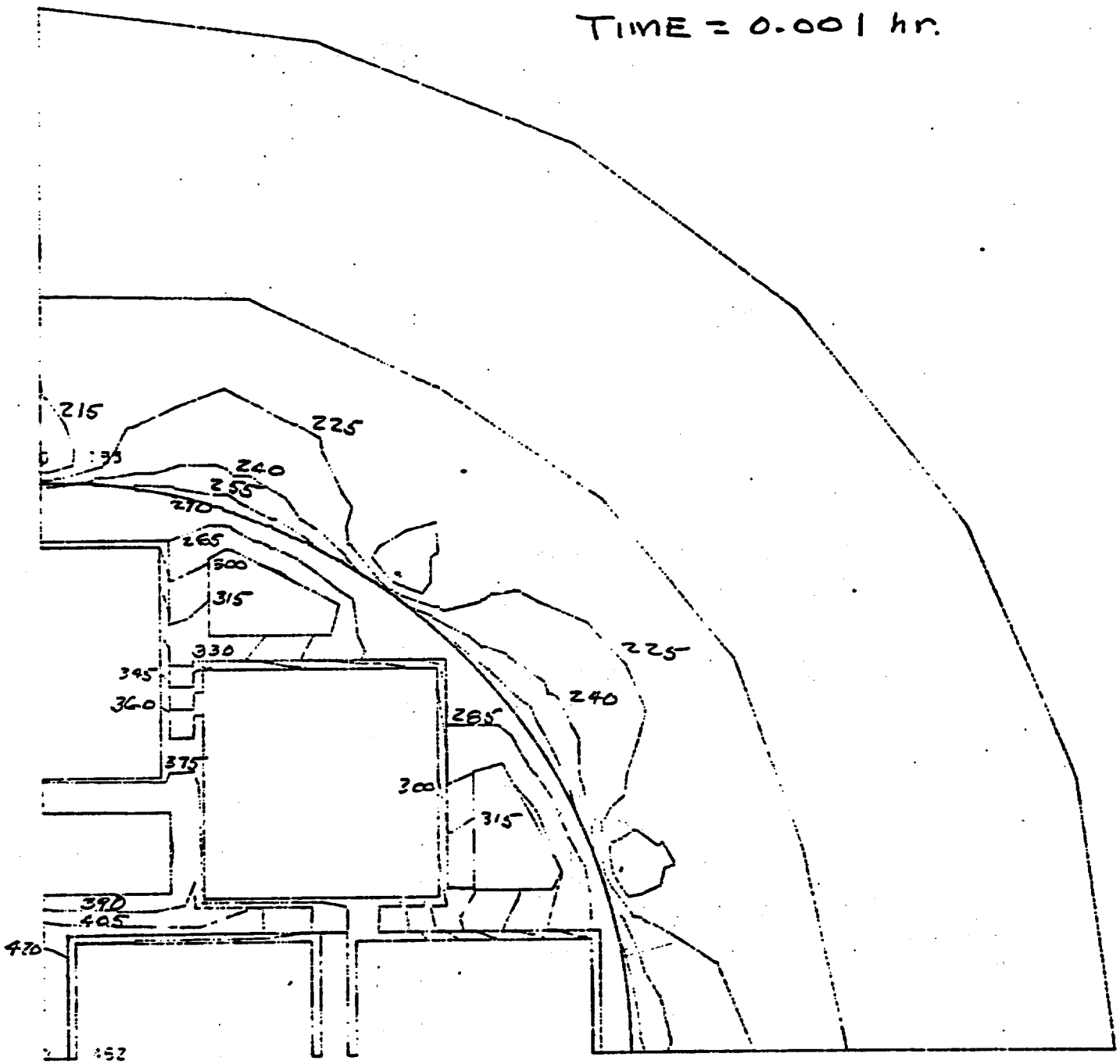
STEP= 2 ITERATION= 2



PR-101 COOL-DOWN TRANS TIME 0.0 TO 0.001 HR. JHG AUG 29 1974 TEMPERATURE

FIGURE 9

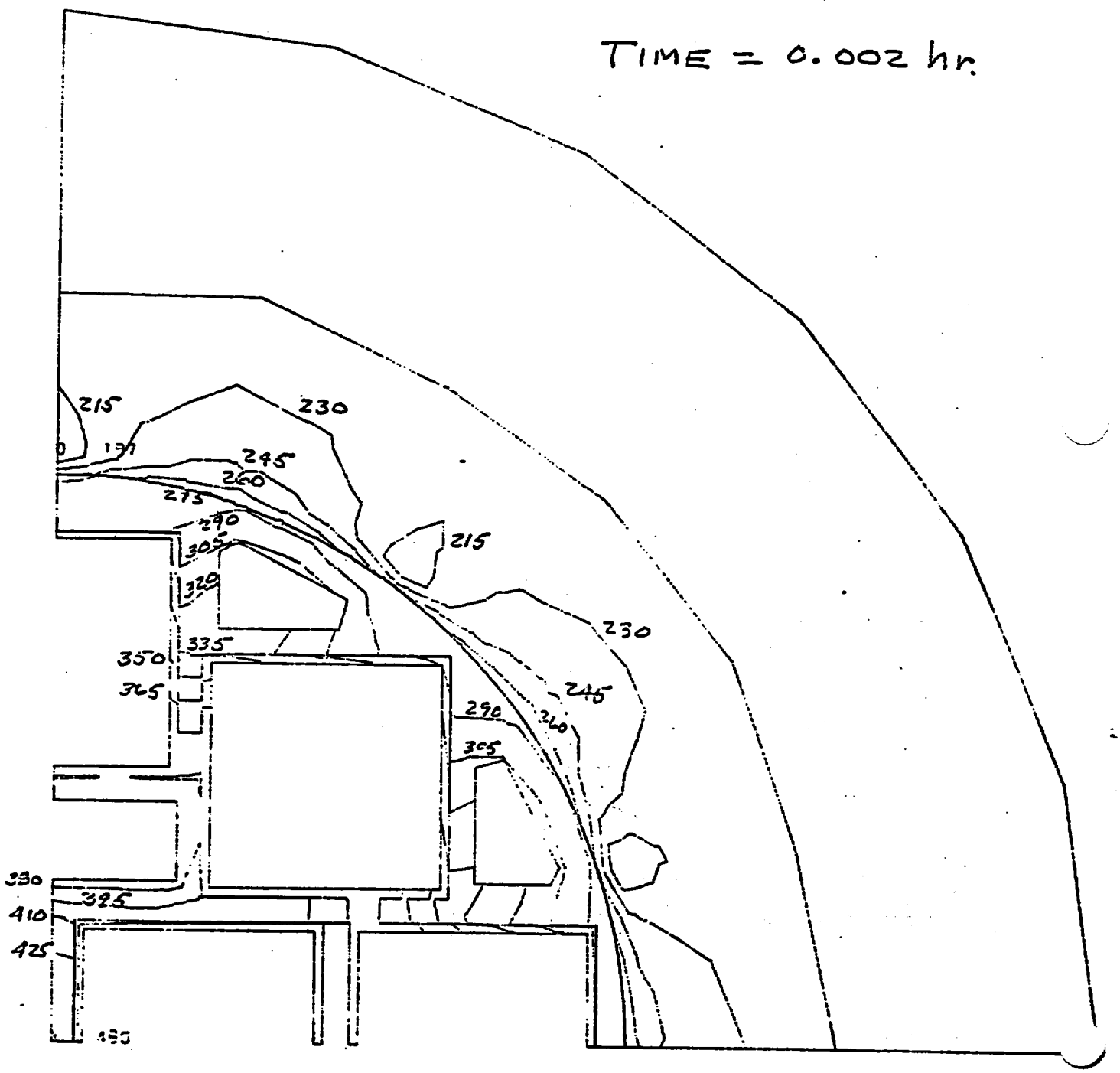
STEP= 3 ITERATION= 2



PR-'01 COOL-DOWN TRANS TIME 0.0 TO 0.001 HR. JHS AUG 28 1974 TEMPERATUR

FIGURE 10

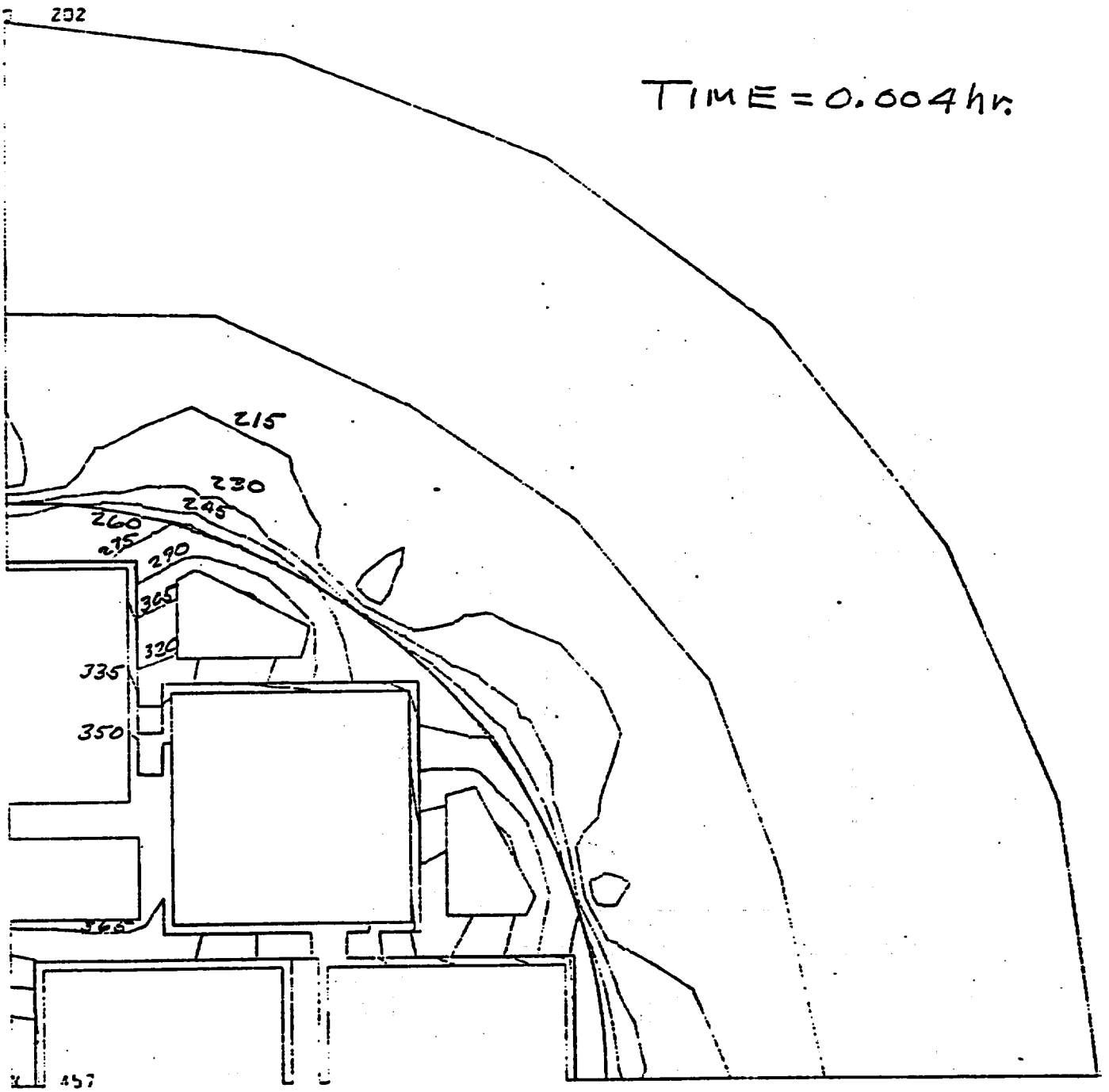
STEP= 2 ITERATION= 2



PR-101 COOL-DOWN TRANS TIME 0.0 TO 0.004 HR. JMG AUG 23 1974 TEMPERATUR

FIGURE 11

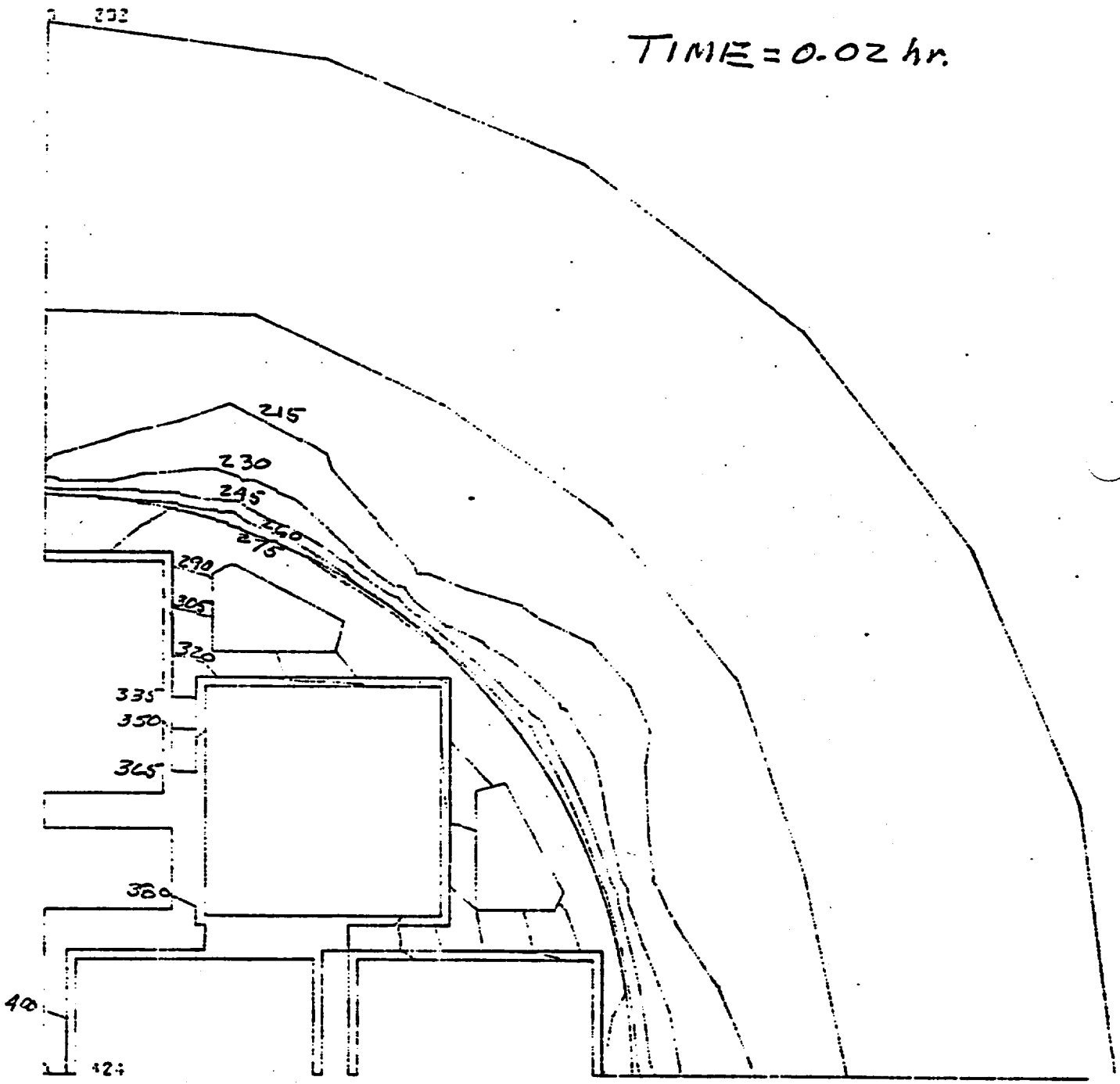
STEP= 3 ITERATION= 2



PR-101 COOL-DOWN TRANS TIME 0.0 TO 0.004 HR. JHS AUG 28 1974 TEMPERATUR

FIGURE 12

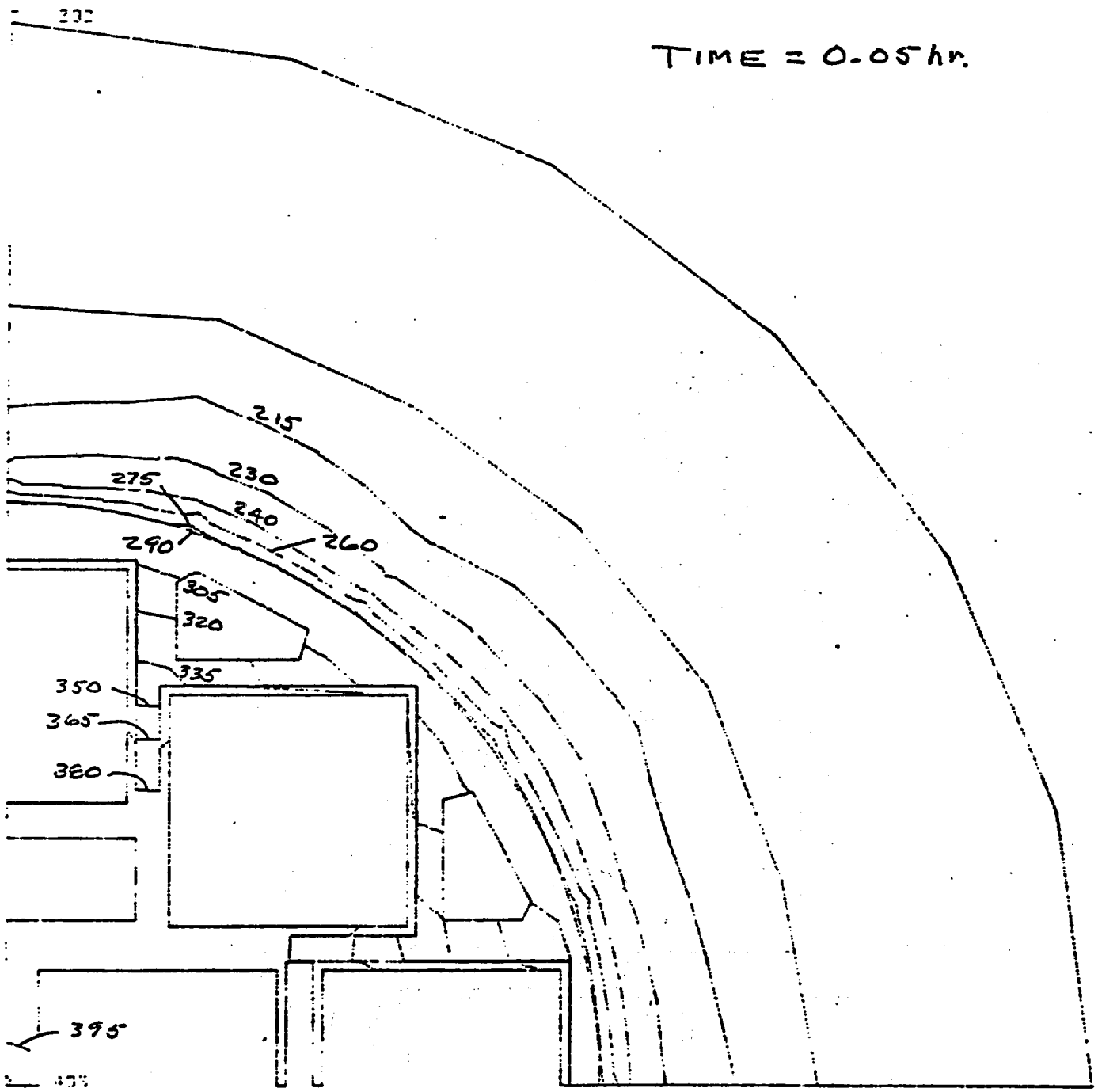
STEP= 5 ITERATION= 5



TRANS TIME 0.004 TO 0.15. JHS AUG 23 1974 TEMPERATURE

FIGURE 13

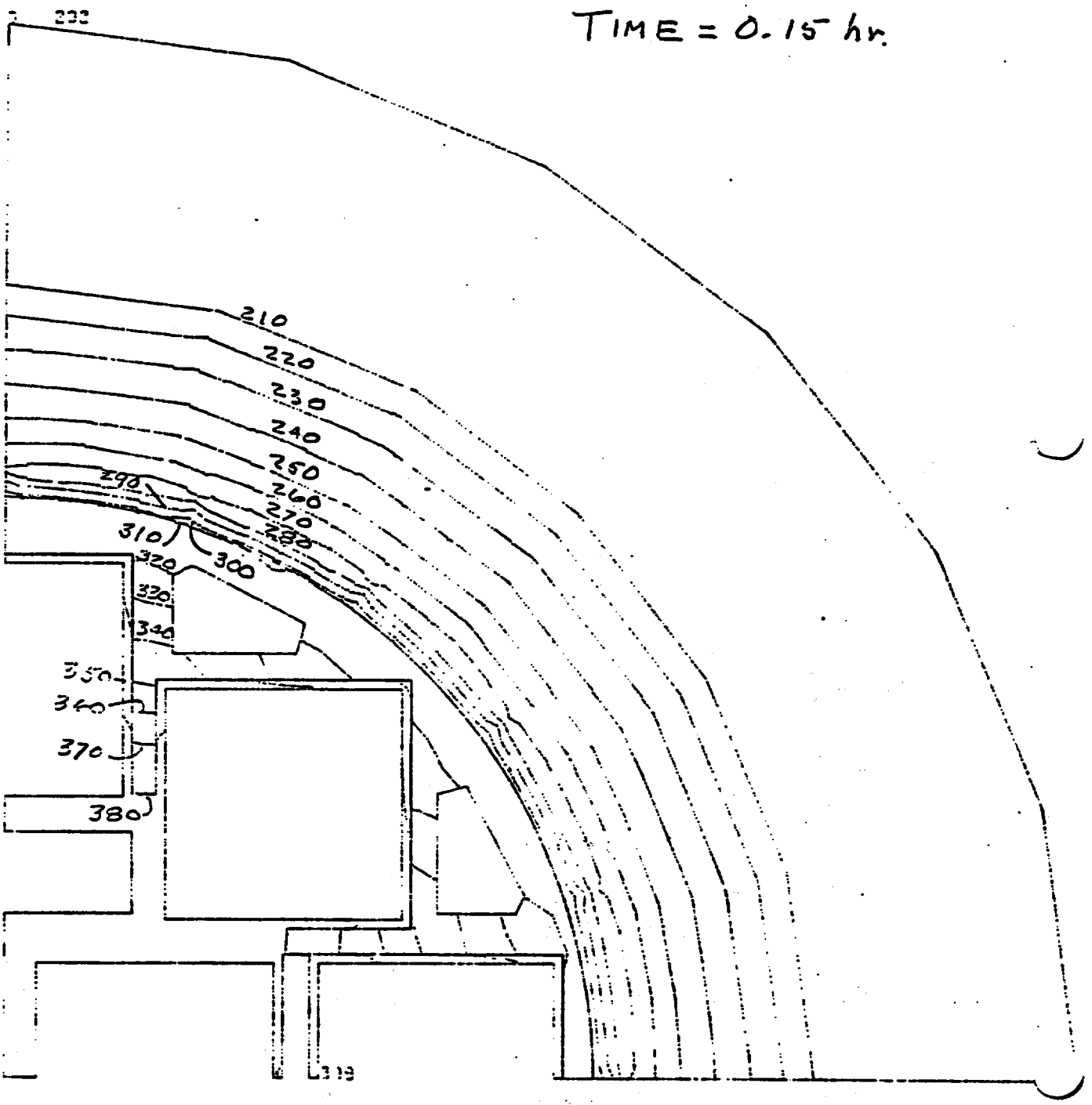
STEP= 6 ITERATION= 6



COOL-DOWN TRANS TIME 0.004 TO 0.15 JHS AUG 23 1974 TEMPERATURE

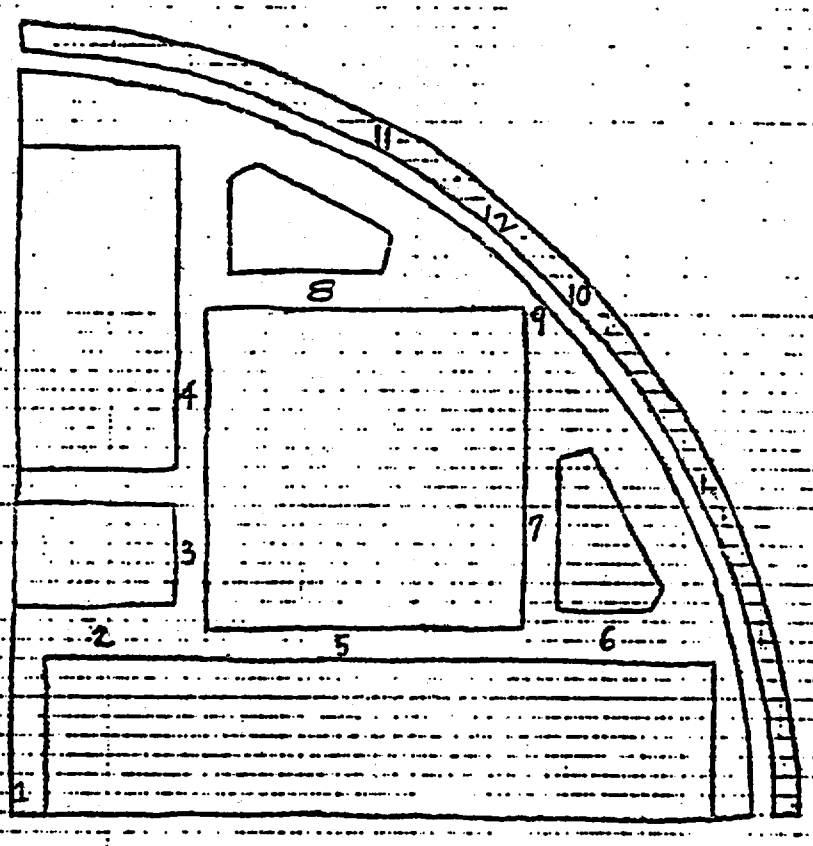
FIGURE 14

STEP= 7 ITERATION= 9



PR-101 COOL-DOWN TRANS TIME 0.004 TO 0.15 JHA AUG 29 1974 TEMPERATURE

FIGURE 15



REGIONS IN CROSS-SECTION USED IN THE CALCULATION OF CRITICAL TIMES OF COOL-DOWN TRANSIENT

COMPUTED AS A FUNCTION OF TIME FROM THE COMPUTER OUTPUT. THE TIMES OF MAXIMUM ΔT (TEMPERATURE DIFFERENCE) CORRESPONDS APPROXIMATELY TO THE TIMES OF MAXIMUM STRESS. THE RESULTS OF THESE CALCULATIONS ARE PLOTTED ON THE FOLLOWING PAGES.

FIGURE 16

CRITICAL TIMES IN COOL-DOWN TRANSIENT (Cont.)

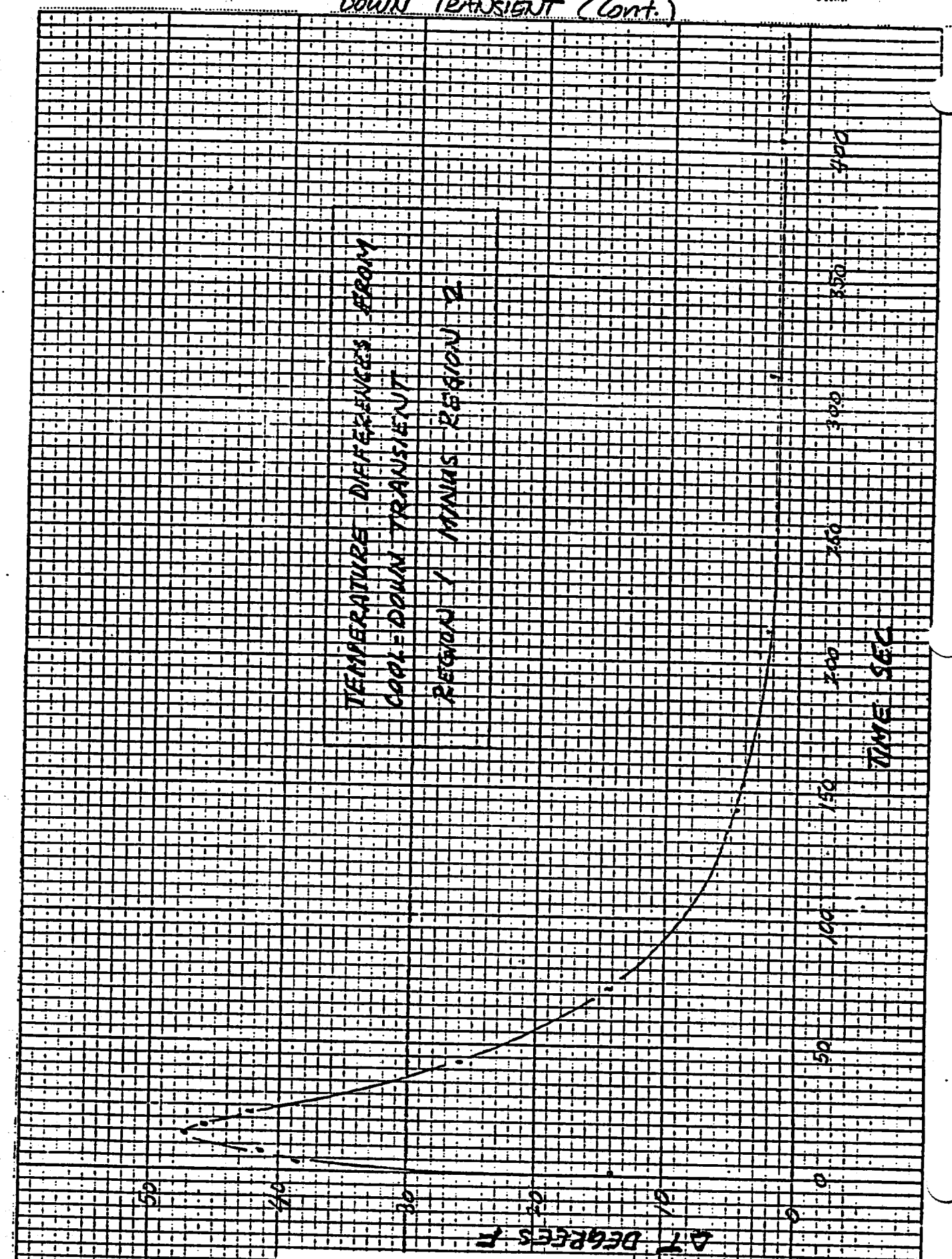


FIGURE 16A

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

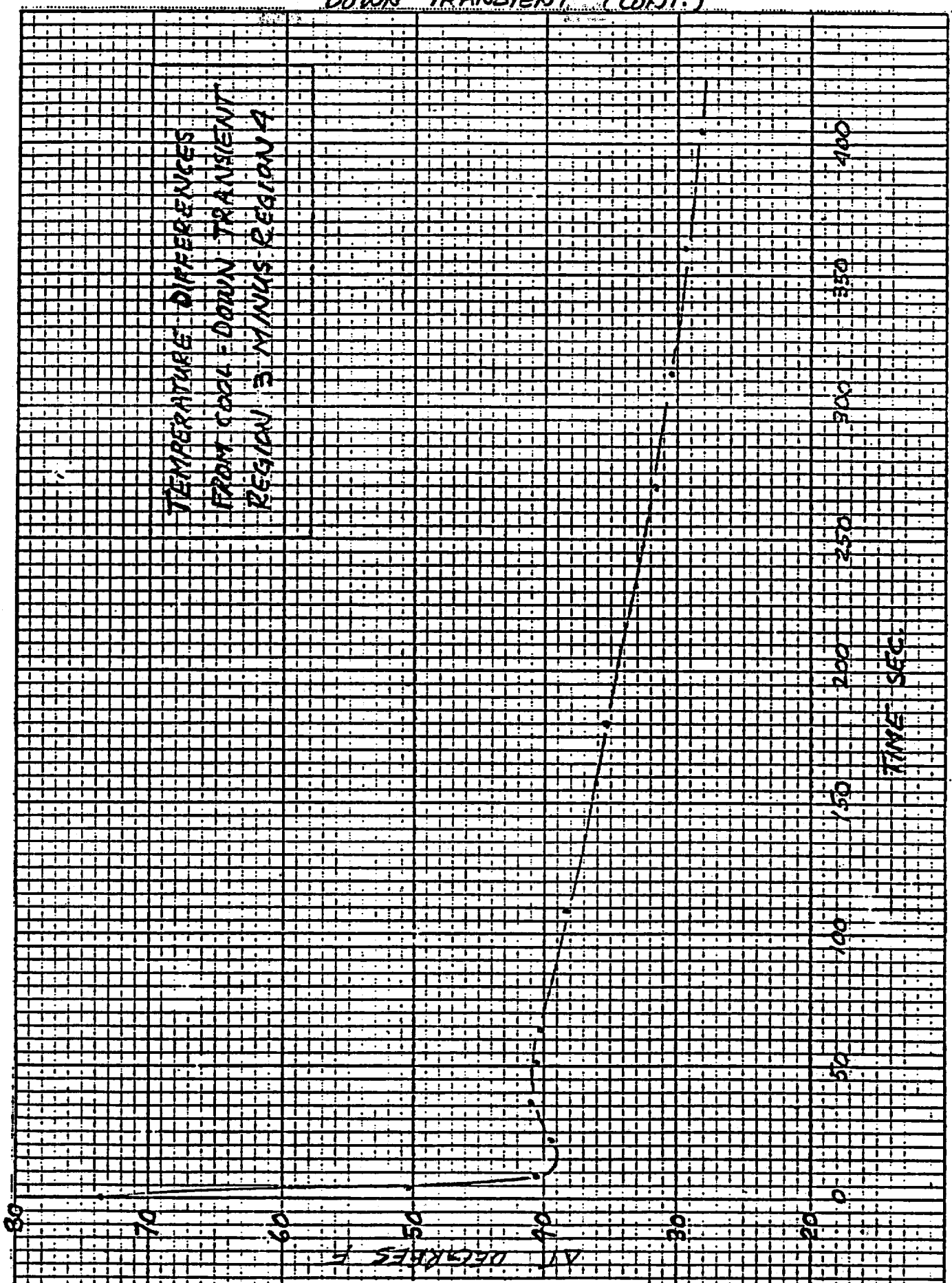


FIGURE 16B

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (Cont.)

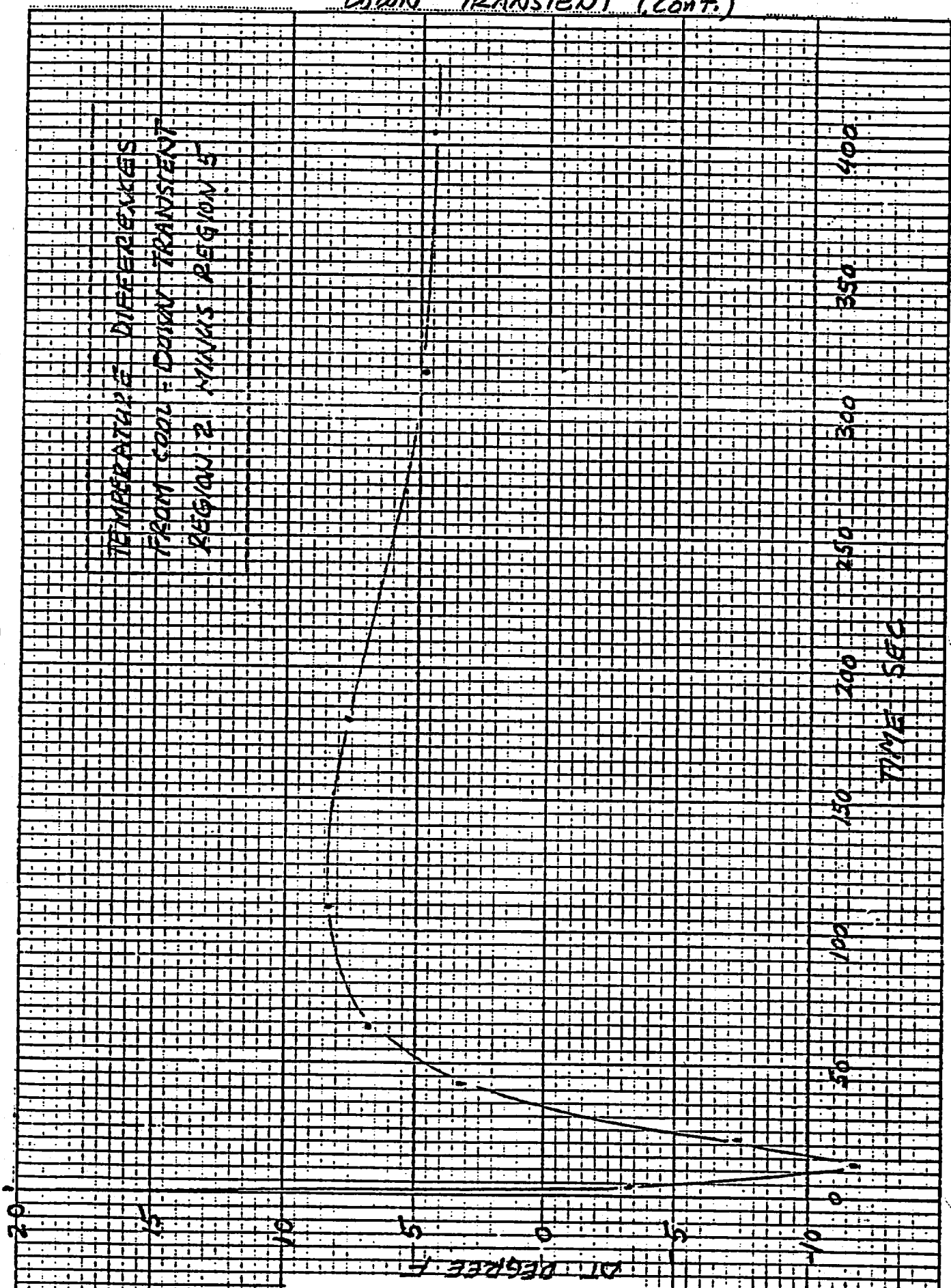


FIGURE 16.F

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (Cont.)

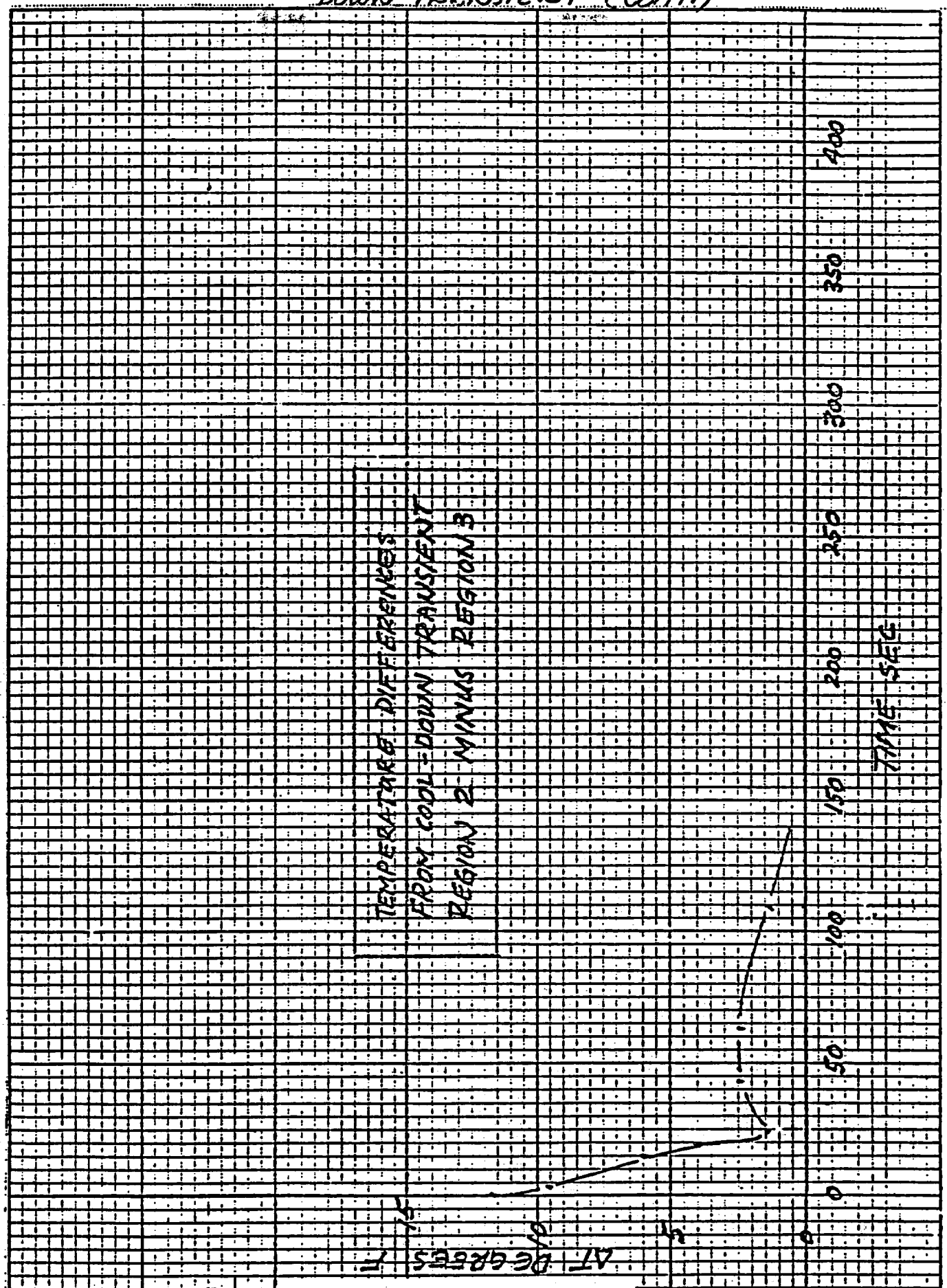


FIGURE 17

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

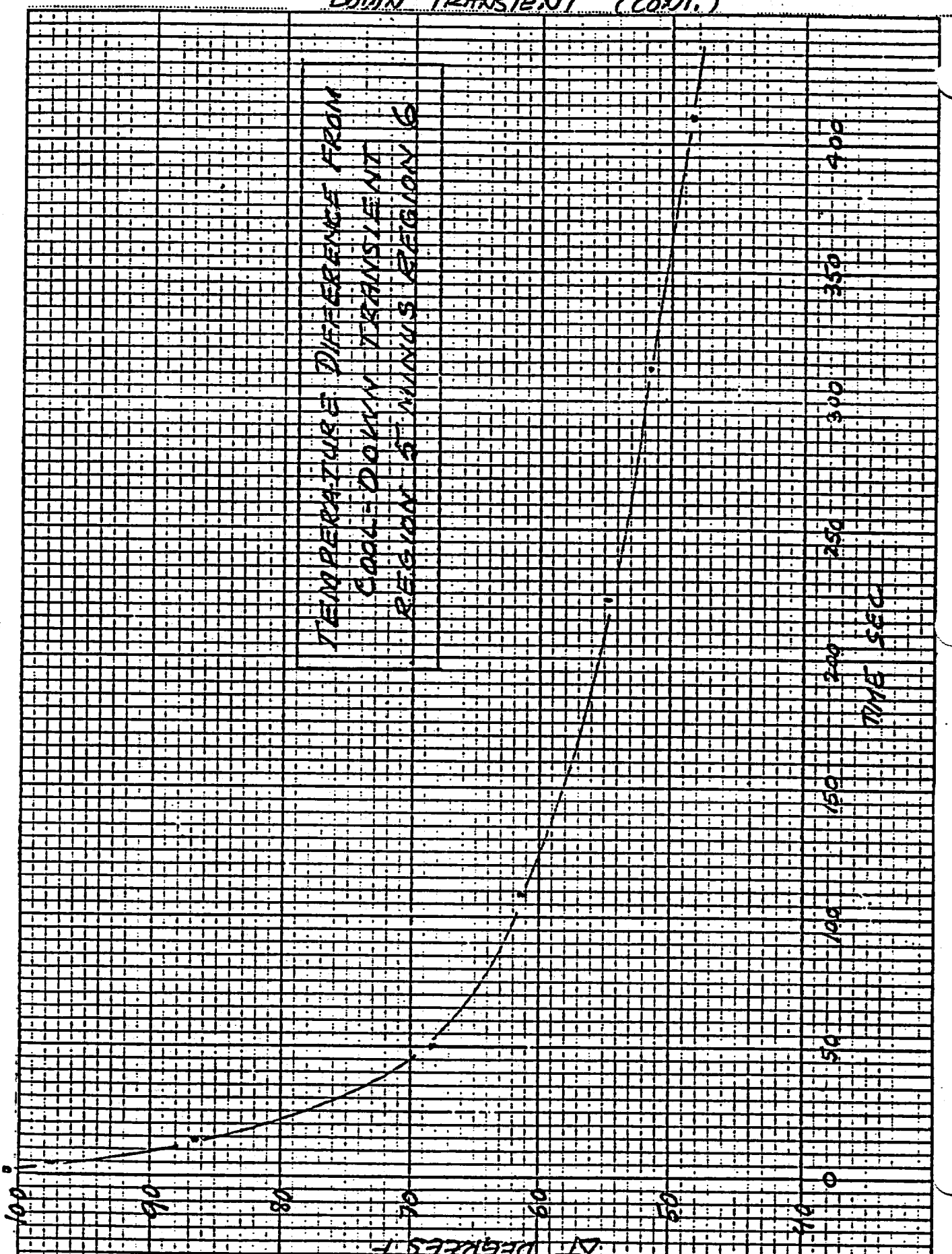


FIGURE 17A

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

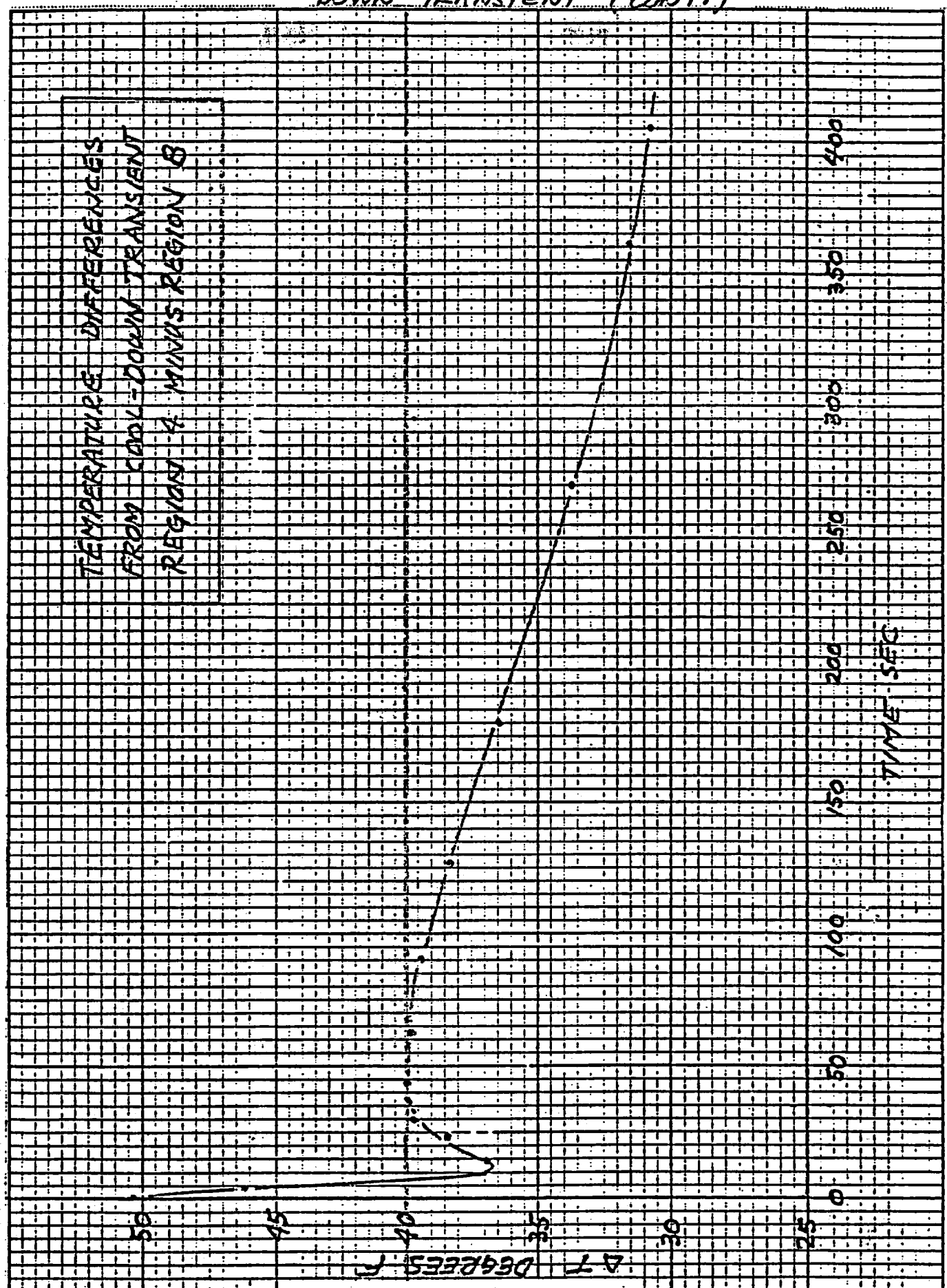


FIGURE 18

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

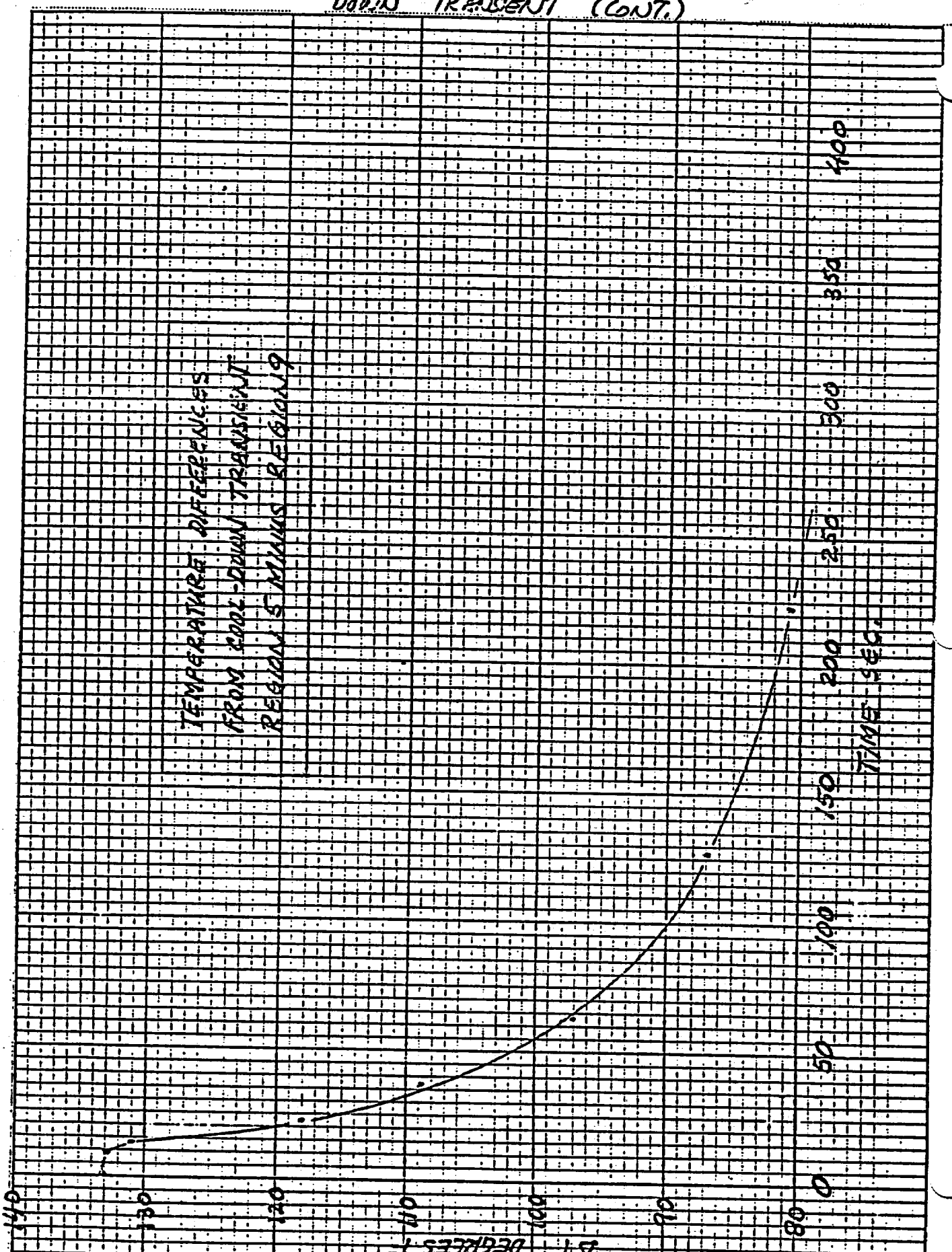


FIGURE 12A

DETERMINATION OF CRITICAL TIMES OF COOL-DOWN TRANSIENT (CONT.)

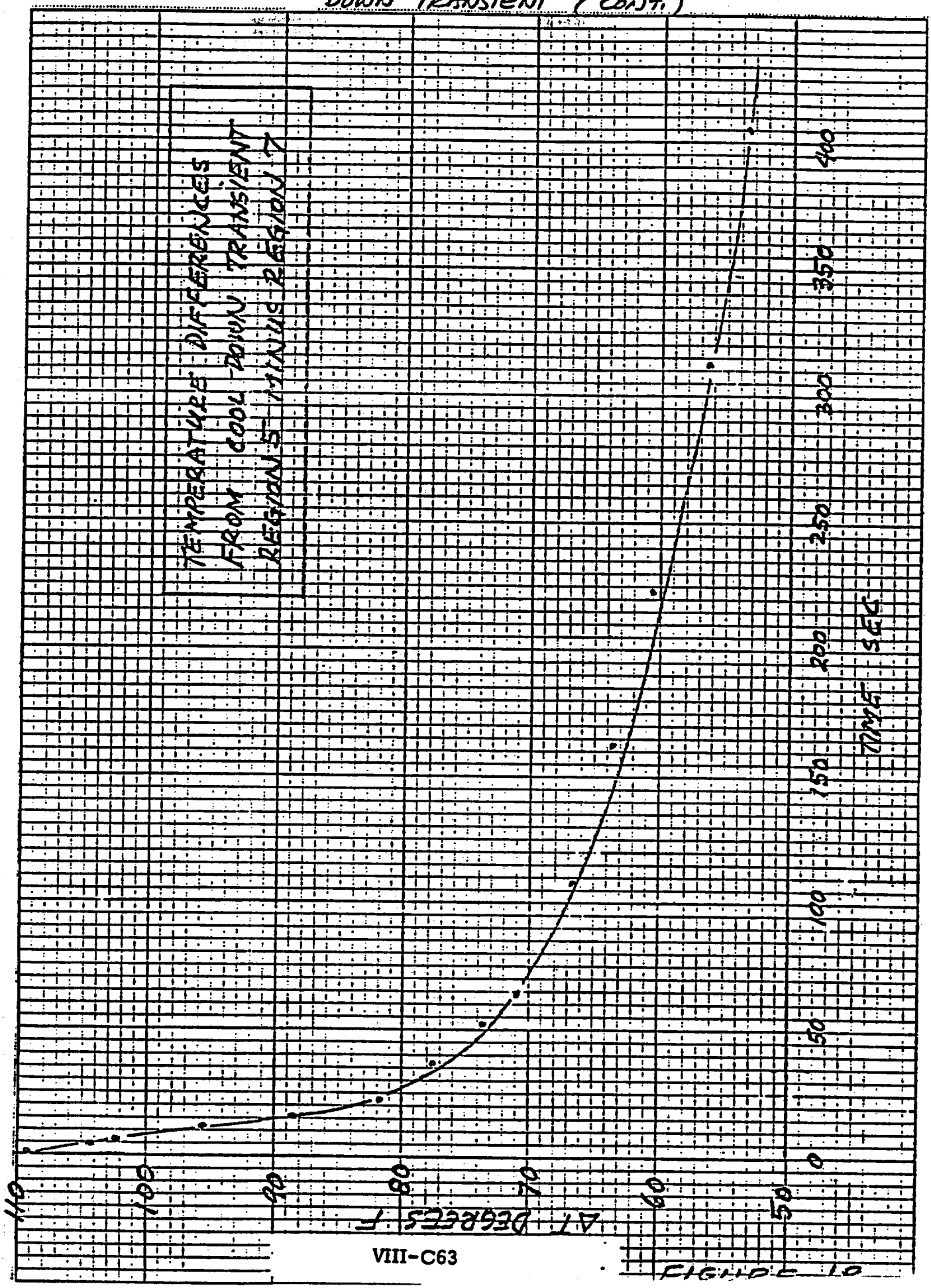


FIGURE 10

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

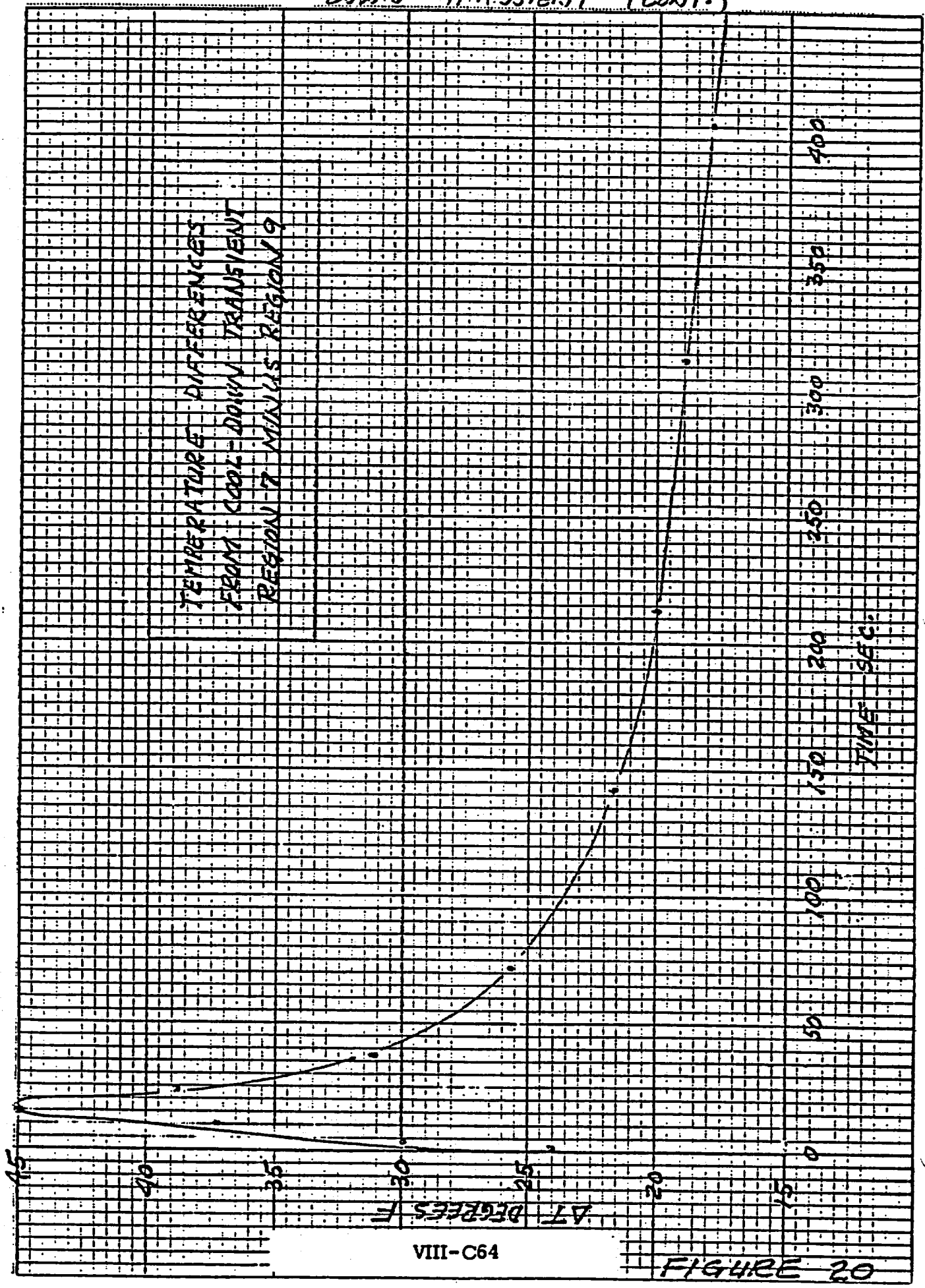


FIGURE 20

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

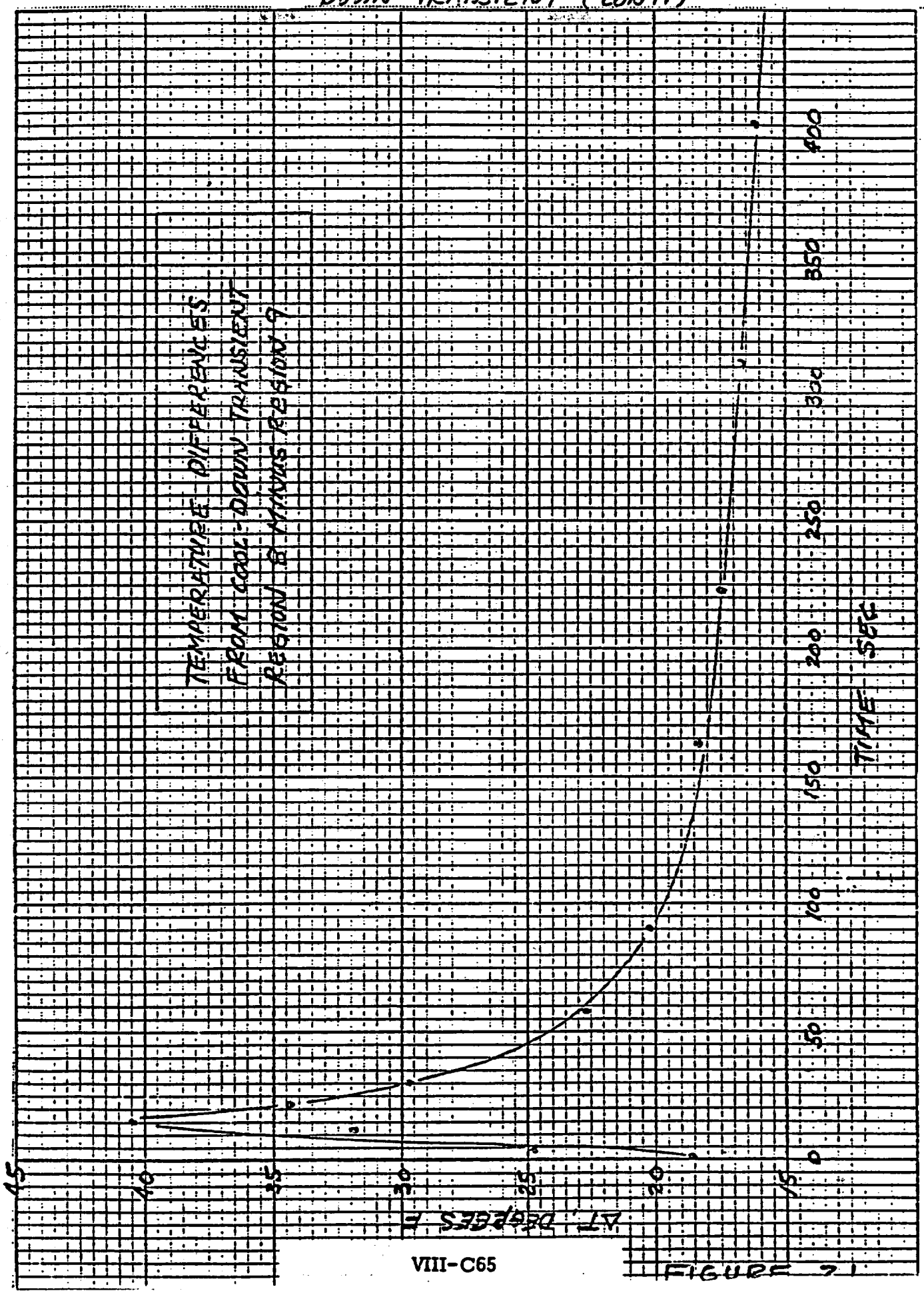


FIGURE 21

DETERMINATION OF CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT)

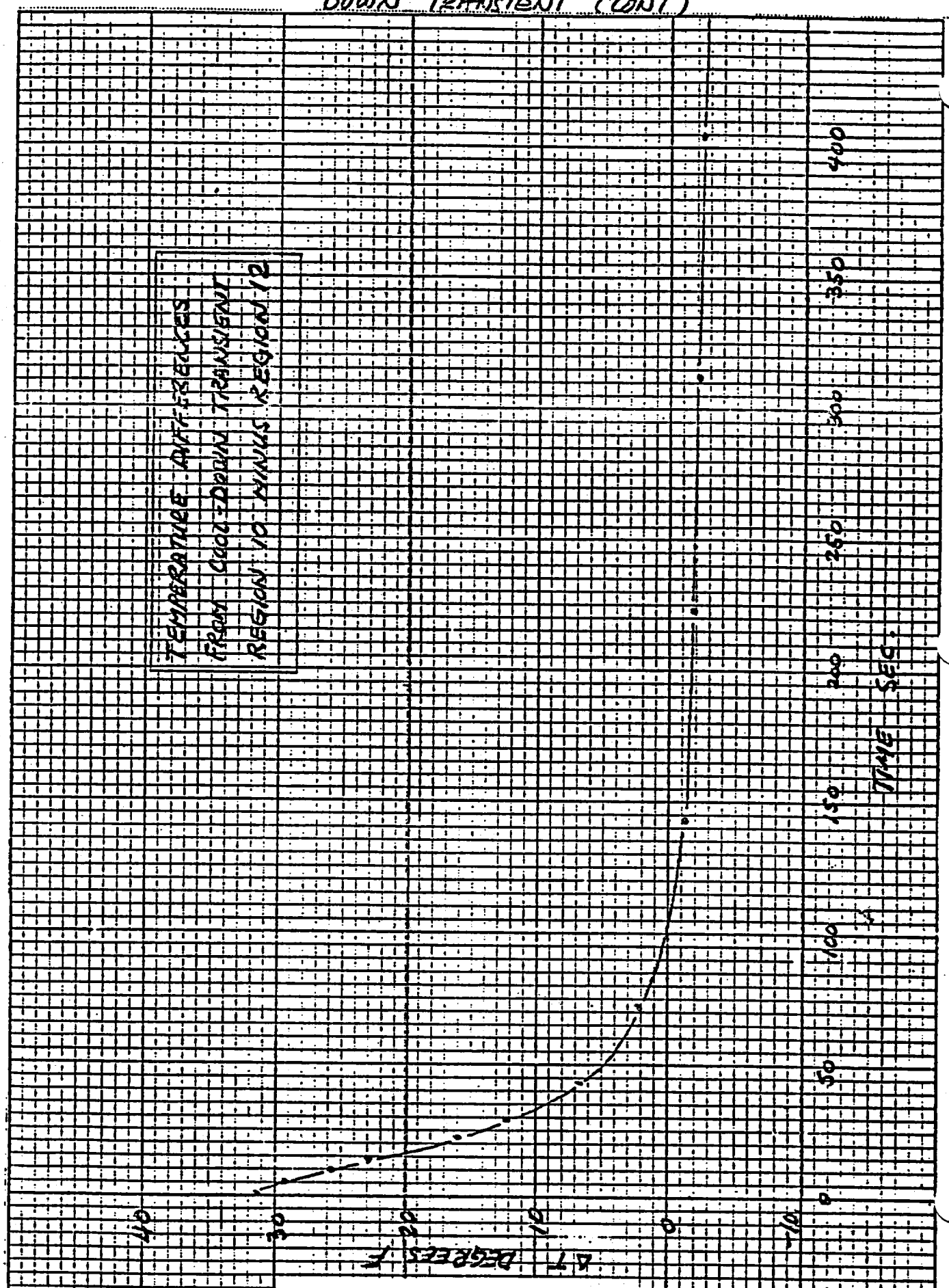
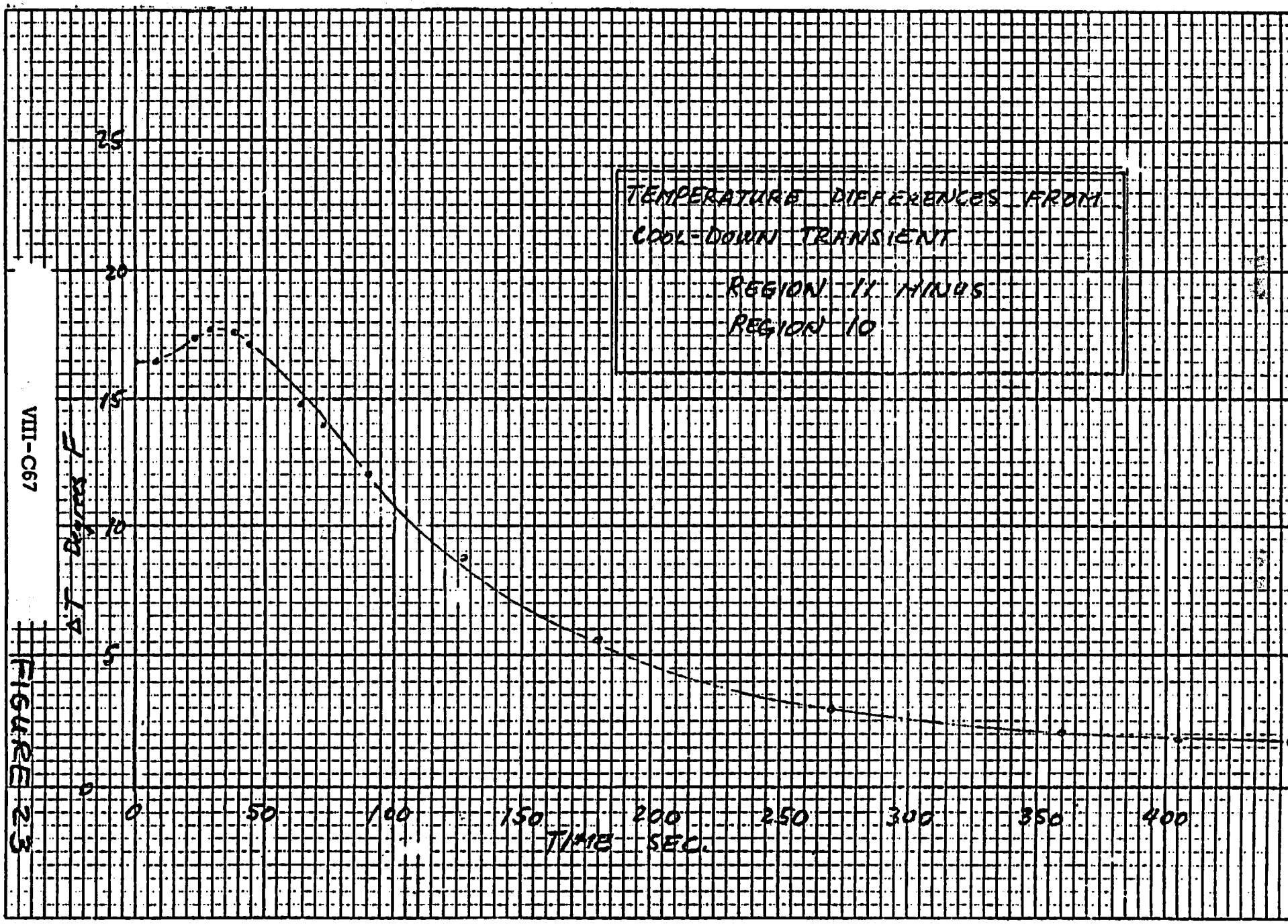


FIGURE 22



CRITICAL TIMES IN COOL-DOWN TRANSIENT (CONT.)

FIGURE 23

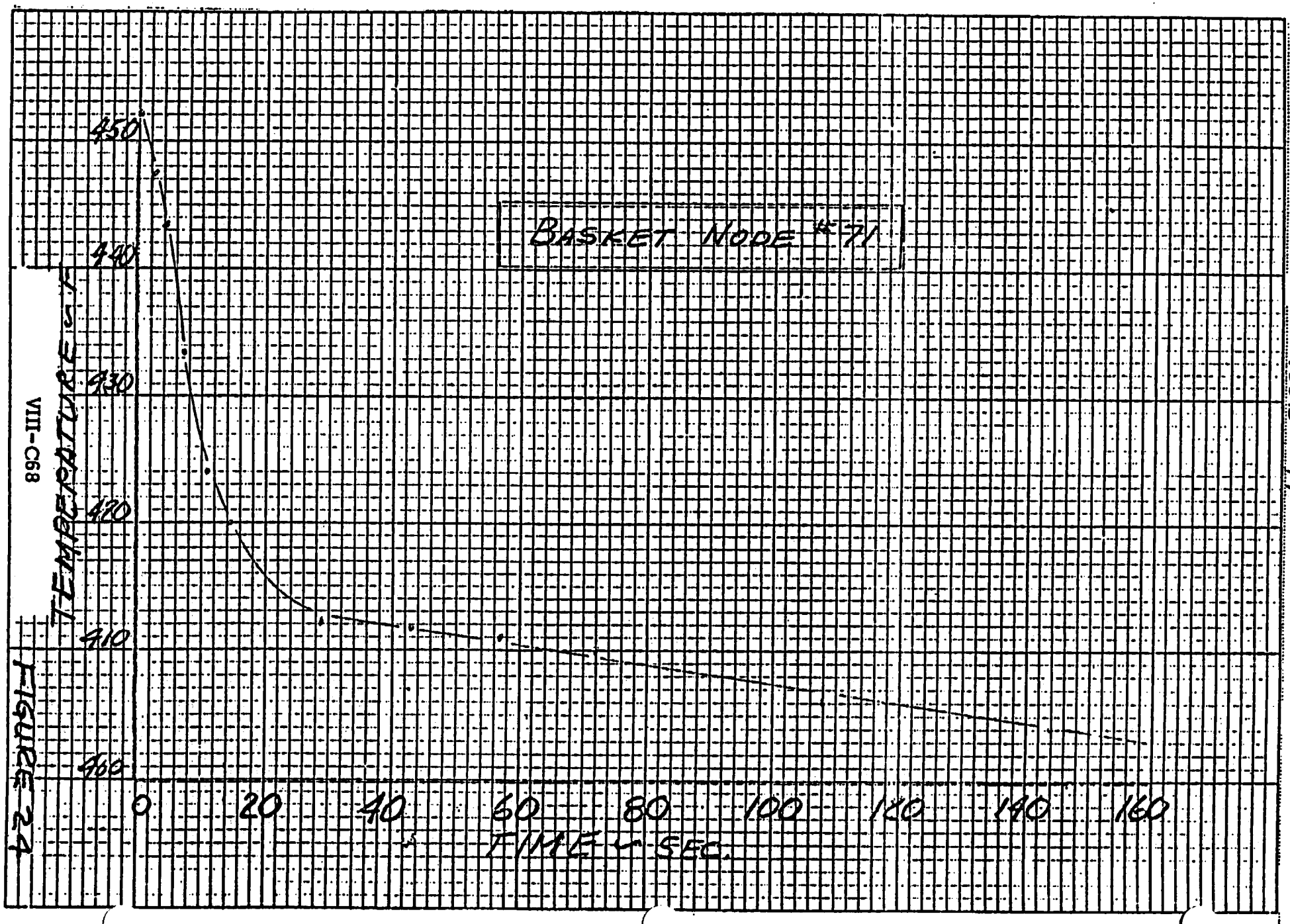

TIME PLOTS
NODE #71
BASKET NODE #71
TEMPERATURE °F
450
440
430
420
410
400
0
20
40
60
80
100
120
140
160
TIME ~ SEC.

FIGURE 24

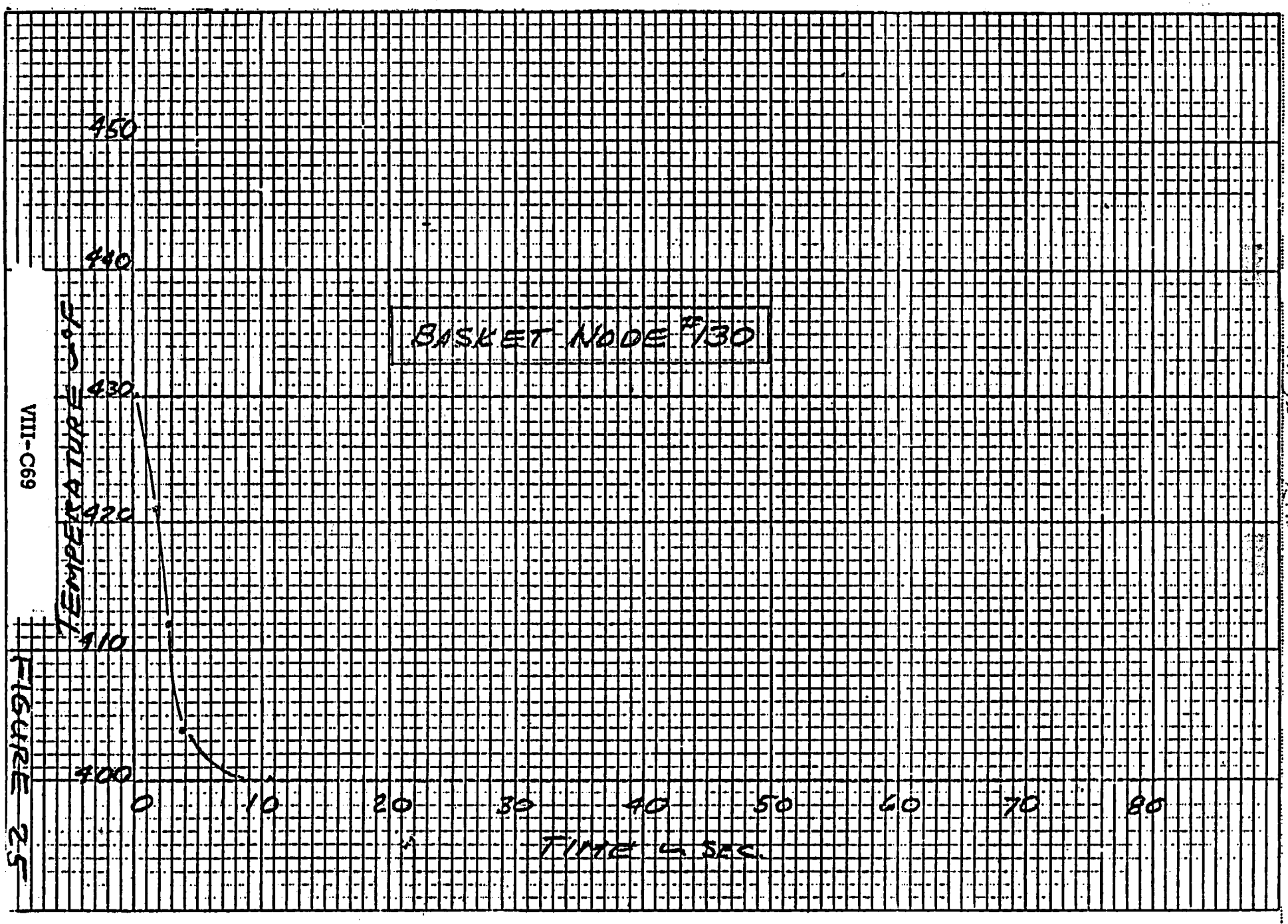


FIGURE 2.5

BASKET TEMP - TIME PLOT
VIEW FROM

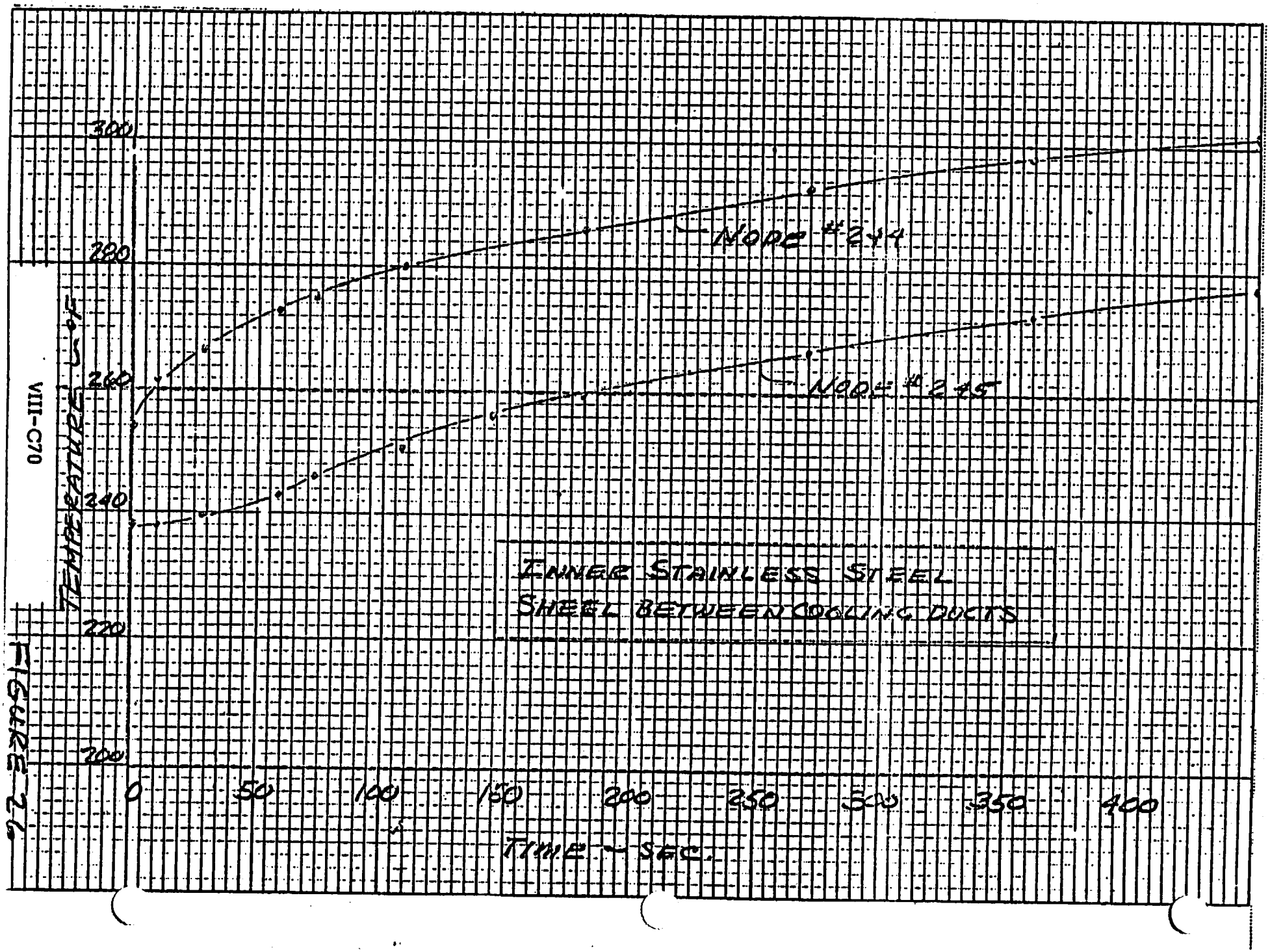

INNER SHELL
TEMP. VS. TIME
NODE #244
NODE #245
INNER STAINLESS STEEL
SHEEL BETWEEN COOLING DUCTS
TEMPERATURE ~ °F
300
280
260
240
220
200
0
50
100
150
200
250
300
350
400
TIME ~ SEC.

FIGURE 27

INNER SHELL
TEMP. VS. TIME PLOTS

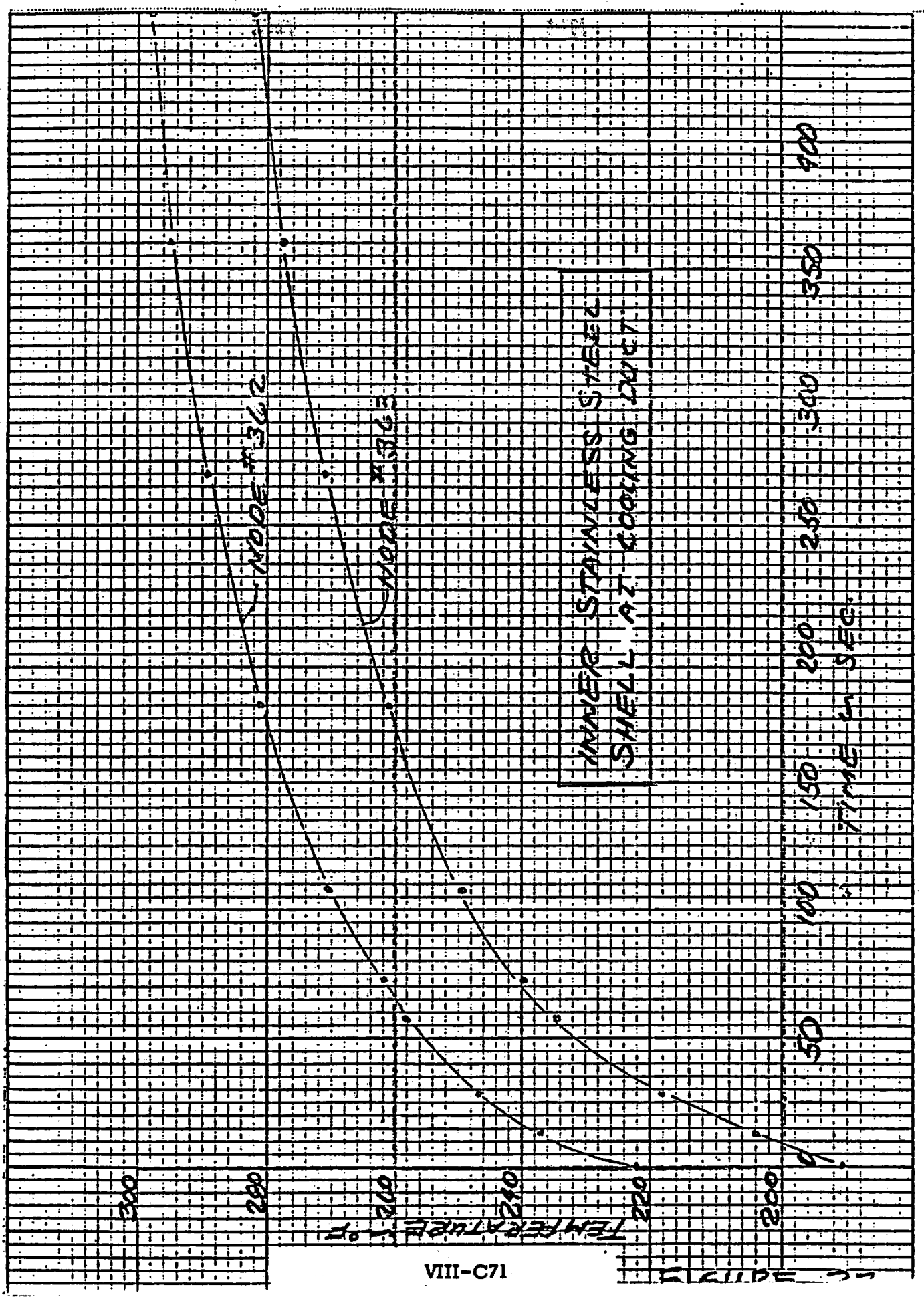


FIGURE 77

AT TEMP. VS. TIME

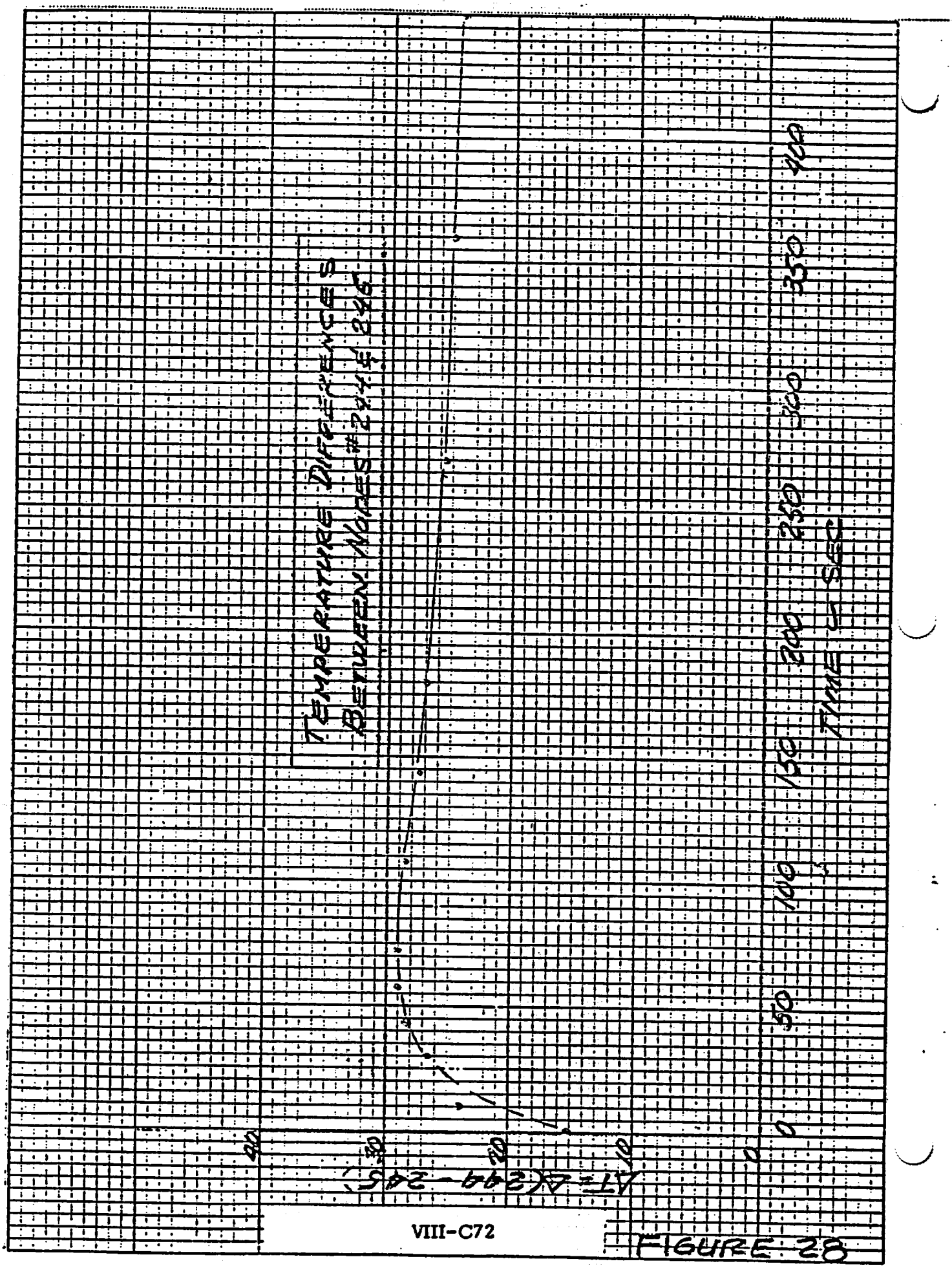


FIGURE 28

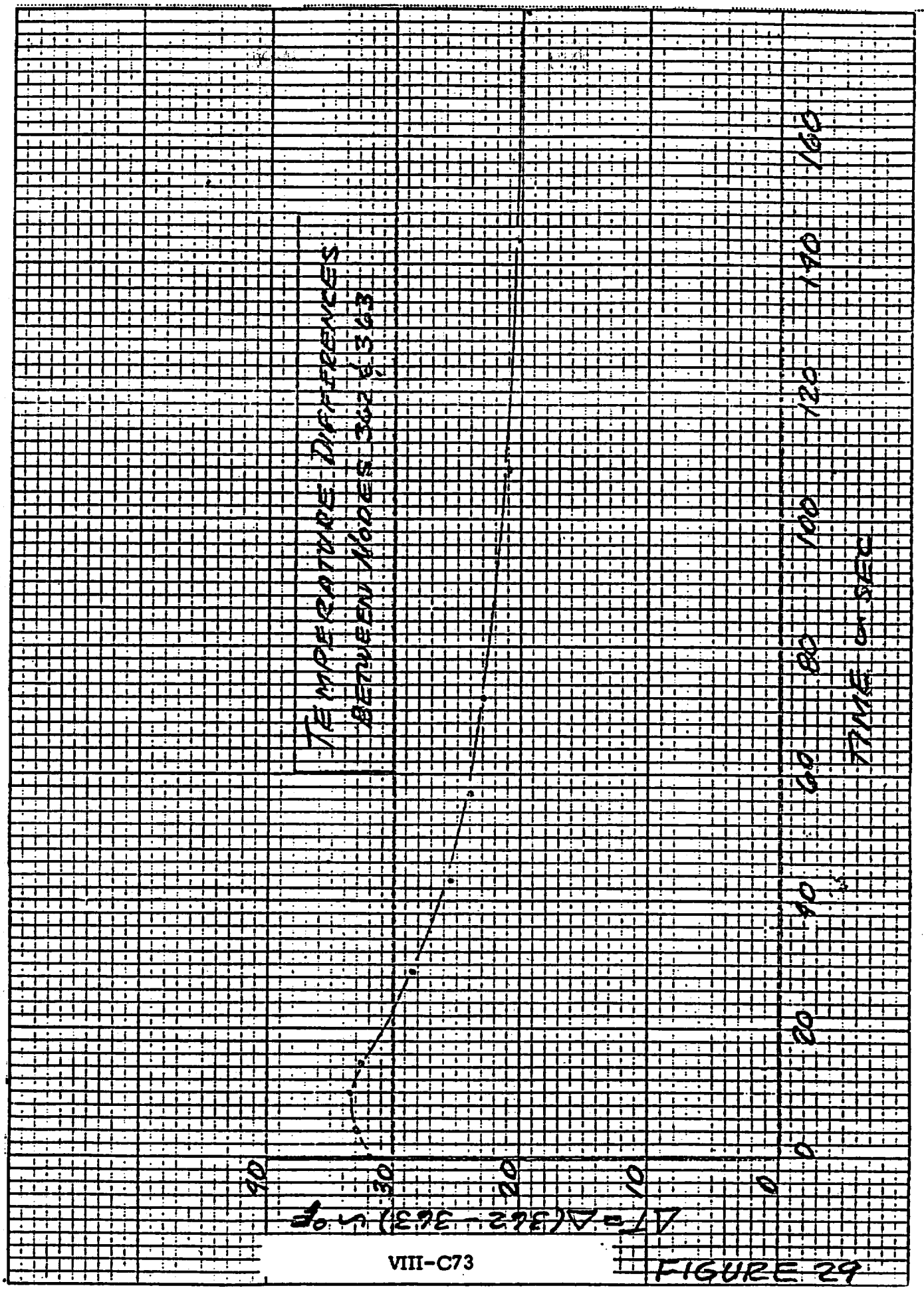
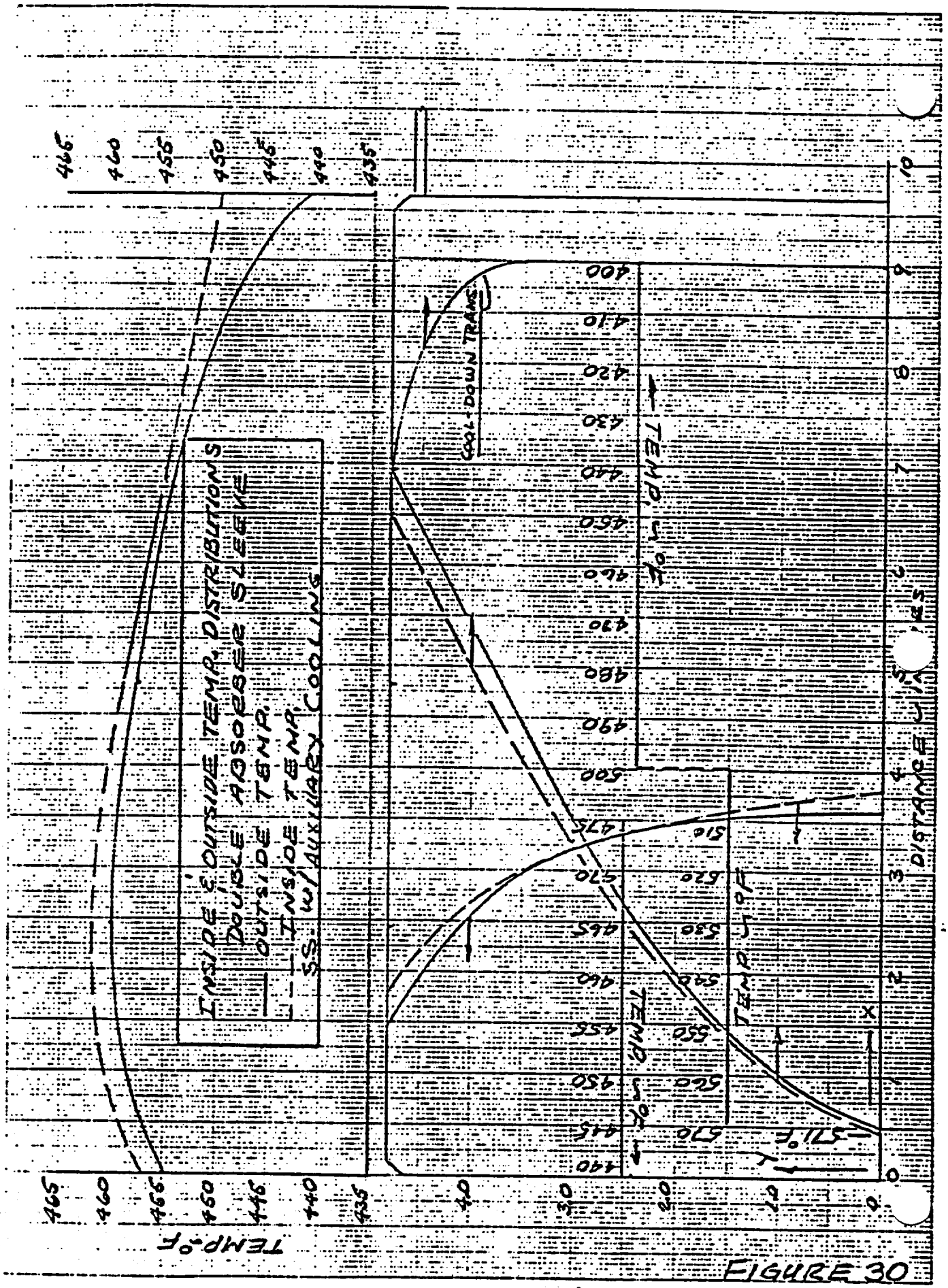

TEMP VS. TIME
TEMPERATURE DIFFERENCES
BETWEEN NODES 362 & 363
TIME IN SEC
0
20
40
60
80
100
120
140
160
10
20
30
40
ΔT = T(362 - 363) in °F

FIGURE 29


INSIDE & OUTSIDE TEMP. DISTRIBUTIONS
DOUBLE ABSORBER SLEEVE
OUTSIDE TEMP.
INSIDE TEMP.
SS. W/AUXILIARY COOLING
COOL-DOWN TRANS.
TEMP. °F
DISTANCE, INCHES
TEMP. °F
TEMP. °F
FIGURE 30

K&E 10 X 10 TO THE CM. 359T-14
KEUFFEL & ESSER CO. MADE IN U.S.A.

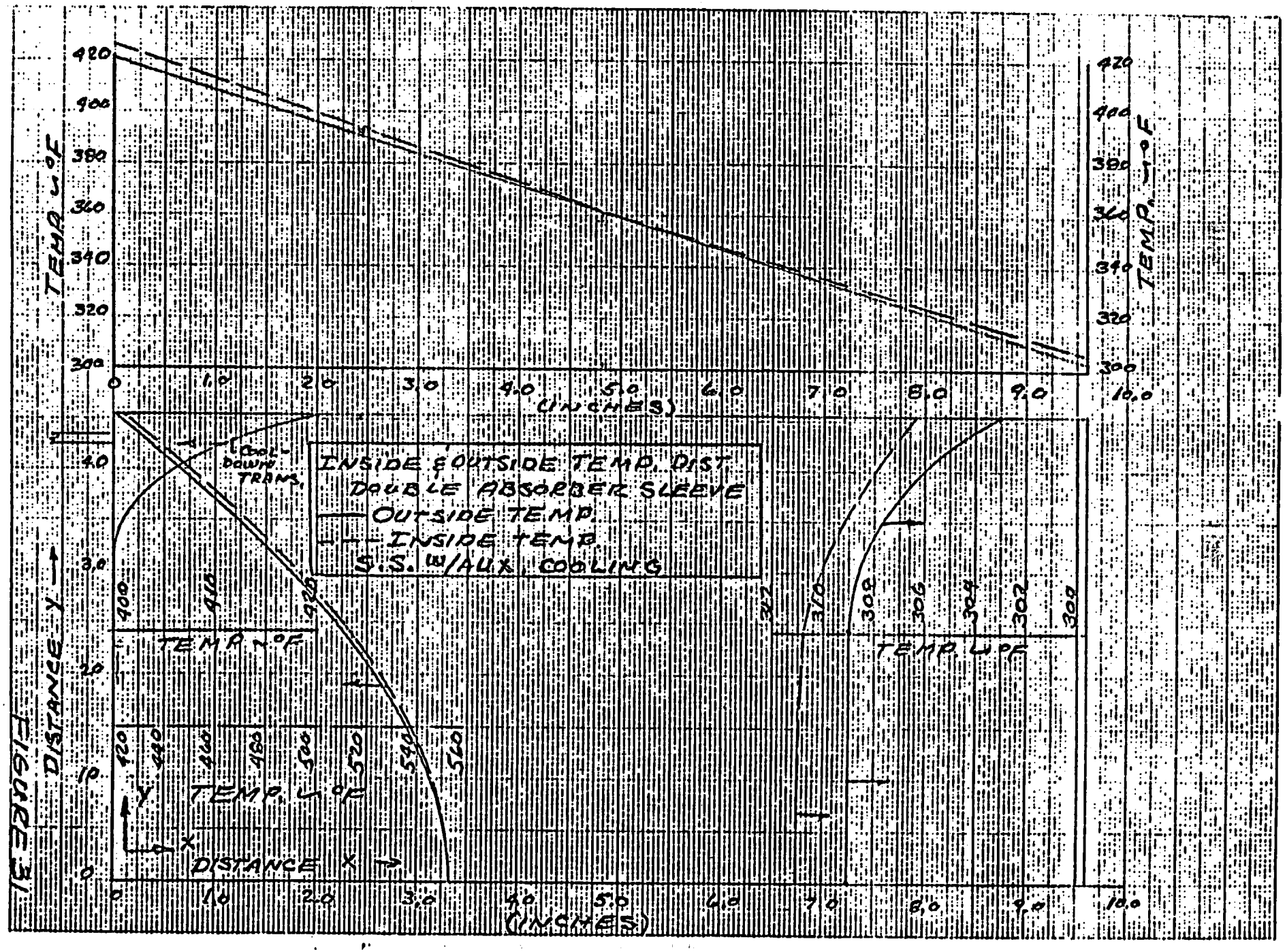


FIGURE 31

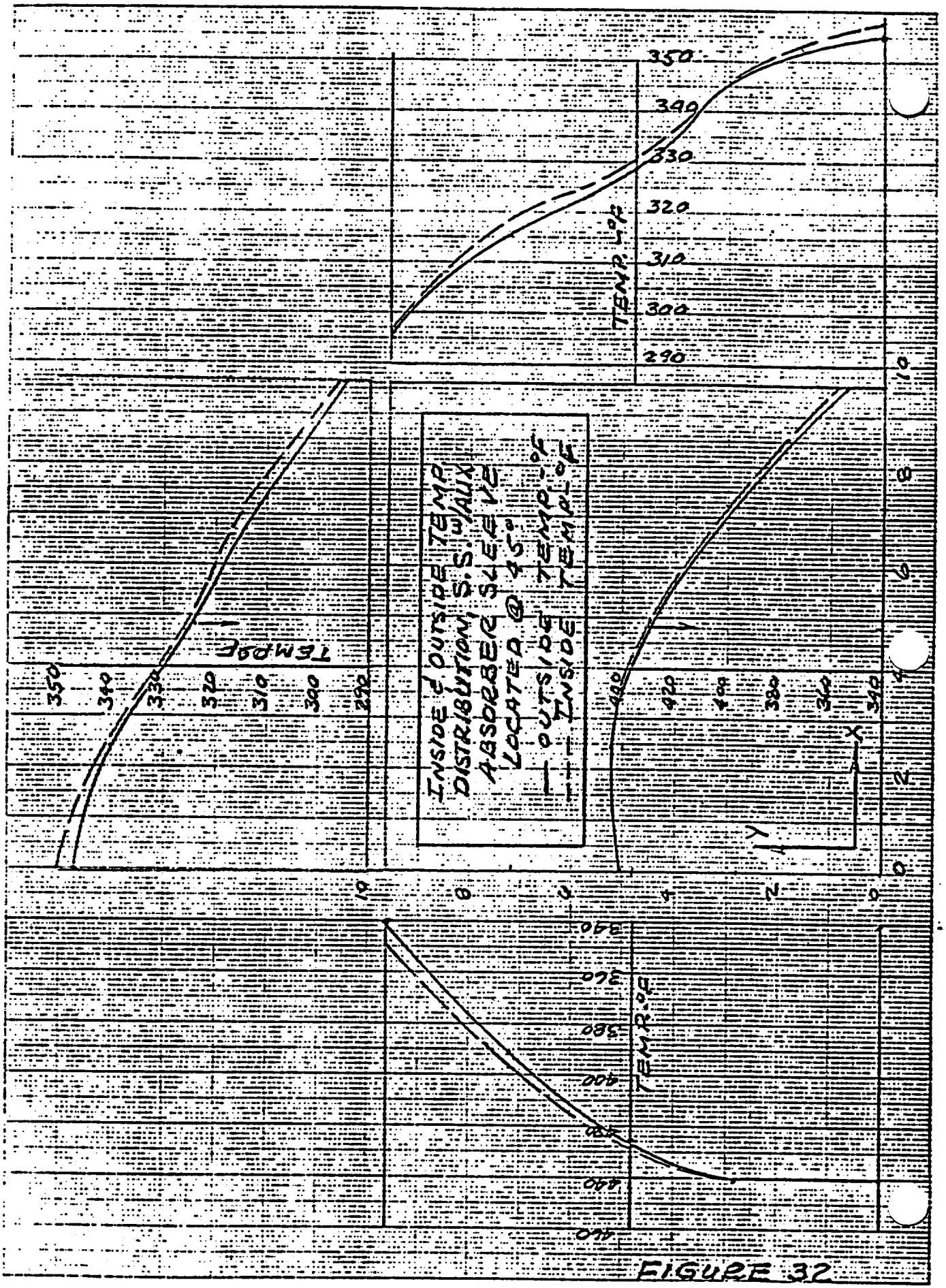
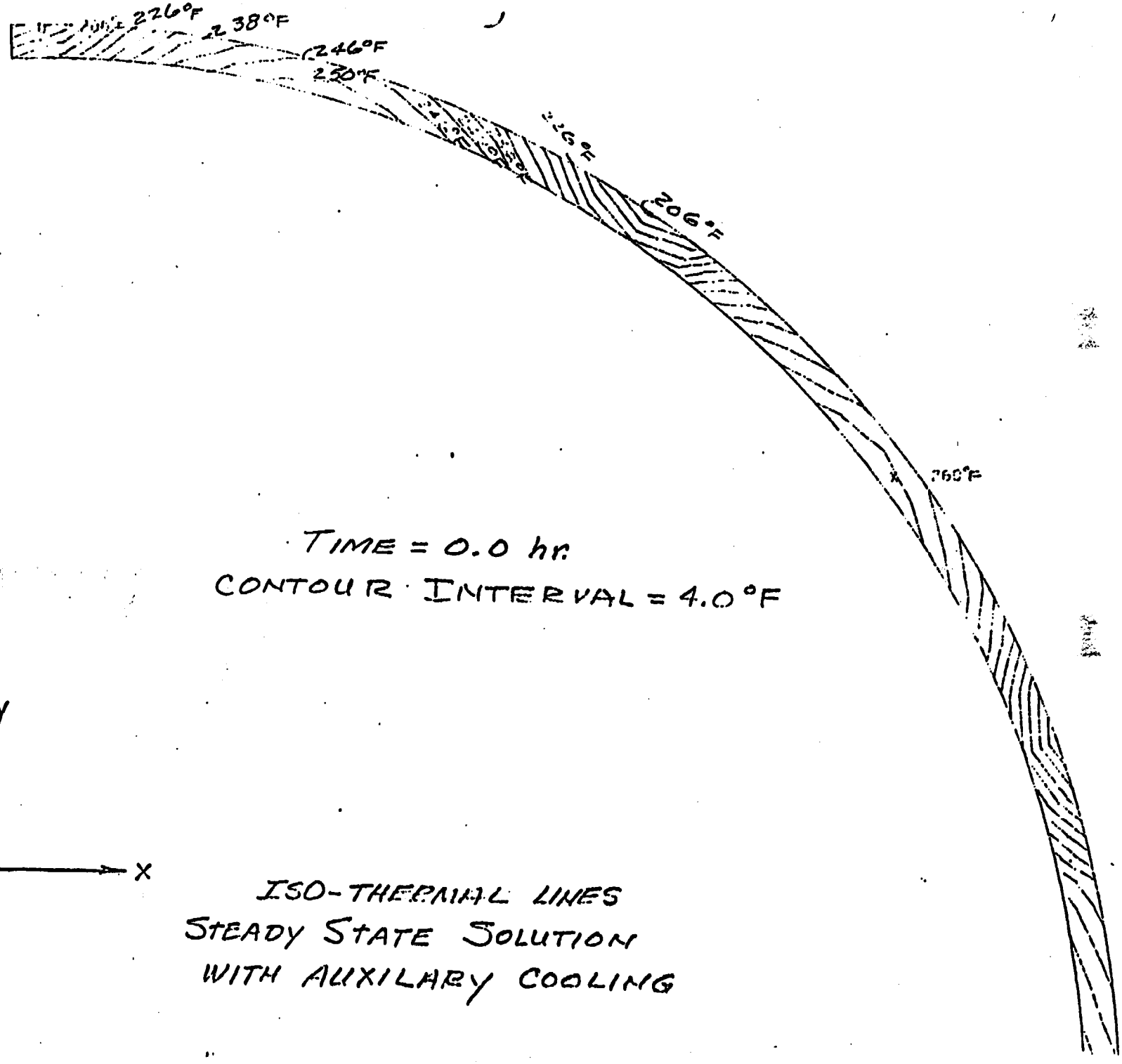
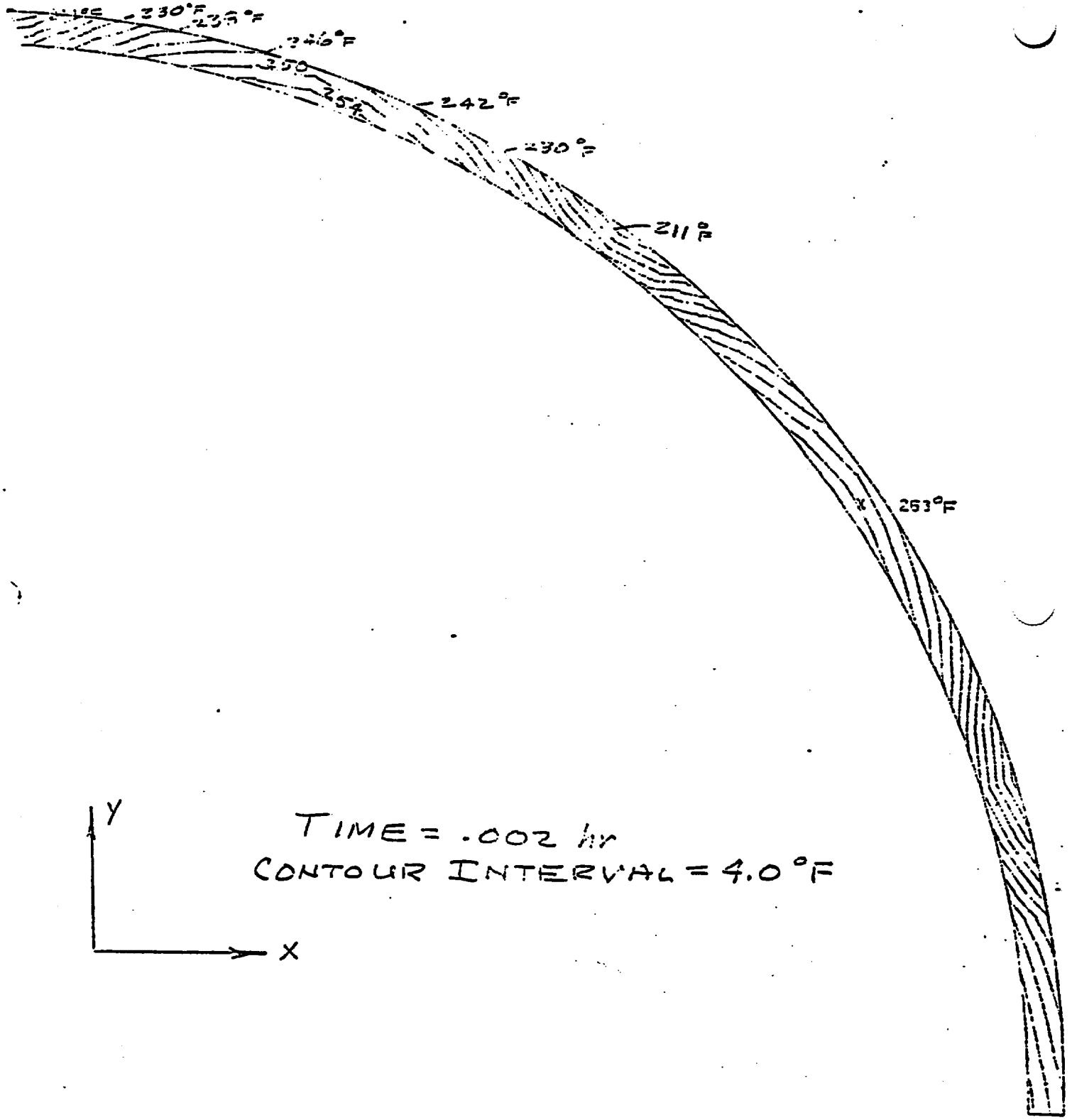

INSIDE & OUTSIDE TEMP DISTRIBUTION, S.S. W/AUX ABSORBER SLEEVE LOCATED @ 45°
OUTSIDE TEMP. °F
INSIDE TEMP. °F
TEMP. °F
TEMP. °F
TEMP. °F
X
Y

FIGURE 32



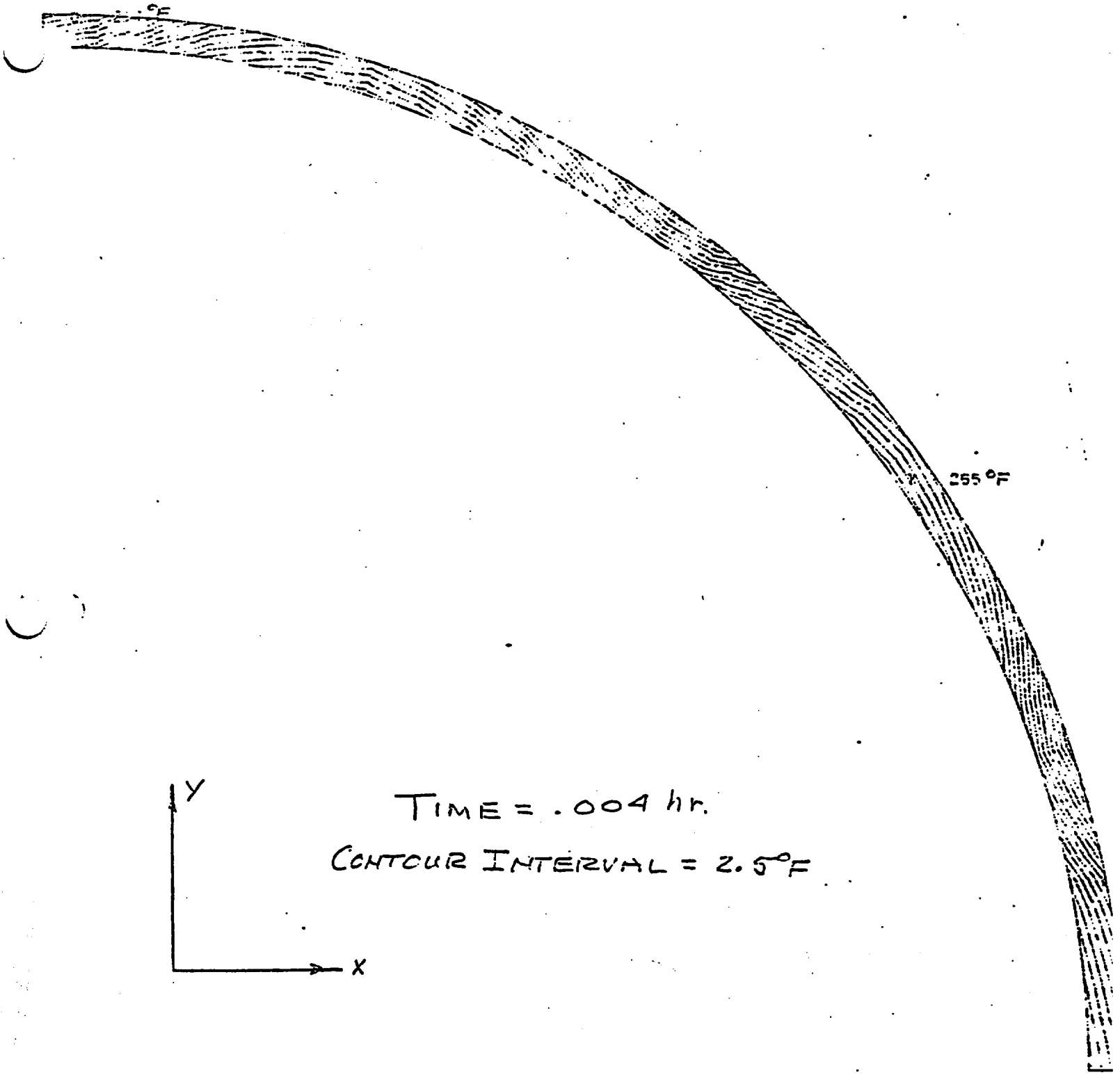
ISO-THERMAL LINES
STEADY STATE SOLUTION
WITH AUXILARY COOLING

FIGURE 33



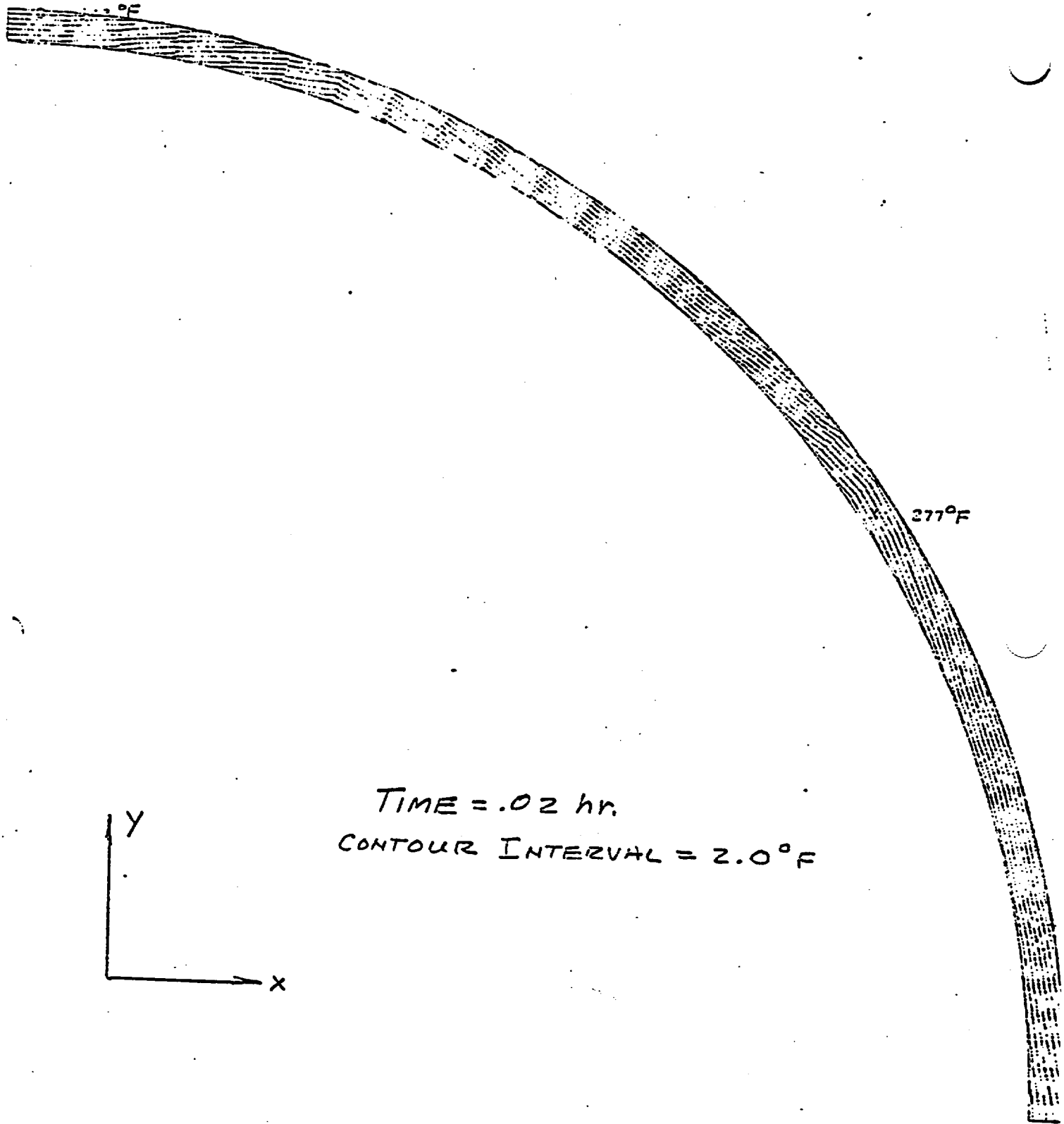
COOL-DOWN TRANS ELAS SOLN OF INNER SHELL TEMPERATURES

FIGURE 34



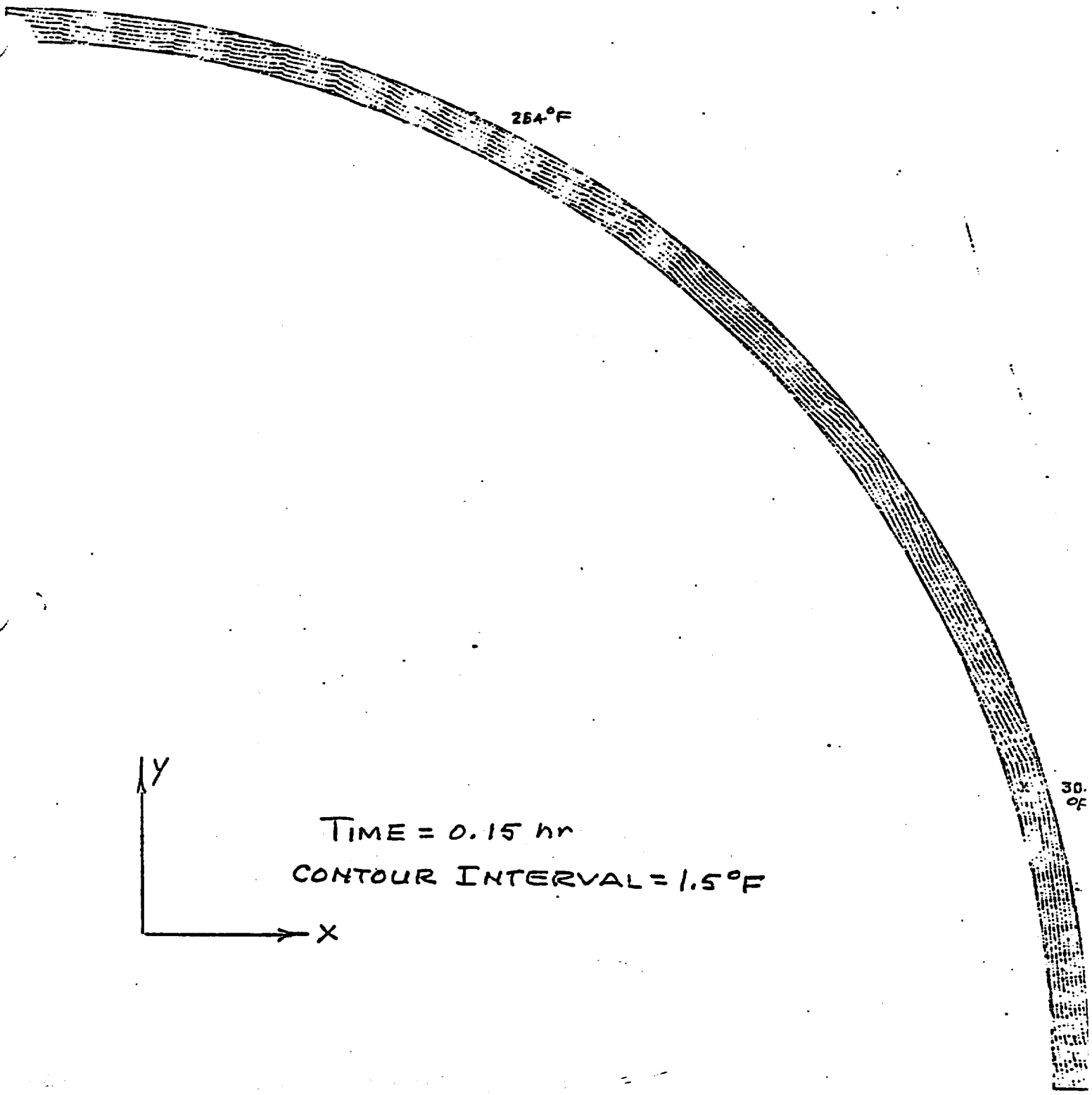
COOL-DOWN TRANS ELAS SOLN OF INNER SHELL TEMPERATURES

FIGURE 35



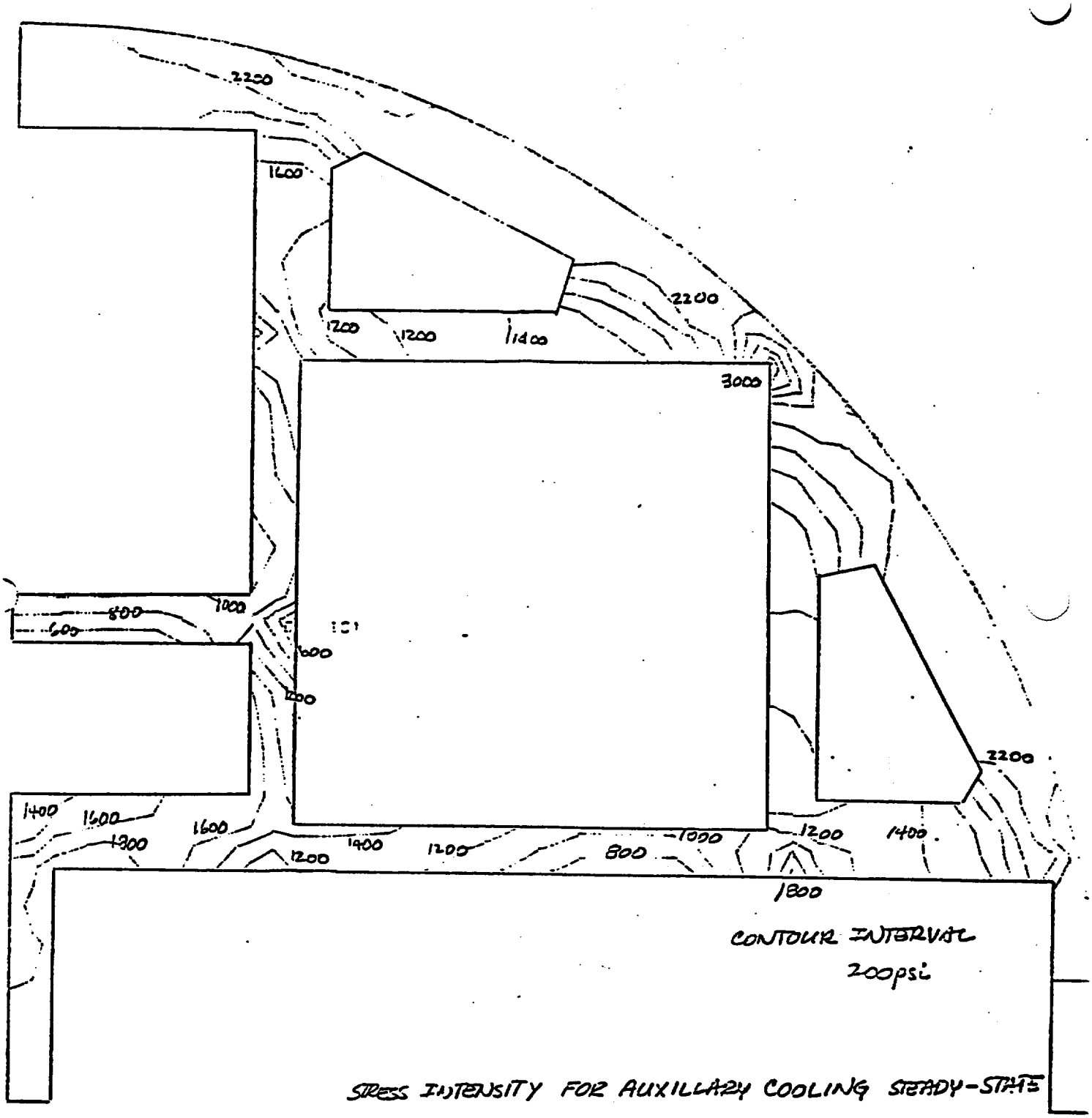
COOL-DOWN TRANS BLAS SOLN OF INNER SHELL TEMPERATURES

FIGURE 36



COOL-DOWN TRANS ELAS SOLN OF INNER SHELL TEMPERATURES

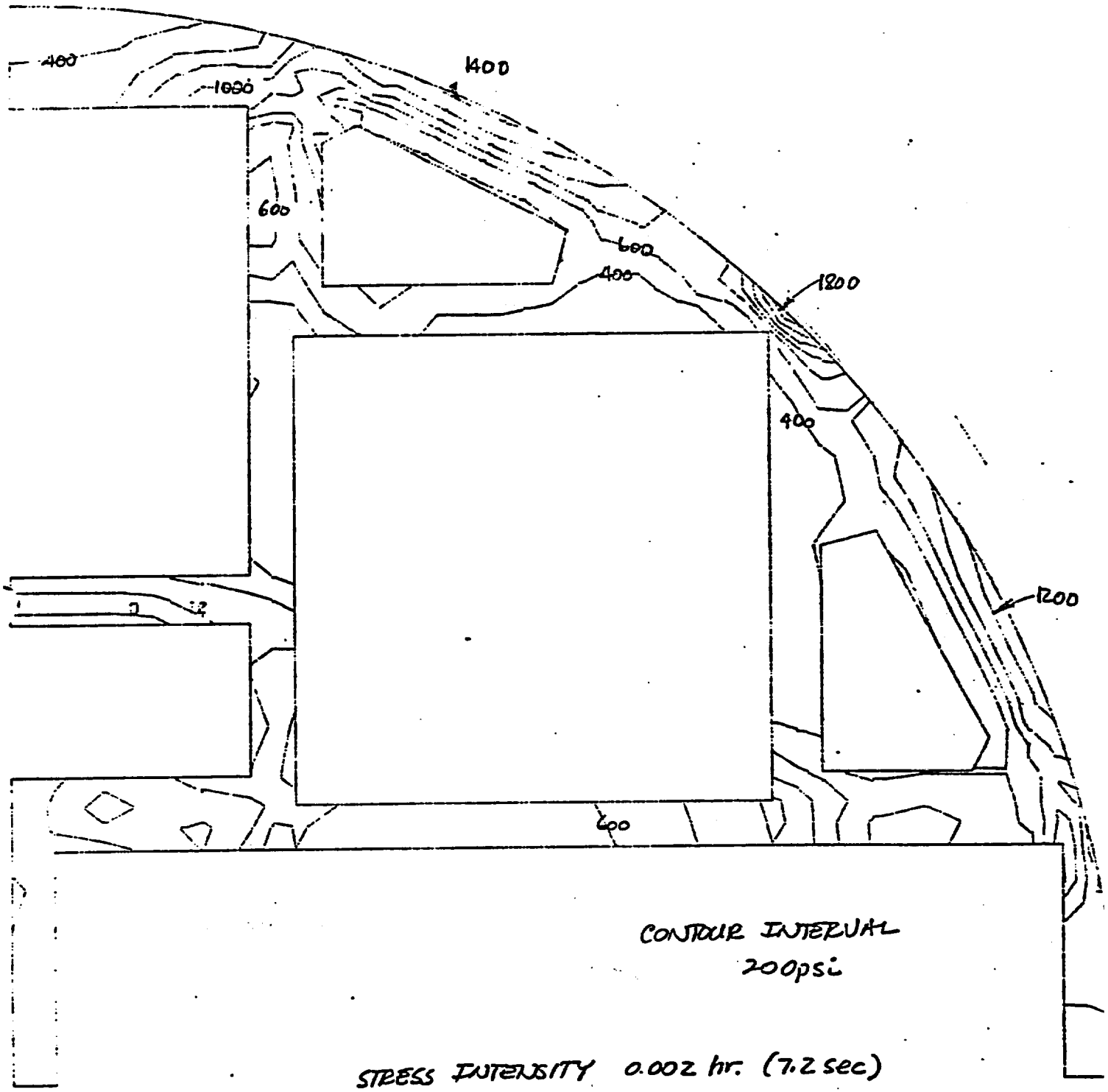
FIGURE 37



STRESS INTENSITY FOR AUXILLARY COOLING STEADY-STATE

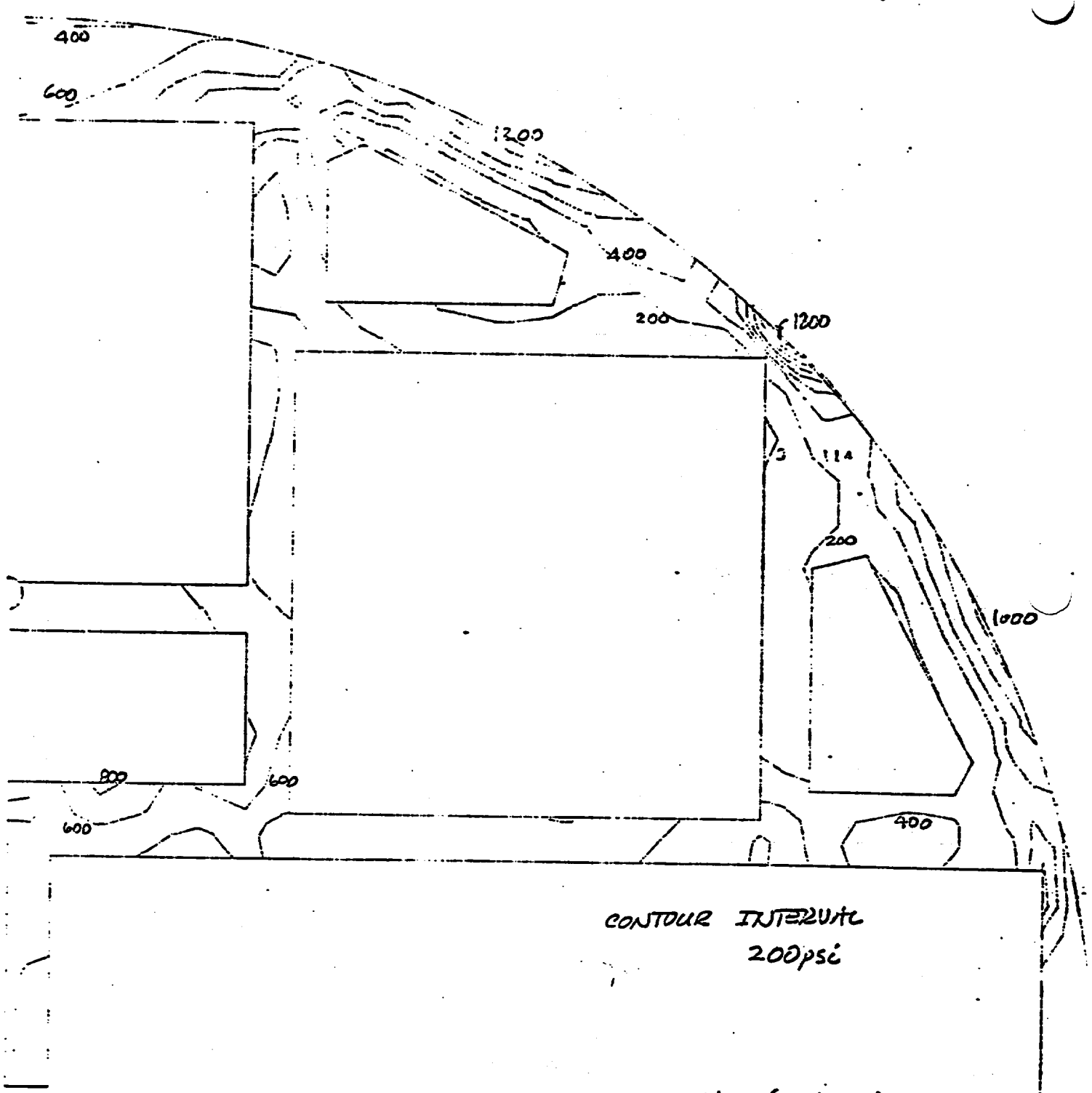
STRESS MODE: AUX COOLING STEADY-STATE E: AS-PLAS SOLN JHS 9-4 STRESS INTENSI

FIGURE 38



STRESS MODEL COOL DOWN TRANS ELAS-PLAS SOLN 0.002-0.004 HR. JHS STRESS INTENSI

FIGURE 39



STRESS INTENSITY 0.004 hr. (14.4 Sec)

STRESS MODEL COOL DOWN TRANS GLASS-PLAS SOLN 0 002-0 004 HR. JHS STRESS INTENSITY

FIGURE 40

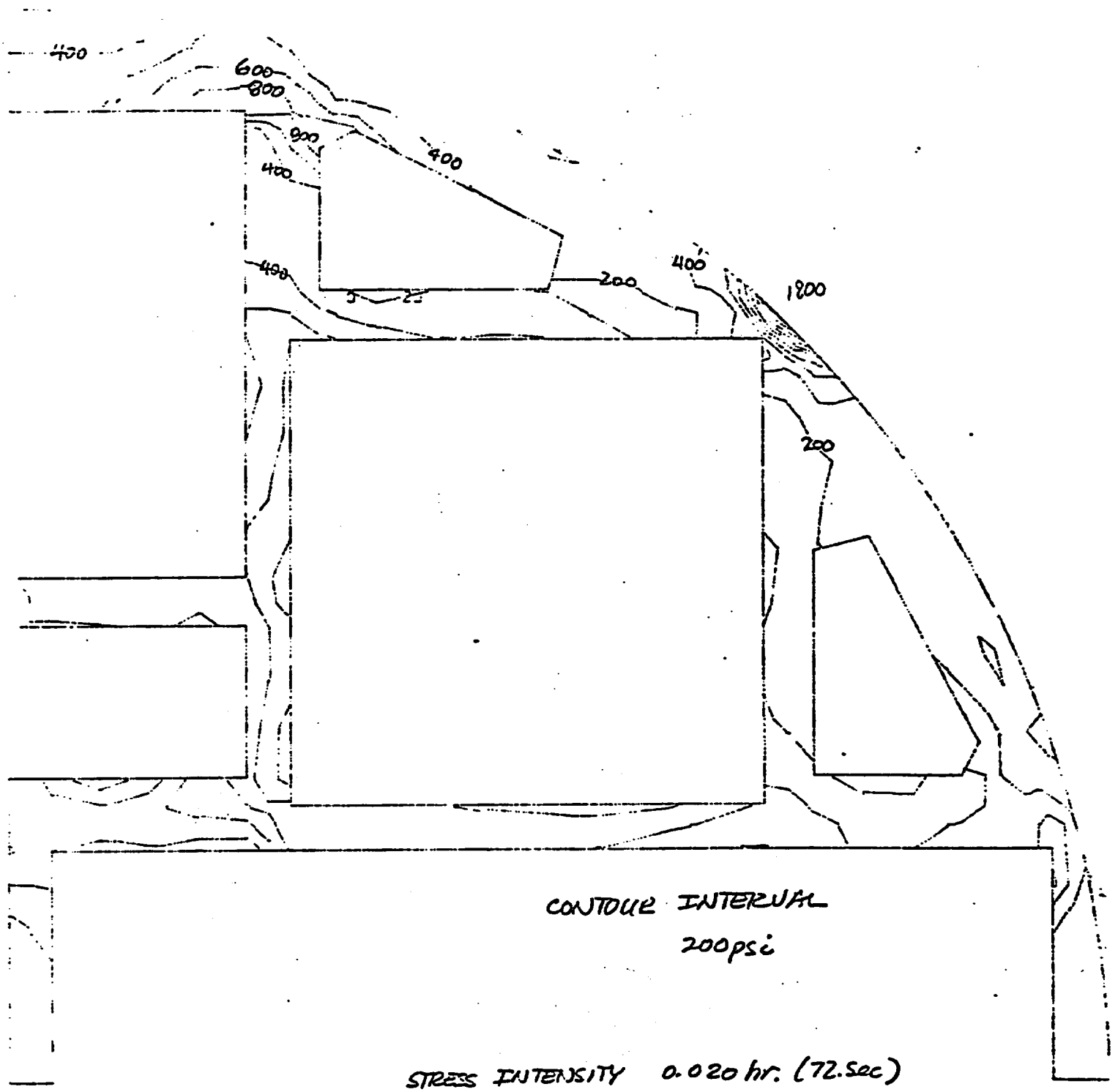
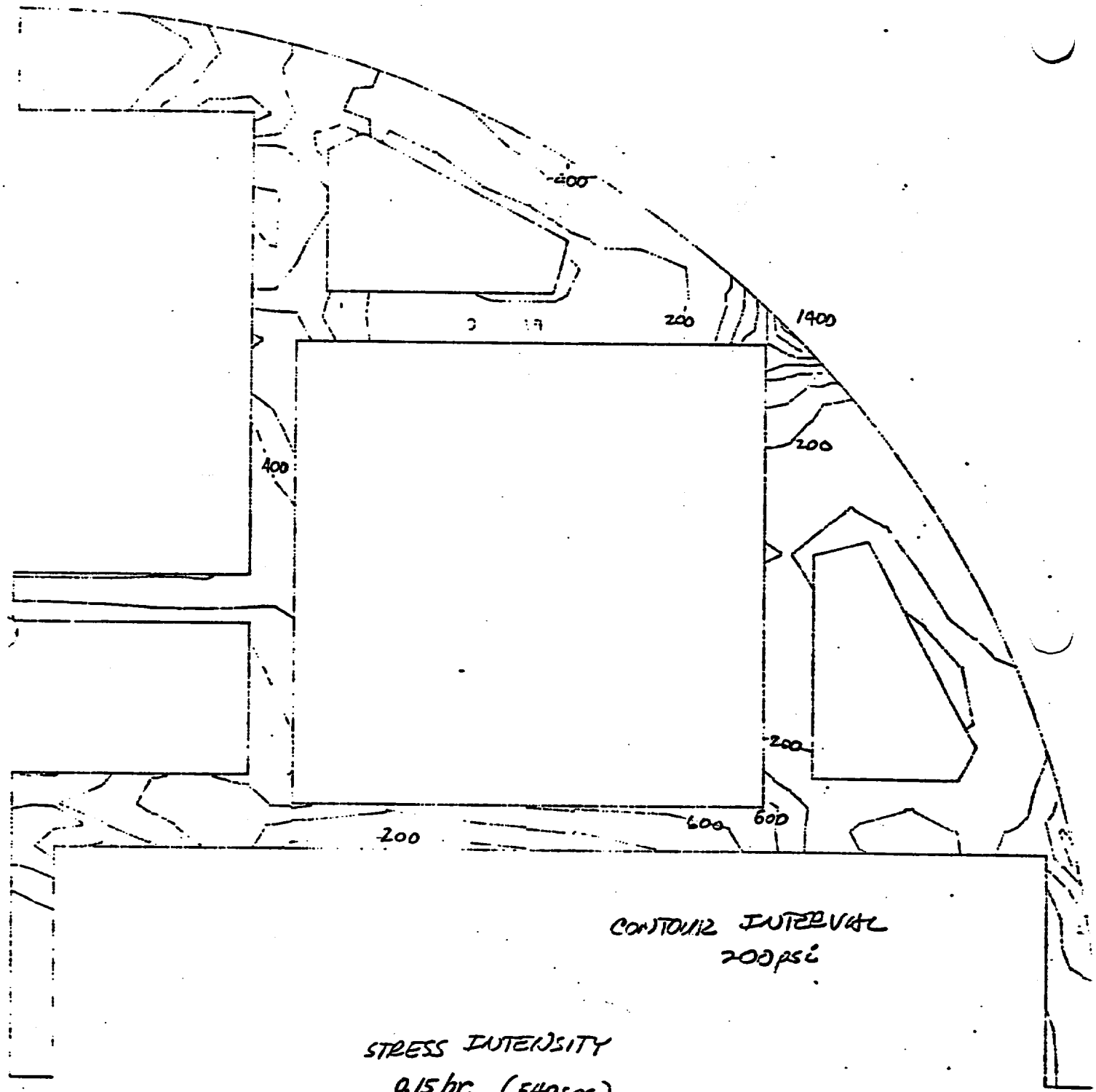
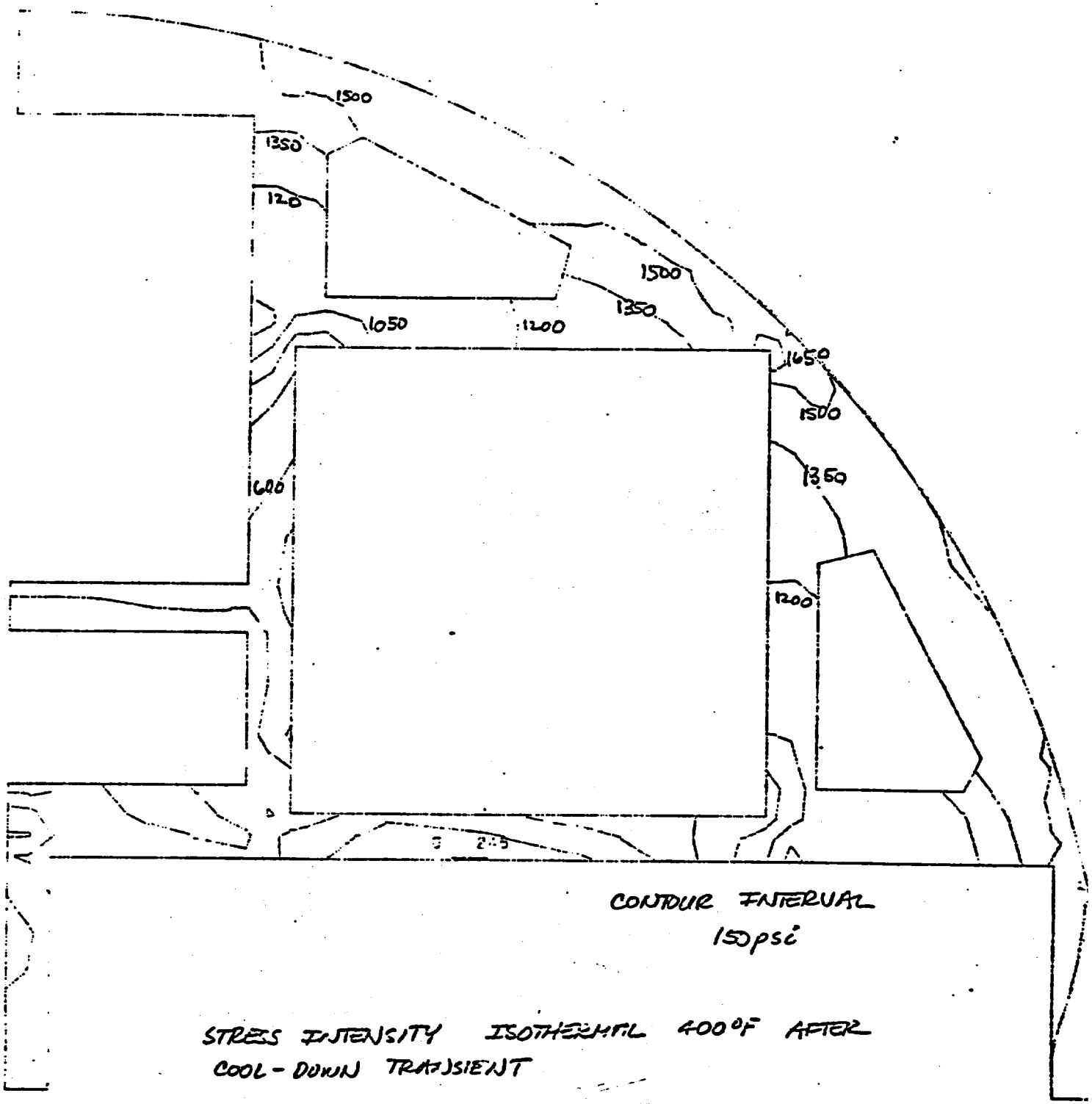

400
600
800
800
400
400
400
400
200
1800
200
CONTOUR INTERVAL
200psi
STRESS INTENSITY 0.020 hr. (72.Sec)

FIGURE 41



STRESS MODEL COOL DOWN TRANS LEAS-PLAS COIN C 004-0.15 HR. JMG STRESS INTENSIT

FIGURE 42



STRESS MODEL COOL DOWN TRANS 11 GS-PLAS SOLN 0 004-0.15 HR. JHG STRESS INTENSI

FIGURE 43

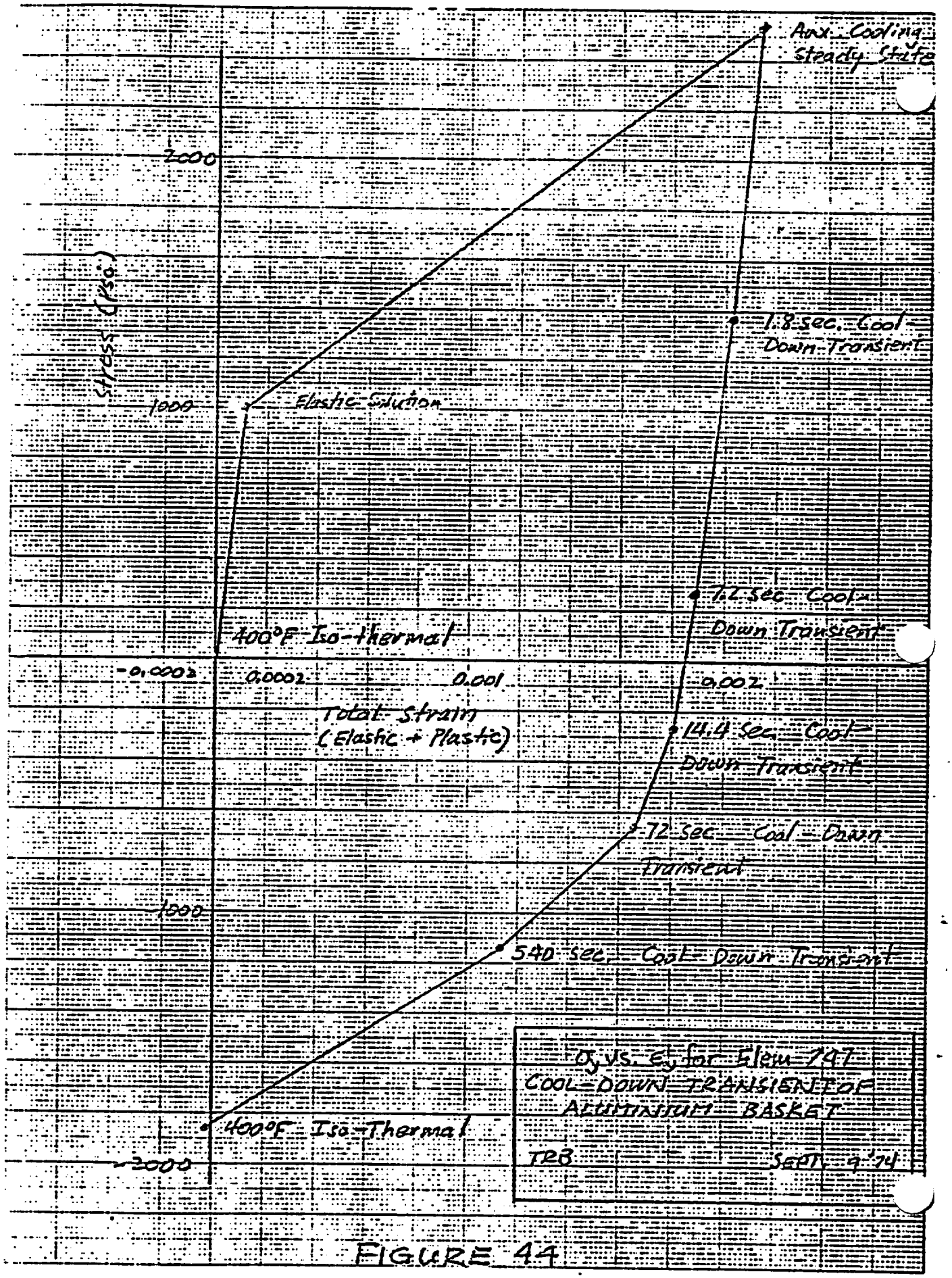
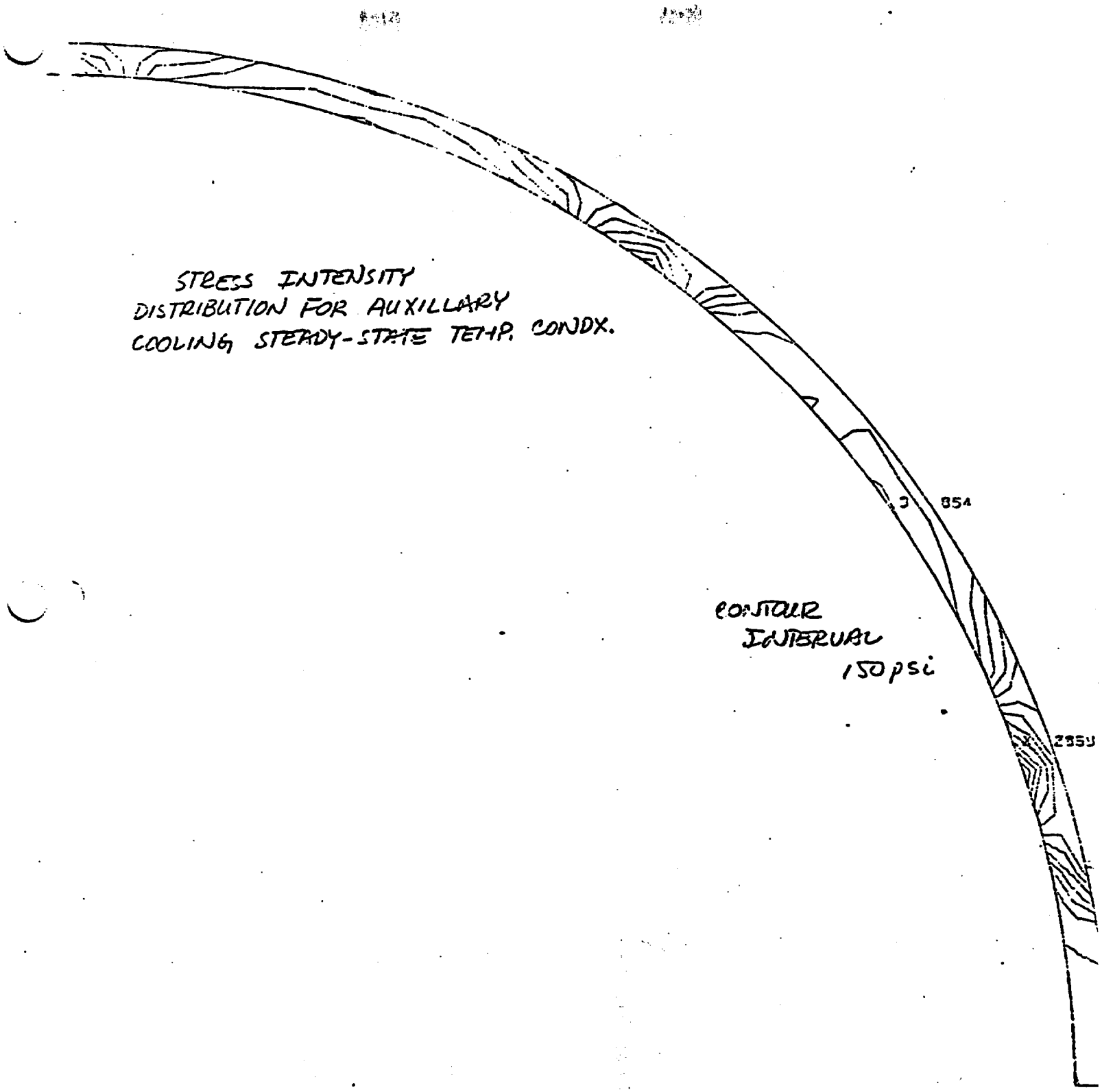

Aux. Cooling Steady State
2000
Stress (psi)
1.8 sec. Cool-Down Transient
1000
Elastic Solution
7.2 sec Cool-Down Transient
400°F Iso-thermal
-0.0002
0.0002
0.001
0.002
Total Strain (Elastic + Plastic)
14.4 sec Cool-Down Transient
72 sec Cool-Down Transient
-1000
540 sec. Cool-Down Transient
400°F Iso-Thermal
-2000
σ, vs. ε, for Item 197
COOL-DOWN TRANSIENT OF
ALUMINUM BASKET
TRB
SEPT. 9 '74

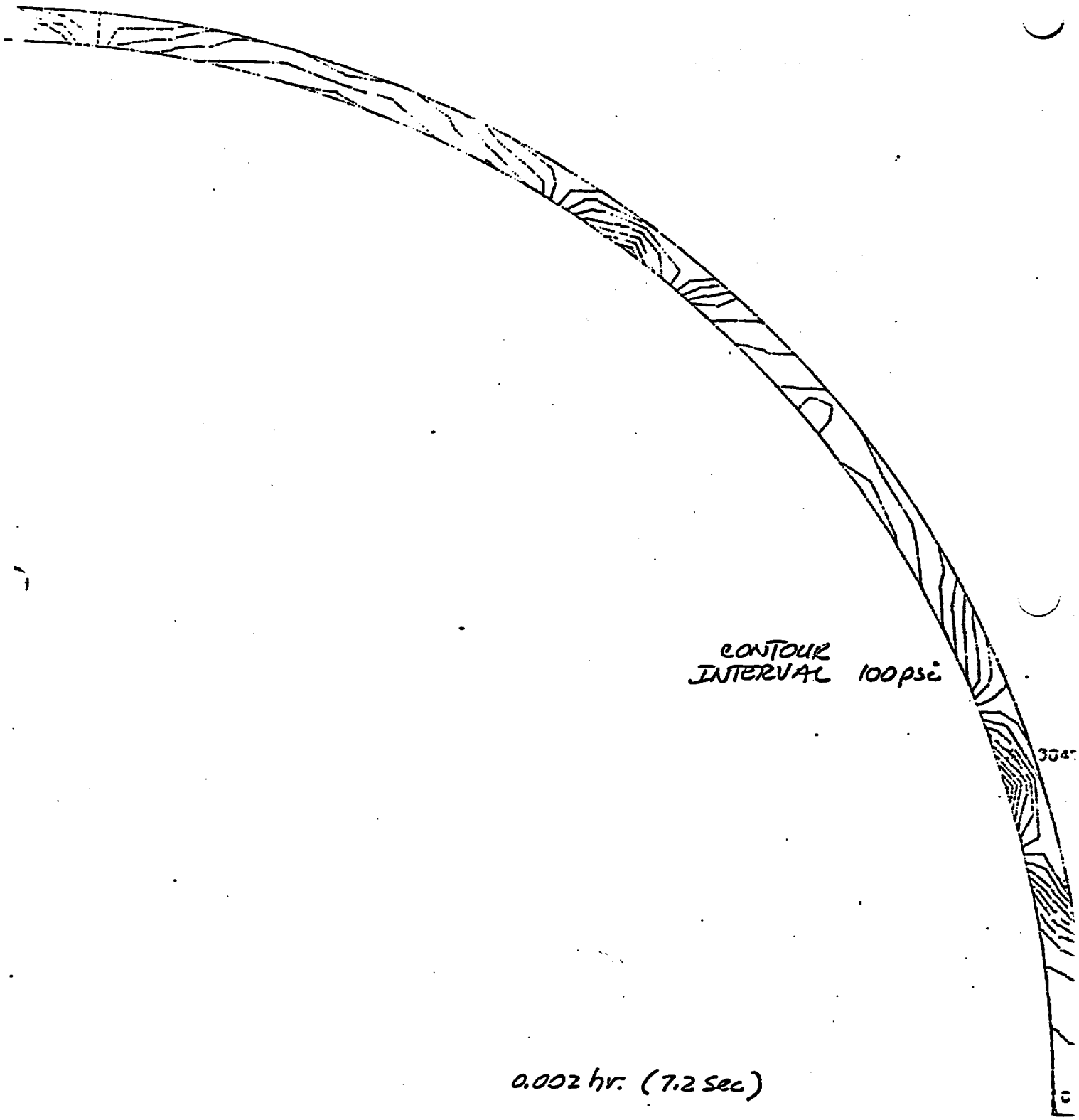
FIGURE 44



COOL-DOWN TRANS ELAS SOLN OF INNER SHELL JHS 3-9 STRESS INTENSITY

FIGURE 45

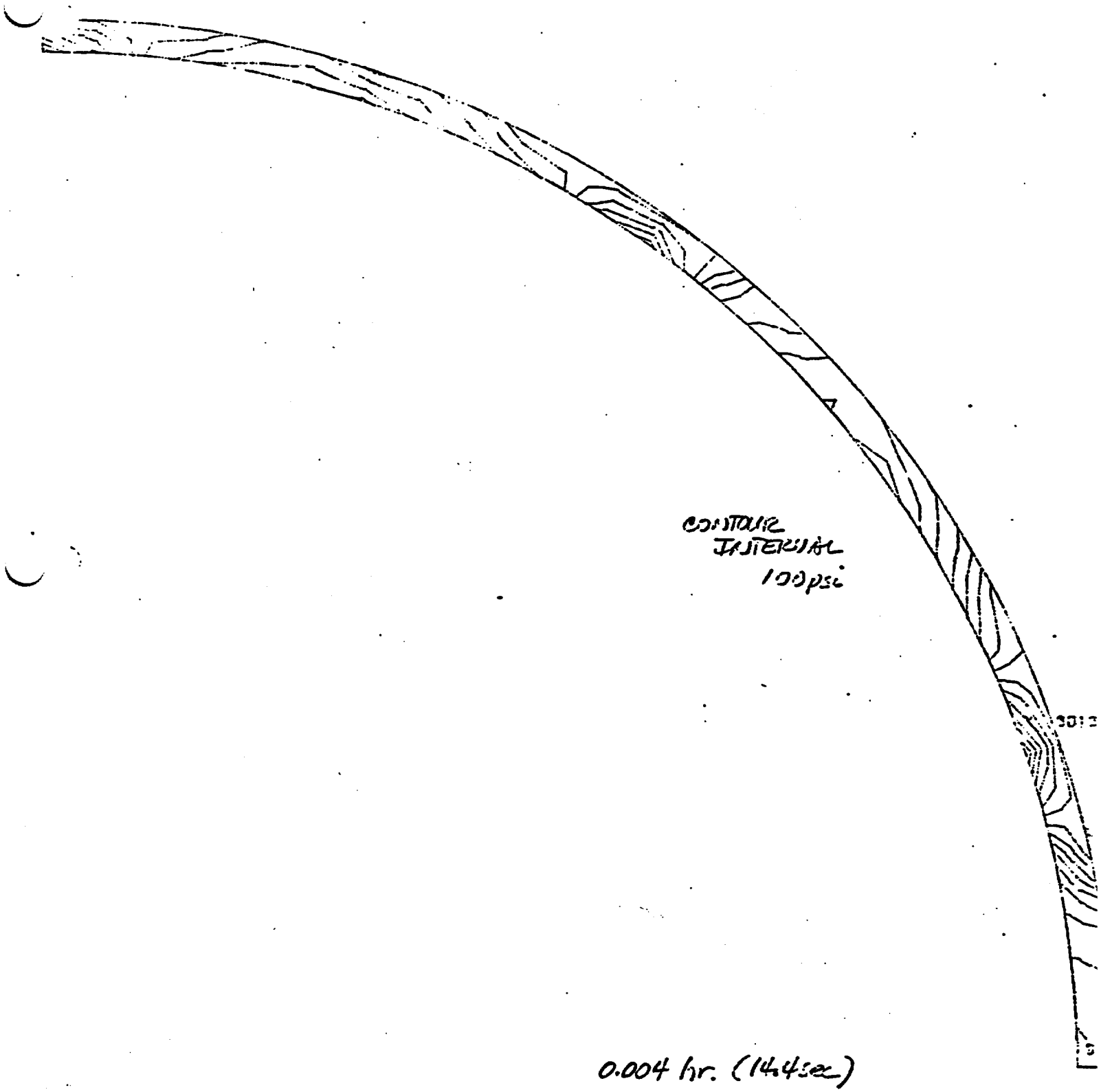
STEP= 1 ITERATION= 1



COOL-DOWN TRANS ELAS SOLN OF INNER SHELL STRESS INTENS

FIGURE 46

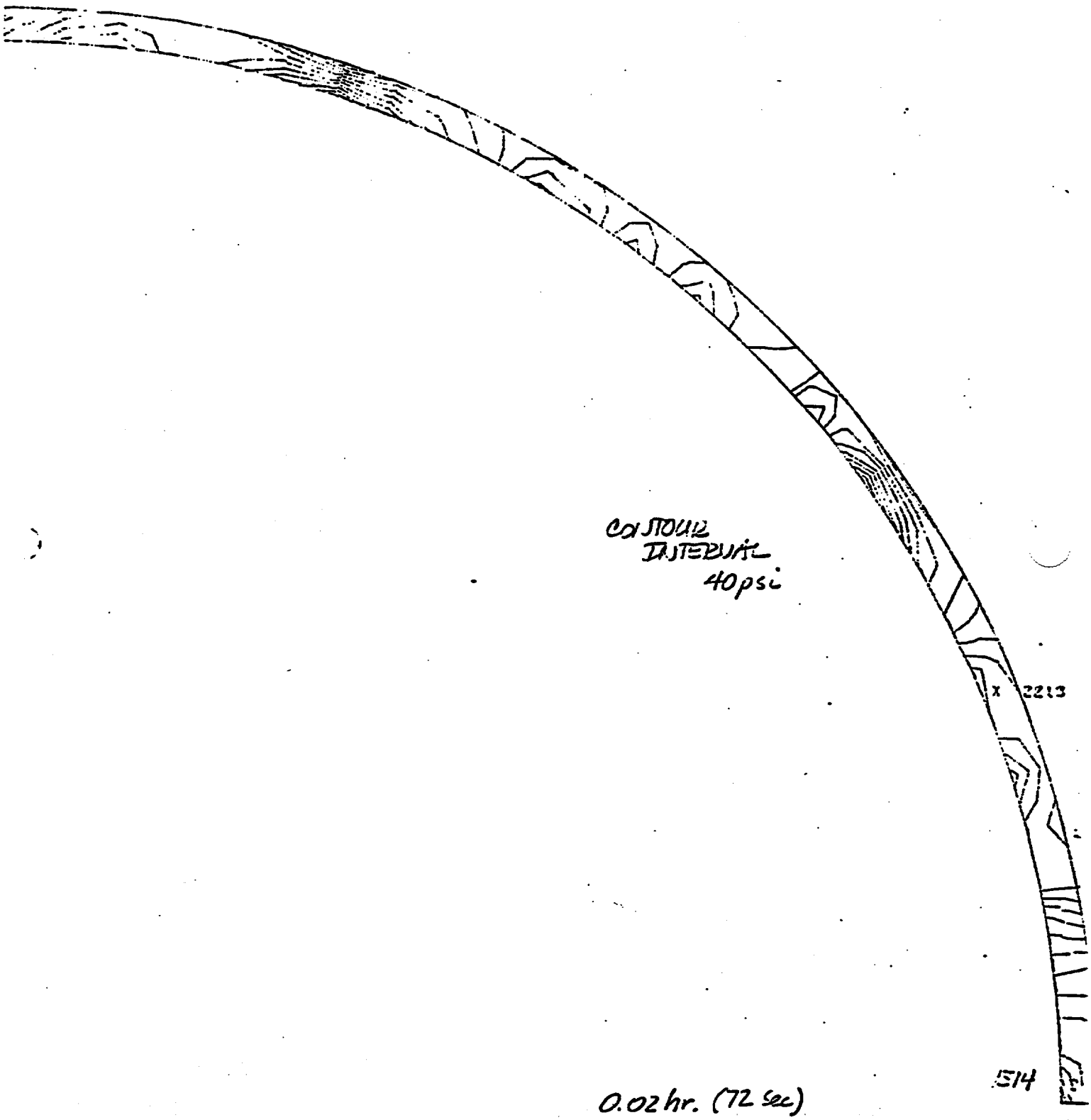
STEP= 2 ITERATION= 1



COOL-DOWN TRANS 8:55 SOLN OF INNER SHELL STRESS INTENSITY

FIGURE 47

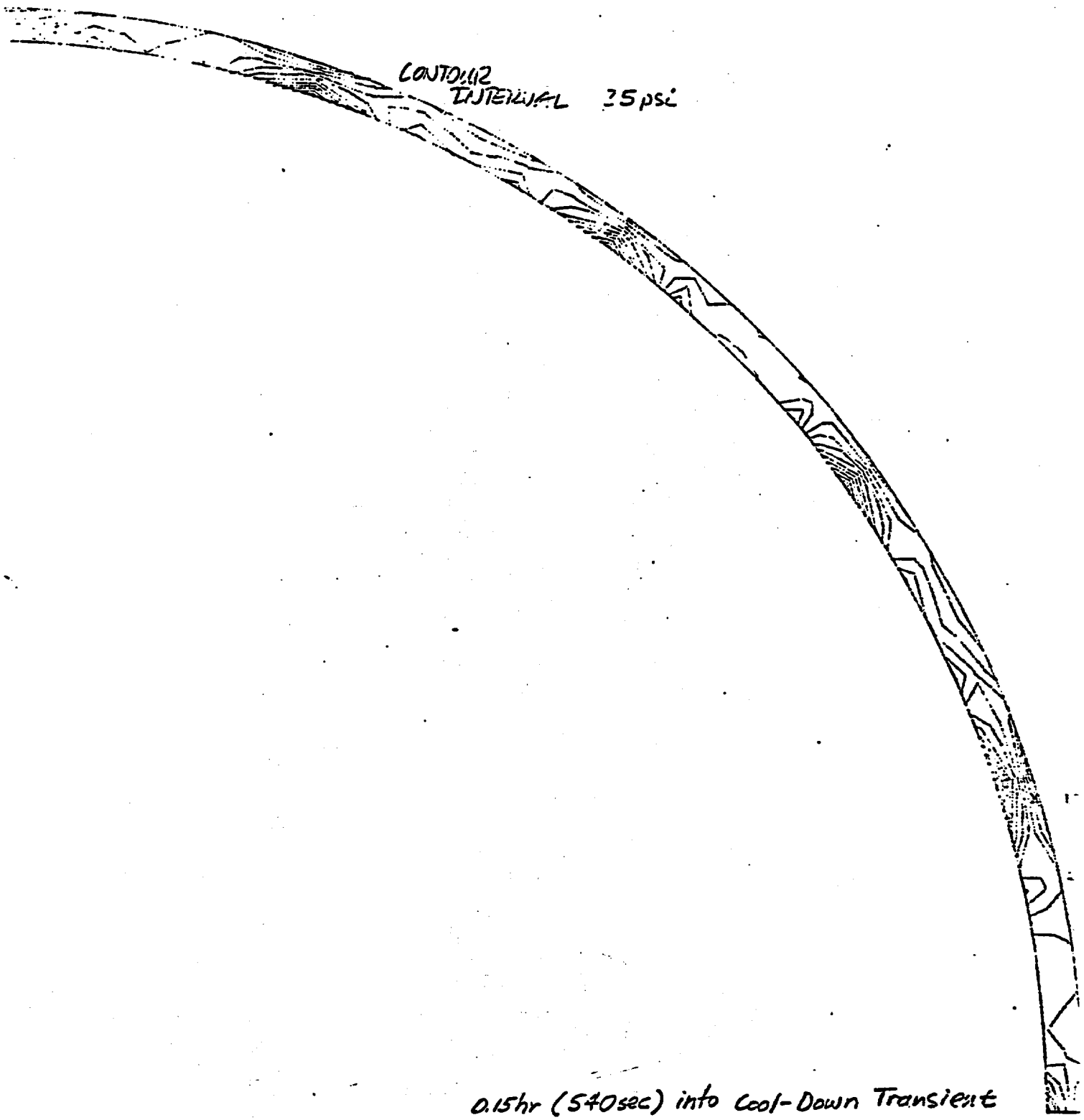
STEP= 3 ITERATION= 1



COOL-DOWN TRANS ELAC SOLN OF INNER SHELL STRESS INTENSITY

FIGURE 48

TEP= 4 ITERATION= 1



0.15hr (540sec) into Cool-Down Transient

COOL-DOWN TRANS ELAS SOLN OF INNER SHELL STRESS INTENSITY

FIGURE 49

Δ-CLEARANCE X10⁻³ IN.
10
20
30
40
50
60
70
80
90
100
SAD CLEARANCE
7 MILS
BEARING LOAD = 1.5 LB
LOCATION = 0.5"
WHEEL
SHAFT
Δ
X
Y

FIGURE 60

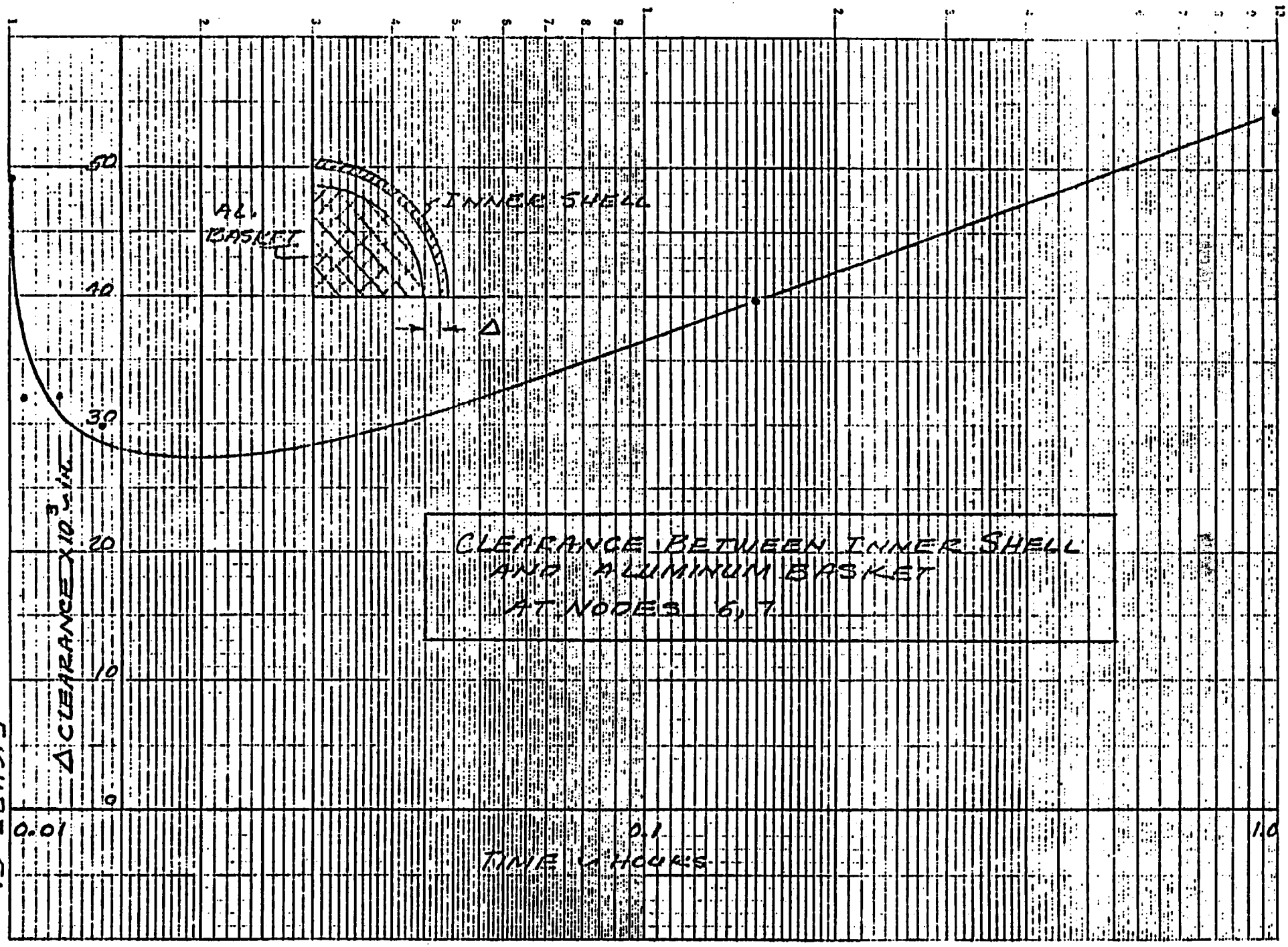
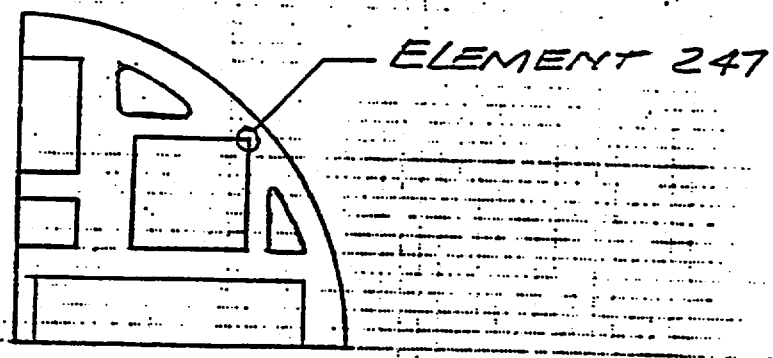
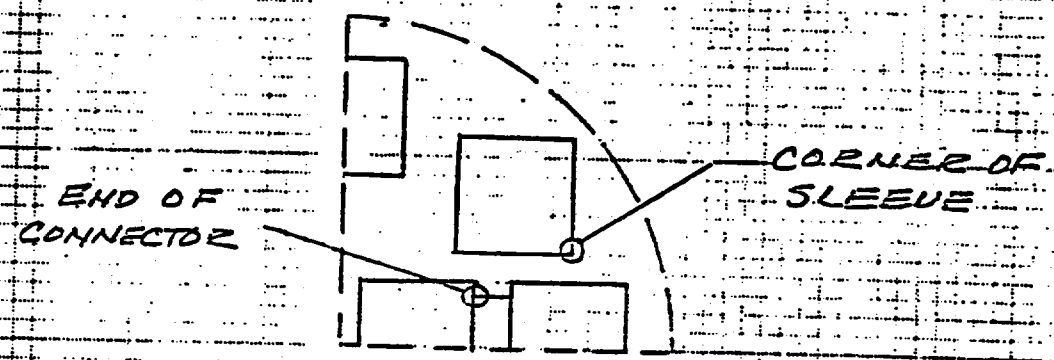

K+E SEMI-LOGARITHMIC 46 4973
KEUFFEL & ESSER CO.
ALL BASKET
INNER SHELL
Δ
CLEARANCE BETWEEN INNER SHELL AND ALUMINUM BASKET AT NODES 6, 7
ΔCLEARANCE X 10³ IN.
50
40
30
20
10
0
0.01
0.1
1.0
TIME IN HOURS

FIGURE 51



(a) ALUMINUM BASKET



(b) ABSORBER SLEEVES.

LOCATIONS OF LARGEST STRESS AND STRAIN

FIGURE 52

5.0 Detailed Calculations

This section contains the detailed calculations for the convection areas, flow areas, flow rates, etc.

CASK FLOW

AREA - PWR

Inside Area of Cask

$$A_c = \pi R_c^2$$

R = 22.5" From NL Drwg. No. 70651F, Rev. 1 Sht. 2 of 7

$$A_c = 1590.4 \text{ in}^2$$

Area of Basket w/o Fuel Cavities

$$A_b = \pi R_b^2$$

R_b = 22.48" Based on .020" Hot Gap - Ref. 1

$$A_b = 1587.6 \text{ in}^2$$

Area of Fuel Cavities in Aluminum

Single Fuel Element

$$A_{sf} = L^2$$

L = 9.705 in from NL Drwg. No. 70652F, Rev. 0, Sht. 2 of 2

$$A_{sf} = (9.705)^2 = \underline{94.19 \text{ in}^2}$$

Double Fuel Element

$$A_{df} = L \times W$$

L = 20.41" (NL 70652F, Rev. 0 Sht. 2 of 2)

W = 9.705"

$$A_{df} = (20.41)(9.705)$$

$$A_{df} = 198.08 \text{ in}^2$$

Cross-Sectional Area of Absorber Sleeve (NL 70652F, Rev. 0 Sht. 2 of 2)

Mean length of one side of Sleeve

$$L_m = \frac{8.956 + 9.633}{2}$$

$$L_m = 9.29''$$

Thickness of Sleeve

$$t = .2425 + 2\ (.048)$$

$$t = .339 \text{ in.}$$

Area $A_{as} = 4\ L_m\ t$

$$A_{as} = 4\ (9.29)\ (.339)$$

$$A_{as} = 12.6 \text{ in}^2$$

Area of Ports

Rectangular Port

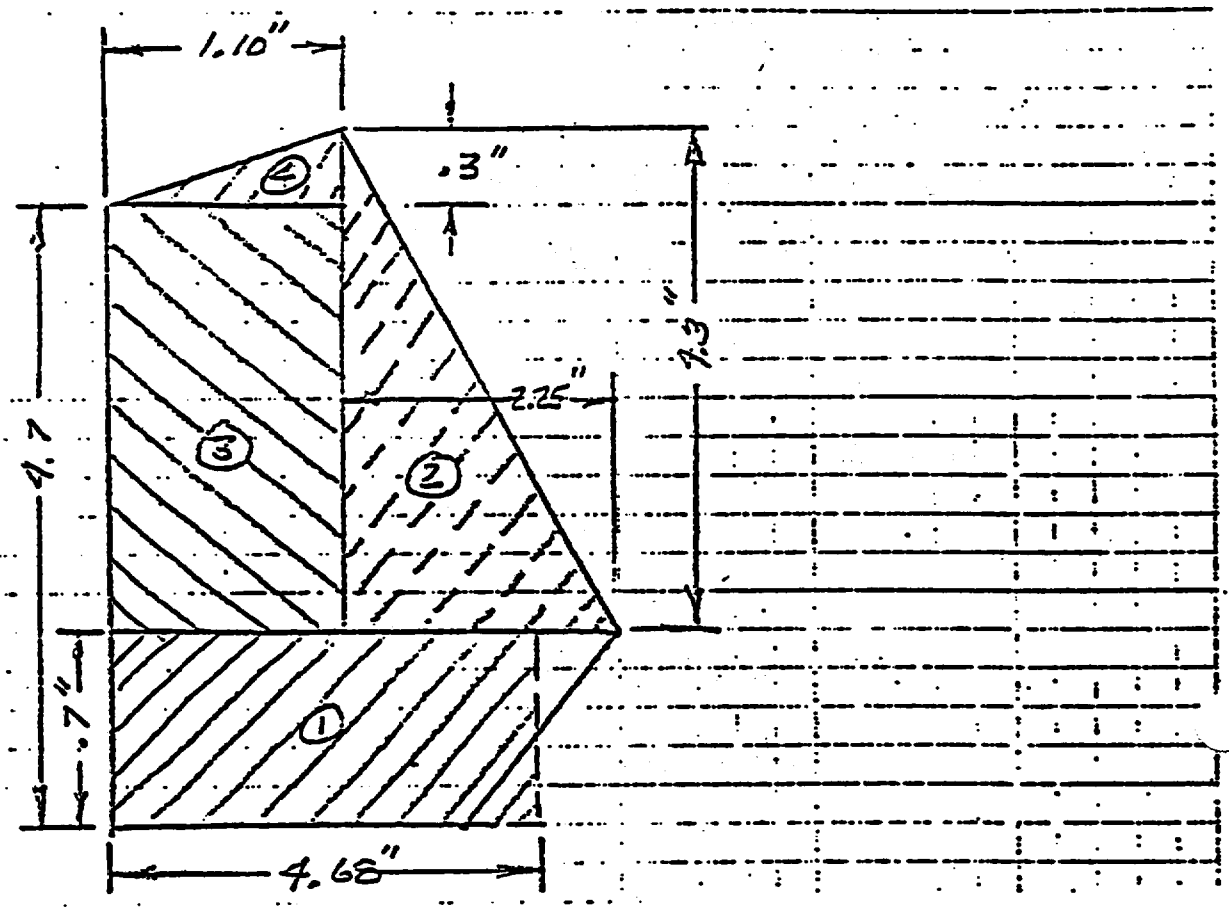
$A_{\square} = 2\ (4.85)\ (3.15)$ (For Dimensions See Ref. 1)

$$A_{\square} = 30.56 \text{ in}^2 / \square \text{ Port}$$

CASK FLOW

AREA - PWR

Triangular Ports (See Ref. 1)



$A_{①} = (.7)\ (4.68) = 3.28\ in^2$

$A_{②} = \frac{1}{2}\ (2.25)\ (4.3) = 4.84\ in^2$

$A_{③} = (4.0)\ (1.10) = 4.4\ in^2$

$A_{④} = \frac{1}{2}\ (1.1)\ (.3) = .17\ in^2$

$A_{\Delta} = \sum A_n = 12.69\ in^2$

Fuel Pin Area

One fuel El. Area $= 204 \times \frac{\pi D^2}{4} = 28.5\ in^2$ (D = .422")

Total fuel $A_{fe} = 10 \times 28.5 = 285\ in^2$

CASK FLOW

AREA - PWR

Total Flow Area

$$A_{tot} = A_c - A_b + 6A_{sf} + 2\,A_{df} - 10\,A_{as} + 2\,A_{\square} + 7\,A_{\Delta} - A_{FE}$$

$$A_{tot} = 1590.4 - 1587.6 + (6)\,(94.19) + (2)\,(198.08)$$

$$- (10)\,(12.6) + (2)\,(30.56) + (7)\,(12.69) - 285$$

$$A_{tot} = 706.19\ in^2\ (4.904\ Ft^2)$$

Vertical Steam Velocity

Steam Conditions

Temp. = 400°F

Press. = 248 psi

Q = 6000 #/hr

V_g = 1.86 Ft^3/# (Ref. 2)

A_{tot} = 706.19 in.^{2} = 4.904 Ft.^{2}

Q = 1.67 #/Sec.

A_{tot} . V. T = V_g . Q = (1.86) (1.67) = 3.106 Ft.^{3}

V = .633 Ft/Sec

<u>V = 7.60 "/Sec Steam Velocity</u>

Total time to fill cask with water assuming no Steam Generation:

$A_{tot} = 4.904\ Ft^2$

$L = 155.94"$ or 11.25 Ft (Aluminum Basket)

$Q = 1.67$ #/Sec.

Volume $= A_{tot} \cdot L = 55.17\ Ft^3$

$\rho = 53.65\ \#/Ft^3$ @ $400^\circ F$, $p = 248$ psi

Time $T = \frac{Vol.\ \rho}{Q} = \frac{(55.17)\ (53.65)}{(1.67)}$

$\underline{T = 29.5\ Min.}$

FORCED CONVECTION COEFFICIENT FOR WET DUCT

The sink temperature in the wet duct during Auxiliary Cooling (Steady-State) is 181°F

Forced Convection Coefficient

$$h = C\,(T_i - T_o)^b$$

T_i = Sink temperature

T_o = Source temperature

b = 0 for forced convection

Therefore

$$h_{fc} = C\,(T_i - T_o)^o = C$$

$$C = 696.0 \text{ BTU/hr - Ft}^2$$

or $$C = 4.833 \text{ BTU/hr - In}^2$$

SURFACE AREAS
-CONVECTION LINKS -
ALUMINUM

The following convection areas pertain to the Aluminum Surface.

Area is based on per inch of longitudinal length and equals 1/2 the areas between adjacent Nodes.

Node No.	Area (In^2)	Description
2	1.213	DOUBLE FUEL ELEMENT
30	2.426	
71	2.424	
72	2.423	
73	2.423	
74	2.423	
75	1.726	
76	1.726	
77	2.423	
78	2.423	
79	2.423	
80	2.425	
39	2.426	
13	1.213	
91	2.426	FUEL ELEMENT @ 45°
92	2.426	
93	2.426	
94	2.426	
95	2.426	
130	2.426	
156	2.426	
185	2.426	
135	2.426	
162	2.426	
190	1.618	
209	.809	
217	.809	
242	.808	
241	.809	
240	.809	
239	1.618	
238	2.426	
237	2.426	
236	2.426	

SURFACE AREAS
- CONVECTION LINKS -
ALUMINUM

Node No.	Area (In^2)	Description
153	1.213	FUEL ELE. @ 90°
154	2.426	
155	2.426	
184	2.426	
235	2.426	
264	2.426	
315	2.426	
314	2.426	
313	1.213	
96	1.213	RECTANGULAR PORT
97	2.426	
98	2.0	
129	1.574	
147	2.0	
146	2.426	
145	1.213	
253	1.925	UPPER TRIA. PORT
254	2.35	
255	1.675	
266	3.0	
293	4.854	
316	2.819	
306	1.142	
265	1.5	
109	1.925	LOWER TRIA. PORT
110	1.5	
111	1.142	
118	2.819	
137	4.854	
164	3.0	
163	1.675	
136	2.35	

6.0 Computer results

```
[illegible]
52039.5451   .2000   -11. -36512.    3.    1.  6861.  -6872.  6453.  2059. -38570. -34453.
62039.3856   0.0000   -10. -36519.    3.    1.  7088.  -7098.  7379.  2127. -38615. -34392.
 I      UN        US        ROT        UX        UY        EPS       EPTH     CURVE S    CURVE TH
 1 -5.851102  -.005267   .009541   6.851002   .005267   .0052668   .0034141   .0095011   0.0000000
 2 -5.852752  -.004213   .007947   6.852752   .004213   .0052668   .0034150   .0091339   0.0000000
 3 -5.854135  -.003160   .005985   6.854136   .003160   .0052668   .0034157   .0094727   0.0000000
 4 -5.855142  -.002107   .004155   6.855142   .002107   .0052668   .0034162   .0098016   0.0000000
 5 -5.855759  -.001053   .002062   6.855759   .001053   .0052668   .0034165   .0101444   0.0000000
 6 -5.855962  -.000000   .000000   6.855962   .000000   .0052668   .0034166   .0104843   0.0000000
FORCES ON NODE   63   .175355E+04   .162975E+04  -.444715E+14
FORCES ON NODE   64  -.476337E-36  -.162975E+04   .532365E+14

SHELL ELEM   67  NODES=   56   70  MAT=  1  LENGTH=      .1397  TEMPERATURES (1,2) =   451.0   417.2
 I      X        Y      SIG S  SIG TH   S MOM  TH MOM  S BEND  SIG S1  SIG S2 TH BEND SIG TH1 SIG TH2
12039.5853   4.5020   -130.  -3293.    11.    3.  4394.  -4523.  4264.  1319.  -4611.  -1974.
22039.6231   4.5020   -130.  -3293.    11.    3.  4093.  -4222.  3963.  1229.  -4521.  -2065.
32039.6613   4.5020   -130.  -3293.    10.    3.  3791.  -3921.  3662.  1139.  -4431.  -2155.
42039.6994   4.5020   -130.  -3293.     9.    3.  3490.  -3620.  3361.  1048.  -4340.  -2245.
52039.7376   4.5020   -130.  -3292.     8.    2.  3189.  -3319.  3061.   957.  -4236.  -2335.
62039.7757   4.5020   -130.  -3292.     8.    2.  2888.  -3018.  2759.   867.  -4130.  -2425.
 I      UN        US        ROT        UX        UY        EPS       EPTH     CURVE S    CURVE TH
 1  -.021316  6.816744  -.000455   6.816744   .021316   .0035477   .0033921   .0024237   .0000092
 2  -.021297  6.816879  -.000544   6.816879   .021297   .0035477   .0033921   .0022510   .0000093
 3  -.021274  6.817014  -.000627   6.817014   .021274   .0035477   .0033921   .0020830   .0000093
 4  -.021249  6.817150  -.000703   6.817150   .021249   .0035477   .0033921   .0019231   .0000093
 5  -.021221  6.817285  -.000773   6.817285   .021221   .0035477   .0033921   .0017571   .0000094
 6  -.021190  6.817420  -.000837   6.817420   .021190   .0035477   .0033921   .0015912   .0000094
FORCES ON NODE   56  -.325193E+05  -.413153E+05  -.223940E+15
FORCES ON NODE   70   .325978E+05   .413153E+05   .151157E+15

SHELL ELEM   68  NODES=   70   71  MAT=  1  LENGTH=      .1336  TEMPERATURES (1,2) =   417.2   417.3
 I      X        Y      SIG S  SIG TH   S MOM  TH MOM  S BEND  SIG S1  SIG S2 TH BEND SIG TH1 SIG TH2
12039.7757   4.5020   -130.   1429.     8.    2.  2484.  -3018.  2758.   867.   542.  2296.
22039.8139   4.5020   -130.   1429.     7.    2.  2587.  -2717.  2457.   777.   632.  2206.
32039.8521   4.5020   -130.   1429.     6.    2.  2286.  -2416.  2156.   687.   722.  2115.
42039.8901   4.5020   -130.   1429.     5.    2.  1985.  -2115.  1855.   596.   813.  2025.
52039.9282   4.5020   -130.   1429.     4.    1.  1684.  -1814.  1554.   566.   927.  1935.
62039.9663   4.5020   -130.   1429.     4.    1.  1383.  -1513.  1253.   416.  1017.  1845.
 I      UN        US        ROT        UX        UY        EPS       EPTH     CURVE S    CURVE TH
 1  -.021198  6.817420  -.000837   6.817420   .021198   .0033157   .0033921   .0019859   .0000094
 2  -.021157  6.817547  -.000835   6.817547   .021157   .0033157   .0033921   .0014236   .0000094
 3  -.021122  6.817673  -.000846   6.817673   .021122   .0033157   .0033921   .0012532   .0000095
 4  -.021095  6.817800  -.000990   6.817800   .021095   .0033157   .0033921   .0013819   .0000095
 5  -.021046  6.817926  -.001023   6.817926   .021046   .0033157   .0033921   .0009266   .0000095
 6  -.021046  6.818052  -.001061   6.818052   .021046   .0033157   .0033921   .0007593   .0000095
FORCES ON NODE   70  -.325978E+05  -.413153E+05  -.151157E+15
FORCES ON NODE   71   .325637E+05   .413153E+05   .723923E+14

SHELL ELEM   69  NODES=   71   72  MAT=  1  LENGTH=      .1337  TEMPERATURES (1,2) =   417.2   417.5
 I      X        Y      SIG S  SIG TH   S MOM  TH MOM  S BEND  SIG S1  SIG S2 TH BEND SIG TH1 SIG TH2
12039.9663   4.5020   -130.   1335.     4.    1.  1383.  -1513.  1254.   416.   959.  1881.
22040.0045   4.5020   -130.   1335.     3.    1.  1082.  -1212.   953.   326.  1050.  1711.
32040.0426   4.5020   -130.   1335.     2.    1.   781.   -911.   652.   235.  1170.  1620.
42040.0807   4.5020   -130.   1335.     1.    0.   480.   -610.   351.   145.  1290.  1530.
52040.1189   4.5020   -130.   1335.     0.    0.   179.   -309.    50.    55.  1310.  1440.
62040.1570   4.5020   -130.   1335.    -0.   -0.  -122.     -8.  -251.   -36.  1420.  1349.
 I      UN        US        ROT        UX        UY        EPS       EPTH     CURVE S    CURVE TH
 1  -.021046  6.818052  -.001061   6.818052   .021046   .0033179   .0033921   .0007533   .0000095
 2  -.020965  6.818179  -.001087   6.818179   .020965   .0033179   .0033921   .0005401   .0000095
 3  -.020924  6.818305  -.001106   6.818305   .020924   .0033179   .0033921   .0004238   .0000096
 4  -.020881  6.818432  -.001119   6.818432   .020881   .0033179   .0033921   .0002635   .0000096
 5  -.020839  6.818558  -.001126   6.818558   .020838   .0033179   .0033921   .0001635   .0000096
 6  -.020795  6.818685  -.001127   6.818685   .020795   .0033179   .0033921   .0000671   .0000096
FORCES ON NODE   71  -.325637E+05  -.413153E+05  -.723923E+14
FORCES ON NODE   72   .325307E+05   .413153E+05  -.637433E+13
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DOUBLE ABSORBER SLEEVE, EL. 67

STEADY STATE W/AUX. COOLING

1	-6.385732	-.003106	-.000659	6.385732	.003106	.0031061	.0031776	-.0006626	0.0000000
2	-6.385613	-.002485	-.000527	6.385613	.002485	.0031061	.0031776	-.0006613	0.0000000
3	-6.385521	-.001864	-.000395	6.385521	.001864	.0031061	.0031775	-.0006601	0.0000000
4	-6.385455	-.001242	-.000263	6.385455	.001242	.0031061	.0031775	-.0006589	0.0000000
5	-6.385416	-.000621	-.000131	6.385416	.000621	.0031061	.0031775	-.0006576	0.0000000
6	-6.385403	-.000000	.000000	6.385403	.000000	.0031061	.0031775	-.0006564	0.0000000

FORCES ON NODE 63 .667294E+01 .154414E+06 .359248E+03
FORCES ON NODE 64 -.476837E-06 -.154414E+06 -.359848E+03

DOUBLE ABSORBER SLEEVE, EL. 67

COOL-DOWN TRANS. W/AUX. COOLING

SHELL ELEM 67 NODES= 56 70 MAT= 1 LENGTH= .1907 TEMPERATURES (1,2) = 417.0 400.0

T	X	Y	SIG S	SIG TH	S MOM	TH MOM	S MEND	SIG S1	SIG S2	TH MEND	SIG TH1	SIG TH2
12000.5850		4.5020	-71.	-1840.	-84.	-25.	-32350.	32279.	-32420.	-9702.	7842.	-11542.
22000.6231		4.5020	-71.	-1840.	-79.	-24.	-31232.	30161.	-30302.	-9067.	7227.	-10787.
32000.6613		4.5020	-71.	-1840.	-73.	-22.	-28114.	28043.	-28184.	-8433.	6597.	-10273.
42000.6994		4.5020	-70.	-1840.	-68.	-20.	-25996.	25925.	-26066.	-7798.	5958.	-9637.
52000.7376		4.5020	-70.	-1840.	-62.	-19.	-23877.	23807.	-23948.	-7163.	5323.	-9002.
62000.7757		4.5020	-70.	-1840.	-57.	-17.	-21759.	21689.	-21830.	-6528.	4688.	-8367.

I	UN	US	HOT	UX	UY	EPS	EPTH	CURVE S	CURVE TH
1	-.014040	6.392271	-.013146	6.392271	.014049	.0032675	.0031809	-.0177361	.0000016
2	-.013941	6.392396	-.012692	6.392396	.013941	.0032675	.0031809	-.0165748	.0000012
3	-.013858	6.392520	-.011882	6.392520	.013858	.0032675	.0031809	-.0154134	.0000009
4	-.013797	6.392645	-.011316	6.392645	.013797	.0032675	.0031809	-.0142521	.0000007
5	-.013757	6.392770	-.010795	6.392770	.013757	.0032675	.0031809	-.0130908	.0000004
6	-.013736	6.392894	-.010317	6.392894	.013736	.0032675	.0031809	-.0119295	.0000002

FORCES ON NODE 56 -.176871E+05 .290594E+06 .149207E+06
FORCES ON NODE 70 .177389E+05 -.290594E+06 -.113885E+06

SHELL ELEM 68 NODES= 7 71 MAT= 1 LENGTH= .1906 TEMPERATURES (1,2) = 400.0 400.0

T	X	Y	SIG S	SIG TH	S MOM	TH MOM	S MEND	SIG S1	SIG S2	TH MEND	SIG TH1	SIG TH2
12000.7757		4.5020	-71.	410.	-57.	-17.	-21759.	21689.	-21830.	-6528.	6937.	-4118.
22000.8138		4.5020	-71.	410.	-51.	-15.	-19642.	19572.	-19713.	-5893.	6302.	-5483.
32000.8520		4.5020	-71.	410.	-46.	-14.	-17525.	17454.	-17596.	-5258.	5668.	-4848.
42000.8901		4.5020	-71.	410.	-40.	-12.	-15408.	15337.	-15478.	-4623.	5033.	-4213.
52000.9282		4.5020	-71.	410.	-35.	-10.	-13291.	13220.	-13361.	-3988.	4398.	-3578.
62000.9663		4.5020	-71.	410.	-20.	-9.	-11173.	11103.	-11244.	-3353.	3763.	-2944.

I	UN	US	HOT	UX	UY	EPS	EPTH	CURVE S	CURVE TH
1	-.013734	6.392894	-.010317	6.392894	.013736	.0031574	.0031809	-.0119104	.0000002
2	-.013732	6.393015	.000115	6.393015	.013732	.0031574	.0031809	-.0107515	-.0000001
3	-.013744	6.393135	.000503	6.393135	.013744	.0031574	.0031809	-.0095926	-.0000003
4	-.013779	6.393256	.000896	6.393256	.013779	.0031574	.0031809	-.0084336	-.0000006
5	-.013808	6.393376	.001146	6.393376	.013808	.0031574	.0031809	-.0072747	-.0000006
6	-.013857	6.393496	.001481	6.393496	.013857	.0031574	.0031809	-.0061158	-.0000007

FORCES ON NODE 70 -.177389E+05 .290594E+06 .113885E+06
FORCES ON NODE 71 .177212E+05 -.290594E+06 -.584856E+05

SHELL ELEM 69 NODES= 71 72 MAT= 1 LENGTH= .1907 TEMPERATURES (1,2) = 400.0 400.0

T	X	Y	SIG S	SIG TH	S MOM	TH MOM	S MEND	SIG S1	SIG S2	TH MEND	SIG TH1	SIG TH2
12000.9663		4.5020	-71.	410.	-20.	-9.	-11173.	11103.	-11244.	-3353.	3763.	-2943.
22010.0045		4.5020	-71.	410.	-24.	-7.	-9057.	8986.	-9127.	-2718.	3128.	-2309.
32010.0426		4.5020	-71.	410.	-18.	-5.	-6940.	6869.	-7010.	-2083.	2493.	-1674.
42010.0807		4.5020	-71.	410.	-13.	-4.	-4823.	4752.	-4893.	-1448.	1858.	-1039.
52010.1189		4.5020	-71.	410.	-7.	-2.	-2706.	2635.	-2777.	-813.	1223.	-404.
62010.1570		4.5020	-71.	410.	-2.	-0.	-589.	519.	-660.	-178.	588.	231.

I	UN	US	HOT	UX	UY	EPS	EPTH	CURVE S	CURVE TH
1	-.013857	6.393496	.001481	6.393496	.013857	.0031574	.0031809	-.0061158	-.0000007
2	-.013914	6.393617	.001612	6.393617	.013914	.0031574	.0031809	-.0049570	-.0000008
3	-.013979	6.393737	.001779	6.393737	.013979	.0031574	.0031809	-.0037983	-.0000009
4	-.014040	6.393857	.001952	6.393857	.014049	.0031574	.0031809	-.0026396	-.0000009
5	-.014124	6.393978	.001980	6.393978	.014124	.0031574	.0031809	-.0014809	-.0000010
6	-.014200	6.394098	.002015	6.394098	.014200	.0031574	.0031809	-.0003222	-.0000010

FORCES ON NODE 71 -.177212E+05 .290594E+06 .584856E+05
FORCES ON NODE 72 .177114E+05 -.290594E+06 -.398485E+04

SHELL ELEM 70 NODES= 72 73 MAT= 1 LENGTH= .1906 TEMPERATURES (1,2) = 400.0 400.0

T	X	Y	SIG S	SIG TH	S MOM	TH MOM	S MEND	SIG S1	SIG S2	TH MEND	SIG TH1	SIG TH2
12010.1570		4.5020	-70.	410.	-2.	-0.	-589.	0.	-660.	-178.	588.	231.

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ELEM 131 NODES= 149 178 453 454   MATERIAL = 2  AREA=  .4453  STRESS INT.=   3015.  SIGEFF=   2721.
X= 21.75 Y=  6.44 T= 232. XY STR=    488.  -2020.    837.    0. MAX-MIN STR=   742.  -2274.   1508. A= 73.1

ELEM 132 NODES= 454 453 179 150   MATERIAL = 2  AREA=  .4527  STRESS INT.=   2269.  SIGEFF=   1970.
X= 22.11 Y=  6.85 T= 214. XY STR=   1143.   2129.   -397.    0. MAX-MIN STR=  2269.   1033.    633. A=-19.4

ELEM 133 NODES= 164 149 454 455   MATERIAL = 2  AREA=  .4451  STRESS INT.=   3047.  SIGEFF=   2744.
X= 21.38 Y=  7.67 T= 232. XY STR=    439.  -1942.    951.    0. MAX-MIN STR=   772.  -2275.   1524. A= 78.7

ELEM 134 NODES= 455 454 150 165   MATERIAL = 2  AREA=  .4524  STRESS INT.=   2278.  SIGEFF=   1970.
X= 21.73 Y=  7.70 T= 214. XY STR=   1125.   2164.   -343.    0. MAX-MIN STR=  2278.   1019.    626. A=-17.8

ELEM 135 NODES= 176 164 455 456   MATERIAL = 2  AREA=  .4452  STRESS INT.=   1938.  SIGEFF=   1902.
X= 20.95 Y=  8.48 T= 243. XY STR=    -344.  -1667.    657.    0. MAX-MIN STR=   -73.  -1938.    932. A= 67.6

ELEM 136 NODES= 456 455 165 177   MATERIAL = 2  AREA=  .4526  STRESS INT.=   2053.  SIGEFF=   1998.
X= 21.30 Y=  8.02 T= 229. XY STR=     124.   1498.   -650.    0. MAX-MIN STR=  1937.   -116.   1027. A=-28.0

ELEM 137 NODES= 182 176 456 457   MATERIAL = 2  AREA=  .4451  STRESS INT.=   1698.  SIGEFF=   1550.
X= 20.47 Y=  9.76 T= 253. XY STR=    -613.  -1429.    536.    0. MAX-MIN STR=  -348.  -1695.    673. A= 63.7

ELEM 138 NODES= 457 456 177 183   MATERIAL = 2  AREA=  .4523  STRESS INT.=   2184.  SIGEFF=   1937.
X= 20.81 Y=  9.03 T= 241. XY STR=     -54.   1338.   -784.    0. MAX-MIN STR=  1694.   -410.   1052. A=-24.3

ELEM 139 NODES= 199 182 457 458   MATERIAL = 2  AREA=  .4480  STRESS INT.=   1537.  SIGEFF=   1439.
X= 19.93 Y= 10.02 T= 258. XY STR=    -532.  -1211.    567.    0. MAX-MIN STR=  -211.  -1532.    661. A= 60.4

ELEM 140 NODES= 458 457 183 200   MATERIAL = 2  AREA=  .4524  STRESS INT.=   1806.  SIGEFF=   1686.
X= 20.24 Y= 11.63 T= 247. XY STR=     129.   1131.   -751.    0. MAX-MIN STR=  1533.   -273.    903. A=-29.1

ELEM 141 NODES= 294 199 458 459   MATERIAL = 2  AREA=  .4452  STRESS INT.=   1458.  SIGEFF=   1449.
X= 19.34 Y= 11.05 T= 261. XY STR=    -419.  -1058.    645.    0. MAX-MIN STR=   -19.  -1458.    720. A= 58.2

ELEM 142 NODES= 459 458 2 0 225   MATERIAL = 2  AREA=  .4526  STRESS INT.=   1460.  SIGEFF=   1453.
X= 19.64 Y= 12.08 T= 258. XY STR=     395.   1080.   -637.    0. MAX-MIN STR=  1460.     15.    723. A=-30.9

ELEM 211 NODES= 244 279 459 460   MATERIAL = 2  AREA=  .4494  STRESS INT.=   1307.  SIGEFF=   1206.
X= 18.69 Y= 12.85 T= 264. XY STR=    -579.   -965.    494.    0. MAX-MIN STR=  -238.  -1307.    535. A= 55.6

ELEM 212 NODES= 46 459 225 245   MATERIAL = 2  AREA=  .4597  STRESS INT.=   1652.  SIGEFF=   1511.
X= 19.09 Y= 13.26 T= 254. XY STR=     177.    792.   -767.    0. MAX-MIN STR=  1310.   -342.    826. A=-34.1

ELEM 213 NODES= 280 244 460 461   MATERIAL = 2  AREA=  .4485  STRESS INT.=   1308.  SIGEFF=   1254.
X= 17.99 Y= 13.81 T= 263. XY STR=    -549.   -875.    573.    0. MAX-MIN STR=  -116.  -1308.    596. A= 52.9

ELEM 214 NODES= 461 460 245 255   MATERIAL = 2  AREA=  .4528  STRESS INT.=   1498.  SIGEFF=   1414.
X= 18.29 Y= 14.23 T= 254. XY STR=     370.    755.   -724.    0. MAX-MIN STR=  1317.   -186.    749. A=-37.5

ELEM 215 NODES= 258 254 481 462   MATERIAL = 2  AREA=  .2228  STRESS INT.=   1596.  SIGEFF=   1539.
X= 17.44 Y= 14.81 T= 261. XY STR=    -558.   -797.    783.    0. MAX-MIN STR=   121.  -1475.    798. A= 49.3

ELEM 216 NODES= 462 461 255 259   MATERIAL = 2  AREA=  .2245  STRESS INT.=   1477.  SIGEFF=   1376.
X= 17.71 Y= 14.75 T= 257. XY STR=     774.    930.   -613.    0. MAX-MIN STR=  1477.    230.    624. A=-41.5

ELEM 217 NODES= 268 258 482 463   MATERIAL = 2  AREA=  .2223  STRESS INT.=   1477.  SIGEFF=   1464.
X= 17.04 Y= 14.85 T= 250. XY STR=    -648.   -857.    717.    0. MAX-MIN STR=   -28.  -1477.    725. A= 49.1

ELEM 218 NODES= 463 482 259 269   MATERIAL = 2  AREA=  .2260  STRESS INT.=   1504.  SIGEFF=   1492.
X= 17.34 Y= 15.37 T= 249. XY STR=     626.    826.   -744.    0. MAX-MIN STR=  1478.    -26.    752. A=-41.2

ELEM 244 NODES= 279 268 483 484   MATERIAL = 2  AREA=  .2228  STRESS INT.=   1495.  SIGEFF=   1489.
X= 16.64 Y= 15.41 T= 257. XY STR=    -683.   -823.    731.    0. MAX-MIN STR=   -11.  -1495.    742. A= 47.7

ELEM 245 NODES= 484 483 269 275   MATERIAL = 2  AREA=  .2264  STRESS INT.=   1507.  SIGEFF=   1502.
X= 16.93 Y= 15.45 T= 244. XY STR=     478.    805.   -751.    0. MAX-MIN STR=  1494.    -12.    754. A=-42.6
```

INNER SHELL
EL. 140
COOL-DOWN
TRANSIENT
TIME = .002 hours

```
THERMAL   .0020096  .0029996 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0000936  POSGEN= .4631   SIGE=  1390.83   FLUENCE= 0.

ELEM 243  NODES= 272  266  267  273   MATERIAL = 1  AREA=   .1564  STRESS INT.=  1440.  SIGEFF=  1313.
X= 16.36 Y= 15.11 T= 294. XY STR=  1002.   -181.   -411.      0. MAX-MIN STR=  1130.   -310.   720. A=-72.6
ELASTIC   .0001152 -.0000546 -.0001186 -.0000294  PLASTIC   .0004897 -.0000002 -.0002991 -.0004995
THERMAL   .0029911  .0029911 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0007168  POSGEN= .4567   SIGE=  1313.16   FLUENCE= 0.

ELEM 244  NODES= 274  268  463  464   MATERIAL = 2  VOL.=    .2228  STRESS INT.=  1347.  SIGEFF=  1334.
X= 16.40 Y= 15.47 T= 253. XY STR=   -644.   -727.    661.      0. MAX-MIN STR=   -23.  -1347.   662. A= 46.8

ELEM 245  NODES= 464  463  269  275   MATERIAL = 2  VOL.=    .2264  STRESS INT.=   871.  SIGEFF=   868.
X= 16.67 Y= 15.73 T= 246. XY STR=    397.    461.   -434.      0. MAX-MIN STR=   865.    -6.   435. A=-47.9

ELEM 246  NODES= 267  268  USEP.USLIDE=   .07215  -.01499 FN=  0.        FS=  0.        KTYPE= 3 OLD= 3

ELEM 247  NODES= 289  270  271   -0   MATERIAL = 1  AREA=   .0818  STRESS INT.=  2413.  SIGEFF=  2327.
X= 16.59 Y= 15.18 T= 294. XY STR=    810.   2566.   -791.      0. MAX-MIN STR=  2613.    763.   925. A= -9.2
ELASTIC  -.0000040  .0002494 -.0000840 -.0001209  PLASTIC  -.0001036  .0018971 -.0006855 -.0017935
THERMAL   .0029879  .0029879 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0024197  POSGEN= .4822   SIGE=  2327.35   FLUENCE= 0.

ELEM 248  NODES= 289  271  272  290   MATERIAL = 1  AREA=   .1539  STRESS INT.=  1820.  SIGEFF=  1751.
X= 16.75 Y= 15.35 T= 294. XY STR=    1400.    587.   -729.      0. MAX-MIN STR=  1829.    168.   830. A=-59.8
ELASTIC   .0001318  .0000133 -.0002082 -.0000715  PLASTIC   .0008264  .0002337 -.0009564 -.0010401
THERMAL   .0029832  .0029832 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0014941  POSGEN= .4737   SIGE=  1750.88   FLUENCE= 0.

ELEM 249  NODES= 290  272  273  291   MATERIAL = 1  AREA=   .1566  STRESS INT.=  1399.  SIGEFF=  1378.
X= 16.94 Y= 15.63 T= 293. XY STR=    1100.    210.   -540.      0. MAX-MIN STR=  1355.    -45.   700. A=-64.8
ELASTIC   .0001118 -.0000166 -.0001557 -.0000469  PLASTIC   .0006421  .0000266 -.0004564 -.0006487
THERMAL   .0029756  .0029756 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0009414  POSGEN= .4645   SIGE=  1377.53   FLUENCE= 0.

ELEM 250  NODES= 292  274  464  465   MATERIAL = 2  VOL.=    .2226  STRESS INT.=  1324.  SIGEFF=  1306.
X= 16.90 Y= 15.89 T= 251. XY STR=    -658.   -704.    643.      0. MAX-MIN STR=   -38.  -1324.   643. A= 46.8

ELEM 251  NODES= 465  464  275  293   MATERIAL = 2  VOL.=    .2263  STRESS INT.=   849.  SIGEFF=   844.
X= 16.25 Y= 16.16 T= 243. XY STR=    340.    423.   -439.      0. MAX-MIN STR=   816.    -53.   435. A=-47.3

ELEM 252  NODES= 273  274  USEP.USLIDE=   .07458  -.01487 FN=  0.        FS=  0.        KTYPE= 3 OLD= 3

ELEM 253  NODES= 294  276  277  295   MATERIAL = 1  AREA=   .2211  STRESS INT.=  1501.  SIGEFF=  1362.
X= 6.07 Y= 15.71 T= 342. XY STR=    323.    490.    744.      0. MAX-MIN STR=  1157.    -344.   750. A= 41.8
ELASTIC   .0000178  .0000423  .0002192 -.0000296  PLASTIC   .0008230  .0003899  .0006804 -.0004129
THERMAL   .0036430  .0036430 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0007656  POSGEN= .4588   SIGE=  1361.88   FLUENCE= 0.

ELEM 254  NODES= 295  277  278  296   MATERIAL = 1  AREA=   .2288  STRESS INT.=  1582.  SIGEFF=  1383.
X= 6.52 Y= 15.71 T= 348. XY STR=     -13.    -359.    772.      0. MAX-MIN STR=   606.    -977.   791. A= 51.3
ELASTIC   .0000117 -.0000392  .0002267  .0000135  PLASTIC   .0001409 -.0000402  .0004297 -.0001086
THERMAL   .0036425  .0036425 0.0000000 0.0000000  SWELL   0.0000000 0.0000000 0.0000000 0.0000000
 CREEP  0.0000000 0.0000000 0.0000000 0.0000000  0.SHIFT  0.0000000 0.0000000 0.0000000 0.0000000
 EPREFN= .0004900  POSGEN= .4345   SIGE=  1302.84   FLUENCE= 0.

ELEM 255  NODES= 296  278  279  297   MATERIAL = 1  AREA=   .[illegible]  STRESS INT.=  1785.  SIGEFF=  1561.
X= 6.05 Y= 15.71 T= 339. XY STR=   -1583.   -1309.   -316.      0. MAX-MIN STR=  -1107.   -1785.   339. A=-33.1
ELASTIC  -.0001271 -.0000868 -.0000909  .0001004  PLASTIC  -.0001134 -.0000765 -.0003186 [illegible]
THERMAL   .0036184  .0036184 0.0000000 0.0000000  SWELL   [illegible]
```

STEADY STATE
W/AUX. COOLING
TIME = 0.0
EL. 247

```
ELEM  242  NODES=  271  265  266  272   MATERIAL = 1  AREA=   .1541  STRESS INT.=   1562.  SIGEFF=   1444.
X= 16.15 Y= 14.93 T= 400. XY STR=  -1509.  -1319.    139.      0. MAX-MIN STR=  -1246.  -1562.    168. A= 27.8
 ELASTIC  -.0001213 -.0000929  .0000417  .0000628  PLASTIC  -.0004102 -.0000998  .0004795  .0005099
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0005291  .0000762 -.0006345 -.0006054
  EPGEN=  .0008381   POSGEN=  .4622   SIGE=   1635.38   FLUENCE= 0.

ELEM  243  NODES=  272  266  267  273   MATERIAL = 1  AREA=   .1564  STRESS INT.=   1525.  SIGEFF=   1390.
X= 16.35 Y= 15.11 T= 400. XY STR=  -1491.  -1229.    101.      0. MAX-MIN STR=  -1194.  -1525.    165. A= 18.9
 ELASTIC  -.0001226 -.0000833  .0000305  .0000601  PLASTIC  -.0003210 -.0000504  .0006565  .0003714
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0004897 -.0000002 -.0002991 -.0004095
  EPGEN=  .0006203   POSGEN=  .4512   SIGE=   1575.81   FLUENCE= 0.

ELEM  244  NODES=  274  263  463  464   MATERIAL = 2  VOL.=     .2228  STRESS INT.=   2255.  SIGEFF=   2000.
X= 16.40 Y= 15.47 T= 400. XY STR=  -1915.  -1997.   -349.      0. MAX-MIN STR=  -1557.  -2255.    349. A=-44.2

ELEM  245  NODES=  464  463  269  275   MATERIAL = 2  VOL.=     .2264  STRESS INT.=   2563.  SIGEFF=   2309.
X= 16.67 Y= 15.73 T= 400. XY STR=  -2240.  -2232.   -333.      0. MAX-MIN STR=  -1903.  -2569.    333. A=-44.6

ELEM  246  NODES=  267  268  USEP,USLIDE=   .07123  -.01128 FN=  0.          FS=  0.          KTYPE= 3 OLD= 3

ELEM  247  NODES=  269  270  271   -0   MATERIAL = 1  AREA=   .0818  STRESS INT.=   1819.  SIGEFF=   1695.
X= 15.59 Y= 15.18 T= 400. XY STR=  -1538.  -1815.    -31.      0. MAX-MIN STR=  -1535.  -1819.    142. A=-83.8
 ELASTIC  -.0001041 -.0001478 -.0000092  .0000669  PLASTIC   .0002175 -.0017653  .0000397  .0015477
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT  -.0001036  .0018971 -.0006855 -.0017935
  EPGEN=  .0022610   POSGEN=  .4831   SIGE=   1992.71   FLUENCE= 0.

ELEM  248  NODES=  289  271  272  290   MATERIAL = 1  AREA=   .1539  STRESS INT.=   1625.  SIGEFF=   1496.
X= 15.75 Y= 15.35 T= 400. XY STR=  -1547.  -1367.    142.      0. MAX-MIN STR=  -1289.  -1625.    168. A= 28.9
 ELASTIC  -.0001278 -.0000968  .0000427  .0000635  PLASTIC  -.0007563 -.0002125  .0007377  .0009609
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0009264  .0002337 -.0009564 -.0010601
  EPGEN=  .0013547   POSGEN=  .4747   SIGE=   1784.39   FLUENCE= 0.

ELEM  249  NODES=  290  272  273  291   MATERIAL = 1  AREA=   .1566  STRESS INT.=   1665.  SIGEFF=   1484.
X= 15.94 Y= 15.53 T= 400. XY STR=  -1583.  -1266.    180.      0. MAX-MIN STR=  -1185.  -1665.    243. A= 24.4
 ELASTIC  -.0001317 -.0000941  .0000543  .0000571  PLASTIC  -.0004554  .0000217  .0000310  .0004330
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0006421  .0000266 -.0004564 -.0006687
  EPGEN=  .0007316   POSGEN=  .4578   SIGE=   1607.40   FLUENCE= 0.

ELEM  250  NODES=  292  274  464  465   MATERIAL = 2  VOL.=     .2226  STRESS INT.=   2249.  SIGEFF=   2002.
X= 15.99 Y= 15.89 T= 400. XY STR=  -1913.  -1920.   -333.      0. MAX-MIN STR=  -1584.  -2249.    333. A=-45.3

ELEM  251  NODES=  465  464  275  293   MATERIAL = 2  VOL.=     .2263  STRESS INT.=   2563.  SIGEFF=   2307.
X= 16.25 Y= 16.16 T= 400. XY STR=  -2226.  -2238.   -336.      0. MAX-MIN STR=  -1896.  -2568.    336. A=-45.5

ELEM  252  NODES=  273  274  USEP,USLIDE=   .07219  -.01131 FN=  0.          FS=  0.          KTYPE= 3 OLD= 3

ELEM  253  NODES=  294  276  277  295   MATERIAL = 1  AREA=   .2211  STRESS INT.=   1307.  SIGEFF=   1138.
X=  5.07 Y= 15.71 T= 400. XY STR=   -991.  -1097.   -263.      0. MAX-MIN STR=   -771.  -1317.    268. A=-50.1
 ELASTIC  -.0000715 -.0000858 -.0000792  .0000640  PLASTIC   .0000574 -.0005267 -.0005321  .0004693
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0000230  .0003899  .0006804 -.0004129
  EPGEN=  .0003500   POSGEN=  .4629   SIGE=   1641.03   FLUENCE= 0.

ELEM  254  NODES=  295  277  278  296   MATERIAL = 1  AREA=   .2200  STRESS INT.=   1162.  SIGEFF=   1006.
X=  5.52 Y= 15.71 T= 400. XY STR=   -855.   -858.   -395.      0. MAX-MIN STR=   -592.  -1162.    305. A=-49.1
 ELASTIC  -.0000646 -.0000651 -.0000917  .0000527  PLASTIC  -.0001240  .0000530 -.0002699  .0003710
 THERMAL   .0045045  .0045045 0.0000000 0.0000000  SWELL    0.0000000 0.0000000 0.0000000 0.0000000
   CREEP  0.0000000 0.0000000 0.0000000 0.0000000  O.SHIFT   .0001409 -.0000402  .0004297 -.0001096
  EPGEN=  .0003536   POSGEN=  .4293   SIGE=   1301.28   FLUENCE= 0.

ELEM  255  NODES=  296  279  279  297   MATERIAL = 1  AREA=   .2994  STRESS INT.=    532.  SIGEFF=    501.
```

ISOTHERMAL 400°F CASE AFTER COOL-DOWN

EL. 247

Immersion of Cask into Fuel Storage Pool

The 10/24 Rail Cask can arrive at the fuel reprocessing plant in either the Normal Condition of Transport (no auxiliary cooling) or with the auxiliary cooling system operating properly. If the auxiliary cooling system is operating, the cask undergoes the cooldown procedure described in Section VIII Appendix C. If the cask is at the higher temperatures reached under normal transport conditions, cooling will be provided through the cask internal cooling channels and operated until cask temperatures are reduced to those usually maintained by the auxiliary cooling system during transport. Then the cooldown procedure of Section VIII Appendix C will be followed. In either situation, the cask temperatures after cooldown will be the same when the cask is lowered into the fuel unloading pool. These temperatures are estimated to be 200°F for the inner shell and water jacket and 240°F for the outer shell. The cask containment vessel will be filled with water at about 180°F; the unloading pool water will be at about 100°F. During unloading of the fuel, the cask will cool slowly and eventually reach ambient temperature after removal from the unloading pool. Consequently, during the cask unloading process, shell temperatures will range from 200 to 240°F down to ambient temperature. Under normal transport conditions cask shell temperatures are 300 to 400°F (Sec. 3.1). Evaluation of stresses in the cask shells for cyclic operation over the full temperature range

between ambient and normal transport conditions shows the stresses to within allowable limits (Sec. 3.8). Since the range of cask shell temperatures is much less during fuel unloading than during the normal operating cycle, cask shell stresses during this operation must also be withing allowable limits.

7.0 References

1. Section XI, Para. 3.4.

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3. Roshenow, W. M. "A Method of Correlating Heat Transfer Data for Surface Boiling Liquids", Trans. ASME, Vol. 74, P. 969, 1952

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APPENDIX D

THERMAL ANALYSIS OF CASK INCLUDING TOP AND BOTTOM SECTION DETAILS

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TABLE OF CONTENTS

Thermal Analysis of Cask--Summary D1

TRUMP Printout for Top Section of NLI 10/24 Cask

- Input Data D16
  - Material Properties D17
  - Node Description D19
  - Connector Description D22
  - External Boundry Conditions D28
- Output Data D34
  - Temperatures for Normal Conditions D34
  - Temperatures for Post-Fire Test Conditions D38

TRUMP Printout for Bottom Section of NLI 10/24 Cask

- Input Data D41
  - Material Properties D44
  - Node Description D46
  - Connector Description D49
  - External Boundry Conditions D55
- Output Data
  - Temperatures for Normal Conditions D61
  - Temperatures for Post-Fire Conditions D65

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APPENDIX D

Thermal Analysis of Cask Including Top and Bottom Section Details

A detailed analysis of the NLI 10/24 cask was made to provide axial temperature distributions and temperature data for the ends of the cask. This data was generated specifically for use in the thermal stress analysis calculations.

The calculation models for the top and bottom of the cask are shown in figures D1 and D2, respectively. The calculated steady state temperature profile corresponding to the cask with auxiliary cooling is summarized in Exhibit 3. The transient response of the cask to submersion in the fuel unloading pool was also analyzed and the results of these calculations are summarized in Exhibits 4, 5, 6, 7, and 8 corresponding to 10, 20, 30, 60, and 120 minutes after submersion, respectively. The TRUMP computer program was used for this analysis. In these models, the node centers are located at the geometric center of the subregions. The node numbers appearing in Figures D1 and D2 are identical to those used in the TRUMP analysis and permit the resulting temperatures to be correlated with the calculation models.

The cask has radial symmetry which allowed the models to be generated with an included angle of $\pi/6$ radians. Other assumptions and conditions for the analysis include:

- 70 kw internal heat generation in the center 10 foot axial section
- Cask in full sun on 130F day
- Natural convection and radiation heat transport from cask surface along axial length and off the ends of the cask
- Natural convection of helium and radiation heat transport assumed between the basket and the ends of the inner cavity
- A 200F temperature differential is assumed across the empty neutron shield cavity for the post-fire test condition

The input data corresponding to these operating conditions along with the material properties are summarized in Exhibits D1 and D2.

The calculated temperatures for the top end of the cask are shown in Figures D3 and D4 for the normal and post-fire test conditions, respectively. The temperatures for the bottom section of the cask are shown in Figures D5 and D6 for the normal and post-fire test conditions, respectively. These temperatures are representative of a point at the geometric center of the nodes. The TRUMP computer printout for the analysis of the top section of the cask is found in Exhibit D1 and the printout for the bottom section is found in Exhibit D2.

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE D1 THERMAL ANALYSIS NODAL MAP FOR NLI 10/24 DISK – TOP SECTION

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE 1. CALCULATIONAL MODEL FOR BOTTOM END OF NLI 10/24 CASK INDICATING NODE NUMBERS USED IN TRUMP HEAT TRANSFER COMPUTER PROGRAM

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE D3 TEMPERATURES FOR NORMAL CONDITIONS – TOP SECTION OF CASK

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE D4 TEMPERATURES FOR POST FIRE TEST CONDITIONS – TOP SECTION OF CASK

FIGURE WITHHELD UNDER 10 CFR 2.390

EXHIBIT 1. STEADY STATE TEMPERATURE PROFILE OF CASK UNDER NORMAL CONDITIONS

FIGURE WITHHELD UNDER 10 CFR 2.390

EXHIBIT 2. STEADY STATE TEMPERATURE PROI OF CASK UNDER POST-FIRE CONDITIONS

FIGURE WITHHELD UNDER 10 CFR 2.390

EXHIBIT 3. STEADY STATE TEMPERATURES OF CASK WITH AUXILLARY COOLING--PRIOR TO SUBMERSION

FIGURE WITHHELD UNDER 10 CFR 2.390

IBIT 4: TEMPERATURE PROFILE OF CASK 10 MINUTES A R SUBMERSION IN POOL

FIGURE WITHHELD UNDER 10 CFR 2.390

EXHIBIT 5. TEMPERATURE PROFILE OF CASK 20 MINUTES AFTER SUBMERSION IN POOL

FIGURE WITHHELD UNDER 10 CFR 2.390

EXHIBIT C. TEMPERATURE PROFILE OF CASK 30 W TES AFTER SUBMERSION IN POOL

FIGURE WITHHELD UNDER 10 CFR 2.390

2.

EXHIBIT 7. TEMPERATURE PROFILE OF CASK 60 MINUTES AFTER SUBMERSION IN POOL

F.

FIGURE WITHHELD UNDER 10 CFR 2.390

HIBIT 6. TEMPERATURE PROFILE OF CASK 120 MINUTES (AR SUBMERSION IN POOL

Exhibit D1

TRUMP Printout for Top

Section of NLI 10/24 Cask

DATA BLOCK 1 STEADY STATE BASE, NEW RAD,NO AUX COOL

****TIME, TEMPS WILL BE WRITTEN ON TAPE 66 EVERY 1 TIME STEPS.

IPRINT	NUM	KDATA	KSPEC	MCYC	MSEC	NPUNCH	NDOT	IRITE	ITAPE	TIMEP	SCALE	PTIME
-0	-0	-1	-0	-0	-0	1	-0	1	66	.50000E+01	.83333E-01	-0.

KD	KT	DELTO	SMALL	TVARY	TAU	TIMAX	TMIN	TMAX
1	3	5.00000E-01	1.00000E-12	3.00000E+00	-0.	6.00000E+01	-1.00000E+12	1.00000E+12

KD	KSYM	GECM	SIGMA	TBASE
1	1	1.30000E+00	1.73000E-09	4.60000E+02

TONE	ALONE	BONE	GONE	FONE	HONE	RONE	PONE
2.50000E+02	-0.	-0.	-0.	-0.	-0.	-0.	-0.

VIII - D16

SEE EXHIBIT D2 FOR EXPLANATION OF TABLES

DATA BLOCK 2 MATERIAL PROPERTIES

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
321SS	1	1	-0	-0	9	8	4.9310E+02	-0.	-0.	2.6000E+03	1.2000E+02

CAPACITY	SLOPE	ENERGY	SLOPE	TVABC
1.3000000E-01	8.000000E-05	-6.144000E+00	1.040000E-01	-6.000000E+01
1.680000E-01	8.000000E-05	4.256000E+00	1.040000E-01	4.000000E+01
1.150000E-01	7.000000E-05	1.540600E+01	1.115000E-01	1.430000E+02
1.210000E-01	6.000000E-05	2.726600E+01	1.180000E-01	2.400000E+02
1.330000E-01	4.000000E-05	6.530600E+01	1.270000E-01	5.400000E+02
1.350000E-01	2.000000E-05	7.870600E+01	1.340000E-01	6.400000E+02
1.370000E-01	2.000000E-05	9.230600E+01	1.360000E-01	7.400000E+02
1.560000E-01	2.111111E-05	2.241560E+02	1.465000E-01	1.640000E+03

CONDUCTIVITY	SLOPE	TVABK
7.700000E+00	6.500000E-03	-6.000000E+01
8.350000E+00	6.500000E-03	4.000000E+01
8.950000E+00	6.000000E-03	1.400000E+02
9.550000E+00	6.000000E-03	2.400000E+02
1.110000E+01	5.166667E-03	5.400000E+02
1.155000E+01	4.500000E-03	6.400000E+02
1.190000E+01	4.300000E-03	7.400000E+02
1.590000E+01	4.021053E-03	1.690000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
LEAD	2	2	-0	-0	6	8	7.0500E+02	-0.	-0.	6.2100E+02	1.0500E+01

CAPACITY	SLOPE	ENERGY	SLOPE	TVABC
3.630000E-02	6.666667E-06	3.661867E-01	3.090000E-02	3.200000E+01
3.150000E-02	6.666667E-06	6.526187E+00	3.090000E-02	2.120000E+02
3.390000E-02	6.388889E-06	1.928219E+01	3.265000E-02	5.720000E+02
3.370000E-02	-2.646816E-06	1.993594E+01	3.375000E-02	6.210000E+02
3.260000E-02	-1.100000E+00	1.993594E+01	3.315000E-02	6.210000E+02
3.260000E-02	0.	3.256913E+02	3.260000E-02	1.000000E+04

CONDUCTIVITY	SLOPE	TVABK
2.310000E+01	-2.777778E-03	3.200000E+01
1.960000E+01	-2.777778E-03	2.120000E+02
1.800000E+01	-4.444445E-03	5.720000E+02
8.800000E+00	-1.877551E-01	6.210000E+02
9.800000E+00	0.	6.210000E+02
8.900000E+00	3.594229E-04	9.000000E+02
9.600000E+01	2.333333E-03	1.200000E+03
1.150000E+01	6.333333E-03	1.500000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
ALUM	3	3	-0	-0	-0	-0	1.7000E+02	2.400E-01	1.0000E+02	1.2000E+03	1.6700E+02
CU	4	4	-0	-0	8	8	5.5800E+02	-0.	-0.	2.4400E+03	4.0000E+01

NOT USED

CAPACITY	SLOPE	ENERGY	SLOPE	TVABC
7.500000E-02	9.500000E-05	-1.763950E+01	7.975000E-02	-2.100000E+02
8.450000E-02	9.500000E-05	-9.664500E+00	7.975000E-02	-1.100000E+02
8.400000E-02	7.000000E-05	-5.352000E+00	8.625000E-02	-6.000000E+01
9.100000E-02	4.000000E-05	1.366500E+00	8.950000E-02	1.500000E+01

9.300000E-02	2.666667E-05	1.260000E+04	9.200000E-02	9.000000E+01
1.210000E-01	1.391304E-05	6.435500E+01	9.700000E-02	6.650000E+02
1.215000E-01	1.576923E-05	2.086605E+02	1.112500E-01	1.965000E+03
1.660000E-01	1.323324E-05	6.182430E+02	1.407500E-01	4.875000E+03

CONDUCTIVITY	SLOPE	TVARK
2.475000E+02	-7.000000E-02	-6.000000E+01
2.330000E+02	-7.000000E-02	9.000000E+01
2.210000E+02	-4.000000E-02	3.900000E+02
2.145000E+02	-3.095238E-02	6.000000E+02
2.090000E+02	-2.750000E-02	8.000000E+02
2.040000E+02	-2.500000E-02	1.000000E+03
1.990000E+02	-2.500000E-02	1.200000E+03
1.845000E+02	-2.071429E-02	1.900000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTARK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
COCU	5	5	-0	-0	3	4	5.550000E+02	-0.	-0.	1.890000E+03	2.240000E+03

NOT USED

CAPACITY	SLOPE	ENERGY	SLOPE	TVAFC
8.900000E-02	4.880952E-05	-3.599048E+00	1.095000E-01	-4.000000E+01
1.300000E-01	4.880952E-05	8.838095E+01	1.095000E-01	8.000000E+02
1.150000E-01	-2.222222E-05	1.710685E+02	1.225000E-01	1.475000E+03

CONDUCTIVITY	SLOPE	TVARK
1.540000E+02	6.136364E-02	-4.000000E+01
1.810000E+02	6.136364E-02	4.000000E+02
1.900000E+02	6.000000E-02	5.500000E+02
1.900000E+02	0.	1.475000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTARK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
UPRNT	6	6	-0	-0	6	5	1.170000E+03	-0.	-0.	2.070000E+03	4.000000E+01

CAPACITY	SLOPE	ENERGY	SLOPE	TVAFC
2.600000E-02	1.000000E-05	-2.650000E+00	2.650000E-02	-1.000000E+02
2.700000E-02	1.000000E-05	0.	2.650000E-02	0.
2.900000E-02	2.000000E-05	2.800000E+00	2.800000E-02	1.000000E+02
3.450000E-02	1.100000E-05	1.867500E+01	3.175000E-02	6.000000E+02
4.200000E-02	1.875000E-05	3.397500E+01	3.825000E-02	1.000000E+03
4.950000E-02	3.125000E-05	4.495500E+01	4.575000E-02	1.240000E+03

CONDUCTIVITY	SLOPE	TVARK
1.820000E+01	-1.900000E-02	-1.000000E+02
1.330000E+01	-1.900000E-02	0.
1.500000E+01	8.500000E-03	2.000000E+02
1.900000E+01	7.500000E-03	6.000000E+02
2.470000E+01	7.444444E-03	1.500000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTARK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
ZIRCP	7	7	-0	-0	-0	-0	5.500000E+01	5.500000E-01	3.000000E-01	1.500000E+03	1.000000E+00
BALSA	8	8	-0	-0	-0	-0	1.500000E+01	5.000000E-01	3.400000E-02	1.500000E+03	1.000000E+00

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DATA BLOCK 4

SEE EXHIBIT D2 FOR EXPLANATION OF TABLES

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME
3111	1	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3211	2	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3311	3	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3411	4	3	0	7.50000E-01	3.80000E-01	1.76417E+00	5.02787E-01
3511	5	3	0	5.00000E-01	3.80000E-01	1.76417E+00	3.35192E-01
1111	6	1	0	1.66667E+00	6.25000E-02	1.99583E+00	2.07899E-01
1211	7	1	0	1.66667E+00	6.25000E-02	1.99583E+00	2.07899E-01
1311	8	1	0	1.66667E+00	6.25000E-02	1.99583E+00	2.07899E-01
1411	9	1	0	7.50000E-01	6.25000E-02	1.99583E+00	9.35547E-02
1511	10	1	0	7.50000E-01	6.25000E-02	1.99583E+00	9.35547E-02
2111	11	2	0	1.66667E+00	8.33333E-02	2.07250E+00	2.87847E-01
2211	12	2	0	1.66667E+00	8.33333E-02	2.07250E+00	2.87847E-01
2311	13	2	0	1.66667E+00	8.33333E-02	2.07250E+00	2.87847E-01
2411	14	2	0	7.50000E-01	8.33333E-02	2.07250E+00	1.29531E-01
2511	15	2	0	7.50000E-01	8.33333E-02	2.07250E+00	1.29531E-01
2121	16	2	0	1.66667E+00	8.33333E-02	2.16000E+00	3.00000E-01
2221	17	2	0	1.66667E+00	8.33333E-02	2.16000E+00	3.00000E-01
2321	18	2	0	1.66667E+00	8.33333E-02	2.16000E+00	3.00000E-01
2421	19	2	0	7.50000E-01	8.33333E-02	2.16000E+00	1.35000E-01
2521	20	2	0	7.50000E-01	8.33333E-02	2.16000E+00	1.35000E-01
2131	21	2	0	1.66667E+00	8.33333E-02	2.24750E+00	3.12153E-01
2231	22	2	0	1.66667E+00	8.33333E-02	2.24750E+00	3.12153E-01
2331	23	2	0	1.66667E+00	8.33333E-02	2.24750E+00	3.12153E-01
2431	24	2	0	7.50000E-01	8.33333E-02	2.24750E+00	1.40469E-01
2531	25	2	0	7.50000E-01	8.33333E-02	2.24750E+00	1.40469E-01
2141	26	2	0	1.66667E+00	8.33333E-02	2.33417E+00	3.24190E-01
2241	27	2	0	1.66667E+00	8.33333E-02	2.33417E+00	3.24190E-01
2341	28	2	0	1.66667E+00	8.33333E-02	2.33417E+00	3.24190E-01
2441	29	2	0	7.50000E-01	8.33333E-02	2.33417E+00	1.45885E-01
2541	30	2	0	7.50000E-01	8.33333E-02	2.33417E+00	1.45885E-01
2151	31	2	0	1.66667E+00	8.33333E-02	2.42167E+00	3.36343E-01
2251	32	2	0	1.66667E+00	8.33333E-02	2.42167E+00	3.36343E-01
2351	33	2	0	1.66667E+00	8.33333E-02	2.42167E+00	3.36343E-01
2451	34	2	0	7.50000E-01	8.33333E-02	2.42167E+00	1.51354E-01
2551	35	2	0	7.50000E-01	8.33333E-02	2.42167E+00	1.51354E-01
2161	36	2	0	1.66667E+00	8.33333E-02	2.50833E+00	3.48383E-01
2261	37	2	0	1.66667E+00	8.33333E-02	2.50833E+00	3.48383E-01
2361	38	2	0	1.66667E+00	8.33333E-02	2.50833E+00	3.48383E-01
2461	39	2	0	7.50000E-01	8.33333E-02	2.50833E+00	1.56771E-01
2561	40	2	0	7.50000E-01	8.33333E-02	2.50833E+00	1.56771E-01
1121	41	1	0	1.66667E+00	8.33333E-02	2.63917E+00	3.66551E-01
1221	42	1	0	1.66667E+00	8.33333E-02	2.63917E+00	3.66551E-01
1321	43	1	0	1.66667E+00	8.33333E-02	2.63917E+00	3.66551E-01
1421	44	1	0	7.50000E-01	8.33333E-02	2.63917E+00	1.64948E-01
1521	45	1	0	7.50000E-01	8.33333E-02	2.63917E+00	1.64948E-01
1131	46		0	1.66667E+00	8.33333E-02	2.51667E+00	3.49537E-01
1231	47	1	0	1.66667E+00	8.33333E-02	2.51667E+00	3.49537E-01
1331	48		0	1.66667E+00	8.33333E-02	2.51667E+00	3.49537E-01
1431	49	1	0	7.50000E-01	8.33333E-02	2.51667E+00	1.57292E-01
1531	50	1	0	7.50000E-01	8.33333E-02	2.51667E+00	1.57292E-01
1132	51	1	0	1.66667E+00	8.33333E-02	1.66667E-01	2.31481E-02

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME
1232	52	1	0	1.66667E+00	8.33333E-02	1.66667E-01	2.31481E-02
1332	53	1	0	1.66667E+00	8.33333E-02	1.66667E-01	2.31481E-02
1432	54	1	0	7.50000E-01	8.33333E-02	1.66667E-01	1.04167E-02
1532	55	1	0	7.50000E-01	8.33333E-02	1.66667E-01	1.04167E-02
1141	56	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1241	57	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1341	58	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1441	59	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1541	60	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1142	61	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1242	62	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1342	63	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1442	64	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1542	65	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1151	66	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1251	67	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1351	68	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1451	69	1	0	6.64167E-01	3.12500E-02	3.54500E+00	7.35772E-02
1551	70	1	0	6.64167E-01	3.12500E-02	3.54500E+00	7.35772E-02
1152	71	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1252	72	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1352	73	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1452	74	1	0	8.58333E-02	3.12500E-02	3.54500E+00	9.50872E-03
1552	75	1	0	8.58333E-02	3.12500E-02	3.54500E+00	9.50872E-03
1161	76	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1261	77	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1361	78	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1461	79	1	0	8.33333E-02	8.33333E-02	5.00000E-01	3.47222E-03
1561	80	1	0	8.33333E-02	8.33333E-02	5.00000E-01	3.47222E-03
1162	81	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1262	82	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1362	83	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1462	84	1	0	8.58333E-02	8.33333E-02	3.62167E+00	2.59050E-02
1562	85	1	0	8.58333E-02	8.33333E-02	3.62167E+00	2.59050E-02
1171	86	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51939E-02
1271	87	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51939E-02
1371	88	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51938E-02
1471	89	1	0	8.58333E-02	8.33333E-02	3.70917E+00	2.65308E-02
1571	90	1	0	8.58333E-02	8.33333E-02	3.70917E+00	2.65308E-02
1181	91	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.65907E-02
1281	92	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.66907E-02
1381	93	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.66907E-02
1481	94	1	0	8.58333E-02	8.33333E-02	3.79583E+00	2.71538E-02
1581	95	1	0	8.58333E-02	8.33333E-02	3.79583E+00	2.71538E-02
1	96	6	0	2.50000E-01	4.90833E-01	2.34417E-01	2.87649E-02
2	97	6	0	2.50000E-01	4.90833E-01	7.03167E-01	8.62844E-02
3	98	6	0	2.50000E-01	4.90833E-01	1.17192E+00	1.43804E-01
4	99	6	0	2.50000E-01	4.90833E-01	1.64067E+00	2.01323E-01
5	100	1	0	2.50000E-01	4.90833E-01	2.34417E-01	2.87649E-02
6	101	1	0	2.50000E-01	4.90833E-01	7.03167E-01	8.62844E-02
7	102	1	0	2.50000E-01	4.90833E-01	1.17192E+00	1.43804E-01

NODE	INDEX	MATL	N/TYPE	DLONG	DWIDE	DRAD	VOLUME
8	107	1	0	2.50000E-01	4.90833E-01	1.64067E+00	2.01323E-01
9	104	7	0	2.50000E-01	4.90833E-01	2.34417E-01	2.87649E-02
10	105	7	0	2.50000E-01	4.90833E-01	7.03167E-01	8.62944E-02
11	106	7	0	2.50000E-01	4.90833E-01	1.17192E+00	1.43804E-01
12	107	7	0	2.50000E-01	4.90833E-01	1.64067E+00	2.01323E-01
13	108	1	0	2.08333E-01	4.90833E-01	2.34417E-01	2.39707E-02
14	109	1	0	2.08333E-01	4.90833E-01	7.03167E-01	7.19037E-02
15	110	1	0	2.08333E-01	4.90833E-01	1.17192E+00	1.19837E-01
16	111	1	0	2.08333E-01	4.90833E-01	1.64067E+00	1.67776E-01
17	112	1	0	6.66667E-01	4.36667E-01	2.05000E+00	5.96773E-01
18	113	1	0	9.79167E-01	5.89167E-01	2.15833E+00	1.24513E+00
19	114	1	0	2.50000E-01	5.89167E-01	2.15833E+00	3.17905E-01
20	115	1	0	2.50000E-01	5.89167E-01	2.15833E+00	3.17905E-01
21	116	7	0	2.50000E-01	5.89167E-01	2.15833E+00	3.17905E-01
22	117	1	0	2.08333E-01	5.89167E-01	2.15833E+00	2.64920E-01
23	118	6	0	5.66667E-01	1.52500E-01	2.36667E+00	2.43611E-01
24	119	1	0	5.66667E-01	1.74167E-01	2.52500E+00	2.93191E-01
25	120	1	0	5.83333E-01	3.70833E-01	2.78333E+00	6.02369E-01
26	121	1	0	9.79167E-01	5.45000E-01	2.70000E+00	1.44084E+00
27	122	1	0	9.59333E-01	5.45000E-01	2.70000E+00	1.41019E+00
28	123	1	0	2.50000E-01	4.80000E-01	3.19167E+00	3.83000E-01
29	124	7	0	1.08333E+00	1.30833E-01	3.02500E+00	4.28752E-01
30	125	3	0	4.16667E-01	4.90833E-01	2.34417E-01	4.79415E-02
31	126	3	0	4.16667E-01	4.90833E-01	7.03333E-01	1.43841E-01
32	127	3	0	4.16667E-01	4.90833E-01	1.17225E+00	2.39741E-01
33	128	3	0	4.16667E-01	4.90833E-01	1.64117E+00	3.35641E-01
34	129	3	0	4.16667E-01	4.90833E-01	2.11008E+00	4.31541E-01

DATA BLOCK 5

SEE EXHIBIT D2 FOR EXPLANATION OF TABLE

[illegible]	[illegible]	INDEX	[illegible]	[illegible]	DLOW	DHIGH	MINT	RINT	AREA
3111	1111	1	0.[illegible]E+00	4.1667E-02	1.0667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3211	1211	2	0.[illegible]E+00	4.1667E-02	1.0667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3311	1311	3	0.[illegible]E+00	4.1667E-02	1.0667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3411	1411	4	0.[illegible]E+00	4.1667E-02	7.5020E-01	1.9633E+00	1.0000E+12	0.	1.4725E+00
3511	1511	5	[illegible]E+01	4.1667E-02	7.1667E-01	1.9633E+00	1.0000E+12	0.	8.1405E-01
1111	2111	6	3.1250E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2111	2121	7	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2121	2131	8	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6719E+00
2131	2141	9	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2141	2151	10	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9626E+00
2151	2161	11	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1080E+00
1211	2211	12	4.1667E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2211	2221	13	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2221	2231	14	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6719E+00
2231	2241	15	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2241	2251	16	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9626E+00
2251	2261	17	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1080E+00
1311	2311	18	4.1667E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2311	2321	19	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2321	2331	20	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6719E+00
2331	2341	21	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2341	2351	22	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9626E+00
2351	2361	23	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1080E+00
1411	2411	24	[illegible]	4.1667E-02	7.8542E-01	1.9375E+00	5.0000E+02	0.	1.5217E+00
2411	2421	25	4.1667E-02	4.1667E-02	7.8542E-01	2.0208E+00	1.0000E+12	0.	1.5872E+00
2421	2431	26	4.1667E-02	4.1667E-02	7.8542E-01	2.1042E+00	1.0000E+12	0.	1.6526E+00
2431	2441	27	4.1667E-02	4.1667E-02	7.8542E-01	2.1875E+00	1.0000E+12	0.	1.7181E+00
2441	2451	28	4.1667E-02	4.1667E-02	7.8542E-01	2.2708E+00	1.0000E+12	0.	1.7836E+00
2451	2461	29	4.1667E-02	4.1667E-02	7.8542E-01	2.3542E+00	1.0000E+12	0.	1.8490E+00
1511	2511	30	4.1667E-02	4.1667E-02	7.8542E-01	1.9375E+00	5.0000E+02	0.	1.5217E+00
2511	2521	31	4.1667E-02	4.1667E-02	7.8542E-01	2.0208E+00	1.0000E+12	0.	1.5872E+00
2521	2531	32	4.1667E-02	4.1667E-02	7.8542E-01	2.1042E+00	1.0000E+12	0.	1.6526E+00
2531	2541	33	4.1667E-02	4.1667E-02	7.8542E-01	2.1875E+00	1.0000E+12	0.	1.7181E+00
2541	2551	34	4.1667E-02	4.1667E-02	7.8542E-01	2.2708E+00	1.0000E+12	0.	1.7836E+00
2551	2561	35	4.1667E-02	4.1667E-02	7.8542E-01	2.3542E+00	1.0000E+12	0.	1.8490E+00
2161	1121	36	4.1667E-02	4.1667E-02	1.7450E+00	1.9283E+00	1.0000E+12	0.	3.1904E+00
2261	1221	37	4.1667E-02	4.1667E-02	1.7450E+00	1.9283E+00	1.0000E+12	0.	3.1904E+00
2361	1321	38	4.1667E-02	4.1667E-02	1.7450E+00	1.9283E+00	1.0000E+12	0.	3.1904E+00
2461	1421	39	4.1667E-02	4.1667E-02	7.8542E-01	1.9283E+00	1.0000E+12	0.	1.4360E+00
2561	1521	40	4.1667E-02	4.1667E-02	7.8542E-01	1.9283E+00	1.0000E+12	0.	1.4360E+00
1121	1131	41	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1221	1231	42	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1321	1331	43	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1421	1431	44	4.1667E-02	4.1667E-02	7.8542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1521	1531	45	4.1667E-02	4.1667E-02	7.8542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1121	1132	46	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1221	1232	47	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1321	1332	48	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1421	1432	49	4.1667E-02	4.1667E-02	7.8542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1521	1532	50	4.1667E-02	4.1667E-02	7.8542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1131	1142	51	4.2500E-02	4.1667E-02	1.0667E+00	1.0667E+00	1.0000E+12	0.	2.7778E+00

NOD1	NOD2	INDEX	DFL1	DFL2	DFDNG	DFAD	HINT	SIGI	AREA
1231	1232	52	5.2500E-02	4.1667E-02	1.6667E+00	1.0667E+00	1.0000E+12	0.	2.7779E+00
1331	1332	53	5.2500E-02	4.1667E-02	1.6667E+00	1.0667E+00	1.0000E+12	0.	2.7779E+00
1431	1432	54	5.2500E-02	4.1667E-02	7.5000E-02	1.0667E+00	1.0000E+12	0.	1.2500E-01
1531	1532	55	5.2500E-02	4.1667E-02	7.5000E-02	1.0667E+00	1.0000E+12	0.	1.2500E-01
1132	1141	56	0.	0.	1.6667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1232	1241	57	0.	0.	1.6667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1332	1341	58	0.	0.	1.6667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1432	1441	59	0.	0.	7.5000E-01	2.0667E-01	2.0700E+01	-3.3300E-01	2.0000E-01
1532	1541	60	0.	0.	7.5000E-01	2.0667E-01	2.0700E+01	-3.3300E-01	2.0000E-01
1131	1141	61	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1231	1241	62	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1331	1341	63	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1131	1142	64	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1231	1242	65	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1331	1342	66	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1431	1442	67	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1531	1542	68	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1431	1441	69	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1531	1541	70	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1451	1461	71	1.5667E-02	4.1667E-02	1.4325E-01	3.5783E+00	1.0000E+12	0.	5.1260E-01
1551	1561	72	1.5667E-02	4.1667E-02	1.4325E-01	3.5783E+00	1.0000E+12	0.	5.1260E-01
1152	1162	73	1.5667E-02	4.1667E-02	2.1043E-01	3.5783E+00	1.0000E+12	0.	7.5443E-01
1252	1262	74	1.5667E-02	4.1667E-02	2.1043E-01	3.5783E+00	1.0000E+12	0.	7.5443E-01
1352	1362	75	1.5667E-02	4.1667E-02	2.1043E-01	3.5783E+00	1.0000E+12	0.	7.5443E-01
1452	1462	76	1.5667E-02	4.1667E-02	8.5917E-02	3.5783E+00	1.0000E+12	0.	3.0744E-01
1552	1562	77	1.5667E-02	4.1667E-02	8.5917E-02	3.5783E+00	1.0000E+12	0.	3.0744E-01
1162	1171	78	4.1667E-02	4.1667E-02	2.1043E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1262	1271	79	4.1667E-02	4.1667E-02	2.1043E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1362	1371	80	4.1667E-02	4.1667E-02	2.1043E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1462	1471	81	4.1667E-02	4.1667E-02	8.5917E-02	3.0650E+00	1.0000E+12	0.	3.1488E-01
1562	1571	82	4.1667E-02	4.1667E-02	8.5917E-02	3.0650E+00	1.0000E+12	0.	3.1488E-01
1171	1181	83	4.1667E-02	4.1667E-02	2.1043E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1271	1281	84	4.1667E-02	4.1667E-02	2.1043E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1371	1381	85	4.1667E-02	4.1667E-02	2.1043E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1471	1481	86	4.1667E-02	4.1667E-02	8.5917E-02	3.7525E+00	1.0000E+12	0.	3.2240E-01
1571	1581	87	4.1667E-02	4.1667E-02	8.5917E-02	3.7525E+00	1.0000E+12	0.	3.2240E-01
3111	3211	88	8.3333E-01	8.3333E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3211	3311	89	8.3333E-01	8.3333E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3311	3411	90	8.3333E-01	3.7500E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3411	3511	91	3.7500E-01	2.5000E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
1111	1211	92	8.3333E-01	8.3333E-01	8.5417E-02	1.9058E+00	1.0000E+12	0.	1.2467E-01
1211	1311	93	8.3333E-01	8.3333E-01	8.5417E-02	1.9058E+00	1.0000E+12	0.	1.2467E-01
1311	1411	94	8.3333E-01	3.7500E-01	8.5417E-02	1.9058E+00	1.0000E+12	0.	1.2467E-01
1411	1511	95	3.7500E-01	3.7500E-01	8.5417E-02	1.9058E+00	1.0000E+12	0.	1.2467E-01
2111	2211	96	8.3333E-01	8.3333E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2211	2311	97	8.3333E-01	8.3333E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2311	2411	98	8.3333E-01	3.7500E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2411	2511	99	3.7500E-01	3.7500E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2121	2221	100	8.3333E-01	8.3333E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2221	2321	101	8.3333E-01	8.3333E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2321	2421	102	8.3333E-01	3.7500E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01

NOD1	NOD2	INDEX	DELI	DELJ	DLONG	DPAD	HINT	RINT	AREA
2421	2521	103	3.7500E-01	3.7500E-01	4.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2131	2231	104	4.1333E-01	4.1333E-01	4.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2231	2331	105	4.3333E-01	4.3333E-01	4.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2331	2431	106	4.3333E-01	3.7500E-01	4.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2431	2531	107	3.7500E-01	3.7500E-01	4.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2141	2241	108	3.3333E-01	4.3333E-01	4.7250E-02	2.2292E+00	1.0000E+12	0.	1.8722E-01
2241	2341	109	4.3333E-01	4.3333E-01	4.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2341	2441	110	4.3333E-01	3.7500E-01	4.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2441	2541	111	3.7500E-01	3.7500E-01	4.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2151	2251	112	4.3333E-01	4.3333E-01	4.7250E-02	2.3125E+00	1.0000E+12	0.	1.9449E-01
2251	2351	113	4.3333E-01	4.3333E-01	4.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2351	2451	114	4.3333E-01	3.7500E-01	4.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2451	2551	115	3.7500E-01	3.7500E-01	4.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2161	2261	116	4.3333E-01	4.3333E-01	4.7250E-02	2.3958E+00	1.0000E+12	0.	2.0177E-01
2261	2361	117	4.3333E-01	4.3333E-01	4.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
2361	2461	118	4.3333E-01	3.7500E-01	4.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
2461	2561	119	3.7500E-01	3.7500E-01	4.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
1121	1221	120	4.3333E-01	4.3333E-01	4.7250E-02	2.4792E+00	1.0000E+12	0.	2.0904E-01
1221	1321	121	4.3333E-01	4.3333E-01	4.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1321	1421	122	4.3333E-01	4.3333E-01	4.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1421	1521	123	3.7500E-01	3.7500E-01	4.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1131	1231	124	4.3333E-01	4.3333E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.1631E-01
1231	1331	125	4.3333E-01	4.3333E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1331	1431	126	4.3333E-01	4.3333E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1431	1531	127	3.7500E-01	3.7500E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1132	1232	128	4.3333E-01	4.3333E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1232	1332	129	4.3333E-01	4.3333E-01	4.3333E-02	1.5667E-01	1.0000E+12	0.	1.3889E-02
1332	1432	130	4.3333E-01	3.7500E-01	4.3333E-02	1.5667E-01	1.0000E+12	0.	1.3889E-02
1432	1532	131	[illegible]	[illegible]	4.3333E-02	1.5667E-01	1.0000E+12	0.	1.3889E-02
1141	1241	132	[illegible]	[illegible]	[illegible]	1.7642E+00	1.0000E+12	0.	1.3889E-02
1241	1341	133	[illegible]	[illegible]	[illegible]	1.7642E+00	1.0000E+12	0.	5.5130E-02
1341	1441	134	[illegible]	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1441	1541	135	3.7500E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1142	1242	136	4.3333E-01	4.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1242	1342	137	4.3333E-01	4.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1342	1442	138	4.3333E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1442	1542	139	3.7500E-01	[illegible]	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1151	1252	140	5.4667E-02	7.4333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	5.5130E-02
1251	1352	141	5.4667E-02	7.4333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1351	1452	142	5.4667E-02	7.4333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1451	1552	143	5.4667E-02	7.4333E-03	1.4325E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1161	1162	144	5.4667E-02	7.4333E-03	1.4325E-01	3.5783E+00	1.0000E+12	0.	5.1260E-01
1161	1262	145	4.3333E-03	7.4333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	5.1260E-01
1261	1252	146	4.3333E-03	7.4333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1361	1362	147	4.3333E-03	7.4333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1461	1462	148	4.3333E-03	7.4333E-03	1.4325E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1561	1562	149	4.3333E-03	7.4333E-03	1.4325E-01	3.5833E+00	1.0000E+12	0.	5.1331E-01
1151	1251	150	5.3333E-01	8.3333E-01	3.1250E-02	1.7608E+00	1.0000E+12	0.	5.1331E-01
1251	1351	151	8.3333E-01	8.3333E-01	3.1250E-02	1.7608E+00	1.0000E+12	0.	5.5651E-02
1351	1451	152	8.3333E-01	3.7500E-01	3.1250E-02	1.7608E+00	1.0000E+12	0.	5.5651E-02
1451	1551	153	3.7500E-01	3.7500E-01	3.1250E-02	1.7608E+00	1.0000E+12	0.	5.5651E-02

NOD1	NOD2	INDEX	OFL1	OFL2	QLOAD	DRAD	HINT	RINT	AREA
1152	1252	154	5.3333E-01	5.3333E-01	3.1250E-02	1.7508E+00	1.0000E+12	0.	5.5651E-02
1252	1352	155	5.3333E-01	5.3333E-01	3.1250E-02	1.7508E+00	1.0000E+12	0.	5.5651E-02
1352	1452	156	5.3333E-01	5.3333E-01	3.1250E-02	1.7508E+00	1.0000E+12	0.	5.5651E-02
1452	1552	157	3.7500E-01	3.7500E-01	3.1250E-02	1.7508E+00	1.0000E+12	0.	5.5651E-02
1161	1151	158	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1261	1251	159	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1361	1351	160	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1461	1451	161	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	2.7200E-01	3.3199E+00
1561	1551	162	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	2.7200E-01	3.3199E+00
1171	1161	163	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1271	1261	164	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1371	1361	165	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1471	1461	166	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	2.2200E-01	3.4001E+00
1571	1561	167	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	2.2200E-01	3.4001E+00
1181	1171	168	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.6500E-01	8.5406E+00
1281	1271	169	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.6500E-01	8.5406E+00
1381	1371	170	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.6500E-01	8.5406E+00
1481	1471	171	0.	0.	9.1667E-01	3.7958E+00	1.0000E-24	1.6500E-01	3.4795E+00
1581	1571	172	0.	0.	9.1667E-01	3.7958E+00	1.0000E-24	1.6500E-01	3.4795E+00
1162	1171	173	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.6500E-01	8.1487E+00
1262	1271	174	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.6500E-01	8.1487E+00
1362	1371	175	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.6500E-01	8.1487E+00
1462	1471	176	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	1.6500E-01	3.3199E+00
1562	1571	177	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	1.6500E-01	3.3199E+00
1141	1151	178	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1241	1251	179	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1341	1351	180	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1142	1151	181	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1242	1251	182	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1342	1351	183	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1141	1152	184	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1241	1252	185	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1341	1352	186	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1142	1152	187	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1242	1252	188	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1342	1352	189	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1441	1451	190	1.5667E-02	1.5667E-02	8.5403E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1541	1551	191	1.5667E-02	1.5667E-02	8.5403E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1442	1451	192	1.5667E-02	1.5667E-02	8.5403E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1542	1551	193	1.5667E-02	1.5667E-02	8.5403E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1441	1452	194	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5086E-01
1541	1552	195	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5086E-01
1442	1452	196	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5086E-01
1542	1552	197	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5086E-01
1151	1161	198	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1251	1261	199	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1351	1361	200	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1162	1161	201	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1262	1261	202	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1362	1361	203	0.	0.	2.2500E+00	3.0217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1462	1461	204	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	1.1000E-02	3.3199E+00

NOD1	NOD2	INDEX	DEL1	DEL2	DLOAD	DMAD	MINT	RIVI	AREA
1462	1581	205	0.	0.	9.1667E-01	3.0217E+00	1.0000E-24	1.1000E-02	3.3199E+00
1171	1181	206	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3456E+00
1271	1281	207	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3456E+00
1371	1381	208	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3456E+00
1471	1481	209	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	3.7200E-01	3.4001E+00
1571	1581	210	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	3.7200E-01	3.4001E+00
1	2	211	2.3417E-01	2.3417E-01	1.7417E-01	4.0875E-01	1.0000E+12	0.	8.1641E-02
2	3	212	1.8167E-01	2.3417E-01	1.7417E-01	9.3750E-01	1.0000E+12	0.	1.6328E-01
3	4	213	1.8167E-01	2.3417E-01	1.7417E-01	1.4062E+00	1.0000E+12	0.	2.4492E-01
5	6	214	2.3417E-01	2.3417E-01	2.1833E-01	4.0875E-01	1.0000E+12	0.	1.0234E-01
6	7	215	2.3417E-01	2.3417E-01	2.1833E-01	9.3750E-01	1.0000E+12	0.	2.0469E-01
7	8	216	2.3417E-01	2.3417E-01	2.1833E-01	1.4062E+00	1.0000E+12	0.	3.0703E-01
9	10	217	2.3417E-01	2.3417E-01	3.4917E-01	4.0875E-01	1.0000E+12	0.	1.6367E-01
10	11	218	2.3417E-01	2.3417E-01	3.4917E-01	9.3750E-01	1.0000E+12	0.	3.2734E-01
11	12	219	2.3417E-01	2.3417E-01	3.4917E-01	1.4062E+00	1.0000E+12	0.	4.9102E-01
13	14	220	2.3417E-01	2.3417E-01	3.3833E-01	4.0875E-01	1.0000E+12	0.	1.5859E-01
14	15	221	2.3417E-01	2.3417E-01	3.3833E-01	9.3750E-01	1.0000E+12	0.	3.1719E-01
15	16	222	2.3417E-01	2.3417E-01	3.3833E-01	1.4067E+00	2.5000E+01	1.5000E-01	4.7592E-01
4	18	223	2.3417E-01	3.1667E-02	1.7417E-01	1.8750E+00	1.0000E+12	0.	3.2655E-01
9	19	224	2.3417E-01	3.1667E-02	2.1833E-01	1.8750E+00	2.5000E+01	3.2000E-01	4.0937E-01
12	20	225	2.3417E-01	6.2500E-02	3.4917E-01	1.8750E+00	1.0000E+12	0.	6.5469E-01
16	21	226	2.3417E-01	6.2500E-02	3.3833E-01	1.8750E+00	1.0000E+12	0.	6.3437E-01
17	22	227	3.1667E-02	1.1500E-01	4.8000E-01	1.9417E+00	2.5000E+01	3.2000E-01	9.3200E-01
18	23	228	3.1667E-02	1.1500E-01	1.7417E-01	1.9417E+00	2.5000E+01	3.2000E-01	3.3817E-01
19	23	229	3.1667E-02	1.1500E-01	2.1833E-01	1.9417E+00	2.5000E+01	3.2000E-01	4.2393E-01
20	24	230	3.1667E-02	1.1500E-01	1.5250E-01	1.9417E+00	1.0000E+12	0.	2.9610E-01
21	24	231	3.1667E-02	1.1500E-01	3.3833E-01	1.9417E+00	1.0000E+12	0.	6.5693E-01
22	25	232	1.4583E-01	1.4750E-01	4.4000E-01	2.1667E+00	9.0000E-02	2.5000E-01	1.0400E+00
23	25	233	1.4583E-01	1.4750E-01	5.8917E-01	2.1667E+00	9.0000E-02	2.5000E-01	1.2765E+00
24	26	234	1.1583E-01	3.0917E-01	5.2333E-01	2.1667E+00	1.0000E+12	0.	1.1339E+00
25	27	235	1.4750E-01	2.0917E-01	2.8167E-01	2.9543E+00	1.0000E+12	0.	7.7410E-01
26	28	236	1.4750E-01	1.2500E-01	5.3250E-01	2.9543E+00	2.5000E+01	1.5000E-01	1.8711E+00
28	1521	237	5.0833E-01	3.5417E-01	5.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
29	1531	238	5.0833E-01	3.5417E-01	4.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
29	1532	239	-.0833E-01	3.5417E-01	8.3333E-02	1.0667E-01	1.0000E+12	0.	1.3889E-02
29	26	240	5.0833E-01	2.5000E-01	5.7583E-01	2.5667E+00	1.0000E+12	0.	1.7345E+00
27	1531	241	0.	0.	3.7083E-01	3.1667E+00	1.0000E-24	1.2000E-01	1.1743E+00
27	28	242	1.2583E-01	1.0000E-01	2.8167E-01	3.1083E+00	2.5000E+01	1.5000E-01	6.1335E-01
27	1551	243	1.2500E-01	3.7500E-01	6.5417E-02	3.4450E+00	1.0000E+12	0.	2.2144E-01
1	3511	244	0.	0.	4.9083E-01	2.3442E-01	1.0000E-24	2.5000E-01	1.1506E-01
2	3511	245	0.	0.	4.9083E-01	7.0317E-01	1.0000E-24	2.5000E-01	3.4514E-01
3	3511	246	0.	0.	4.9083E-01	1.1719E+00	1.0000E-24	2.5000E-01	5.7522E-01
4	3511	247	0.	0.	4.9083E-01	1.6407E+00	1.0000E-24	2.5000E-01	8.0529E-01
1	3511	248	0.	0.	4.9083E-01	2.3442E-01	3.0000E-01	-3.3500E-01	1.1506E-01
2	3511	249	0.	0.	4.9083E-01	7.0317E-01	3.0000E-01	-3.3500E-01	3.4514E-01
3	3511	250	0.	0.	4.9083E-01	1.1719E+00	3.0000E-01	-3.3500E-01	5.7522E-01
4	3511	251	0.	0.	4.9083E-01	1.6407E+00	3.0000E-01	-3.3500E-01	8.0529E-01
17	3511	252	0.	0.	4.9000E-01	1.8750E+00	3.0000E-01	-3.3500E-01	9.0000E-01
17	3511	253	0.	0.	4.9000E-01	1.8750E+00	1.0000E-24	2.5000E-01	9.0000E-01
1	5	254	8.3333E-02	1.0417E-01	4.9083E-01	2.3442E-01	5.0000E+02	3.2000E-01	1.1506E-01
2	6	255	8.3333E-02	1.0417E-01	4.9083E-01	7.0317E-01	5.0000E+02	3.2000E-01	3.4514E-01

9/75

NODE	INDEX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	52	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	53	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	54	274	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	55	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	56	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	57	277	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	58	278	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	59	279	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	60	280	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	61	281	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	62	282	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	63	283	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	64	284	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	65	285	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	66	286	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	67	287	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	68	288	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	69	289	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	70	290	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	71	291	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	72	292	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	73	293	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	74	294	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SEE EXHIBIT D2 FOR EXPLANATION OF TABLE

DATA BLOCK 6

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1162	1000	1	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

HSURT	SLOPE	TVARH
.2500000E+00	-.328571E-03	-.400000E+02
.2120000E+00	-.328571E-03	.100000E+03
.1710000E+00	-.265000E-03	.300000E+03
.1390000E+00	-.166667E-03	.600000E+03
.1120000E+00	-.675000E-04	.100000E+04
.9300000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1262	1000	2	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

HSURT	SLOPE	TVARH
.2500000E+00	-.328571E-03	-.400000E+02
.2120000E+00	-.328571E-03	.100000E+03
.1710000E+00	-.265000E-03	.300000E+03
.1390000E+00	-.166667E-03	.600000E+03
.1120000E+00	-.675000E-04	.100000E+04
.9300000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1362	1000	3	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

HSURT	SLOPE	TVARH
.2500000E+00	-.328571E-03	-.400000E+02
.2120000E+00	-.328571E-03	.100000E+03
.1710000E+00	-.265000E-03	.300000E+03
.1390000E+00	-.166667E-03	.600000E+03
.1120000E+00	-.675000E-04	.100000E+04
.9300000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1462	1000	4	6	3.3300E-01	9.1667E-01	3.6217E+00	-0.	9.9000E-02	3.3199E+00

HSURT	SLOPE	TVARH
.2500000E+00	-.328571E-03	-.400000E+02
.2120000E+00	-.328571E-03	.100000E+03
.1710000E+00	-.265000E-03	.300000E+03
.1390000E+00	-.166667E-03	.600000E+03
.1120000E+00	-.675000E-04	.100000E+04
.9300000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1562	1000	5	6	3.3300E-01	9.1667E-01	3.6217E+00	-0.	9.9000E-02	3.3199E+00

HSURT	SLOPE	TVARH
.2500000E+00	-.328571E-03	-.400000E+02
.2120000E+00	-.328571E-03	.100000E+03
.1710000E+00	-.265000E-03	.300000E+03
.1390000E+00	-.166667E-03	.600000E+03
.1120000E+00	-.675000E-04	.100000E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1181	1000	11	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.136667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1281	1000	12	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.136667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1331	1000	13	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.136667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1481	1000	14	6	3.3300E-01	9.1667E-01	4.1558E+00	-0.	1.6500E-01	3.8095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.136667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1581	1000	15	6	3.3300E-01	9.1667E-01	4.1558E+00	-0.	1.6500E-01	3.8095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.136667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1151	1000	16	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1251	1000	17	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1351	1000	19	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1451	1000	19	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1551	1000	21	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS

31	1000	21	4	3.3300E-01	4.9083E-01	2.3417E-01	-0.		6.0000E-01	1.1494E-01

HSURT	SLOPE	TVARH
.129[illegible]E+00	-.164286E-03	-.400000E+02
.106[illegible]E+03	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.7[illegible]E-01	-.533333E-04	.600000E+03

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
31	1000	22	4	3.3300E-01	4.9083E-01	7.0333E-01	-0.	6.0000E-01	3.4522E-01

HSURT	SLOPE	TVARH
.129[illegible]E+00	-.164286E-03	-.400000E+02
.106[illegible]E+03	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
32	1000	23	4	3.3300E-01	4.9083E-01	1.1750E+00	-0.	6.0000E-01	5.7673E-01

HSURT	SLOPE	TVARH
.129000E+00	-.164286E-03	-.400000E+02
.106000E+03	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
33	1000	24	4	3.3300E-01	4.9083E-01	1.6417E+00	-0.	6.0000E-01	8.0578E-01

HSURT	SLOPE	TVARH
.129000E+00	-.164286E-03	-.400000E+02
.106000E+03	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
34	1000	25	4	3.3300E-01	5.1667E-01	2.1083E+00	-0.	6.0000E-01	1.0893E+00

HSURT	SLOPE	TVARH
.129000E+00	-.164286E-03	-.400000E+02
.106000E+03	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
27	1000	26	6	3.3300E-01	8.7250E-02	5.7667E+01	-0.	4.0000E-01	5.0314E+00

HSURT	SLOPE	TVARH
.2[illegible]E+00	-.328571E-03	-.400000E+02
.2[illegible]E+03	-.328571E-03	.100000E+03
.174[illegible]E+03	-.200000E-03	.300000E+03
.139[illegible]E+00	-.106667E-03	.600000E+03
.112[illegible]E+00	-.675000E-04	.100000E+04
.9[illegible]E-01	-.400000E-04	.147500E+04

NODS	NODS9	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS

29	1000	27	6	3.3330E-01	3.6917E-01	3.2500E+00	-0.		4.0000E-01	1.1340E+00

HSURT	SLOPE	TVARH
.2596[illegible]E+00	-.329571E-03	-.400000E+02
.212000E+00	-.329571E-03	.100000E+03
.171000E+00	-.200000E-03	.300000E+03
.139000E+00	-.166667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTARH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
29	1000	29	5	3.3330E-01	1.1833E+00	3.0250E+00	-0.	4.0000E-01	3.5796E+00

HSURT	SLOPE	TVARH
.2596[illegible]E+00	-.329571E-03	-.400000E+02
.212000E+00	-.329571E-03	.100000E+03
.171000E+00	-.200000E-03	.300000E+03
.139000E+00	-.166667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

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TRUMP OUTPUT DATA — *Normal Transportation Conditions* — DATA DECK 1

***DOUBLE. NLI 3-D. MODEL — 70 KW, 1 TOP EN 134913 — 03/20/75

PRINTOUT CYCLE	HF	MSS	KWIT	DELTMX	SMALL	TVARY	DTEMP	DTMAXS	NUTS
23	261	5	76	1	.50000E+02	.23654E-03	.31000E+01	.71399E-01	.45000E+00	6

TOTAL TIME	TIME STEP	HEAT FLOW	TEMP FROM FLUX	FLUX RATE	TEMP RATE
5.00000E+01	5.00000E-01	-1.39136E+06	-1.11532E+03	-2.31493E+04	-1.05997E+01

AVG TEMP	HEAT CAPACITY	HEAT CONTENT	GEN RATE	HEAT GEN	TEMP FROM GEN
3.33418E+02	1.27246E+03	3.95660E+05	2.12464E+04	1.27479E+06	1.00108E+03

FINAL HEAT = 3.95466E+05 FINAL FLOW = -1.39136E+06

NODE	TEMP	DT	DDT	GEN RATE	W	H	F
3111	.5211E+03	-.1467E-01	-.2873E-01	.5822E+04	.1979E+05	-.5551E+04	-.3549E+06
3211	.5098E+03	-.1669E-01	-.3293E-01	.5944E+04	.1937E+05	-.5353E+04	-.3620E+06
3311	.4914E+03	-.2188E-01	-.4305E-01	.5788E+04	.1830E+05	-.4972E+04	-.3522E+06
3411	.4453E+03	-.2791E-01	-.5491E-01	.2392E+04	.7629E+04	-.2357E+04	-.1450E+06
3511	.4247E+03	-.3163E-01	-.6223E-01	0.	.4840E+04	-.1303E+04	-.1303E+04
1111	.4077E+03	-.1162E-01	-.2286E-01	0.	.4926E+04	-.2039E+04	-.2039E+04
1211	.3998E+03	-.1248E-01	-.2455E-01	0.	.4821E+04	-.1503E+04	-.1962E+04
1311	.3799E+03	-.1711E-01	-.3367E-01	0.	.4563E+04	-.1404E+04	-.1804E+04
1411	.3528E+03	-.2247E-01	-.4421E-01	0.	.1896E+04	-.7362E+03	-.7364E+03
1511	.3294E+03	-.2742E-01	-.5396E-01	0.	.1755E+04	-.6746E+03	-.6750E+03
2111	.3565E+03	-.1127E-01	-.2219E-01	0.	.2525E+04	-.1030E+04	-.1029E+04
2211	.3849E+03	-.1212E-01	-.2364E-01	0.	.2475E+04	-.9916E+03	-.9910E+03
2311	.3698E+03	-.1657E-01	-.3259E-01	0.	.2350E+04	-.9147E+03	-.9146E+03
2411	.3435E+03	-.2192E-01	-.4317E-01	0.	.9796E+03	-.3744E+03	-.3749E+03
2511	.3231E+03	-.2714E-01	-.5339E-01	0.	.9183E+03	-.3437E+03	-.3452E+03
2121	.3899E+03	-.1082E-01	-.2129E-01	0.	.2587E+04	-.1072E+04	-.1072E+04
2221	.3924E+03	-.1144E-01	-.2251E-01	0.	.2536E+04	-.1033E+04	-.1033E+04
2321	.3639E+03	-.1580E-01	-.3109E-01	0.	.2409E+04	-.9532E+03	-.9534E+03
2421	.3393E+03	-.2099E-01	-.4129E-01	0.	.1003E+04	-.3904E+03	-.3912E+03
2521	.3196E+03	-.2601E-01	-.5118E-01	0.	.9475E+03	-.3581E+03	-.3602E+03
2131	.3836E+03	-.1069E-01	-.2103E-01	0.	.2647E+04	-.1116E+04	-.1116E+04
2231	.3763E+03	-.1127E-01	-.2219E-01	0.	.2595E+04	-.1075E+04	-.1079E+04
2331	.3544E+03	-.1569E-01	-.3086E-01	0.	.2466E+04	-.9912E+03	-.9924E+03
2431	.3332E+03	-.2109E-01	-.4150E-01	0.	.1039E+04	-.4003E+03	-.4076E+03
2531	.3152E+03	-.2651E-01	-.5216E-01	0.	.9753E+03	-.3724E+03	-.3753E+03
2141	.3776E+03	-.1063E-01	-.2096E-01	0.	.2704E+04	-.1158E+04	-.1160E+04
2241	.3700E+03	-.1118E-01	-.2201E-01	0.	.2652E+04	-.1116E+04	-.1118E+04
2341	.3531E+03	-.1568E-01	-.3085E-01	0.	.2522E+04	-.1031E+04	-.1033E+04
2441	.3294E+03	-.2350E-01	-.4192E-01	0.	.1053E+04	-.4123E+03	-.4244E+03
2541	.3127E+03	-.2619E-01	-.5153E-01	0.	.1001E+04	-.3904E+03	-.3902E+03
2151	.3718E+03	-.1098E-01	-.2160E-01	0.	.2761E+04	-.1202E+04	-.1205E+04
2251	.3650E+03	-.1169E-01	-.2300E-01	0.	.2708E+04	-.1158E+04	-.1162E+04
2351	.3493E+03	-.1659E-01	-.3264E-01	0.	.2578E+04	-.1069E+04	-.1074E+04
2451	.3235E+03	-.2192E-01	-.4314E-01	0.	.1077E+04	-.4382E+03	-.4415E+03
2551	.3092E+03	-.2809E-01	-.5524E-01	0.	.1026E+04	-.4009E+03	-.4061E+03
2161	.3653E+03	-.1349E-01	-.2064E-01	0.	.2916E+04	-.1245E+04	-.1248E+04
2261	.3596E+03	-.1112E-01	-.2189E-01	0.	.2763E+04	-.1199E+04	-.1204E+04

2361	.3432E+03	-.1595E-01	-.3137E-01	0.	.2632E+04	-.1107E+04	-.1113E+04	

NODE	TEMP	DT	DDT	GEN RATE	H	H	F
2461	.3193E+03	-.1999E-01	-.3934E-01	0.	.1099E+04	-.4544E+03	-.4576E+03
2561	.3055E+03	-.2547E-01	-.5014E-01	0.	.1050E+04	-.4150E+03	-.4195E+03
1121	.3561E+03	-.4261E-02	-.1625E-01	0.	.7504E+04	-.3598E+04	-.3603E+04
1221	.3499E+03	-.8392E-02	-.1651E-01	0.	.7361E+04	-.3465E+04	-.3470E+04
1321	.3343E+03	-.1228E-01	-.2416E-01	0.	.7013E+04	-.3188E+04	-.3194E+04
1421	.3149E+03	-.1490E-01	-.2932E-01	0.	.2918E+04	-.1307E+04	-.1310E+04
1521	.2983E+03	-.1993E-01	-.3725E-01	0.	.2792E+04	-.1188E+04	-.1192E+04
1131	.3437E+03	.3661E-03	.7203E-27	0.	.6887E+04	-.3453E+04	-.3456E+04
1231	.3379E+03	.2716E-02	.4558E-26	0.	.6761E+04	-.3325E+04	-.3329E+04
1331	.3234E+03	.3426E-02	.6745E-26	0.	.6451E+04	-.3059E+04	-.3063E+04
1431	.2984E+03	.9243E-02	.1919E-25	0.	.2653E+04	-.1254E+04	-.1256E+04
1531	.2469E+03	.1389E-01	.2732E-25	0.	.2553E+04	-.1137E+04	-.1140E+04
1132	.3495E+03	-.3976E-02	-.7825E-02	0.	.4644E+03	-.2284E+03	-.2307E+03
1232	.3435E+03	-.2951E-02	-.5807E-02	0.	.4558E+03	-.2200E+03	-.2225E+03
1332	.3285E+03	-.4729E-02	-.9305E-02	0.	.4345E+03	-.2123E+03	-.2056E+03
1432	.3078E+03	-.6685E-02	-.1315E-01	0.	.1823E+03	-.8326E+02	-.8420E+02
1532	.2956E+03	-.7012E-02	-.1380E-01	0.	.1746E+03	-.7565E+02	-.7685E+02
1141	.3273E+03	-.1334E-01	-.2625E-01	0.	.1719E+04	.2440E+02	.2018E+02
1241	.3220E+03	-.1514E-01	-.2978E-01	0.	.1683E+04	.2569E+02	.2069E+02
1341	.3187E+03	-.2249E-01	-.4423E-01	0.	.1613E+04	.2344E+02	.1723E+02
1441	.2842E+03	-.2787E-01	-.5484E-01	0.	.6644E+03	.1036E+02	.1289E+02
1541	.2742E+03	-.3694E-01	-.7249E-01	0.	.6393E+03	.1562E+02	.1150E+02
1142	.3269E+03	-.1159E-01	-.2280E-01	0.	.1715E+04	.2376E+02	.1967E+02
1242	.3215E+03	-.1249E-01	-.2457E-01	0.	.1685E+04	.2517E+02	.2331E+02
1342	.3042E+03	-.1931E-01	-.3799E-01	0.	.1611E+04	.2262E+02	.1660E+02
1442	.2832E+03	-.2301E-01	-.4541E-01	0.	.6631E+03	.1564E+02	.1255E+02
1542	.2737E+03	-.2935E-01	-.5775E-01	0.	.6381E+03	.1511E+02	.1111E+02
1151	.3244E+03	-.8341E-02	-.1641E-01	.3168E+03	.2996E+04	.4052E+02	-.1897E+05
1251	.3191E+03	-.8661E-02	-.1704E-01	.3168E+03	.2935E+04	.4290E+02	-.1897E+05
1351	.3061E+03	-.1324E-01	-.2612E-01	.3158E+03	.2906E+04	.3870E+02	-.1898E+05
1451	.2815E+03	-.1545E-01	-.3041E-01	.1445E+03	.1171E+04	.2723E+02	-.8650E+04
1551	.2719E+03	-.1327E-01	-.3791E-01	.1445E+03	.1127E+04	.2630E+02	-.8653E+04
1152	.3233E+03	-.8127E-02	-.1599E-01	0.	.4317E+03	.5984E+01	.3804E+01
1252	.3156E+03	-.8299E-02	-.1653E-01	0.	.4242E+03	.6106E+01	.3639E+01
1352	.3056E+03	-.1291E-01	-.2541E-01	0.	.4055E+03	.5543E+01	.2511E+01
1452	.2814E+03	-.1512E-01	-.2976E-01	0.	.1512E+03	.3501E+01	.2327E+01
1552	.2716E+03	-.1991E-01	-.3720E-01	0.	.1456E+03	.3392E+01	.1497E+01
1161	.3194E+03	-.6339E-02	-.1345E-01	0.	.1556E+03	.1999E+01	-.3551E+01
1261	.3147E+03	-.6927E-02	-.1343E-01	0.	.1529E+03	.2101E+01	-.4684E+01
1361	.3024E+03	-.1066E-01	-.2097E-01	0.	.1481E+03	.1023E+01	-.6240E+01
1461	.2794E+03	-.1277E-01	-.2512E-01	0.	.5457E+02	.1207E+01	-.2956E+01
1561	.2668E+03	-.1558E-01	-.3125E-01	0.	.5257E+02	.1203E+01	-.4318E+01
1162	.3103E+03	-.5783E-02	-.1138E-01	0.	.1153E+04	.1416E+02	.1006E+02
1262	.3123E+03	-.5524E-02	-.1087E-01	0.	.1131E+04	.1402E+02	.9839E+01
1362	.2948E+03	-.8596E-02	-.1711E-01	0.	.1082E+04	.1373E+02	.7936E+01
1462	.2748E+03	-.9969E-02	-.1965E-01	0.	.4049E+03	.8665E+01	.5790E+01
1562	.2670E+03	-.1231E-01	-.2363E-01	0.	.3894E+03	.8611E+01	.4700E+01
1171	.2931E+03	-.6737E-02	-.1326E-01	0.	.1082E+04	.8803E+01	.8336E+01
1271	.2889E+03	-.7005E-02	-.1378E-01	0.	.1066E+04	.9485E+01	.8890E+01
1371	.2743E+03	-.1091E-01	-.2147E-01	0.	.1024E+04	.8475E+01	.7761E+01
1471	.2588E+03	-.1300E-01	-.2558E-01	0.	.3857E+03	.6414E+01	.6037E+01

1571	[illegible]	-.1651E-01	-.3249E-01	0.	.3732E+03	.6395E+01	.5964E+01

NODE	TEMP	DT	DDT	GEN RATE	W	H	F
1151	.2805E+03	-.5979E-02	-.1176E-01	.1874E+02	.1057E+04	.6346E+01	-.1118E+04
1241	.2784E+03	-.6149E-02	-.1214E-01	.1874E+02	.1342E+04	.7046E+01	-.1118E+04
1331	.2673E+03	-.9659E-02	-.1903E-01	.1874E+02	.1004E+04	.6149E+01	-.1119E+04
1421	.2493E+03	-.1127E-01	-.2217E-01	.7629E+01	.3403E+03	.5299E+01	-.4526E+03
1511	.2426E+03	-.1218E-01	-.2396E-01	.7629E+01	.3684E+03	.5220E+01	-.4528E+03
1	.3546E+03	-.5931E-01	-.1167E+00	0.	.3604E+03	-.1361E+03	-.1361E+03
2	.3522E+03	-.5926E-01	-.1166E+00	0.	.1075E+04	-.3156E+03	-.3156E+03
3	.3477E+03	-.5923E-01	-.1165E+00	0.	.1766E+04	-.5168E+03	-.5168E+03
4	.3422E+03	-.5930E-01	-.1167E+00	0.	.2419E+04	-.7036E+03	-.7036E+03
5	.3452E+03	-.6393E-01	-.1258E+00	0.	.5695E+03	-.1643E+03	-.1643E+03
6	.3427E+03	-.6386E-01	-.1256E+00	0.	.1695E+04	-.4891E+03	-.4891E+03
7	.3374E+03	-.6369E-01	-.1253E+00	0.	.2777E+04	-.7950E+03	-.7950E+03
8	.3279E+03	-.6331E-01	-.1246E+00	0.	.3773E+04	-.1067E+04	-.1067E+04
9	.2937E+03	-.7141E-01	-.1405E+00	0.	.2573E+03	-.5587E+02	-.5587E+02
10	.2944E+03	-.7132E-01	-.1403E+00	0.	.7684E+03	-.1665E+03	-.1665E+03
11	.2916E+03	-.7110E-01	-.1399E+00	0.	.1269E+04	-.2735E+03	-.2735E+03
12	.2867E+03	-.7047E-01	-.1386E+00	0.	.1746E+04	-.3732E+03	-.3732E+03
13	.2487E+03	-.6225E-01	-.1225E+00	0.	.3304E+03	-.5560E+02	-.5560E+02
14	.2482E+03	-.6220E-01	-.1224E+00	0.	.9913E+03	-.1670E+03	-.1670E+03
15	.2481E+03	-.6223E-01	-.1221E+00	0.	.1651E+04	-.2790E+03	-.2790E+03
16	.2481E+03	-.6197E-01	-.1211E+00	0.	.2311E+04	-.3927E+03	-.3927E+03
17	.3169E+03	-.4967E-01	-.9774E-01	0.	.1079E+05	-.3461E+04	-.3461E+04
18	.3124E+03	-.6032E-01	-.1197E+00	0.	.2215E+05	-.6293E+04	-.6293E+04
19	.3116E+03	-.6104E-01	-.1201E+00	0.	.5637E+04	-.1588E+04	-.1588E+04
20	.3032E+03	-.6214E-01	-.1223E+00	0.	.5572E+04	-.1533E+04	-.1533E+04
21	.2773E+03	-.6742E-01	-.1327E+00	0.	.2665E+04	-.5587E+03	-.5587E+03
22	.2466E+03	-.5998E-01	-.1180E+00	0.	.3561E+04	-.6353E+03	-.6353E+03
23	.3041E+03	-.5074E-01	-.9983E-01	0.	.2604E+04	-.8199E+03	-.8200E+03
24	.3049E+03	-.5165E-01	-.1016E+00	0.	.5383E+04	-.1590E+04	-.1590E+04
25	.2965E+03	-.5337E-01	-.1050E+00	0.	.1014E+05	-.3016E+04	-.3016E+04
26	.3007E+03	-.6233E-01	-.1226E+00	0.	.2463E+05	-.6778E+04	-.6778E+04
27	.2677E+03	-.5413E-01	-.1065E+00	0.	.2126E+05	-.4658E+04	-.4658E+04
28	.2926E+03	-.5049E-01	-.9934E-01	0.	.6113E+04	-.1699E+04	-.1699E+04
29	.2095E+03	-.1967E-01	-.3969E-01	0.	.2713E+04	-.3556E+03	-.3556E+03
30	.2455E+03	-.5856E-01	-.1154E+00	0.	.3923E+03	-.5844E+02	-.5848E+02
31	.2437E+03	-.5853E-01	-.1154E+00	0.	.1177E+04	-.1760E+03	-.1761E+03
32	.2439E+03	-.5858E-01	-.1153E+00	0.	.1963E+04	-.2938E+03	-.2940E+03
33	.2416E+03	-.5852E-01	-.1151E+00	0.	.2751E+04	-.4142E+03	-.4144E+03
34	.2415E+03	-.5848E-01	-.1151E+00	0.	.3543E+04	-.5360E+03	-.5361E+03

NODE	TEMP	W/F A	DA	DDA	W/F B	DB	DDB
3111	5.2107E+02	1.0000E+00	0.	0.	0.	0.	0.
3211	5.1978E+02	1.0000E+00	0.	0.	0.	0.	0.
3311	4.8193E+02	1.0000E+00	0.	0.	0.	0.	0.
3411	4.4529E+02	1.0000E+00	0.	0.	0.	0.	0.
3511	4.2467E+02	1.0000E+00	0.	0.	0.	0.	0.
1111	4.7770E+02	1.0000E+00	0.	0.	0.	0.	0.
1211	3.9965E+02	1.0000E+00	0.	0.	0.	0.	0.
1311	3.2995E+02	1.0000E+00	0.	0.	0.	0.	0.
1411	3.5290E+02	1.0000E+00	0.	0.	0.	0.	0.

DATA BLOCK 50

DATA MODIFIES OR ADDS TO DATA ALREADY READ IN.

DATA ADDED TO PRODUCE DROP AT END TWO
NEUTRON WATER SHIELD CAVITY

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	HINT	RINT	AREA
1132	1141	51	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1232	1241	52	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1332	1341	53	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1432	1441	54	0.	0.	7.5000E-01	2.6667E-01	7.5000E-01	-3.3300E-01	2.0000E-01
1532	1541	55	0.	0.	7.5000E-01	2.6667E-01	7.5000E-01	-3.3300E-01	2.0000E-01
1131	1141	56	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1231	1241	57	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1331	1341	58	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1131	1142	59	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1231	1242	60	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1331	1342	61	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1431	1442	62	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00
1531	1542	63	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00
1431	1441	64	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00
1531	1541	65	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00

TRUMP OUTPUT DATA — POST FIRE TEST CONDITIONS — DATA DECK 2

* AFTER FIRE 3 134913 09/20/75

PRINTOUT CYCLE	HF	MSS	KWIT	DELTMX	SMALL	TVARY	DTEMP	DTMAXS	NUTS
14	168	0	37	1	.5000[illegible]E+00	.23659E-03	.3300[illegible]E+01	.12449E+00	.18205E-01	0

TOTAL TIME	TIME STEP	HEAT FLOW	TEMP FROM FLUX	FLUX RATE	TEMP RATE
6.[illegible]30E+01	5.[illegible]E-01	-1.14707E+06	-9.98383E+02	-1.91178E+04	-1.49731E+01

AVG TEMP	HEAT CAPACITY	HEAT CONTENT	GEN RATE	HEAT GEN	TEMP FROM GEN
.35421E+02	1.27691E+03	5.23703E+05	2.12464E+04	1.27479E+06	9.98413E+02

FINAL HEAT = 5.[illegible]E+05 FINAL FLOW = -1.14707E+06

NODE	TEMP	DT	DDT	GEN RATE	H	H	F
3111	.6419E+03	.4685E-01	.9625E-01	.5822E+04	.2590E+05	.6106E+04	-.3432E+06
3211	.6643E+03	.5311E-01	.1046E+00	.5944E+04	.2525E+05	.5883E+04	-.3538E+06
3311	.6257E+03	.6144E-01	.1219E+00	.5788E+04	.2377E+05	.5464E+04	-.3418E+06
3411	.5785E+03	.7122E-01	.1403E+00	.2382E+04	.9883E+04	.2256E+04	-.1406E+06
3511	.5502E+03	.7664E-01	.1511E+00	0.	.6271E+04	.1431E+04	.1431E+04
1111	.5752E+03	.4166E-01	.8211E-01	0.	.7175E+04	.2249E+04	.2244E+04
1211	.5615E+03	.4560E-01	.8983E-01	0.	.6984E+04	.2163E+04	.2159E+04
1311	.5295E+03	.5391E-01	.1062E+00	0.	.6551E+04	.1988E+04	.1985E+04
1411	.4897E+03	.6451E-01	.1271E+00	0.	.2706E+04	.8101E+03	.8097E+03
1511	.4556E+03	.7363E-01	.1451E+00	0.	.2497E+04	.7419E+03	.7426E+03
2111	.5643E+03	.4365E-01	.8049E-01	0.	.3661E+04	.1135E+04	.1121E+04
2211	.5517E+03	.4477E-01	.8820E-01	0.	.3568E+04	.1093E+04	.1082E+04
2311	.5202E+03	.5399E-01	.1046E+00	0.	.3356E+04	.1007E+04	.9992E+03
2411	.4811E+03	.6389E-01	.1259E+00	0.	.1391E+04	.4115E+03	.4116E+03
2511	.4499E+03	.7338E-01	.1446E+00	0.	.1297E+04	.3778E+03	.3801E+03
2121	.5534E+03	.4036E-01	.7952E-01	0.	.3773E+04	.1182E+04	.1167E+04
2221	.5401E+03	.4417E-01	.8701E-01	0.	.3674E+04	.1138E+04	.1124E+04
2321	.5144E+03	.5243E-01	.1033E+00	0.	.3459E+04	.1049E+04	.1040E+04
2421	.4761E+03	.6311E-01	.1243E+00	0.	.1434E+04	.4292E+03	.4283E+03
2521	.4467E+03	.7292E-01	.1435E+00	0.	.1341E+04	.3935E+03	.3963E+03
2131	.5527E+03	.3965E-01	.7812E-01	0.	.3877E+04	.1230E+04	.1211E+04
2231	.5398E+03	.4354E-01	.8579E-01	0.	.3773E+04	.1154E+04	.1169E+04
2331	.5091E+03	.5174E-01	.1019E+00	0.	.3559E+04	.1092E+04	.1081E+04
2431	.4731E+03	.6260E-01	.1233E+00	0.	.1476E+04	.4467E+03	.4466E+03
2531	.4431E+03	.7256E-01	.1429E+00	0.	.1384E+04	.4092E+03	.4128E+03
2141	.5464E+03	.3920E-01	.7724E-01	0.	.3981E+04	.1277E+04	.1260E+04
2241	.5334E+03	.4292E-01	.8456E-01	0.	.3882E+04	.1230E+04	.1214E+04
2341	.5039E+03	.5108E-01	.1006E+00	0.	.3656E+04	.1134E+04	.1123E+04
2441	.4665E+03	.6173E-01	.1216E+00	0.	.1517E+04	.4642E+03	.4632E+03
2541	.4305E+03	.7190E-01	.1417E+00	0.	.1426E+04	.4247E+03	.4279E+03
2151	.5438E+03	.3450E-01	.7585E-01	0.	.4086E+04	.1324E+04	.1305E+04
2251	.5249E+03	.4229E-01	.8332E-01	0.	.3984E+04	.1270E+04	.1260E+04
2351	.4990E+03	.5037E-01	.9923E-01	0.	.3754E+04	.1170E+04	.1165E+04
2451	.4621E+03	.6110E-01	.1204E+00	0.	.1559E+04	.4820E+03	.4817E+03
2551	.4360E+03	.7153E-01	.1409E+00	0.	.1467E+04	.4403E+03	.4439E+03
2161	.5354E+03	.3943E-01	.7492E-01	0.	.4188E+04	.1372E+04	.1358E+04
2261	.5229E+03	.4167E-01	.8209E-01	0.	.4084E+04	.1322E+04	.1309E+04

2351	.4944E+03	.4958E-01	.9786E-01	0.	.3851E+04	.1219E+04	.1210E+04

NODE	TEMP	DT	DDT	GEN RATE	W	H	F
2461	.4579E+03	.6319E-01	.1186E+00	0.	.1599E+04	.4998E+03	.4988E+03
2561	.4325E+03	.7977E-01	.1394E+00	0.	.1506E+04	.4566E+03	.4582E+03
1121	.5263E+03	.3726E-01	.7302E-01	0.	.1147E+05	.3969E+04	.3959E+04
1221	.5141E+03	.4370E-01	.8318E-01	0.	.1119E+05	.3821E+04	.3812E+04
1321	.4864E+03	.4854E-01	.9564E-01	0.	.1052E+05	.3513E+04	.3507E+04
1421	.4576E+03	.5389E-01	.1160E+00	0.	.4757E+04	.1439E+04	.1438E+04
1521	.4289E+03	.6981E-01	.1375E+00	0.	.4399E+04	.1308E+04	.1307E+04
1131	.5156E+03	.3602E-01	.7195E-01	0.	.1070E+05	.3808E+04	.3804E+04
1231	.5038E+03	.3953E-01	.7787E-01	0.	.1043E+05	.3667E+04	.3662E+04
1331	.4769E+03	.4715E-01	.9289E-01	0.	.9821E+04	.3370E+04	.3367E+04
1431	.4392E+03	.5657E-01	.1114E+00	0.	.4043E+04	.1381E+04	.1381E+04
1531	.4154E+03	.6757E-01	.1331E+00	0.	.3403E+04	.1251E+04	.1251E+04
1132	.5299E+03	.3603E-01	.7195E-01	0.	.7164E+03	.2519E+03	.2474E+03
1232	.5199E+03	.4095E-01	.7999E-01	0.	.6983E+03	.2425E+03	.2385E+03
1332	.4914E+03	.4782E-01	.9422E-01	0.	.6574E+03	.2230E+03	.2202E+03
1432	.4437E+03	.5848E-01	.1152E+00	0.	.2739E+03	.9156E+02	.9135E+02
1532	.4225E+03	.6929E-01	.1365E+00	0.	.2577E+03	.8310E+02	.8342E+02
1141	.5224E+03	.1711E-01	.3371E-01	0.	.1693E+04	-.2788E+02	-.3083E+02
1241	.5169E+03	.1880E-01	.3705E-01	0.	.1653E+04	-.2910E+02	-.3151E+02
1341	.5039E+03	.2239E-01	.4412E-01	0.	.1586E+04	-.2675E+02	-.2807E+02
1441	.4771E+03	.2484E-01	.4893E-01	0.	.6466E+03	-.1787E+02	-.1764E+02
1541	.4672E+03	.2863E-01	.5641E-01	0.	.6219E+03	-.1742E+02	-.1636E+02
1142	.5225E+03	.1706E-01	.3362E-01	0.	.1688E+04	-.2729E+02	-.3322E+02
1242	.5154E+03	.1875E-01	.3694E-01	0.	.1656E+04	-.2843E+02	-.3092E+02
1342	.5059E+03	.2237E-01	.4399E-01	0.	.1594E+04	-.2623E+02	-.2755E+02
1442	.4757E+03	.2476E-01	.4876E-01	0.	.6457E+03	-.1730E+02	-.1708E+02
1542	.4659E+03	.2857E-01	.5621E-01	0.	.6211E+03	-.1693E+02	-.1587E+02
1151	.3[illegible]E+03	.1678E-01	.3306E-01	.3168E+03	.2941E+04	-.4640E+02	-.1906E+05
1251	.3142E+03	.1844E-01	.3633E-01	.3168E+03	.2886E+04	-.4839E+02	-.1906E+05
1351	.3146E+03	.2197E-01	.4328E-01	.3168E+03	.2762E+04	-.4471E+02	-.1905E+05
1451	.2740E+03	.2426E-01	.4780E-01	.1445E+03	.1141E+04	-.3113E+02	-.8700E+04
1551	.2652E+03	.2797E-01	.5511E-01	.1445E+03	.1194E+04	-.2947E+02	-.8697E+04
1152	.3191E+03	.1673E-01	.3297E-01	0.	.4250E+03	-.6675E+01	-.8389E+01
1252	.3137E+03	.1835E-01	.3623E-01	0.	.4172E+03	-.6963E+01	-.8425E+01
1352	.3111E+03	.2191E-01	.4316E-01	0.	.3992E+03	-.6437E+01	-.7199E+01
1452	.2746E+03	.2425E-01	.4778E-01	0.	.1473E+03	-.3696E+01	-.3758E+01
1552	.2652E+03	.2793E-01	.5503E-01	0.	.1419E+03	-.3803E+01	-.3226E+01
1151	.3154E+03	.1871E-01	.3213E-01	0.	.1533E+03	-.2799E+01	-.7385E+01
1261	.3101E+03	.1793E-01	.3531E-01	0.	.1505E+03	-.2395E+01	-.6470E+01
1361	.2974E+03	.2135E-01	.4207E-01	0.	.1441E+03	-.2217E+01	-.4299E+01
1461	.2719E+03	.2341E-01	.4652E-01	0.	.5321E+02	-.1354E+01	-.9336E+00
1561	.2625E+03	.2720E-01	.5360E-01	0.	.5125E+02	-.1326E+01	.4142E+00
1162	.3128E+03	.1635E-01	.3158E-01	0.	.1131E+04	-.1632E+02	-.1994E+02
1262	.3076E+03	.1751E-01	.3479E-01	0.	.1113E+04	-.1712E+02	-.2021E+02
1362	.2965E+03	.2098E-01	.4134E-01	0.	.1066E+04	-.1596E+02	-.1744E+02
1462	.2722E+03	.2320E-01	.4571E-01	0.	.3942E+03	-.9300E+01	-.9489E+01
1562	.2639E+03	.2672E-01	.5265E-01	0.	.3798E+03	-.9500E+01	-.8317E+01
1171	.2934E+03	.1365E-01	.2689E-01	0.	.1372E+04	-.1029E+02	-.1084E+02
1271	.2862E+03	.1499E-01	.2953E-01	0.	.1355E+04	-.1108E+02	-.1155E+02
1371	.2787E+03	.1743E-01	.3513E-01	0.	.1314E+04	-.1025E+02	-.1051E+02
1471	.2543E+03	.1973E-01	.3888E-01	0.	.3785E+03	-.7231E+01	-.7210E+01

1571	.2464E+03	.2279E-01	.4489E-01	0.	.3660E+03	-.7126E+01	-.6982E+01

NODE	TEMP	DT	DDT	GEN RATE	W	H	F
1141	.2797E+03	.1239E-01	.2441E-01	.1874E+02	.1350E+04	-.7395E+01	-.1132E+04
1221	.2747E+03	.1240E-01	.2680E-01	.1874E+02	.1033E+04	-.8182E+01	-.1133E+04
1331	.2654E+03	.1518E-01	.3197E-01	.1874E+02	.9961E+03	-.7561E+01	-.1132E+04
1481	.2451E+03	.1791E-01	.3528E-01	.7629E+01	.3740E+03	-.6607E+01	-.4639E+03
1581	.2384E+03	.2053E-01	.4044E-01	.7629E+01	.3624E+03	-.5955E+01	-.4637E+03
1	.4602E+03	.1163E+00	.2292E+00	0.	.4778E+03	.1170E+03	.1170E+03
2	.4670E+03	.1160E+00	.2236E+00	0.	.1422E+04	.3478E+03	.3478E+03
3	.4[illegible]E+03	.1156E+00	.2278E+00	0.	.2336E+04	.5698E+03	.5697E+03
4	.4412E+03	.1152E+00	.2269E+00	0.	.3194E+04	.7754E+03	.7753E+03
5	.4456E+03	.1271E+00	.2423E+00	0.	.7507E+03	.1812E+03	.1812E+03
6	.4422E+03	.1226E+00	.2416E+00	0.	.2233E+04	.5379E+03	.5379E+03
7	.4[illegible]E+03	.1219E+00	.2401E+00	0.	.3654E+04	.8765E+03	.8765E+03
8	.4216E+03	.1234E+00	.2371E+00	0.	.4947E+04	.1176E+04	.1176E+04
9	.3653E+03	.1245E+00	.2452E+00	0.	.3189E+03	.6147E+02	.6147E+02
10	.3746E+03	.1242E+00	.2448E+00	0.	.9516E+03	.1832E+03	.1832E+03
11	.3688E+03	.1276E+00	.2436E+00	0.	.1571E+04	.3010E+03	.3010E+03
12	.3541E+03	.1222E+00	.2439E+00	0.	.2157E+04	.4106E+03	.4106E+03
13	.2486E+03	.9938E-01	.1958E+00	0.	.3916E+03	.6115E+02	.6117E+02
14	.2986E+03	.9932E-01	.1957E+00	0.	.1175E+04	.1836E+03	.1836E+03
15	.2285E+03	.9915E-01	.1953E+00	0.	.1954E+04	.3066E+03	.3067E+03
16	.2589E+03	.9862E-01	.1943E+00	0.	.2743E+04	.4319E+03	.4321E+03
17	.4197E+03	.1513E+00	.1995E+00	0.	.1459E+05	.3815E+04	.3815E+04
18	.4[illegible]E+03	.1156E+00	.2278E+00	0.	.2908E+05	.6931E+04	.6930E+04
19	.4[illegible]E+03	.1157E+00	.2280E+00	0.	.7387E+04	.1750E+04	.1750E+04
20	.3941E+03	.1166E+00	.2298E+00	0.	.7261E+04	.1689E+04	.1689E+04
21	.3412E+03	.1168E+00	.2300E+00	0.	.3279E+04	.6145E+03	.6149E+03
22	.2905E+03	.9678E-01	.1907E+00	0.	.4356E+04	.6980E+03	.6982E+03
23	.4[illegible]E+03	.1112E+00	.1993E+00	0.	.3504E+04	.9040E+03	.9039E+03
24	.4[illegible]E+03	.1116E+00	.2041E+00	0.	.6432E+04	.1752E+04	.1752E+04
25	.3964E+03	.1127E+00	.2024E+00	0.	.1346E+05	.3325E+04	.3325E+04
26	.3945E+03	.1165E+00	.2295E+00	0.	.3206E+05	.7467E+04	.7467E+04
27	.3273E+03	.9927E-01	.1977E+00	0.	.2634E+05	.5123E+04	.5123E+04
28	.3623E+03	.9453E-01	.1862E+00	0.	.7989E+04	.1871E+04	.1871E+04
29	.2397E+03	.3542E-01	.6974E-01	0.	.3109E+04	.3901E+03	.3901E+03
30	.2831E+03	.9279E-01	.1828E+00	0.	.4565E+03	.6426E+02	.6457E+02
31	.2812E+03	.9279E-01	.1829E+00	0.	.1373E+04	.1931E+03	.1943E+03
32	.2805E+03	.9279E-01	.1823E+00	0.	.2286E+04	.3231E+03	.3245E+03
33	.2813E+03	.9282E-01	.1829E+00	0.	.3206E+04	.4548E+03	.4567E+03
34	.2516E+03	.9292E-01	.1831E+00	0.	.4132E+04	.5892E+03	.5904E+03

NODE	TEMP	W/F A	DA	DDA	W/F B	DB	DDB
3111	6.8178E+02	1.0000E+00	0.	0.	0.	0.	0.
3211	5.6481E+02	1.0000E+00	0.	0.	0.	0.	0.
3311	6.2565E+02	1.0000E+00	0.	0.	0.	0.	0.
3411	5.7[illegible]E+02	1.0000E+00	0.	0.	0.	0.	0.
3511	5.5122E+02	1.0000E+00	0.	0.	0.	0.	0.
1111	5.7621E+02	1.0000E+00	0.	0.	0.	0.	0.
1211	5.6127E+02	1.0000E+00	0.	0.	0.	0.	0.
1311	5.2953E+02	1.0000E+00	0.	0.	0.	0.	0.
1411	4.6974E+02	1.0000E+00	0.	0.	0.	0.	0.

Exhibit D2

TRUMP Printout for Bottom

Section of NLI 10/24 Cask

TRUMP OUTPUT DATA PROGRAM DATE 140116 08/20/75 DATA DECK 1

***DOUBLE. NLI 3-D MODEL 70 KW. 1 BOTTOM 140116 08/20/75

NO DATA CARRYOVER FROM PRECEDING PROBLEM.

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DATA BLOCK  1                STEADY STATE BASE, NEW RAD,NO AUX COOL, FLUID 17 ,
****TIME, TEMPS WILL BE WRITTEN ON TAPE    66 EVERY    1 TIME STEPS.

IPRINT   NUM KDATA KSPEC  MCYC  MSEC NPUNCH NDOT IRITE ITAPE  TIMEP        SCALE        PTIME
   -0    -0    -1    -0    -0    -0     1    -0     1    66  .30000E+02  .83333E-01 -0.

KC   KT    DELTO       SMALL       TVARY       TAU         TIMAX       TMIN        TMAX
 1    3  5.00000E-01  1.00000E-12  3.00000E+00 -0.         6.00000E+01 -3.00000E-03 2.00000E+03

KC KSYM    GEOM        SIGMA       TBASE
 1    1  1.00000E+00  1.73000E-09  4.60000E+02

TONE        ALONE       BONE        GONE        FONE        HONE        RONE        PONE
2.5000E+02 -0.          -0.         -0.         -0.         -0.         -0.         -0.
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DATA BLOCK 2 MATERIAL PROPERTIES

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
301SS	1	1	-0	-0	8	8	4.9300E+02	-0.	-0.	2.6300E+03	1.2000E+02

CAPACITY	SLOPE	ENERGY	SLOPE	TVARC ← TEMPERATURE °F
1.000000E-01	8.000000E-05	-6.144000E+00	1.040000E-01	-6.000000E+01
1.050000E-01	8.000000E-05	4.256000E+00	1.040000E-01	4.000000E+01
1.150000E-01	7.000000E-05	1.540500E+01	1.110000E-01	1.400000E+02
1.210000E-01	6.000000E-05	2.720500E+01	1.180000E-01	2.400000E+02
1.330000E-01	4.000000E-05	6.530500E+01	1.270000E-01	5.400000E+02
1.350000E-01	2.000000E-05	7.870500E+01	1.340000E-01	6.400000E+02
1.370000E-01	2.000000E-05	9.230600E+01	1.360000E-01	7.400000E+02
1.560000E-01	2.111111E-05	2.241360E+02	1.465000E-01	1.640000E+03

CONDUCTIVITY	SLOPE	TVARK ← TEMPERATURE °F
7.700000E+00	6.500000E-03	-6.000000E+01
8.350000E+00	6.500000E-03	4.000000E+01
8.950000E+00	6.000000E-03	1.400000E+02
9.550000E+00	6.000000E-03	2.400000E+02
1.110000E+01	5.166667E-03	5.400000E+02
1.150000E+01	4.500000E-03	6.400000E+02
1.190000E+01	4.300000E-03	7.400000E+02
1.560000E+01	4.021053E-03	1.690000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
LEAD	2	2	-0	-0	6	8	7.0500E+02	-0.	-0.	6.2100E+02	1.0500E+01

CAPACITY	SLOPE	ENERGY	SLOPE	TVARC
3.030000E-02	6.666667E-06	9.661867E-01	3.090000E-02	3.200000E+01
3.150000E-02	6.666667E-06	6.528187E+00	3.090000E-02	2.120000E+02
3.390000E-02	6.388889E-06	1.828219E+01	3.265000E-02	5.720000E+02
3.470000E-02	-2.040816E-06	1.993594E+01	3.375000E-02	6.210000E+02
3.260000E-02	-1.100000E+09	1.993594E+01	3.315000E-02	6.210000E+02
3.260000E-02	0.	3.256913E+02	3.260000E-02	1.000000E+04

CONDUCTIVITY	SLOPE	TVARK
2.010000E+01	-2.777778E-03	3.200000E+01
1.950000E+01	-2.777778E-03	2.120000E+02
1.800000E+01	-4.444444E-03	5.720000E+02
8.300000E+00	-1.877551E-01	6.210000E+02
8.300000E+00	0.	6.210000E+02
8.900000E+00	3.584229E-04	9.000000E+02
9.600000E+00	2.333333E-03	1.200000E+03
1.150000E+01	6.333333E-03	1.500000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
ALUM	3	3	-0	-0	-0	-0	1.7000E+02	2.0000E-01	1.0000E+02	1.2000E+03	1.6700E+02
CU	4	4	-0	-0	8	8	5.5800E+02	-0.	-0.	2.4500E+03	4.0000E+01

NOT USED IN CALC

CAPACITY	SLOPE	ENERGY	SLOPE	TVARC
7.500000E-02	9.500000E-05	-1.763950E+01	7.975000E-02	-2.100000E+02
8.450000E-02	9.500000E-05	-9.664500E+00	7.97[illegible]E-02	-1.100000E+02
8.800000E-02	7.000000E-05	-5.352000E+00	8.6[illegible]E-02	-6.000000E+01
9.100000E-02	4.000000E-05	1.360500E+00	8.95[illegible]E-02	1.500000E+01

9.300000E-02	2.666667E-05	8.260500E+00	9.200000E-02	9.000000E+01
1.010000E-01	1.391304E-05	6.403350E+01	9.700000E-02	6.650000E+02
1.215000E-01	1.576923E-05	2.086505E+02	1.112500E-01	1.965000E+03
1.600000E-01	1.323024E-05	6.182430E+02	1.407500E-01	4.875000E+03

CONDUCTIVITY	SLOPE	TVARK
2.435000E+02	-7.000000E-02	-6.000000E+01
2.330000E+02	-7.000000E-02	9.000000E+01
2.210000E+02	-4.000000E-02	3.900000E+02
2.145000E+02	-3.095238E-02	6.000000E+02
2.090000E+02	-2.750000E-02	8.000000E+02
2.040000E+02	-2.500000E-02	1.000000E+03
1.990000E+02	-2.500000E-02	1.200000E+03
1.845000E+02	-2.071429E-02	1.900000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
COCU	5	5	-0	-0	3	4	5.5500E+02	-0.	-0.	1.8900E+03	2.2400E+03

NOT USED IN CALC.

CAPACITY	SLOPE	ENERGY	SLOPE	TVARC
8.900000E-02	4.880952E-05	-3.599048E+00	1.095000E-01	-4.000000E+01
1.300000E-01	4.880952E-05	8.838095E+01	1.095000E-01	8.000000E+02
1.150000E-01	-2.222222E-05	1.710685E+02	1.225000E-01	1.475000E+03

CONDUCTIVITY	SLOPE	TVARK
1.540000E+02	6.133364E-02	-4.000000E+01
1.610000E+02	6.133364E-02	4.000000E+02
1.900000E+02	6.000000E-02	5.500000E+02
1.900000E+02	0.	1.475000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
URANI	6	6	-0	-0	6	5	1.1900E+03	-0.	-0.	2.0700E+03	0.

CAPACITY	SLOPE	ENERGY	SLOPE	TVARC
2.600000E-02	1.000000E-05	-2.650000E+00	2.650000E-02	-1.000000E+02
2.700000E-02	1.000000E-05	0.	2.650000E-02	0.
2.900000E-02	2.000000E-05	2.800000E+00	2.800000E-02	1.000000E+02
3.450000E-02	1.000000E-05	1.867500E+01	3.175000E-02	6.000000E+02
4.200000E-02	1.875000E-05	3.397500E+01	3.825000E-02	1.000000E+03
4.000000E-02	3.125000E-05	4.495500E+01	4.575000E-02	1.240000E+03

CONDUCTIVITY	SLOPE	TVARK
1.520000E+01	-1.900000E-02	-1.000000E+02
1.330000E+01	-1.900000E-02	0.
1.500000E+01	8.500000E-03	2.000000E+02
1.800000E+01	7.500000E-03	6.000000E+02
2.470000E+01	7.444444E-03	1.500000E+03

NAME	MATL	INDEX	KA	KB	LTABC	LTABK	DENSITY	CAPACITY	CONDUCTIVITY	TMELT	HMELT
RICOR	7	7	-0	-0	-0	-0	5.5000E+01	5.5000E-01	3.0000E-01	1.5000E+03	1.0000E+00
BALSA	8	8	-0	-0	-0	-0	1.5000E+01	5.0000E-01	3.4000E-02	1.5000E+03	1.0000E+00

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DATA BLOCK 4

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME
3111	1	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3211	2	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3311	3	3	0	1.66667E+00	3.80000E-01	1.76417E+00	1.11731E+00
3411	4	3	0	7.50000E-01	3.80000E-01	1.76417E+00	5.02737E-01
3511	5	3	0	5.00000E-01	3.80000E-01	1.76417E+00	3.35192E-01
1111	6	1	0	1.66667E+00	5.25000E-02	1.99583E+00	2.07899E-01
1211	7	1	0	1.66667E+00	5.25000E-02	1.99583E+00	2.07899E-01
1311	8	1	0	1.66667E+00	5.25000E-02	1.99583E+00	2.07899E-01
1411	9	1	0	7.50000E-01	5.25000E-02	1.99583E+00	9.35947E-02
1511	10	1	0	7.50000E-01	5.25000E-02	1.99583E+00	9.35947E-02
2111	11	2	0	1.66667E+00	9.33333E-02	2.07250E+00	2.87847E-01
2211	12	2	0	1.66667E+00	9.33333E-02	2.07250E+00	2.87847E-01
2311	13	2	0	1.66667E+00	9.33333E-02	2.07250E+00	2.87847E-01
2411	14	2	0	7.50000E-01	9.33333E-02	2.07250E+00	1.29531E-01
2511	15	2	0	7.50000E-01	9.33333E-02	2.07250E+00	1.29531E-01
2121	16	2	0	1.66667E+00	9.33333E-02	2.16000E+00	3.00000E-01
2221	17	2	0	1.66667E+00	9.33333E-02	2.16000E+00	3.00000E-01
2321	18	2	0	1.66667E+00	9.33333E-02	2.16000E+00	3.00000E-01
2421	19	2	0	7.50000E-01	9.33333E-02	2.16000E+00	1.35000E-01
2521	20	2	0	7.50000E-01	9.33333E-02	2.16000E+00	1.35000E-01
2131	21	2	0	1.66667E+00	9.33333E-02	2.24750E+00	3.12153E-01
2231	22	2	0	1.66667E+00	9.33333E-02	2.24750E+00	3.12153E-01
2331	23	2	0	1.66667E+00	9.33333E-02	2.24750E+00	3.12153E-01
2431	24	2	0	7.50000E-01	9.33333E-02	2.24750E+00	1.40469E-01
2531	25	2	0	7.50000E-01	9.33333E-02	2.24750E+00	1.40469E-01
2141	26	2	0	1.66667E+00	9.33333E-02	2.33417E+00	3.24190E-01
2241	27	2	0	1.66667E+00	9.33333E-02	2.33417E+00	3.24190E-01
2341	28	2	0	1.66667E+00	9.33333E-02	2.33417E+00	3.24190E-01
2441	29	2	0	7.50000E-01	9.33333E-02	2.33417E+00	1.45885E-01
2541	30	2	0	7.50000E-01	9.33333E-02	2.33417E+00	1.45885E-01
2151	31	2	0	1.66667E+00	9.33333E-02	2.42167E+00	3.36343E-01
2251	32	2	0	1.66667E+00	9.33333E-02	2.42167E+00	3.36343E-01
2351	33	2	0	1.66667E+00	9.33333E-02	2.42167E+00	3.36343E-01
2451	34	2	0	7.50000E-01	9.33333E-02	2.42167E+00	1.51354E-01
2551	35	2	0	7.50000E-01	9.33333E-02	2.42167E+00	1.51354E-01
2161	36	2	0	1.66667E+00	9.33333E-02	2.50833E+00	3.48380E-01
2261	37	2	0	1.66667E+00	9.33333E-02	2.50833E+00	3.48380E-01
2361	38	2	0	1.66667E+00	9.33333E-02	2.50833E+00	3.48380E-01
2461	39	2	0	7.50000E-01	9.33333E-02	2.50833E+00	1.56771E-01
2561	40	2	0	7.50000E-01	9.33333E-02	2.50833E+00	1.56771E-01
1121	41	1	0	1.66667E+00	9.33333E-02	2.63917E+00	3.66551E-01
1221	42	1	0	1.66667E+00	9.33333E-02	2.63917E+00	3.66551E-01
1321	43	1	0	1.66667E+00	9.33333E-02	2.63917E+00	3.66551E-01
1421	44	1	0	7.50000E-01	9.33333E-02	2.63917E+00	1.84949E-01
1521	45	1	0	7.50000E-01	9.33333E-02	2.63917E+00	1.84949E-01
1131	46	1	0	1.66667E+00	9.33333E-02	2.51667E+00	3.49537E-01
1231	47	1	0	1.66667E+00	9.33333E-02	2.51667E+00	3.49537E-01
1331	48	1	0	1.66667E+00	9.33333E-02	2.51667E+00	3.49537E-01
1431	49	1	0	7.50000E-01	9.33333E-02	2.51667E+00	1.57292E-01
1531	50	1	0	7.50000E-01	9.33333E-02	2.51667E+00	1.57292E-01
1132	51	1	0	1.66667E+00	9.33333	1.66667E-01	2.31481E-02

Basalt

SS Cavity liner

LEAD

2" SS outer shell

VIII - D46

9/15

FIPS and WATER JACKET SHELL

VIII - 1 Part

NODE	INDEX	MATL	ATYPE	DLONG	DWIDE	DRAD	VOLUME
1232	52	1	0	1.66667E+00	3.33333E-02	1.66667E-01	2.31481E-02
1332	53	1	0	1.66667E+00	3.33333E-02	1.66667E-01	2.31481E-02
1432	54	1	0	7.50000E-01	3.33333E-02	1.66667E-01	1.04167E-02
1532	55	1	0	7.50000E-01	3.33333E-02	1.66667E-01	1.04167E-02
1141	56	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1241	57	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1341	58	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1441	59	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1541	60	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1142	61	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1242	62	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1342	63	1	0	1.66667E+00	3.12500E-02	1.76417E+00	9.18837E-02
1442	64	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1542	65	1	0	7.50000E-01	3.12500E-02	1.76417E+00	4.13477E-02
1151	66	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1251	67	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1351	68	1	0	1.45583E+00	3.12500E-02	3.54500E+00	1.61279E-01
1451	69	1	0	6.64167E-01	3.12500E-02	3.54500E+00	7.35772E-02
1551	70	1	0	6.64167E-01	3.12500E-02	3.54500E+00	7.35772E-02
1152	71	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1252	72	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1352	73	1	0	2.10833E-01	3.12500E-02	3.54500E+00	2.33564E-02
1452	74	1	0	8.58333E-02	3.12500E-02	3.54500E+00	9.50872E-03
1552	75	1	0	8.58333E-02	3.12500E-02	3.54500E+00	9.50872E-03
1161	76	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1261	77	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1361	78	1	0	8.33333E-02	8.33333E-02	1.22833E+00	8.53009E-03
1461	79	1	0	8.33333E-02	8.33333E-02	5.00000E-01	3.47222E-03
1561	80		0	8.33333E-02	8.33333E-02	5.00000E-01	3.47222E-03
1162	81	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1262	82	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1362	83	1	0	2.10833E-01	8.33333E-02	3.62167E+00	6.36307E-02
1462	84	1	0	8.58333E-02	8.33333E-02	3.62167E+00	2.59050E-02
1562	85	1	0	8.58333E-02	8.33333E-02	3.62167E+00	2.59050E-02
1171	86	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51938E-02
1271	87	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51938E-02
1371	88	1	0	2.10917E-01	8.33333E-02	3.70917E+00	6.51938E-02
1471	89	1	0	8.58333E-02	8.33333E-02	3.70917E+00	2.65308E-02
1571	90	1	0	8.58333E-02	8.33333E-02	3.70917E+00	2.65304E-02
1181	91	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.66907E-02
1281	92	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.66907E-02
1381	93	1	0	2.10833E-01	8.33333E-02	3.79583E+00	6.66907E-02
1481	94	1	0	8.58333E-02	8.33333E-02	3.79583E+00	2.71504E-02
1581	95	1	0	8.58333E-02	8.33333E-02	3.79583E+00	2.71503E-02
1	96	1	0	1.66667E-01	4.90833E-01	2.34417E-01	1.91766E-02
2	97	1	0	1.66667E-01	4.90833E-01	7.03167E-01	5.75229E-02
3	98	1	0	1.66667E-01	4.90833E-01	1.17192E+00	9.58693E-02
4	99	1	0	1.66667E-01	4.90833E-01	1.64067E+00	1.34216E-01
5	100	6	0	2.08333E-01	4.90833E-01	2.34417E-01	2.39707E-02
6	101	6	0	2.08333E-01	4.90833E-01	7.03167E-01	7.19037E-02
7	102	6	0	2.08333E-01	4.90833E-01	1.17192E+00	1.19837E-01

Crack Bottom EWP

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME
8	103	6	0	2.06333E-01	4.90833E-01	1.64067E+00	1.67770E-01
9	104	1	0	3.33333E-01	4.90833E-01	2.34417E-01	3.83532E-02
10	105	1	0	3.33333E-01	4.90833E-01	7.03167E-01	1.15046E-01
11	106	1	0	3.33333E-01	4.90833E-01	1.17192E+00	1.91739E-01
12	107	1	0	3.33333E-01	4.90833E-01	1.64067E+00	2.68431E-01
13	108	7	0	3.23333E-01	4.90833E-01	2.34417E-01	3.72026E-02
14	109	7	0	3.23333E-01	4.90833E-01	7.03167E-01	1.11595E-01
15	110	7	0	3.23333E-01	4.90833E-01	7.03167E-01	1.11595E-01
16	111	1	0	3.23333E-01	4.90833E-01	1.64083E+00	2.60405E-01
17	112	1	0	4.58333E-01	5.54167E-02	1.90667E+00	5.71663E-02
18	113	1	0	1.66667E-01	5.54167E-02	1.90667E+00	2.07850E-02
19	114	1	0	2.08333E-01	5.54167E-02	1.90667E+00	2.59850E-02
20	115	1	0	3.33333E-01	5.54167E-02	1.90667E+00	4.15759E-02
21	116	1	0	3.23333E-01	5.54167E-02	1.90667E+00	4.03285E-02
22	117	6	0	4.58333E-01	2.40000E-01	2.02083E+00	2.22292E-01
23	118	6	0	5.62500E-01	2.40000E-01	2.02083E+00	2.72812E-01
24	119	1	0	5.00000E-01	2.40000E-01	2.02083E+00	2.42500E-01
25	120	1	0	1.02083E+00	4.16667E-01	2.78333E+00	1.13388E+00
26	121	1	0	5.00000E-01	3.29167E-01	2.56667E+00	1.06410E+00
27	122	1	0	2.50000E-01	4.80000E-01	3.10833E+00	3.73000E-01
28	123	7	0	6.04167E-01	2.61667E-01	3.08333E+00	4.87443E-01

DATA BLOCK 5

HEAT CONDUCTION PATH LENGTHS — DEFINES AREA OF CONNECTED INTERFACE — HEAT TRANSFER COEFFICIENT — RADIATION FORM FACTOR

NOD1	NOD2	INDEX	DEL1	DEL2	DLOW	DHIGH	HINT	RINT	AREA
3111	1111	1	6.6667E+00	4.1667E-02	1.6667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3211	1211	2	6.6667E+00	4.1667E-02	1.6667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3311	1311	3	6.6667E+00	4.1667E-02	1.6667E+00	1.9633E+00	1.0000E+12	0.	3.2722E+00
3411	1411	4	6.6667E+00	4.1667E-02	7.5000E-01	1.9633E+00	1.0000E+12	0.	1.4725E+00
3511	1511	5	6.6667E+00	4.1667E-02	4.1667E-01	1.9633E+00	1.0000E+12	0.	8.1806E-01
1111	2111	6	3.1250E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2111	2121	7	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2121	2131	8	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6718E+00
2131	2141	9	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2141	2151	10	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9626E+00
2151	2161	11	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1080E+00
1211	2211	12	3.1250E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2211	2221	13	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2221	2231	14	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6718E+00
2231	2241	15	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2241	2251	16	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9626E+00
2251	2261	17	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1080E+00
1311	2311	18	3.1250E-02	4.1667E-02	1.7450E+00	1.9375E+00	5.0000E+02	0.	3.3809E+00
2311	2321	19	4.1667E-02	4.1667E-02	1.7450E+00	2.0208E+00	1.0000E+12	0.	3.5264E+00
2321	2331	20	4.1667E-02	4.1667E-02	1.7450E+00	2.1042E+00	1.0000E+12	0.	3.6718E+00
2331	2341	21	4.1667E-02	4.1667E-02	1.7450E+00	2.1875E+00	1.0000E+12	0.	3.8172E+00
2341	2351	22	4.1667E-02	4.1667E-02	1.7450E+00	2.2708E+00	1.0000E+12	0.	3.9625E+00
2351	2361	23	4.1667E-02	4.1667E-02	1.7450E+00	2.3542E+00	1.0000E+12	0.	4.1040E+00
1411	2411	24	3.1250E-02	4.1667E-02	7.5542E-01	1.9375E+00	5.0000E+02	0.	1.5217E+00
2411	2421	25	4.1667E-02	4.1667E-02	7.5542E-01	2.0208E+00	1.0000E+12	0.	1.5872E+00
2421	2431	26	4.1667E-02	4.1667E-02	7.5542E-01	2.1042E+00	1.0000E+12	0.	1.6526E+00
2431	2441	27	4.1667E-02	4.1667E-02	7.5542E-01	2.1875E+00	1.0000E+12	0.	1.7181E+00
2441	2451	28	4.1667E-02	4.1667E-02	7.5542E-01	2.2708E+00	1.0000E+12	0.	1.7836E+00
2451	2461	29	4.1667E-02	4.1667E-02	7.5542E-01	2.3542E+00	1.0000E+12	0.	1.8490E+00
1511	2511	30	3.1250E-02	4.1667E-02	7.5542E-01	1.9375E+00	5.0000E+02	0.	1.5217E+00
2511	2521	31	4.1667E-02	4.1667E-02	7.5542E-01	2.0208E+00	1.0000E+12	0.	1.5872E+00
2521	2531	32	4.1667E-02	4.1667E-02	7.5542E-01	2.1042E+00	1.0000E+12	0.	1.6526E+00
2531	2541	33	4.1667E-02	4.1667E-02	7.5542E-01	2.1875E+00	1.0000E+12	0.	1.7181E+00
2541	2551	34	4.1667E-02	4.1667E-02	7.5542E-01	2.2708E+00	1.0000E+12	0.	1.7836E+00
2551	2561	35	4.1667E-02	4.1667E-02	7.5542E-01	2.3542E+00	1.0000E+12	0.	1.8490E+00
2161	1121	36	4.1667E-02	4.1667E-02	1.7450E+00	1.6243E+00	1.0000E+12	0.	3.1904E+00
2261	1221	37	4.1667E-02	4.1667E-02	1.7450E+00	1.6243E+00	1.0000E+12	0.	3.1904E+00
2361	1321	38	4.1667E-02	4.1667E-02	1.7450E+00	1.6243E+00	1.0000E+12	0.	3.1904E+00
2461	1421	39	4.1667E-02	4.1667E-02	7.5542E-01	1.6243E+00	1.0000E+12	0.	1.4360E+00
2561	1521	40	4.1667E-02	4.1667E-02	7.5542E-01	1.6243E+00	1.0000E+12	0.	1.4360E+00
1121	1131	41	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1221	1231	42	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1321	1331	43	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1421	1431	44	4.1667E-02	4.1667E-02	7.5542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1521	1531	45	4.1667E-02	4.1667E-02	7.5542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1121	1132	46	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1221	1232	47	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1321	1332	48	4.1667E-02	4.1667E-02	1.7450E+00	1.2750E+00	1.0000E+12	0.	2.2249E+00
1421	1432	49	4.1667E-02	4.1667E-02	7.5542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1521	1532	50	4.1667E-02	4.1667E-02	7.5542E-01	1.2750E+00	1.0000E+12	0.	1.0014E+00
1131	1132	51	4.2500E-02	4.1667E-02	1.6667E+00	1.6667E+00	1.0000E+12	0.	2.7778E+00

NOD1	NOD2	INDEX	DFL1	DFL2	DLONG	DWAD	HINT	RINT	AREA
1231	1232	52	5.2500E-02	4.1667E-02	1.0667E+00	1.0667E+00	1.0000E+12	0.	2.7779E+00
1331	1332	53	5.2500E-02	4.1667E-02	1.0667E+00	1.0667E+00	1.0000E+12	0.	2.7779E+00
1431	1432	54	5.2500E-02	4.1667E-02	7.5000E-02	1.0667E+00	1.0000E+12	0.	1.2500E-01
1531	1532	55	5.2500E-02	4.1667E-02	7.5000E-02	1.0667E+00	1.0000E+12	0.	1.2500E-01
1132	1141	56	0.	0.	1.6667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1232	1241	57	0.	0.	1.0667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1332	1341	58	0.	0.	1.0667E+00	2.0667E-01	2.0700E+01	-3.3300E-01	4.4444E-01
1432	1441	59	0.	0.	7.5000E-01	2.0667E-01	2.0700E+01	-3.3300E-01	2.0000E-01
1532	1541	60	0.	0.	7.5000E-01	2.0667E-01	2.0700E+01	-3.3300E-01	2.0000E-01
1131	1141	61	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1231	1241	62	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1331	1341	63	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1131	1142	64	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1231	1242	65	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1331	1342	66	0.	0.	8.3333E-01	3.1200E+00	2.0700E+01	-3.3300E-01	2.6000E+00
1431	1442	67	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1531	1542	68	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1431	1441	69	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1531	1541	70	0.	0.	3.7500E-01	3.1200E+00	2.0700E+01	-3.3300E-01	1.1700E+00
1451	1461	71	1.5667E-02	4.3333E-01	1.4325E-01	3.5743E+00	1.0000E+12	0.	5.1260E-01
1551	1561	72	1.5667E-02	4.3333E-01	1.4325E-01	3.5743E+00	1.0000E+12	0.	5.1260E-01
1152	1162	73	1.5667E-02	4.1667E-02	2.1083E-01	3.5743E+00	1.0000E+12	0.	7.5443E-01
1252	1262	74	1.5667E-02	4.1667E-02	2.1083E-01	3.5743E+00	1.0000E+12	0.	7.5443E-01
1352	1362	75	1.5667E-02	4.1667E-02	2.1083E-01	3.5743E+00	1.0000E+12	0.	7.5443E-01
1452	1462	76	1.5667E-02	4.1667E-02	8.5917E-02	3.5743E+00	1.0000E+12	0.	3.0744E-01
1552	1562	77	1.5667E-02	4.1667E-02	8.5917E-02	3.5743E+00	1.0000E+12	0.	3.0744E-01
1162	1171	78	4.1667E-02	4.1667E-02	2.1083E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1262	1271	79	4.1667E-02	4.1667E-02	2.1083E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1362	1371	80	4.1667E-02	4.1667E-02	2.1083E-01	3.0650E+00	1.0000E+12	0.	7.7270E-01
1462	1471	81	4.1667E-02	4.1667E-02	8.5917E-02	3.0650E+00	1.0000E+12	0.	3.1488E-01
1562	1571	82	4.1667E-02	4.1667E-02	8.5917E-02	3.0650E+00	1.0000E+12	0.	3.1488E-01
1171	1181	83	4.1667E-02	4.1667E-02	2.1083E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1271	1281	84	4.1667E-02	4.1667E-02	2.1083E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1371	1381	85	4.1667E-02	4.1667E-02	2.1083E-01	3.7525E+00	1.0000E+12	0.	7.9115E-01
1471	1481	86	4.1667E-02	4.1667E-02	8.5917E-02	3.7525E+00	1.0000E+12	0.	3.2240E-01
1571	1581	87	4.1667E-02	4.1667E-02	8.5917E-02	3.7525E+00	1.0000E+12	0.	3.2240E-01
3111	3211	88	8.3333E-01	8.3333E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3211	3311	89	8.3333E-01	8.3333E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3311	3411	90	8.3333E-01	3.7500E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
3411	3511	91	3.7500E-01	2.5000E-01	8.3333E-02	1.0167E+01	1.0000E+12	0.	8.4722E-01
1111	1211	92	8.3333E-01	8.3333E-01	8.5417E-02	1.9052E+00	1.0000E+12	0.	1.2467E-01
1211	1311	93	8.3333E-01	8.3333E-01	8.5417E-02	1.9052E+00	1.0000E+12	0.	1.2467E-01
1311	1411	94	8.3333E-01	3.7500E-01	8.5417E-02	1.9052E+00	1.0000E+12	0.	1.2467E-01
1411	1511	95	3.7500E-01	3.7500E-01	8.5417E-02	1.9052E+00	1.0000E+12	0.	1.2467E-01
2111	2211	96	8.3333E-01	8.3333E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2211	2311	97	8.3333E-01	8.3333E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2311	2411	98	8.3333E-01	3.7500E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2411	2511	99	3.7500E-01	3.7500E-01	8.7250E-02	1.9792E+00	1.0000E+12	0.	1.7268E-01
2121	2221	100	8.3333E-01	8.3333E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2221	2321	101	8.3333E-01	8.3333E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2321	2421	102	8.3333E-01	3.7500E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	HINT	RINT	AREA
2421	2521	103	3.7500E-01	3.7500E-01	8.7250E-02	2.0625E+00	1.0000E+12	0.	1.7995E-01
2131	2231	104	8.3333E-01	8.3333E-01	8.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2231	2331	105	8.3333E-01	8.3333E-01	8.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2331	2431	106	8.3333E-01	3.7500E-01	8.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2431	2531	107	3.7500E-01	3.7500E-01	8.7250E-02	2.1458E+00	1.0000E+12	0.	1.8722E-01
2141	2241	108	8.3333E-01	8.3333E-01	8.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2241	2341	109	8.3333E-01	8.3333E-01	8.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2341	2441	110	8.3333E-01	3.7500E-01	8.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2441	2541	111	3.7500E-01	3.7500E-01	8.7250E-02	2.2292E+00	1.0000E+12	0.	1.9449E-01
2151	2251	112	8.3333E-01	8.3333E-01	8.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2251	2351	113	8.3333E-01	8.3333E-01	8.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2351	2451	114	8.3333E-01	3.7500E-01	8.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2451	2551	115	3.7500E-01	3.7500E-01	8.7250E-02	2.3125E+00	1.0000E+12	0.	2.0177E-01
2161	2261	116	8.3333E-01	8.3333E-01	8.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
2261	2361	117	8.3333E-01	8.3333E-01	8.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
2361	2461	118	8.3333E-01	3.7500E-01	8.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
2461	2561	119	3.7500E-01	3.7500E-01	8.7250E-02	2.3958E+00	1.0000E+12	0.	2.0904E-01
1121	1221	120	8.3333E-01	8.3333E-01	8.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1221	1321	121	8.3333E-01	8.3333E-01	8.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1321	1421	122	8.3333E-01	3.7500E-01	8.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1421	1521	123	3.7500E-01	3.7500E-01	8.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
1131	1231	124	8.3333E-01	8.3333E-01	8.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1231	1331	125	8.3333E-01	8.3333E-01	8.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1331	1431	126	8.3333E-01	3.7500E-01	8.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1431	1531	127	3.7500E-01	3.7500E-01	8.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
1132	1232	128	8.3333E-01	8.3333E-01	8.3333E-02	1.6667E-01	1.0000E+12	0.	1.3889E-02
1232	1332	129	8.3333E-01	8.3333E-01	8.3333E-02	1.6667E-01	1.0000E+12	0.	1.3889E-02
1332	1432	130	8.3333E-01	3.7500E-01	8.3333E-02	1.6667E-01	1.0000E+12	0.	1.3889E-02
1432	1532	131	3.7500E-01	3.7500E-01	8.3333E-02	1.6667E-01	1.0000E+12	0.	1.3889E-02
1141	1241	132	8.3333E-01	8.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1241	1341	133	8.3333E-01	8.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1341	1441	134	8.3333E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1441	1541	135	3.7500E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1142	1242	136	8.3333E-01	8.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1242	1342	137	8.3333E-01	8.3333E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1342	1442	138	8.3333E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1442	1542	139	3.7500E-01	3.7500E-01	3.1250E-02	1.7642E+00	1.0000E+12	0.	5.5130E-02
1151	1152	140	5.4667E-02	7.8333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1251	1252	141	5.4667E-02	7.8333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1351	1352	142	5.4667E-02	7.8333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1451	1452	143	5.4667E-02	7.8333E-03	1.4325E-01	3.5783E+00	1.0000E+12	0.	5.1260E-01
1551	1552	144	5.4667E-02	7.8333E-03	1.4325E-01	3.5783E+00	1.0000E+12	0.	5.1260E-01
1161	1162	145	4.3333E-03	7.8333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1261	1262	146	4.3333E-03	7.8333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1361	1362	147	4.3333E-03	7.8333E-03	3.5167E-01	3.5833E+00	1.0000E+12	0.	1.2601E+00
1461	1462	148	4.3333E-03	7.8333E-03	1.4325E-01	3.5833E+00	1.0000E+12	0.	5.1331E-01
1561	1562	149	4.3333E-03	7.8333E-03	1.4325E-01	3.5833E+00	1.0000E+12	0.	5.1331E-01
1151	1251	150	8.3333E-01	8.3333E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1251	1351	151	8.3333E-01	8.3333E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1351	1451	152	8.3333E-01	3.7500E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1451	1551	153	3.7500E-01	3.7500E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	BINT	RINT	AREA
1152	1252	154	5.3333E-01	5.3333E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1252	1352	155	5.3333E-01	5.3333E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1352	1452	156	5.3333E-01	3.7500E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1452	1552	157	3.7500E-01	3.7500E-01	3.1250E-02	1.7808E+00	1.0000E+12	0.	5.5651E-02
1162	1151	158	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1262	1251	159	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1362	1351	160	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	2.7200E-01	8.1487E+00
1462	1451	161	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	2.7200E-01	3.3199E+00
1562	1551	162	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	2.7200E-01	3.3199E+00
1171	1151	163	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1271	1251	164	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1371	1351	165	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	2.2200E-01	8.3456E+00
1471	1451	166	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	2.2200E-01	3.4001E+00
1571	1551	167	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	2.2200E-01	3.4001E+00
1181	1151	168	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.2400E-01	8.5406E+00
1281	1251	169	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.2400E-01	8.5406E+00
1381	1351	170	0.	0.	2.2500E+00	3.7958E+00	1.0000E-24	1.2400E-01	8.5406E+00
1481	1451	171	0.	0.	9.1667E-01	3.7958E+00	1.0000E-24	1.2400E-01	3.4795E+00
1581	1551	172	0.	0.	9.1667E-01	3.7958E+00	1.0000E-24	1.2400E-01	3.4795E+00
1162	1171	173	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.5900E-01	8.1487E+00
1262	1271	174	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.5900E-01	8.1487E+00
1362	1371	175	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.5900E-01	8.1487E+00
1462	1471	176	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	1.5900E-01	3.3199E+00
1562	1571	177	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	1.5900E-01	3.3199E+00
1141	1151	178	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1241	1251	179	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1341	1351	180	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1142	1151	181	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1242	1251	182	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1342	1351	183	1.5667E-02	1.5667E-02	1.4558E+00	1.7558E+00	1.0000E+12	0.	2.5562E+00
1141	1152	184	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1241	1252	185	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1341	1352	186	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1142	1152	187	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1242	1252	188	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1342	1352	189	1.5667E-02	1.5667E-02	2.1083E-01	1.7558E+00	1.0000E+12	0.	3.7019E-01
1141	1151	190	1.5667E-02	1.5667E-02	5.6408E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1541	1551	191	1.5667E-02	1.5667E-02	5.6408E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1442	1451	192	1.5667E-02	1.5667E-02	5.6408E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1542	1551	193	1.5667E-02	1.5667E-02	5.6408E-01	1.7558E+00	1.0000E+12	0.	1.1660E+00
1141	1152	194	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5046E-01
1541	1552	195	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5046E-01
1442	1452	196	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5046E-01
1542	1552	197	1.5667E-02	1.5667E-02	8.5917E-02	1.7558E+00	1.0000E+12	0.	1.5046E-01
1151	1161	198	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1251	1261	199	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1351	1361	200	1.5667E-02	4.3333E-03	3.5167E-01	3.5783E+00	1.0000E+12	0.	1.2584E+00
1162	1181	201	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1262	1281	202	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1362	1381	203	0.	0.	2.2500E+00	3.6217E+00	1.0000E-24	1.1000E-02	8.1487E+00
1462	1481	204	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	1.1000E-02	3.3199E+00

NOD1	NOD2	INDEX	DFL1	DFL2	DLONG	DRAD	HINT	RINT	AREA
1562	1581	205	0.	0.	9.1667E-01	3.6217E+00	1.0000E-24	1.1000E-02	3.3199E+00
1171	1181	206	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3456E+00
1271	1281	207	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3455E+00
1371	1381	208	0.	0.	2.2500E+00	3.7092E+00	1.0000E-24	3.7200E-01	8.3456E+00
1471	1481	209	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	3.7200E-01	3.4001E+00
1571	1581	210	0.	0.	9.1667E-01	3.7092E+00	1.0000E-24	3.7200E-01	3.4001E+00
1	2	211	2.3417E-01	2.3417E-01	1.7417E-01	4.6875E-01	1.0000E+12	0.	8.1641E-02
2	3	212	1.6167E-01	2.3417E-01	1.7417E-01	9.3750E-01	1.0000E+12	0.	1.6328E-01
3	4	213	1.6167E-01	2.3417E-01	1.7417E-01	1.4062E+00	1.0000E+12	0.	2.4492E-01
5	6	214	2.3417E-01	2.3417E-01	2.1833E-01	4.6875E-01	1.0000E+12	0.	1.0234E-01
6	7	215	2.3417E-01	2.3417E-01	2.1833E-01	9.3750E-01	1.0000E+12	0.	2.0469E-01
7	8	216	2.3417E-01	2.3417E-01	2.1833E-01	1.4062E+00	1.0000E+12	0.	3.0703E-01
9	10	217	2.3417E-01	2.3417E-01	3.4917E-01	4.6875E-01	1.0000E+12	0.	1.6367E-01
10	11	218	2.3417E-01	2.3417E-01	3.4917E-01	9.3750E-01	1.0000E+12	0.	3.2734E-01
11	12	219	2.3417E-01	2.3417E-01	3.4917E-01	1.4062E+00	1.0000E+12	0.	4.9102E-01
13	14	220	2.3417E-01	2.3417E-01	3.3833E-01	4.6875E-01	1.0000E+12	0.	1.5859E-01
14	15	221	2.3417E-01	2.3417E-01	3.3833E-01	9.3750E-01	1.0000E+12	0.	3.1719E-01
15	16	222	2.3417E-01	2.3417E-01	3.3833E-01	1.4062E+00	2.5000E+01	1.5000E-01	4.7592E-01
4	18	223	2.3417E-01	3.1667E-02	1.7417E-01	1.6750E+00	1.0000E+12	0.	3.2655E-01
8	19	224	2.3417E-01	3.1667E-02	2.1833E-01	1.6750E+00	2.5000E+01	3.2000E-01	4.0937E-01
12	20	225	2.3417E-01	6.2500E-02	3.4917E-01	1.6750E+00	1.0000E+12	0.	6.5469E-01
16	21	226	2.3417E-01	6.2500E-02	3.3833E-01	1.6750E+00	1.0000E+12	0.	6.3437E-01
17	22	227	3.1667E-02	1.1500E-01	4.6000E-01	1.9417E+00	2.5000E+01	3.2000E-01	9.3200E-01
18	23	228	3.1667E-02	1.1500E-01	1.7417E-01	1.9417E+00	2.5000E+01	3.2000E-01	3.3817E-01
19	23	229	3.1667E-02	1.1500E-01	2.1833E-01	1.9417E+00	2.5000E+01	3.2000E-01	4.2393E-01
20	24	230	3.1667E-02	1.1500E-01	1.5250E-01	1.9417E+00	1.0000E+12	0.	2.9610E-01
21	24	231	3.1667E-02	1.1500E-01	3.3833E-01	1.9417E+00	1.0000E+12	0.	6.5693E-01
22	25	232	1.4583E-01	1.8750E-01	4.4000E-01	2.1667E+00	8.0000E-02	2.5000E-01	1.0400E+00
23	25	233	1.4583E-01	1.8750E-01	5.4917E-01	2.1667E+00	8.0000E-02	2.5000E-01	1.2765E+00
24	26	234	1.1500E-01	1.0000E-01	5.2333E-01	2.1667E+00	1.0000E+12	0.	1.1339E+00
25	27	235	1.5750E-01	2.2917E-01	2.6167E-01	2.9583E+00	1.0000E+12	0.	7.7410E-01
26	24	236	1.6750E-01	1.2500E-01	6.3250E-01	2.9583E+00	2.5000E+01	1.5000E-01	1.8711E+00
26	1521	237	5.0833E-01	1.5417E-01	8.7250E-02	2.4792E+00	1.0000E+12	0.	2.1631E-01
26	1531	238	5.0833E-01	1.5417E-01	5.3333E-02	2.5167E+00	1.0000E+12	0.	2.0972E-01
26	1532	239	5.0833E-01	1.5417E-01	4.3333E-02	1.5667E-01	1.0000E+12	0.	1.3849E-02
26	26	240	5.0833E-01	2.5000E-01	5.7583E-01	2.5667E+00	1.0000E+12	0.	1.7345E+00
27	1531	241	0.	0.	3.7083E-01	3.1667E+00	1.0000E-24	1.2000E-01	1.1743E+00
27	26	242	1.2500E-01	1.0000E-01	2.6167E-01	3.1083E+00	2.5000E+01	1.5000E-01	8.1335E-01
27	1551	243	1.2500E-01	1.7500E-01	6.5417E-02	3.4850E+00	1.0000E+12	0.	2.2144E-01
1	3511	244	0.	0.	4.9083E-01	2.3442E-01	1.0000E-24	2.5000E-01	1.1506E-01
2	3511	245	0.	0.	4.9083E-01	7.0317E-01	1.0000E-24	2.5000E-01	3.4514E-01
3	3511	246	0.	0.	4.9083E-01	1.1719E+00	1.0000E-24	2.5000E-01	5.7522E-01
4	3511	247	0.	0.	4.9083E-01	1.6407E+00	1.0000E-24	2.5000E-01	8.0529E-01
1	3511	248	0.	0.	4.9083E-01	2.3442E-01	3.0000E-01	-3.3300E-01	1.1506E-01
2	3511	249	0.	0.	4.9083E-01	7.0317E-01	3.0000E-01	-3.3300E-01	3.4514E-01
3	3511	250	0.	0.	4.9083E-01	1.1719E+00	3.0000E-01	-3.3300E-01	5.7522E-01
4	3511	251	0.	0.	4.9083E-01	1.6407E+00	3.0000E-01	-3.3300E-01	8.0529E-01
17	3511	252	0.	0.	4.8000E-01	1.6750E+00	3.0000E-01	-3.3300E-01	9.0000E-01
17	3511	253	0.	0.	4.8000E-01	1.6750E+00	1.0000E-24	2.5000E-01	9.0000E-01
1	5	254	8.3333E-02	1.0417E-01	4.9083E-01	2.3442E-01	5.0000E+02	3.2000E-01	1.1506E-01
2	6	255	8.3333E-02	1.0417E-01	4.9083E-01	7.0317E-01	5.0000E+02	3.2000E-01	3.4514E-01

NOD1	NOD2	INDEX	[illegible]	DELX	DLDXG	DRAD	HINT	KINT	AREA
3	7	255	[illegible]	1.0417E-01	4.9083E-01	1.1719E+00	5.0000E+02	3.2000E-01	5.7522E-01
4	8	257	[illegible]	[illegible]	4.9083E-01	1.0407E+00	5.0000E+02	3.2000E-01	8.0529E-01
5	9	258	1.0417E-01	1.0667E-01	4.9083E-01	2.3442E-01	5.0000E+02	3.2000E-01	1.1505E-01
6	10	259	1.0417E-01	1.0667E-01	4.9083E-01	7.0317E-01	5.0000E+02	3.2000E-01	3.4514E-01
7	11	260	1.0417E-01	1.0667E-01	4.9083E-01	1.1719E+00	5.0000E+02	3.2000E-01	5.7522E-01
8	12	261	1.0417E-01	1.0667E-01	4.9083E-01	1.0407E+00	5.0000E+02	3.2000E-01	8.0529E-01
9	13	262	1.0667E-01	1.0167E-01	4.9083E-01	2.3442E-01	2.5000E+01	1.5000E-01	1.1505E-01
10	14	263	1.0667E-01	1.0167E-01	4.9083E-01	7.0317E-01	2.5000E+01	1.5000E-01	3.4514E-01
11	15	264	1.0667E-01	1.0167E-01	4.9083E-01	1.1719E+00	2.5000E+01	1.5000E-01	5.7522E-01
12	16	265	1.0667E-01	1.0167E-01	4.9083E-01	1.0407E+00	1.0000E+12	0.	8.0529E-01
17	18	266	2.2917E-01	[illegible]	5.5417E-02	1.9067E+00	1.0000E+12	0.	1.2473E-01
18	19	267	8.3333E-02	1.0417E-01	5.5417E-02	1.9067E+00	1.0000E+12	0.	1.2473E-01
19	20	268	1.0417E-01	1.0667E-01	5.5417E-02	1.9067E+00	1.0000E+12	0.	1.2473E-01
20	21	269	1.0667E-01	1.0167E-01	5.5417E-02	1.9067E+00	1.0000E+12	0.	1.2473E-01
17	1511	270	2.2917E-01	[illegible]	5.5417E-02	1.9067E+00	2.5000E+01	3.2000E-01	1.2473E-01
22	2521	271	2.2917E-01	[illegible]	8.7250E-02	2.0625E+00	2.5000E+01	3.2000E-01	1.7995E-01
22	2531	272	2.2917E-01	[illegible]	5.5417E-02	2.0917E+00	2.5000E+01	3.2000E-01	1.3683E-01
22	23	273	2.2917E-01	2.1667E-01	2.4000E-01	2.0500E+00	1.0000E+12	0.	4.9200E-01
23	24	274	2.2917E-01	[illegible]	2.4000E-01	2.0500E+00	2.5000E+01	3.2000E-01	4.9200E-01

EXTERNAL THERMAL CONNECTIONS

DATA BLOCK 6

Exponent for Free Convection

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1162	1000	1	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

Temp Dependent Coefficient → HSURT; TVAR4 ← Temperature

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

Surface Convection $(h_s) = HSURT\,(\Delta T)^{POWER}$

where $\Delta T = |T_s -$

T_s = surface Tem

T_b = boundary Te

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1262	1000	2	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1362	1000	3	6	3.3300E-01	2.2500E+00	3.6217E+00	-0.	9.9000E-02	8.1487E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1462	1000	4	6	3.3300E-01	9.1667E-01	3.6217E+00	-0.	9.9000E-02	3.3199E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1562	1000	5	6	3.3300E-01	9.1667E-01	3.6217E+00	-0.	9.9000E-02	3.3199E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04

FIN

SCR

.930000E-01 -.400000E-04 .147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1171	1000	6	6	3.3300E-01	2.2500E+00	3.7092E+00	-0.	7.4000E-02	8.3456E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1271	1000	7	6	3.3300E-01	2.2500E+00	3.7092E+00	-0.	7.4000E-02	8.3456E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1371	1000	8	6	3.3300E-01	2.2500E+00	3.7092E+00	-0.	7.4000E-02	8.3456E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1471	1000	9	6	3.3300E-01	9.1667E-01	3.7092E+00	-0.	7.4000E-02	3.4001E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1571	1000	10	6	3.3300E-01	9.1667E-01	3.7092E+00	-0.	7.4000E-02	3.4001E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

FIG 2 NODES

NODS	NODS	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1281	101	11	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODS8	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1281	1000	12	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODS8	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1381	1000	13	6	3.3300E-01	2.2500E+00	4.1558E+00	-0.	1.6500E-01	9.3506E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODS8	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1481	1000	14	6	3.3300E-01	9.1667E-01	4.1558E+00	-0.	1.6500E-01	3.8095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODS8	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1581	1000	15	6	3.3300E-01	9.1667E-01	4.1558E+00	-0.	1.6500E-01	3.8095E+00

HSURT	SLOPE	TVARH
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

FIN NODES

CASK SURFACE

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1151	1000	16	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1251	1000	7	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1351	1000	18	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1451	1000	19	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
1551	1000	20	6	3.3300E-01	1.4558E+00	3.5783E+00	-0.	2.1600E-01	5.2095E+00

HSURT	SLOPE	TVAR4
.258000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS

9/75

SURFACE ON BOTTOM OF CASE

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
13	1000	21	4	3.3300E-01	4.9083E-01	2.3417E-01	-0.	6.0000E-01	1.1494E-01

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
14	1000	22	4	3.3300E-01	4.9083E-01	7.0333E-01	-0.	6.0000E-01	3.4522E-01

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
15	1000	23	4	3.3300E-01	4.9083E-01	1.1750E+00	-0.	6.0000E-01	5.7673E-01

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
15	1000	24	4	3.3300E-01	4.9083E-01	1.6400E+00	-0.	6.0000E-01	8.0538E-01

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
24	1000	25	4	3.3300E-01	2.2917E-01	2.0250E+00	-0.	6.0000E-01	4.6406E-01

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
25	1000	26	4	3.3300E-01	6.3333E-02	4.3000E+01	-0.	7.7000E-01	3.5833E+00

HSURT	SLOPE	TVAR4
.129000E+00	-.164286E-03	-.400000E+02
.106000E+00	-.164286E-03	.100000E+03
.860000E-01	-.100000E-03	.300000E+03
.700000E-01	-.533333E-04	.600000E+03

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
27	1000	27	6	3.3300E-01	8.3333E-02	2.9500E+01	-0.	4.0000E-01	2.4583E+00

HSURT	SLOPE	TVAR4
.250000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

NODS	NODSB	INDEX	LTABH	POWER	DLONG	DRAD	HSURE	RSURE	AREAS
28	1000	28	6	3.3300E-01	8.3333E-02	2.2750E+01	-0.	4.0000E-01	1.8958E+00

HSURT	SLOPE	TVAR4
.250000E+00	-.328571E-03	-.400000E+02
.212000E+00	-.328571E-03	.100000E+03
.171000E+00	-.205000E-03	.300000E+03
.139000E+00	-.106667E-03	.600000E+03
.112000E+00	-.675000E-04	.100000E+04
.930000E-01	-.400000E-04	.147500E+04

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TRUMP OUTPUT DATA *NORMAL TRANSPORT CONDITIONS* DATA DECK 1

***DOUBLE. NLT 3-D MODEL OF THERMAL FIX.(A0).125 CU F.T. FINS. 1 BOTTOM 09.41.3

PRINTOUT	CYCLE	NF	NSS	NWIT	DELTMX	SMALL	TVARY	DTEMP	DTMAXS	NUTS
4	232	0	96	1	.50000E+00	.14399E-03	.30000E+01	.59261E-02	.94469E-03	0

TOTAL TIME	TIME STEP	HEAT FLOW	TEMP FROM FLUX	FLUX RATE	TEMP RATE
6.00000E+01	5.00000E-01	-1.24525E+06	-1.26301E+03	-2.07542E+04	-2.10635E+01

AVG TEMP	HEAT CAPACITY	HEAT CONTENT	GEN RATE	HEAT GEN	TEMP FROM GEN
3.39781E+02	9.85313E+02	3.19224E+05	2.12464E+04	1.27479E+05	1.29379E+03

FINAL HEAT = 3.19224E+05 FINAL FLOW = -1.24525E+06

NODE	TEMP	NODE	TEMP	NODE	TEMP	NODE	TEMP	NODE	TEMP
3111	5.27361E+02	3211	5.17937E+02	3311	4.94353E+02	3411	4.65213E+02	3511	4.48559E+02
1111	4.11981E+02	1211	4.05104E+02	1311	3.87534E+02	1411	3.41063E+02	1511	3.33395E+02
2111	4.00590E+02	2211	3.83965E+02	2311	3.76941E+02	2411	3.50803E+02	2511	3.26851E+02
2121	3.93888E+02	2221	3.87434E+02	2321	3.70859E+02	2421	3.44959E+02	2521	3.22810E+02
2131	3.87478E+02	2231	3.81197E+02	2331	3.65034E+02	2431	3.39428E+02	2531	3.18732E+02
2141	3.81336E+02	2241	3.75232E+02	2341	3.59465E+02	2441	3.34174E+02	2541	3.14593E+02
2151	3.75443E+02	2251	3.69516E+02	2351	3.54196E+02	2451	3.29167E+02	2551	3.10373E+02
2161	3.69781E+02	2261	3.64034E+02	2361	3.49147E+02	2461	3.24384E+02	2561	3.06080E+02
1121	3.59393E+02	1221	3.53945E+02	1321	3.39860E+02	1421	3.15454E+02	1521	2.97499E+02
1131	3.46734E+02	1231	3.41694E+02	1331	3.28528E+02	1431	3.01912E+02	1531	2.84847E+02
1132	3.52656E+02	1232	3.47633E+02	1332	3.33818E+02	1432	3.12202E+02	1532	2.94482E+02
1141	3.30110E+02	1241	3.25492E+02	1341	3.13344E+02	1441	2.87737E+02	1541	2.71474E+02
1142	3.29587E+02	1242	3.24975E+02	1342	3.12930E+02	1442	2.87134E+02	1542	2.71329E+02
1151	3.27120E+02	1251	3.22547E+02	1351	3.10747E+02	1451	2.85034E+02	1551	2.69403E+02
1152	3.26525E+02	1252	3.22004E+02	1352	3.10149E+02	1452	2.84786E+02	1552	2.69293E+02
1161	3.22459E+02	1261	3.18070E+02	1361	3.06577E+02	1461	2.81671E+02	1561	2.66514E+02
1162	3.19635E+02	1262	3.15317E+02	1362	3.04037E+02	1462	2.79624E+02	1562	2.64756E+02
1171	2.95215E+02	1271	2.91565E+02	1371	2.82056E+02	1471	2.61542E+02	1571	2.49082E+02
1181	2.82552E+02	1281	2.79259E+02	1381	2.70674E+02	1481	2.52250E+02	1581	2.40959E+02
1	3.22866E+02	2	3.19927E+02	3	3.14471E+02	4	3.07579E+02	5	3.18192E+02
6	3.15148E+02	7	3.09179E+02	8	3.01014E+02	9	3.13508E+02	10	3.10243E+02
11	3.03147E+02	12	2.89178E+02	13	2.15102E+02	14	2.14845E+02	15	2.21596E+02
16	2.76259E+02	17	3.24240E+02	18	3.05058E+02	19	2.97901E+02	20	2.79599E+02
21	2.70254E+02	22	3.12554E+02	23	2.98948E+02	24	2.85579E+02	25	2.45451E+02
26	2.42121E+02	27	2.36331E+02	28	1.99444E+02				

VIII - D64

9/15

DATA BLOCK 58

DATA MODIFIES OR ADDS TO DATA ALREADY READ IN.
THIS DATA ADDED TO NORMAL CONDITIONS TO
PRODUCE 200°F ΔT ACROSS NEUTRON SHIELD CHAMBER

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DAD1	DIN1	DIN2	AREA
1132	1141	56	0.	0.	1.6667E+00	2.6667E-01	9.6000E-01	-3.3300E-01	4.4444E-01
1232	1241	57	0.	0.	1.6667E+00	2.6667E-01	9.6000E-01	-3.3300E-01	4.4444E-01
1332	1341	58	0.	0.	1.6667E+00	2.6667E-01	9.6000E-01	-3.3300E-01	4.4444E-01
1432	1441	59	0.	0.	7.5000E-01	2.6667E-01	9.6000E-01	-3.3300E-01	2.0000E-01
1532	1541	60	0.	0.	7.5000E-01	2.6667E-01	9.6000E-01	-3.3300E-01	2.0000E-01
1131	1141	61	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1231	1241	62	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1331	1341	63	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1131	1142	64	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1231	1242	65	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1331	1342	66	0.	0.	8.3333E-01	3.1200E+00	9.6000E-01	-3.3300E-01	2.6000E+00
1431	1442	67	0.	0.	3.7500E-01	3.1200E+00	9.6000E-01	-3.3300E-01	1.1700E+00
1531	1542	68	0.	0.	3.7500E-01	3.1200E+00	9.6000E-01	-3.3300E-01	1.1700E+00
1431	1441	69	0.	0.	3.7500E-01	3.1200E+00	9.6000E-01	-3.3300E-01	1.1700E+00
1531	1541	70	0.	0.	3.7500E-01	3.1200E+00	9.6000E-01	-3.3300E-01	1.1700E+00

VIII - D6d

9/75

POST FIRE CONDITIONS

09.41.3

PRINTOUT	CYCLE	MF	MSS	KWIT	DELTAX	SMALL	TVARY	DTFAS	DTMAXS	NUTS
4	163	0	94	1	.50000E+00	.14389E-03	.30000E+01	.37001E-01	.55544E-02	0

TOTAL TIME	TIME STEP	HEAT FLOW	TEMP FROM FLOW	FLUX RATE	TEMP RATE
6.00000E+01	5.00000E-01	-1.18333E+06	-1.17707E+03	-1.97221E+04	-1.95178E+01

AVG TEMP	HEAT CAPACITY	HEAT CONTENT	GEN RATE	HEAT GEN	TEMP FROM GEN
4.32073E+02	1.00532E+03	4.11004E+05	2.12459E+04	1.27474E+05	1.26804E+03

FINAL HEAT = 4.11004E+05 FINAL FLOW = -1.18333E+06

NODE	TEMP	NODE	TEMP	NODE	TEMP	NODE	TEMP	NODE	TEMP
3111	6.68457E+02	3211	6.55358E+02	3311	6.24625E+02	3411	5.89379E+02	3511	5.57876E+02
1111	5.57548E+02	1211	5.46765E+02	1311	5.21118E+02	1411	4.95732E+02	1511	4.50116E+02
2111	5.46747E+02	2211	5.36138E+02	2311	5.11032E+02	2411	4.75774E+02	2511	4.43577E+02
2121	5.40064E+02	2221	5.29680E+02	2321	5.04902E+02	2421	4.69866E+02	2521	4.39274E+02
2131	5.33642E+02	2231	5.23473E+02	2331	4.99041E+02	2431	4.64311E+02	2531	4.35039E+02
2141	5.27577E+02	2241	5.17547E+02	2341	4.93584E+02	2441	4.59070E+02	2541	4.30785E+02
2151	5.21730E+02	2251	5.11880E+02	2351	4.88494E+02	2451	4.54115E+02	2551	4.26351E+02
2161	5.16121E+02	2261	5.06456E+02	2361	4.83270E+02	2461	4.49422E+02	2561	4.21744E+02
1121	5.06530E+02	1221	4.97154E+02	1321	4.74636E+02	1421	4.41254E+02	1521	4.12854E+02
1131	4.95107E+02	1231	4.86059E+02	1331	4.64413E+02	1431	4.28599E+02	1531	4.00188E+02
1132	5.00757E+02	1232	4.91554E+02	1332	4.69421E+02	1432	4.39147E+02	1532	4.10833E+02
1141	3.28314E+02	1241	3.23632E+02	1341	3.12147E+02	1441	2.94716E+02	1541	2.72132E+02
1142	3.27887E+02	1242	3.23217E+02	1342	3.11744E+02	1442	2.94337E+02	1542	2.71801E+02
1151	3.25503E+02	1251	3.20912E+02	1351	3.09484E+02	1451	2.82290E+02	1551	2.70022E+02
1152	3.24928E+02	1252	3.20347E+02	1352	3.09106E+02	1452	2.82058E+02	1552	2.69821E+02
1161	3.21051E+02	1261	3.16590E+02	1361	3.05645E+02	1461	2.79120E+02	1561	2.67200E+02
1162	3.18339E+02	1262	3.13959E+02	1362	3.03207E+02	1462	2.77141E+02	1562	2.65442E+02
1171	2.94943E+02	1271	2.91229E+02	1371	2.82126E+02	1471	2.50218E+02	1571	2.50298E+02
1181	2.62760E+02	1281	2.79394E+02	1381	2.71145E+02	1481	2.51395E+02	1581	2.42413E+02
1	4.08857E+02	2	4.04511E+02	3	3.90750E+02	4	3.87120E+02	5	4.01905E+02
6	3.97473E+02	7	3.93773E+02	8	3.76941E+02	9	3.98895E+02	10	3.90094E+02
11	3.79568E+02	12	3.58498E+02	13	2.42845E+02	14	2.41646E+02	15	2.51914E+02
16	3.38237E+02	17	4.17745E+02	18	3.95860E+02	19	3.73579E+02	20	3.44133E+02
21	3.24572E+02	22	4.00419E+02	23	3.70716E+02	24	3.24172E+02	25	2.95042E+02
26	2.88827E+02	27	2.71174E+02	28	2.26745E+02				

DATA BLOCK 53

DATA MODIFIES OR ADDS TO DATA ALREADY READ IN.

THIS DATA ADDED TO NORMAL CONDITIONS TO PRODUCE 200 OF ELT ACROSS HELMETON SHOULD CHANGE

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	HINT	RINT	AREA
1132	1141	56	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1232	1241	57	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1332	1341	58	0.	0.	1.6667E+00	2.6667E-01	7.5000E-01	-3.3300E-01	4.4444E-01
1432	1441	59	0.	0.	7.5000E-01	2.6667E-01	7.5000E-01	-3.3300E-01	2.0000E-01
1532	1541	60	0.	0.	7.5000E-01	2.6667E-01	7.5000E-01	-3.3300E-01	2.0000E-01
1131	1141	61	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1231	1241	62	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1331	1341	63	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1131	1142	64	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1231	1242	65	0.	0.	8.3333E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.6000E+00
1331	1342	66	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.0000E+00
1431	1442	67	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.0000E+00
1531	1542	68	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	2.0000E+00
1481	1441	69	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00
1531	1541	70	0.	0.	3.7500E-01	3.1200E+00	7.5000E-01	-3.3300E-01	1.1700E+00

TRUMP OUTPUT DATA — DATA DECK 2

* AFTER FIRE — Post File Test Conditions — 3 — 140116 — 08/20/75

PRINTOUT	CYCLE	NF	NSS	KHIT	DELTMX	SMALL	TVARY	DTEMP	DTMAXS	NUTS
4	169	0	96	1	.50000E+00	.17272E-03	.30000E+01	.43043E-01	.22500E+00	3

TOTAL TIME	TIME STEP	HEAT FLOW	TEMP FROM FLUX	FLUX RATE	TEMP RATE
6.30000E+01	3.00000E-01	-1.16463E+06	-1.15371E+03	-1.34106E+04	-1.92235E+01

AVG TEMP	HEAT CAPACITY	HEAT CONTENT	GEN RATE	HEAT GEN	TEMP FROM GEN
4.51623E+02	1.00907E+03	4.30641E+05	2.12464E+04	1.27479E+06	1.26283E+03

FINAL HEAT = 4.30641E+05 FINAL FLOW = -1.16463E+06

NODE	TEMP	DT	DDT	GEN RATE	A	H	F
3111	.6939E+03	.2111E-01	.4127E-01	.5822E+04	.2644E+05	.6450E+04	-.3429E+06
3211	.6814E+03	.2156E-01	.4215E-01	.5944E+04	.2589E+05	.6271E+04	-.3904E+06
3311	.6479E+03	.2295E-01	.4491E-01	.5768E+04	.2461E+05	.5926E+04	-.3413E+06
3411	.6034E+03	.2446E-01	.4782E-01	.2382E+04	.1340E+05	.2512E+04	-.1404E+06
3511	.5834E+03	.2530E-01	.4945E-01	0.	.6676E+04	.1614E+04	.1614E+04
1111	.5556E+03	.1947E-01	.3805E-01	0.	.7331E+04	.2360E+04	.2356E+04
1211	.5744E+03	.1990E-01	.3893E-01	0.	.7164E+04	.2266E+04	.2262E+04
1311	.5463E+03	.2041E-01	.3990E-01	0.	.6779E+04	.2130E+04	.2134E+04
1411	.5335E+03	.2192E-01	.4265E-01	0.	.2821E+04	.8558E+03	.8553E+03
1511	.4725E+03	.2317E-01	.4523E-01	0.	.2603E+04	.8213E+03	.8215E+03
2111	.5738E+03	.1726E-01	.3374E-01	0.	.3736E+04	.1186E+04	.1177E+04
2211	.5640E+03	.1842E-01	.3601E-01	0.	.3655E+04	.1153E+04	.1144E+04
2311	.5334E+03	.2021E-01	.3950E-01	0.	.3467E+04	.1079E+04	.1073E+04
2411	.4790E+03	.2221E-01	.4342E-01	0.	.1446E+04	.4487E+03	.4472E+03
2511	.4692E+03	.2366E-01	.4605E-01	0.	.1346E+04	.4155E+03	.4177E+03
2121	.5631E+03	.1762E-01	.3444E-01	0.	.3946E+04	.1235E+04	.1224E+04
2221	.5575E+03	.1840E-01	.3595E-01	0.	.3764E+04	.1200E+04	.1169E+04
2321	.5303E+03	.1988E-01	.3885E-01	0.	.3570E+04	.1123E+04	.1115E+04
2421	.4932E+03	.2130E-01	.4162E-01	0.	.1488E+04	.4669E+03	.4655E+03
2521	.4820E+03	.2269E-01	.4435E-01	0.	.1390E+04	.4331E+03	.4342E+03
2131	.5627E+03	.1510E-01	.3145E-01	0.	.3954E+04	.1285E+04	.1273E+04
2231	.5514E+03	.1792E-01	.3502E-01	0.	.3870E+04	.1243E+04	.1235E+04
2331	.5246E+03	.1972E-01	.3853E-01	0.	.3672E+04	.1164E+04	.1161E+04
2431	.4877E+03	.2174E-01	.4250E-01	0.	.1531E+04	.4953E+03	.4[illegible]E+03
2531	.4977E+03	.2320E-01	.4533E-01	0.	.1432E+04	.4497E+03	.4511E+03
2141	.5357E+03	.1729E-01	.3350E-01	0.	.4060E+04	.1334E+04	.1328E+04
2241	.5455E+03	.1792E-01	.3503E-01	0.	.3975E+04	.1295E+04	.1282E+04
2341	.5141E+03	.1932E-01	.3777E-01	0.	.3772E+04	.1212E+04	.1203E+04
2441	.4844E+03	.2085E-01	.4076E-01	0.	.1572E+04	.5036E+03	.5021E+03
2541	.4514E+03	.2230E-01	.4359E-01	0.	.1473E+04	.4661E+03	.4674E+03
2151	.5[illegible]E+03	.1574E-01	.3075E-01	0.	.4166E+04	.1388E+04	.1366E+04
2251	.5399E+03	.1743E-01	.3407E-01	0.	.4079E+04	.1342E+04	.1333E+04
2351	.5131E+03	.1919E-01	.3751E-01	0.	.3872E+04	.1256E+04	.1246E+04
2451	.4777E+03	.2119E-01	.4142E-01	0.	.1614E+04	.5223E+03	.5209E+03
2551	.4439E+03	.2268E-01	.4432E-01	0.	.1512E+04	.4522E+03	.4836E+03
2161	.5453E+03	.1668E-01	.3259E-01	0.	.4269E+04	.1431E+04	.1420E+04
2261	.5386E+03	.1742E-01	.3404E-01	0.	.4181E+04	.1390E+04	.1360E+04

[illegible]	[illegible]	.1895E-01	.3704E-01	0.	.3970E+04	.1301E+04	.1294E+04

NODE	TEMP	DT	DDT	GEN RATE	J	H	F
2461	.4731E+03	.2038E-01	.3987E-01	0.	.1655E+04	.5409E+03	.5395E+03
2561	.4442E+03	.2191E-01	.4283E-01	0.	.1549E+04	.4976E+03	.4965E+03
1121	.3460E+03	.1966E-01	.3042E-01	0.	.1170E+05	.4141E+04	.4132E+04
1221	.3285E+03	.1689E-01	.3301E-01	0.	.1145E+05	.4017E+04	.4009E+04
1321	.3036E+03	.1654E-01	.3524E-01	0.	.1080E+05	.3743E+04	.3744E+04
1421	.4652E+03	.2036E-01	.3980E-01	0.	.4511E+04	.1556E+04	.1555E+04
1521	.4332E+03	.2203E-01	.4307E-01	0.	.4195E+04	.1414E+04	.1415E+04
1131	.5249E+03	.1540E-01	.3025E-01	0.	.1091E+05	.3968E+04	.3964E+04
1231	.5147E+03	.1649E-01	.3222E-01	0.	.1068E+05	.3849E+04	.3846E+04
1331	.4936E+03	.1805E-01	.3523E-01	0.	.1013E+05	.3591E+04	.3583E+04
1431	.4523E+03	.1940E-01	.3791E-01	0.	.4178E+04	.1489E+04	.1489E+04
1531	.4227E+03	.2120E-01	.4144E-01	0.	.3876E+04	.1344E+04	.1344E+04
1132	.5334E+03	.1575E-01	.3081E-01	0.	.7307E+03	.2627E+03	.2587E+03
1232	.5231E+03	.1673E-01	.3271E-01	0.	.7151E+03	.2543E+03	.2519E+03
1332	.4956E+03	.1630E-01	.3573E-01	0.	.6703E+03	.2377E+03	.2355E+03
1432	.4632E+03	.1959E-01	.3889E-01	0.	.2835E+03	.9597E+02	.9670E+02
1532	.4332E+03	.2159E-01	.4220E-01	0.	.2630E+03	.9093E+02	.9003E+02
1141	.3253E+03	.7401E-02	.1453E-01	0.	.1715E+04	-.1563E+02	-.1799E+02
1241	.3220E+03	.7758E-02	.1515E-01	0.	.1688E+04	-.1581E+02	-.1749E+02
1341	.3133E+03	.6593E-02	.1679E-01	0.	.1622E+04	-.1266E+02	-.1296E+02
1441	.2939E+03	.4749E-02	.1710E-01	0.	.6612E+03	-.1021E+02	-.1015E+02
1541	.2716E+03	.1083E-01	.2115E-01	0.	.5329E+03	-.2993E+00	.1323E+01
1142	.3254E+03	.7442E-02	.1455E-01	0.	.1713E+04	-.1506E+02	-.1740E+02
1242	.3216E+03	.7735E-02	.1512E-01	0.	.1696E+04	-.1526E+02	-.1693E+02
1342	.3099E+03	.6568E-02	.1675E-01	0.	.1620E+04	-.1199E+02	-.1246E+02
1442	.2826E+03	.4718E-02	.1704E-01	0.	.6603E+03	-.9634E+01	-.9572E+01
1542	.2713E+03	.1081E-01	.2112E-01	0.	.6321E+03	.2756E+00	.1687E+01
1151	.3243E+03	.7284E-02	.1424E-01	.3168E+03	.2983E+04	-.2528E+02	-.1904E+05
1251	.3143E+03	.7593E-02	.1484E-01	.3168E+03	.2936E+04	-.2543E+02	-.1904E+05
1351	.3179E+03	.6414E-02	.1645E-01	.3168E+03	.2823E+04	-.1933E+02	-.1903E+05
1451	.2836E+03	.4916E-02	.1663E-01	.1445E+03	.1166E+04	-.1573E+02	-.4637E+04
1551	.2665E+03	.1063E-01	.2075E-01	.1445E+03	.1117E+04	.1354E+01	-.3669E+04
1152	.3215E+03	.7297E-02	.1423E-01	0.	.4311E+03	-.3624E+01	-.9011E+01
1252	.3147E+03	.7573E-02	.1481E-01	0.	.4244E+03	-.3676E+01	-.4656E+01
1352	.3073E+03	.6395E-02	.1641E-01	0.	.4081E+03	-.2770E+01	-.3263E+01
1452	.2913E+03	.4532E-02	.1663E-01	0.	.1506E+03	-.2191E+01	-.2112E+01
1552	.2813E+03	.1054E-01	.2070E-01	0.	.1442E+03	.1126E+00	.1000E+01
1161	.3146E+03	.7129E-02	.1393E-01	0.	.1356E+03	-.1202E+01	-.5023E+01
1261	.3151E+03	.7347E-02	.1444E-01	0.	.1331E+03	-.1224E+01	-.3909E+01
1361	.3039E+03	.6391E-02	.1601E-01	0.	.1473E+03	-.3131E+00	-.2260E+01
1461	.2774E+03	.5317E-02	.1625E-01	0.	.5436E+02	-.7347E+00	-.5174E+00
1561	.2537E+03	.1037E-01	.2026E-01	0.	.5213E+02	.3167E-01	.2733E+01
1162	.3170E+03	.6959E-02	.1360E-01	0.	.1149E+04	-.4352E+01	-.1123E+02
1262	.3129E+03	.7250E-02	.1417E-01	0.	.1132E+04	-.8532E+01	-.1059E+02
1362	.3015E+03	.6037E-02	.1571E-01	0.	.1089E+04	-.6295E+01	-.7311E+01
1462	[illegible]	.6149E-02	.1593E-01	0.	.4027E+03	-.5278E+01	-.5167E+01
1562	.2636E+03	.1014E-01	.1902E-01	0.	.3863E+03	.6935E+00	.2702E+01
1171	.2939E+03	.5960E-02	.1105E-01	0.	.1086E+04	-.3362E+01	-.3614E+01
1271	.2901E+03	.5164E-02	.1209E-01	[illegible]	.1071E+04	-.3613E+01	-.3945E+01
1371	[illegible]	.6953E-02	.1339E-01	[illegible]	.1034E+04	-.1923E+01	-.2115E+01
1471	[illegible]	.6963E-02	.1361E-01	0.	.3859E+03	-.3307E+01	-.3311E+01

157:	.2530E+03	.9660E-02	.1693E-01	0.	.3717E+03	.1590E+01	.1928E+01

NODE	TEMP	DT	DDT	GEN RATE	A	H	F
1181	.2519E+03	.5429E-02	.1061E-01	.1874E+02	.1062E+04	-.9037E+00	-.1126E+04
1281	.2735E+03	.5630E-02	.1100E-01	.1874E+02	.1048E+04	-.1246E+01	-.1126E+04
1381	.2761E+03	.6227E-02	.1217E-01	.1874E+02	.1015E+04	.1766E+00	-.1124E+04
1481	.2937E+03	.6310E-02	.1233E-01	.7629E+01	.3608E+03	-.2362E+01	-.4601E+03
1581	.2422E+03	.7830E-02	.1531E-01	.7629E+01	.3677E+03	.2169E+01	-.4555E+03
1	.4606E+03	.3954E-01	.7731E-01	0.	.5186E+03	.1346E+03	.1346E+03
2	.4571E+03	.3902E-01	.7627E-01	0.	.1543E+04	.3995E+03	.3995E+03
3	.4563E+03	.3307E-01	.7441E-01	0.	.2530E+04	.6327E+03	.6327E+03
4	.4313E+03	.3671E-01	.7175E-01	0.	.3449E+04	.8852E+03	.8853E+03
5	.4316E+03	.4143E-01	.8097E-01	0.	.3733E+03	.9320E+02	.9320E+02
6	.4294E+03	.4079E-01	.7973E-01	0.	.1108E+04	.2755E+03	.2755E+03
7	.4210E+03	.3959E-01	.7736E-01	0.	.1808E+04	.4458E+03	.4458E+03
8	.4039E+03	.3800E-01	.7426E-01	0.	.2459E+04	.6001E+03	.6001E+03
9	.4134E+03	.4304E-01	.8411E-01	0.	.9152E+03	.2217E+03	.2217E+03
10	.4050E+03	.4226E-01	.4254E-01	0.	.2707E+04	.6511E+03	.6511E+03
11	.3932E+03	.4052E-01	.7920E-01	0.	.4368E+04	.1033E+04	.1033E+04
12	.3700E+03	.3757E-01	.7343E-01	0.	.5726E+04	.1300E+04	.1300E+04
13	.2814E+03	.2397E-01	.4685E-01	0.	.3167E+03	.4748E+02	.4748E+02
14	.2805E+03	.2362E-01	.4617E-01	0.	.9468E+03	.1417E+03	.1417E+03
15	.2834E+03	.2334E-01	.4562E-01	0.	.9735E+03	.1531E+03	.1531E+03
16	.3409E+03	.3550E-01	.6933E-01	0.	.5224E+04	.1128E+04	.1128E+04
17	.4554E+03	.3169E-01	.6193E-01	0.	.1528E+04	.4147E+03	.4147E+03
18	.4251E+03	.3550E-01	.6934E-01	0.	.5167E+03	.1320E+03	.1320E+03
19	.4039E+03	.3601E-01	.7037E-01	0.	.6095E+03	.1501E+03	.1501E+03
20	.3540E+03	.3541E-01	.6993E-01	0.	.6560E+03	.1304E+03	.1905E+03
21	.3420E+03	.3444E-01	.6731E-01	0.	.7305E+03	.1690E+03	.1691E+03
22	.4[illegible]7E+03	.3196E-01	.6247E-01	0.	.3434E+04	.9173E+03	.9173E+03
23	.4050E+03	.3429E-01	.6702E-01	0.	.3957E+04	.3849E+03	.9650E+03
24	.3321E+03	.3363E-01	.6573E-01	0.	.4680E+04	.9913E+03	.9915E+03
25	.3042E+03	.3051E-01	.5963E-01	0.	.2046E+05	.4158E+04	.4158E+04
26	.2939E+03	.2953E-01	.5772E-01	0.	.1786E+05	.3342E+04	.3342E+04
27	.2775E+03	.2362E-01	.4617E-01	0.	.5842E+04	.9160E+03	.9161E+03
28	.2447E+03	.1960E-01	.3843E-01	0.	.3607E+04	.4787E+03	.4787E+03

NODE	TEMP	W/F A	DA	DDA	W/F B	DB	DDB
3111	6.9900E+02	1.0000E+00	0.	0.	0.	0.	0.
3211	6.5140E+02	1.0000E+00	0.	0.	0.	0.	0.
3311	6.4736E+02	1.0000E+00	0.	0.	0.	0.	0.
3411	6.0840E+02	1.0000E+00	0.	0.	0.	0.	0.
3511	5.8690E+02	1.0000E+00	0.	0.	0.	0.	0.
1111	5.8650E+02	1.0000E+00	0.	0.	0.	0.	0.
1211	5.7441E+02	1.0000E+00	0.	0.	0.	0.	0.
1311	5.4628E+02	1.0000E+00	0.	0.	0.	0.	0.
1411	5.0857E+02	1.0000E+00	0.	0.	0.	0.	0.
1511	4.7234E+02	1.0000E+00	0.	0.	0.	0.	0.
2111	5.7533E+02	1.0000E+00	0.	0.	0.	0.	0.
2211	5.6431E+02	1.0000E+00	0.	0.	0.	0.	0.
2311	5.3541E+02	1.0000E+00	0.	0.	0.	0.	0.
2411	4.[illegible]E+02	1.0000E+00	0.	0.	0.	0.	0.
2511	4.6620E+02	1.0000E+00	0.	0.	0.	0.	0.

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