MULTI, A FORTRAN Code for Least-Squares Shape Fitting of Neutron Cross-Section Data Using the Reich-Moore Multilevel Formalism

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MASTER

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How to interpret changes:

Each Fortran statement has beginning in column 73 an identification;
ex. EQ4 0004. , SUB2 00008 etc., where the number represents the statement
number for those Fortran statements with the label EQ4 or SUB2.

Statements on the change sheet with an * represent control statements.

There are three such statements that will be used to make changes in
MULTI. They are:

*IDENT xxxxxxxx - identification statement. All changes made between
this *IDENT statement and the next *IDENT statement
are appended (starting in col. 73) with the label
xxxxxxx.

*DELETE A.n, B.m - delete statements with labels A.n through B.m
inclusively. If Fortran statements follow this
control statement insert them in place of the
deletions.

*INSERT A.n - Insert the following Fortran statements after the
statement labeled A.n.

The identifications for the changes are given on the right-hand side of
the correction sheet.

ERRATUM

LA-5473-MS

CHANGES TO MULTI

*IDENT 121973	
*I 5/25/73.2862	
EM1=0.	121973
*I 5/25/73.2867	
IF (IRESOPR.EQ.3) EM1=SHIFTGE(0.5*WID/WID1)	121973
*U 5/25/73.2872,5/25/73.2873	
19 EU=FM+WUP-EM1	121973
EL=FM-WLW-EM1	121973
*IDENT 1/7/74	
*DELETE 5/25/73.110	
IF (ITAPE.NE.6HNODATA) GO TO 200	1/7/74
CALL OUT	1/7/74
CALL OPTA1	1/7/74
GO TO 46	1/7/74
200 CALL OPTA	1/7/74
*DELETE 5/25/73.327	
19 U(KM)=SIGN(SQRT(ABS(PKEN(I))),PKEN(I))	1/7/74
*DELETE 5/25/73.595	
10 PKEN(I)=SIGN(U(IJ)**2,PKEN(I))	1/7/74
*INSERT 5/25/73.1525	
ENTRY OPTA1	1/7/74
*DELETE 5/25/73.2132,5/25/73.2133	
SQPK=SIGN(2.*SQRT(ABS(PKEN(K))),PKEN(K))	1/7/74
PA(L,KKM)=BPR*TEMP5*SQPK	1/7/74
PB(L,KKM)=-BPR*TEMP2*2.*SQPK	1/7/74

ERRATUM

LA-5473-MS

CHANGES TO MULTI

973	
2862	
.	121973 1
2867	
ESOPR.EQ.3)EM1=SHIFTGE(0.5*WID/WID1)	121973 2
2872,5/25/73.2873	
WUP-EM1	121973 3
WLW-EM1	121973 4
74	
5/73.110	
TAPE.NE.6HNODATA) GO TO 200	1/7/74 1
OUT	1/7/74 2
OPTA1	1/7/74 3
46	1/7/74 4
OPTA	1/7/74 5
5/73.327	
=SIGN(SQRT(ABS(PKEN(I))),PKEN(I))	1/7/74 6
5/73.595	
I)=SIGN(U(IJ)**2,PKEN(I))	1/7/74 7
5/73.1525	
7 OPTA1	1/7/74 8
5/73.2132,5/25/73.2133	
SIGN(2.*SQRT(ABS(PKEN(K))),PKEN(K))	1/7/74 9
KKM)=BPR*TEMP5*SQPK	1/7/74 10
KKM)=-BPR*TEMP2*2.*SQPK	1/7/74 11

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George F. Auchampaugh

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CONTENTS

I.	INTRODUCTION	1
II.	REICH-MOORE MULTILEVEL FORMALISM	2
	A. Cross Section Formulae	2
	B. General Formulae for $W_{nc}^J(W_{nf}^J \neq 0)$	2
	C. Formula for $W_{nn}^J(W_{nf}^J = 0)$	3
	D. Approximate Formulae for $W_{nc}^J(W_{nf}^J \neq 0)$	4
III.	LEAST-SQUARES TECHNIQUE	4
	A. General	4
	B. Eta Method	5
	C. P Method	6
	D. U Parameters	7
IV.	DOPPLER- AND RESOLUTION-BROADENING	7
	A. Convolution Technique	7
	B. Doppler Integral	8
	C. Resolution Integrals	8
	1. Gaussian Function	8
	2. Exponential Function	8
	3. Convolution of Gaussian and Exponential Functions	8
	D. No Doppler- or Resolution-Broadening	9
	E. Broadening of Partial Derivatives	9
V.	THE CODE	9
	A. Input	9
	B. Description of MULTI Subroutines	9
	C. Library Routines	14
VI.	OUTPUT EXAMPLES	14
	A. Common Output	14
	B. PSEARCH Output	15
	C. ETASRCH Output	16
	D. PTABLE Output	16
VII.	MODIFYING RESOLUTION FUNCTION	16
VIII.	MODIFYING THE SIZE OF MULTI	17
IX.	RUNNING MULTI	18
	ACKNOWLEDGMENTS	18
	REFERENCES	18
	APPENDIX A. FORTRAN LISTING OF MULTI	19
	Main Program RESEXP	19
	Subroutine MLRI	21
	Subroutine PARU	23
	Subroutine PSRCH	25
	Subroutine UPAR	28
	Function WD	29
	Function ROWLOW	30
	Subroutine OUT	30
	Subroutine RIDATA	32
	Subroutine PHIMAIN	34
	Subroutine ETASRCH	39
	Subroutine OPTIMIZE	43
	Subroutine ESCALE	46
	Subroutine RESDOD	50
	Subroutine CRTP	50
	Subroutine PARSH	53
	Subroutine PHIGRAD	58
	Subroutine ALPHBT	64
	Subroutine ECSP	66
	Subroutine INTWTS	68
	Subroutine INTCOEF	70
	Subroutine RESDOB	71
	Subroutine WDSINTW	73
	Function VF	73
	Function SF	74
	Function PHIF	75
	Subroutine PRINTP	76
	Function SHIFTGE	80
	Subroutine DOTPRO	80
	APPENDIX B. FORTRAN LISTING OF NINE SAMPLE PROBLEMS	82
	Problem 1 ... 82	Problem 4 126
	Problem 2 ... 101	Problem 5 136
	Problem 3 ... 120	Problem 6 146
	Problem 7 156	Problem 8 173
	Problem 9 188	

MULTI, A FORTRAN CODE FOR LEAST-SQUARES SHAPE FITTING OF NEUTRON
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ABSTRACT

The FORTRAN code MULTI shape fits a multilevel R-matrix formula to experimental neutron cross-section data by the least-squares technique. The program utilizes the multilevel formalism developed by Reich and Moore for neutron reactions involving 0, 1, or 2 fission channels per spin state. Each spin state may be chosen to represent s, p, d, f, or g wave neutron reactions. The cross sections can be Doppler-broadened and resolution-broadened by a Gaussian function, an exponential function, or a convolution of a Gaussian and an exponential function. The program can simultaneously fit all four neutron cross sections, can handle a maximum of 1600 data points and 100 resonances, and search on at most 150 parameters. Nine sample problems and a FORTRAN listing are given in the Appendices.

I. INTRODUCTION

This report describes the FORTRAN code MULTI, which shape fits a multilevel R-matrix formula to experimental neutron cross-section data by the least-squares technique. The approach taken by Reich and Moore¹ in applying the Wigner-Eisenbud² R-matrix theory to experimental data has been used in this program. A preliminary version of this code was available in 1965 for the CDC-6600 computer. At that time, interactive time-sharing systems were not a reality and therefore the time per iteration was not an important parameter. However, with the advent of interactive graphic terminals it became highly desirable to improve the time per iteration and thus reduce the amount of unproductive waiting time spent by a user. Also, without improvements in MULTI it would be prohibitive in terms of machine time and cost to run data sets of several thousand data points. A considerable effort has gone into making MULTI more flexible, more efficient, faster, and smaller in terms of its central memory requirements. Most of this increase in flexibility has come about through the use of large fast-core mass storage devices such as the extended core storage (ECS) system on the CDC 6600 or the large core

memory (LCM) system on the CDC 7600, and through improved program techniques. Faster algorithms for generating and broadening the cross section and the derivatives of the cross section with respect to the varied parameters have resulted in a significant reduction in running time for typical problems.

The present configuration of MULTI requires 40 000 words of central memory (system and user programs and common blocks) and 400 000 words of large core storage memory. In this configuration MULTI will: (1) Simultaneously fit all four neutron cross sections: total, scattering, fission, and capture. (2) Doppler- and resolution-broaden all cross sections with a common resolution function which must be well defined and represented analytically. (3) Handle as many as 100 resonances which need not be located in the energy region being fitted and therefore can be used to generate a pseudo-background R^∞ -type matrix. (4) Handle 0 (with or without the shift and boundary functions), 1, or 2 fission channels per resonance group with a total of ten resonance groups, which may be chosen to represent s, p, d, f, or g wave neutron reactions. (5) Search on as many as 150/N parameters, where N is the number of cross sections fitted. (6) Handle 1600/N data points per cross section.

Running times per iteration for the largest problem MULTI will handle are less than 10(60) sec on the CDC 7600(6600).

II. REICH-MOORE MULTILEVEL FORMALISM

A. Cross-Section Formulae

The neutron cross section for the reaction in the outgoing channel c is given by

$$\sigma_{nc} = \pi\lambda^2 \sum_{J\pi} g(J\pi) |\delta_{nc} - U_{nc}^{J\pi}|^2, \quad (1)$$

where λ is the neutron wavelength in the center-of-mass system divided by 2π , δ_{nc} = Kronecker delta function, and $g(J\pi) = \frac{2J\pi+1}{2(2I+1)}$ is the statistical factor for resonances of spin and parity $J\pi$. The collision matrix element $U_{nc}^{J\pi}$ can be written as

$$U_{nc}^{J\pi} = e^{i(\phi_{\ell n} + \phi_{\ell c})} W_{nc}^{J\pi},$$

where $\phi_{\ell n}$ and $\phi_{\ell c}$ are the potential scattering phase shifts. The neutron cross sections expressed in terms of the matrix W are:

$$\begin{aligned} \sigma_{\text{total}} &= \sum_J \sigma_{nT}^J = 2\pi\lambda^2 \sum_J g(J) \operatorname{Re} (1 - U_{nn}^J) \\ &= 2\pi\lambda^2 \sum_J g(J) [1 - \cos(2\phi_{\ell n}) \operatorname{Re} (W_{nn}^J) - \sin(2\phi_{\ell n}) \operatorname{Im} (W_{nn}^J)], \end{aligned} \quad (2a)$$

$$\begin{aligned} \sigma_{\text{scatter}} &= \sum_J \sigma_{nn}^J = \pi\lambda^2 \sum_J g(J) |1 - U_{nn}^J|^2 \\ &= \pi\lambda^2 \sum_J g(J) \left\{ [1 - \cos(2\phi_{\ell n}) \operatorname{Re} (W_{nn}^J) - \sin(2\phi_{\ell n}) \operatorname{Im} (W_{nn}^J)]^2 \right. \\ &\quad \left. + [\sin(2\phi_{\ell n}) \operatorname{Re} (W_{nn}^J) - \cos(2\phi_{\ell n}) \operatorname{Im} (W_{nn}^J)]^2 \right\}, \end{aligned} \quad (2b)$$

$$\sigma_{\text{fiss}} = \sum_J \sum_{i=1}^2 \sigma_{nf_i}^J = \pi\lambda^2 \sum_J g(J) \left[|W_{nf_1}^J|^2 + |W_{nf_2}^J|^2 \right], \quad (2c)$$

and

$$\sigma_{\text{capture}} = \sum_J \left(\sigma_{nT}^J - \sigma_{nn}^J - \sigma_{nf}^J \right). \quad (2d)$$

The parity π is assumed implicit in the spin J .

The capture cross section is computed from the difference between the total cross section and the fission and scattering cross sections.

B. General Formulae for W_{nc}^J ($W_{nf}^J \neq 0$)

In the Reich-Moore formalism the matrix W is expressed in terms of the $(m+1) \times (m+1)$ channel matrix K , where m is equal to the number of fission channels ($m = 2$ for MULTI). Thus,

$$\begin{aligned} W_{nc}^J &= \left(\frac{1 + iK}{1 - iK} \right)_{cc}, \\ (1 \pm iK)_{cc'} &= \delta_{cc'} \pm i \sum_{\lambda} \frac{\alpha_{\ell\lambda c} \alpha_{\ell\lambda c'}}{E_{\lambda} - E - i\alpha_{\lambda\gamma}^2}, \end{aligned} \quad (3)$$

where for the λ^{th} resonance

$$\begin{aligned} \alpha_{\ell\lambda c} \quad (c=n) &= \sqrt{\frac{\Gamma_{\ell\lambda n}^{(o)}}{2}} \sqrt{E} v_{\ell n}, \\ \alpha_{\ell\lambda c} \quad (c = f_1, f_2, \gamma) &= \sqrt{\frac{\Gamma_{\lambda c}}{2}} v_{\ell c}, \end{aligned}$$

in which

$V_{\ell n}$ = penetration factor for neutrons of orbital angular momentum ℓ ,

$V_{\ell c} = 1$, penetration factor for the channels $c \neq n$, and

$\Gamma_{\ell \lambda n}^{(0)}$ = reduced neutron width.

Expressions for $V_{\ell n}$ and $\phi_{\ell n}$ in terms of $\rho = ka$ (a = channel radius, k = neutron wave number) are given in Table I. The potential phase shifts for the other channels $\phi_{\ell c}$ ($c \neq n$) need not be defined. Equation (3) assumes that boundary condition parameters can be chosen such that over the energy range to be fitted the elements of the C matrix^{1,2} which give rise to level shifts can be taken to be zero.

To reduce the time necessary to compute the cross sections and the partial derivatives of the cross sections, the inversion of the $(I - iK)$ matrix is done explicitly. For this purpose the K matrix is separated into a real part A_{cc} , and an imaginary part B_{cc} :

$$(I \pm iK)_{cc} = \delta_{cc} + B_{cc} \pm i A_{cc},$$

where

$$B_{cc} = \sum_{\lambda} \frac{\alpha_{\ell \lambda c} \alpha_{\ell \lambda c'} \frac{\alpha_{\lambda}^2}{(E_{\lambda} - E)^2 + \alpha_{\lambda}^2}} = B_{cc}^v + B_{cc}^c,$$

$$A_{cc} = \sum_{\lambda} \frac{\alpha_{\ell \lambda c} \alpha_{\ell \lambda c'} \frac{(E_{\lambda} - E)}{4}}{(E_{\lambda} - E)^2 + \alpha_{\lambda}^2} = A_{cc}^v + A_{cc}^c. \quad (4)$$

Each sum over λ is treated as two separate sums; one containing terms which vary with iteration, A_{cc}^v , and B_{cc}^v , and the other containing terms which do not vary with iteration, A_{cc}^c , and B_{cc}^c . In this way the user can use the matrices A^c and B^c to generate in the R-matrix an R^{∞} -background matrix which has the proper energy dependence. This division can also result in a significant saving in running time when there are more resonances with fixed parameters than resonances with varied parameters.

C. Formula for W_{nn}^J ($W_{nf}^J = 0$)

Equation (3) assumes that the shift matrix $S_{\ell}^{J(0)} = S_{\ell} - B_{\ell}^J = 0$ over the energy interval being fitted (usually less than a few hundred electron volts in width). This is equivalent to choosing the boundary condition, $B_{\ell}^J = S_{\ell}$. Since S_{ℓ} is energy-dependent, this equality can be satisfied at only one energy. However, at low energies S_{ℓ} does not vary significantly with energy and therefore a B_{ℓ}^J can be found which makes $S_{\ell}^{J(0)} \approx 0$. With light elements the energy interval may be several hundreds of kiloelectron volts, even several million electron volts, wide and S_{ℓ}^J can vary by factors of 2 or more over this interval. For this reason the expression for W_{nn}^J has been modified to incorporate the shift factor S_{ℓ} and the boundary condition factor B_{ℓ}^J when only elastic and radiative reactions are allowed:

$$W_{nn}^J = \frac{1 - R_{\ell}^J [S_{\ell}^{J(0)} - iP_{\ell}^J]}{1 - R_{\ell}^J [S_{\ell}^{J(0)} + iP_{\ell}^J]},$$

$$= \frac{1 + iK_{\ell}^J - K_{\ell}^J \Delta_{\ell}^J}{1 - iK_{\ell}^J - K_{\ell}^J \Delta_{\ell}^J}, \quad (5)$$

TABLE I
PENETRATION (V), PHASE SHIFT (ϕ), AND SHIFT (S) FUNCTIONS

ℓ	$V_{\ell n}$	$\phi_{\ell n}$	$S_{\ell n}$
0	1	ρ	0
1	$\rho^2/(1 + \rho^2)$	$\rho - \tan^{-1} \rho$	$-1/(1 + \rho^2)$
2	$\rho^4/(9 + 3\rho^2 + \rho^4)$	$\rho - \tan^{-1} (3\rho)/(3 - \rho^2)$	$-(18 + 3\rho^2)/(9 + 3\rho^2 + \rho^4)$
3	$\rho^6/(225 + 45\rho^2 + 6\rho^4 + \rho^6)$	$\rho - \tan^{-1} [\rho(15 - \rho^2)/(15 - 6\rho^2)]$	$-(675 + 90\rho^2 + 6\rho^4)/(225 + 45\rho^2 + 6\rho^4 + \rho^6)$
4	$\rho^8/(11\,025 + 1575\rho^2 + 135\rho^4 + 10\rho^6 + \rho^8)$	$\rho - \tan^{-1} [\rho(105 - 10\rho^2)/(105 - 45\rho^2 - \rho^4)]$	$-(44\,100 + 4725\rho^2 + 270\rho^4 + 10\rho^6)/(11\,025 + 1575\rho^2 + 135\rho^4 + 10\rho^6 + \rho^8)$

where

$$\Delta_{\ell}^J = S_{\ell}^{J(0)} / P_{\ell} = (S_{\ell} - B_{\ell}^J) / \rho v_{\ell n},$$

K_{ℓ}^J is defined by Eq. (3). Expressions for $S_{\ell} \equiv S_{\ell n}$ are given in Table I.

D. Approximate Formulae for w_{nc}^J ($w_{nf}^J \neq 0$)

A substantial portion of the running time of the code is used to calculate the cross sections, σ_{nc} , and the partial derivatives of the cross sections with respect to the parameters U_i , $\partial \sigma_{nc} / \partial U_i$. Two approaches were considered to help reduce this time: better algorithms for calculating σ and $\partial \sigma / \partial U_i$, and approximations to σ and consequently $\partial \sigma / \partial U_i$ which would preserve most of the multilevel effects present in the more general expression for σ . By comparing the expression for the single-level case with that for the more general case and isolating those terms needed to reduce the multilevel expression to the single-level expression, it was possible to pick out the terms that would result in a good approximation to the partial cross sections for a wide range of conditions on the resonance parameters. The approximation involved keeping terms to second order in the matrices A and B:

$$w_{nf}^J = 2/\Delta \sum_{k=2}^{m+1} \left[\left(A_{1k}^J \right)^2 + \left(B_{1k}^J \right)^2 \right] \quad (6a)$$

$$\text{Re}(w_{nn}^J) = 1/\Delta \left\{ \left(1 + \sum_{k=2}^{m+1} B_{kk}^J \right)^2 + \left(\sum_{k=2}^{m+1} A_{kk}^J \right)^2 - \left[(A_{11}^J)^2 + (B_{11}^J)^2 \right] + 2 \left[B_{22}^J B_{33}^J - A_{22}^J A_{33}^J + (A_{23}^J)^2 - (B_{23}^J)^2 \right] \right\} \quad (6b)$$

$$\text{Im}(w_{nn}^J) = 2/\Delta \left[A_{11}^J + 2 \left(A_{11}^J B_{22}^J - A_{12}^J B_{22}^J - A_{12}^J B_{12}^J + A_{11}^J B_{33}^J - A_{13}^J B_{13}^J \right) \right] \quad (6c)$$

$$\Delta = \left(1 + \sum_{k=1}^{m+1} B_{kk}^J \right)^2 + \left(\sum_{k=1}^{m+1} A_{kk}^J \right)^2 + 2 \left[\begin{array}{l} B_{11}^J B_{22}^J - A_{22}^J A_{11}^J + (A_{12}^J)^2 - (B_{12}^J)^2 \\ + B_{11}^J B_{33}^J - A_{33}^J A_{11}^J + (A_{13}^J)^2 - (B_{13}^J)^2 \\ + B_{22}^J B_{33}^J - A_{33}^J A_{22}^J + (A_{23}^J)^2 - (B_{23}^J)^2 \end{array} \right] \quad (6d)$$

where m = number of fission channels.

Test cases showed that the agreement between the exact and approximate expressions for all partial cross sections was better than 1% at the resonance energies and less than a few tenths of a percent between resonances -- well within the statistical quality of present cross-section data. In particular, for the fission cross section the agreement was better than 0.01% even for a $\Gamma/D \approx 7$.

The use of Eq. (6) in calculating the cross sections did not save as much time as had been expected, but time was saved by basing the derivatives of the cross sections on these equations. Either the general expression or the approximate expression for the cross sections may be used in the code. However, only the approximate partial derivative expressions are used. This inconsistency is not critical since the derivatives are used only to obtain a guess direction along which the fit to the data improves. This is discussed more fully in Sec. III.

III. LEAST-SQUARES TECHNIQUE

A. General

The weighted least-squares techniques used in MULTI to obtain the final set of best parameters are somewhat nonstandard.

Let us assume that we have a set of N data points, $h_Q = d_Q/W_Q$, where d_Q represents the unweighted Q th data point and W_Q its weight, and that we wish to fit these data points with a function $f_Q(U_1 \dots U_n)$, $n < N$. If R_Q represents the Q th residual ($f_Q - h_Q$), then

$$R_Q(\bar{U} + \bar{Z}) = R_Q(\bar{U}) + R_{Q,j}(\bar{U}) Z^j \quad (7)$$

to first order in the vector $\bar{Z}$, the correction vector. The components of the vector $\bar{U}$ represent the initial parameters, and $R_{Q,j}$ the derivatives of R_Q with respect to the U_j parameter. To find $\bar{Z}$ by the least-squares method requires minimizing the sum of the squares of R_Q with respect to the U_i 's or

$$\nabla_i \phi(\bar{U} + \bar{Z}) = 0 \quad (8)$$

where

$$\phi(\bar{U} + \bar{Z}) = R_Q(\bar{U} + \bar{Z}) R_Q(\bar{U} + \bar{Z}),$$

summation over the index Q implied.

Keeping only first-order derivatives, Eq. (8) becomes

$$\begin{aligned} R_{Q,i}(\bar{U}) R_{Q,j}(\bar{U}) Z^j &= -R_Q(\bar{U}) R_{Q,i} \\ g_{ij} Z^j &= -1/2 \nabla_i \phi \end{aligned} \quad (9)$$

the normal equations. Solving Eq. (9) for $\bar{Z}$ results in an exact solution to the problem if the function $f(U)$ is linear in U , but in our case the functions $f(U)$ given by Eq. (2) are not linear in U . Therefore, the solution to the problem is obtained by iterating on the parameters (U) until the gradient $\nabla \phi$ or the relative change in ϕ per iteration has met some convergence criteria. The two convergence criteria used in MULTI are:

$$(1) \quad \left| \frac{\phi_i - \phi_{i+1}}{\phi_i} \right| < 10^{-4},$$

$$(2) \quad |Z|^2 < 10^{-8}.$$

Two methods are used to find the new set of parameters for each iteration. They are the Eta method which solves Eq. (9) and the P method which solves the equation

$$(g_{ij} + P \delta_{ij}) Z^j = -1/2 \nabla_i \phi. \quad (10)$$

B. Eta Method

Solving Eq. (9) for the solution vector $\bar{Z}$ results in an unrealistic magnitude for this vector when the assumption underlying the derivation of Eq. (9) is no longer valid, namely, that the higher order derivatives can be ignored in the expansion of $\nabla \phi$. This frequently happens in nonlinear problems where the initial set of parameters is a poor representation of the final set. The Eta method assumes, however, that the direction given by $\bar{Z}$ does point toward a minimum even when the higher order derivatives may be important. In this method, if $\phi(\bar{U} + \bar{Z})$ is less than $\phi(\bar{U})$ a new iteration is started with the parameters $\bar{U} = \bar{U} + \bar{Z}$. If this condition is not satisfied, then a binary search is made along the $\bar{Z}$ direction, starting with $\eta = 1$, until $\phi(\bar{U} + \eta \bar{Z})$ is less than $\phi(\bar{U})$. An example of this is illustrated in Fig. 1. Eta = 1/2 results in a ϕ less than the starting ϕ , and therefore a new iteration is started with $\bar{U} = \bar{U} + 1/2 \bar{Z}$.

Fig. 1. An example of an Eta search. The solid curve represents the actual variation of ϕ with η , the dashed curve a parabolic fit to the function ϕ at $\eta = 1/2, 1$, and $3/2$ with the vertex at η_{v1} , and the dashed-dot curve a parabolic fit to the function ϕ at $\eta = 1/2, 3/4$, and 1 with the vertex at η_{v2} . If the relative change in the vertices of the two parabolas is less than 0.1, a new iteration is started with the parameter $\bar{U} = \bar{U} + \eta_{v2} \bar{Z}$.

If, in the search for a $\phi(\eta_{i+1}) < \phi(\eta_i)$ the relative change in ϕ , $\left| \frac{\phi(\eta_{i+1}) - \phi(\eta_i)}{\phi(\eta_{i+1})} \right|$, is less than 10^{-3} , the

Eta method switches to the P method.

An example of an option available in the Eta method is also illustrated in Fig. 1. Instead of a search for the first η , which results in a lower ϕ than the starting ϕ , the η that locates the first minimum in ϕ is found. This is accomplished by passing parabolas through $\phi(\bar{U} + \eta \bar{Z})$ for sets of three values of η , calculating the vertices of the parabolas, and terminating the search when the relative change in the vertices of the parabolas is less than 10%. In our example this means passing a parabola through the points $\phi(\eta=1/2)$, $\phi(\eta=1)$, and $\phi(\eta=3/2)$, storing the vertex η_{v1} and, since $1/2 < \eta_{v1} < 1$, fitting the next parabola to $\phi(\eta=1/2)$, $\phi(\eta=3/4)$, and $\phi(\eta=1)$. If $|(\eta_{v1} - \eta_{v2})/\eta_{v1}| < 0.1$, a new iteration is started with the adjusted parameter $\bar{U} + \eta_{v2} \bar{Z}$. This option does not restrict the search on η to values less than 1. In fact, when close to a very broad minimum in the ϕ hypersurface, it is not uncommon for η to be as large as 4 or 5.

C. P Method

The P method solves Eq. (10) for various values of P until the first minimum in $\phi[U+Z(P)]$ is found. To understand what the addition of a constant term to each diagonal element of the derivative matrix g does to the vector $\bar{Z}$, consider the extreme case of $P \gg |g_{ii}|_{\max}$. In this case the $\bar{Z}$ vector points in the direction of the negative gradient and has a very small magnitude of $|\nabla\phi|/2P$. If $P = 0$, then $\bar{Z}$ is in some other direction, which turns out to be approximately at a right angle to the negative gradient direction. Here $|\bar{Z}|$ is large; P therefore has the effect of rotating the solution vector $\bar{Z}$ into the direction of $-\nabla\phi$ and monotonically decreasing its magnitude, as illustrated in Fig. 2. The length of the line represents the magnitude Z. The $\cos \theta$ between the $-\nabla\phi$ and $\bar{Z}$ directions is printed out after each iteration.

The P method, which searches for a better direction than that obtained with $P = 0$, partially compensates for not keeping the higher order derivatives in the expansion of $\nabla\phi$ and for not using the exact expressions for $R_{Q,i}(\partial\phi/\partial U_i)$.

Fig. 2. An illustration of the effect on the correction vector $\bar{Z}$ to an increase in the parameter P in the normal equation $(g_{ij} + \delta_{ij}P)Z_j = -1/2\nabla\phi_i$. As P increases, the solution vector $\bar{Z}$ rotates into the direction of the negative gradient, $-\nabla\phi$, and the magnitude of $\bar{Z}$ decreases monotonically.

A table of values of P is formed from a geometrical progression of N values lying between $a|g_{ii}|_{\max}$ and $b|g_{ii}|_{\max}$:

$$P_{i+1} = rP_i,$$

$$r = (b/a)^{1/(N-1)}.$$

If no minimum is found in $\phi[U+Z(P)]$ for these values of P, the problem terminates with an appropriate message. Otherwise the value of P (including $P = 0$), which locates the first minimum in ϕ , is used to correct the parameters and a new iteration begins.

An option is provided in the P method to allow all N values of $\phi(P)$ to be calculated, and the $Z(P)$ which gives the lowest ϕ in this table is used to correct the parameters for the next iteration.

D. U Parameters

Three sets of resonance parameters are kept in MULTI: the external set $GSI(\lambda, 1) = \Gamma_{\lambda n}^{(o)}$, $GSI(\lambda, 2) = \Gamma_{\lambda f_1}$, $GSI(\lambda, 3) = \Gamma_{\lambda f_2}$, $GGA(\lambda) = \Gamma_{\lambda \gamma}$, and $PKEN(\lambda) = E_{\lambda}$; the internal set $BETAPR(\lambda, 1) = \sqrt{\Gamma_{\lambda n}^{(o)}/2}$, $BETAPR(\lambda, 2) = \sqrt{\Gamma_{\lambda f_1}/2}$, $BETAPR(\lambda, 3) = \sqrt{\Gamma_{\lambda f_2}/2}$, $BETAPR(\lambda, 4) = \sqrt{\Gamma_{\lambda \gamma}/2}$, and $PKEN(\lambda) = E_{\lambda}$ used in calculating σ and $\partial\sigma/\partial U$; and the U set which contains only the search parameters. The U parameters are defined in terms of the internal set except for the resonance energy parameter which is defined in terms of the $\sqrt{E_{\lambda}}$.

IV. DOPPLER- AND RESOLUTION-BROADENING

A. Convolution Technique

Doppler- (D) and resolution-broadening (R) of large sets of cross-section data account for a significant fraction of the total running time of MULTI. To reduce this contribution to a negligible fraction and at the same time make it easier to change the resolution function, two techniques are used:

(1) The integral expression for the broadened cross section is treated as a dot-product between two vectors,

$$\begin{aligned}\sigma_{R,D}(E) &= \int_{E_{MN}}^{E_{MX}} \sigma(E') f_{R,D}(E-E') dE' \\ &\approx \sum_{j(E_{MN})}^{j(E_{MX})} \sigma(E'_j) D(E'_j) f_{R,D}(E-E'_j) \\ &= \sum_{j(E_{MN})}^{j(E_{MX})} \sigma(E'_j) \bar{V}(E-E'_j) \\ &= \bar{\sigma} \cdot \bar{V}.\end{aligned}\quad (11)$$

The vector $\bar{V}$ is a function of E with components at the energies E'_j . A different $\bar{V}$ is needed to broaden the cross section at each energy E . The components of the vector $\bar{\sigma}$ are just the unbroadened cross sections at the energies E'_j . The vector $\bar{V}$ is computed separately for both the Doppler function $[\bar{A}(E)]$ and the resolution function $[\bar{B}(E)]$ at the energy E , and if both functions are convoluted with

the cross section, as is the case for the fission, capture, and scattering reactions, then a new vector $\bar{C}(E)$ is formed by combining the $\bar{A}$ and $\bar{B}$ vectors. The j th element of $\bar{C}(E'_j)$ is either $A(E'_j)$ or $B(E'_j)$ or $A(E'_j) B(E'_j)$ if both $\bar{A}$ and $\bar{B}$ have a corresponding element at the energy E'_j . The number of elements in $\bar{C}$ is therefore greater than the number of elements in either $\bar{A}$ or $\bar{B}$.

(2) Since the vectors $\bar{V}$ are not a function of the parameters U_i , they do not change with iteration and can be computed once (before the start of the first iteration), stored in ECS(LCM), and recalled into memory when needed.

Incorporation of these techniques into MULTI has reduced the time necessary to calculate the integrals by a factor of approximately 50, and has reduced the overall time by a factor between 2 and 5.

The numerical integration scheme used in MULTI to calculate the $D(E'_j)$'s in Eq. (11) is based upon the four-point progressive interpolation method developed by Mintz and Jordan³ at Lawrence Livermore Laboratory. The appropriate expressions are:

$$\begin{aligned}\int_{x_1}^{x_4} y dx &= D_{1A} Y_1 + D_{2A} Y_2 + D_{3A} Y_3 \\ \int_{x_2}^{x_3} y dx &= D_1 Y_1 + D_2 Y_2 + D_3 Y_3 + D_4 Y_4 \\ \int_{x_3}^{x_4} y dx &= D_{2B} Y_2 + D_{3B} Y_3 + D_{4B} Y_4\end{aligned}$$

where

$$\begin{aligned}D_{1A} &= -1/6 \left[(x_1 - x_2) + (x_1 - x_3) - \frac{(x_2 - x_3)^2}{(x_2 - x_3)} \right], \\ D_{2A} &= 1/6 \left[(x_2 - x_1) + (x_2 - x_3) - \frac{(x_1 - x_3)^2}{(x_2 - x_3)} \right], \\ D_{3A} &= 1/6 \left[\frac{(x_1 - x_2)^3}{(x_3 - x_1)(x_3 - x_2)} \right], \\ D_1 &= \frac{(x_2 - x_3)^3}{12(x_1 - x_2)(x_1 - x_3)},\end{aligned}$$

$$D_2 = \frac{(x_2 - x_3)}{12} \left[\frac{x_1 - x_3}{x_2 - x_1} + \frac{x_4 - x_3}{x_2 - x_4} - 4 \right],$$

$$D_3 = \frac{x_3 - x_2}{12} \left[4 - \frac{x_1 - x_2}{x_3 - x_1} - \frac{x_4 - x_2}{x_3 - x_4} \right],$$

$$D_4 = \frac{(x_2 - x_3)^3}{12(x_4 - x_2)(x_4 - x_3)},$$

$$D_{2B} = -1/6 \left[\frac{(x_4 - x_3)^3}{(x_2 - x_4)(x_2 - x_3)} \right],$$

$$D_{3B} = -1/6 \left[(x_3 - x_4) + (x_3 - x_2) - \frac{(x_4 - x_2)^2}{(x_3 - x_2)} \right],$$

$$D_{4B} = 1/6 \left[(x_4 - x_3) + (x_4 - x_2) - \frac{(x_3 - x_2)^2}{(x_4 - x_2)} \right]. \quad (12)$$

The D coefficients are a function of the energy E_j . The formulas for D_A and D_B are used at the "end points" of the tabular data. If the D coefficients are negative, which sometimes happens when two of the four points needed in this scheme lie too close together, they are calculated with the trapezoidal integration scheme.

An element of the vector $\bar{V}$, $V(E_j) = V_j$, is formed by multiplying $D(E_j)$ by either the value of the resolution function $f_R(E - E_j)$ or the Doppler function $f_D(E - E_j)$ at the energy E_j and normalizing each element by the sum over all elements of the vector $\bar{V}$,

$$V_j = V_j / \sum_i V_i.$$

B. Doppler Integral

The cross-section data are Doppler-broadened by the integral

$$\sigma_D(E) = \frac{1}{\sqrt{\pi} \Delta_D} \int_{E-3\Delta_D}^{E+3\Delta_D} e^{-[(E-E')/\Delta_D]^2} \sigma(E') dE', \quad (13)$$

where

$$\Delta_D = DO \sqrt{E'/AW},$$

in which

$$DO = 0.318 \sqrt{TEMP/293.0},$$

AW = atomic weight,

TEMP = effective sample temperature (K).

C. Resolution Integrals

The Doppler-broadened cross section σ_D is resolution-broadened by a Gaussian function, an exponential function, or a convolution of an exponential and a Gaussian function.

1. Gaussian Function

$$\sigma_{DG}(E) = \frac{1}{\Delta_G \sqrt{\pi}} \int_{E-3\Delta_G}^{E+3\Delta_G} e^{-[(E-E')/\Delta_G]^2} \sigma_D(E') dE', \quad (14)$$

where

$$\Delta_G = E \sqrt{AO2 E + BO2},$$

in which

$$AO2 = (0.01661 \Delta t_G / \text{DIST})^2,$$

$$BO2 = (0.81650 \Delta \ell / \text{DIST})^2,$$

DIST = flight path in meters,

Δt_G = FWHM of Gaussian function in microseconds,

$\Delta \ell$ = flight path uncertainty in meters.

The flight path uncertainty is considered a square function of width $\Delta \ell$ and is approximated by a Gaussian function with an e-folding width of $\Delta \ell / \sqrt{6}$.

2. Exponential Function

$$\sigma_{DE}(E) = \frac{1}{\Delta_E} \int_E^{E+6\Delta_E} e^{-(E-E')/\Delta_E} \sigma_D(E') dE', \quad (15)$$

where

$$\Delta_E = CO2 E^{3/2},$$

in which

$$CO2 = 0.02766 \Delta t_E / \text{DIST},$$

Δt_E = e-folding width in microseconds.

3. Convolution of Gaussian and Exponential Functions

$$\sigma_{DGE}(E) = \frac{1}{\Delta_G \Delta_E \sqrt{\pi}} \int_{-3\Delta_G}^C e^{-[(\Delta_G/2\Delta_E)^2 - (E'-E'')/\Delta_E]} \text{ERFC} [\Delta_G/2\Delta_E - (E'-E'')/\Delta_G] \sigma_D(E') dE', \quad (16)$$

where

$$C = 6\Delta_E \text{ for } \Delta_G/\Delta_E < 1$$

$$= 3(5 - \Delta_G/\Delta_E)\Delta_G \text{ for } 1 \leq \Delta_G/\Delta_E \leq 2$$

$$= 3\Delta_G \text{ for } \Delta_G/\Delta_E > 2,$$

$$\text{ERFC}(x) = 2/\sqrt{\pi} \int_x^\infty e^{-t^2} dt,$$

and $E'' = E - \Delta_E$.

ΔE_S takes into account the fact that the maximum of this function is not at the energy $E' = E$ but is at some higher energy $E' = E + \Delta E_S$. This shift in the maximum relative to $E' = E$, ΔE_S , is calculated by Newton's methods.

D. No Doppler- or Resolution-Broadening

By setting the parameters $TEMP = DELTAG = DELTAL = DELTAE = 0$ the data are not Doppler- or resolution-broadened.

E. Broadening of Partial Derivatives

The original version of MULTI Doppler- and resolution-broadened the partial derivatives of the cross sections with respect to the varied parameters $U_1, \partial \sigma_{nc} / \partial U_1$. This version of MULTI does not broaden $\partial \sigma_{nc} / \partial U_1$. It was found, through fitting many examples with and without broadening, that the convergence of a problem did not depend upon whether the partials were broadened.

V. THE CODE

A complete FORTRAN listing of MULTI is given in App. A.

A. Input

A list is given in Table II of the variables read in, their locations on IBM cards, formats, units, options, and explanations.

B. Description of MULTI Subroutines

A flow chart describing how the main program and the various subprograms are connected in an Eta or P search is shown in Fig. 3. The setup of a problem is handled by those routines contained within the dashed box. Only a small percentage of the running time of a typical problem is spent in setup. A majority of the time is spent in the routines PARSH, RESDOD, and PHIMAIN, and a lesser amount in PSRCH or ETASRCH, and OPTIMIZE.

RESEXP starts a new problem by initializing parameters needed in MULTI and by calling OPTIMIZE. It also checks the last card read in to determine whether another problem is to be run or whether the same problem is to be run with different resonance parameters.

OPTIMIZE calls PHIGRAD for setup and either PSRCH or ETASRCH if $ITMAX > 0$. If $ITMAX = 0$, PHIMAIN is called to generate mock cross-section data which

Fig. 3. A flow chart of the η and P least-squares search methods. The dashed box encloses the subroutines used to set up MULTI.

are plotted and printed and punched in a 9E8.5 format $[E(eV), \sigma(b), A\sigma(b) \dots]$ with the highest energy data first. OPTIMIZE also keeps track of the number of iterations and handles the convergence criteria on ϕ and $|Z|^2$.

PHIGRAD reads in (Tape 1) and prints out (Tape 3) the input parameters, calls the subroutines RIDATA which reads in the data, ESCALE which generates an energy scale for broadening the data, ECSP and INTWTS which determine parameters and weights needed for broadening the data, and ALPHBT which calculates the constant A^C and B^C matrices. PHIGRAD also sets the boundaries in ECS(LCM) for those quantities which will be stored in ECS(LCM), checks to make sure that the number of resonances (NRES) does not exceed the maximum number (NRESM), that the number of varied parameters (KM) does not exceed the maximum number (KM MAX), and that the size of ECS(LCM) (IS18) does not exceed the maximum allowable size (IECS).

If some of the parameters are read in with zero or negative values, they will be set to nonzero values. These values are 10^{-10} for $\Gamma_n^0 \leq 0$, 10^{-6} for Γ_{f1} or Γ_{f2} , and 1 for $IGROUP \leq 0$.

RIDATA reads in data from two sources -- tape and cards -- and will generate an energy scale for mock data. The same energy scale is required for all cross sections. For both the card and tape modes a check on the cross section is made to ensure that its magnitude is not less than 0.01 b. If it is less, then the cross section is set to 0.01 b and the error is set to 10^{-10} (cards) or 0.01- σ (tape).

TABLE II
INPUT CARD FORMAT

Card	Columns	Format	Variable	Units	Options	Explanation
1	1-48	6A8	TITLE	--	--	Inserted after the title MULTILEVEL ANALYSIS OF which the code prints out.
	49-56	A8	ELEM	--	--	Element.
	57-64	A8	RUN NO	--	--	Problem number.
2	1-8	A8	IF1(1)	--	TOTAL,	
	9-16	A8	IF1(2)	--	SCATTER,	Cross-section data to be fitted or generated.
	17-24	A8	IF1(3)	--	FISSION,	
	25-32	A8	IF1(4)	--	CAPTURE.	
	33-40	A8	ITAPE	--	NODATA	Mock cross-section data generated from input parameters and stored on output file PUNCH in a 9E8.5 format, E(eV), $\sigma(b)$, $\Delta\sigma(b)$ with highest energy first.
					CARDS	Cross-section data read from cards in a 9E8.5 format.
					TAPE	Cross-section data read from tape in a 9E8.5 format.
	41-42	I2	LLY	--	0	Linear scale along Y axis.
					1,2,3,4,5	Number of cycles along Y axis.
	43-44	I2	NFCHS	--	0,1,2	Maximum number of fission channels in any resonance group.
	45-46	I2	ITMAX	--	> 0	Maximum number of iterations.
					0	Same as NODATA.
3	1-12	E12.0	AW	--	--	Atomic weight.
	13-24	E12.0	TEMP	K	--	Effective temperature of the sample.
	25-36	E12.0	CRFN	fm	> 0	Channel radius.
					0	Computed using $1.45 (1.009 + AW)^{1/3}$.
	37-48	E12.0	ERROR	--	< 0	$W_Q = 1$ (Sec. III-A).
					0	$W_Q =$ statistical error for the Qth data point ($\Delta\sigma_Q$).
					> 0	$W_Q = \text{ERROR} * \sigma_Q / 100$.
	49-60	E12.0	DIST	m		Flight path.
4	61-72	E12.0	THICK	at/b		Total cross-section sample thickness.
	1-12	E12.0	DELTA G	μs		FWHM of Gaussian resolution function.
	13-24	E12.0	DELTA E	μs		e-folding width of exponential resolution function.
	25-36	E12.0	DELTA L	m		Flight path uncertainty (full width of square pulse).
	37-48	E12.0	YMAX	b		Maximum value of Y axis scale. Only valid LLY = 0.
	49-60	E12.0	YMIN	b		Minimum value of Y axis scale. Independent of LLY.
	61-72	E12.0	ESPAN	ev		Energy span per page or film frame.

TABLE II - continued

Card	Columns	Format	Variable	Units	Options	Explanation
5	1-12	E12.0	STORAGE	--	0	The constant terms in the A and B matrices, A^C and B^C (Sec. II-B) are calculated once for all iterations and stored on ECS(LCM).
					1	The A^C and B^C matrices are calculated for every iteration.
	13-24	E12.0	SIMPLE	--	0	$\sigma(E)$ calculated using the approximate formulas for U, Eq. (6).
					1	$\sigma(E)$ calculated using the general formula for U, Eq. (3).
	25-36	E12.0	PRINTCS	--	0	Print $\sigma(b)$ vs $E(eV)$ in 10 E 13.7 format.
					1	Suppress printing of σ vs E .
	37-48	E12.0	DSHIFTF	--	0	If NFCHS = 0, S^0 calculated (Sec. II-C).
					1	DSHIFTF ignored if NFCHS $\neq$ 0; $S^0 = 0$.
6 and 7	1-5	F5.0	GOJ(1)	--	--	Statistical factor, g, for the resonances in group 1.
	6-7	F2.0	GRSPIN(1)	--	0,1,2,3,4	Orbital angular momentum of the resonances in group 1.
	8-12	F5.0	BOUND(1)	--	--	Boundary condition for the resonances in group 1. Valid only if NFCHS = 0.
FORMAT REPEATED FOR REMAINING NINE GROUPS, SIX GROUPS PER CARD.						
8	1-8	A8	SKIP	--	SKIPSRCH	Search along $\bar{Z}$ for the first η which makes $\Phi(\bar{U}+\eta\bar{Z}) < \Phi(\bar{U})$.
					ETASRCH	Search along $\bar{Z}$ for the η which locates the first minimum in the function $\Phi(\bar{U}+\eta\bar{Z})$.
					PSEARCH	Search for the value of P which locates the first minimum in the function $\Phi[\bar{U}+\bar{Z}(P)]$.
					PTABLE	Form a table of NPS values of $\Phi[\bar{U}+\bar{Z}(P)]$ and locate the P corresponding to the smallest value of $\Phi[\bar{U}+\bar{Z}(P)]$ in the table.
					PSEARCHE	Use PSEARCH to find a better direction for Z and then use ETASRCH to find the optimal $ Z $.
					PTABLEE	Same as PSEARCHE except PTABLE used in place of PSEARCH.
	9-20	E12.0	CMIN	--	--	The minimum factor multiplying the magnitude of the largest diagonal element of the normal matrix g_{ij} (Sec. III-C).
	21-32	E12.0	CMAX	--	--	The maximum factor multiplying the magnitude of the largest diagonal element of the normal matrix g_{ij} .
	33-44	I12	NPS	--	--	The maximum number of entries in the P table.

TABLE II - continued

Card	Columns	Format	Variable	Units	Options	Explanation
RESONANCE PARAMETER CARDS						$9 \leq K \leq 8 + \lambda, \lambda = 1, 100$
	1-12	E12.0	PKFN(λ)	$\pm$ eV		Resonance energy.
	13-24	E12.0	GGA(λ)	meV		Radiation width.
	25-36	E12.0	GSI($\lambda, 1$)	meV		Reduced neutron width.
	37-48	E12.0	GSI($\lambda, 2$)	meV		Fission width for channel 1.
	49-60	E12.0	GSI($\lambda, 3$)	meV		Fission width for channel 2.
K	61-62	I2	IELIM($\lambda, 1$)	--	0	PKEN(λ) not iterated on.
					1	PKEN(λ) iterated on.
	63-64	I2	IELIM($\lambda, 2$)	--	0	GGA(λ) not iterated on.
					1	GGA(λ) iterated on.
	65-66	I2	IELIM($\lambda, 3$)	--	0	GSI($\lambda, 1$) not iterated on.
					1	GSI($\lambda, 1$) iterated on.
	67-68	I2	IELIM($\lambda, 4$)	--	0	GSI($\lambda, 2$) not iterated on.
					1	GSI($\lambda, 2$) iterated on.
	69-70	I2	IELIM($\lambda, 5$)	--	0	GSI($\lambda, 3$) not iterated on.
					1	GSI($\lambda, 3$) iterated on.
	71-72	I2	IGROUP(λ)	--	1-10	Resonance group.
	BLANK CARD					
DATA CARD(S) FOLLOW NEXT.						
ITAPE = NODATA						
9+ λ	1-12	E12.0	EMIN	eV	--	Interval from EMIN to EMAX divided into MAXEN points.
	13-24	E12.0	EMAX	eV	--	
ITAPE = CARDS						
Three data points per card. Data read in until blank card encountered.						
8+ λ + N/3	1-12	E8.5	ENER(N)	eV	--	Energy of the data point.
	13-24	E8.5	CROSS(N)	b	--	Cross section of the data point.
	25-36	E8.5	EXT(N)		--	Relative statistical error ($\Delta\sigma/\sigma$) of the data point. ENER(1) > ENER(2) > ENER(3)
LAST CARD IS A BLANK CARD.						

TABLE II - continued

Card	Columns	Format	Variable	Units	Options	Explanation
ITAPE = TAPE						
Three data points per record. Files separated by blank card.						
	1-12	E12.0	EMIN	eV	--	Data read in from EMIN to EMAX from tape 5 after skipping ISKP files of data. Format the same as cards.
9+λ	13-24	E12.0	EMAX	eV	--	EXT = total relative error.
	25-36	I12	ISKP	--	--	Number of data files to skip.
	37-48	E12.0	CORR2	--	--	CORR2 = relative correlated error squared to be subtracted in quadrature from EXT.
LAST CARD OF CURRENT PROBLEM.						
	1-8	A8		--	NEWPROB	Start a new problem. Read in new values for the cards 1 to 9+λ.
					--	Repeat current problem with new resonance parameters. Read in new values for the cards 6 and 7 and the resonances parameter cards.
					ENDPROB	Last problem in input deck.

In the cards mode the entire deck is read in from the input file until a blank card is encountered. The data must be organized so that the highest energy is read in first. The number of data points is checked against MAXEN = 1600/# of values of IF1 = IDIMX. If the number of data points exceeds MAXEN, the problem is terminated and an appropriate message is given. Relative statistical errors are read in. The absolute statistical errors are computed in RIDATA from the relative errors.

In the tape mode the data are read in from a file called MULDAT. Many sets of data can be stored on this file, with a blank card separating each data set. The organization of the data is the same as in the cards mode. A particular data set can be searched for (ISKP) and read in from EMIN to EMAX. The data are energy-averaged in bins (EMAX-EMIN)/(MAXEN-1) to ensure no more than MAXEN data points in the interval. In this mode the errors are treated as total relative errors, with the option of reading in a relative correlated error squared (CORR2) which is subtracted from each error in quadrature.

In the NODATA mode a set of MAXEN energies is created from EMIN to EMAX. This mode is useful for generating mock data from the input parameters.

ESCALE sets up the energy table ENER1 of length MAXEN1, which is used in broadening the data. The minimum spacing between points in the ENER1 table is set at one-fourth of either the average Doppler width or the average resolution width for the energy interval being fitted, whichever is smaller. The maximum number of intervals between points in the input table ENER is 5, and the actual number is printed out as XDIV along with the average number of points required to broaden the data, IM. Points are added at the beginning and at the end of the ENER1 table to broaden properly the end points of the ENER table. The variable IM is checked against MSTORE to make sure that adequate space is available in memory to broaden the data. If the average spacing between points (WID) is greater than one-fourth the total width of a resonance, then the interval from $E_{\lambda} - \Gamma_{\lambda}$ to $E_{\lambda} + \Gamma_{\lambda}$ is further divided into nine equally spaced points with one point at the resonance energy. This is necessary to ensure proper broadening of those resonances whose widths are much smaller than the broadening width. The resonance energy and width for these resonances are printed out.

ECSP sets up two tables in ECS(LCM), one for Doppler-broadening and one for resolution-broadening.

Each entry consists of five numbers: the starting location (KC) in ECS(LCM) of the energy table (EE) needed to broaden a data point, the length of the table (IAI), the relative location in the EE table of the data point to be broadened (IPKE), and the widths of the resolution (WID1) and Doppler (WID) functions at EE(IPKE).

ALPHBT calculates the A^C and B^C matrices for those resonances with fixed parameters. If the parameter STORAGE $\neq 0$, then ALPHBT is not called. As a result, there can be a saving of space on ECS(LCM) of about 60 000 locations for a very large problem, but at the expense of an increase in running time of probably a factor of 2 or more if many of the resonances have fixed parameters.

INTWTS, along with INTCOE (integration coefficients), RESDOB (broadening functions), and SHIFTGE (Gaussian exponential shift routine), calculates the integration weights V_j (Sec. IV-A). A further check on whether there is enough space available to hold the entire vector $\bar{V}$ is made against MSTORE. If there is insufficient space, the problem terminates with an appropriate message.

ETASRCH performs the operations associated with the Eta methods outlined in Sec. III-B. If the relative change in ϕ is less than 10^{-3} , ETASRCH changes to PSRCH.

PSRCH performs the operations associated with the P methods as outlined in Sec. III-C.

PARSH calculates the cross sections SIGT (I) ($I = 1, 1DIMX$) and the partial derivatives of the cross sections SJKL(I) at the energy SU. If NGRAD = 0 only the SIGT(I) are calculated.

RESDOB Doppler- and resolution-broadens the data by forming the dot-product given in Eq. (11).

VF(ρ, ℓ), SF(ρ, ℓ), and PHIF(ρ, ℓ) calculate the penetration factor, the shift factor, and the potential scattering phase shift, respectively, for neutrons of orbital angular momentum ℓ and parameter $\rho = ka$.

PHIMAIN sets up calls to PARSH and RESDOB for all energies, and forms the scalar quantity ϕ and the matrices $-1/2 \nabla \phi$, and g providing NGRAD = 1. If only ϕ is required (NGRAD = 0) then $\nabla \phi$, g , and $\partial \sigma / \partial \rho$ are not calculated.

CRTP provides graphic output for each iteration in the form of film. The data are plotted as points and the theoretical curve as a solid line. This

routine also calls PRINTP, which provides graphic output in the form of a printer plot. The data are plotted as D and the theoretical curve as T.

OUT prints out (Tape 3) the current values of the resonance parameters, magnitude of the diagonal element of the varied parameters (DIAG) and, in the case of two fission channels, the angle (THETA) between the fission vector for each resonance relative to that for the first resonance. The parameters PKEN, GGA, GSI, IELIM, and IGROUP are written onto a file called PUNCH in the form (6E12.6, 6I2). This file can be punched and the cards used as resonance parameter cards for a new problem or as a continuation of the present problem.

C. Library Routines

There are several library routines used in MULTI which may not be a part of the standard libraries at other installations. These routines are listed in Table III, along with a brief explanation of what they do.

VI. OUTPUT EXAMPLES

Complete outputs from nine test problems are given in App. B. The part of the output common to all problems and the outputs from three different search techniques are discussed in the following sections.

A. Common Output

For the common output consider test problem 9. This problem fits high-energy total cross section ^{12}C data using the simplified formulas, although for pure elastic scattering these reduce to the general formulas. The A^C and B^C matrices for the 2.07-MeV resonance, whose parameters are held fixed, are calculated as a function of energy (ENER1) before the first iteration and stored for subsequent iterations. In this case there was no reduction in running time because there was only one resonance with fixed parameters, but a considerable amount of time would have been saved if, for example, there had been 50 resonances with fixed parameters. The data are read in from cards, and the weights on each residual are obtained from the statistical errors read in for each data point. The resolution function is a Gaussian with a timing uncertainty of 2.5 nsec (FWHM) and a flight path uncertainty of 1.25 cm. Typical values of CMIN and CMAX are used, namely

TABLE III
SPECIAL LIBRARY ROUTINES

CLOCK1(X)	X = hours/minutes/seconds.
DATE1(X)	X = month/day/year.
SECOND(X)	X = elapsed CPU time in seconds.
ECWR(X,I,N,E)	Block transfer to (ECWR) or from (ECDR) ECS(LCM).
ECDR(X,I,N,E)	X = variable transferred. N = number of values of X transferred. I = starting location of X on ECS(LCM); 0 is first location. E = error flag; if = 0, transfer is successful.
DOTPRO(N,X,IX,Y,IY)	Forms $X(I + IX)$ $Y(I + IY)$ for $I = 1, N$. X, Y = real vectors of length N. IX, IY = spacing between elements of X and Y, respectively.
VECSUM(Y,X,A,Z,N)	Forms $Z(I) = A X(I) + Y(I)$ for $I = 1, N$. A = scalar.
ERFC(X)	Error function complement, $ERFC = 2/\sqrt{\pi} \int_X^\infty e^{-t^2} dt$.
SNGL(X)	Double-precision variable X is treated as a single-precision variable.
DBLE(X)	Single-precision variable X is treated as a double-precision variable.
LABRT(ISW,J,K)	Aborter and message printer. Prints out J and causes job termination according to ISW. J = name of an array of 50 Hollerith characters. ISW, K integers, ISW = 1, K = 0.

10^{-3} and 1, respectively. This problem has seven groups of resonances representing s, p, d, and f wave neutrons. The level shift is calculated and the boundary conditions are chosen to make the shift function zero for one of the resonances within each group. Although it was not necessary to divide the interval between points in the ENER table to form the ENER1 table (XDIV = 1), it was necessary to divide each of the regions defined by $E_\lambda \pm \Gamma_\lambda$ for three resonances into nine additional data points. These resonances are printed out along with their total width and the average width between points in the

ENER1 table (WID). The amount of ECS(LCM) required is 59 365.

Two timing statements are printed out, interspersed between other information. Each contains two times: the smaller figure represents the time required to generate MAXEN1 cross sections (NGRAD = 0) or MAXEN1 cross sections and partial derivatives of the cross sections (NGRAD = 1), and the larger figure represents the sum of this time plus the time required to broaden the cross sections. After each iteration, information pertaining to the search technique is printed out, followed by a list of the new parameters with values of the diagonal elements g_{ii} for the varied parameters. These values are sometimes useful for determining which parameters are important (large diagonal terms) and which are not important and could just as well be held fixed (small diagonal terms). Also, in the case of two fission channels, the angle (THETA) between the two fission vectors relative to that for the first resonance is printed out.

The cross section vs energy for the new parameters can be printed out by setting PRINTCS = 0.

A printer plot of the data (D) and the theoretical cross section (T) completes the common information printed for each iteration.

B. PSEARCH Output

An example of the type of information printed out for each iteration for a P search is given in Table IV.

Ideally, one would want to select a narrow range of values of P by keeping the ratio of CMAX/CMIN small (2 to 10) so that NSAV ≈ 1 and $\cos(\theta) \approx 0$. This would result in the largest change in ϕ and in $\bar{U}$ per iteration per time spent in each iteration -- but is not possible when the initial parameters are poor guesses for the final parameters. In the latter

TABLE IV

PSEARCH OUTPUT		
STARTING PHI	0.235782 E +05	$\phi(\bar{U})$
MAGNITUDE OF CRAD	0.113410 E +04	$ 1/2 \nabla \phi(\bar{U}) $
FINAL PHI	0.435499 E +04	$\phi[\bar{U} + Z(P)]$
DIAG WEIGHTS	0.310833 E +01	P(N)
NSAV	5	N
COS(THETA)	0.63425 E +00	$\bar{Z} \cdot \nabla \phi / \bar{Z} \nabla \phi $

case P varies drastically from one iteration to the next, necessitating a large ratio in CMAX/CMIN (1000). As the parameter set converges, P will appear to approach a limit asymptotically, in which case CMAX/CMIN can be made smaller. If CMAX/CMIN is too large for the number of entries in the P table, NPS, then it is quite possible to miss the narrow minima in ϕ near $\cos(\theta) \simeq 0$, in which case $\cos(\theta) \rightarrow 1$ and very little progress will be made toward finding a better set of parameters. Remember that as $\cos(\theta) \rightarrow 1$, $|Z| \rightarrow 0$.

C. ETASRCH Output

An example of the type of information printed out after each iteration for an Eta search is given in Table V.

TABLE V
ETASRCH OUTPUT

PHI1	0.23578 E +05	$\phi(\bar{U})$
PHID	0.68259 E +04	$\phi(\bar{U}+\bar{Z})$
<hr/>		
NVER = 1		
PHI2	0.74295 E +04	$\phi(\bar{U}+0.5 \bar{Z})$
PHI3	0.68259 E +04	$\phi(\bar{U}+\bar{Z})$
PHI4	0.34081 E +05	$\phi(\bar{U}+1.5 \bar{Z})$
ETAVERS	0.76084 E +06	η_{v_2}
<hr/>		
NVER = 2		
PHI1	0.74299 E +04	$\phi(\bar{U}+0.5 \bar{Z})$
PHI2	0.43345 E +04	$\phi(\bar{U}+0.75 \bar{Z})$
PHI3	0.68259 E +04	$\phi(\bar{U}+\bar{Z})$
ETAVERS	0.76351 E +00	η_{v_2}
<hr/>		
SCAL	0.43092 E +04	$\phi(\bar{U}+\eta_{v_2} \bar{Z})$
<hr/>		

In the example in Table V two parabolic searches are necessary before the vertices of the parabolas, ETAVERS, satisfy the 10% convergence criterion. Since $\phi(\bar{U}+\bar{Z})$ is less than $\phi(\bar{U})$, the first parabola is fitted to the three ϕ 's corresponding to the sets of parameters $\bar{U}+0.5\bar{Z}$, $\bar{U}+\bar{Z}$, and $\bar{U}+1.5\bar{Z}$. The second parabola is fitted to the three ϕ 's corresponding to the sets of parameters $\bar{U}+0.5\bar{Z}$, $\bar{U}+0.75\bar{Z}$, and $\bar{U}+\bar{Z}$ since the vertex of the first parabola falls between $\eta = 1/2$ and 1. The iteration ends with a calculation of ϕ corresponding to the parameters at the second vertex and, if less than in our example PHI2, a new iteration begins with the parameters $\bar{U}+\eta_{v_2}\bar{Z}$. If $\phi > \text{PHI2}$, the new iteration begins with the parameters $\bar{U}+0.75\bar{Z}$.

TABLE VI
PTABLE OUTPUT

STARTING PHI	0.235782 E +05	$\phi(\bar{U})$
P = P	ZSQ = $ Z ^2$	$\cos \theta = \bar{Z} \cdot \bar{V}_0 / Z \cdot \bar{V}_0 $
0.	0.479217 E +05	0.368873 E -03
0.137102 E +00	0.277833 E +02	0.606487 E +00
0.414503 E +01	0.231674 E +02	0.645109 E +00
0.233092 E +02	0.129006 E +02	0.775763 E +00
0.131077 E +03	0.479333 E +01	0.945355 E +00
<hr/>		
MAGNITUDE OF GRAD	0.113410 E +04	$ \nabla \phi $
FINAL PHI	0.424383 E +04	$\phi(\bar{U}+\bar{Z}(P))$
NSAV	3	N
DIAG WEIGHT	0.414503 E +01	P(N)
COS(THETA)	0.645109 E +00	$\bar{Z} \cdot \nabla \phi / \nabla \phi $

D. PTABLE Output

An example of the type of information printed out for a PTABLE search is given in Table VI.

In this example NPS = 5. The lowest value of ϕ in the table is that corresponding to N = 3. A new iteration is started with the parameters $\bar{U}+\bar{Z}[P(3)]$. If the P table shows no value lower than the starting ϕ , the problem terminates with an appropriate message. The length of the $\bar{Z}$ vector becomes very small as the $\cos(\theta)$ approaches 1 (Sec. IV-C and Table VI). With $\text{CMIN} = 10^{-3}$ and $\text{CMAX} = 1$, most of the entries in the P table for this case correspond to large angles relative to the original $\bar{Z}$ direction (37° to 81°). If smaller values of these parameters are chosen, a deeper minimum in the $\phi[Z(P)]$ curve may be found nearer to the original direction of $\bar{Z}$ with a correspondingly larger change in the parameters and a faster convergence.

VII. MODIFYING RESOLUTION FUNCTION

MULTI makes the following assumptions about the resolution function:

- (1) $W = C f(E)$ when W is some appropriate width of the resolution function. In the case of the exponential resolution function, W is the e-folding width, $C = \text{CO2}$, and $f(E) = E^{3/2}$.
- (2) The lower and upper limits on the resolution integral are functions of the width W.

To replace, for example, the exponential resolution function by some other function requires changing the expression for the parameter CO2 in PHIGRAD, the parameter ROLOW in ROLOW, the parameters WLW and WUP for the case IRESOPR = 2 in WDSINTW, and replacing the exponential resolution function by the new function in RESDOB.

VIII. MODIFYING THE SIZE OF MULTI

The size of MULTI depends upon the values of the parameters MAX, IENER1, IECS, NRESM, NGRPM, NPSM, MSTORE, KMMAX, and IDIMXM set in the main program RESEXP. If any of these parameters are changed from their present values, then the size of those

variables in common which are a function of these parameters must also be changed, as well as the corresponding equivalence statements. A list of the variables in common and the equivalence statements which are a function of these parameters is given in Table VII.

TABLE VII

VARIABLES WHICH ARE USED TO MODIFY SIZE OF MULTI

MAX	= Maximum number of data points = 1600
NRESM	= Maximum number of resonances = 100
NPSM	= Maximum number of entries in P table = 10
NGRPM	= Maximum number of groups = 10
MSTORE	= Maximum number of elements in $\bar{V}$ = 100
KMMAX	= Maximum number of parameters = 150
IDIMXM	= Maximum number of cross sections = 4
KMS	= Number of elements in triangular matrix $g = KMMAX (1 + KMMAX)/2$
IECS	= Size of ECS(LCM) = 377 000
IENER1	= Maximum number of entries in ENER1 table = 2000

BLANK COMMON	COMMON ONE	COMMON TWO	COMMON THREE
SUM1 (IDIMXM)	IF1 (IDIMXM)	U (KMMAX)	RINF (KMMAX)
SIGT (IDIMXM)	PKEN (NRESM)		
SJKL (KMMAX)	GGA (NRESM)		
IELIMS (NRESM)	GSI (NRESM 3)		
BOUND (NGRPM)	ICGROUP (NRESM)		
GRSPIN (NGRPM)	BETAPR (NRESM 4)		
DUMMY [6+4 NPSM+KMS+3 KMMAX +MSTORE (IDIMXM+1)]	IELIM (NRESM 5)		
	GOJ (NGRPM)		
	BETA11 (NRESM)		
	BETA12 (NRESM)		
	BETA13 (NRESM)		
	BETA22 (NRESM)		
	BETA23 (NRESM)		
	BETA33 (NRESM)		

EQUIVALENCE CHANGES

I1 = MAX+1	I8 = MSTORE+1	I18 = 2 MAX+1	I23 = I4+MAX	I27 = NRESM
I2 = I1+MAX	I9 = I8+IDIMXM MSTORE	I19 = I18+1	I24 = I23+MAX	I28 = I27+NRESM
I3 = I3+MAX	I10 = I9+KMMAX	I20 = I19+6 KMMAX	I25 = I24+MAX	I29 = I28+NRESM
I5 = I4+MAX	I11 = I10+KMS	I21 = I20+6 KMMAX	I26 = I25+MSTORE	
I6 = I5+MSTORE	I12 = I11+KMMAX	I22 = I21+NRESM		
I7 = I6+MSTORE	I13 = I12+NPSM			
	I14 = I13+6			
	I15 = I14+NPSM			
	I16 = I15+NPSM			
	I17 = I16+NPSM			
ENR, DIA, EXT, ENER1, DUMMY (I1)	SS, DUMMY (I18)	SU, DUMMY (I18)	SIG, DUMMY (I23)	TEMPE, DUMMY (I27)
CROSS, IC, DUMMY (I2)	Z, B, GRAD, DUMMY (I9)	PA1, PA, DUMMY (I19)	CRS, DUMMY (I24)	ALPHAN, DUMMY (I28)
SIGDR, DNUM, DUMMY (I3)	GRADS, GSAV, A, DUMMY (I10)	PB1, PB, DUMMY (I20)	POINT, DUMMY (I25)	BETAN, DUMMY (I29)
PF, CRS1, DUMMY (I4)	DIAG, DUMMY (I11)	ALPHAN, DUMMY (I21)	YAXIS, DUMMY (I26)	
GSI, DUMMY (I5)	P, DUMMY (I12)	BETAN, DUMMY (I22)		
ESI, DUMMY (I6)	JS, DUMMY (I13)			
EES, DUMMY (I7)	CTHETA, DUMMY (I14)			
	ZSQ1, DUMMY (I15)			
	PHI, DUMMY (I16)			
	USAV, DUMMY (I17)			

IX. RUNNING MULTI

The following information is useful in running MULTI.

(1) The largest changes in ϕ per iteration per running time are accomplished by using the PSRCH method. It may be that a P search followed by an Eta search will make a larger change in ϕ for a given iteration, but the extra time required will not be worth the small additional improvement made in ϕ .

(2) Typical values of the parameters CMIN, CMAX, and NPS are 10^{-3} , 1, and 10, respectively. It is important not to make the ratio of CMAX/CMIN too large for a given NPS or the table will be too coarse, minima near $\cos(\theta) \approx 0$ will not be found, and a very slow convergence will result.

(3) Four to five iterations per problem configuration are sufficient for convergence. If the fit to the data in a limit region or over the entire region is still very poor and the change in ϕ per iteration very small (about a few percent), the problem probably has been set up wrong. The following suggestions may help in correcting the problem.

(a) If ERROR = 0, some of the errors on the data points may have been read in incorrectly as a result of being punched incorrectly. For a quick check, rerun the problem with ERROR = 1.

(b) If the fit is bad near a resonance, the resonance may be in the wrong spin group.

(c) The values of some of the fixed parameters may be grossly in error, therefore these parameters should be allowed to vary.

(4) The code will broaden correctly those resonances whose total widths are 10 to 20 times smaller than the resolution width.

(5) Use of the approximate formulae for fitting fission and capture data can save time without much loss in exactness. However, in fitting total or scattering data the general formulae should always be used, particularly if NFCHS = 2.

(6) To make the fit more sensitive to the peaks of the resonances, set ERROR = 1; to make the fit more sensitive to the valleys, set ERROR = 3. A good compromise is to use the statistical error on the data points as the residual weights, ERROR = 0.

(7) Remember that the code tries to fit the data within the framework of the constraints placed upon the problem by the number of resonances held fixed

or varied, the spins of the resonances, the number of fission channels, the "fixed" channel radius, the boundary conditions for each spin group, weights on the residuals, etc., and if the problem does not converge it probably means that one or more of these constraints is in error and does not necessarily mean that there is an error in MULTI.

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APPENDIX A

FORTRAN LISTING OF MULTI

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C-----101173 1
C          MAIN PROGRAM RESEXP          101173 2
C-----101173 3
C          PROGRAM RESEXP (INP,FSET2=INP,OUT,FSET3=OUT,PUN,MULVAL,FSET5=MULDA 5/25/73 2
C          IT,FSET9=PUN,FILM,BIN)          5/25/73 3
C          *** COMMON BLOCK ***          5/25/73 4
C          5/25/73 5
C          5/25/73 6
C          COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1( 5/25/73 7
C          14),SJKL(150),SIGT(4),DUMMY(1236),EXIT(4),CROSST(4),IS16,IS17,IS18 5/25/73 8
C          2,STORAGE,SIMPLE,STORBRD,ZERSTON,GRSPIN(10),IALBE,WGNO,IELIMS(100), 5/25/73 9
C          3,DELTA,DELTAE,IRESOPH,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST, 5/25/73 10
C          4NSHIFT,NPSM,NGRPM          101173 4
C          COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCA1,IFISS,ICAP,NHES,NFCHS,NFCHS1, 5/25/73 12
C          INFCHS2,NFCHS3,AN,CRFN,IT,ITMAX,KESWID,THICK,A02,B02,C02,DU,FRACT,E 5/25/73 13
C          2LEN,RUNNO,NODAT,UAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN 5/25/73 14
C          3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IRC,MAXID,IRESTOT,MAXENM,MSTO 5/25/73 15
C          4REN,DELTA1,DELTA2,DIET,NHESM,K2,NGRAV,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX 5/25/73 16
C          5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14, 5/25/73 17
C          6,IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG 5/25/73 18
C          7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,ISIONPS,IUMXM,ETAOP,IFC 5/25/73 19
C          8S,IUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10 5/25/73 20
C          90),BETA14(100),BETA23(100),BETA32(100),IENER1          5/25/73 21
C          *** DIMENSION BLOCK ***          5/25/73 22
C          5/25/73 23
C          5/25/73 24
C          DIMENSION P(1),JS(1)          5/25/73 25
C          5/25/73 26
C          *** EQUIVALENCE BLOCK ***          5/25/73 27
C          EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)), 5/25/73 28
C          1(CROSS,IC,DUMMY(201)), (SIGDH,DNUM,DUMMY(4801)), (GRADS,GRAD(150 5/25/73 29
C          2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU 5/25/73 30
C          3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (QIAQ,DUMMY 5/25/73 31
C          4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142 5/25/73 32
C          5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)), 5/25/73 33
C          6(P,P,DUMMY(6401))          5/25/73 34
C          5/25/73 35
C          5/25/73 36
C          MAIN PROGRAM          5/25/73 37
C          IF THE VALUES OF THE PARAMETERS,MAXENM,MSTORE,NHESM, 5/25/73 38
C          NPSM,KMMAX,IDIMX,AND IENER1 ARE CHANGED THEN THE VARIABLES 5/25/73 39
C          WHICH ARE A FUNCTION OF THESE PARAMETERS, AS LISTED IN THE 5/25/73 40
C          WRITE-UP, MUST BE CHANGED          5/25/73 41
C          5/25/73 42
C          MAX=1600          5/25/73 43
C          IENER1=2000          5/25/73 44
C          IFCS=31/1000          5/25/73 45
C          NHESM=100          5/25/73 46
C          MSTORE=100          5/25/73 47
C          NPSM=10          5/25/73 48
C          NGRPM=10          101173 5
C          KMMAX=150          5/25/73 49
C          IDIMX=4          5/25/73 50
C          IAA=MSTORE*KMMAX          5/25/73 51
C          X=XMMAX          5/25/73 52
C          Y=(X/2.)*(X+1.)          5/25/73 53
C          KMS=Y          5/25/73 54
C          IDIMMY=2*KMMAX*KMS          5/25/73 55

```

	ASSIGN 46 TO MOPTA	5/25/73	56
	NFILES=0	5/25/73	57
1	RETVAR=1.	5/25/73	58
	MAXENM=MAX	5/25/73	59
	WRITE (3,55)	5/25/73	60
C		5/25/73	61
C	*** NEW PROBLEM ***	5/25/73	62
C		5/25/73	63
	CALL OPTIMIZ	5/25/73	64
C		5/25/73	65
10	NFILES=NFILES+1+NRES	5/25/73	66
	MAX3=(MAXEN+2)/3	5/25/73	67
	IF (ITAPE.EQ.6HNO DATA) NFILES=NFILES+IDIMX*MAX3-1-NRES	5/25/73	68
	READ (2,100) CONDIR	5/25/73	69
	IF (CONDIR.EQ.7HENDPROB) CALL EXIT	5/25/73	70
C		5/25/73	71
C	*** START OF PROBLEM ***	5/25/73	72
C		5/25/73	73
	IF (CONDIR.EQ.7HNEWPROB) GO TO 1	5/25/73	74
C		5/25/73	75
C	*** SAME PROBLEM WITH DIFFERENT PARAMETERS ***	5/25/73	76
C		5/25/73	77
	MAXENM=MAX	5/25/73	78
	RETVAR=1.	5/25/73	79
	WRITE (3,82)	5/25/73	80
	READ (2,64) (GOJ(J),GRSPIN(J),BOUND(J),J=1,10)	5/25/73	81
	WRITE (3,73) (J,GRSPIN(J),GOJ(J),BOUND(J),J=1,10)	5/25/73	82
	NRES=0.	5/25/73	83
19	NRES=NRES+1	5/25/73	84
	READ (2,91) (P(J),J=1,5), (JS(J),J=1,6)	5/25/73	85
	IF (P(3).LE.0.) P(3)=1.E-10	5/25/73	86
	IF (P(4).EQ.0.) P(4)=1.E-6	5/25/73	87
	IF (P(5).EQ.0.) P(5)=1.E-6	5/25/73	88
	IF (P(1).EQ.0.) GO TO 28	5/25/73	89
	PKEN(NRES)=P(1)	5/25/73	90
	GGA(NRES)=P(2)	5/25/73	91
	GSI(NRES,1)=P(3)	5/25/73	92
	GSI(NRES,2)=P(4)	5/25/73	93
	GSI(NRES,3)=P(5)	5/25/73	94
	IELIM(NRES,1)=JS(1)	5/25/73	95
	IELIM(NRES,2)=JS(2)	5/25/73	96
	IELIM(NRES,3)=JS(3)	5/25/73	97
	IELIM(NRES,4)=JS(4)	5/25/73	98
	IELIM(NRES,5)=JS(5)	5/25/73	99
	IF (JS(6).LE.0) JS(6)=1	5/25/73	100
	IGROUP(NRES)=JS(6)	5/25/73	101
	GO TO 19	5/25/73	102
28	NRES=NRES+1	5/25/73	103
C		5/25/73	104
	CALL PARU	5/25/73	105
	IF (STORAGE.GT.0.) GO TO 37	5/25/73	106
	CALL UPAR	5/25/73	107
	CALL ALPHBT	5/25/73	108
37	CONTINUE	5/25/73	109
	CALL OPTA	5/25/73	110
C		5/25/73	111
C	*** RETURN FOR OPTB ***	5/25/73	112
C		5/25/73	113
46	CONTINUE	5/25/73	114
	GO TO 10	5/25/73	115
C		5/25/73	116

	NR=2	5/25/73	175
	ND=N	5/25/73	176
1	NP=ID	5/25/73	177
	J=ID	5/25/73	178
	K=ND	5/25/73	179
	X=ABS(A(ID))	5/25/73	180
	L=ID+1	5/25/73	181
	IF (NR)=0.	5/25/73	182
	DO 10 I=NR,N	5/25/73	183
	J=J+K	5/25/73	184
	K=K-1	5/25/73	185
	IF (X.GE.ABS(A(J))) GO TO 10	5/25/73	186
	X=ABS(A(J))	5/25/73	187
	IF (NR)=I	5/25/73	188
	NP=L	5/25/73	189
10	L=L+1	5/25/73	190
	IF (X.EQ.0.0) GO TO 172	5/25/73	191
	IF (NP.EQ.ID) GO TO 73	5/25/73	192
	II=1	5/25/73	193
10	IF (NR.EQ.2) GO TO 37	5/25/73	194
	L=IC(NR)	5/25/73	195
	J=NR-1	5/25/73	196
	K=N-1	5/25/73	197
	DO 48 I=3,NR	5/25/73	198
	X=A(J)	5/25/73	199
	A(J)=A(L)	5/25/73	200
	A(L)=X	5/25/73	201
	L=L+K	5/25/73	202
	J=J+K	5/25/73	203
28	K=K-1	5/25/73	204
37	J=IC(NR)	5/25/73	205
	DO 46 I=1,NS	5/25/73	206
	X=B(NR-1,I)	5/25/73	207
	R(NR-1,I)=B(J,I)	5/25/73	208
46	R(J,I)=X	5/25/73	209
	L=NP	5/25/73	210
	NP=L+1	5/25/73	211
	IF (NO.LE.1) GO TO 64	5/25/73	212
	NP=NP-1	5/25/73	213
	J=ID	5/25/73	214
	K=ND	5/25/73	215
	DO 55 I=1,ND	5/25/73	216
	X=A(J)	5/25/73	217
	A(J)=A(L)	5/25/73	218
	A(L)=X	5/25/73	219
	K=K-1	5/25/73	220
	J=J+1	5/25/73	221
	IF (J.GT.NP) K=1	5/25/73	222
55	L=L+K	5/25/73	223
64	X=A(ID)	5/25/73	224
	A(ID)=A(NP)	5/25/73	225
	A(NP)=X	5/25/73	226
	IF (II.EQ.2) GO TO 154	5/25/73	227
73	LL=ND	5/25/73	228
	N1=ID+ND	5/25/73	229
	J=N1+ND-2	5/25/73	230
	K=ID+1	5/25/73	231
	DO 140 NP=NR,N	5/25/73	232
	L=K	5/25/73	233
	X=A(K)/A(ID)	5/25/73	234
	DO 42 I=N1,J	5/25/73	235

	A(I)=A(I)-X*A(L)	5/25/73	236
82	L=L+1	5/25/73	237
	DO 91 I=1,NS	5/25/73	238
91	R(NP,I)=B(NP,I)-X*B(NR-1,I)	5/25/73	239
	LL=LL-1	5/25/73	240
	N1=N1+LL	5/25/73	241
	J=N1+LL-2	5/25/73	242
100	K=K+1	5/25/73	243
	IU=ID+ND	5/25/73	244
	ND=ND-1	5/25/73	245
	NR=NR+1	5/25/73	246
	IF (NR.LE.N) GO TO 1	5/25/73	247
	X=A(ID)	5/25/73	248
	IF (ABS(X).LT.EPS) CALL LABRT (1,M3,0)	5/25/73	249
	NR=N	5/25/73	250
	N1=N-1	5/25/73	251
109	LL=N-NR	5/25/73	252
	IF (LL.EQ.0) GO TO 136	5/25/73	253
	DO 127 K=1,NS	5/25/73	254
	J=ID+1	5/25/73	255
	Y=DBLE(B(NR,K))	5/25/73	256
	DO 118 I=NR,N1	5/25/73	257
	Y=Y-DBLE(A(J))*DBLE(B(I+1,K))	5/25/73	258
118	J=J+1	5/25/73	259
127	R(NR,K)=SGL(Y)	5/25/73	260
136	X=A(ID)	5/25/73	261
	DO 145 I=1,NS	5/25/73	262
145	R(NR,I)=B(NR,I)/X	5/25/73	263
	NR=NR-1	5/25/73	264
	ND=ND+1	5/25/73	265
	ID=ID-ND	5/25/73	266
	IF (NR.GT.0) GO TO 109	5/25/73	267
	ID=(N*(N+1))/2-2	5/25/73	268
	ND=2	5/25/73	269
	NR=N	5/25/73	270
	DO 163 N1=2,N	5/25/73	271
	IF (IC(NR).EQ.0) GO TO 154	5/25/73	272
	L=IC(NR)	5/25/73	273
	NP=ID+L-NR+1	5/25/73	274
	II=2	5/25/73	275
	GO TO 19	5/25/73	276
154	ND=ND+1	5/25/73	277
	ID=ID-ND	5/25/73	278
163	NR=NR-1	5/25/73	279
C	RETURN	5/25/73	280
C		5/25/73	281
C		5/25/73	282
172	ID=2	5/25/73	283
181	CALL LABRT (1,M1(1,ID),0)	5/25/73	284
C		5/25/73	285
C	RETURN	5/25/73	286
C		5/25/73	287
C	END	5/25/73	288
C	-----	101173	9
C	SUBROUTINE PARU	101173	10
C	-----	101173	11
C	SUBROUTINE PARU	5/25/73	289
C		5/25/73	290
C	*** COMMON BLOCK ***	5/25/73	291
C		5/25/73	292
C	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1	5/25/73	293

	14),SJKL(150),SIGT(4),DUMMY(12321),EXIT(4),CROSST(4),IS16,IS17,IS18	5/25/73	294
	2,STORAGE,SIMPLE,STORBRU,ZERSTOK,GRSPIN(10),IALBE,WGND,IELIMS(100),	5/25/73	295
	3DELTA,DELTA,IRESOPT,NOBRU,WUP,WLW,NKLP(4),ROUND(10),PRINTCS,EST,	5/25/73	296
	4DSHIFT	5/25/73	297
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	298
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,BU2,CU2,DO,FRACT,E	5/25/73	299
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSLORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	300
	3,IBIGJ,IBIGK,IBIGL,IBIGH,IBT,IBS,IBF,IBC,MAXID,IRESTOT,MAXENM,MSTO	5/25/73	301
	4REN,DELTA,DELTA,DI,DI,NRESH,K2,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	302
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	303
	6IS15,IAA,IF1(4),IELIM(100,2),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	304
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC	5/25/73	305
	8S,IDUMMY,KMS,RETVAR,MUPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	306
	90),BETA2(100),BETA23(100),BETA33(100),IENER1	5/25/73	307
	COMMON /2/ U(150)	5/25/73	308
C		5/25/73	309
C		5/25/73	310
C	CONVERT INPUT PARAMETERS TO BE ITERATED ON TO THE U PARAMETERS	5/25/73	311
C	DEFINES KMS,IBT,IBS,IBF,IBC,IBIGJ,IBIGK,IBIGL,IBIGH	5/25/73	312
		5/25/73	313
	KM=0	5/25/73	314
	DO 10 I=1,NRES	5/25/73	315
	DO 1 J=1,NFCHS1	5/25/73	316
1	BETAPR(I,J)=SIGN(SQRT(5.E-04*ABS(GSI(I,J))),GSI(I,J))	5/25/73	317
10	BETAPR(I,4)=SQRT(5.E-04*GGA(I))	5/25/73	318
	DO 73 J=1,10	5/25/73	319
	DO 73 I=1,NRES	5/25/73	320
	IF (IGROUP(I).NE.J) GO TO 73	5/25/73	321
	NGROUP=J	5/25/73	322
	DO 64 M=1,NFCHS3	5/25/73	323
	IF (IELIM(I,M).EQ.0) GO TO 64	5/25/73	324
	KM=KM+1	5/25/73	325
	GO TO (19,28,37,46,55), M	5/25/73	326
19	U(KM)=PKEN(I)	5/25/73	327
	GO TO 64	5/25/73	328
28	U(KM)=BETAPR(I,4)	5/25/73	329
	GO TO 64	5/25/73	330
37	U(KM)=BETAPR(I,1)	5/25/73	331
	GO TO 64	5/25/73	332
46	U(KM)=BETAPR(I,2)	5/25/73	333
	GO TO 64	5/25/73	334
55	U(KM)=BETAPR(I,3)	5/25/73	335
64	CONTINUE	5/25/73	336
73	CONTINUE	5/25/73	337
	KMX=KM*IDIMX	5/25/73	338
	S=KM	5/25/73	339
	X=(S/2.)*(S+1.)	5/25/73	340
	KMS=X	5/25/73	341
	IBIGJ=1	5/25/73	342
	IBT=1	5/25/73	343
	IF (ISCAT.EQ.1) GO TO 82	5/25/73	344
	IRIGK=(ITOTAL/2)*KM+1	5/25/73	345
	IRIS=(ITOTAL/2)+1	5/25/73	346
82	IF (IFISS.EQ.1) GO TO 91	5/25/73	347
	IBIGL=((ITOTAL/2)+(ISCAT/2))*KM+1	5/25/73	348
	IBF=((ITOTAL/2)+(ISCAT/2)+1	5/25/73	349
91	IF (ICAP.EQ.1) GO TO 100	5/25/73	350
	IRIGH=((ITOTAL/2)+(ISCAT/2)+(IFISS/2))*KM+1	5/25/73	351
	IBC=((ITOTAL/2)+(ISCAT/2)+(IFISS/2)+1	5/25/73	352
100	CONTINUE	5/25/73	353
C		5/25/73	354

	RETURN	5/25/73	355
C		5/25/73	356
	END	5/25/73	357
C	-----	101173	12
C	SUBROUTINE PSRCH	101173	13
C	-----	101173	14
	SUBROUTINE PSRCH	5/25/73	358
C		5/25/73	359
C	*** COMMON BLOCK ***	5/25/73	360
C		5/25/73	361
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WIO,WID1,NEXPD,SUM1(	5/25/73	362
	14),SJKL(150),SIGI(4),DUMMY(12341),EXIT(4),CROSST(4),IS+6,IS17,IS18	5/25/73	363
	2,STORAGE,SIMPLE,STORBRD,ZERSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	364
	3DELTA,DELTA,IESOPR,NOHRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	365
	4DSHIFT	5/25/73	366
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	367
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,BU2,CU2,DO,FRACT,E	5/25/73	368
	2LEM,RUNNO,NODAT,VAIT,ITAPE,MSTORE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	369
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IESIOT,MAXENM,MSTO	5/25/73	370
	4REN,DELTA,DELTA,DIS,INRESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	371
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	372
	6IS15,IAA,IF1(4),IELIM(100,5),PKN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	373
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIMX,ETAOP,IEC	5/25/73	374
	8S,1DUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	375
	90),BETA21(100),BETA23(100),BETA31(100),ENER1	5/25/73	376
	COMMON /2/ V(150)	5/25/73	377
C		5/25/73	378
C	*** DIMENSION BLOCK ***	5/25/73	379
C		5/25/73	380
	DIMENSION P(1), CTHETA(1), GRAD(1), GRADS(1), ZSQ(1), PHI(1), Z(I	5/25/73	381
	1), GSAV(1), USAV(1), EE(1), SS(1), AA(1), DIAG(1)	5/25/73	382
C		5/25/73	383
C	*** EQUIVALENCE BLOCK ***	5/25/73	384
C		5/25/73	385
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (OIA,EXT,ENER1,DUMMY(160)),	5/25/73	386
	1(CROSS,IC,DUMMY(3201)), (SIGDR,DNUM,DUMMY(480)), (GRADS,GRAD(150)	5/25/73	387
	2), (GSI,DUMMY(7400)), (ES1,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	388
	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	389
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	390
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	391
	6(PP,DUMMY(6401))	5/25/73	392
C		5/25/73	393
C		5/25/73	394
C	PSRCH FINDS A VALUE OF P WHICH WILL GIVE A LOWER PHI THAN THE	5/25/73	395
C	STARTING PHI. SEE WRITE-UP ON OPTIMIZATION TECHNIQUES FOR MORE	5/25/73	396
C	DETAILS.	5/25/73	397
C		5/25/73	398
	ETAOP=1.	5/25/73	399
	IS10NPS=IS10	5/25/73	400
	NGRAD=1	5/25/73	401
C		5/25/73	402
C	*** FORM PHI,GRAD,GSAV,SIGDR ***	5/25/73	403
C		5/25/73	404
	CALL PHIMAIN	5/25/73	405
C		5/25/73	406
	PHI1=PHI+SCAL	5/25/73	407
	GRADM=0.	5/25/73	408
	DIAMAX=0.	5/25/73	409
	ITSS=IT+1	5/25/73	410
C		5/25/73	411
C	*** WRITE ECS GRAD,GSAV ***	5/25/73	412

C	CALL ECWR (GRAD,IS12,KM,IERR)	5/25/73	413
	IERRT=IERR	5/25/73	414
	CALL ECWR (GSAV,IS11,KMS,IERR)	5/25/73	415
	IERRT=IERRT+IERR	5/25/73	416
C		5/25/73	417
C	*** PRINT PARAMETERS AND PLOT DATA ***	5/25/73	418
C		5/25/73	419
C	CALL OUT	5/25/73	420
	CALL CRTP	5/25/73	421
C		5/25/73	422
	WRITE (3,100)SKIP,ITSS,PHI1	5/25/73	423
C		5/25/73	424
C	*** READ ECS GRAD ***	5/25/73	425
C		5/25/73	426
	CALL ECRD (GRAD,IS12,KM,IERR)	5/25/73	427
	IERRT=IERRT+IERR	5/25/73	428
	DO 1 K=1,KM	5/25/73	429
	USAV(K)=U(K)	5/25/73	430
	IF (DIAG(K).LT.DIAMAX) GO TO 1	5/25/73	431
	DIAMAX=DIAG(K)	5/25/73	432
1	GRADM=GRADM+GRAD(K)*GRAD(K)	5/25/73	433
	GRADM=SQR1(GRADM)	5/25/73	434
	NGRAD=	5/25/73	435
	IF (NPS.GT.2) R=(CMAX/CMIN)**(1./(NPS-2))	5/25/73	436
	P(1)=0.	10/11/73	15
	P(2)=CMIN*DIAMAX	5/25/73	438
	DO 37 N=1,NPS	5/25/73	439
C		5/25/73	440
C	*** READ ECS GRAD,GSAV ***	5/25/73	441
C		5/25/73	442
	CALL ECRD (GSAV,IS11,KMS,IERR)	5/25/73	443
	IERRT=IERRT+IERR	5/25/73	444
	CALL ECRD (GRAD,IS12,KM,IERR)	5/25/73	445
	IERRT=IERRT+IERR	5/25/73	446
C		5/25/73	447
	IF (IERRT.NE.0) GO TO 91	5/25/73	448
	I=1	5/25/73	449
	DO 10 K=1,KM	5/25/73	450
	GSAV(I)=DIAG(K)*P(N)	5/25/73	451
10	I=I+KM-K+1	5/25/73	452
	KZ=KM	5/25/73	453
C		5/25/73	454
C	*** SOLVE LEAST SQUARE EQ. ***	5/25/73	455
C		5/25/73	456
	CALL MLR1	5/25/73	457
C		5/25/73	458
	ZSQM=COST=0.	5/25/73	459
	IST=KM*(N-1)+IS13	5/25/73	460
C		5/25/73	461
C	*** READ ECS GRADS=GRAD, AND WRITE ECS Z ***	5/25/73	462
C		5/25/73	463
	CALL ECWR (Z,IST,KM,IERR)	5/25/73	464
	IERRT=IERRT+IERR	5/25/73	465
	CALL ECRD (GRADS,IS12,KM,IERR)	5/25/73	466
	IERRT=IERRT+IERR	5/25/73	467
C		5/25/73	468
	DO 19 K=1,KM	5/25/73	469
	U(K)=USAV(K)+Z(K)	5/25/73	470
	ZSQM=ZSQM+Z(K)*Z(K)	5/25/73	471
19	COST=COST+Z(K)*GRADS(K)	5/25/73	472
		5/25/73	473

	ZSQM=SQRT(ZSQM)	5/25/73	474
	ZSQ1(N)=ZSQM	5/25/73	475
	CTHETA(N)=COST/(GRADM*ZSQM)	5/25/73	476
	IS10NPS=N*MAXID+IS10	5/25/73	477
C		5/25/73	478
C	*** FORM PHI,SIGDR ***	5/25/73	479
C		5/25/73	480
	CALL PHIMAIN	5/25/73	481
C		5/25/73	482
	PHI(N)=SCAL	5/25/73	483
	IF (SKIP.EQ.6HPTABLE.OR.SKIP.EQ.7HPTABLEE) GO TO 28	5/25/73	484
	IF (PHI(N).GT.PHI1.AND.PHI1.EQ.PHIE) GO TO 28	5/25/73	485
	IF (PHI(N).GT.PHIE) GO TO 64	5/25/73	486
	PHIE=PHI(N)	5/25/73	487
	NSAV=N	5/25/73	488
28	IF (P(N).EQ.0) GO TO 37	5/25/73	489
	P(N+1)=P(N)*R	5/25/73	490
37	CONTINUE	5/25/73	491
	WRITE (3,127)	5/25/73	492
	WRITE (3,136) (P(N),ZSQ1(N),CTHETA(N),PHI(N),N+1,NPS)	5/25/73	493
	PHIF=PHI1	5/25/73	494
	NSAV=0	5/25/73	495
	DO 40 N=1,NPS	5/25/73	496
	IF (PHI(N).GT.PHIE) GO TO 46	5/25/73	497
	NSAV=N	5/25/73	498
	PHIF=PHI(N)	5/25/73	499
46	CONTINUE	5/25/73	500
	IF (NSAV.NE.0) GO TO 64	5/25/73	501
	WRITE (2,118) GRADM	5/25/73	502
	WRITE (3,109)	5/25/73	503
	RETVAR=1.	5/25/73	504
	DO 55 K=1,KM	5/25/73	505
55	U(K)=USAV(K)	5/25/73	506
	IS10NPS=IS10	5/25/73	507
C		5/25/73	508
C	*** EXIT IF NO PHI FOUND LES THAN STARTING PHI ***	5/25/73	509
C		5/25/73	510
	CALL OPTB	5/25/73	511
C		5/25/73	512
64	IST=KM*(NSAV-1)+IS13	5/25/73	513
	IS10NPS=NSAV*MAXID+IS10	5/25/73	514
C		5/25/73	515
C	*** READ ECS Z(PHI(MIN)) ***	5/25/73	516
C		5/25/73	517
	CALL ECRD (Z,IST,KM,IERR)	5/25/73	518
	IERRT=IERRT+IERR	5/25/73	519
C		5/25/73	520
	DO 73 K=1,KM	5/25/73	521
73	U(K)=USAV(K)+Z(K)	5/25/73	522
	ZSC=ZSQ1(NSAV)	5/25/73	523
	IF (SKIP.EQ.7HPSSEARCH.OR.SKIP.EQ.6HPTABLE) GO TO 82	5/25/73	524
	SCAL=PHIE	5/25/73	525
	IF (IERRT.NE.0) GO TO 91	5/25/73	526
C		5/25/73	527
C	*** SWITCH TO ETASRCH METHOD ***	5/25/73	528
C		5/25/73	529
	CALL ETASRCH	5/25/73	530
C		5/25/73	531
C		5/25/73	532
	PHIS=PHI1	5/25/73	533
	PHI1=PHIE	5/25/73	534

82	PHIE=PHIS	5/25/73	535
	CONTINUE	5/25/73	536
	WRITE (3,118) GRADM	5/25/73	537
	WRITE (3,145) PHI1,PHIE,P(NSAV),CTHETA(NSAV),NSAV,ETAOP	5/25/73	538
	PHI1=PHIE	5/25/73	539
C		5/25/73	540
	RETURN	5/25/73	541
C		5/25/73	542
91	WRITE (3,154)	5/25/73	543
	STOP	5/25/73	544
C		5/25/73	545
C		5/25/73	546
C		5/25/73	547
100	FORMAT (30X,A8.7H METHOD,5X,9HITERATION,I6.,/,1X,13HSTARTING PHI ,E	5/25/73	548
	114.6,///)	5/25/73	549
109	FORMAT (/,56H NO PHI FOUND LESS THAN STARTING PHI- PROBLEM TERMINA	5/25/73	550
	ITED,///)	5/25/73	551
118	FORMAT (///,23H MAGNITUDE OF GRADIENT ,E12.6,///)	5/25/73	552
127	FORMAT (15X,1HP,12X,3HZSQ,9X,6HCOSINE,12X,3MPHI,///)	5/25/73	553
136	FORMAT (4E15.6)	5/25/73	554
145	FORMAT (1X,13HSTARTING PHI ,E15.6,2X,10HFINAL PHI ,E15.6,2X,14H01A	5/25/73	555
	IG, WEIGHTS ,E15.6,2X,11HCOS(THETA) ,E15.6,2X,5HNSAV ,I6.,/5H ETA ,	5/25/73	556
	2E15.6)	5/25/73	557
154	FORMAT (/,5X,18HECS ERROR IN PSRCH)	5/25/73	558
	END	5/25/73	559
C	-----	101173	16
C	SUBROUTINE UPAR	101173	17
C	-----	101173	18
	SUBROUTINE UPAR	5/25/73	560
C		5/25/73	561
C	*** COMMON BLOCK ***	5/25/73	562
C		5/25/73	563
C		5/25/73	564
C	*** COMMON BLOCK ***	5/25/73	565
C		5/25/73	566
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	567
	14),SJKL(150),SIGT(4),DUMMY(12321),EXIT(4),CROSST(4),IS16,IS17,IS18	5/25/73	568
	2,STORAGE,SIMPLE,STORBRD,ZERSTOR,GRSPIN(10),IALRE,WGNO,IELIMS(100),	5/25/73	569
	3DELTA,DELTA,IESOPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	570
	4DSHIFT	5/25/73	571
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	572
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,D0,FRACY,E	5/25/73	573
	2LEM,RUNNO,NODAT,LAIT,ITAPE,MSIORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	574
	3,IBIGJ,IBIGK,IBIGL,IBIGH,IBT,IBS,IBF,IBC,MAXID,IRES101,MAXENM,MSTO	5/25/73	575
	4REN,DELTA,DELTA,DIS, NHESM,KZ,NGRAU,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	576
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	577
	6IS15,IAA,IF1(4),IELIM(100,3),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	578
	7A(100),G0J(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIMXM,ETAOP,IEC	5/25/73	579
	8S,[DUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	580
	90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	581
	COMMON /2/ U(150)	5/25/73	582
C		5/25/73	583
C	SUBROUTINE UPAR CONVERTS THE ITERATED PARAMETERS (U) TO THE	5/25/73	584
C	PARAMETERS PKEN,GGA,GSI,AND BETAPR	5/25/73	585
C		5/25/73	586
	IJ=0	5/25/73	587
	DO 64 J=1,NGROUP	5/25/73	588
	DO 64 I=1,NRES	5/25/73	589
	IF (IGROUP(I)-J) 64,1,64	5/25/73	590
1	DO 55 M=1,NFCHS3	5/25/73	591
	IF (IELIM(I,M).EQ.0) GO TO 55	5/25/73	592

	IJ=IJ+1	5/25/73	593
	GO TO (10,19,28,37,46), M	5/25/73	594
10	PKEN(I)=U(IJ)	5/25/73	595
	GO TO 55	5/25/73	596
19	RETAPR(I,4)=U(IJ)	5/25/73	597
	GG(I)=2.E+03*U(IJ)*U(IJ)	5/25/73	598
	GO TO 55	5/25/73	599
28	RETAPR(I,1)=U(IJ)	5/25/73	600
	GSI(I,1)=2.E+03*U(IJ)*U(IJ)	5/25/73	601
	GO TO 55	5/25/73	602
37	RETAPR(I,2)=U(IJ)	5/25/73	603
	GSI(I,2)=SIGN(2.E+03*U(IJ)*U(IJ),U(IJ))	5/25/73	604
	GO TO 55	5/25/73	605
46	RETAPR(I,3)=U(IJ)	5/25/73	606
	GSI(I,3)=SIGN(2.E+03*U(IJ)*U(IJ),U(IJ))	5/25/73	607
55	CONTINUE	5/25/73	608
64	CONTINUE	5/25/73	609
	M=6	5/25/73	610
	DO 109 K=1,NGROUP	5/25/73	611
	DO 109 I=1,NRES	5/25/73	612
	IF (IGROUP(I),NE,K) GO TO 109	5/25/73	613
	IF (STORAGE.GT.0.) GO TO 73	5/25/73	614
	IF (IELIMS(I).EQ.0) GO TO 109	5/25/73	615
73	M=M+1	5/25/73	616
	S=BETAPR(I,1)	5/25/73	617
	GO TO (100,91,82), NFCHS1	5/25/73	618
82	RETA33(M)=BETAPR(I,3)*BETAPR(I,3)	5/25/73	619
	RETA23(M)=BETAPR(I,2)*BETAPR(I,3)	5/25/73	620
	RETA13(M)=S*BETAPR(I,3)	5/25/73	621
91	RETA22(M)=BETAPR(I,2)*BETAPR(I,2)	5/25/73	622
	RETA12(M)=S*BETAPR(I,2)	5/25/73	623
100	RETA11(M)=S*S	5/25/73	624
109	CONTINUE	5/25/73	625
C	RETURN	5/25/73	626
C	END	5/25/73	627
C	-----	5/25/73	628
C	-----	5/25/73	629
C	-----	101173	19
C	FUNCTION WD	101173	20
C	-----	101173	21
C	FUNCTION WD (E)	5/25/73	630
C	*** COMMON BLOCK ***	5/25/73	631
C	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	632
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,DO,FRACT,E	5/25/73	633
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSIORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	634
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IRI,IRS,IRF,IRC,MAXID,IRES,OT,MAXENM,MSTO	5/25/73	635
	4REN,DELTAT,DELTAL,DIST,NHESH,KZ,NGHAU,PHI1,ZSO,SCAL,SKIP,CMIN,CMAX	5/25/73	636
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	637
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	638
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC	5/25/73	639
	8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	640
	90),BETA42(100),BETA23(100),BETA33(100),IENER1	5/25/73	641
C		5/25/73	642
C	FORMS THE DOPPLER WIDTH (WD) AT THE ENERGY E	5/25/73	643
C		5/25/73	644
C	WD=DO*SQRT(E/AW)	5/25/73	645
C		5/25/73	646
C	RETURN	5/25/73	647
C		5/25/73	648
C		5/25/73	649
C		5/25/73	650

	END	5/25/73	651
C	-----	101173	22
C	FUNCTION ROLOW	101173	23
C	-----	101173	24
	FUNCTION ROLOW (E)	5/25/73	652
C		5/25/73	653
C	*** COMMON BLOCK ***	5/25/73	654
C		5/25/73	655
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1, INFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,DO,FRACT,E PLEM,RUNNO,NODAT,UAIT,ITAPE,MSTORE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPAN 3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IHES,OT,MAXENM,MSTO 4REN,DELTAI,DELTAL,DIST,NRESM,KZ,NGRAU,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX 5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14, 6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG 7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC 8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10 90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	656
		5/25/73	657
		5/25/73	658
		5/25/73	659
		5/25/73	660
		5/25/73	661
		5/25/73	662
		5/25/73	663
		5/25/73	664
		5/25/73	665
C		5/25/73	666
C	*** EXPONENTIAL RESOLUTION WIDTH ***	101173	25
C		5/25/73	668
	ROLOW=E*C02*SQRT(E)	5/25/73	669
	RETURN	5/25/73	670
C		5/25/73	671
C	*** GAUSSIAN RESOLUTION WIDTH ***	101173	26
C		5/25/73	673
	ENTRY ROLOWG	5/25/73	674
	ROLOWG=E*SQRT(A02+E*B02)	5/25/73	675
	RETURN	5/25/73	676
	END	5/25/73	677
C	-----	101173	27
C	SUBROUTINE OUT	101173	28
C	-----	101173	29
	SUBROUTINE OUT	5/25/73	678
C		5/25/73	679
C	*** COMMON BLOCK ***	5/25/73	680
C		5/25/73	681
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(14),SJKL(150),SIGT(4),DUMMY(1234),EXTT(4),CROSST(4),IS46,IS17,IS18 2,STORAGE,SIMPLE,STORBRD,ZERSTON,GHSPIN(10),IALBE,WGNO,IELIMS(100), 3DELTAI,DELTAE,IRESOPR,NORBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST, 4DSHIFT	5/25/73	682
		5/25/73	683
		5/25/73	684
		5/25/73	685
		5/25/73	686
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1, INFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,DO,FRACT,E 2LEM,RUNNO,NODAT,UAIT,ITAPE,MSTORE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPAN 3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IHES,OT,MAXENM,MSTO 4REN,DELTAI,DELTAL,DIST,NRESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX 5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14, 6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG 7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC 8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10 90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	687
		5/25/73	688
		5/25/73	689
		5/25/73	690
		5/25/73	691
		5/25/73	692
		5/25/73	693
		5/25/73	694
		5/25/73	695
		5/25/73	696
		5/25/73	697
C	*** DIMENSION BLOCK ***	5/25/73	698
C		5/25/73	699
	DIMENSION DIA(100,5), THETA(1), DIAG(1)	5/25/73	700
C		5/25/73	701
C	*** EQUIVALENCE BLOCK ***	5/25/73	702
C		5/25/73	703
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)), 1(CROSS,IC,DUMMY(201)), (SIGPR,ONUM,DUMMY(4801)), (GRADS,GRAD(151))	5/25/73	704
		5/25/73	705

	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	706
	3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	707
	4/11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	708
	5)), (ZSQI,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	709
	6(PP,DUMMY(6401))	5/25/73	710
C		5/25/73	711
C		5/25/73	712
C	SUBROUTINE OUT PRINTS AND PUNCHES THE CURRENT VALUES OF THE	5/25/73	713
C	RESONANCE PARAMETERS	5/25/73	714
C		5/25/73	715
	END FILE 3	5/25/73	716
	REWIND 9	5/25/73	717
	IF (NFILES.EQ.0) GO TO 10	5/25/73	718
	DO J K=1,NFILES	5/25/73	719
1	READ (X,J18)	5/25/73	720
10	CONTINUE	5/25/73	721
C		5/25/73	722
C	*** PARAMETERS PUNCHED ***	5/25/73	723
C		5/25/73	724
	PUNCH 82, IT,SCAL	5/25/73	725
	PUNCH 73, ((PKEN(I),GGA(I),(GSI(I,J),J=1,3),(IELIM(I,J),J=1,5),IGR	5/25/73	726
	10UP(I)),I=1,NRES)	5/25/73	727
C		5/25/73	728
C	IF NFCHS=2 FORM RELATIVE PHASE ANGLE (THETA) WITH RESPECT	5/25/73	729
C	TO FIRST RESONANCE READ IN.	5/25/73	730
C		5/25/73	731
	IF (NFCHS.LT.2) GO TO 28	5/25/73	732
	THETA(1)=ATAN2(SIGN(SQRT(ABS(GSI(1,3))),GSI(1,3)),SIGN(SQRT(ABS(GS	5/25/73	733
	1I(1,2))),GSI(1,2)))*57.296	5/25/73	734
	DO 19 I=2,NRES	5/25/73	735
	THETA(I)=ATAN2(SIGN(SQRT(ABS(GSI(I,3))),GSI(I,3)),SIGN(SQRT(ABS(GS	5/25/73	736
	1I(I,2))),GSI(I,2)))*57.296	5/25/73	737
19	THETA(I)=THETA(I)-THETA(1)	5/25/73	738
	THETA(1)=0.	5/25/73	739
	GO TO 46	5/25/73	740
28	DO 37 I=1,NRES	5/25/73	741
37	THETA(I)=0.	5/25/73	742
46	CONTINUE	5/25/73	743
	WRITE (3,91)IT	5/25/73	744
	WRITE (3,100)	5/25/73	745
	K=0	5/25/73	746
	DO 64 N=1,NGROUP	5/25/73	747
	DO 64 I=1,NRES	5/25/73	748
	IF (IGROUP(I).NE.N) GO TO 64	5/25/73	749
	DO 55 M=1,N	5/25/73	750
	DIA(I,M)=0.	5/25/73	751
	IF (IELIM(I,M).EQ.0) GO TO 55	5/25/73	752
	K=K+1	5/25/73	753
	DIA(I,M)=DIAG(K)	5/25/73	754
55	CONTINUE	5/25/73	755
64	CONTINUE	5/25/73	756
C		5/25/73	757
C	*** PARAMETERS PRINTED ***	5/25/73	758
C		5/25/73	759
	WRITE (3,109) (PKEN(I),DIA(I,1),GGA(I),DIA(I,2),(GSI(I,J),DIA(I,J,2	5/25/73	760
	1),J=1,3),(IELIM(I,J),J=1,5),IGROUP(I),THETA(I),I=1,NRES)	5/25/73	761
C		5/25/73	762
	END FILE 3	5/25/73	763
C		5/25/73	764
	RETURN	5/25/73	765
C		5/25/73	766

C		5/25/73	767
C		5/25/73	768
73	FORMAT (E12.6,6I2)	5/25/73	769
82	FORMAT (1X,10 ITERATION NUMBER,16,5H PHI, E12.4)	5/25/73	770
91	FORMAT (1H,144X,9HITERATION,16,//)	5/25/73	771
100	FORMAT (5X,4HPKEN,6X,4HDIAG,5X,3HGGGA,6X,4HDIAG,5X,6HSGSI(1),6X,4HDI	5/25/73	772
	1AG,6X,6HSGSI(2),6X,4HDIAG,6X,6HSGSI(3),6X,4HDIAG,8X,5HIELIM,4X,5HGRO	5/25/73	773
	2UP,3X,5HMETAF,//)	5/25/73	774
109	FORMAT (1X,G9.4,E9.3,F8.2,E10.3,G11.6,E10.3,2(F12.4,E10.3),3X,S12,	5/25/73	775
	17X,12,F8.2)	5/25/73	776
118	FORMAT (1X)	5/25/73	777
	END	5/25/73	778
C	-----	101173	30
C	SUBROUTINE RIDATA	101173	31
C	-----	101173	32
	SUBROUTINE RIDATA	5/25/73	779
C		5/25/73	780
C	*** COMMON BLOCK ***	5/25/73	781
C		5/25/73	782
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	783
	14),SJKL(150),SIGT(4),DUMMY(12341),EXIT(4),CROSS(4),IS16,IS17,IS18	5/25/73	784
	2,STORAGE,SIMPLE,STORBRU,ZERSTON,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	785
	3DELTA,DELTA,IRESORP,NORRO,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	786
	4DSHIFT	5/25/73	787
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	788
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWU,THICK,A02,BU2,CU2,DO,FRACT,E	5/25/73	789
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	790
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IRESTOT,MAXENM,MSTO	5/25/73	791
	4REN,DELTA,DELTA,DIST,NHESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	792
	5,NPS,ISA,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	793
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	794
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IVIMXM,ETAOP,IFC	5/25/73	795
	8S,1DUMMY,KIS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	796
	90),BETA24(100),BETA23(100),BETA32(100),IENER1	5/25/73	797
C		5/25/73	798
C	*** DIMENSION BLOCK ***	5/25/73	799
C		5/25/73	800
	DIMENSION ET(3), S(3), EX(3), ENER(1), EXT(1), CROSS(1), DNUM(1)	5/25/73	801
	DIMENSION P(1), SIGDR(1)	5/25/73	802
	DIMENSION PP(1)	5/25/73	803
C		5/25/73	804
C	*** EQUIVALENCE BLOCK ***	5/25/73	805
C		5/25/73	806
	EQUIVALENCE (ISKP,SIGT(1)), (CORR2,SIGT(2)), (I,IPKE), (NWID,SJKL)	5/25/73	807
	1, (JL,SJKL(3)), (JU,SJKL(5)), (IP,SJKL(7)), (IE,SJKL(9))	5/25/73	808
	EQUIVALENCE (THEIA,E,ENEM,E,E,DUMMY), (UIA,EXT,ENER1,DUMMY(160)),	5/25/73	809
	1(CROSS,IC,DUMMY(320)), (SIGDR,DNUM,DUMMY(480)), (GRADS,GRAD(15))	5/25/73	810
	2), (GSI,DUMMY(740)), (ESI,DUMMY(750)), (EES,DUMMY(760)), (SS,OU	5/25/73	811
	3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (UIAG,DUMMY	5/25/73	812
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHEIA,DUMMY(12142	5/25/73	813
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	814
	6(PP,DUMMY(6401))	5/25/73	815
C		5/25/73	816
C		5/25/73	817
C	SUBROUTINE RIDATA READS IN DATE (ENERGIES (ENER), CROSS SECTION	5/25/73	818
C	(CROSS) AND WEIGHTS (EXT)) OFF OF CARDS (ITAPE = CARDS) OR TAPE	5/25/73	819
C	(ITAPE = TAPE). IF ITAPE= NODATA IT WILL GENERATE A SET OF MAXENM	5/25/73	820
C	POINTS AND SET THE WEIGHTS TO 1	5/25/73	821
C		5/25/73	822
	IF (ITAPE.EQ.6HNODATA) GO TO 55	5/25/73	823
	IF (ITAPE.EQ.4HTAPE) GO TO 82	5/25/73	824

C		5/25/73	825
C	ITAPE = CARDS	5/25/73	826
C		5/25/73	827
	MAXEN=1	5/25/73	828
	DO 19 K=1, IDIMX	5/25/73	829
	L=K*MAXENM+1	5/25/73	830
	J=1	5/25/73	831
1	READ (2,280) (ET(I),S(I),EX(I),I=1,3)	5/25/73	832
	IF (ET(I).EQ.0.) GO TO 19	5/25/73	833
	DO 10 I=1,3	5/25/73	834
	IF (ET(I).EQ.0.) GO TO 1	5/25/73	835
	FNER(MAXENM+1-J)=ET(I)	5/25/73	836
	SIGDR(L-J)=S(I)	5/25/73	837
	PP(L-J)=EX(I)	5/25/73	838
	J=J+1	5/25/73	839
10	MAXEN=MAXEN+1	5/25/73	840
	GO TO 1	5/25/73	841
19	CONTINUE	5/25/73	842
	MAXEN=(MAXEN-1)/IDIMX	5/25/73	843
	ISHIFT=MAXENM-MAXEN	5/25/73	844
	DO 46 I=1,MAXEN	5/25/73	845
	ENER(I)=ENER(I+ISHIFT)	5/25/73	846
	DO 37 K=1, IDIMX	5/25/73	847
	L=(K-1)*MAXEN+I	5/25/73	848
	LL=(K-1)*MAXENM+I+ISHIFT	5/25/73	849
	IF (SIGDR(LL).GT..01) GO TO 28	5/25/73	850
	CROSS(L)=.01	10/11/73	33
	EXT(L)=1.E+10	5/25/73	852
	GO TO 37	5/25/73	853
28	CROSS(L)=SIGDR(LL)	5/25/73	854
	EXT(L)=PP(LL)*CROSS(L)	5/25/73	855
37	CONTINUE	5/25/73	856
46	CONTINUE	5/25/73	857
	IF (MAXEN.LE.MAXENM) RETURN	5/25/73	858
	WRITE (3,253) MAXEN	5/25/73	859
C		5/25/73	860
	STOP	5/25/73	861
C		5/25/73	862
C	ITAPE = NODATO	5/25/73	863
C		5/25/73	864
55	CONTINUE	5/25/73	865
	READ (2,262) ENER(1), ENER(MAXENM)	5/25/73	866
	DE=(ENER(MAXENM)-ENER(1))/(MAXENM-1.)	5/25/73	867
	IMAX=MAXENM-1	5/25/73	868
	IU=MAXENM*IDIMX	5/25/73	869
	DO 64 I=1, IU	5/25/73	870
64	CROSS(I)=0.	5/25/73	871
	DO 73 I=2, IMAX	5/25/73	872
73	FNER(I)=ENER(I-1)+DE	5/25/73	873
	MAXEN=MAXENM	5/25/73	874
	ITMAX=0	5/25/73	875
C		5/25/73	876
	RETURN	5/25/73	877
C		5/25/73	878
C	ITAPE = TAPE	5/25/73	879
C		5/25/73	880
82	IST=0	5/25/73	881
	DO 244 IXAU=1, IDIMX	5/25/73	882
	DO 91 I=1, MAXENM	5/25/73	883
91	ENER(I)=DNUM(I)+CROSS(I+IST)=EXT(I+IST)=0.	5/25/73	884
	MAXEN=MAXENM	5/25/73	885

	READ (2,271)EMIN,EMAX,ISKP,CORR2	5/25/73	886
	REWIND 5	5/25/73	887
	DE=(EMAX-EMIN)/(MAXEN-1.)	5/25/73	888
100	READ (5,280) (ET(I),S(I),EX(I),I=1,3)	5/25/73	889
	IF (ET(I)) 109,172,109	5/25/73	890
109	IF (ISKP) 118,118,100	5/25/73	891
118	KP=1	5/25/73	892
127	IF (ET(KP)-EMAX) 136,136,163	5/25/73	893
136	IF (ET(KP)) 163,163,145	5/25/73	894
145	IF (ET(KP)-EMIN) 190,154,154	5/25/73	895
154	K=(ET(KP)-EMIN)/DE+1.	5/25/73	896
	W=1./(EX(KP)*EX(KP)-CORR2)/S(KP)/S(KP)	5/25/73	897
	DNUM(K)=UNUM(K)*W	5/25/73	898
	FNER(K)=ENER(K)*ET(KP)*W	5/25/73	899
	CROSS(K*IST)=CROSS(K*IST)+S(KP)*W	5/25/73	900
	EXT(K*IST)=EXT(K*IST)+1.	5/25/73	901
163	KP=KP+1	5/25/73	902
	IF (KP=3) 127,127,100	5/25/73	903
172	IF (ISKP) 190,190,181	5/25/73	904
181	ISKP=ISKP-1	5/25/73	905
	GO TO 100	5/25/73	906
190	MAX=MAXEN	5/25/73	907
	DO 199 I=1,MAX	5/25/73	908
	IF (DNUM(I).LE.0.) GO TO 199	5/25/73	909
	FNER(I)=ENER(I)/DNUM(I)	5/25/73	910
	CROSS(I*IST)=CROSS(I*IST)/DNUM(I)	5/25/73	911
	IF (CROSS(I*IST).LT..01) EXT(I*IST)=EXT(I*IST)+DNUM(I)*(.01-CROSS(I*IST))*2	5/25/73	912
	CROSS(I*IST)=AMAX1(CROSS(I*IST),.01)	5/25/73	914
	EXT(I*IST)=SQRT(EXT(I*IST)/DNUM(I))	5/25/73	915
199	CONTINUE	5/25/73	916
	DO 235 I=1,MAX	5/25/73	917
208	IF (ENER(I)) 217,217,235	5/25/73	918
217	MAXEN=MAXEN-1	5/25/73	919
	IF (MAXEN.LT.1) GO TO 244	5/25/73	920
	DO 226 K=1,MAXEN	5/25/73	921
	EXT(K*IST)=EXT(K*1+IST)	5/25/73	922
	ENER(K)=ENER(K+1)	5/25/73	923
226	CROSS(K*IST)=CROSS(K*IST+1)	5/25/73	924
	GO TO 208	5/25/73	925
235	CONTINUE	5/25/73	926
244	IST=IST+MAXEN	5/25/73	927
	REWIND 5	5/25/73	928
C		5/25/73	929
	RETURN	5/25/73	930
C		5/25/73	931
C		5/25/73	932
C		5/25/73	933
253	FORMAT (46H NUMBER OF DATA POINTS READ IN EXCEEDS MAXENM ,I6)	5/25/73	934
262	FORMAT (2E12.0)	5/25/73	935
271	FORMAT (2E12.0,I12,E12.0)	5/25/73	936
280	FORMAT (3(3E8.5))	5/25/73	937
	END	5/25/73	938
C	-----	101173	34
C	SUBROUTINE PHIMAIN	101173	35
C	-----	101173	36
	SUPROUTINE PHIMAIN	5/25/73	939
C		5/25/73	940
C	*** COMMON BLOCK ***	5/25/73	941
C		5/25/73	942
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	943

	14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSST(4),IS16,IS17,IS18	5/25/73	944
	2,STORAG, SIMPLE,STORWRD,ZERSTOR,GRSPIN(10),IALBE,WGMO,IELMS(100),	5/25/73	945
	3DEL TAG,DELTA E, IRESOPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	946
	4DSHIFT	5/25/73	947
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	948
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,DO,FRAC,T,E	5/25/73	949
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	950
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IRES10T,MAXENM,MSTO	5/25/73	951
	4REN,DELTA T,DELTA L,DIST,NRESM,KZ,NGRAV,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	952
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	953
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	954
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NRS,IUIMXM,ETAOP,IEC	5/25/73	955
	8S, IDUMMY,KMS,RETVAR,MUPTA,NFILES,BEA11(100),BETA12(100),BETA13(10	5/25/73	956
	90),BETA12(100),BETA13(100),BETA13(100),ENER1	5/25/73	957
C		5/25/73	958
	COMMON /3/ RINF(120),NB11(1),NA11,NB12,NB22,NA12,NA22,NB13,NB23,NB	5/25/73	959
	133,NA13,NA23,NA33	5/25/73	960
	2,A11,A12,A13,A22,A23,A33,B11,B12,B13,B22,B23,B33	101173	37
C	*** DIMENSION BLOCK ***	5/25/73	961
C		5/25/73	962
	DIMENSION ALPHA(1), BETA(1), U(1), AU(3,3), CPR(1), PU(1), PCPR(1)	5/25/73	963
	1, PC(1), PCAU(1), BBBB(1), A1(1), PA(6,1), PB(6,1), EE(1), SS(1),	5/25/73	964
	2AA(1), GRAD(1), GSAV(1), DIAG(1), EXT(1), CROSS(1), ENER1(1), ENER	5/25/73	965
	3(1)	5/25/73	966
C		5/25/73	967
C		5/25/73	968
C	*** EQUIVALENCE BLOCK ***	5/25/73	969
C		5/25/73	970
	EQUIVALENCE (ISKP,SIGT(1)), (CORR2,SIGT(2)), (I,IPKE), (NWID,SJKL)	5/25/73	971
	1, (JL,SJKL(3)), (JU,SJKL(5)), (IP,SJKL(7)), (IE,SJKL(9))	5/25/73	972
	EQUIVALENCE (SU,DUMMY(3601)), (PA,PA1,DUMMY(3602)), (PB,PB1,DUMMY(	5/25/73	973
	14502)), (BETAP1,BETAP1), (ALPHAN,DUMMY(5402)), (BETAN,DUMMY(5502))	5/25/73	974
	2	5/25/73	975
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	976
	1(CROSS,IC,DUMMY(2201)), (SIGDR,DNUM,DUMMY(4801)), (GRADS,GRAD(151)	5/25/73	977
	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	978
	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	979
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	980
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(121/2)),	5/25/73	981
	6(PP,DUMMY(6401))	5/25/73	982
		5/25/73	983
C		5/25/73	984
C		5/25/73	985
C	SUBROUTINE PHIMAIN FORMS THE MATRICES GRAD AND GSAV FOR THE NORMAL	5/25/73	986
C	EQUATION GSAV * Z = GRAD. , THEORETICAL CROSS SECTION SIGDR,	5/25/73	987
C	AND PHI = SCAL	5/25/73	988
C		5/25/73	989
C	CALL SECOND (71)	5/25/73	990
C		5/25/73	991
	IAUT=NGRAD	5/25/73	992
	SCAL=0.	5/25/73	993
	IERRT=0	5/25/73	994
	A11=A12=A13=A22=A23=A33=B11=B12=B13=B22=B23=B33=0.	5/25/73	995
	IF (NGRAD.EQ.0) GO TO 10	5/25/73	996
	KMXX=KMXX*6	5/25/73	997
	DO 1 K=1,KMXX	5/25/73	998
	PA(K)=PB(K)=0.	5/25/73	999
1	CONTINUE	5/25/73	1000
10	CONTINUE	5/25/73	1001
C		5/25/73	1002
C	*** READ ECS ENER1 ***	5/25/73	1003

C	CALL ECRD (ENER1,IS6,MAXEN1,IEHR)	5/25/73	1004
	IERRT=IERRT+IERR	5/25/73	1005
	CALL ECRD (ENER,IS7,MAXEN,IERR)	5/25/73	1006
C	CALL UPAR	5/25/73	1007
C		5/25/73	1008
C	*** FORM UNBROADENED CROSS SECTION AND PARTIALS ***	5/25/73	1009
C		5/25/73	1010
C	KC=0	5/25/73	1011
C	ISSA=IS15	5/25/73	1012
C	KP4=IS4	5/25/73	1013
	KKPKE=1	5/25/73	1014
	DO 37 J=1,MAXEN1	5/25/73	1015
	SU=ENER1(J)	5/25/73	1016
	IPKE=0	5/25/73	1017
	IF (ABS(SU-ENER(KKPKE)).GT.1.E-10) GO TO 19	5/25/73	1018
	IPKE=1	5/25/73	1019
	KKPKE=KKPKE+1	5/25/73	1020
19	CONTINUE	5/25/73	1021
C		5/25/73	1022
C	*** FORMS CROSS SECTION AND PARTIALS ***	5/25/73	1023
C		5/25/73	1024
	IF (STORAGE.GT.0..OR.ZERSTOR.EQ.0.) GO TO 28	5/25/73	1025
	CALL ECRD (RINF,ISSA,IALBE,IEHR)	5/25/73	1026
	IERRT=IERRT+IERR	5/25/73	1027
	ISSA=ISSA+IALBE	5/25/73	1028
28	CONTINUE	5/25/73	1029
	CALL PARSH	5/25/73	1030
C		5/25/73	1031
C	*** WRITE ECS UNBROADENED CROSS SECTION AND PARTIALS ***	5/25/73	1032
C		5/25/73	1033
	CALL ECWR (SIGT,KC,IDIMX,IERR)	5/25/73	1034
	IERRT=IERRT+IERR	5/25/73	1035
	IF (NGRAD.EQ.0) GO TO 37	5/25/73	1036
	IF (IPKE.EQ.0) GO TO 37	5/25/73	1037
	CALL ECWR (SJKL,KP2,KMX,IERR)	5/25/73	1038
	IERRT=IERRT+IERR	5/25/73	1039
C		5/25/73	1040
	KP2=KP2+KMX	5/25/73	1041
37	KC=KC+IDIMX	5/25/73	1042
C		5/25/73	1043
	CALL SECOND (T2)	5/25/73	1044
C		5/25/73	1045
	ISD=IS2	5/25/73	1046
	ISC=0	5/25/73	1047
	NEXP0=1	5/25/73	1048
	ISWT=IS16	5/25/73	1049
	IF (NGRAD.EQ.0) GO TO 55	5/25/73	1050
	DO %6 J=1,IDUMMY	5/25/73	1051
46	GRAD(J)=0.	5/25/73	1052
55	CONTINUE	5/25/73	1053
	IF (IRESTOT.EQ.1) GO TO 73	5/25/73	1054
C		5/25/73	1055
C	*** FORM RESOLUTION BROADENED CROSS SECTION ***	5/25/73	1056
C		5/25/73	1057
	IPX=ISS	5/25/73	1058
	KC1=IS1+IDIMX*8	5/25/73	1059
	JN=INTEN=0	5/25/73	1060
	KP3=IS3+KMX*8	5/25/73	1061
		5/25/73	1062
		5/25/73	1063
		5/25/73	1064

	M8=MAXEN1-8	5/25/73	1065
	DO 64 J=9,M8	5/25/73	1066
C		5/25/73	1067
	CALL ECRD (KC,IPX,4,IERR)	5/25/73	1068
	IERRT=IERRT+IERR	5/25/73	1069
C		5/25/73	1070
	IAIX=IAI*IDIMX	5/25/73	1071
	IAIKMX=IAI*KMX	5/25/73	1072
	KE=KC*IS6	5/25/73	1073
	KS=KC*IDIMX*ISC	5/25/73	1074
C		5/25/73	1075
C	*** READ ECS EE, AND BROADENED CROSS SECTION ***	5/25/73	1076
	CALL ECRD (EE,ISWT,IAI,IERR)	5/25/73	1078
	IERRT=IERRT+IERR	5/25/73	1079
	IERRT=IERRT+IERR	5/25/73	1080
	CALL ECRD (SS,KS,IAIX,IERR)	5/25/73	1081
	IERRT=IERRT+IERR	5/25/73	1082
C		5/25/73	1083
	IERR=0	5/25/73	1084
C		5/25/73	1085
C	*** FOLD DOPPLER FUNCTION INTO CROSS SECTION ***	5/25/73	1086
C		5/25/73	1087
	CALL RESDOD	5/25/73	1088
C		5/25/73	1089
	IF (ITOTAL,EQ,2) SIGT(1)=EXP(-THICK*SIGT(1))	5/25/73	1090
C		5/25/73	1091
C	*** WRITE ECS RES. BROADENED CROSS SECTION ***	5/25/73	1092
C		5/25/73	1093
	CALL ECWR (SIGT,KC1,IDIMX,IERR)	5/25/73	1094
	IERRT=IERRT+IERR	5/25/73	1095
C		5/25/73	1096
	ISWT=ISWT+IAI	5/25/73	1097
	IPX=IPX+4	5/25/73	1098
64	KC1=KC1+IDIMX	5/25/73	1099
	ISC=IS1	5/25/73	1100
	ISWT=IS17	5/25/73	1101
C		5/25/73	1102
C	*** FORM RESOLUTION AND DOPPLER BROADENED CROSS SECTION IF	5/25/73	1103
C	IHSTOT=1, OTHERWISE RESOLUTION BROADEN DOPPLER BROADENED	5/25/73	1104
C	CROSS SECTION ***	5/25/73	1105
C		5/25/73	1106
73	IPX=IS4	5/25/73	1107
	ISNB=U	5/25/73	1108
	IS10N=IS10NPS	5/25/73	1109
	SCAL=0.	5/25/73	1110
	IN=INTER=0	5/25/73	1111
	DO 127 J=1,MAXEN	5/25/73	1112
	IF (NOBRD,EQ,0) GO TO 82	5/25/73	1113
	CALL ECRD (SIGT,ISNB,IDIMX,IERR)	5/25/73	1114
	ISNB=ISNB+IDIMX	5/25/73	1115
	GO TO 91	5/25/73	1116
82	CALL ECRD (KC,IPX,NKCP(1),IERR)	5/25/73	1117
	IERRT=IERRT+IERR	5/25/73	1118
C		5/25/73	1119
	IAIX=IAI*IDIMX	5/25/73	1120
	IAIKMX=IAI*KMX	5/25/73	1121
	KE=KC*IS6	5/25/73	1122
	KS=KC*IDIMX*ISC	5/25/73	1123
C		5/25/73	1124
C	*** READ ECS EE, AND EITHER DOPPLER BROADENED CROSS SECTION OR	5/25/73	1125

C	UNBROADENED CROSS SECTION ***	5/25/73	1126
C	CALL ECRD (EE,ISWT,IAI,IERR)	5/25/73	1127
	IERRT=IERHT+IERR	5/25/73	1128
	CALL ECRD (SS,KS,IAIX,IERR)	5/25/73	1129
	IERRT=IERHT+IERR	5/25/73	1130
C		5/25/73	1131
C		5/25/73	1132
C	CALL RESDOD	5/25/73	1133
C		5/25/73	1134
C	IF (ITOTAL.EQ.2) SIGT(1)=-ALOG(SIGT(1))/THICK	5/25/73	1135
91	IS8I=IS8+IDIMX*(J-1)	5/25/73	1136
	IS9I=IS9+IDIMX*(J-1)	5/25/73	1137
C		5/25/73	1138
C	*** READ ECS EXT AND CROSS AT ENER(J) ***	5/25/73	1139
C		5/25/73	1140
C	CALL ECRD (EXTT,IS8I,IDIMX,IERR)	5/25/73	1141
	CALL ECRD (CROSST,IS9I,IDIMX,IERR)	5/25/73	1142
	IERRT=IERHT+IERR	5/25/73	1143
C		5/25/73	1144
C	READ PARTIALS FROM ECS	5/25/73	1145
C		5/25/73	1146
	IF (NGRAD.EQ.0) GO TO 100	5/25/73	1147
	CALL ECRD (SJKL,ISD,KMX,IERR)	5/25/73	1148
	ISD=ISD+KMX	5/25/73	1149
100	CONTINUE	5/25/73	1150
C		5/25/73	1151
	IST=-KM	5/25/73	1152
	DO 118 IXAU=1,IDIMX	5/25/73	1153
	IST=IST+KM	5/25/73	1154
	EQ=EXTT(IXAU)*(SIGT(IXAU)-CROSST(IXAU))	5/25/73	1155
	IF (NGRAD.EQ.) GO TO 118	5/25/73	1156
	IJ=1	5/25/73	1157
	FQEXT=-EQ*EXTT(IXAU)	5/25/73	1158
	FXT2=EXTT(IXAU)**2	5/25/73	1159
C		5/25/73	1160
C	*** FORM GRAD,DIAG,GSAB,PHI=SCAL ***	5/25/73	1161
C		5/25/73	1162
	DO 109 K=1,KM	5/25/73	1163
	SJKLS=SJKL(K+IST)	5/25/73	1164
	FJSJKL=EXT *SJKLS	5/25/73	1165
	GRAD(K)=GRAD(K)+EQEXT*SJKLS	5/25/73	1166
	DIAG(K)=DIAG(K)+ETSJKL*SJKLS	5/25/73	1167
	KMK=KM-K+1	5/25/73	1168
	CALL VELDUM (GSAB(IJ),SJKL(K+IST),ETSJKL,GSAB(IJ),KMK)	5/25/73	1169
109	IJ=IJ+KMK	5/25/73	1170
118	SCAL=SCAL+EQ*EQ	5/25/73	1171
C		5/25/73	1172
C	WRITE ECS BROADENED CROSS SECTION SIGDR ***	5/25/73	1173
C		5/25/73	1174
	CALL ECWR (SIGT,IS10N,IDIMX,IERR)	5/25/73	1175
	IERRT=IERHT+IERR	5/25/73	1176
C		5/25/73	1177
	IPX=IPX+NKCP(1)	5/25/73	1178
	ISWT=ISWT+IAI	5/25/73	1179
127	IS10N=IS10N+IDIMX	5/25/73	1180
C		5/25/73	1181
	CALL SECOND (T3)	5/25/73	1182
C		5/25/73	1183
	T3=T3-T1	5/25/73	1184
	T2=T2-T1	5/25/73	1185
		5/25/73	1186

	WRITE (3,145) T3,T2,NGRAD,MAXEN1	5/25/73	1187
	IF (IERR!.EQ.0) RETURN	5/25/73	1188
C		5/25/73	1189
	WRITE (3,136)	5/25/73	1190
	STOP	5/25/73	1191
C		5/25/73	1192
C		5/25/73	1193
C		5/25/73	1194
136	FORMAT (/,21H ECS ERROR IN PHIMAIN)	5/25/73	1195
145	FORMAT (/,5X,F8.3,30H SECONDS IN PHIMAIN INCLUDING ,F8.3,29H SECON	5/25/73	1196
	DS IN PAMSH WITH NGRAD=,I2,I2H AND MAXEN1=,I6)	5/25/73	1197
	FNO	5/25/73	1198
C	-----	101173	38
C	SUBROUTINE ETASRCH	101173	39
C	-----	101173	40
	SUBROUTINE ETASRCH	5/25/73	1199
C		5/25/73	1200
C	*** COMMON BLOCK ***	5/25/73	1201
C		5/25/73	1202
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	1203
	14),SJKL(150),SIGT(4),DUMM1(1234),EXIT(4),CROSS(4),IS16,IS17,IS18	5/25/73	1204
	2,STORAGE,SIMPLE,STORBRD,ZENSTON,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	1205
	3DELTA,DELTAE,IRESOPH,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	1206
	4DSHIFT	5/25/73	1207
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	1208
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,AO2,H02,CO2,DO,FRACT,E	5/25/73	1209
	2LEN,RUNNO,NODAT,DAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	1210
	3,IBIGJ,IBIGK,IBIGL,IBIGH,IBT,IBS,IBF,IBC,MAXID,IRESLOT,MAXENM,MSTO	5/25/73	1211
	4REN,DELTA1,DELTA2,DELTA3,DELTA4,DELTA5,DELTA6,DELTA7,DELTA8,DELTA9,	5/25/73	1212
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	1213
	6,IS15,IAA,IF1(4),IELIM(100,5),PKN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	1214
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC	5/25/73	1215
	8S,IDUMMY,KMS,RETVAR,MUPTA,NFILES,PETA11(100),BETA12(100),BETA13(10	5/25/73	1216
	90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	1217
	COMMON /2/ U(150)	5/25/73	1218
C		5/25/73	1219
C	*** DIMENSION BLOCK ***	5/25/73	1220
C		5/25/73	1221
	DIMENSION Z(1), USAV(1), GRAD(1), GSAV(1)	5/25/73	1222
C		5/25/73	1223
C	*** EQUIVALENCE BLOCK ***	5/25/73	1224
C		5/25/73	1225
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	1226
	1(CROSS,IC,DUMMY(1201)), (SIGDH,DNUM,DUMMY(4801)), (GRADS,GRAD(154	5/25/73	1227
	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	1228
	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	1229
	4(11776)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	1230
	5)), (ZSQ,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	1231
	6(PP,DUMMY(6401))	5/25/73	1232
C		5/25/73	1233
C		5/25/73	1234
C	ETASRCH SEARCHES FOR A VALUE OF ETA WHICH WILL GIVE A VALUE OF	5/25/73	1235
C	PHI THAT IS LOWER THAN THE STARTING PHI. SEE WRITE-UP ON	5/25/73	1236
C	OPTIMIZATION TECHNIQUES FOR MORE DETAILS.	5/25/73	1237
C	ETAVERS = OPTIMUM VALUE OF ETA	5/25/73	1238
C		5/25/73	1239
	IS10NPS=IS10	5/25/73	1240
	FYA=ETA3=ETA1=1.	5/25/73	1241
	ZSQ=0.	5/25/73	1242
	ETAVERS=1.E+99	5/25/73	1243
	NVER=0	5/25/73	1244

	NSTEP=0	5/25/73	1245
	NSAVE=1	5/25/73	1246
	PHI3=PHI1	5/25/73	1247
	PHID=SCAL	5/25/73	1248
	IF (SKIP.EQ.8HPSERCH.EQ.SKIP.EQ.7HPTABLEE) GO TO 28	5/25/73	1249
	NGRAD=1	5/25/73	1250
C		5/25/73	1251
C	PHI(U) ,GRAD, GSAV FORMED	5/25/73	1252
C		5/25/73	1253
	CALL PHIMAIN	5/25/73	1254
C		5/25/73	1255
C	*** WRITE ECS GRAD,GSAV ***	5/25/73	1256
C		5/25/73	1257
	CALL ECWR (GRAD,IS12,KM,IERR)	5/25/73	1258
	IERRT=IERR	5/25/73	1259
	CALL ECWR (GSAV,IS11,KMS,IERR)	5/25/73	1260
	IERRT=IERRT+IERR	5/25/73	1261
C		5/25/73	1262
	PHI1=SCAL	5/25/73	1263
C	PHI3=PHI1	5/25/73	1264
C		5/25/73	1265
	CALL OUT	5/25/73	1266
C		5/25/73	1267
	CALL CRTP	5/25/73	1268
C		5/25/73	1269
	ITSS=IT	5/25/73	1270
	IF (SKIP.EQ.6HPTABLE.EQ.SKIP.EQ.7HPSERCH) ITSS=ITSS-1	5/25/73	1271
	ITSS=ITSS+1	5/25/73	1272
	WRITE (3,316) ITSS	5/25/73	1273
	KZ=KY=KM	5/25/73	1274
C		5/25/73	1275
C	*** READ ECS GRAD,GSAV ***	5/25/73	1276
C		5/25/73	1277
	CALL ECRD (GRAD,IS12,KM,IERR)	5/25/73	1278
	IERRT=IERRT+IERR	5/25/73	1279
	CALL ECRD (GSAV,IS11,KMS,IERR)	5/25/73	1280
	IERRT=IERRT+IERR	5/25/73	1281
C		5/25/73	1282
C	*** SOLVE LEAST SQUARE EQ. ***	5/25/73	1283
C		5/25/73	1284
	CALL MLR1	5/25/73	1285
C		5/25/73	1286
	DO 1 K=1,KM	5/25/73	1287
1	USAV(K)=U(K)	5/25/73	1288
10	DO 12 K=1,KM	5/25/73	1289
19	U(K)=USAV(K)+ETA1*Z(K)	5/25/73	1290
	NGRAD=0	5/25/73	1291
	CALL ECWR (Z,IS13,KM,IERR)	101173	41
C		5/25/73	1292
C	PHI(U+Z) FORMED	5/25/73	1293
C		5/25/73	1294
	CALL PHIMAIN	5/25/73	1295
C		5/25/73	1296
	CALL ECRD (Z,IS13,KM,IERR)	101173	42
	PHID=SCAL	5/25/73	1297
C		5/25/73	1298
C	PHI(U+Z) COMPARED WITH PHI(U)	5/25/73	1299
C		5/25/73	1300
	IF (PHID.GT.PHI1) GO TO 55	5/25/73	1301
	IF (PHID.GT.PHI3) GO TO 55	5/25/73	1302
C		5/25/73	1303

C	PHI(U*Z) LESS THAN PHI(U)	5/25/73	1304
C	IF (SKIP.NE.BNSKIPSRCH) GO TO 28	5/25/73	1305
	WRITE (3,235)PHI1,PHID	5/25/73	1306
	PHI1=PHIU	5/25/73	1307
	ZFL=ETA	5/25/73	1308
	GO TO 208	5/25/73	1309
28	CONTINUE	5/25/73	1310
	IF (NSAVE.LT.0) ETA1=ETA1+ETAS	5/25/73	1311
	NO 37 K=1,KM	5/25/73	1312
	USAV(K)=U(K)-(ETA1+ETAS)*Z(K)	5/25/73	1313
	NSAVE=NSAVE+1	5/25/73	1314
	PHI1=PHI3	5/25/73	1315
	PHI3=PHID	5/25/73	1316
	WRITE (3,235)PHI1,PHID	5/25/73	1317
	GO TO 10	5/25/73	1318
		5/25/73	1319
C	RELATIVE CHANGE IN PHI LESS THAN 1.E-03	5/25/73	1320
C		5/25/73	1321
C		5/25/73	1322
46	CONTINUE	5/25/73	1323
	WRITE (3,235)PHI1,PHID	5/25/73	1324
	PHI1=PHIU	5/25/73	1325
	ZFL=ETA1	5/25/73	1326
	IF (SKIP.NE.THETASRCH.AND.SKIP.NE.BNSKIPSRCH) GO TO 208	5/25/73	1327
	WRITE (3,226)	5/25/73	1328
	SKIP=THPSEARCH	5/25/73	1329
	IT=IT+1	5/25/73	1330
		5/25/73	1331
C	*** SWITCH TO PSRCH METHOD ***	5/25/73	1332
C		5/25/73	1333
C	CALL PSRCH	5/25/73	1334
		5/25/73	1335
C	RETURN	5/25/73	1336
		5/25/73	1337
	PHI(U*Z) GREATER THAN PHI(U)	5/25/73	1338
C		5/25/73	1339
C	IF (ABS(PHID-PHI1)/PHID.LT.1.E-3) GO TO 46	5/25/73	1340
55	PHIS=PHID	5/25/73	1341
	IF (NSTEP.GT.0) GO TO 64	5/25/73	1342
	IF (PHI1.NE.PHI3) GO TO 82	5/25/73	1343
64	ETAS=ETAS*.5	5/25/73	1344
	ETA=ETA-LTAS	5/25/73	1345
	NO 73 K=1,KM	5/25/73	1346
	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1347
73	NSTEP=NSTEP+1	5/25/73	1348
	NGRAD=0	5/25/73	1349
C		5/25/73	1350
C	CALL PHIMAIN	5/25/73	1351
		5/25/73	1352
C	CALL ECRD(Z,IS13,KM,ITER)	101173	43
	PHI3=SCAL	5/25/73	1353
	PHID=PHI3	5/25/73	1354
	WRITE (3,244)NSTEP,PHI1,PHI3,PHIS	5/25/73	1355
C		5/25/73	1356
	IF (PHI3.GT.PHI1) GO TO 55	5/25/73	1357
	IF (SKIP.NE.BNSKIPSRCH) GO TO 82	5/25/73	1358
	WRITE (3,244)NSTEP,PHI1,PHI3,PHIS	5/25/73	1359
	PHI1=PHI3	5/25/73	1360
	ZFL=ETA	5/25/73	1361
	GO TO 208	5/25/73	1362
82	ETAVER=ETAVERS	5/25/73	1363

	ETAS=ETAS*.5	5/25/73	1364
	ETA=ETA-ETAS	5/25/73	1365
	DO 91 K=1,KM	5/25/73	1366
91	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1367
	NVER=NVER+1	5/25/73	1368
C		5/25/73	1369
	CALL PHIMAIN	5/25/73	1370
C		5/25/73	1371
	CALL ECRD(Z,IS13,KM,IEHR)	10/11/73	44
	PHI2=SCAL	5/25/73	1372
	IF (PHI4.GT.PHI3) GO TO 100	5/25/73	1373
C		5/25/73	1374
C	ETA VERTEX FOUND FROM PARABOLIC FIT TO PHI(U),PHI(U+.25*ETA*Z),	5/25/73	1375
C	AND PHI(U+ETA*Z)	5/25/73	1376
C		5/25/73	1377
	ETAVERS=ETA+.5*((PHI1-PHI3)/(PHI1+PHI3-2.*PHI2))*ETAS	5/25/73	1378
	WRITE (3,253)NVER,PHI1,PHI2,PHI3	5/25/73	1379
	PHI5=PHI3	5/25/73	1380
	PHI3=PHI2	5/25/73	1381
	GO TO 134	5/25/73	1382
100	ETA=ETA+2.*ETAS	5/25/73	1383
	DO 109 K=1,KM	5/25/73	1384
109	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1385
C		5/25/73	1386
	CALL PHIMAIN	5/25/73	1387
C		5/25/73	1388
	CALL ECRD(Z,IS13,KM,IERR)	10/11/73	45
	PHI4=SCAL	5/25/73	1389
	IF (PHI4.LT.PHI5) GO TO 127	5/25/73	1390
	ETA=ETA-ETAS	5/25/73	1391
	ZFL=ETA	5/25/73	1392
	DO 118 K=1,KM	5/25/73	1393
118	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1394
	WRITE (3,298)	5/25/73	1395
	GO TO 208	5/25/73	1396
127	IF (PHI4.GT.PHI3) GO TO 136	5/25/73	1397
C		5/25/73	1398
C	ETA VERTEX FOUND FROM PARABOLIC FIT TO PHI(U+.5*ETA*Z),	5/25/73	1399
C	PHI(U+.75*ETA*Z) AND PHI(U+ETA*Z)	5/25/73	1400
C		5/25/73	1401
	ETAVERS=ETA+.5*((PHI3-PHI5)/(PHI3+PHI5-2.*PHI4))*ETAS	5/25/73	1402
	WRITE (3,262)NVER,PHI3,PHI4,PHI5	5/25/73	1403
	PHI1=PHI3	5/25/73	1404
	PHI3=PHI4	5/25/73	1405
	GO TO 134	5/25/73	1406
136	ETA=ETA-ETAS	5/25/73	1407
	DO 145 K=1,KM	5/25/73	1408
145	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1409
C		5/25/73	1410
C	ETA VERTEX FOUND FROM PARABOLIC FIT TO PHI(U+.25*ETA*Z),	5/25/73	1411
C	PHI(U+.5*ETA*Z) AND PHI(U+.75*ETA*Z)	5/25/73	1412
C		5/25/73	1413
	ETAVERS=ETA+.5*((PHI2-PHI4)/(PHI2+PHI4-2.*PHI3))*ETAS	5/25/73	1414
	WRITE (3,271)NVER,PHI2,PHI3,PHI4	5/25/73	1415
	PHI1=PHI2	5/25/73	1416
	PHI5=PHI4	5/25/73	1417
C		5/25/73	1418
154	IF (ETAVERS.GT.0.) GO TO 163	5/25/73	1419
C		5/25/73	1420
C	ETAVERS LESS THAN ZERO	5/25/73	1421
C		5/25/73	1422

	WRITE (3,307)	5/25/73	1423
	GO TO 208	5/25/73	1424
163	CONTINUE	5/25/73	1425
	WRITE (3,280)NVER,ETAVERS,ETAVER	5/25/73	1426
C		5/25/73	1427
C	RELATIVE CHANGE IN ETAVERS COMPARED WITH 1.E-01.	5/25/73	1428
C		5/25/73	1429
	IF (ABS(ETAVER-ETAVERS)/ETAVER.GT..1) GO TO 82	5/25/73	1430
C		5/25/73	1431
C	RELATIVE CHANGE IN ETAVERS LESS THAN 10-1	5/25/73	1432
C		5/25/73	1433
	DO 172 K=1,KM	5/25/73	1434
172	U(K)=USAV(K)+ETAVERS*Z(K)	5/25/73	1435
C		5/25/73	1436
	CALL PHIMAIN	5/25/73	1437
C		5/25/73	1438
	CALL ECRD(Z,IS13,KM,IERR)	101173	46
	IF (SCAL.GT.PHI3) GO TO 181	5/25/73	1439
	PHI1=SCAL	5/25/73	1440
	ZFL=ETAVERS	5/25/73	1441
	GO TO 199	5/25/73	1442
181	DO 190 K=1,KM	5/25/73	1443
190	U(K)=USAV(K)+ETA*Z(K)	5/25/73	1444
	PHI1=PHI3	5/25/73	1445
	ZFL=ETA	5/25/73	1446
199	CONTINUE	5/25/73	1447
	WRITE (3,289)SCAL,PHI3	5/25/73	1448
C		5/25/73	1449
C	FORM SUM OF (ETA*Z(K))**2	5/25/73	1450
C		5/25/73	1451
208	DO 217 K=1,KM	5/25/73	1452
217	ZSQ=ZSQ+Z(K)*Z(K)	5/25/73	1453
	ZSQ=ZSQ/ZFL*ZFL	5/25/73	1454
	ETAOP=ZFL+NSAVE	5/25/73	1455
C		5/25/73	1456
	RETURN	5/25/73	1457
C		5/25/73	1458
C		5/25/73	1459
226	FORMAT (58H RELATIVE CHANGE IN PHI LESS THAN E-3,SWITCH TO P METHO	5/25/73	1460
	1 D)	5/25/73	1461
235	FORMAT (8H PHI1 = ,E12.5,8H PHID = ,E12.5)	5/25/73	1462
244	FORMAT (9H NSTEP = ,I6,8H PHI1 = ,E12.5,8H PHI3 = ,E12.5,8H PHI5 =	5/25/73	1463
	1 ,E12.5)	5/25/73	1464
253	FORMAT (8H NVER = ,I6,8H PHI1 = ,E12.5,8H PHI2 = ,E12.5,8H PHI3 =	5/25/73	1465
	1,E12.5)	5/25/73	1466
262	FORMAT (8H NVER = ,I6,8H PHI3 = ,E12.5,8H PHI4 = ,E12.5,8H PHI5 =	5/25/73	1467
	1,E12.5)	5/25/73	1468
271	FORMAT (8H NVER = ,I6,8H PHI2 = ,E12.5,8H PHI3 = ,E12.5,8H PHI4 =	5/25/73	1469
	1,E12.5)	5/25/73	1470
280	FORMAT (8H NVER = ,I6,11H ETAVERS = ,E12.5,10H ETAVER = ,E12.5)	5/25/73	1471
289	FORMAT (8H SCAL = ,E12.5,8H PHI3 = ,E12.5)	5/25/73	1472
298	FORMAT (24H PHI4 GREATER THAN PHI5)	5/25/73	1473
307	FORMAT (36H ETAVERS LESS THAN OR EQUAL TO ZERO)	5/25/73	1474
316	FORMAT (30X,25HETASRCH METHOD ITERATION ,I6,/))	5/25/73	1475
	END	5/25/73	1476
C	-----	101173	47
C	SUBROUTINE OPTIMIZ	101173	48
C	-----	101173	49
	SUBROUTINE OPTIMIZ	5/25/73	1477
C		5/25/73	1478
C	*** COMMON BLOCK ***	5/25/73	1479

C	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXP0,SUM1(	5/25/73	1480
	14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSST(4),IS16,IS17,IS18	5/25/73	1481
	2,STORAGE,SIMPLE,STORBRD,ZENSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	1482
	3DELTA0,DELTA0E,IRESOPR,NORRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	1483
	4DSHIFT	5/25/73	1484
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAI,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	1485
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,H02,C02,DO,FRACT,E	5/25/73	1486
	2LEM,RUNNO,NODMT,UAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	1487
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IHES,LOT,MAXENM,MSTO	5/25/73	1488
	4REN,DELTA1,DELTA0,DIST,NHESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CHIN,CMAX	5/25/73	1489
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	1490
	6IS15,IAA,IF1(4),JELIM(100,2),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	1491
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAUP,IEC	5/25/73	1492
	8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	1493
	90),BETA2(100),BETA23(100),BETA33(100),IENER1	5/25/73	1494
		5/25/73	1495
C	*** DIMENSION BLOCK ***	5/25/73	1496
C		5/25/73	1497
C	DIMENSION ENER(1), SIGUR(1)	5/25/73	1498
C		5/25/73	1499
C	*** EQUIVALENCE BLOCK ***	5/25/73	1500
C		5/25/73	1501
C	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	1502
	1(CROSS,IC,DUMMY(3201)), (SIGDR,DNUM,DUMMY(4801)), (GRADS,GRAD(151	5/25/73	1503
	2), (GSI,DUMMY(7400)), (ES1,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	1504
	3MMY(101)), (Z,B,GNAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	1505
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	1506
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12112)),	5/25/73	1507
	6(PP,DUMMY(6401))	5/25/73	1508
		5/25/73	1509
		5/25/73	1510
C	CONVERGENCE SUBROUTINE, THREE METHODS FOR TERMINATING PROBLEM,	5/25/73	1511
C	1 NUMBER OF ITERATIONS(I1) GREATER THAN THE MAXIMUM NUMBER (ITMAX)	5/25/73	1512
C	2 RELATIVE CHANGE IN PHI LESS THAN 1.E-04	5/25/73	1513
C	3 RELATIVE CHANGE IN Z**2 (ZSQ) LESS THAN 1.E-08	5/25/73	1514
C		5/25/73	1515
	NGRAD=2	5/25/73	1516
	RETVAR=0.	5/25/73	1517
	IERRT=0	5/25/73	1518
		5/25/73	1519
C	READ IN INPUT PARAMETERS FROM SUBROUTINE PHIGRAD	5/25/73	1520
C		5/25/73	1521
C	CALL PHIGRAD	5/25/73	1522
		5/25/73	1523
C	IF (ITMAX.GT.0.AND.ITAPE.NE.6HNODATA) GO TO 46	5/25/73	1524
		5/25/73	1525
C	ITMAX = 0	5/25/73	1526
C	ONE PASS MADE THROUGH CODE	5/25/73	1527
C		5/25/73	1528
	NGRAD=0	5/25/73	1529
	CALL SECOND (TSTART)	5/25/73	1530
	IT=0	5/25/73	1531
	IS10NPS=IS10	5/25/73	1532
		5/25/73	1533
C	*** FORM THEORETICAL CROSS SECTION PLOT AND READ ECS SIGDR ***	5/25/73	1534
C		5/25/73	1535
	CALL PHIMAIN	5/25/73	1536
	CALL CRTP	5/25/73	1537
	CALL ECRD (SIGDR,IS10NPS,MAXID,IERR)	5/25/73	1538
	IERRT=IERR	5/25/73	1539
		5/25/73	1540

C	MS=MAXEN/2	5/25/73	1541
	DO 1 J=1,IDIMX	5/25/73	1542
	IST=J*MAXEN+1	5/25/73	1543
	ISB=(J-1)*MAXEN	5/25/73	1544
	DO 1 I=1,MS	5/25/73	1545
	BT=SIGDR(IST-I)	5/25/73	1546
	BS=SIGDR(ISB+I)	5/25/73	1547
	SIGDR(IST-I)=BS	5/25/73	1548
1	SIGDR(ISB+I)=BT	5/25/73	1549
	DO 1 I=1,MS	5/25/73	1550
	RS=ENER(MAXEN+1-I)	5/25/73	1551
	TS=FNER(I)	5/25/73	1552
	FNER(MAXEN+1-I)=TS	5/25/73	1553
10	FNER(I)=RS	5/25/73	1554
	ERX=.01	5/25/73	1555
	DO 1 J=1,IDIMX	5/25/73	1556
	ILOW=(J-1)*MAXEN+1	5/25/73	1557
	IUP=MAXEN-ILOW-1	5/25/73	1558
C		5/25/73	1559
C	*** PUNCH AND PRINT THEORETICAL CROSS SECTION ***	5/25/73	1560
C		5/25/73	1561
	IF (J.GT.1) GO TO 28	5/25/73	1562
	DO 19 I=1,MAXEN	5/25/73	1563
	ENCODE (10,91,TEN)ENER(I)	5/25/73	1564
19	ENER(I)=(TEN,A.777777B).0,(SHIFT(TEN,-6),A.7777777777000000B)	5/25/73	1565
28	CONTINUE	5/25/73	1566
	PUNCH 100, (ENER(I-ILOW+1),SIGDR(I),ERX,I=ILOW,IUP)	5/25/73	1567
	WRITE (3,100) (ENER(I-ILOW+1),SIGDR(I),ERX,I=ILOW,IUP)	5/25/73	1568
37	CONTINUE	5/25/73	1569
	CALL SECOND (TEND)	5/25/73	1570
	TEND=TEND-TSTART	5/25/73	1571
	WRITE (3,136)TEND	5/25/73	1572
C		5/25/73	1573
C		5/25/73	1574
	RETURN	5/25/73	1575
C		5/25/73	1576
C	ITMAX GREATER THAN ZERO	5/25/73	1577
C		5/25/73	1578
C		5/25/73	1579
C	*** ENTRY POINT FOR PROBLEM WITH SAME PARAMETERS ***	5/25/73	1580
C		5/25/73	1581
	ENTRY OPTA	5/25/73	1582
C		5/25/73	1583
46	CALL SECOND (TSTART)	5/25/73	1584
C		5/25/73	1585
	IT=-1	5/25/73	1586
	PHI1=1.E+99	5/25/73	1587
55	PHIR=PHI1	5/25/73	1588
	IT=IT+1	5/25/73	1589
C		5/25/73	1590
	IF (SKIP.NE.7HETASRCH.AND.SKIP.NE.8HSKIPSRCH) CALL PSRCH	5/25/73	1591
	IF (SKIP.EQ.7HETASRCH.OR.SKIP.EQ.8HSKIPSRCH) CALL ETASRCH	5/25/73	1592
C		5/25/73	1593
C		5/25/73	1594
C	RELATIVE CHANGE IN PHI COMPARED WITH 1.E-04	5/25/73	1595
C		5/25/73	1596
	IF (ABS(PHIR-PHI1)/PHIR.GT.1.E-4) GO TO 64	5/25/73	1597
	WRITE (3,149)	5/25/73	1598
	GO TO 82	5/25/73	1599
C		5/25/73	1600
C	IT COMPARED WITH ITMAX	5/25/73	1601

C		5/25/73	1602
64	IF (IT.LT.ITMAX-1) GO TO 73	5/25/73	1603
	WRITE (3,118)	5/25/73	1604
	GO TO 42	5/25/73	1605
C		5/25/73	1606
C	ZSQ COMPARED WITH 1.E-08	5/25/73	1607
C		5/25/73	1608
73	IF (ZSQ.GT.1.E-08) GO TO 55	5/25/73	1609
	WRITE (3,127)	5/25/73	1610
C		5/25/73	1611
C	*** ENTRY POINT WHEN IN PSRCH NO PHI FOUND LESS THAN STARTING	5/25/73	1612
C	PHI ***	5/25/73	1613
C		5/25/73	1614
	ENTRY ORTB	5/25/73	1615
C		5/25/73	1616
82	CALL UPAR	5/25/73	1617
C		5/25/73	1618
	IT=IT+1	5/25/73	1619
C		5/25/73	1620
	CALL OUT	5/25/73	1621
C		5/25/73	1622
	CALL CRTP	5/25/73	1623
C		5/25/73	1624
	CALL SECOND (TEND)	5/25/73	1625
C		5/25/73	1626
	TEND=TEND-TSTART	5/25/73	1627
	WRITE (3,136) TEND	5/25/73	1628
C		5/25/73	1629
	IF (RETVAR.EQ.1) GO TO MORTA	5/25/73	1630
	IF (IERRT.EQ.0) RETURN	5/25/73	1631
	WRITE (3,145)	5/25/73	1632
	STOP	5/25/73	1633
C		5/25/73	1634
C		5/25/73	1635
C		5/25/73	1636
91	FORMAT (E10.5)	5/25/73	1637
100	FORMAT (5X,3(R8,2F8.3))	5/25/73	1638
109	FORMAT (1H1,5)H RELATIVE CHANGE IN PHI LESS THAN OR EQUAL TO 1.E-4	5/25/73	1639
	1)	5/25/73	1640
118	FORMAT (1H1,40H STOPPED ON MAXIMUM NUMBER OF ITERATIONS)	5/25/73	1641
127	FORMAT (1H1,5BH SQUARE MAGNITUDE OF Z VECTOR LESS THAN OR EQUAL TO	5/25/73	1642
	11. E- 8)	5/25/73	1643
136	FORMAT (/2BH RUNNING TIME FOR PROBLEM = ,E12.6)	5/25/73	1644
145	FORMAT (/21H ECS ERROR IN OPTIMIZ)	5/25/73	1645
	END	5/25/73	1646
C	-----	101173	50
C	SUBROUTINE ESCALE	101173	51
C	-----	101173	52
	SUBROUTINE ESCALE	5/25/73	1647
C		5/25/73	1648
C	*** COMMON BLOCK ***	5/25/73	1649
C		5/25/73	1650
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1 (	5/25/73	1651
	14),SJKL (150),SIGT (4),DUMMY (12341),EXITT (4),CROSS (4),IS16,IS17,IS18	5/25/73	1652
	2,STORAGE,SIMPLE,STORBRD,ZERSTOR,GRSPIN (10),IALBE,WGNO,IELIMS (100),	5/25/73	1653
	3DELTA,DELTA,IESOPR,NOBRD,WUP,WLW,NKCP (2),BOUND (10),PHINTCS,EST,	5/25/73	1654
	4DSHIFT	5/25/73	1655
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	1656
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,H02,C02,DO,FRACT,E	5/25/73	1657
	2LEN,RUNNO,NODAT,LAIT,ITAPE,MSIURE,NGROUP,NI,NM,YMIN,YMAX,LLY,ESPAN	5/25/73	1658
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IHC,MAXID,IRESOT,MAXENM,MSTO	5/25/73	1659

	4REN,DELTAI,DELTAI,DIST,NRESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	1660
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	1661
	6IS15,IAA,IF1(3),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	1662
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUMXM,ETAOP,IEC	5/25/73	1663
	8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	1664
	90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	1665
C		5/25/73	1666
C	*** DIMENSION BLOCK ***	5/25/73	1667
C		5/25/73	1668
	DIMENSION GSI(1), ESI(1), ENER(1), ENER1(1), EES(1)	5/25/73	1669
C		5/25/73	1670
C	*** EQUIVALENCE BLOCK ***	5/25/73	1671
C		5/25/73	1672
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	1673
	1(CROSS,IC,DUMMY(3201)), (SIGDH,ONUM,DUMMY(4801)), (GRADS,GRAD(151)	5/25/73	1674
	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	1675
	3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (VIAG,DUMMY	5/25/73	1676
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	1677
	5)!, (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	1678
	6(PP,DUMMY(6401))	5/25/73	1679
C		5/25/73	1680
C		5/25/73	1681
C	SUBROUTINE ESCALE FORMS A SET OF ENERGIES (ENER1)	5/25/73	1682
C	WHICH ARE USED IN BROADENING THE DATA. THE MIN. SPACING BETWEEN	5/25/73	1683
C	POINTS IN THE ENER1 TABLE IS SET AT 1/4 THE SMALLER OF THE AVERAGE	5/25/73	1684
C	OF EITHER THE EXPONENTIAL RESOLUTION WIDTH (ROLOW) OR THE QUADRUTU	5/25/73	1685
C	RE OF THE DOPPLER WIDTH + GAUSSIAN RESOLUTION WIDTH (HLOWG). THE	5/25/73	1686
C	MAX NUMBER OF INTERVALS BETWEEN THE VALUES IN THE ENER1 TABLE IS 5	5/25/73	1687
C	IF THE AVERAGE SPACING BETWEEN POINTS IS GREATER THAN 1/4 THE	5/25/73	1688
C	TOTAL WIDTH(G) OF A RESONANCE(E) THEN THE INTERVAL FROM E-G TO E+G	5/25/73	1689
C	IS DIVIDED INTO 8 EQUALLY SPACED INTERVALS	5/25/73	1690
C		5/25/73	1691
	FRACT=0.25	5/25/73	1692
	IDIV=((IECS-25000)/(2*KMX))-(2*KMMAX)/MAXEN	5/25/73	1693
	IF (IDIV-1) 10,10,1	5/25/73	1694
1	IF (IDIV.GT.5) IDIV=5	5/25/73	1695
10	XMAX=MAXEN	5/25/73	1696
	EMAX=ENER(MAXEN)	5/25/73	1697
	FMIN=ENER(1)	5/25/73	1698
	EAVE=(ENER(MAXEN)-ENER(1))/(XMAX-1.)	5/25/73	1699
	GO TO 64	5/25/73	1700
19	IF (W-.2*EAVE) 28,28,37	5/25/73	1701
28	XDIV=IDIV	5/25/73	1702
	GO TO 118	5/25/73	1703
37	IF (W-EAVE) 46,55,55	5/25/73	1704
46	XDIV=FIX(EAVE/W)	5/25/73	1705
	GO TO 118	5/25/73	1706
55	XDIV=1.	5/25/73	1707
	GO TO 118	5/25/73	1708
C		5/25/73	1709
C	NON-GAUSSIAN OR ITOTAL=2	5/25/73	1710
C		5/25/73	1711
64	CONTINUE	5/25/73	1712
	CALL WDSINTW (EMIN)	5/25/73	1713
	FG=WLW*0.125	5/25/73	1714
	S=EMIN	5/25/73	1715
	DO 73 I=1,8	5/25/73	1716
	S=S-EG	5/25/73	1717
73	ENER1(9-I)=S	5/25/73	1718
	ISYART=B	5/25/73	1719
	R=0	5/25/73	1720

	DO 82 I=1,MAXEN	5/25/73	1721
82	R=P-XOLQW(ENER(I))	5/25/73	1722
	R=R/XMAX	5/25/73	1723
	W=U.	5/25/73	1724
	DO 91 I=1,MAXEN	5/25/73	1725
91	W=W+SQRT(WD(ENER(I))*2+ROLOWG(ENER(I))*2)	5/25/73	1726
	W=W/XMAX	5/25/73	1727
	IF (R-W) 100,109,109	5/25/73	1728
100	WAVE=W*U.	5/25/73	1729
	W=R*FRACT	5/25/73	1730
	GO TO 19	5/25/73	1731
109	W=W*FRACT	5/25/73	1732
	WAVE=R*U.	5/25/73	1733
	GO TO 19	5/25/73	1734
118	XDIVS=XDIV	5/25/73	1735
127	XDIV=XDIV-1.	5/25/73	1736
	IF (XDIV) 163,163,136	5/25/73	1737
136	IM=WAVE*XDIV/EAVE	5/25/73	1738
	IF (IM,2,4) GO TO 145	5/25/73	1739
	XDIV=1.	5/25/73	1740
	GO TO 172	5/25/73	1741
C		5/25/73	1742
C	CHECK TO MAKE SURE AVERAGE NUMBER OF POINTS WHICH WILL BE USED BY	5/25/73	1743
C	RESDDO DOES NOT EXCEED MSTORE-16.	5/25/73	1744
C		5/25/73	1745
145	IF (IM-MSTORE+16) 154,127,127	5/25/73	1746
154	SAVE=XDIV*MAXEN+8*NRES+32	5/25/73	1747
	IF (IFIX(SAVE)-IENER) 172,172,127	5/25/73	1748
163	IM=WAVE/EAVE	5/25/73	1749
	IOUT=IM-MSTORE+16	5/25/73	1750
	XDIV=1.	5/25/73	1751
	IF (IOUT,LE,0) GO TO 172	5/25/73	1752
	WRITE (2,388)IOUT	5/25/73	1753
	GO TO 18	5/25/73	1754
C		5/25/73	1755
C	PRINT OUT AVERAGE NUMBER OF POINTS IM AND THE NUMBER OF INTERVALS	5/25/73	1756
C	BETWEEN DATA POINTS XDIV	5/25/73	1757
C		5/25/73	1758
172	WRITE (3,397)XDIV,IM	5/25/73	1759
181	WID=EAVE/XDIV	5/25/73	1760
	L=0	5/25/73	1761
	DO 199 I=1,NRES	5/25/73	1762
	IF (PKEN(I),LT,EMIN,OR,PKEN(I),GT,EMAX) GO TO 199	5/25/73	1763
	ET=ABS(PKEN(I))	5/25/73	1764
	IGROUPI=IGROUP(I)	5/25/73	1765
	LV=GRSPIN(IGROUPI)	5/25/73	1766
	RHO=2.1268E-4*CRFN*SQRT(ET)*(AW/(AW+1.009))	5/25/73	1767
	GD=GGA(I)+GSI(I,1)*SQRT(ET)*VF(RHO,LV)+ABS(GSI(I,2))+ABS(GSI(I,3))	5/25/73	1768
	GD=GD*1.E-03	5/25/73	1769
	IF (GD-WID*4.) 190,199,199	5/25/73	1770
190	L=L+1	5/25/73	1771
	ESI(L)=PKEN(I)	5/25/73	1772
	GSI(L)=GD	5/25/73	1773
199	CONTINUE	5/25/73	1774
	EES(1)=ENER(MAXEN)	5/25/73	1775
	MAXEN1=1START	5/25/73	1776
	IDIV=XDIV	5/25/73	1777
	M1=MAXEN-1	5/25/73	1778
	JK=1	5/25/73	1779
	JK=0	5/25/73	1780
	IF (L,EQ,0) GO TO 253	5/25/73	1781

	DO 208 K=1,L	5/25/73	1782
	EG=.25*GS1(K)	5/25/73	1783
	S=ES1(K)-GS1(K)-EG	5/25/73	1784
	DO 208 J=1,9	5/25/73	1785
	JK=JK+1	5/25/73	1786
208	FES(JK)=S+S*EG	5/25/73	1787
	FES(JK+1)=EMAX	5/25/73	1788
	IF (L.EQ.1) GO TO 244	5/25/73	1789
	DO 235 K=1,JK	5/25/73	1790
	J=K+1	5/25/73	1791
	DO 235 I=J,JK	5/25/73	1792
	IF (EES(I)-EES(K)) 226,217,235	5/25/73	1793
217	FES(I)=EMAX	5/25/73	1794
	GO TO 235	5/25/73	1795
226	X=EES(K)	5/25/73	1796
	EES(K)=EES(I)	5/25/73	1797
	FES(I)=X	5/25/73	1798
235	CONTINUE	5/25/73	1799
244	CONTINUE	5/25/73	1800
C		5/25/73	1801
C	PRINT OUT THOSE RESONANCES WHOSE WIDTHS ARE LESS THAN 1/4 THE AVE.	5/25/73	1802
C	SPACING BETWEEN POINTS	5/25/73	1803
C		5/25/73	1804
	WRITE (3,370)WID	5/25/73	1805
	WRITE (3,379)	5/25/73	1806
	WRITE (3,361)(ES1(J),GS1(J),J=1,L)	5/25/73	1807
253	DO 316 I=1,M1	5/25/73	1808
	EG=(ENER(I+1)-ENER(I))/XDIV	5/25/73	1809
	S=ENER(I)-EG	5/25/73	1810
	DO 307 M=1,IDIV	5/25/73	1811
	S=S*EG	5/25/73	1812
262	IF (S-EES(JK1)) 298,280,271	5/25/73	1813
271	MAXEN1=MAXEN1+1	5/25/73	1814
	ENER1(MAXEN1)=EES(JK1)	5/25/73	1815
280	JK1=JK1+1	5/25/73	1816
	IF (JK1=JK) 262,262,289	5/25/73	1817
289	FES(JK1)=ENER(MAXEN1)	5/25/73	1818
298	MAXEN1=MAXEN1+1	5/25/73	1819
	ENER1(MAXEN1)=S	5/25/73	1820
307	CONTINUE	5/25/73	1821
316	CONTINUE	5/25/73	1822
	MAXEN1=MAXEN1+1	5/25/73	1823
	ENER1(MAXEN1)=EMAX	5/25/73	1824
	CALL WDSINTW (EMAX)	5/25/73	1825
	EG=WUP*.125*1.1	5/25/73	1826
	S=ENER1(MAXEN1)	5/25/73	1827
	DO 325 I=1,8	5/25/73	1828
	S=S*EG	5/25/73	1829
	MAXEN1=MAXEN1+1	5/25/73	1830
325	ENER1(MAXEN1)=S	5/25/73	1831
	SU=ENER1(MAXEN1)	5/25/73	1832
	EG=0.5*WU(SL)	5/25/73	1833
	DO 334 I=1,8	5/25/73	1834
	MAXEN1=MAXEN1+1	5/25/73	1835
	SU=SU*EG	5/25/73	1836
334	ENER1(MAXEN1)=SU	5/25/73	1837
	DO 343 I=1,MAXEN1	5/25/73	1838
	M1=MAXEN1-I+9	5/25/73	1839
	M2=MAXEN1-I+1	5/25/73	1840
343	ENER1(M1)=ENER1(M2)	5/25/73	1841
	SU=ENER1(9)	5/25/73	1842

	EG=0.5*WD(SU)	5/25/73	1843
	NO 322 I=1,8	5/25/73	1844
	SU=SU-EG	5/25/73	1845
352	ENER1(9-I)=SU	5/25/73	1846
	MAXEN1=MAXEN1+8	5/25/73	1847
C		5/25/73	1848
	RETURN	5/25/73	1849
C		5/25/73	1850
C		5/25/73	1851
C		5/25/73	1852
361	FORMAT (2E12.6)	5/25/73	1853
370	FORMAT (6X,3HWID,/,E12.6)	5/25/73	1854
379	FORMAT (2X,10HRES ENERGY,2X,11HTOTAL WIDTH)	5/25/73	1855
388	FORMAT (//,87H BEWARE MSIORE MAY NOT BE LARGE ENOUGH. IF PROBLEM	5/25/73	1856
1	DOESNOT WORK INCREASE MSTORE BY ,16)	5/25/73	1857
397	FORMAT (//8H XDIV = ,E12.6,6H IM = ,16)	5/25/73	1858
	END	5/25/73	1859
C	-----	101173	53
C	SUBROUTINE RESDOD	101173	54
C	-----	101173	55
	SUBROUTINE RESDOD	5/25/73	1860
C		5/25/73	1861
C	*** COMMON BLOCK ***	5/25/73	1862
C		5/25/73	1863
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	1864
	14),SJKL(150),SIG1(4),DUMMY(12341),EXIT(4),CROSS(4),IS46,IS17,IS18	5/25/73	1865
	2,STORAGE,SIMPLE,STORBRD,ZENSTOK,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	1866
	3DELTA,DELTA,RESOPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	1867
	4DSHIFTF	5/25/73	1868
	DIMENSION EE(1), SS(1), AA(1)	5/25/73	1869
	DIMENSION EXT(1)	5/25/73	1870
C		5/25/73	1871
C	*** EQUIVALENCE BLOCK ***	5/25/73	1872
C		5/25/73	1873
	EQUIVALENCE (ISKP,SIGT(1)), (CORR2,SIGT(2)), (I,IPKE), (NWID,SJKL)	5/25/73	1874
	1, (JL,SJKL(3)), (JU,SJKL(5)), (IP,SJKL(7)), (IE,SJKL(9))	5/25/73	1875
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	1876
	1(CROSS,IC,DUMMY(3201)), (SIGDR,DNUM,DUMMY(4801)), (GRADS,GRAD(151)	5/25/73	1877
	2), (GS1,DUMMY(7400)), (ES1,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	1878
	3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	1879
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	1880
	5)), (ZSQ1,DUMMY(12152)), (PH1,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	1881
	6(PF,DUMMY(6401))	5/25/73	1882
C		5/25/73	1883
C		5/25/73	1884
C	RESDOD FORMS THE DOT PRODUCT OF THE VECTORS V(EE) AND SIGMA(SS)	5/25/73	1885
C	SEE WRITE UP FOR MORE DETAILS	5/25/73	1886
C		5/25/73	1887
	NPTS=IAI	5/25/73	1888
	DO 1 IXAU=1,IDIMX	5/25/73	1889
1	SIGT(IXAU)=DOTPRQ(NPTS,EE,1,SS(IXAU),IDIMX)	5/25/73	1890
	RETURN	5/25/73	1891
	END	5/25/73	1892
C	-----	101173	56
C	SUBROUTINE CRTP	101173	57
C	-----	101173	58
	SUBROUTINE CRTP	5/25/73	1893
C		5/25/73	1894
C	*** COMMON BLOCK ***	5/25/73	1895
C		5/25/73	1896
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	1897

	14),SJKL(150),SIGT(4),DUMMY(12321),EXIT(4),CROSS(4),IS16,IS17,IS18	5/25/73	1898
	2,STORAGE,SIMPLE,STORARD,ZERSTON,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	1899
	3DELTA,DELTA,IRESDPR,NOBRD,WUP,WLW,NKCP(2),BOUND(1),PRINTCS,EST,	5/25/73	1900
	4NSHIFT	5/25/73	1901
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NKES,NFCHS,NFCHS1,	5/25/73	1902
	INFCHS2,NFCHS3,AW,CREN,IT,ITMAX,RESWID,THICK,AO2,BO2,CO2,DO,FRAC,E	5/25/73	1903
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSIORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	1904
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IRESIOT,MAXENM,MSTO	5/25/73	1905
	4REN,DELTA1,DELTA2,DIST,NKESH,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMA	5/25/73	1906
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	1907
	6IS15,IAA,IF1(4),IELIM(100,5),PKN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	1908
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIMXM,EIAP,IFC	5/25/73	1909
	8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	1910
	90),BETA22(100),BETA23(100),BETA33(100),ENER1	5/25/73	1911
C		5/25/73	1912
C	*** EQUIVALENCE BLOCK ***	5/25/73	1913
C		5/25/73	1914
	EQUIVALENCE (CRS1,DUMMY(6401)), (SIG,DUMMY(8001)), (CRS,DUMMY(9601	5/25/73	1915
	1)), (ENR,DUMMY(1601)), (POINT,DUMMY(11401)), (YAXIS,DUMMY(11402))	5/25/73	1916
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	1917
	1(CROSS,IC,DUMMY(3201)), (SIGDR,ONUM,DUMMY(4801)), (GRADS,GRAD(151)	5/25/73	1918
	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	1919
	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (UIAG,DUMMY	5/25/73	1920
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	1921
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	1922
	6(PP,DUMMY(6401))	5/25/73	1923
C		5/25/73	1924
	DIMENSION IXY(4), ORD(4), AB(2), ENER(1), CROSS(1), SIGDR(1), POIN	5/25/73	1925
	IT(1), CRS(1), ENR(1), CRS1(1), YAXIS(1), SIG(1), CROD(1)	5/25/73	1926
	EQUIVALENCE (CROD,CRS)	5/25/73	1927
	DATA ORD/23HCROSS SECTION (BARNSE)/,AB/19HNEUTRON ENERGY (EV)/,RT	5/25/73	1928
	1E/3H /	5/25/73	1929
C		5/25/73	1930
C	CRIP PROVIDES GRAPHIC OUTPUT FOR EACH ITERATION IN THE FORM OF	5/25/73	1931
C	FILM. IT ALSO CALLS SUB. PRINTP WHICH PROVIDES GRAPHIC OUTPUT IN	5/25/73	1932
C	THE FORM OF A PRINTER PLOT	5/25/73	1933
C		5/25/73	1934
	DATA ITERAT/10ITERATION /	5/25/73	1935
	CALL ECRD (ENER,IS7,MAXEN,IERR)	5/25/73	1936
	IERRT=IERR	5/25/73	1937
	J3=0	5/25/73	1938
	J1S=IS10NPS	5/25/73	1939
	DO 1 J=1,IDIMX	5/25/73	1940
	J2S=J1S+(J-1)-IDIMX	5/25/73	1941
	J2C=IS9*(J-1)-IDIMX	5/25/73	1942
	DO 1 JX=1,MAXEN	5/25/73	1943
	J3=J3+1	5/25/73	1944
	J2S=J2S+IDIMX	5/25/73	1945
	J2C=J2C+IDIMX	5/25/73	1946
	CALL ECRD (SIGDR(J3),J2S+1,IERR)	5/25/73	1947
	IERRT=IERRT+IERR	5/25/73	1948
	CALL ECRD (CROSS(J3),J2C+1,IERR)	5/25/73	1949
1	IERRT=IERRT+IERR	5/25/73	1950
	MAXID=IDIMX*MAXEN	5/25/73	1951
	IF (PRINTCS.GT.0.) GO TO 19	5/25/73	1952
	MM=0	5/25/73	1953
	DO 10 KK=1,IDIMX	5/25/73	1954
	WRITE (3,100) (ENER(IPR),SIGDR(IPR+MM),IPR=1,MAXEN)	5/25/73	1955
10	MM=MM+MAXEN	5/25/73	1956
19	CONTINUE	5/25/73	1957
	DO 28 I=1,MAXID	5/25/73	1958

28	IF (ITAPE.EQ.6HNO DATA) CROSS(I)=YMIN	5/25/73	1959
	CONTINUE	5/25/73	1960
	CALL ECWR (SIGDR,IS)ONPS*MAXIU,*ERR)	5/25/73	1961
	IERRT=IERRT+IERR	5/25/73	1962
	AMAX=YMAX	5/25/73	1963
	AMIN=YMIN	5/25/73	1964
	IF (LLY.EQ.0) GO TO 37	5/25/73	1965
	AMAX=ALOG1*(YMAX)	5/25/73	1966
	AMIN=ALOG10(YMIN)	5/25/73	1967
37	CONTINUE	5/25/73	1968
	ENCODE (10,109,ITT)IT	5/25/73	1969
	EL=ENER(I)	5/25/73	1970
	ER=EL*ESPAN	5/25/73	1971
	DIFF=ENER(MAXEN)-ENER(I)	5/25/73	1972
	NLOOP=DIFF/ESPAN	5/25/73	1973
	IF (NLOOP*ESPAN.NE.DIFF) NLOOP=NLOOP+1	5/25/73	1974
	DO 91 ILOOP=1,NLOOP	5/25/73	1975
	CALL SEARCH (EL,ENER,MAXEN,NMIN,MFLAG)	5/25/73	1976
	IF (MFLAG.EQ.1) AMIN=NMIN+1	5/25/73	1977
	CALL SEARCH (ER,ENER,MAXEN,NMAX,MFLAG)	5/25/73	1978
	IF (MFLAG.EQ.2) NMAX=MAXEN	5/25/73	1979
	NPTS=NMAX-NMIN+1	5/25/73	1980
	CALL ASCL (5,EL,ER,NE,ME,KKE)	5/25/73	1981
	IF (LLY.EQ.0) CALL ASCL (5,AMIN,AMAX,NY,MY,KKY)	5/25/73	1982
	CALL DGA (88,998,40,975,EL,ER,AMAX,AMIN)	5/25/73	1983
	ILOW=1	5/25/73	1984
	DO 82 LOOP=1,IOIMX	5/25/73	1985
	DO 46 II=NMIN,NMAX	5/25/73	1986
	III=II+ILOW-1	5/25/73	1987
	CROD(III)=SIGDR(III)	5/25/73	1988
	IF (CROD(III).LE.0.) CROD(III)=YMIN	5/25/73	1989
	IF (LLY.GT.0) CROD(III)=ALOG10(CROD(III))	5/25/73	1990
46	CONTINUE	5/25/73	1991
	CALL ADV (I)	5/25/73	1992
	IF (LLY.EQ.0) GO TO 55	5/25/73	1993
	CALL DLNLG (ME)	5/25/73	1994
	CALL SLLOG	5/25/73	1995
	NY=LLY	5/25/73	1996
	GO TO 64	5/25/73	1997
55	CALL DLNLN (ME,MY)	5/25/73	1998
	CALL SLLIN (NY,KKY)	5/25/73	1999
64	CALL SBLIN (NE,KKE)	5/25/73	2000
	CALL DLNLN (NE,NY)	5/25/73	2001
	CALL PLOT (NPTS,ENER(NMIN),1,CROD(NMIN),1,48,1)	5/25/73	2002
	CALL WLCH (88,0,8,ELEM,1)	5/25/73	2003
	CALL WLCH (196,0,8,IF1(LOOP),1)	5/25/73	2004
	CALL WLCH (304,0,8,DAIT,1)	5/25/73	2005
	CALL WLCH (854,0,10,ITERA,1)	5/25/73	2006
	CALL WLCH (866,0,10,ITT,1)	5/25/73	2007
	CALL WLCV (7,7<0,23,OWD,1)	5/25/73	2008
	CALL WLCV (0,516,3,RTE,1)	5/25/73	2009
	CALL WLCV (0,336,3,RTE,1)	5/25/73	2010
	IF (ITAPE.EQ.6HNO DATA) GO TO 82	5/25/73	2011
	DO /3 II=NMIN,NMAX	5/25/73	2012
	III=II+ILOW-1	5/25/73	2013
	CROD(III)=CROSS(III)	5/25/73	2014
	IF (CROD(III).LE.0.) CROD(III)=YMIN	5/25/73	2015
	IF (LLY.GT.0) CROD(III)=ALOG10(CROD(III))	5/25/73	2016
73	CONTINUE	5/25/73	2017
	CALL PLOT (NPTS,ENER(NMIN),1,CROD(NMIN),1,16,0)	5/25/73	2018
82	ILOW=ILOW+MAXEN-1	5/25/73	2019

	EL=ER	5/25/73	2020
	ER=ER+ESPA	5/25/73	2021
91	CONTINUE	5/25/73	2022
	CALL PRINTP	5/25/73	2023
	RETURN	5/25/73	2024
C		5/25/73	2025
100	FORMAT (10E13.7)	5/25/73	2026
109	FORMAT (I10)	5/25/73	2027
	END	5/25/73	2028
C	-----	101173	59
C	SUBROUTINE PARSH	101173	60
C	-----	101173	61
	SUBROUTINE PARSH	5/25/73	2029
C		5/25/73	2030
C	*** COMMON BLOCK ***	5/25/73	2031
C		5/25/73	2032
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1	5/25/73	2033
	14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSS(4),IS16,IS17,IS18	5/25/73	2034
	2,STORAGE,SIMPLE,STOR8,ZERSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	2035
	3DELTA,DELTA,IRESQPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINICS,EST,	5/25/73	2036
	4DSHIFT	5/25/73	2037
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	2038
	1NFCHS2,NFCHS3,AW,CREFN,IT,ITMAX,RESWID,THICK,A02,B02,CU2,DO,FRACT,E	5/25/73	2039
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSIORE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPA	5/25/73	2040
	3,IBIGJ,IRIGK,IBIGL,IBIGH,IBT,IBS,IBF,IRC,MAXID,IHSTOT,MAXENM,MSTO	5/25/73	2041
	4REN,DELTA,DELTA,DISI,NRESM,KZ,NGHAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	2042
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	2043
	6IS15,IAA,IF1(4),IELIM(100,2),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	2044
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC	5/25/73	2045
	8S,DUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	2046
	90),BETA22(100),BETA23(100),BETA33(100),ENER1	5/25/73	2047
	COMMON /3/ RINF(120),NB11(1),NA11,NB12,NB22,NA12,NA22,NB13,NB23,NB	5/25/73	2048
	133,NA13,NA23,NA33	5/25/73	2049
	2,A11,A12,A13,A22,A23,A33,B11,B12,B13,B22,B23,B33	101173	62
	DIMENSION ENER1(1), PA(6,1), PB(6,1), TEMP3(3), TEMP4(3), TEMP6(3)	5/25/73	2050
	1, PA1(1), PB1(1), BETAP1(1), ALPHAN(1), BETAN(1)	5/25/73	2051
C		5/25/73	2052
C	*** EQUIVALENCE BLOCK ***	5/25/73	2053
C		5/25/73	2054
	EQUIVALENCE (SU,DUMMY(3601)), (PA,PA1,DUMMY(3602)), (PB,PB1,DUMMY(	5/25/73	2055
	14502)), (BETAP1,BETAPR), (ALPHAN,DUMMY(5402)), (BETAN,DUMMY(5502))	5/25/73	2056
	2	5/25/73	2057
C		5/25/73	2058
C	SUBROUTINE PARSH FORMS THE PARTIAL CROSS SECTIONS SIGT (I)	5/25/73	2059
C	AND THE PARTIAL DERIVATIVES OF THE PARTIAL CROSS SECTIONS	5/25/73	2060
C	(SJKL(I)) WITH RESPECT TO THE PARAMETERS ITERATED ON AT THE ENERGY	5/25/73	2061
C	SU	5/25/73	2062
C		5/25/73	2063
	DO 1 IXAU=1,IDIMX	5/25/73	2064
1	SIGT(IXAU)=0.	5/25/73	2065
	JXJ=IBIGJ	5/25/73	2066
	JXK=IRIGK	5/25/73	2067
	JXL=IBIGL	5/25/73	2068
	JXM=IRIGH	5/25/73	2069
	NRESM2=4*NRESM	5/25/73	2070
	NRESM3=3*NRESM	5/25/73	2071
	ITSC=ISCAT*ITOTAL*ICAP	5/25/73	2072
	SQENER1=SQRT(SU)	5/25/73	2073
	CAV=2.1768E-4*SQENER1*(AW/(AW+1.009))	5/25/73	2074
	PILAM5=0.0314159/CAV**2	5/25/73	2075
C		5/25/73	2076

	ARG1=CAY*CRFN	5/25/73	2077
C	KK=KKM=0	5/25/73	2078
	KML=1	5/25/73	2079
	MMS=1	5/25/73	2080
	DSHIFT=0.	5/25/73	2082
	DO 307 NGR=1,NGROUP	5/25/73	2083
	LV=GRSPIN(NGR)	5/25/73	2084
	SQEN=VF(ARG1,LV)	5/25/73	2085
	IF (ITSC.LT.2) GO TO 10	5/25/73	2086
	ARG=PHIP(ARG1,LV)	5/25/73	2087
	IF (NFCHS.EQ.0.AND.DSHIFTF.EQ.0.) DSHIFT=SF(ARG1,LV,BOUND(NGR))/(A	5/25/73	2088
	IRG1*SQEN)	5/25/73	2089
	CSINE=COS(ARG)	5/25/73	2090
	SINE=SIN(ARG)	5/25/73	2091
10	SQENER=SQEN*SQENER1	5/25/73	2092
	SQSQEN=SQRT(SQENER)	5/25/73	2093
	MMM=0	5/25/73	2094
	DO 118 K=1,NRES	5/25/73	2095
	IF (IGROUP(K).NE.NGR) GO TO 118	5/25/73	2096
	IF (STORAGE.GT.0.) GO TO 19	5/25/73	2097
	IF (IELIMS(K).EQ.0) GO TO 118	5/25/73	2098
19	M1=0	5/25/73	2099
	DIFEN=PKEN(K)-SU	5/25/73	2100
	TEMP11=BETAP1(K+NRESM3)	5/25/73	2101
	TEMP1=TEMP11**2	5/25/73	2102
	XDEN=1./((DIFEN**2+TEMP1**2)	5/25/73	2103
	MMM=MMM+1	5/25/73	2104
	ALPHAN(MMM)=DIFEN*XDEN	5/25/73	2105
	BETAN(MMM)=TEMP1*XDEN	5/25/73	2106
	IF (IAUT*IPKE.EQ.0) GO TO 118	5/25/73	2107
	TEMP6(1)=BETAP1(K)*SQSQEN	5/25/73	2108
	TEMP6(2)=BETAP1(K+NRESM1)	5/25/73	2109
	TEMP6(3)=BETAP1(K+NRESM2)	5/25/73	2110
	EDEX=DIFEN*XDEN	5/25/73	2111
	GDEX=TEMP1*XDEN	5/25/73	2112
	TEMP2=EDEX*GDEX	5/25/73	2113
	TEMP5=(-2.*EDEX**2+XDEN)	5/25/73	2114
	TEMP7=.5*XDEN-GDEX**2	5/25/73	2115
	DO 28 I=1,NFCHS1	5/25/73	2116
	TEMP3(I)=TEMP6(I)*EDEX	5/25/73	2117
28	TEMP4(I)=TEMP6(I)*GDEX	5/25/73	2118
C		5/25/73	2119
C	PARTIAL OF ALPHA AND BETA MATRICES	5/25/73	2120
C		5/25/73	2121
	IF (IELIM(K,1)+IELIM(K,2).EQ.0) GO TO 64	5/25/73	2122
	DO 35 J=1,NFCHS1	5/25/73	2123
	CONS=TEMP6(J)	5/25/73	2124
	DO 53 I=J,NFCHS1	5/25/73	2125
	L=I+J	5/25/73	2126
	IF (I-3.GE.0) GO TO 37	5/25/73	2127
	L=L-1	5/25/73	2128
37	BPR=TEMP6(I)*CONS	5/25/73	2129
	IF (IELIM(K,1).EQ.0) GO TO 46	5/25/73	2130
	KKM=KK+1	5/25/73	2131
	PA(L,KKM)=BPR*TEMP5	5/25/73	2132
	PR(L,KKM)=-2.0*BPR*TEMP2	5/25/73	2133
	M1=1	5/25/73	2134
46	IF (IELIM(K,2).EQ.0) GO TO 55	5/25/73	2135
	KKM=KK+1+M1	5/25/73	2136
	PA(L,KKM)=-4.*TEMP11*BPR*TEMP2	5/25/73	2137

	PB(L,KKM)=4.*TEMP11*8PR*TEMP7	5/25/73	2138
55	CONTINUE	5/25/73	2139
C		5/25/73	2140
64	CONTINUE	5/25/73	2141
	IF (KKM-KK,LE,0) GO TO 73	5/25/73	2142
	KK=KKM	5/25/73	2143
73	N4=(KK-1)*6	5/25/73	2144
	DO 109 M=3,NFCHS3	5/25/73	2145
	IF (IELIM(K,M).EQ.0) GO TO 109	5/25/73	2146
	MOG=M-2	5/25/73	2147
	GO TO (82,91,100), MOG	5/25/73	2148
C		5/25/73	2149
62	KK=KK+1	5/25/73	2150
	N4=N4+6	5/25/73	2151
	PA1(N4+1)=TEMP3(1)*2.*SQSQEN	5/25/73	2152
	PB1(N4+1)=TEMP4(1)*2.*SQSQEN	5/25/73	2153
	IF (NFCH>.LE,0) GO TO 109	5/25/73	2154
	PA1(N4+2)=TEMP3(2)*SQSQEN	5/25/73	2155
	PB1(N4+2)=TEMP4(2)*SQSQEN	5/25/73	2156
	IF (NFCH>.LE,1) GO TO 109	5/25/73	2157
	PA1(N4+4)=TEMP3(3)*SQSQEN	5/25/73	2158
	PB1(N4+4)=TEMP4(3)*SQSQEN	5/25/73	2159
	GO TO 107	5/25/73	2160
C		5/25/73	2161
91	KK=KK+1	5/25/73	2162
	N4=N4+6	5/25/73	2163
	PA1(N4+2)=TEMP3(1)	5/25/73	2164
	PB1(N4+2)=TEMP4(1)	5/25/73	2165
	PA1(N4+3)=2.0*TEMP3(2)	5/25/73	2166
	PB1(N4+3)=2.0*TEMP4(2)	5/25/73	2167
	IF (NFCH>.LE,1) GO TO 109	5/25/73	2168
	PA1(N4+5)=TEMP3(3)	5/25/73	2169
	PB1(N4+5)=TEMP4(3)	5/25/73	2170
	GO TO 109	5/25/73	2171
C		5/25/73	2172
100	KK=KK+1	5/25/73	2173
	N4=N4+6	5/25/73	2174
	PA1(N4+4)=TEMP3(1)	5/25/73	2175
	PB1(N4+4)=TEMP4(1)	5/25/73	2176
	PA1(N4+5)=TEMP3(2)	5/25/73	2177
	PB1(N4+5)=TEMP4(2)	5/25/73	2178
	PA1(N4+6)=2.0*TEMP3(3)	5/25/73	2179
	PB1(N4+6)=2.0*TEMP4(3)	5/25/73	2180
109	CONTINUE	5/25/73	2181
118	CONTINUE	5/25/73	2182
C		5/25/73	2183
	KM1=KK	5/25/73	2184
C		5/25/73	2185
C	FORM ALPHA AND BETA MATRICES	5/25/73	2186
C		5/25/73	2187
	GO TO (145,136,127), NFCHS1	5/25/73	2188
127	A33=DOTPRO(MMM,ALPHAN,1,BETA33(MMS),1)*RINF(NGR+NA33)	5/25/73	2189
	A23=DOTPRO(MMM,ALPHAN,1,BETA23(MMS),1)*RINF(NGR+NA23)	5/25/73	2190
	A13=SQSQEN*(DOTPRO(MMM,ALPHAN,1,BETA13(MMS),1)*RINF(NGR+NA13))	5/25/73	2191
	R33=DOTPRO(MMM,BETAN,1,BETA33(MMS),1)*RINF(NGR+NB33)	5/25/73	2192
	R23=DOTPRO(MMM,BETAN,1,BETA23(MMS),1)*RINF(NGR+NB23)	5/25/73	2193
	R13=SQSQEN*(DOTPRO(MMM,BETAN,1,BETA13(MMS),1)*RINF(NGR+NB13))	5/25/73	2194
136	A22=DOTPRO(MMM,ALPHAN,1,BETA22(MMS),1)*RINF(NGR+NA22)	5/25/73	2195
	A12=SQSQEN*(DOTPRO(MMM,ALPHAN,1,BETA12(MMS),1)*RINF(NGR+NA12))	5/25/73	2196
	R22=DOTPRO(MMM,BETAN,1,BETA22(MMS),1)*RINF(NGR+NB22)	5/25/73	2197
	R12=SQSQEN*(DOTPRO(MMM,BETAN,1,BETA12(MMS),1)*RINF(NGR+NB12))	5/25/73	2198

145	A11=SQENER*(DOTPRO(MMM,ALPHAN,1,BETA11(MMS),1)*RINF(NGR+NA11))	5/25/73	2199
	B11=SQENER*(DOTPRO(MMM,BETAN,1,BETA11(MMS),1)*RINF(NGR+NB11))	5/25/73	2200
	MMS=MMS+MMM	5/25/73	2201
C		5/25/73	2202
C	FORM CROSS SECTION COMPENENTS	5/25/73	2203
C		5/25/73	2204
	IF (NFCHS.GT.0) GO TO 154	5/25/73	2205
	XNR1=1.-B11-A11*DSHIFT	5/25/73	2206
	XN11=A11-B11*DSHIFT	5/25/73	2207
	XDR1=1.+B11-A11*DSHIFT	5/25/73	2208
	XDI1=A11+B11*DSHIFT	5/25/73	2209
	XD=1./(XDR1**2+XDI1**2)	5/25/73	2210
	XNR=XNR1*XDR1-XN11*XDI1	5/25/73	2211
	XNI=XN11*XDR1+XNR1*XDI1	5/25/73	2212
	XREAL=XNR*XD	5/25/73	2213
	XIMG=XNI*XD	5/25/73	2214
	GO TO 170	5/25/73	2215
154	CONTINUE	5/25/73	2216
	IF (SIMPLE.EQ.0.) GO TO 172	5/25/73	2217
	XN1=1.+B11*B22*B33	5/25/73	2218
	XD2=A11+A22+A33	5/25/73	2219
	DR1=B11*B22*B33	5/25/73	2220
	DI1=A11+A22+A33	5/25/73	2221
	DR2=B11*B22-A11*A22-B12*B12+A12*A12+B11*B33-A11*A33-B13*B13+A13*A13	5/25/73	2222
	13-B22*B33-A22*A33-B23*B23+A23*A23	5/25/73	2223
	DI2=A11*B22+A22*B11-2.*A12*B12+A11*B33+A33*B11-2.*A13*B13+A22*B33+	5/25/73	2224
	1A33*B22-2.*A23*B23	5/25/73	2225
	DR3=B11*B22*B33+B11*(A23*A23-B23*B23-A22*A33)+B22*(A13*A13-B13*B13	5/25/73	2226
	1-A11*A33)+B33*(A12*A12-B12*B12-A11*A42)+2.*(B12*B13+B23-B12*(A13*A	5/25/73	2227
	223-A12*A33)-B13*(A12*A23-A13*A22)+B23*(A12*A13-A23*A11))	5/25/73	2228
	DI3=-A11*A22*A33+A11*(B22*B33-B23*B23+A23*A23)+A22*(B11*B33-B13*B1	5/25/73	2229
	13+A13*A13)+A33*(B11*B22-B12*B12+A12*A12)+2.*(-A12*A13*A23+A12*(B13	5/25/73	2230
	2*B23-B12*B13)+A13*(B12*B23-B13*B22)+A23*(B12*B13-B23*B11))	5/25/73	2231
	XD=1./((1.+DR1+DR2+DR3)**2+(DI1+DI2+DI3)**2)	5/25/73	2232
	IF (ITS.EQ.1) GO TO 163	5/25/73	2233
	TR1=B22*B33-B11	5/25/73	2234
	TI1=A11-A22-A33	5/25/73	2235
	TR2=A11*A22-B11*B22+B12*B12-A12*A12+A11*A33-B11*B33+B13*B13-A13*A1	5/25/73	2236
	13-(A22*A33-B22*B33+B23*B23-A23*A23)	5/25/73	2237
	TI2=A11*B22+A22*B11-2.*A12*B12+A11*B33+A33*B11-2.*A13*B13-(A22*B33	5/25/73	2238
	1+A33*B22-2.*A23*B23)	5/25/73	2239
	TR3=-B11*B12+B33*B11*(B23*B23-A23*A23+A22*A33)+B22*(B13*B13-A13*A1	5/25/73	2240
	13+A11*A33)+B33*(B12*B12-A22*A12+A11*A22)+2.*(-B12*B13+B23-B12*(A13	5/25/73	2241
	2*A23-A12*A33)+B13*(A12*A23-A13*A22)+B23*(A12*A13-A23*A11))	5/25/73	2242
	TI3=-A11*A22*A33+A11*(B22*B33-B23*B23+A23*A23)+A22*(B11*B33-B13*B1	5/25/73	2243
	13+A13*A13)+A33*(B11*B22-B12*B12+A12*A12)+2.*(-A12*A13*A23+A12*(B13	5/25/73	2244
	2*B23-B12*B13)+A13*(B12*B23-B13*B22)+A23*(B12*B13-B23*B11))	5/25/73	2245
	XNR=(1.+DR1+DR2+DR3)*(1.+TR1+TR2+TR3)-(DI1+DI2+DI3)*(TI1+TI2+TI3)	5/25/73	2246
	XN1=(1.+DR1+DR2+DR3)*(TI1+TI2+TI3)+(1.+TR1+TR2+TR3)*(DI1+DI2+DI3)	5/25/73	2247
	XNR1=1.+B22*B33	5/25/73	2248
	XNR2=A22*A33	5/25/73	2249
	XREAL=XNR*XD	5/25/73	2250
	XIMG=XN1*XD	5/25/73	2251
	IF (FIS=ICAP.EQ.1) GO TO 190	5/25/73	2252
163	XNF=(A12**2+B12**2)*(A33**2+(1.+B33)**2+A23**2+B23**2)+(A13**2+B13	5/25/73	2253
	1**2)*(A22**2+(1.+B22)**2+A23**2+B23**2)-2.*((B13*B23-A13*A23)*(B12	5/25/73	2254
	2*(1.+B33)-A12*A33)+(B12*B23-A12*A23)*(B13*(1.+B22)-A13*A42)+(A13*B	5/25/73	2255
	23+A23*B13)*(A12*(1.+B33)+A33*B12)+(A12*B23+A23*B12)*(A13*(1.+B22)	5/25/73	2256
	4+A22*B13))	5/25/73	2257
	XFIS=XNF*XD	5/25/73	2258
	GO TO 19	5/25/73	2259

172	CONTINUE	5/25/73	2260
	X01=1+B11*B22+B33	5/25/73	2261
	X02=A11*A22+A33	5/25/73	2262
	X0=1/(X01*X01+X02*X02+2.*(B11*B22-A11*A22+A12**2-B12**2+B11*B33-A	5/25/73	2263
	111*A33+A13**2-B13**2+B22*B33-A22*A33+A43**2-B23**2))	5/25/73	2264
	IF (ITSC.EQ.1) GO TO 181	5/25/73	2265
	XNR2=A22*A33	5/25/73	2266
	XNR1=1+B22*B33	5/25/73	2267
	XNR=XNR1*XNR1+XNR2*XNR2-A11*A11-B11*B11+2.*(B22*B33-A22*A33+A23**2	5/25/73	2268
	1-B43**2)	5/25/73	2269
	XNI=C.*(A11+2.*(A11*B22-A12*B12+A11*B33-A13*B13))	5/25/73	2270
	XREAL=XNR*X0	5/25/73	2271
	XIMG=XNI*X0	5/25/73	2272
	IF (1+ISS*ICAP.EQ.1) GO TO 190	5/25/73	2273
181	XNF=A12*A12+B12*B12+A13*A13+B13*B13	5/25/73	2274
	XFIS=XNF*X0	5/25/73	2275
190	CONTINUE	5/25/73	2276
C		5/25/73	2277
	FORM PARTIAL OF THE CROSS SECTION COMPONENTS	5/25/73	2278
C		5/25/73	2279
	IF (IAUT*IPKE.EQ.0) GO TO 271	5/25/73	2280
C		5/25/73	2281
	IF (KML.LT.KML) GO TO 271	5/25/73	2282
	MK1=(KML-2)*6	5/25/73	2283
	DO 292 MK=KML,KM1	5/25/73	2284
	MK1=MK1+6	5/25/73	2285
	M11=1+MK1	5/25/73	2286
	M12=2+MK1	5/25/73	2287
	M13=4+MK1	5/25/73	2288
	M22=3+MK1	5/25/73	2289
	M23=5+MK1	5/25/73	2290
	M33=6+MK1	5/25/73	2291
	IF (NPCHS.GT.0) GO TO 199	5/25/73	2292
	PXNR=-PB1(M11)-PA1(M11)*DSHIFT	5/25/73	2293
	PXNI=PA1(M11)-PB1(M11)*DSHIFT	5/25/73	2294
	PXDR=PB1(M11)-PA1(M11)*DSHIFT	5/25/73	2295
	PXDI=PA1(M11)+PB1(M11)*DSHIFT	5/25/73	2296
	PR=XNR1*PXDR+XDR1*PXNR-XNI1*PXDI-XDI1*PXNI	5/25/73	2297
	PI=XNI1*PXDR+XDR1*PXNI+XNR1*PXDI+XDI1*PXNR	5/25/73	2298
	PD=XDR1*PXDR+XDI1*PXDI	5/25/73	2299
	PR=0.5*PR	5/25/73	2300
	PI=0.5*PI	5/25/73	2301
	GO TO 208	5/25/73	2302
199	CONTINUE	5/25/73	2303
	PD=XD1*(PB1(M11)+PB1(M22)+PB1(M33))+XD2*(PA1(M11)+PA1(M22)+PA1(M33	5/25/73	2304
	1))+B11*PB1(M22)+B22*PB1(M11)-A11*PA1(M22)-A22*PA1(M11)+2.*(A12*PA	5/25/73	2305
	21*(P12)-P12*PB1(M12))+B11*PB1(M33)+B33*PB1(M11)-A11*PA1(M33)-A33*PA	5/25/73	2306
	31(M11)+2.*(A13*PA1(M13)-B13*PB1(M13))+B22*PB1(M33)+B33*PB1(M22)-A2	5/25/73	2307
	42*PA1(M33)-A33*PA1(M22)+2.*(A23*PA1(M23)-B23*PB1(M23)))	5/25/73	2308
	IF (ITSC.EQ.1) GO TO 217	5/25/73	2309
	PR=XNR1*(PB1(M22)+PB1(M33))+XNR2*(PA1(M22)+PA1(M33))-A11*PA1(M11)-	5/25/73	2310
	1A11*PB1(M11)+B22*PB1(M33)+B33*PB1(M22)-A22*PA1(M33)-A33*PA1(M22)+2	5/25/73	2311
	2.*(A23*PA1(M23)-B23*PB1(M23))	5/25/73	2312
	PI=PA1(M11)+2.*(A11*PB1(M22)+B22*PA1(M11)-A12*PB1(M12)+B12*PA1(M12	5/25/73	2313
	1)+A11*PB1(M33)+B33*PA1(M11)-A13*PB1(M13)-B13*PA1(M13))	5/25/73	2314
208	CONTINUE	5/25/73	2315
	PRD=XD*(PR-XD*XNR*PD)	5/25/73	2316
	PID=XD*(PI-XD*XNI*PD)	5/25/73	2317
	IF (IFISS*ICAP.EQ.1) GO TO 226	5/25/73	2318
217	PF=A12*PA1(M12)+B12*PB1(M12)+A13*PA1(M13)+B13*PB1(M13)	5/25/73	2319
	PF4=XD*(PF-XD*XNF*PD)	5/25/73	2320

226	CONTINUE	5/25/73	2321
C		5/25/73	2322
C	PARTIALS OF THE CROSS SECTION FORMED	5/25/73	2323
C		5/25/73	2324
	IF (ITOTAL.EQ.1) GO TO 235	5/25/73	2325
	SJKL(JXJ)=-4.0*PILAMS*GOJ(NGR)*(CSINE*PRD+SINE*PID)	5/25/73	2326
	JXJ=JXJ+1	5/25/73	2327
235	IF (ISCAT.EQ.1) GO TO 244	5/25/73	2328
	SJKL(JXK)=4.0*PILAMS*GOJ(NGR)*((-1.-XREAL*CSINE-XIMG*SINE)*(PRD*CS	5/25/73	2329
	INE+SINE*PID)+(XREAL*SINE-XIMG*CSINE)*(PRD*SINE-CSINE*PID))	5/25/73	2330
	JXK=JXK+1	5/25/73	2331
244	IF (IFISS.EQ.1) GO TO 253	5/25/73	2332
	SJKL(JXL)=8.0*PILAMS*GOJ(NGR)*PFD	5/25/73	2333
	JXL=JXL+1	5/25/73	2334
253	IF (ICAP.EQ.1) GO TO 262	5/25/73	2335
	SJKL(JXM)=4.0*PILAMS*GOJ(NGR)*((-1.-CSINE*XREAL-XIMG*SINE-1.0)*(CSI	5/25/73	2336
	NE*PRD+SINE*PID)-(XREAL*SINE-XIMG*CSINE)*(SINE*PRD-CSINE*PID)-2.0*	5/25/73	2337
	2PFD)	5/25/73	2338
	JXM=JXM+1	5/25/73	2339
262	CONTINUE	5/25/73	2340
	KML=KML+1	5/25/73	2341
C		5/25/73	2342
C	CROSS SECTIONS FORMED	5/25/73	2343
C		5/25/73	2344
271	IF (ITOTAL.EQ.1) GO TO 280	5/25/73	2345
	SIGT(IBT)=SIGT(IBT)+2.0*PILAMS*GOJ(NGR)*(1.-XREAL*CSINE-XIMG*SINE)	5/25/73	2346
280	IF (ISCAT.EQ.1) GO TO 289	5/25/73	2347
	SIGT(IBS)=SIGT(IBS)+PILAMS*GOJ(NGR)*((1.-XREAL*CSINE-XIMG*SINE)**2	5/25/73	2348
	1+(XREAL*SINE-XIMG*CSINE)**2)	5/25/73	2349
C		5/25/73	2350
289	IF (IFISS.EQ.1) GO TO 298	5/25/73	2351
	SIGT(IBF)=SIGT(IBF)+4.0*PILAMS*GOJ(NGR)*XFIS	5/25/73	2352
298	IF (ICAP.EQ.1) GO TO 307	5/25/73	2353
	SIGT(IBC)=SIGT(IBC)+PILAMS*GOJ(NGR)*(2.0*(1.-XREAL*CSINE-XIMG*SINE	5/25/73	2354
	1)-((1.-CSINE*XREAL-SINE*XIMG)**2+(XREAL*SINE-XIMG*CSINE)**2+4.0*XF	5/25/73	2355
	2IS))	5/25/73	2356
307	CONTINUE	5/25/73	2357
C		5/25/73	2358
	RETURN	5/25/73	2359
C		5/25/73	2360
	END	5/25/73	2361
C	-----	101173	63
C	SUBROUTINE PHIGRAD	101173	64
C	-----	101173	65
	SUBROUTINE PHIGRAD	5/25/73	2362
C		5/25/73	2363
C	*** COMMON BLOCK ***	5/25/73	2364
C		5/25/73	2365
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	2366
	14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSST(4),IS16,IS17,IS18	5/25/73	2367
	2,STORAGE,SIMPLE,STORBRD,ZERSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	2368
	3DELTA,DELTAE,IRE SOPR,NORRD,WUP,WLW,NKLP(4),BOUND(10),PRINTLS,EST,	5/25/73	2369
	4DSHIFT,NPSM,NGRPM	101173	66
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	2371
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,D0,FRACT,E	5/25/73	2372
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSIORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	2373
	3,IRIGJ,IRIGK,IRIGL,IRIGM,IBT,IBS,IBF,IBC,MAXID,IRESTOT,MAXENM,MSTO	5/25/73	2374
	4REN,DELTAI,DELTA,DISI,NHESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	2375
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	2376
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETA,GR(100,4),GG	5/25/73	2377
	7A(100)*GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIXMX,ETAOP,IFC	5/25/73	2378

85, IDUMMY, KMS, RETVAR, MOPTA, NFILES, BETA1(100), BETA12(100), BETA13(100), BETA2(100), BETA23(100), BETA3(100), IENER1	5/25/73	2379
COMMON /3/ RINF(120), NW1(1), NA11, NB12, NB22, NA12, NA22, NB13, NB23, NB133, NA13, NA23, NA33	5/25/73	2380
*** DIMENSION BLOCK ***	5/25/73	2381
DIMENSION ENER(1), EXT(1), CROSS(1), P(1), JS(1)	5/25/73	2382
DIMENSION ENER1(1)	5/25/73	2383
*** EQUIVALENCE BLOCK ***	5/25/73	2384
EQUIVALENCE (ISKP, SIGT(1)), (CORR2, SIGT(2)), (I, IPKE), (NW10, SJKL)	5/25/73	2385
1, (JL, SJKL(3)), (JU, SJKL(5)), (IP, SJKL(7)), (IE, SJKL(9))	5/25/73	2386
EQUIVALENCE (THETA, E, ENER, EE, DUMMY), (DIA, EXT, ENER1, DUMMY(1601)),	5/25/73	2387
1(CROSS, IC, DUMMY(3201)), (SIGDR, DNUM, DUMMY(4801)), (GRADS, GRAD(151)	5/25/73	2388
2), (GS1, DUMMY(7400)), (ES1, DUMMY(7501)), (EES, DUMMY(7601)), (SS, DU	5/25/73	2389
3MMY(101)), (Z, R, GRAD, DUMMY(501)), (GSAV, A, DUMMY(651)), (DIAG, DUMMY	5/25/73	2390
4(11976)), (P, DUMMY(12126)), (JS, DUMMY(12136)), (CTHETA, DUMMY(12142	5/25/73	2391
5)), (ZSQ1, DUMMY(12152)), (PH1, DUMMY(12162)), (USAV, DUMMY(12172)),	5/25/73	2392
6(PP, DUMMY(6401))	5/25/73	2393
PHIGRAD IS A SET UP ROUTINE WHICH READS IN THE PARAMETERS AND	5/25/73	2394
THE DATA(RIDATA). IT ALSO CALLS ROUTINES ESCALE, PANU, ALPHBT, ECSP,	5/25/73	2395
AND INTWIS.	5/25/73	2396
READ IN INPUT PARAMETERS	5/25/73	2397
IERRT=0	5/25/73	2398
READ (2,307) (TITLE(1), I=1,6), ELEM, RUNNO	5/25/73	2399
READ (2,316) (IF1(I), I=1,4), ITAPE, LLY, NFCHS, ITMAX, INMAX	5/25/73	2400
READ (2,325) AW, TEMP, CRFN, ERROR, DIST, THICK, DELTAG, DELTAE, DELTAL, YMA	5/25/73	2401
1X, YMIN, LSPAN, STORAGE, SIMPLE, PRINTCS, DSHIFIF	5/25/73	2402
READ (2,496) (GOJ(J), GRSPIN(J), BOUND(J), J=1, NGRPM)	5/25/73	2403
READ (2,433) SKIP, CHIN, CMAX, NPS	5/25/73	2404
NRES=0	5/25/73	2405
NRES=NRES+1	5/25/73	2406
READ (2,334) (P(J), J=1,5), (JS(J), J=1,6)	5/25/73	2407
IF (P(3).LE.0.) P(3)=1.E-10	5/25/73	2408
IF (P(4).EQ.0.) P(4)=1.E-6	5/25/73	2409
IF (P(5).EQ.0.) P(5)=1.E-6	5/25/73	2410
IF (P(1).EQ.0.) GO TO 10	5/25/73	2411
PKFN(NRES)=P(1)	5/25/73	2412
GGA(NRES)=P(2)	5/25/73	2413
GS1(NRES,1)=P(3)	5/25/73	2414
GS1(NRES,2)=P(4)	5/25/73	2415
GS1(NRES,3)=P(5)	5/25/73	2416
IELIM(NRES,1)=JS(1)	5/25/73	2417
IELIM(NRES,2)=JS(2)	5/25/73	2418
IELIM(NRES,3)=JS(3)	5/25/73	2419
IELIM(NRES,4)=JS(4)	5/25/73	2420
IELIM(NRES,5)=JS(5)	5/25/73	2421
IF (JS(6).LE.0) JS(6)=1	5/25/73	2422
IGROUP(NRES)=JS(6)	5/25/73	2423
GO TO 1	5/25/73	2424
NRES=NRES+1	5/25/73	2425
DO 19 I=1,NRES	5/25/73	2426
IELIMS(I)=IELIM(I,1)+IELIM(I,2)+IELIM(I,3)+IELIM(I,4)+IELIM(I,5)	5/25/73	2427

	DO 19 M=1,5	5/25/73	2440
	IF (IELIM(I,M).GT.0) GO TO 19	5/25/73	2441
	IELIM(I,M)=0	5/25/73	2442
19	CONTINUE	5/25/73	2443
C		5/25/73	2444
C	SET IFISS ,ISCAT, ITOTAL, AND ICAP	5/25/73	2445
		5/25/73	2446
	IFISS=ITOTAL=ISCAT=ICAP=1	5/25/73	2447
	DO 55 I=1,4	5/25/73	2448
	IF (IF1(I).NE.5HTOTAL) GO TO 28	5/25/73	2449
	ITOTAL=2	5/25/73	2450
28	IF (IF1(I).NE.7HSCATTER) GO TO 37	5/25/73	2451
	ISCAT=2	5/25/73	2452
37	IF (IF1(I).NE.7HFISSION) GO TO 46	5/25/73	2453
	IFISS=2	5/25/73	2454
46	IF (IF1(I).NE.7HCAPTURE) GO TO 55	5/25/73	2455
	ICAP=2	5/25/73	2456
55	CONTINUE	5/25/73	2457
C		5/25/73	2458
	NFCHS1=NFCHS+1	5/25/73	2459
	NFCHS2=NFCHS+2	5/25/73	2460
	NFCHS3=NFCHS+3	5/25/73	2461
	IDIMX=ITOTAL/2+ISCAT/2+IFISS/2+ICAP/2	5/25/73	2462
	MAXENM=MAXENM/IDIMX	5/25/73	2463
C		5/25/73	2464
	CALL PARU	5/25/73	2465
	IF (KM.EQ.0) KM=KMX=1	5/25/73	2466
C		5/25/73	2467
C		5/25/73	2468
	CALL DATE1 (DAIT)	5/25/73	2469
C		5/25/73	2470
C	READ CLOCK TIME, DATE, AND INPUT DATA.	5/25/73	2471
C		5/25/73	2472
	CALL CLOCK1 (TIME)	5/25/73	2473
C		5/25/73	2474
C	READ IN INPUT DATA	5/25/73	2475
C	CROSS = CROSS SECTION	5/25/73	2476
C	ENER = ENERGY OF DATA POINTS	5/25/73	2477
C		5/25/73	2478
	CALL RIDATA	5/25/73	2479
C		5/25/73	2480
	MAXID=MAXEN*IDIMX	5/25/73	2481
C		5/25/73	2482
C	SETUP FOR BROADENING	5/25/73	2483
C		5/25/73	2484
	DO=.318*SQRT(TEMP/293.0)	5/25/73	2485
	DIST1=1./DIST	5/25/73	2486
	A02=(0.04661*DIST1*DELTA0)**2	5/25/73	2487
	B02=(0.81650*DIST1*DELTA1)**2	5/25/73	2488
	C02=0.02766*DIST1*DELTA2	5/25/73	2489
	NOBRD=0	5/25/73	2490
	IRESTOT=0	71373	1
	IF (A02+B02+C02+DO.EQ.0.) IRESTOT=NOBRD=1	5/25/73	2491
	IF (A02+B02.NE.0..AND.C02.EQ.0.) IRESOPH=1	5/25/73	2492
	IF (A02+B02.EQ.0..AND.C02.NE.0.) IRESOPH=2	5/25/73	2493
	IF (A02+B02.NE.0..AND.C02.NE.0.) IRESOPH=3	5/25/73	2494
	NKCP(1)=NKCP(2)=4	5/25/73	2496
	IF (IRE=OPR.EQ.3) NKCP(1)=5	5/25/73	2497
	NN=(7*NFCHS1)/3-1	5/25/73	2498
	NI=(NN+1)/2	5/25/73	2499
C		5/25/73	2500

C	IF (ITAPE.EQ.6HNO DATA) ERROR=-1.0	5/25/73	2501
C	COMPUTE CHANNEL RADIUS (CRFN) IF READ IN AS ZERO	5/25/73	2502
C	IF (CRFN.GT.0.) GO TO 64	5/25/73	2503
64	CRFN=1.45*(11.00Y*AW)**.333)	5/25/73	2504
C	CONTINUE	5/25/73	2505
C	WRITE OUT INPUT PARAMETERS	5/25/73	2506
C	IF (SIMPLE.EQ.0) WRITE (3,235)	5/25/73	2507
C	IF (SIMPLE.NE.0) WRITE (3,244)	5/25/73	2508
C	IF (STORAGE.EQ.) WRITE (3,253)	5/25/73	2509
C	IF (STORAGE.NE.0) WRITE (3,262)	5/25/73	2510
C	WRITE (3,343) (TILE(I),I=1,6),ELEM,DAIT,RUNNO,TIME	5/25/73	2511
C	WRITE (3,352)	5/25/73	2512
C	WRITE (3,361) (IF1(I),I=1,4),ITAPE,LLY,NN,NI,NFCHS,IIMAX,MAXEN,NGRO	5/25/73	2513
C	IUP,KM,NPS	5/25/73	2514
C	WRITE (3,370)	5/25/73	2515
C	WRITE (3,379)AW,TEMP,CHFN,ERROR,DISI,DELTAG,DELTAE,DELTAL	5/25/73	2516
C	WRITE (3,415)	5/25/73	2517
C	WRITE (3,388)THICK,YMAX,YMIN,ESPAN,A02,B02,CO2,DO,CMIN,CMAX	5/25/73	2518
C	WRITE (3,289)NGROUP	5/25/73	2519
C	WRITE (3,298) (J,GRSPIN(J),GOJ(J),BOUND(J),J=1,NGROUP)	5/25/73	2520
C	IF (NFCHS.EQ.0.AND.DSHIF1P.EQ.0.) WRITE (3,271)	5/25/73	2521
C	IF (NFCHS.EQ.0.AND.DSHIF1F.NE.0.) WRITE (3,280)	5/25/73	2522
C	WRITE (3,397)	5/25/73	2523
C	WRITE (3,406) ((PKEN(I),GGA(I),(GSI(I,J),J=1,3),(IELIM(I,J),J=1,5),	5/25/73	2524
C	IIGROUP(I)),I=1,NRES)	5/25/73	2525
C	IF (ITAPE.EQ.4HTAPE) WRITE (3,478)ENER(1),ENER(MAXEN),ISKP,CORR2	5/25/73	2526
C	IF (ITAPE.NE.4HTAPE) WRITE (3,487)ENER(1),ENER(MAXEN)	5/25/73	2527
C		101173	68
C	CHECK NPS AGAINST NPSM	101173	69
C		101173	70
C	IF (NPS .LE. NPSM) GO TO 731	101173	71
C	WRITE (3,424)NPS ,NPSM	101173	72
C		101173	73
C	STOP	101173	74
C		101173	75
731	CONTINUE	101173	76
C		5/25/73	2532
C	CHECK NRES AGAINST NRESM	5/25/73	2533
C		5/25/73	2534
C	IF (NRES.LE.NRESM) GO TO 73	5/25/73	2535
C	WRITE (2,424)NRES,NRESM	5/25/73	2536
C		5/25/73	2537
C	STOP	5/25/73	2538
C		5/25/73	2539
73	CONTINUE	5/25/73	2540
C		5/25/73	2541
C	CHECK KMx AGAINST KMMAX	5/25/73	2542
C		5/25/73	2543
C	IF (KMx.LE.KMMAX) GO TO 82	5/25/73	2544
C	WRITE (3,451)KMx,KMMAX	5/25/73	2545
C		5/25/73	2546
C	STOP	5/25/73	2547
C		5/25/73	2548
82	CONTINUE	5/25/73	2549
C		5/25/73	2550
C		5/25/73	2551
C	EXT = WEIGHTING FACTORS FOR THE LEAST SQUARES ROUTINE	5/25/73	2552

C		5/25/73	2553
	IF (ERROR) 91,109,127	5/25/73	2554
91	DO 100 I=1,MAXID	5/25/73	2555
100	EXT(I)=1.0	5/25/73	2556
	GO TO 145	5/25/73	2557
109	DO 118 I=1,MAXID	5/25/73	2558
118	EXT(I)=1./EXT(I)	5/25/73	2559
	GO TO 145	5/25/73	2560
127	XX=100.0/ERROR	5/25/73	2561
	DO 136 I=1,MAXID	5/25/73	2562
136	EXT(I)=XX/CROSS(I)	5/25/73	2563
145	CONTINUE	5/25/73	2564
C		5/25/73	2565
	J1=0	5/25/73	2566
	DO 154 J=1,IDIMX	5/25/73	2567
	J2S=J-1-IDIMX	5/25/73	2568
	J2C=J2S*MAXID	5/25/73	2569
	DO 154 JX=1,MAXEN	5/25/73	2570
	J1=J1+1	5/25/73	2571
	J2S=J2C+IDIMX	5/25/73	2572
	J2C=J2C-IDIMX	5/25/73	2573
C		5/25/73	2574
C	*** WRITE ECS EXT,CROSS INTO TEMP, ECS LOCATION ***	5/25/73	2575
C		5/25/73	2576
	CALL ECWR (EXT(J1),J2S,1,IERR)	5/25/73	2577
	IERRT=IERRT+IERR	5/25/73	2578
	CALL ECWR (CROSS(J1),J2C,1,IERR)	5/25/73	2579
154	IERRT=IERRT+IERR	5/25/73	2580
	MAXEN1=MAXEN	5/25/73	2581
	IF (NOBRD.EQ.0) GO TO 172	5/25/73	2582
	DO 163 J=1,MAXEN	5/25/73	2583
163	ENER1(J)=ENER(J)	5/25/73	2584
	GO TO 181	5/25/73	2585
C		5/25/73	2586
C	*** FORM ENER1 ***	5/25/73	2587
C		5/25/73	2588
172	CALL ESCALE	5/25/73	2589
181	CONTINUE	5/25/73	2590
C		5/25/73	2591
C	*** DEFINE ECS POSITIONS FOR PARAMETERS STORED ON ECS ***	5/25/73	2592
C		5/25/73	2593
	IS1=MAXEN1-IDIMX	5/25/73	2594
	IS2=IS1+MAXEN1-IDIMX	5/25/73	2595
	IS3=IS2+MAXEN*KMX	5/25/73	2596
	IS4=IS3	5/25/73	2597
	IS5=IS4+NKCP(1)*MAXEN	5/25/73	2598
	IS6=IS5+4*MAXEN1	5/25/73	2599
	IS7=IS6+MAXEN1	5/25/73	2600
	IS8=IS7+MAXEN	5/25/73	2601
	IS9=IS8+MAXID	5/25/73	2602
	IS10=IS9+MAXID	5/25/73	2603
	IS11=IS10+MAXID*(NPS+1)	5/25/73	2604
	IS12=IS11*KMS	5/25/73	2605
	IS13=IS12*KM	5/25/73	2606
	IS14=IS13*KM*NPS	5/25/73	2607
	IS15=IS14	5/25/73	2608
C		5/25/73	2609
C	*** WRITE ECS ENER ,ENER1 ***	5/25/73	2610
C		5/25/73	2611
	CALL ECWR (ENER,IS7,MAXEN,IERR)	5/25/73	2612
	IERRT=IERRT+IERR	5/25/73	2613

	CALL ECWR (ENER1,IS6,MAXEN1,IERR)	5/25/73	2614
	IERRT=IERRT+IERR	5/25/73	2615
	IS16=IS17=IS15	5/25/73	2616
	IALBE=2*NGROUP*NN	5/25/73	2617
	DO 190 I=1,IALBE	5/25/73	2618
190	RINF(I)=0.	5/25/73	2619
	ZERSTOR=0.	5/25/73	2620
	IF (ITAPE.EQ.6HNODEATA) STORAGE=1.	5/25/73	2621
	IF (STORAGE.GT.0) GO TO 208	5/25/73	2622
	NN2=2*NN	5/25/73	2623
	NR11(1)=0	5/25/73	2624
	DO 199 K=2,NN2	5/25/73	2625
199	NR11(K)=NR11(K-1)+NGROUP	5/25/73	2626
	CALL ALPHBT	5/25/73	2627
208	CONTINUE	5/25/73	2628
C		5/25/73	2629
C	*** READ ECS EXT,CROSS AND WRITE THEM ON ECS ***	5/25/73	2630
C		5/25/73	2631
	CALL ECRD (EXT,0,MAXID,IERR)	5/25/73	2632
	IERRT=IERRT+IERR	5/25/73	2633
	CALL ECRD (CROSS,MAXID,MAXID,IERR)	5/25/73	2634
	IERRT=IERRT+IERR	5/25/73	2635
	CALL ECWR (EXT,IS8,MAXID,IERR)	5/25/73	2636
	IERRT=IERRT+IERR	5/25/73	2637
	CALL ECWR (CROSS,IS9,MAXID,IERR)	5/25/73	2638
	IERRT=IERRT+IERR	5/25/73	2639
C		5/25/73	2640
C	*** FORM KC,I,IAI,WID ***	5/25/73	2641
C		5/25/73	2642
	IS18=IS16	5/25/73	2643
	IF (NOBRD.EQ.1) GO TO 217	5/25/73	2644
	CALL ECSP	5/25/73	2645
	CALL INTWIS	5/25/73	2646
217	CONTINUE	5/25/73	2647
	WRITE (3,469) IS18	5/25/73	2648
	IF (IS18.GT.IECS) GO TO 226	5/25/73	2649
C		5/25/73	2650
	IF (IERRT.EQ.0) RETURN	5/25/73	2651
	WRITE (3,442)	5/25/73	2652
C		5/25/73	2653
	STOP	5/25/73	2654
C		5/25/73	2655
226	WRITE (3,460) IS18,IECS	5/25/73	2656
	STOP	5/25/73	2657
C		5/25/73	2658
C		5/25/73	2659
C		5/25/73	2660
235	FORMAT (1H1,85HXXXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CA	5/25/73	2661
	LCULATE CROSS SECTIONS XXXXXXXXXXXX)	5/25/73	2662
244	FORMAT (81HXXXXXXXXXX GENERAL R-MATRIX FORMULAS USED TO CALCULATE	5/25/73	2663
	1 CROSS SECTION XXXXXXXXXXXX)	5/25/73	2664
253	FORMAT (67HXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED	5/25/73	2665
	1 XXXXXXXXXXXX)	5/25/73	2666
262	FORMAT (71HXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES NOT CALCUL	5/25/73	2667
	ATED XXXXXXXXXXXX)	5/25/73	2668
271	FORMAT (48HXXXXXXXXXX LEVEL SHIFT CALCULATED XXXXXXXXXXXX)	5/25/73	2669
280	FORMAT (56HXXXXXXXXXX LEVEL SHIFT ASSUMED TO BE ZERO XXXXXXXXXXXX	5/25/73	2670
	1X)	5/25/73	2671
289	FORMAT (//,68H ANGULAR MOMENTUM,BOUNDARY CONDITIONS,AND G VALUES O	5/25/73	2672
	IF SPIN GROUPS 1=,I2,/,32H GROUP L VALUE G VALUE BOUNDO	5/25/73	2673
298	FORMAT (I4,F8.0, X,2F8.3)	5/25/73	2674

307	FORMAT (8A8)	5/25/73	2675
316	FORMAT (5A8,4I2)	5/25/73	2676
325	FORMAT (6E12,0)	5/25/73	2677
334	FORMAT (5E12,0,6I2)	5/25/73	2678
343	FORMAT (5X,29HMULTILEVEL ANALYSIS OF ,6A8,,5X,9MELEMENT ,A	5/25/73	2679
	1R,5X,0KDATE ,A8,5X,12HRUN NUMBER ,A8,5X,5HTIME ,A9,//)	5/25/73	2680
352	FORMAT (//20X3HIF11,4XSH11APE8X,59MLLY NN NI NFCHS ITMAX	5/25/73	2681
	1 MAXEN NGROUP KM NPS)	5/25/73	2682
361	FORMAT (5X,5A8,9I7)	5/25/73	2683
370	FORMAT (//,8X,2HAW,6X,4HTEMP,6X,4HCFN,5X,SHERROR,6X,4HDIST,4X,6HD	5/25/73	2684
	1ELTAG,4X,6HDELTAE,4X,6HDELTAL)	5/25/73	2685
379	FORMAT (12F10,4)	5/25/73	2686
388	FORMAT (10E12,4)	5/25/73	2687
397	FORMAT (//,21X,4HPKEN,12X,3HGGG,10X,5HGS1 1,10X,5HGS1 2,10X,5HGS1	5/25/73	2688
	13,13X,10H1 2 3 4 5 IGROUP)	5/25/73	2689
406	FORMAT (10X,5G15,6,12X,6I4)	5/25/73	2690
415	FORMAT (/,4X,5HTHICK,7X,4HYMAX,8X,4HYMIN,10X,SHESPAN,7X,3HA02,9X,3	5/25/73	2691
	1HB029X3HC029X2H00RX,4HCMIN8X,4HCMAX)	5/25/73	2692
424	FORMAT (//,52M PHIGRAD NUMBER OF RESONANCES EXCEEDS NRESM NRES=	5/25/73	2693
	1,16,7M NMESM=,16)	5/25/73	2694
433	FORMAT (A8,2E12,0,112,4E12,0)	5/25/73	2695
442	FORMAT (//,23M ECS ERKOR IN PHIGRAD)	5/25/73	2696
451	FORMAT (//,51M PHIGRAD NUMBER OF PARAMETERS EXCEEDS KMAX KMA=,	5/25/73	2697
	116,7M KMAX=,16)	5/25/73	2698
460	FORMAT (//,69M PHIGRAD ECS REQUIRED FOR PROBLEM EXCEEDS AVAILABL	5/25/73	2699
	IF STORAGE IS18=,18,6M IECS=,18)	5/25/73	2700
469	FORMAT (/,11M ECS USED =,19)	5/25/73	2701
478	FORMAT (/,19M DATA READ IN FROM ,E12,4,4M TO ,E12,4,10M SKIPPING ,	5/25/73	2702
	116,44M RECORDS WITH A SQUARED CORRELATED ERROR OF ,E12,4)	5/25/73	2703
487	FORMAT (/,32M DATA READ IN OR GENERATED FROM ,E12,4,4M TO ,E12,4)	5/25/73	2704
496	FORMAT (61F5,0,F2,0,F5,0)	5/25/73	2705
4241	FORMAT(//,59M PHIGRAD NUMBER OF ENTRIES IN P TABLE EXCEEDS NSPM	101173	77
	INPS =,16,6M NPSM=,16)	101173	78
	END	5/25/73	2706
C	-----	101173	79
C	SUBROUTINE ALPHBT	101173	80
C	-----	101173	81
	SUBROUTINE ALPHBT	5/25/73	2707
C		5/25/73	2708
C	*** COMMON BLOCK ***	5/25/73	2709
C		5/25/73	2710
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXP0,SUM1(	5/25/73	2711
	14),SJKL(150),SIGT(4),DUMMY(12341),EXIT(4),CROSSI(4),IS16,IS17,IS18	5/25/73	2712
	2,STORAGE,SIMPLE,STORBUO,ZERSTOR,GHSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	2713
	3DELTA,DELTA,RESOPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	2714
	4DSHIFT	5/25/73	2715
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NMES,NFCHS,NFCHS1,	5/25/73	2716
	INFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWIO,THICK,A02,B02,C02,00,FRACT,E	5/25/73	2717
	2LEM,RUNNO,NODAT,CAIT,ITAPE,MSIURE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	2718
	3,10IGJ,10IGK,10IGL,10IGH,IHT,IHS,IHF,IHC,MAXIO,IRESTUT,MAXENH,MSTO	5/25/73	2719
	4REN,DELTA1,DELTA1,01SI,NMESM,NZ,NGRAV,PH11,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	2720
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	2721
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GS1(100,3),BETAPR(100,4),GG	5/25/73	2722
	7A(100),G0J(10),IGROUP(100),TITLE(6),KMAX,IS10NPS,IUIMX,ETAOP,IFC	5/25/73	2723
	8S,1DUMMY,KMS,RETVAR,MOPTA,NF1LS,BETA1(100),BETA12(100),BETA13(10	5/25/73	2724
	90),BETA22(100),BETA23(100),BETA33(100),IENERI	5/25/73	2725
	COMMON /3/ RINF(120),NO11(1),NA11,NB12,NH22,NA12,NA22,NH13,NH23,NB	5/25/73	2726
	133,NA13,NA23,NA33	5/25/73	2727
	FOUVALANCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENER1,DUMMY(1601)),	5/25/73	2728
	1(CROSS,IC,DUMMY(3201)), (SIGOK,DNUM,DUMMY(4001)), (GHADS,GHAL(15)	5/25/73	2729
	2), (GS1,DUMMY(7400)), (ES1,DUMMY(7501)), (ECS,DUMMY(7601)), (SS,DU	5/25/73	2730

	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	2731
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTNETA,DUMMY(12142	5/25/73	2732
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	2733
	6(PP,DUMMY(6401))	5/25/73	2734
C		5/25/73	2735
	DIMENSION ENER1(1)	5/25/73	2736
	DIMENSION TEMPG(1), TEMPE(1), MM(10)	5/25/73	2737
	DIMENSION ALPHAN(1), BETAN(1)	5/25/73	2738
	EQUIVALENCE (ALPHAN,DUMMY(200)), (BETAN,DUMMY(300))	5/25/73	2739
	EQUIVALENCE (TEMPG(1),DUMMY(1)), (TEMPE(1),DUMMY(100))	5/25/73	2740
C		5/25/73	2741
C	ALPHBT FORMS THE MATRICE BETAJK= BEIAPR(I,J)*BETAPR(I,K) AND	5/25/73	2742
C	THE R-INFINITY MATRICES RINF.	5/25/73	2743
C		5/25/73	2744
	ISS=IS15	5/25/73	2745
	M=0	5/25/73	2746
	CALL ECRD (ENER1,IS6,MAXEN1,IERR)	5/25/73	2747
	DO 37 K=1,NGROUP	5/25/73	2748
	MM(K)=0	5/25/73	2749
	MM=0	5/25/73	2750
	DO 28 I=1,NRES	5/25/73	2751
	IF (IGROUP(I).NE.K) GO TO 28	5/25/73	2752
	IF (IELIMS(I).NE.0) GO TO 28	5/25/73	2753
	M=M+1	5/25/73	2754
	MM=MM+1	5/25/73	2755
	TEMPG(M)=BETAPR(I,4)**2	5/25/73	2756
	TEMPE(M)=PKEN(I)	5/25/73	2757
	S=BETAPR(I,1)	5/25/73	2758
	GO TO (*2,10,1), NFMCS1	5/25/73	2759
1	BETA33(M)=BETAPR(I,3)**2	5/25/73	2760
	BETA23(M)=BETAPR(I,2)*BETAPR(I,3)	5/25/73	2761
	BETA13(M)=S*BETAPR(I,3)	5/25/73	2762
10	BETA22(M)=BETAPR(I,2)**2	5/25/73	2763
	BETA12(M)=S*BETAPR(I,2)	5/25/73	2764
19	BETA11(M)=S*S	5/25/73	2765
28	CONTINUE	5/25/73	2766
37	MM(K)=MM	5/25/73	2767
	IF (M.EQ.0) RETURN	5/25/73	2768
	ZERSTOR=1.	5/25/73	2769
	DO 91 K=1,MAXEN1	5/25/73	2770
	S=ENER1(K)	5/25/73	2771
	DO 46 I=1,M	5/25/73	2772
	DIFEN=TEMPE(I)-S	5/25/73	2773
	XDEN=1./DIFEN**2*TEMPG(I)**2	5/25/73	2774
	ALPHAN(I)=DIFEN*XDEN	5/25/73	2775
46	BETAN(I)=TEMPG(I)*XDEN	5/25/73	2776
	MMS=1	5/25/73	2777
	DO 82 NGR=1,NGROUP	5/25/73	2778
	IF (MM(NGR).EQ.0) GO TO 82	5/25/73	2779
	GO TO (73,64,55), NFMCS1	5/25/73	2780
55	RINF(NGR,NA33)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA33(MMS),1)	5/25/73	2781
	RINF(NGR,NA23)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA23(MMS),1)	5/25/73	2782
	RINF(NGR,NA13)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA13(MMS),1)	5/25/73	2783
	RINF(NGR,NH33)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA33(MMS),1)	5/25/73	2784
	RINF(NGR,NH23)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA23(MMS),1)	5/25/73	2785
	RINF(NGR,NH13)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA13(MMS),1)	5/25/73	2786
64	RINF(NGR,NA22)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA22(MMS),1)	5/25/73	2787
	RINF(NGR,NA12)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA12(MMS),1)	5/25/73	2788
	RINF(NGR,NH22)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA22(MMS),1)	5/25/73	2789
	RINF(NGR,NH12)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA12(MMS),1)	5/25/73	2790
73	RINF(NGR,NA11)=DOTPRO(MMM(NGR),ALPHAN(MMS),1,BETA11(MMS),1)	5/25/73	2791

	RINF(NGR,NR11)=DOTPRO(MMM(NGR),BETAN(MMS),1,BETA11(MMS),1)	5/25/73	2792
82	MMS=MMS+MMM(NGR)	5/25/73	2793
	CALL ECWR (RINF,ISS,IALBE,IERR)	5/25/73	2794
	IERRT=IERR+IERR	5/25/73	2795
91	ISS=ISS+IALBE	5/25/73	2796
	IS10=ISS	5/25/73	2797
	RETURN	5/25/73	2798
	END	5/25/73	2799
C	-----	101173	82
C	SUBROUTINE ECSP	101173	83
C	-----	101173	84
	SUBROUTINE ECSP	5/25/73	2800
C		5/25/73	2801
C	*** COMMON BLOCK ***	5/25/73	2802
C		5/25/73	2803
	COMMON IOIMX,KMX,INTER,IN,IAUT,KH,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	2804
	14),SJKL(150),SIGT(4),DUMMY(12321),EXIT(4),CROSS(4),IS16,IS17,IS18	5/25/73	2805
	2,STORAGE,SIMPLE,STORBD,ZERSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	2806
	3NFLTAG,DELTAE,IRESOPR,NOBRD,WUP,WLW,NKCP(3),BOUND(10),PRINTCS,EST,	5/25/73	2807
	4DSHIFT	5/25/73	2808
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NNES,NFCHS,NFCHS1,	5/25/73	2809
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,R02,C02,D0,FRACT,E	5/25/73	2810
	2LEM,RUNNO,NODAT,OA1Y,ITAPE,MSIORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	2811
	3,IUIGJ,IUIGK,IUIGL,IUIGH,IUT,IBS,IBF,IBC,MAXID,INESIOT,MAXENM,MSTO	5/25/73	2812
	4PEN,DELTAI,DELTAI,DIST,NKESH,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CHAX	5/25/73	2813
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	2814
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPH(100,4),GG	5/25/73	2815
	7A(100),UQJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIMXM,ETAOP,IFC	5/25/73	2816
	8G,IUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	2817
	90),BETA22(100),BETA23(100),BETA33(100),ENER1	5/25/73	2818
C		5/25/73	2819
C	*** DIMENSION BLOCK ***	5/25/73	2820
C		5/25/73	2821
	DIMENSION NWID(1), JL(1), JU(1), IP(1), IE(1), E(1)	5/25/73	2822
C		5/25/73	2823
C	*** EQUIVALENCE BLOCK ***	5/25/73	2824
C		5/25/73	2825
	EQUIVALENCE (ISKP,SIGT(1)), (CORR2,SIGT(2)), (I,IPKE), (NWID,SJKL)	5/25/73	2826
	1, (JL,SJKL(3)), (JU,SJKL(5)), (IP,SJKL(7)), (IE,SJKL(9))	5/25/73	2827
	EQUIVALENCE (THETA,E,ENER,E,DUMMY), (UIA,EXT,ENER1,DUMMY(160)),	5/25/73	2828
	1(CROSS,IC,DUMMY(320)), (SIGDM,DNUM,DUMMY(480)), (GRADS,GRAD(15))	5/25/73	2829
	2), (GSI,DUMMY(7400)), (ESI,DUMMY(7601)), (EES,DUMMY(7601)), (SS,DU	5/25/73	2830
	3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	2831
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	2832
	5)), (ZSQ,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	2833
	6(PP,DUMMY(6401))	5/25/73	2834
		5/25/73	2835
C	ECSP FORMS THE PARAMETERS KC,I,IAI,WID,WID1	5/25/73	2836
C		5/25/73	2837
	IMAX=0	5/25/73	2838
	ID=IS6-IS6	5/25/73	2839
C		5/25/73	2840
C	*** READ ECS ENER1 AND ENER ***	5/25/73	2841
C		5/25/73	2842
	CALL ECRD (E,IS6,ID,IERR)	5/25/73	2843
C		5/25/73	2844
	IERRT=IERR	5/25/73	2845
	JL(1)=1	5/25/73	2846
	JU(1)=MAXEN	5/25/73	2847
	JL(2)=9	5/25/73	2848
		5/25/73	2849

	JU(2)=MAXEN1-8	5/25/73	2850
	IP(1)=IS4	5/25/73	2851
	IP(2)=IS5	5/25/73	2852
	IE(1)=MAXEN1	5/25/73	2853
	IE(2)=8	5/25/73	2854
C		5/25/73	2855
C	*** KC,I,IAI,WID ***	5/25/73	2856
C		5/25/73	2857
	DO 64 K=1,2	5/25/73	2858
	JLOW=JL(K)	5/25/73	2859
	JUP=JU(K)	5/25/73	2860
	KC=IUP-I=0	5/25/73	2861
	IEK=IE(K)	5/25/73	2862
	DO 64 J=JLOW,JUP	5/25/73	2863
	IEK=IEK+1	5/25/73	2864
	FM=IE(K)	5/25/73	2865
1	GO TO (1,10)*K	5/25/73	2866
	CALL WDSINTW (EM)	5/25/73	2867
10	GO TO 19	5/25/73	2868
	WID=MO(EM)	5/25/73	2869
	WLB=J.5*WID	5/25/73	2870
19	WUP=J.2*WID	5/25/73	2871
	FU=EM-WUP	5/25/73	2872
28	FL=EM-WLB	5/25/73	2873
	KC=KC+1	5/25/73	2874
37	IF (IE(KC)-EL) 28,28,37	5/25/73	2875
46	KC=KC+2	5/25/73	2876
55	IU=IU+1	5/25/73	2877
	IF (IE(IU)-EU) 46,55,55	5/25/73	2878
	I=I+1	5/25/73	2879
	IF (ABS(IE(I)-EM).GT.1.E-6) GO TO 55	5/25/73	2880
	I=I-KC	5/25/73	2881
	IAI=IU-KC	5/25/73	2882
C		5/25/73	2883
C	*** WRITE ECS KC,I,IAI,WID ***	5/25/73	2884
C		5/25/73	2885
	WID=1./WID	5/25/73	2886
	WID1=1./WID1	5/25/73	2887
	IF (IAI.GT.MSTORE) GO TO 82	5/25/73	2888
	CALL ECMR (KC,IP(K),MKCP(K),IERR)	5/25/73	2889
	IERRT=IERRT+IERR	5/25/73	2890
C		5/25/73	2891
	IP(K)=IP(K)+MKCP(K)	5/25/73	2892
	IU=IU-1	5/25/73	2893
	I=I-1	5/25/73	2894
64	CONTINUE	5/25/73	2895
	IF (IERRT.NE.0) GO TO 73	5/25/73	2896
	RETURN	5/25/73	2897
73		5/25/73	2898
C	WRITE (3,100)	5/25/73	2900
	STOP	5/25/73	2901
C		5/25/73	2902
82	WRITE (3,91)IAI,MSTORE	5/25/73	2903
C		5/25/73	2904
C	STOP	5/25/73	2905
91		5/25/73	2906
	FORMAT (//,64H ECSP NUMBER OF COEFFICIENTS FOR INTEGRAL EXCEEDS	5/25/73	2907
	1MSTORE IAI=,16,4H MSTORE=,16)	5/25/73	2908
100	FORMAT (//,16H ECS ERROR IN ECSP)	5/25/73	2909
	END	5/25/73	2909
C-----		101173	85

C		SUBROUTINE INTWTS	101173	86
C	-----		101173	87
		SUBROUTINE INTWTS	5/25/73	2910
C			5/25/73	2911
C		*** COMMON BLOCK ***	5/25/73	2912
C			5/25/73	2913
		COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	2914
		14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSST(4),IS16,IS17,IS18	5/25/73	2915
		2,STORAGE,SIMPLE,STORBRD,ZERSTON,GRSPIN(10),IALRE,WGNO,IELIMS(100),	5/25/73	2916
		3DELTA,DELTAE,IRESOPR,NOBRD,WUP,WLW,NKCP(4),BOUND(10),PRINTCS,EST,	5/25/73	2917
		4DSHIFT	5/25/73	2918
		COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	2919
		1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,D0,FRACT,E	5/25/73	2920
		2LEM,RUNNO,NODAT,CAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESP,N	5/25/73	2921
		3,IBIGJ,IBIGK,IBIGL,IBIGH,IBT,IBS,IBF,IBC,MAXID,IHSTOI,MAXENM,MSTO	5/25/73	2922
		4RFN,DELTAI,DELTA,DIS,NMESM,KZ,NGRAV,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	2923
		5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	2924
		6IS15,IAA,IFI(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	2925
		7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IUIMXM,ETAOP,IEC	5/25/73	2926
		8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	2927
		90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	2928
		FOLI,VALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENEM1,DUMMY(1601)),	5/25/73	2929
		1(CROSS,IC,DUMMY(3201)), (SIGDR,DNUM,DUMMY(4801)), (GRADS,GRAD(151)	5/25/73	2930
		2), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	2931
		3MMY(101)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (UAG,DUMMY	5/25/73	2932
		4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	2933
		5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	2934
		6(PP,DUMMY(6401))	5/25/73	2935
C			5/25/73	2936
		DIMENSION EE(1), EXT(1)	5/25/73	2937
		EQUIVALENCE (ACF,DUMMY), (BCF,DUMMY(2000)), (CCF,DUMMY(4000))	5/25/73	2938
		DIMENSION ACF(1), BCF(1), CCF(1)	5/25/73	2939
C			5/25/73	2940
C		CALCULATE THE WEIGHTS FOR THE DOPPLER AND RESOLUTION INTEGRALS	5/25/73	2941
C			5/25/73	2942
		ISWTW=IS16	5/25/73	2943
		NEXPD=1	5/25/73	2944
		IPX=IS5	5/25/73	2945
		MR=MAXEN1-B	5/25/73	2946
		EST=.01	5/25/73	2947
		DO 19 J=9,MR	5/25/73	2948
		CALL ECRD (KC,IPX,4,IERR)	5/25/73	2949
		IF (IAI.GE.4) GO TO 1	5/25/73	2950
		EXT(1)=EXT(2)=EXT(3)=EXT(4)=0.	5/25/73	2951
		FXT(IPKE)=1.	5/25/73	2952
		GO TO 10	5/25/73	2953
1		KE=KC+IS6	5/25/73	2954
		CALL ECRD (EE,KE,IAI,IERR)	5/25/73	2955
		CALL INTCOEF	5/25/73	2956
		CALL RESDOB	5/25/73	2957
10		CALL ECHR (EXT,ISWTW,IAI,IEHR)	5/25/73	2958
		IPX=IPX+4	5/25/73	2959
19		ISWTW=ISWTW+IAI	5/25/73	2960
		IS17=ISWTW	5/25/73	2961
		IPX=IS4	5/25/73	2962
		NEXPD=2	5/25/73	2963
		DO 46 J=1,MAXEN	5/25/73	2964
		CALL ECRD (KC,IPX,NKCP(1),IERR)	5/25/73	2965
		IF (IAI.GE.4) GO TO 28	5/25/73	2966
		FXT(1)=EXT(2)=EXT(3)=EXT(4)=0.	5/25/73	2967
		FXT(IPKE)=.	5/25/73	2968

	GO TO 37	5/25/73	2969
28	KE=KC+IS6	5/25/73	2970
	CALL ECRD (EE,KE,IAI,IERR)	5/25/73	2971
	CALL INTCOEF	5/25/73	2972
	CALL RESDOB	5/25/73	2973
37	CALL ECNR (EXT,ISWTW,IAI,IERR)	5/25/73	2974
	IPX=IPX+NKCP(1)	5/25/73	2975
46	ISWTW=ISWTW+IAI	5/25/73	2976
	ISIB=ISWTW	5/25/73	2977
	IF (ITOTAL.EQ.2) RETURN	5/25/73	2978
C		5/25/73	2979
C	COMBINE DOPPLER AND RESOLUTION WEIGHTS IF NOT TOTAL	5/25/73	2980
C		5/25/73	2981
	IPX=IS4	5/25/73	2982
	ISWT=IS17	5/25/73	2983
	ISWTSS=IS16	5/25/73	2984
	ISWTS1S=IS18	5/25/73	2985
	IF (IECS-IS18.L1.60000) ISWTS1S=0	5/25/73	2986
	ISWTS1=ISWTS1S	5/25/73	2987
	KCS5=8	5/25/73	2988
	CALL ECRD (KC,IS5,4,IERR)	5/25/73	2989
	KCS6=KC	5/25/73	2990
	LS=KCS6	5/25/73	2991
	LST=IS5	5/25/73	2992
	LS=0	5/25/73	2993
	LST1=ISS	5/25/73	2994
	DO 91 J=1-MAXEN	5/25/73	2995
	CALL ECHD (KC,IPX,NKCP(1),IERR)	5/25/73	2996
	IAIS=IAI	5/25/73	2997
	IPKES=IPKE	5/25/73	2998
	WIDS=WIW	5/25/73	2999
	IPX1=IS5*(KC-KCS5)*4	5/25/73	3000
	LS=KC-KCS5	5/25/73	3001
	CALL ECRD (KC,IPX1,4,IERR)	5/25/73	3002
	KCS1=KC	5/25/73	3003
	IPKES=IPKES+IPKE-1	5/25/73	3004
	CALL ECHD (KC,IPX1+4*(IAIS-1),4,IERR)	5/25/73	3005
	KS4S1=KC+IAI-KCS1	5/25/73	3006
	ISWTSS=0	5/25/73	3007
	IF (LS.EQ.0) GO TO 64	5/25/73	3008
	LST=LST1	5/25/73	3009
	ISWTSS=0	5/25/73	3010
	DO 55 MX=1,LS	5/25/73	3011
	CALL ECRU (KC,LST,4,IERR)	5/25/73	3012
	LST=LST+4	5/25/73	3013
55	ISWTSS=ISWTSS+IAI	5/25/73	3014
64	ISWTS=ISWTSS+IS16	5/25/73	3015
	DO 73 M=1,KS4S1	5/25/73	3016
73	CCF(M)=0.	5/25/73	3017
	CALL ECHD (ACF,ISWT,IAIS,IERR)	5/25/73	3018
	ISWT=ISWT+IAIS	5/25/73	3019
	DO 82 K=1,IAIS	5/25/73	3020
	CALL ECHD (KC,IPX1,4,IERR)	5/25/73	3021
	CALL ECHD (BCF,ISWTS,IAI,IERR)	5/25/73	3022
	ISWTS=ISWTS+IAI	5/25/73	3023
	KCS2=KC-KCS1+1	5/25/73	3024
	IPX1=IPX1+4	5/25/73	3025
	CALL VECSUM (CCF(KCS2),BCF,ACF(K),CCF(KCS2),IAI)	5/25/73	3026
82	CONTINUE	5/25/73	3027
	KC=KCS1	5/25/73	3028
	IAI=KS4S1	5/25/73	3029

	IPKE=IPKES	5/25/73	3030
	WID=WIDS	5/25/73	3031
	IF (IAI.GT.MSTORE) GO TO 109	5/25/73	3032
	CALL ECWR (CCF,ISWTS1,IAI,IERR)	5/25/73	3033
	CALL ECWR (KC,IPX,NKCP(1),IERR)	5/25/73	3034
	ISWTS1=ISWTS1+IAI	5/25/73	3035
91	IPX=IPX+NKCP(1)	5/25/73	3036
	IPX=IS4	5/25/73	3037
	ISWTS1=ISWTS1S	5/25/73	3038
	ISWT=IS16	5/25/73	3039
	DO 100 J=1,MAXEN	5/25/73	3040
	CALL ECHD (KC,IPX,NKCP(1),IERR)	5/25/73	3041
	CALL ECRD (CCF,ISWTS1,IAI,IERR)	5/25/73	3042
	CALL ECWR (CCF,ISWT,IAI,IERR)	5/25/73	3043
	ISWT=ISWT+IAI	5/25/73	3044
	ISWTS1=ISWTS1+IAI	5/25/73	3045
100	IPX=IPX+NKCP(1)	5/25/73	3046
	IRESOT=1	5/25/73	3047
	ISIR=ISWT	5/25/73	3048
	RETURN	5/25/73	3049
109	WRITE (3,118)IAI,MSTORE	5/25/73	3050
	STOP	5/25/73	3051
C		5/25/73	3052
118	FORMAT (//,67H INTWTS NUMBER OF COEFFICIENTS FOR INTEGRAL EXCEE	5/25/73	3053
	IDS MSTORE IAI=,I6,BH MSTORE=,I6)	5/25/73	3054
	END	5/25/73	3055
C	-----	101173	88
C	SUBROUTINE INTCOEF	101173	89
C	-----	101173	90
	SUBROUTINE INTCOEF	5/25/73	3056
C		5/25/73	3057
C	*** COMMON BLOCK ***	5/25/73	3058
C		5/25/73	3059
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	3060
	14),SJKL(150),SIGT(4),DUMMY(12321),EXT(4),CROSST(4),IS16,IS17,IS18	5/25/73	3061
	2,STORAGE,SIMPLE,STORDRD,4ERSTOR,GRSPIN(10),IALBE,WGMO,IELIMS(100),	5/25/73	3062
	3DELTAG,DELTAE,IRESOPR,NOBRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	3063
	4NSHIFTF	5/25/73	3064
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	3065
	1NFCHS2,NFCHS3,AW,GRFN,IT,ITMAX,RESWID,THICK,A02,BU2,CU2,DO,FRACT,E	5/25/73	3066
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSTORE,NGROUP,NI,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	3067
	3,IRIGJ,IRIGK,IRIGL,IRIGM,IBT,IBS,IBF,IBC,MAXID,IRESOT,MAXENM,MSTO	5/25/73	3068
	4REN,DELTAT,DELTAL,DIST,NRESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	3069
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	3070
	6IS15,IAA,IF1(4),ELIM(100,3),PKEN(100),GSI(100,3),DETAPR(100,4),GG	5/25/73	3071
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMXM,ETAOP,IEC	5/25/73	3072
	8S,DDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	3073
	90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	3074
	EQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENEH1,DUMMY(1601)),	5/25/73	3075
	1(CROSS,IC,DUMMY(3201)), (SIGDH,DNUM,DUMMY(4801)), (GRADS,GRAD(151	5/25/73	3076
	2), (GSI,DUMMY(7400)), (ES1,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	3077
	3MMY(101)), (Z,R,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	3078
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	3079
	5)), (ZSU4,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12142)),	5/25/73	3080
	6(PP,DUMMY(6401))	5/25/73	3081
C		5/25/73	3082
	DIMENSION EE(1), EXT(1)	5/25/73	3083
C		5/25/73	3084
C	FOUR POINT PROGRESSIVE INTEGRATION COEFFICIENTS	5/25/73	3085
C	IF THE COEFFICIENTS ARE NEGATIVE USE TRAPEZOIDAL RULE FOR DETERMIN	5/25/73	3086
C	G THE COEFFICIENTS.	5/25/73	3087

C	IAI3=IAI-3	5/25/73	3088
	DO 1 K=1,IAI	5/25/73	3089
1	EXT(K)=0.	5/25/73	3090
	KS=1	5/25/73	3091
	IF (NEXPD.EQ.2.AND.IRESOPR.EQ.2) KS=IPKE	5/25/73	3092
	EXT(IPKE)=1.0	71373	2
	IF (IAI=KS.LT.4) RETURN	5/25/73	3094
	DO 19 K=KS,IAI3	5/25/73	3095
	X21=EE(K+1)-EE(K)	5/25/73	3096
	X31=EE(K+2)-EE(K)	5/25/73	3097
	X41=EE(K+3)-EE(K)	5/25/73	3098
	X32=EE(K+2)-EE(K+1)	5/25/73	3099
	X42=EE(K+3)-EE(K+1)	5/25/73	3100
	X43=EE(K+3)-EE(K+2)	5/25/73	3101
	IF (K.NE.KS) GO TO 10	5/25/73	3102
	EXT(KS)=-(X32**2/X31-X31-X21)/6.	5/25/73	3103
	EXT(KS+1)=(X31**4/X32-X32-X21)/6.	5/25/73	3104
	EXT(KS+2)=-X21**3/X31/X32/6.	5/25/73	3105
10	CONTINUE	5/25/73	3106
	EXT(K)=EXT(K)-X32**3/X21/X31/12.	5/25/73	3107
	EXT(K+1)=EXT(K+1)+(X31/X21+X43/X42+4.)*X32/12.	5/25/73	3108
	EXT(K+2)=EXT(K+2)+(X42/X43+X21/X31+4.)*X32/12.	5/25/73	3109
19	EXT(K+3)=EXT(K+3)-X32**3/X42/X43/12.	5/25/73	3110
	EXT(IAI-2)=EXT(IAI-2)-X43**3/X42/X32/6.	5/25/73	3111
	EXT(IAI-1)=EXT(IAI-1)-(X32-X43-X42**2/X32)/6.	5/25/73	3112
	EXT(IAI)=EXT(IAI)+(X42+X43-X32**2/X42)/6.	5/25/73	3113
	DO 28 K=1,IAI	5/25/73	3114
	IF (EXT(K).LT.0.) GO TO 37	5/25/73	3115
28	CONTINUE	5/25/73	3116
	RETURN	5/25/73	3117
C		5/25/73	3118
C	TRAPEZOIDAL INTEGRATION COEFFICIENTS IF ABOVE WEIGHTS ARE NEGATIV	5/25/73	3119
C		5/25/73	3120
37	IAI1=IAI-1	5/25/73	3121
	IF (NEXPD.EQ.2.AND.IRESOPR.EQ.2) GO TO 46	5/25/73	3122
	KS=2	71373	3
	EXT(1)=(EE(2)-EE(1))*0.5	5/25/73	3124
	GO TO 64	5/25/73	3125
46	KS=IPKE+1	5/25/73	3126
	EXT(IPKE)=(EE(KS)-EE(IPKE))*0.5	5/25/73	3127
	KU=IPKE+1	5/25/73	3128
	DO 55 K=1,KU	5/25/73	3129
55	EXT(K)=0.	5/25/73	3130
64	IF (KS.GT.1) RETURN	5/25/73	3131
	DO 73 K=KS,IAI1	5/25/73	3132
73	EXT(K)=(EE(K+1)-EE(K-1))*0.5	5/25/73	3133
	EXT(IAI)=(EE(IAI)-EE(IAI1))*0.5	5/25/73	3134
	RETURN	5/25/73	3135
	END	5/25/73	3136
C		5/25/73	3137
C	SUBROUTINE RESDOB	101173	91
C		101173	92
C		101173	93
C	SUBROUTINE RESDOB	5/25/73	3138
C		5/25/73	3139
C	*** COMMON BLOCK ***	5/25/73	3140
C		5/25/73	3141
	COMMON IDIMX,KMA,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	3142
	14),SJKL(150),SIG(4),DUMMT(12341),EXTT(4),CROSS(4),IS46,IS17,IS18	5/25/73	3143
	2,STORAGE,SIMPLE,STORHWD,ZERSTOR,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	3144
	3DELTA,DELTA,RESOPR,NORHD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	3145

	4DSHIFTF	5/25/73	3146
	COMMON /1/ MAXEN1,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NRES,NFCHS,NFCHS1,	5/25/73	3147
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESWID,THICK,A02,B02,C02,D0,FRACT,E	5/25/73	3148
	2LEM,RUNNO,NODAT,DAIT,ITAPE,MSIURE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPAN	5/25/73	3149
	3,IBIGJ,IBIGK,IBIGL,IBIGM,IBT,IBS,IBF,IBC,MAXID,IRESTOT,MAXENM,MSTO	5/25/73	3150
	4REN,DELTA1,DELTA2,DIST,NHFSM,KZ,NGRAD,PHI1,ZSQ,SCAL,SKIP,CMIN,CMAX	5/25/73	3151
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	3152
	6IS15,IAA,IF1(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPR(100,4),GG	5/25/73	3153
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,I0IMXM,ETAOP,IEC	5/25/73	3154
	8S,IDUMMY,KMS,RETVAR,MOPTA,NFILES,BETA11(100),BETA12(100),BETA13(10	5/25/73	3155
	90),BETA22(100),BETA23(100),BETA33(100),IENER1	5/25/73	3156
	FQUIVALENCE (THETA,E,ENER,EE,DUMMY), (DIA,EXT,ENEH1,DUMMY(1601)),	5/25/73	3157
	1(CROSS,IC,DUMMY(2201)), (SIGDH,DNUM,DUMMY(4801)), (GRADS,GRAD(151	5/25/73	3158
	2), (GSI,DUMMY(7400)), (ES1,DUMMY(7501)), (EES,DUMMY(7601)), (SS,DU	5/25/73	3159
	3MMY(101)), (Z,B,GMAO,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	3160
	4(11976)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHETA,DUMMY(12142	5/25/73	3161
	5)), (ZSQ,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	3162
	6(PP,DUMMY(6401))	5/25/73	3163
C		5/25/73	3164
	DIMENSION EE(1), EXT(1)	5/25/73	3165
C		5/25/73	3166
C	RESDOB FORMS THE GAUSSIAN , EXPONENTIAL OR GAUSSIAN+EXPONENTIAL	5/25/73	3167
C	WEIGHTS AND NORM. THEM	5/25/73	3168
C		5/25/73	3169
	S=0.	5/25/73	3170
	GO TO (1,28), NEXPD	5/25/73	3171
C		5/25/73	3172
C	DOPPLER OR GAUSSIAN WEIGHTS	5/25/73	3173
C		5/25/73	3174
1	DO 19 K=1,IAI	5/25/73	3175
	A=(EE(K)-EE(IPKE))*WID	5/25/73	3176
	T=.	5/25/73	3177
	IF (ABS(A).GT.100.) GO TO 10	5/25/73	3178
	T=EXP(-A*A)	5/25/73	3179
10	CONTINUE	5/25/73	3180
	EXT(K)=EXT(K)*T	5/25/73	3181
19	S=S+EXT(K)	5/25/73	3182
	GO TO 100	5/25/73	3183
C		5/25/73	3184
C	EXPONENTIAL WEIGHTS	5/25/73	3185
C		5/25/73	3186
C		5/25/73	3187
28	GO TO (1,37,87), IRESOPR	5/25/73	3188
37	IF (IPKE.EQ.1) GO TO 55	5/25/73	3189
	IPKE1=IPKE-1	5/25/73	3190
	DO 46 K=1,IPKE1	5/25/73	3191
46	EXT(K)=0.	5/25/73	3192
55	DO 73 K=IPKE,IAI	5/25/73	3193
	A=(EE(K)-EE(IPKE))*WID	5/25/73	3194
	T=.	5/25/73	3195
	IF (A.GT.10.) GO TO 64	5/25/73	3196
	T=EXP(-A)	5/25/73	3197
64	CONTINUE	5/25/73	3198
	EXT(K)=EXT(K)*T	5/25/73	3199
73	S=S+EXT(K)	5/25/73	3200
	GO TO 100	5/25/73	3201
C		5/25/73	3202
C	GAUSSIAN PLUS EXPONENTIAL	5/25/73	3203
C		5/25/73	3204
82	C=WID1*0.5/WID	5/25/73	3205
	EST=SHIFTGE(C)	5/25/73	3206

	DE=EE(IPKE)-EST	5/25/73	3207
	DO 91 K=1,IAI	5/25/73	3208
	A=(EE(K)-DE)*WID	5/25/73	3209
	R=(EE(K)-DE)*WID1	5/25/73	3210
	T=EXP(C**2-B)*ERFC(C-A)	5/25/73	3211
	EXT(K)=EXT(K)*T	5/25/73	3212
91	S=S+EXT(K)	5/25/73	3213
C		5/25/73	3214
C	NORMALIZE WEIGHTS	5/25/73	3215
C		5/25/73	3216
100	S=1./S	5/25/73	3217
	DO 109 K=1,IAI	5/25/73	3218
109	EXT(K)=EXT(K)*S	5/25/73	3219
	RETURN	5/25/73	3220
	END	5/25/73	3221
C	-----	101173	94
C	SUBROUTINE WDSINTW	101173	95
C	-----	101173	96
	SUBROUTINE WDSINTW (ED)	5/25/73	3222
C		5/25/73	3223
C	*** COMMON BLOCK ***	5/25/73	3224
C		5/25/73	3225
	COMMON IDIMX,KMX,INTER,IN,IAUT,KM,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	3226
	14),SJKL(150),SIGT(4),DUMMT(123<1),EXTT(4),CROSST(4),ISA6,ISA7,ISA8	5/25/73	3227
	2,STORAGE,SIMPLE,STORBRD,ZERSTOK,GRSPIN(10),IALBE,MGNO,IELIMS(100),	5/25/73	3228
	3DELTA,DELTA,RESOPR,NOMRD,WUP,WLW,NKCP(2),BOUND(14),PRINTLS,EST,	5/25/73	3229
	4NSHIFT,	5/25/73	3230
	E=ED	5/25/73	3231
	WID1=1.	5/25/73	3232
C		5/25/73	3233
C	LOWER AND UPPER LIMITS TO RESOLUTION INTEGRAL AND WID AND WID1	5/25/73	3234
C		5/25/73	3235
	GO TO (1,10,19), IRESOPR	5/25/73	3236
1	WID=ROLOW(E)	5/25/73	3237
	WLW=3.5*WID	5/25/73	3238
	WUP=3.25*WID	5/25/73	3239
	RETURN	5/25/73	3240
10	WID=ROLOW(E)	5/25/73	3241
	WLW=4.5*WID	5/25/73	3242
	WUP=6.25*WID	5/25/73	3243
	RETURN	5/25/73	3244
19	WID=ROLOW(E)	5/25/73	3245
	WID1=ROLOW(E)	5/25/73	3246
	WLW=3.5*WID	5/25/73	3247
	RWID=WID/WID1	5/25/73	3248
	IF (RWID.GT.1) GO TO 28	5/25/73	3249
	WUP=6.25*WID1	5/25/73	3250
	RETURN	5/25/73	3251
28	IF (RWID.GT.2) GO TO 37	5/25/73	3252
	WUP=3.25*(3.-RWID)*WID	5/25/73	3253
	RETURN	5/25/73	3254
37	WUP=3.25*WID	5/25/73	3255
	RETURN	5/25/73	3256
	END	5/25/73	3257
C	-----	101173	97
C	FUNCTION VF	101173	98
C	-----	101173	99
	FUNCTION VF (RHO,L)	5/25/73	3258
C		5/25/73	3259
C	VF FORMS THE PENETRATION FACTOR	5/25/73	3260
C		5/25/73	3261

	A=RHO	5/25/73	3262
	L1=L+1	5/25/73	3263
	GO TO (1,10,19,28,37), L1	5/25/73	3264
C		5/25/73	3265
C	*** V0 ***	5/25/73	3266
C		5/25/73	3267
1	VF=1.	5/25/73	3268
	RETURN	5/25/73	3269
C		5/25/73	3270
C	*** V1 ***	5/25/73	3271
C		5/25/73	3272
10	A2=A*A	5/25/73	3273
	VF=A2/(1.+A2)	5/25/73	3274
	RETURN	5/25/73	3275
C		5/25/73	3276
C	*** V2 ***	5/25/73	3277
C		5/25/73	3278
19	A2=A*A	5/25/73	3279
	A4=A2*A2	5/25/73	3280
	VF=A4/(19.+3.*A2+A4)	5/25/73	3281
	RETURN	5/25/73	3282
C		5/25/73	3283
C	*** V3 ***	5/25/73	3284
C		5/25/73	3285
28	A2=A*A	5/25/73	3286
	A4=A2*A2	5/25/73	3287
	A6=A2*A4	5/25/73	3288
	VF=A6/(225.+45.*A2+6.*A4+A6)	5/25/73	3289
	RETURN	5/25/73	3290
C		5/25/73	3291
C	*** V4 ***	5/25/73	3292
C		5/25/73	3293
37	A2=A*A	5/25/73	3294
	A4=A2*A2	5/25/73	3295
	A6=A2*A4	5/25/73	3296
	A8=A4*A4	5/25/73	3297
	VF=A8/(11025.+1575.*A2+135.*A4+10.*A6+A8)	5/25/73	3298
	RETURN	5/25/73	3299
	END	5/25/73	3300
C	-----	101173	100
C	FUNCTION SF	101173	101
C	-----	101173	102
	FUNCTION SF (RHO,L,BND)	5/25/73	3301
C		5/25/73	3302
C	SF FORMS THE SHIFT FACTOR S=B	5/25/73	3303
C		5/25/73	3304
	A=RHO	5/25/73	3305
	L1=L+1	5/25/73	3306
	GO TO (1,10,19,28,37), L1	5/25/73	3307
C		5/25/73	3308
C	*** S0 ***	5/25/73	3309
C		5/25/73	3310
1	SF=0.	5/25/73	3311
	SF=Sf-BND	5/25/73	3312
	RETURN	5/25/73	3313
C		5/25/73	3314
C	*** S1 ***	5/25/73	3315
C		5/25/73	3316
10	A2=A*A	5/25/73	3317
	SF=-1./(1.+A2)	5/25/73	3318
	SF=Sf-BND	5/25/73	3319

C	RETURN	5/25/73	3320
C	*** S2 ***	5/25/73	3321
C		5/25/73	3322
19	A2=A*A	5/25/73	3323
	A4=A2*A2	5/25/73	3324
	SF=-(18.+3.*A2)/(9.+3.*A2+A4)	5/25/73	3325
	SF=SF-BND	5/25/73	3326
	RETURN	5/25/73	3327
C		5/25/73	3328
C	*** S3 ***	5/25/73	3329
C		5/25/73	3330
28	A2=A*A	5/25/73	3331
	A4=A2*A2	5/25/73	3332
	A6=A2*A4	5/25/73	3333
	SF=-(675.+90.*A2+6.*A4)/(225.+45.*A2+6.*A4+A6)	5/25/73	3334
	SF=SF-BND	5/25/73	3335
	RETURN	5/25/73	3336
C		5/25/73	3337
C	*** S4 ***	5/25/73	3338
C		5/25/73	3339
37	A2=A*A	5/25/73	3340
	A4=A2*A2	5/25/73	3341
	A6=A2*A4	5/25/73	3342
	A8=A4*A4	5/25/73	3343
	SF=-(44100.+4725.*A2+270.*A4+10.*A6)/(11025.+1575.*A2+135.*A4+10.*	5/25/73	3344
	1A6+A8)	5/25/73	3345
	SF=SF-BND	5/25/73	3346
	RETURN	5/25/73	3347
	FND	5/25/73	3348
C	-----	5/25/73	3349
C	FUNCTION PHIF	101173	103
C	-----	101173	104
C	FUNCTION PHIF (RHO,L)	101173	105
C		5/25/73	3350
C	PHIF FORMS THE PHASE FACTOR	5/25/73	3351
C		5/25/73	3352
	A=RHO	5/25/73	3353
	L1=L+1	5/25/73	3354
	GO TO (1,10,19,28,37), L1	5/25/73	3355
C		5/25/73	3356
C	*** PHI0 ***	5/25/73	3357
C		5/25/73	3358
1	PHIF=2.*A	5/25/73	3359
	RETURN	5/25/73	3360
C		5/25/73	3361
C	*** PHI1 ***	5/25/73	3362
C		5/25/73	3363
10	PHIF=2.*(A-ATAN(A))	5/25/73	3364
	RETURN	5/25/73	3365
C		5/25/73	3366
C	*** PHI2 ***	5/25/73	3367
C		5/25/73	3368
19	A2=A*A	5/25/73	3369
	PHIF=2.*(A-ATAN(3.*A/(3.-A2)))	5/25/73	3370
	RETURN	5/25/73	3371
C		5/25/73	3372
C	*** PHI3 ***	5/25/73	3373
C		5/25/73	3374
28	A2=A*A	5/25/73	3375
	PHIF=2.*(A-ATAN(A*(15.-A2)/(15.-6.*A2)))	5/25/73	3376
		5/25/73	3377

	RETURN	5/25/73	3378
C	*** PHI4 ***	5/25/73	3379
C		5/25/73	3380
C		5/25/73	3381
37	A2=A*A	5/25/73	3382
	A4=A2*A2	5/25/73	3383
	PHIF=2.*(A-ATAN(A*(105.-10.*A2)/(105.-45.*A2+A4)))	5/25/73	3384
	RETURN	5/25/73	3385
	END	5/25/73	3386
C	-----	101173	106
C	SUBROUTINE PRINTP	101173	107
C	-----	101173	108
	SUBROUTINE PRINTP	5/25/73	3387
C		5/25/73	3388
C	*** COMMON BLOCK ***	5/25/73	3389
C		5/25/73	3390
	COMMON IDIMX,KMX,INTER,IN,IAUT,KH,KC,IAI,IPKE,WID,WID1,NEXPD,SUM1(	5/25/73	3391
	14),SJKL(150),SIGT(4),DUMMY(12321),EXTT(4),CROSSST(4),IS16,IS17,IS18	5/25/73	3392
	2,STORAGE,SIMPLE,STORORD,ZERSTOR,GRSPIN(10),IALRE,WGMO,IELIMS(100),	5/25/73	3393
	3DELTA,DELTA,DELTA,DELTA,DIST,NHESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SK1P,CMIN,CMAX	5/25/73	3394
	4DS,IFF	5/25/73	3395
	COMMON /1/ MAXEN,MAXEN,ITOTAL,ISCAT,IFISS,ICAP,NHES,NFCHS,NFCHS1,	5/25/73	3396
	1NFCHS2,NFCHS3,AW,CRFN,IT,ITMAX,RESW14,THICK,A02,BU2,CU2,D0,FRACT,E	5/25/73	3397
	2LEN,RUNNO,NODAT,WAIT,ITAPE,MSTORE,NGROUP,N1,NN,YMIN,YMAX,LLY,ESPIN	5/25/73	3398
	3,TRIGJ,TRIGK,TRIGL,TRIGM,TRIT,IBS,IBF,IBC,MAXID,IRESIOT,MAXENM,MSTO	5/25/73	3399
	4REN,DELTA1,DELTA2,DIST,NHESM,KZ,NGRAD,PHI1,ZSQ,SCAL,SK1P,CMIN,CMAX	5/25/73	3400
	5,NPS,IS1,IS2,IS3,IS4,IS5,IS6,IS7,IS8,IS9,IS10,IS11,IS12,IS13,IS14,	5/25/73	3401
	6IS15,IAA,IFI(4),IELIM(100,5),PKEN(100),GSI(100,3),BETAPH(100,4),GG	5/25/73	3402
	7A(100),GOJ(10),IGROUP(100),TITLE(6),KMMAX,IS10NPS,IDIMX,ETAOP,IEC	5/25/73	3403
	8S,DUMMY,KMS,RETVAR,MOPTA,NFILES,BETA1(100),BETA2(100),BETA13(10	5/25/73	3404
	90),BETA22(100),BETA23(100),BETA33(100),ENER1	5/25/73	3405
	FQUIVALENCE (CRS1,DUMMY(6401)), (SIG,DUMMY(8001)), (CRS,DUMMY(9601	5/25/73	3406
	1)), (ENR,DUMMY(1601)), (POINT,DUMMY(11401)), (YAXIS,DUMMY(11502)),	5/25/73	3407
	FQUIVALENCE (THETA,E,ENEM,EE,DUMMY), (DIA,EXT,ENEM1,DUMMY(1601)),	5/25/73	3408
	1(CROSS,IC,DUMMY(3201)), (SIGDR,DNUM,DUMMY(4801)), (GRADS,GRAD(151	5/25/73	3409
	2)), (GSI,DUMMY(7400)), (ESI,DUMMY(7501)), (EES,DUMMY 7601)), (SS,DU	5/25/73	3410
	3MNY(121)), (Z,B,GRAD,DUMMY(501)), (GSAV,A,DUMMY(651)), (DIAG,DUMMY	5/25/73	3411
	4(1176)), (P,DUMMY(12126)), (JS,DUMMY(12136)), (CTHF1A,DUMMY(12142	5/25/73	3412
	5)), (ZSQ1,DUMMY(12152)), (PHI,DUMMY(12162)), (USAV,DUMMY(12172)),	5/25/73	3413
	6(PP,DUMMY(6401))	5/25/73	3414
C		5/25/73	3415
C	*** DIMENSION BLOCK ***	5/25/73	3416
C		5/25/73	3417
	DIMENSION POINT(101), CRS(1), CRS1(1), ENH(1), YAXIS(1), ENER(1),	5/25/73	3418
	1CROSS(1), SIGDR(1), SIG(1)	5/25/73	3419
C		5/25/73	3420
C	*** DIMENSION BLOCK ***	5/25/73	3421
C		5/25/73	3422
	DIMENSION BOARDER(3), SCALEY(3), PLOT(3)	5/25/73	3423
C		5/25/73	3424
C		5/25/73	3425
C	SUBROUTINE CRTP IS A PRINTER PLOTTER WHICH PLOTS THE EXPER. DATA	5/25/73	3426
C	AS D AND THE THEO. DATA AS T. THE SCALE OF THE Y-AXIS CAN BE LIN.	5/25/73	3427
C	(LLY=0) OR LOG (LLY=1-5). THE NUMBER OF CYCLES IS SPECIFIED BY	5/25/73	3428
C	LLY. THE ENERGY SPAN PER PAGE IS GIVEN BY ESPAN. THE MINIMUM	5/25/73	3429
C	AND MAXIMUM VALUE OF YAXIS IS SPECIFIED BY YMIN AND YMAX FOR LLY=0	5/25/73	3430
C	AND BY YMIN AND LLY FOR LLY GREATER THAN ZERO. IF SIGUR (K) IS	5/25/73	3431
C	LESS THAN 0 IT IS SET TO YMIN. IF ITAPE = NODATA CROSS IS SET TO	5/25/73	3432
C	YMIN	5/25/73	3433
C		5/25/73	3434
C	INTEGER POINT	5/25/73	3435

	ALINPG=54.	5/25/73	3436
	CALL ELCD (ENER,IS7,MAXEN,IERR)	5/25/73	3437
	ATEST=(ENER(MAXEN)-ENEN(1))*ALINPG/ESPAN	5/25/73	3438
	IF (IFIX(ATEST).LT.MAXENM) GO TO 1	5/25/73	3439
	ESPAN=ATEST*ESPAN/MAXENM	5/25/73	3440
	GO TO 1.	5/25/73	3441
1	IF (MAXEN.GT.IFIX(ATEST)) GO TO 19	5/25/73	3442
	ESPAN=ATEST*ESPAN/MAXEN	5/25/73	3443
10	WRITE (2,352)ESPAN	5/25/73	3444
19	CONTINUE	5/25/73	3445
C		5/25/73	3446
C	***** ATTENTION *****	5/25/73	3447
C	IF FLIM PLOT TAKEN OUT OF MULTI INSERT FOLLOWING CARUS	5/25/73	3448
C	*** READ ECS ENER ***	5/25/73	3449
C		5/25/73	3450
C	IERRT=IERR	5/25/73	3451
C		5/25/73	3452
C	J3=0	5/25/73	3453
C	J15=IS1/NPS	5/25/73	3454
C	DO 47 J=1,101MX	5/25/73	3455
C	J2S=J1S*(J-1)-101MX	5/25/73	3456
C	J2C=IS9*(J-1)-101MX	5/25/73	3457
C	DO 47 JX=1,MAXEN	5/25/73	3458
C	J3=J3+1	5/25/73	3459
C	J2S=J2S+101MX	5/25/73	3460
C	J2C=J2C+101MX	5/25/73	3461
C		5/25/73	3462
C	*** READ ECS SIGDR AND CROSS ***	5/25/73	3463
C		5/25/73	3464
C	CALL ECDD (SIGDR(J3),J2S+1,IERR)	5/25/73	3465
C	IERRT=IERRT+IERR	5/25/73	3466
C	CALL ECDD (CROSS(J3),J2C+1,IERR)	5/25/73	3467
C	47 IERRT=IERRT+IERR	5/25/73	3468
C		5/25/73	3469
C		5/25/73	3470
C	*** WRITE ECS SIGDR ***	5/25/73	3471
C		5/25/73	3472
C	CALL ECWR (SIGDR,IS10NPS,MAXID,IERR)	5/25/73	3473
C	IERRT=IERRT+IERR	5/25/73	3474
C		5/25/73	3475
C	***** END *****	5/25/73	3476
	DO 28 I=1,MAXID	5/25/73	3477
	IF (SIGDR(I).LE.0) SIGDR(I)=YMIN	5/25/73	3478
	IF (ITAPE.EQ.6HNO DATA) CROSS(I)=YMIN	5/25/73	3479
28	CONTINUE	5/25/73	3480
	IF (LLY=3) 46,37,46	5/25/73	3481
37	NP=100	5/25/73	3482
	SHIFT=.1	5/25/73	3483
	GO TO 55	5/25/73	3484
46	NP=101	5/25/73	3485
	SHIFT=.5	5/25/73	3486
55	IF (LLY.EQ.0) GO TO 109	5/25/73	3487
C		5/25/73	3488
C	LLY GREATER THAN ZERO	5/25/73	3489
C		5/25/73	3490
	IS=LLY+1	5/25/73	3491
	IX=100/LLY-1	5/25/73	3492
	IR=IX-7	5/25/73	3493
	IY=LLY	5/25/73	3494
	JQ1=IS-1	5/25/73	3495
	DO 94 I=1,MAXID	5/25/73	3496

	SIGDR(I)=ALOG10(SIGDR(I))	5/25/73	3497
64	CRS1(I)=ALOG10(CROSS(I))	5/25/73	3498
	YAXIS(I)=YMIN	5/25/73	3499
	IF (LLY=1) 73,73,82	5/25/73	3500
73	YAXIS(I)=YMIN*10.	5/25/73	3501
	GO TO 100	5/25/73	3502
82	CONTINUE	5/25/73	3503
	DO 91 I=2,IS	5/25/73	3504
91	YAXIS(I)=YAXIS(I-1)*10.	5/25/73	3505
100	START=ALOG10(YMIN)	5/25/73	3506
	SCALE=LLY	5/25/73	3507
	GO TO 130	5/25/73	3508
C		5/25/73	3509
C	LLY = 0	5/25/73	3510
C		5/25/73	3511
109	DO 118 I=1,MAXIO	5/25/73	3512
118	CRS1(I)=CROSS(I)	5/25/73	3513
	DY=YMAX-YMIN	5/25/73	3514
	DY10=DY/10.	5/25/73	3515
	YAXIS(I)=YMIN	5/25/73	3516
	IS=11	5/25/73	3517
	IX=9	5/25/73	3518
	IR=2	5/25/73	3519
	IY=10	5/25/73	3520
	JQ1=IS-1	5/25/73	3521
	DO 127 I=2,IS	5/25/73	3522
127	YAXIS(I)=YAXIS(I-1)*DY10	5/25/73	3523
	START=YMIN	5/25/73	3524
	SCALE=DY	5/25/73	3525
C		5/25/73	3526
136	DLE=ESPAN/ALINPG	5/25/73	3527
	IED=(ENER(I)*DLE/2.)/DLE	5/25/73	3528
	ED=DLE*FLOAT(IED)	5/25/73	3529
	IF (ED.GE.ENER(I)) GO TO 145	5/25/73	3530
	ED=ED-DLE	5/25/73	3531
	IED=IED+1	5/25/73	3532
145	IED=(ENER(MAXEN)*DLE/2.)/DLE	5/25/73	3533
	IF (IED*DLE.LE.ENER(MAXEN)) GO TO 154	5/25/73	3534
	IED=IED-1	5/25/73	3535
154	MNUM=IED-IED+1	5/25/73	3536
	ED=ED-DLE	5/25/73	3537
	I=0	5/25/73	3538
	DO 217 J=1,MNUM	5/25/73	3539
	ED=ED-DLE	5/25/73	3540
163	I=I+1	5/25/73	3541
	IF (ENER(I)-ED) 163,190,172	5/25/73	3542
172	F1=1./(ENER(I)-ENER(I-1))	5/25/73	3543
	NERV=-MAXEN	5/25/73	3544
	DO 181 IAXU=1,IDIMX	5/25/73	3545
	NERV=NERV+MAXEN	5/25/73	3546
	M=J*NERV	5/25/73	3547
	SIG(M)=((SIGDR(NERV+I)-SIGDR(NERV+I-1))*ED+SIGDR(NERV+I-1)*ENER(I)	5/25/73	3548
	1-ENER(I-1)*SIGDR(NERV+I))*E1	5/25/73	3549
	CRS(M)=((CRS1(NERV+I)-CRS1(NERV+I-1))*ED+CRS1(NERV+I-1)*ENER(I)-EN	5/25/73	3550
	1FR(I-1)*CRS1(NERV+I))*E1	5/25/73	3551
181	CONTINUE	5/25/73	3552
	GO TO 190	5/25/73	3553
190	NERV=-MAXEN	5/25/73	3554
	DO 177 IAXU=1,IDIMX	5/25/73	3555
	NERV=NERV+MAXEN	5/25/73	3556
	M=J*NERV	5/25/73	3557

	G(M)=SIGDR(NERV+I)	5/25/73	3558
199	CRS(M)=CRS1(NERV+I)	5/25/73	3559
208	I=I-1	5/25/73	3560
217	FNR(J)=ED	5/25/73	3561
C		5/25/73	3562
	FNCODE (21,379,PLOTF)NP	5/25/73	3563
	ENCODE (22,380,SCALEY)JQ1,IB	5/25/73	3564
C		5/25/73	3565
	LLY1=LLY+1	5/25/73	3566
	NERV=-MAXEN	5/25/73	3567
C		5/25/73	3568
	DO 343 IXAU=1, IDIMX	5/25/73	3569
	NERV=NERV+MAXEN	5/25/73	3570
	JMIN=1	5/25/73	3571
	JMAX=0	5/25/73	3572
	ALOOP=MNUM/ALINPG	5/25/73	3573
	LOCP=ALOOP	5/25/73	3574
	IF (ALOOP.EQ.LOOP) GO TO 226	5/25/73	3575
	LOOP=LOOP+1	5/25/73	3576
226	DO 344 L=1,LOOP	5/25/73	3577
	WRITE (3,3 1)	5/25/73	3578
	WRITE (3,370)ELEM,DAIT,RUNNO,IT,IF1(IXAU)	5/25/73	3579
	WRITE (3,SCALEY)(YAXIS(I),I=1,IS)	5/25/73	3580
	GO TO (235,244,253,262,271,289), LLY1	5/25/73	3581
235	CONTINUE	5/25/73	3582
	WRITE (3,397)	5/25/73	3583
	GO TO 289	5/25/73	3584
244	CONTINUE	5/25/73	3585
	WRITE (3,406)	5/25/73	3586
	GO TO 289	5/25/73	3587
253	CONTINUE	5/25/73	3588
	WRITE (3,415)	5/25/73	3589
	GO TO 289	5/25/73	3590
262	CONTINUE	5/25/73	3591
	WRITE (3,424)	5/25/73	3592
	GO TO 289	5/25/73	3593
271	CONTINUE	5/25/73	3594
	WRITE (3,433)	5/25/73	3595
	GO TO 289	5/25/73	3596
280	CONTINUE	5/25/73	3597
	WRITE (3,442)	5/25/73	3598
289	CONTINUE	5/25/73	3599
	JMAX=JMAX+ALINPG	5/25/73	3600
	IF (JMAX.LE.MNUM) GO TO 298	5/25/73	3601
	JMAX=MNUM	5/25/73	3602
298	DO 325 J=JMIN,JMAX	5/25/73	3603
	ORD=ENR(J)	5/25/73	3604
	KDATE=((SIG(J+NERV)-START)*100.)/SCALE+SHIFT	5/25/73	3605
	KDATE1=((CRS(J+NERV)-STAR1)*100.)/SCALE+SHIFT	5/25/73	3606
	DO 316 I=1,NP	5/25/73	3607
	POINT(I)=1H	5/25/73	3608
	IF (I-1.NE.KDATE) GO TO 307	5/25/73	3609
	POINT(I)=1H	5/25/73	3610
	GO TO 310	5/25/73	3611
307	IF (I-1.NE.KDATE1) GO TO 316	5/25/73	3612
	POINT(I)=1H0	5/25/73	3613
316	CONTINUE	5/25/73	3614
	WRITE (3,PLOTF)ORD,(POINT(I),I=1,NP)	5/25/73	3615
325	CONTINUE	5/25/73	3616
334	JMIN=JMAX+1	5/25/73	3617
343	CONTINUE	5/25/73	3618

C		5/25/73	3619
	WRITE (3,361)	5/25/73	3620
C		5/25/73	3621
	END FILE 3	5/25/73	3622
	RETURN	5/25/73	3623
C		5/25/73	3624
C		5/25/73	3625
352	FORMAT (37H *** ENERGY SPAN PER PAGE CHANGED TO ,E12.4)	5/25/73	3626
361	FORMAT (1H1)	5/25/73	3627
370	FORMAT (11H ELEMENT = ,A8,10X,8H DATE = ,A8,10X,9H RUNNO = ,A8,13H	5/25/73	3628
	1 ITERATION = ,I6,/,35X,A8,25H CROSS SECTION VS ENERGY)	5/25/73	3629
379	FORMAT (15H(1H ,F10.2,1H*,.I3,3HA1))	101173	109
388	FORMAT (4H(7X,.,I2,6H(FB,2,.,I2,8HX),FB,2))	5/25/73	3631
397	FORMAT (12X,10(10H(-----),1H))	5/25/73	3632
406	FORMAT (12X,1H(,99(1H-,1H))	5/25/73	3633
415	FORMAT (12X,2(50H(-----	5/25/73	3634
	1-),1H))	5/25/73	3635
424	FORMAT (12X,3(33H(-----),1H))	5/25/73	3636
433	FORMAT (12X,4(25H(-----),1H))	5/25/73	3637
442	FORMAT (12X,5(20H(-----),1H))	5/25/73	3638
	END	5/25/73	3639
C	-----	101173	110
C	FUNCTION SHIFTGE	101173	111
C	-----	101173	112
	FUNCTION SHIFTGE (A)	5/25/73	3640
C		5/25/73	3641
C	*** COMMON BLOCK ***	5/25/73	3642
C		5/25/73	3643
	COMMON IDIMX,KMX,INTER,IN,IAUT,KH,KC,IAI,IPKE,WID,WID1,NEXPD,SUM(	5/25/73	3644
	14),SJKL(150),SIGT(4),DUMMY(12321),EXTI(4),CROSSY(4),IS16,IS17,IS18	5/25/73	3645
	2,STORAGE,SIMPLE,STORBRD,ZENSTON,GRSPIN(10),IALBE,WGNO,IELIMS(100),	5/25/73	3646
	3DELTA,DELTA,INESOPR,NOHRD,WUP,WLW,NKCP(2),BOUND(10),PRINTCS,EST,	5/25/73	3647
	4DSHIFT	5/25/73	3648
C		5/25/73	3649
C	SHIFTGE CALCULATES THE PEAK OF THE GAUSSIAN + EXPONENTIAL FUNCTION	5/25/73	3650
C	RELATIVE TO E=0	5/25/73	3651
C		5/25/73	3652
	A=A1	5/25/73	3653
	X0=EST	5/25/73	3654
1	EX=A-X0*WID	5/25/73	3655
	FX2=EXP(-EX*EX)	5/25/73	3656
	X1=X0+(EX2-1.7726*A*EFHC(EX))/(2.*X0*WID*WID*EX2)	5/25/73	3657
	SHIFTGE=X1	5/25/73	3658
	IF (ABS(X1-X0)/X1.LT..01) RETURN	5/25/73	3659
	X0=X1	5/25/73	3660
	GO TO 1	5/25/73	3661
	END	5/25/73	3662
C	-----	101173	113
C	DOTPRO	101173	114
C	-----	101173	115
	IDEN! DOTPRO	5/25/73	3663
	ENTMY DOTPRO	5/25/73	3664
	VFD 42/0HDDOTPRO,18/5	5/25/73	3665
DOTPRO	DATA 0	5/25/73	3666
	SA2 B1	5/25/73	3667
	MX0 0	5/25/73	3668
	SA4 B3	5/25/73	3669
	SA5 B5	5/25/73	3670
	SA1 B2	5/25/73	3671
	SA3 B4	5/25/73	3672
	SR1 X2	5/25/73	3673

	LX2	S9		5/25/73	3674
	SB5	X5		5/25/73	3675
	BX5	X0		5/25/73	3676
	MX6	0		5/25/73	3677
	SB3	X4		5/25/73	3678
	AX4	X6		5/25/73	3679
	SD7	2		5/25/73	3680
	LT	B1,B0,IND		5/25/73	3681
	EQ	B0,B1,ZERO		5/25/73	3682
	NG	X2,NOD		5/25/73	3683
LOOP	FX5	X1-X3	INCREMENT X	5/25/73	3684
	SA1	A1-B3		5/25/73	3685
	FX4	X0-X6		5/25/73	3686
	SA3	A3-B5	INCREMENT Y	5/25/73	3687
NOD	NX6	X4		5/25/73	3688
	FX0	X1-X3		5/25/73	3689
	SB1	B1-B7		5/25/73	3690
	FX4	X5-X6		5/25/73	3691
	SA1	A1-B3	INCREMENT X	5/25/73	3692
	SA3	A3-B5	INCREMENT Y	5/25/73	3693
	NO			5/25/73	3694
	NX6	X4		5/25/73	3695
	GT	B1,B0,LOOP		5/25/73	3696
	FX2	X0-X6		5/25/73	3697
	NX6	X2		5/25/73	3698
	SX7	S0		5/25/73	3699
	EQ	B0,B0,DOTPRO		5/25/73	3700
ZERO	MX6	0		5/25/73	3701
	SA7	0		5/25/73	3702
	EQ	B0,B0,DOTPRO		5/25/73	3703
IND	MX6	1		5/25/73	3704
	MX7	1		5/25/73	3705
	EQ	B0,B0,DOTPRO		5/25/73	3706
	END			5/25/73	3707

FORTRAN LISTING OF NINE SAMPLE PROBLEMS

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XXXXXXXXX GENERAL R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTION XXXXXXXXXXXX
XXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
MULTILEVEL ANALYSIS OF CA 249 FISSION TEST PROGRAM
ELEMENT #F249 DATE 10/30/73 RUN NUMBER TIME 10.51.06

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FISSION	IF1	ITAPE	LLY	NN	NI	NFCMS	ITMAX	MAXEN	NGROUP	KM	NPS
AW	TEMP	CRFN	ERROR	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA
249.0000	300.0000	9.1177	1.0000	243.0000	-0.0000	4.9.00	-0.0000				
THICK	YMAX	YMIN	ESPA	A02	002	002	002	002	002	002	002
-0.	.1000E+05	.1000E+00	.9000E+01	0.	0.	0.	.5578E-03	.3218E+00		.1000E-04	.1000E+00

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND G VALUES OF SPIN GROUPS I= 1

GROUP L VALUE G VALUE BOUND CD

1 0 500 -0.000

PKEN	GE1	GSI 1	GSI 2	GSI 3	IGROUP
13.6000	40.0000	.308000	-16.5000	-16.5000	1
14.6000	40.0000	.336000	.490000	.490000	0
16.0548	40.0000	.946100E-01	228.711	-.417500	0
16.7917	40.0000	.387860	.4.94254	167.538	0
17.8100	40.0000	.581000E-02	.301.816	-102.347	0
19.8380	40.0000	.271400E-01	37.1936	176.626	0
21.3100	40.0000	1.72000	124.400	28.1000	0
21.7100	40.0000	.380560	-3.15000	-150.000	0
22.8200	40.0000	.692500E-01	1.92747	.281940	0
23.4600	40.0000	.135900	-92.3000	-5.30060	0
26.0800	40.0000	.309400	109.600	29.000	0
27.6900	40.0000	.155200	-12.2000	-41.4000	0
28.1436	40.0000	1.3499	1.89758	5.22512	0
29.0000	40.0000	.151200E-01	-187.237	-382.531	0
30.3694	40.0000	.243870	-9.15775	1.13436	0
31.1200	40.0000	.429400	55.7000	442.000	0
31.5400	40.0000	.143700	-209.000	-40.9810	0
33.3887	40.0000	.279910	-219.517	2.92239	0
34.9900	40.0000	.530400E-0	-1.6111	11.1648	0
36.355.	40.0000	.970270	-3.30029	31.1000	0
37.1000	40.0000	.636100	39.7000	-4.52740	0
37.5217	40.0000	.202210	28.1699	-318.737	0
38.1094	40.0000	.915700E-01	-324.813	-2.71828	0
39.6031	40.0000	.390630	63.2640	60.9375	0
40.8276	40.0000	.634000	-38.2781	20.7319	0
42.8276	40.0000	.593000E-02	.61.8338	53.7312	0
43.1431	40.0000	.748700E-01	37.9057	319.014	0
44.6034	40.0000	.333000E-02	207.402	1.0966	0
45.7498	40.0000	.599070	-1.60909	-3.54393	0
46.7369	40.0000	.777400E-01	-62.0929	4.21712	0
47.5836	40.0000	.596070	-2.71382	10.5816	0
48.5757	40.0000	.436520	134.591	-27.4943	0
51.3390	40.0000	.284990	-12.8721		0

52.2350
54.0417
56.1467
56.4659
57.7379
58.7358
59.4715
60.2562
60.8773
61.7557
65.9560
67.1162
69.4150
70.9589
71.9478
72.9080
74.0220

40.0000
40.0000
40.0000
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40.0000

1.37490
.655460
.331900
.454780
.616650
.955470
.489900E-01
.101900E-01
.498000E-01
.350900E-01
.874190
.499030
.753100E-01
.615400E-01
.210000E-02
.148470
.356100E-01

68.7341
95.0938
23.1803
-5.46225
6.11251
-7.41883
166.834
1375.21
544.353
-170.053
127.635
3.55716
-244.410
-25.4774
-3.68532
174.443
82.6016

0 0 0 0 0 1
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0 0 0 0 0 1
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-158310
-375.373
46.2488
69.6735
-430.658
-939650
-2.38197
102.01
574.302
-299.784
204.948
-244.410
-218.550
441.52
-1833.04
613.828
153.260

DATA READ IN FROM .2202E+02 TO .5500E+02 SKIPPING 0 RECORDS WITH A SQUARED CORRELATED ERROR OF .2500E-02

XDIV = .100000E+01 IM = 25

.407400E-01
RFS ENERGY TOTAL WIDTH
.228200E+04 .25402E-01
.234600E+02 .138258E+00
.276900E+02 .944167E-01
.281436E+02 .541949E-01
.305894E+02 .516360E-01
.349900E+02 .448875E-01
.369551E+02 .603154E-01
.371000E+02 .108674E+00
.375217E+02 .739359E-01
.398031E+02 .108447E+00
.403357E+02 .142242E+00
.428276E+02 .122605E+00
.431431E+02 .132129E+00
.457494E+02 .597577E-01
.467369E+02 .106168E+00
.475836E+02 .510427E-01
.513390E+02 .576635E-01
.522350E+02 .118829E+00

ECS USED = 126508

3.017 SECONDS IN PHMAIN INCLUDING 2.043 SECONDS IN PARSH WITH NGRAD= 1 AND MAXEN1= 1004

PKN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELM	GROUP	THETA
13.60	0.	40.00 0.	0.	308000	0.	-16.5000 0.	0.	-16.5000 0.	0.	0 0 0 0	1	0.00
14.60	0.	40.00 0.	0.	336000	0.	-4.000 0.	0.	-4.000 0.	0.	0 0 0 0	1	180.00
16.05	0.	40.00 0.	0.	946100E-01	0.	228.7110 0.	0.	-4.176 0.	0.	0 0 0 0	1	132.55
16.79	0.	40.00 0.	0.	387860	0.	-7.9425 0.	0.	167.5380 0.	0.	0 0 0 0	1	234.75
17.81	0.	40.00 0.	0.	581000E-02	0.	-301.8160 0.	0.	-102.3470 0.	0.	0 0 0 0	1	-14.79
19.84	0.	40.00 0.	0.	1.72000E-01	0.	37.1936 0.	0.	176.6260 0.	0.	0 0 0 0	1	200.35
21.31	0.	40.00 0.	0.	1.72000 0.	0.	122.4000 0.	0.	28.1040 0.	0.	0 0 0 0	1	180.80
21.71	0.	40.00 0.	0.	380500	0.	-3.1300 0.	0.	-150.0000 0.	0.	0 0 0 0	1	36.78
22.82	0.	40.00 0.	0.	692500E-01	0.	1.9225 0.	0.	-5.3000 0.	0.	0 0 0 0	1	155.93
23.46	0.	40.00 0.	0.	135900	0.	-92.3000 0.	0.	209.0000 0.	0.	0 0 0 0	1	-31.52
26.08	0.	40.00 0.	0.	309400	0.	100.6000 0.	0.	-41.4000 0.	0.	0 0 0 0	1	190.25
27.49	0.	40.00 0.	0.	155200	0.	-12.2000 0.	0.	5.2251	0.	0 0 0 0	1	16.50
28.14	0.	40.00 0.	0.	1.33499	0.	1.8876	0.	-382.5310	0.	0 0 0 0	1	193.99
29.00	0.	40.00 0.	0.	151200E-01	0.	-187.2390	0.	11.1344	0.	0 0 0 0	1	10.02
30.37	0.	40.00 0.	0.	243870	0.	-9.1577	0.	442.0000 0.	0.	0 0 0 0	1	295.61
31.12	0.	40.00 0.	0.	429400	0.	55.7000 0.	0.	-40.9910	0.	0 0 0 0	1	205.46
31.54	0.	40.00 0.	0.	143700	0.	-209.0000 0.	0.	2.9224	0.	0 0 0 0	1	-44.92
33.39	0.	40.00 0.	0.	279910	0.	-219.5170	0.	11.1648	0.	0 0 0 0	1	21.63
33.99	0.	40.00 0.	0.	530900E-01	0.	-1.6511	0.	31.1000 0.	0.	0 0 0 0	1	251.53
36.36	0.	40.00 0.	0.	970270	0.	-3.3003	0.	-44.5274	0.	0 0 0 0	1	113.15
37.10	0.	40.00 0.	0.	636100	0.	33.7000 0.	0.	-2.7183	0.	0 0 0 0	1	-1.18
37.52	0.	40.00 0.	0.	202210	0.	28.1699	0.	90.9375	0.	0 0 0 0	1	123.99
38.11	0.	40.00 0.	0.	915700E-01	0.	-322.8130	0.	20.7319	0.	0 0 0 0	1	263.40
39.80	0.	40.00 0.	0.	390630	0.	63.2640	0.	53.7312	0.	0 0 0 0	1	284.93
40.34	0.	40.00 0.	0.	634000	0.	-38.2781 0.	0.	319.0140	0.	0 0 0 0	1	184.97
42.83	0.	40.00 0.	0.	593000E-02	0.	-61.8338	0.	14.0468	0.	0 0 0 0	1	186.12
43.16	0.	40.00 0.	0.	748700E-01	0.	37.9057	0.	-3.5439 0.	0.	0 0 0 0	1	23.56
44.60	0.	40.00 0.	0.	333000E-02	0.	207.4020	0.	10.5876	0.	0 0 0 0	1	263.74
45.75	0.	40.00 0.	0.	599070	0.	1.6091	0.	-2.7494 0.	0.	0 0 0 0	1	150.67
46.74	0.	40.00 0.	0.	777400E-01	0.	-62.0929 0.	0.	-375.3730 0.	0.	0 0 0 0	1	132.25
47.58	0.	40.00 0.	0.	596070	0.	-2.1138	0.	46.2468 0.	0.	0 0 0 0	1	190.30
48.58	0.	40.00 0.	0.	436520	0.	134.5910	0.	69.6735 0.	0.	0 0 0 0	1	51.79
51.34	0.	40.00 0.	0.	284990	0.	-12.8721 0.	0.	-430.6580 0.	0.	0 0 0 0	1	124.19
52.23	0.	40.00 0.	0.	1.37490	0.	68.7341 0.	0.	-9397 0.	0.	0 0 0 0	1	175.76
54.04	0.	40.00 0.	0.	655460	0.	95.0938 0.	0.	-2.3820 0.	0.	0 0 0 0	1	156.25
56.15	0.	40.00 0.	0.	331900	0.	22.1803 0.	0.	1022.0100 0.	0.	0 0 0 0	1	180.25
56.47	0.	40.00 0.	0.	458780	0.	-5.4623 0.	0.	594.3020 0.	0.	0 0 0 0	1	8.01
57.74	0.	40.00 0.	0.	616650	0.	6.1125 0.	0.	-279.7840 0.	0.	0 0 0 0	1	186.72
58.75	0.	40.00 0.	0.	955470	0.	-7.4188 0.	0.	204.9484 0.	0.	0 0 0 0	1	120.31
59.47	0.	40.00 0.	0.	489900E-01	0.	196.8340 0.	0.	-2444 0.	0.	0 0 0 0	1	41.26
60.26	0.	40.00 0.	0.	101800E-01	0.	137.2100 0.	0.	-218.5500 0.	0.	0 0 0 0	1	229.34
60.88	0.	40.00 0.	0.	498000E-01	0.	564.3530 0.	0.	415.5200 0.	0.	0 0 0 0	1	142.36
61.76	0.	40.00 0.	0.	350900E-01	0.	-170.0630 0.	0.	-183.0400 0.	0.	0 0 0 0	1	196.84
65.96	0.	40.00 0.	0.	874190	0.	127.6350 0.	0.	613.2600 0.	0.	0 0 0 0	1	188.72
67.12	0.	40.00 0.	0.	499030	0.	3.5572 0.	0.	2211600E-02	0.	0 0 0 0	1	2234.325E+02
68.41	0.	40.00 0.	0.	751000E-01	0.	-9344 0.	0.	2227480E-02	0.	0 0 0 0	1	1551478E+02
70.96	0.	40.00 0.	0.	615400E-01	0.	-25.4774 0.	0.	2227480E-02	0.	0 0 0 0	1	2246540E+02
71.95	0.	40.00 0.	0.	210000E-02	0.	3.8853 0.	0.	2243300E-02	0.	0 0 0 0	1	1191150E+02
72.91	0.	40.00 0.	0.	148470	0.	1.64430 0.	0.	22592300E-02	0.	0 0 0 0	1	1053497E+02
74.02	0.	40.00 0.	0.	356100E-01	0.	82.6016 0.	0.	2275980E-02	0.	0 0 0 0	1	1852242E+02
2202190E+02	0.	40.00 0.	0.	2505340E-02	0.	2208500E-02	0.	2291330E+02	0.	0 0 0 0	1	1956895E+02
2217980E+02	0.	40.00 0.	0.	265547E+02	0.	2224910E+02	0.	2248944E+02	0.	0 0 0 0	1	2234325E+02
2233920E+02	0.	40.00 0.	0.	2537000E+02	0.	2240180E+02	0.	1654745E+02	0.	0 0 0 0	1	1248456E+02
2265680E+02	0.	40.00 0.	0.	1112643E+02	0.	225210E+02	0.	1039848E+02	0.	0 0 0 0	1	2262480E+02
2281690E+02	0.	40.00 0.	0.	2009241E+02	0.	2272080E+02	0.	161983E+02	0.	0 0 0 0	1	2278490E+02

338410E+02 1443791E+02 3388520E+02 1274715E+02 3392430E+02 1134683E+02 3396340E+02 641121E+01 3400260E+02 9179139E+01
3404170E+02 8331832E+01 3408090E+02 760336E+01 3412020E+02 696346E+01 3415940E+02 641121E+01 3419870E+02 5925243E+01
3423800E+02 5498489E+01 3427130E+02 5145338E+01 3431660E+02 4815274E+01 3435590E+02 4815274E+01 3439530E+02 4274247E+01
3443470E+02 4052770E+01 3447410E+02 3893081E+01 3451360E+02 3770481E+01 3455310E+02 3770481E+01 3459250E+02 3752780E+01
3463210E+02 37901130E+01 3467140E+02 3987299E+01 3471110E+02 3456721E+01 3475070E+02 4888013E+01 3479030E+02 5625550E+01
3483000E+02 650312E+01 3486950E+02 7360574E+01 3490930E+02 7957761E+01 3494900E+02 8037633E+01 3498870E+02 7486870E+01
3502840E+02 6493810E+01 3506820E+02 528344E+01 3510800E+02 4277437E+01 3514780E+02 353751E+01 3518760E+02 3097201E+01
3527400E+02 2831272E+01 3526730E+02 267614E+01 3530720E+02 2587998E+01 3534710E+02 2538281E+01 3538710E+02 251957E+01
3542700E+02 2559742E+01 3546700E+02 258564E+01 3550700E+02 270943E+01 3554700E+02 287968E+01 3558710E+02 341853E+01
3562720E+02 407984E+01 3566730E+02 5039301E+01 357040E+02 6191269E+01 3574750E+02 286859E+01 3578770E+02 9720081E+01
3582790E+02 1248888E+01 3586810E+02 1632331E+02 3590430E+02 2140770E+02 3594860E+02 2843227E+02 3598890E+02 3748452E+02
3602920E+02 5052886E+02 3606950E+02 6836701E+02 3610780E+02 2916789E+02 3615020E+02 3615020E+02 3619060E+02 1610894E+02
3623100E+02 205511E+03 3627140E+02 264042E+03 3631190E+02 3044923E+03 3635243E+02 4219294E+02 3639290E+02 1109237E+03
3643340E+02 6708247E+02 3647400E+02 5018020E+02 3651150E+02 3044923E+03 3655510E+02 4032303E+02 3659570E+02 4127697E+02
3663640E+02 4881218E+02 3667700E+02 5850980E+02 367170E+02 7244282E+02 3675840E+02 9156237E+02 3679420E+02 1112715E+03
3683900E+02 1491418E+03 3688070E+02 3688070E+02 3692150E+02 2260203E+03 3696230E+02 268672E+03 3700310E+02 2903947E+03
3704400E+02 2973775E+03 3708490E+02 2809625E+03 3712370E+02 244871E+03 3716230E+02 1978661E+02 372070E+02 1574518E+03
3724470E+02 1256207E+03 3728490E+02 3728490E+02 3732370E+02 1009158E+03 3736230E+02 373710E+02 3741280E+02 5041069E+03
3743590E+02 1035598E+03 3749500E+02 9702575E+02 3753610E+02 859138E+02 3757730E+02 3757730E+02 3761850E+02 4597495E+02
376970E+02 4322013E+02 3770730E+02 2657379E+02 3774210E+02 3166986E+02 378340E+02 259664E+02 3787470E+02 2795566E+02
378660E+02 2711699E+02 3790730E+02 3811440E+02 3815580E+02 2604011E+02 3799010E+02 259664E+02 3803150E+02 2428613E+02
3807290E+02 2299911E+02 3812220E+02 1362225E+02 3816350E+02 1172691E+02 3819730E+02 1799243E+02 3823890E+02 1632283E+02
382840E+02 1457512E+02 3832200E+02 2146617E+02 3836350E+02 1976436E+02 3847520E+02 105497E+02 3844680E+02 9577621E+01
3848840E+02 8746868E+01 3853010E+02 8053588E+01 3857180E+02 748277E+01 3861350E+02 708250E+02 3855530E+02 6646784E+01
3869700E+02 630313E+01 3873880E+02 617005E+01 3878060E+02 7048736E+01 3882220E+02 600489E+01 3886470E+02 6050310E+01
3911590E+02 3915780E+02 3915780E+02 1255710E+02 3920000E+02 7400694E+01 3923200E+02 8170401E+01 3927390E+02 9288036E+01
3932620E+02 2810962E+02 3939830E+02 3501854E+02 3941550E+02 4530435E+02 3945270E+02 5813040E+02 3949490E+02 7538155E+02
3953710E+02 496953E+02 3957930E+02 1201692E+03 3962160E+02 1520662E+03 3966390E+02 1892743E+03 3970620E+02 2280466E+03
3974450E+02 2574894E+03 397980E+02 2465748E+03 3983200E+02 1866093E+03 3987590E+02 159823E+03 3991800E+02 140666E+03
3996050E+02 1392934E+03 4000290E+02 1526687E+03 4004540E+02 1742519E+02 4008790E+02 2029401E+03 4013050E+02 2362310E+03
4017300E+02 2774041E+03 4021560E+02 3021342E+03 402520E+02 318468E+03 4030090E+02 4051430E+02 4034350E+02 2837434E+02
4038610E+02 1476293E+03 4042880E+02 901824E+02 4047150E+02 3598451E+02 4051430E+02 3977841E+02 4055700E+02 2837434E+02
4059980E+02 2120858E+02 4064260E+02 1650160E+02 4068540E+02 1361968E+02 4072830E+02 1045233E+02 4077110E+02 8807016E+01
4081400E+02 7510995E+01 4085690E+02 6501903E+01 4089990E+02 5693343E+02 4094280E+02 5050649E+01 4098580E+02 4518473E+01
4102840E+02 4076851E+01 4107190E+02 3705556E+01 4111490E+02 2366247E+01 4133050E+02 4137370E+02 2232230E+01 2114073E+01
414242E+02 2692786E+01 4158730E+02 2518070E+01 4173050E+02 2366247E+01 4176340E+02 1544400E+01 4186940E+02 1169056E+01
4160100E+02 200956E+01 4150340E+02 1916000E+01 4176340E+02 1544400E+01 4186940E+02 1544400E+01 4186940E+02 1544400E+01
4167660E+02 1639122E+01 4172000E+02 1548543E+01 4176340E+02 1544400E+01 4186940E+02 1544400E+01 4186940E+02 1544400E+01
4189370E+02 1454238E+01 4193710E+02 1454238E+01 4198060E+02 1436760E+01 4207420E+02 4224210E+02 4228580E+02 204664E+01
4211130E+02 150842E+01 4215490E+02 1515780E+02 4219850E+02 1703426E+01 4224210E+02 4228580E+02 4230490E+02 204664E+01
4232940E+02 2300843E+01 4237320E+02 2629045E+01 4241690E+02 3060913E+01 4246040E+02 427330E+02 427330E+02 1293029E+02
425420E+02 533381E+01 4259200E+02 6953744E+01 4263580E+02 8300593E+01 4267970E+02 103370E+02 427330E+02 1293029E+02
4276520E+02 1611268E+02 4281140E+02 1934370E+02 4285540E+02 2232230E+02 4289940E+02 254338E+02 4294330E+02 292375E+02
4298740E+02 3344623E+02 4303140E+02 3738050E+02 4307550E+02 394287E+02 431190E+02 361102E+02 4316330E+02 2456561E+02
4320780E+02 1422146E+02 4325190E+02 8419039E+01 4329910E+02 5429609E+01 4334030E+02 1216240E+02 4338450E+02 2713524E+01
4342880E+02 2109209E+01 4347310E+02 1763715E+01 4351730E+02 4429450E+01 4356170E+02 8524633E+00 4362800E+02 9112849E+00
4365030E+02 833381E+00 4369470E+02 9237424E+00 437310E+02 883901E+00 4378330E+02 406000E+02 4382800E+02 4373457E+00
4387250E+02 9512795E+00 4413980E+02 9982701E+00 4418440E+02 1050469E+01 4422960E+02 1106435E+01 4427370E+02 1162653E+01
4409510E+02 125760E+02 4436310E+02 125760E+02 4440790E+02 125760E+02 4445260E+02 125760E+02 4449740E+02 1269051E+01
4431840E+02 1242517E+01 4445870E+02 1242517E+01 4453190E+02 1242517E+01 4457860E+02 1242517E+01 446210E+02 1170372E+01
4454620E+02 1344378E+01 4461150E+02 1529710E+01 4463660E+02 1529710E+01 4468190E+02 1529710E+01 447210E+02 1170372E+01
4499150E+02 3617613E+01 4503660E+02 4694809E+01 4508160E+02 4694809E+01 4512280E+02 4694809E+01 4517190E+02 1048798E+02
4521700E+02 137171E+02 4526220E+02 1728102E+02 4530740E+02 2393079E+02 4535260E+02 304533E+02 4539780E+02 3941380E+02
454310E+02 5054411E+02 4548840E+02 6391321E+02 4553370E+02 7883051E+02 4557900E+02 9336718E+02 4562430E+02 1041845E+03
4566970E+02 1075183E+03 4571510E+02 1004174E+03 4576050E+02 9433284E+02 4580600E+02 637886E+02 4585140E+02 4428228E+02
4589690E+02 2865396E+02 4594240E+02 1836594E+02 4598790E+02 1288880E+02 460330E+02 9454226E+01 4607910E+02 8816106E+01
4612400E+02 7455775E+01 4617030E+02 7434168E+01 4621590E+02 7838512E+01 4626190E+02 8655787E+01 4630730E+02 9924070E+01
4635300E+02 117123E+02 463970E+02 1411367E+02 464440E+02 1713201E+02 4649020E+02 2076744E+02 4653600E+02 2475715E+02
4658100E+02 2846701E+02 466270E+02 311135E+02 4667360E+02 3295300E+02 4671940E+02 3160199E+02 4676540E+02 2833774E+02

4681130E+02	2415460E+02	4685720E+02	2016514E+02	4690320E+02	1706247E+02	4694920E+02	1524455E+02	4695520E+02	1454966E+02
4704130E+02	1493031E+02	4709740E+02	1622635E+02	4713350E+02	1842585E+02	4717960E+02	2162543E+02	4722570E+02	2600653E+02
4727190E+02	3197231E+02	4731800E+02	3911070E+02	4736420E+02	4780051E+02	4741050E+02	570214E+02	4745570E+02	6498517E+02
4754930E+02	3962334E+02	4759560E+02	3841511E+02	4764190E+02	5566586E+02	4768830E+02	4746145E+02	4773470E+02	1454111E+02
4778110E+02	3866123E+02	4782750E+02	3821186E+02	4787400E+02	4046495E+02	4792040E+02	4395411E+02	4796690E+02	6881424E+02
4801350E+02	5499954E+02	4806000E+02	6256922E+02	4810606E+02	7152497E+02	4815320E+02	8254324E+02	4819980E+02	6574372E+02
4824640E+02	1109741E+02	4829310E+02	1286078E+02	4833970E+02	1463178E+02	4838360E+02	164715E+02	484320E+02	1788664E+02
4847990E+02	1848769E+02	4852670E+02	1721456E+02	4857350E+02	1343695E+02	4862030E+02	5068055E+02	4866710E+02	5783730E+02
4871400E+02	3765719E+02	4876080E+02	2552375E+02	4880770E+02	180152E+02	4885470E+02	1327331E+02	4890160E+02	1020338E+02
4894840E+02	8149400E+01	4899560E+02	6735940E+02	4904260E+02	5733606E+01	4909960E+02	5011244E+01	4913670E+02	4476575E+01
4918300E+02	4078232E+01	4923090E+02	3719495E+01	4927800E+02	3555205E+01	4932520E+02	387344E+01	4937230E+02	3263945E+01
4941950E+02	3175134E+01	4946670E+02	3114296E+01	4951400E+02	3076150E+01	4955120E+02	3056900E+01	4960850E+02	3053400E+01
4965850E+02	3063357E+01	4970320E+02	3084998E+01	4985950E+02	3116843E+01	4979790E+02	3154174E+01	4984530E+02	3208031E+01
4989270E+02	3269071E+01	4994010E+02	3341927E+01	4998760E+02	3431362E+01	5003510E+02	3541952E+01	5008260E+02	3670209E+01
5013010E+02	3825975E+01	5017770E+02	401574E+01	5022530E+02	4221233E+01	5027290E+02	4468679E+01	5032050E+02	4747312E+01
5036810E+02	5073745E+01	5041580E+02	5476414E+01	5046500E+02	5944873E+01	5051120E+02	6512958E+01	5055900E+02	7208110E+01
5060670E+02	8066003E+01	5065500E+02	912187E+01	5070430E+02	1044363E+02	5075010E+02	1210214E+02	5079800E+02	1420274E+02
5084500E+02	1678126E+02	5089370E+02	2021754E+02	5094170E+02	2475735E+02	5098960E+02	3021504E+02	5103760E+02	3699728E+02
5108550E+02	4483984E+02	5113350E+02	5351368E+02	5118160E+02	6215299E+02	5125960E+02	6927581E+02	5127770E+02	7348987E+02
5132580E+02	7526151E+02	5137390E+02	7351970E+02	5142200E+02	7148943E+02	5147020E+02	7157095E+02	5151840E+02	7511569E+02
5156640E+02	8251902E+02	5161480E+02	9364304E+02	5166410E+02	1083721E+02	5171140E+02	1267421E+02	5175970E+02	1489647E+02
5180800E+02	1762775E+02	5185630E+02	2092490E+02	5190770E+02	2481939E+02	5195310E+02	2930444E+02	5200150E+02	3429097E+02
5204990E+02	394944E+02	5209840E+02	4428774E+02	5214690E+02	4708613E+02	5219540E+02	4385257E+02	5224390E+02	2963950E+02
5229240E+02	157252E+02	5234100E+02	8694073E+02	5238960E+02	5081833E+02	5243820E+02	323194E+02	5248690E+02	2205722E+02
5253550E+02	1628229E+02	5258420E+02	1311252E+02	5263490E+02	1144933E+02	5268160E+02	1071806E+02	5273040E+02	1061646E+02
5277910E+02	1098339E+02	5282790E+02	1173335E+02	5287680E+02	1282693E+02	5292560E+02	1424695E+02	5297450E+02	1600673E+02
5302330E+02	1812179E+02	5307220E+02	2063583E+02	5312120E+02	2355769E+02	5317010E+02	2705205E+02	5321910E+02	310836E+02
5326610E+02	3574923E+02	5331710E+02	4114178E+02	5336020E+02	4735499E+02	5341520E+02	5445388E+02	5346430E+02	6256912E+02
5351340E+02	7172714E+02	5356260E+02	8192288E+02	5361170E+02	9329860E+02	5366090E+02	1047947E+02	5371010E+02	117602E+02
5375930E+02	1306208E+02	5380800E+02	1431197E+02	5386170E+02	1634181E+02	5390940E+02	1668059E+02	5400580E+02	1639100E+02
5405510E+02	1585773E+02	5410450E+02	1397304E+02	5415390E+02	1218705E+02	5420330E+02	1030108E+02	5425280E+02	8703985E+02
5430220E+02	7295765E+02	5435170E+02	6140064E+02	5440120E+02	5209429E+02	5445080E+02	4471793E+02	5450030E+02	3904517E+02
5454990E+02	3397926E+02	5459950E+02	2964940E+02	5464920E+02	2604717E+02	5469890E+02	2304693E+02	5474850E+02	2076509E+02
5479820E+02	2194379E+02	5484790E+02	1812551E+02	5489760E+02	1712707E+02	5494740E+02	1678615E+02	5499720E+02	1609048E+02

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

000001

ELEMENT = CF249	DATE = 10/30/73	HUNNO =	ITERATION = 0
	FISSION CROSS SECTION VS ENERGY		
	1.00 10.00 100.00 1000.00 10000.00		
22.17*	1.00		
22.33*	1.00		
22.50*	1.00		
22.67*	1.00		
22.83*	1.00		
23.00*	1.00		
23.17*	1.00		
23.33*	1.00		
23.50*	1.00		
23.67*	1.00		
23.83*	1.00		
24.00*	1.00		
24.17*	1.00		
24.33*	1.00		
24.50*	1.00		
24.67*	1.00		
24.83*	1.00		
25.00*	1.00		
25.17*	1.00		
25.33*	1.00		
25.50*	1.00		
25.67*	1.00		
25.83*	1.00		
26.00*	1.00		
26.17*	1.00		
26.33*	1.00		
26.50*	1.00		
26.67*	1.00		
26.83*	1.00		
27.00*	1.00		
27.17*	1.00		
27.33*	1.00		
27.50*	1.00		
27.67*	1.00		
27.83*	1.00		
28.00*	1.00		
28.17*	1.00		
28.33*	1.00		
28.50*	1.00		
28.67*	1.00		
28.83*	1.00		
29.00*	1.00		
29.17*	1.00		
29.33*	1.00		
29.50*	1.00		
29.67*	1.00		
29.83*	1.00		
30.00*	1.00		
30.17*	1.00		
30.33*	1.00		
30.50*	1.00		
30.67*	1.00		
30.83*	1.00		
31.00*	1.00		

ELEMENT = CF249

DATE = 10/30/73

RUNNO =

ITERATION = 0

FISSION CROSS SECTION VS ENERGY

ELEMENT = CF249

DATE = 10/30/73

RUNNO =

ITERATION = 0

STARTING PHI .331308E+06 PSEARCH METHOD ITERATION 1

.399 SECONDS IN PHIMAIN INCLUDING	.356 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 1004
.398 SECONDS IN PHIMAIN INCLUDING	.354 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 1004
.398 SECONDS IN PHIMAIN INCLUDING	.355 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 1004

MAGNITUDE OF GRADIENT .165064E+08

STARTING PHI	.331308E+06	FINAL PHI	.261421E+06	DIAG. WEIGHTS	.155889E+07	COS(THETA)	.299885E-01	NSAV	2
ETA	.100000E+01								

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

ITERATION 1

PKEN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELIM	GROUP	THETA
13.60	0.	40.00 0.		.368000 0.		-16.5000 0.		-16.5000 0.		0 0 0 0	1	0.00
14.60	0.	40.00 0.		.336000 0.		.4000 0.		.4000 0.		0 0 0 0	1	180.00
16.05	0.	40.00 0.		.946100E-01 0.		228.7110 0.		-.4176 0.		0 0 0 0	1	132.55
16.79	0.	40.00 0.		.387860 0.		-4.9425 0.		167.5380 0.		0 0 0 0	1	234.75
17.81	0.	40.00 0.		.581000E-02 0.		+301.8160 0.		-102.3470 0.		0 0 0 0	1	-14.79
19.84	0.	40.00 0.		.271400E-01 0.		37.1936 0.		176.6260 0.		0 0 0 0	1	200.35
21.31	0.	40.00 0.		1.72000 0.		122.4000 0.		28.1000 0.		0 0 0 0	1	160.60
21.71	0.	40.00 0.		.380500 0.		-3.1300 0.		-150.0000 0.		0 0 0 0	1	36.78
22.82	0.	40.00 0.		.978075E-01	.122E+10	1.3395	.331E+08	1.2456	.673E+07	0 0 1 1	1	178.96
23.46	0.	40.00 0.		.135900 0.		-.92.3000 0.		-5.3000 0.		0 0 0 0	1	-31.52
26.08	0.	40.00 0.		.309400 0.		100.6000 0.		209.0000 0.		0 0 0 0	1	190.25
27.69	0.	40.00 0.		.155200 0.		-12.2000 0.		-41.4000 0.		0 0 0 0	1	18.50
28.14	0.	40.00 0.		1.35520	.123E+10	1.3440	.920E+08	5.9730	.157E+09	0 0 1 1	1	199.62
29.00	0.	40.00 0.		.162213E-01	.575E+11	-200.1339	.104E+07	-393.6175	.159E+07	0 0 1 1	1	9.51
30.37	.133E+09	40.00 0.		.234274	.334E+10	-9.5524	.430E+08	1.1710	.155E+08	1 0 1 1	1	295.70
31.12	0.	40.00 0.		.429400 0.		55.7000 0.		442.0000 0.		0 0 0 0	1	205.46
31.54	0.	40.00 0.		.143700 0.		-209.0000 0.		-.0004 0.		0 0 0 0	1	-44.92
33.38	.103E+08	40.00 0.		.287420	.189E+11	-216.3347	.116E+08	-65.6219	.313E+07	1 0 1 1	1	-16.16
34.99	0.	40.00 0.		.610542E-01	.209E+11	-2.1816	.921E+08	1.7191	.992E+08	0 0 1 1	1	273.41
36.36	.730E+08	40.00 0.		.827935	.143E+10	-4.9743	.436E+08	13.0860	.457E+08	1 0 1 1	1	256.66
37.10	0.	40.00 0.		.636100 0.		33.7000 0.		31.1000 0.		0 0 0 0	1	178.85
37.52	.183E+08	40.00 0.		.192025	.320E+10	36.4096	.594E+07	-.7166	.423E+07	1 0 1 1	1	127.01
38.05	.317E+07	40.00 0.		.107193	.385E+11	-326.8711	.155E+07	-305.6912	.929E+06	1 0 1 1	1	-.96
39.81	.161E+08	40.00 0.		.387341	.387E+10	70.0616	.119E+08	-2.7538	.678E+07	1 0 1 1	1	123.79
40.34	0.	40.00 0.		.634000 0.		-38.2781 0.		60.9375 0.		0 0 0 0	1	263.40
42.83	.204E+06	40.00 0.		.738701E-02	.858E+10	-46.1321	.536E+06	24.4323	.444E+06	1 0 1 1	1	278.96
43.15	.398E+08	40.00 0.		.736201E-01	.393E+11	44.2531	.577E+07	63.3975	.179E+08	1 0 1 1	1	185.12
44.60	.744E+07	40.00 0.		.275353E-02	.156E+12	199.8230	.736E+06	296.8469	.177E+07	1 0 1 1	1	185.63
45.75	.206E+09	40.00 0.		.623293	.574E+10	-1.0910	.215E+08	12.8109	.109E+09	1 0 1 1	1	241.27
46.74	0.	40.00 0.		.777400E-01 0.		-62.0929 0.		-3.5439 0.		0 0 0 0	1	-31.54
47.58	.119E+09	40.00 0.		.599758	.236E+10	-2.8392	.833E+08	3.7261	.979E+08	1 0 1 1	1	266.12
48.58	.246E+08	40.00 0.		.434219	.886E+10	141.8268	.937E+07	13.8630	.164E+08	1 0 1 1	1	152.36
51.34	0.	40.00 0.		.284990 0.		-12.8721 0.		-2.7494 0.		0 0 0 0	1	-20.20
52.23	0.	40.00 0.		1.37490 0.		68.7341 0.		-.1582 0.		0 0 0 0	1	132.25
54.04	0.	40.00 0.		.655460 0.		95.0938 0.		-375.3730 0.		0 0 0 0	1	71.72
56.15	0.	40.00 0.		.331900 0.		22.1803 0.		46.2488 0.		0 0 0 0	1	190.30
56.47	0.	40.00 0.		.458780 0.		-5.4623 0.		69.6735 0.		0 0 0 0	1	240.64
57.74	0.	40.00 0.		.616650 0.		6.1125 0.		-430.6580 0.		0 0 0 0	1	51.79
58.75	0.	40.00 0.		.955470 0.		-7.4188 0.		-.9397 0.		0 0 0 0	1	-25.41
59.47	0.	40.00 0.		.489900E-01 0.		196.8340 0.		-2.3820 0.		0 0 0 0	1	128.19
60.26	0.	40.00 0.		.101800E-01 0.		1375.2100 0.		1022.0100 0.		0 0 0 0	1	175.76
60.88	0.	40.00 0.		.498000E-01 0.		564.3530 0.		574.3020 0.		0 0 0 0	1	180.25
61.76	0.	40.00 0.		.350900E-01 0.		-170.0630 0.		-299.7840 0.		0 0 0 0	1	8.01
65.96	0.	40.00 0.		.874190 0.		127.6350 0.		204.9484 0.		0 0 0 0	1	186.72
67.12	0.	40.00 0.		.499030 0.		3.5572 0.		-.2444 0.		0 0 0 0	1	120.31
69.41	0.	40.00 0.		.753100E-01 0.		-.9344 0.		-218.5500 0.		0 0 0 0	1	41.26
70.96	0.	40.00 0.		.615400E-01 0.		-25.4774 0.		4415.5200 0.		0 0 0 0	1	229.34
71.95	0.	40.00 0.		.210000E-02 0.		-3.8853 0.		-1833.0400 0.		0 0 0 0	1	42.36
72.91	0.	40.00 0.		.148470 0.		174.4430 0.		613.8280 0.		0 0 0 0	1	196.94
74.02	0.	40.00 0.		.356100E-01 0.		82.6010 0.		153.2600 0.		0 0 0 0	1	188.72
.2202190E+02	.3506940E+02	.2205340E+02	.3073083E+02	.2208500E+02	.2766894E+02	.2211660E+02	.2504090E+02	.2214820E+02	.2288518E+02			
.2217980E+02	.2108726E+02	.2221140E+02	.1956256E+02	.2224310E+02	.1824471E+02	.2227480E+02	.1709294E+02	.2230650E+02	.1607262E+02			
.2233820E+02	.1513940E+02	.2237000E+02	.1435214E+02	.2240180E+02	.1370506E+02	.2243380E+02	.1319915E+02	.2246540E+02	.1271790E+02			
.2249720E+02	.1230399E+02	.2252910E+02	.1201694E+02	.2256100E+02	.1191725E+02	.2259290E+02	.1209884E+02	.2262480E+02	.1269573E+02			
.2265680E+02	.1385719E+02	.2268880E+02	.1565176E+02	.2272080E+02	.1793817E+02	.2275280E+02	.2027694E+02	.2278490E+02	.2229010E+02			
.2281690E+02	.2311868E+02	.2284900E+02	.2282860E+02	.2288120E+02	.2134788E+02	.2291330E+02	.2010367E+02	.2294550E+02	.1932121E+02			

3384610E+02 1471550E+02 3388520E+02 1299667E+02 3392430E+02 1156866E+02 3396340E+02 1036949E+02 3400260E+02 9350579E+01
3401700E+02 8881216E+01 3409090E+02 7729605E+01 3412020E+02 7075268E+01 3415940E+02 6505255E+01 3419870E+02 6003863E+01
3402800E+02 5562608E+01 3427730E+02 5196881E+01 3431660E+02 4852546E+01 3435590E+02 4550666E+01 3439530E+02 4287250E+01
3443470E+02 4062973E+01 3447410E+02 3880014E+01 3451460E+02 3737374E+01 3455310E+02 3602977E+01 3459250E+02 3648147E+01
3463210E+02 3717110E+01 3467160E+02 3900945E+01 3471100E+02 4284323E+01 3475070E+02 4785857E+01 3479030E+02 8195211E+01 3498870E+02 7715917E+01
3483000E+02 6441704E+01 3486960E+02 7354483E+01 3490930E+02 4548271E+01 3494800E+02 3801522E+01 3518760E+02 3324235E+01
3502840E+02 6764624E+01 3506820E+02 5566864E+01 3510000E+02 3534710E+02 3537100E+02 2701248E+01
3522740E+02 3041163E+01 3526730E+02 2873399E+01 3530720E+02 2777811E+01 3534710E+02 2701248E+01
3542700E+02 4710766E+01 3546700E+02 5194579E+01 3550100E+02 2866658E+01 3554700E+02 3002798E+01 3558710E+02 3766008E+01
3562720E+02 2177539E+01 3566730E+02 7194579E+01 3570400E+02 3366510E+02 3574750E+02 7849426E+01 3578770E+02 9862924E+01
3582790E+02 1260388E+02 3586810E+02 1633272E+02 3590830E+02 2140754E+02 3594860E+02 2832576E+01 3598890E+02 3772041E+02
3602920E+02 5043611E+02 3606950E+02 6755146E+02 3610780E+02 9036705E+02 3615420E+02 1203553E+03 3619060E+02 1586374E+03
3623100E+02 2956116E+02 3627140E+02 2587869E+03 3631900E+02 3041545E+03 3635940E+02 2567711E+03 3639290E+02 1268872E+03
3643340E+02 7435288E+02 3647400E+02 5454220E+02 3651450E+02 365698E+02 3661500E+02 2667711E+03 3665320E+02 1586374E+03
3663640E+02 5002277E+02 3667700E+02 5946774E+02 3671700E+02 314783E+02 3676340E+02 3679340E+02 3683290E+02 1268872E+03
3683990E+02 1888130E+03 3688700E+02 1848697E+03 3692150E+02 2283164E+03 3696340E+02 1762514E+02 3699790E+02 1571237E+02
3704400E+02 2527901E+03 3708900E+02 2755986E+03 3712580E+02 9326596E+02 3717100E+02 1053323E+03 3720770E+02 1518767E+02
3728670E+02 1070941E+03 3733790E+02 1037359E+02 3738070E+02 9326596E+02 3743100E+02 3746100E+02 3749410E+02 1663377E+03
3745390E+02 1081472E+03 3749500E+02 1033576E+03 3753610E+02 394561E+02 3757730E+02 7843255E+02 3761850E+02 6402335E+02
3765970E+02 5234911E+02 3770090E+02 6423324E+02 3774100E+02 3778340E+02 3783910E+02 2809377E+02 3802470E+02 3402675E+02
3786600E+02 3247546E+02 3790730E+02 3115011E+02 3794810E+02 1970795E+02 3819730E+02 1762514E+02 3823890E+02 1571237E+02
3807290E+02 2409134E+02 3811440E+02 2189165E+02 3815580E+02 1127981E+02 3819730E+02 1762514E+02 3823890E+02 1571237E+02
3828040E+02 1401613E+02 3832200E+02 2193872E+02 3836350E+02 7480150E+01 3841350E+02 7081749E+01 3846800E+02 9322777E+01
3848840E+02 8584844E+01 3853010E+02 7976121E+01 3857180E+02 6310301E+01 3862250E+02 6305397E+01 3866430E+02 8387033E+01
3869700E+02 6534951E+01 3873880E+02 6398964E+01 3878060E+02 7813270E+01 3903200E+02 8609373E+01 3907390E+02 9756657E+01
3891420E+02 6663368E+01 3894410E+02 7071957E+01 3899000E+02 813270E+01 3903200E+02 8609373E+01 3907390E+02 9756657E+01
3911590E+02 1203384E+02 3915790E+02 1307486E+02 3920000E+02 4550971E+02 3924200E+02 1876755E+02 3928410E+02 2302219E+02
3932870E+02 2857245E+02 3936830E+02 3599177E+02 3941050E+02 4550971E+02 3945270E+02 5808724E+02 3949490E+02 7497749E+02
3953710E+02 9411849E+02 3957930E+02 1186658E+03 3962160E+02 1494435E+03 3966590E+02 1957455E+03 3970620E+02 2339511E+03
3974850E+02 2535698E+03 397980E+02 2476505E+03 3983420E+02 1939142E+03 3987960E+02 1663932E+03 3991800E+02 1465093E+03
3996050E+02 1438139E+03 4000290E+02 1560804E+03 4004840E+02 1769370E+03 4008790E+02 2051113E+03 4013050E+02 2379812E+03
4017300E+02 2787479E+03 4021560E+02 3029738E+03 4025820E+02 5929012E+02 4031430E+02 3936011E+02 4035700E+02 2804819E+02
4036810E+02 1665532E+03 4042860E+02 8945649E+02 4047150E+02 6088490E+02 4072830E+02 1070941E+02 4077110E+02 680184E+01
4059940E+02 2094904E+02 4064260E+02 1633022E+02 4071500E+02 4089500E+02 4092940E+02 4992949E+01 4098580E+02 4470793E+01
4081400E+02 7412972E+01 4085690E+02 6419517E+01 4095900E+02 368391E+01 4115900E+02 3106622E+01 4120110E+02 2882045E+01
4102800E+02 4080525E+01 4107190E+02 3671759E+01 411590E+02 2372533E+01 4137370E+02 2243740E+01 4141690E+02 2130752E+01
4124420E+02 2988061E+01 4129730E+02 2511699E+01 4133500E+02 2372533E+01 4158950E+02 1799044E+01 4163330E+02 1739575E+01
4160100E+02 2031344E+01 4160340E+02 1537777E+01 4163400E+02 1605998E+01 4180580E+02 1575633E+01 4185020E+02 153620E+01
4167660E+02 1987924E+01 4172000E+02 1643552E+01 4176340E+02 156620E+01 420220E+02 156620E+01 4206770E+02 1503453E+01
4189370E+02 1541297E+01 4193710E+02 1537777E+01 4198600E+02 1898575E+01 4224210E+02 2070504E+01 4228580E+02 2299044E+01
4211130E+02 1663982E+01 4215490E+02 1750003E+01 4219850E+02 1898575E+01 4224210E+02 2070504E+01 4228580E+02 2299044E+01
4239400E+02 2594022E+01 4243720E+02 2968115E+01 4246900E+02 4246900E+02 4246900E+02 4246900E+02 4246900E+02 4246900E+02
4254220E+02 5338158E+01 4259200E+02 2826448E+01 4263380E+02 9101369E+01 4267970E+02 1110074E+02 4272360E+02 1375800E+01
4276750E+02 1705103E+02 4281140E+02 2020919E+02 4285240E+02 276781E+02 4289930E+02 2551046E+02 4293330E+02 2205790E+02
4298740E+02 330391E+02 4303140E+02 3669389E+02 4307550E+02 382865E+02 4311960E+02 3564775E+02 4316370E+02 2362158E+02
4320780E+02 1578262E+02 4325190E+02 5816768E+01 4329910E+02 6417423E+01 4334030E+02 4282144E+01 4338450E+02 3241282E+01
4332880E+02 2510660E+01 4347310E+02 2083917E+01 4351730E+02 1683069E+01 4356170E+02 1402015E+01 4360600E+02 1254450E+01
4350300E+02 1181111E+01 4364770E+02 1018214E+01 4373710E+02 9557153E+00 4373710E+02 911471E+00 4382800E+02 818483E+00
4391250E+02 8948302E+00 4391700E+02 8588146E+00 4400000E+02 8758629E+00 4400000E+02 8758629E+00 4400000E+02 8758629E+00
4409510E+02 9272117E+00 4413780E+02 9640222E+00 4418400E+02 106667E+01 4422900E+02 1053155E+01 4427370E+02 1100937E+01
4454220E+02 1141336E+01 4458700E+02 1112767E+01 4463190E+02 1205292E+01 4465280E+02 1207495E+01 4469740E+02 1184505E+01
4476600E+02 1357745E+01 4481150E+02 1438882E+01 4485900E+02 1485190E+02 4490150E+02 2116093E+01 4494650E+02 2673322E+01
4497150E+02 1597838E+01 4503660E+02 4453438E+01 4508160E+02 5804313E+01 4512670E+02 7587108E+01 4517190E+02 9928932E+01
4521700E+02 1527898E+02 4526220E+02 1695623E+02 4530740E+02 221166E+02 4535260E+02 2870909E+02 453780E+02 3726451E+02
4546310E+02 454840E+02 454940E+02 6049053E+02 4553370E+02 746790E+02 4557900E+02 8855475E+02 4562430E+02 9894345E+02
4566970E+02 1022350E+03 4571150E+02 9558007E+02 4576900E+02 8028015E+02 4580000E+02 6088211E+02 4585140E+02 4208060E+02
4589690E+02 2716300E+02 4594240E+02 1736480E+02 4598950E+02 1179555E+02 4603350E+02 894783E+01 4607910E+02 762747E+01
4612400E+02 7140518E+01 4617030E+02 7172436E+01 4621590E+02 7616640E+01 4626160E+02 8461949E+01 4630730E+02 9757634E+01
4633300E+02 1156494E+02 4639870E+02 1338090E+02 4644400E+02 1700951E+02 4649020E+02 206112E+02 465360E+02 2664355E+02
4659180E+02 2635548E+02 4662770E+02 3098996E+02 4667600E+02 3283661E+02 4671400E+02 347926E+02 4676540E+02 2820505E+02

4681130E+02	2400515E+02	4685720E+02	1999180E+02	4693320E+02	168370E+02	6694920E+02	1495733E+02	4695220E+02	1424416E+02
4704130E+02	1455783E+02	4708740E+02	1516151E+02	471350E+02	1784120E+02	4717960E+02	2088718E+02	4722570E+02	2507211E+02
4727130E+02	3061937E+02	4731800E+02	3764844E+02	4736420E+02	5602250E+02	4741050E+02	5496344E+02	4745670E+02	6277081E+02
4754930E+02	6787590E+02	4759560E+02	6278040E+02	4764190E+02	545910E+02	4768830E+02	467147E+02	4773470E+02	1104529E+02
4778110E+02	3826483E+02	4782750E+02	3812469E+02	4787470E+02	4000750E+02	4792040E+02	434177E+02	4796690E+02	4413768E+02
4801350E+02	5413645E+02	4806000E+02	6146705E+02	4810840E+02	701309E+02	4815320E+02	807740E+02	4819980E+02	5350927E+02
4824640E+02	1081956E+03	4829310E+02	1241024E+03	4833970E+02	1423698E+03	4838640E+02	1593371E+03	4843320E+02	1747466E+03
4847990E+02	1824413E+03	4852670E+02	1735197E+03	4857350E+02	1420647E+03	4862030E+02	997661E+02	4866710E+02	6519426E+02
4894860E+02	9236482E+01	4899560E+02	2917390E+02	4904260E+02	206507E+02	4885470E+02	1517044E+02	4890160E+02	1162169E+02
4941830E+02	4467474E+01	4923090E+02	4109678E+01	492780E+02	383740E+01	4932520E+02	557071E+01	4937670E+02	1940705E+01
4941950E+02	3359734E+01	4946670E+02	3276195E+01	495140E+02	321870E+01	4956120E+02	318290E+01	4960850E+02	3478458E+01
495580E+02	3162659E+01	4970320E+02	317456E+01	4973050E+02	319844E+01	4977790E+02	322880E+01	4984530E+02	3271891E+01
498270E+02	3325820E+01	4994010E+02	339271E+01	4998160E+02	3477238E+01	5003510E+02	3583299E+01	5008260E+02	3707730E+01
5013010E+02	3459911E+01	501770E+02	4046472E+01	5022530E+02	4255174E+01	5027290E+02	4494170E+01	5032050E+02	4770694E+01
5036810E+02	5095360E+01	5041580E+02	5496514E+01	5046350E+02	5963841E+01	5051120E+02	653111E+01	505590E+02	722576E+01
5060670E+02	8079477E+01	5065450E+02	9139595E+01	5070230E+02	1046171E+02	5076010E+02	121409E+02	5079800E+02	122255E+02
5084580E+02	1680220E+02	5089370E+02	2023937E+02	5094170E+02	5094170E+02	509860E+02	302311E+02	5103760E+02	3701729E+02
5132580E+02	4485465E+02	513350E+02	5351835E+02	51360E+02	521071E+02	5125960E+02	692411E+02	515184E+02	749347E+02
515660E+02	4240155E+02	5161490E+02	734079E+02	516200E+02	713881E+02	5166310E+02	1082600E+03	517447E+02	1488575E+02
516040E+02	176174E+03	5185630E+02	2209174E+03	5190470E+02	248104E+03	5195310E+02	2929721E+03	5200150E+02	3428529E+03
5204990E+02	3944349E+03	5209840E+02	4428836E+03	5214090E+02	470708E+03	5219540E+02	438599E+03	5224390E+02	2984866E+03
5229240E+02	1573798E+03	5234100E+02	870865E+02	5239960E+02	509288E+02	5244820E+02	324744E+02	5248690E+02	2221396E+02
5253550E+02	163337E+02	5258420E+02	131746E+02	5263290E+02	115035E+02	5268160E+02	1107541E+02	5273040E+02	11065417E+02
5277910E+02	110199E+02	5282740E+02	114521E+02	5287680E+02	1285444E+02	5292560E+02	1427040E+02	5297450E+02	1602629E+02
5302330E+02	141174E+02	5307220E+02	2064755E+02	5312120E+02	2360534E+02	5317010E+02	270557E+02	5321910E+02	6254377E+02
5326410E+02	257441E+02	533111E+02	4113195E+02	5336220E+02	4734414E+02	5341520E+02	544348E+02	5346430E+02	6254377E+02
5351340E+02	2716964E+02	5356260E+02	8195703E+02	5361170E+02	9325820E+02	5366090E+02	1047555E+03	5371010E+02	117563E+03
5375930E+02	1305775E+03	5380860E+02	1430810E+03	5390710E+02	163306E+02	5395640E+02	106814E+02	5400580E+02	1634451E+03
5405510E+02	1546330E+03	5410450E+02	139797E+03	5415390E+02	121377E+03	5420330E+02	103868E+03	5425280E+02	8708637E+02
5430220E+02	729930E+02	5435170E+02	614266E+02	5440120E+02	5211708E+02	5445080E+02	447313E+02	5450030E+02	390548E+02
5454990E+02	3390571E+02	5459950E+02	5465320E+02	5469720E+02	5604897E+02	5469880E+02	230711E+02	5474850E+02	2076425E+02
5479820E+02	1943630E+02	5484790E+02	1812330E+02	5489760E+02	1712437E+02	5494740E+02	1670330E+02	5499720E+02	1608715E+02

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

000001

ELEMENT = CF249

DATE = 10/30/73

RUNNO =

ITERATION = 1

99

ELEMENT = CF249

DATE = 10/30/73

RUNNO =

ITERATION = 1

FISSION CROSS SECTION VS ENERGY

RUNNING TIME FOR PROBLEM = .540103E+01

XXXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF SPIN GROUP TEST PROBLEM
 ELEMENT DATE 10/30/73 RUN NUMBER TIME 10.51.18

SCATTER	FISSION	IF1	ITAPE	LLY	NN	NI	NFCHS	ITMAX	MAXEN	NGROUP	KM	NPS
			NODATA	5	0	3	2	0	800	6	1	10

AW	TEMP	CRFN	ERROR	DIST	DELTA G	DELTA E	DELTA L
249.0000	300.0000	9.0000	-1.0000	243.0000	0.0000	9.9000	-0.0000

THICK	YMAX	YMIN	ESPAN	A02	B02	C02	D0	CMIN	CMAX
-0.	.1000E+05	.1000E+00	.9000E+01	0.	0.	.5578E-03	.3218E+00	.1000E-04	.1000E+00

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND G VALUES OF SPIN GROUPS 1- 6

GROUP	L	VALUE	G	VALUE	BOUND	CD
1	0	1.000	-0.000			
2	0	1.000	-0.000			
3	1	1.000	-0.000			
4	1	1.000	-0.000			
5	2	1.000	-0.000			
6	2	1.000	-0.000			

PKEN	GGA	GS1 1	GS1 2	GS1 3	1	2	3	4	5	IGROUP
10.0000	40.0000	.316000	100.000	-100.000	0	0	0	0	1	
12.0000	40.0000	.288000	100.000	-100.000	0	0	0	0	2	
14.0000	40.0000	.4889.40	100.000	-100.000	0	0	0	0	3	
16.0000	40.0000	.4001.96	100.000	-100.000	0	0	0	0	4	
18.0000	40.0000	.429400E+09	100.000	-100.000	0	0	0	0	5	
20.0000	40.0000	.330000E+09	100.000	-100.000	0	0	0	0	6	

DATA READ IN OR GENERATED FROM .9000E+01 TO .2100E+02

XDIV = .100000E+01 IM = 41

ECS USED = 75057

.706 SECONDS IN PHIMAIN INCLUDING .644 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 832

.9000000E+01	.1829552E+02	.9015019E+01	.1827075E+02	.9030038E+01	.1824520E+02	.9045056E+01	.1821892E+02	.9060075E+01	.1819169E+02
.9075174E+01	.1816359E+02	.9090113E+01	.1813467E+02	.9105131E+01	.1810493E+02	.9120150E+01	.1807436E+02	.9135169E+01	.1804293E+02
.9150188E+01	.1801057E+02	.9165407E+01	.1797729E+02	.9180425E+01	.1794313E+02	.9195244E+01	.1790825E+02	.9210263E+01	.1787359E+02
.9225282E+01	.1783752E+02	.9240300E+01	.1779867E+02	.9255319E+01	.1775851E+02	.9270338E+01	.1771699E+02	.9285357E+01	.1767402E+02
.9300375E+01	.1762955E+02	.9315394E+01	.1758348E+02	.9330413E+01	.1753574E+02	.9345432E+01	.1748624E+02	.9360451E+01	.1743488E+02
.9375469E+01	.1738157E+02	.9390489E+01	.1732620E+02	.9405507E+01	.1726865E+02	.9420526E+01	.1720881E+02	.9435544E+01	.1714653E+02
.9450563E+01	.1708174E+02	.9465582E+01	.1701425E+02	.9480601E+01	.1694393E+02	.9495620E+01	.1687063E+02	.9510638E+01	.1679420E+02
.9525657E+01	.1671448E+02	.9540676E+01	.1663133E+02	.9555995E+01	.1654458E+02	.9570713E+01	.1645412E+02	.9585732E+01	.1635981E+02
.9600751E+01	.1626156E+02	.9615779E+01	.1615933E+02	.9630788E+01	.1605313E+02	.9645807E+01	.1594307E+02	.9660826E+01	.1582939E+02
.9675845E+01	.1571251E+02	.9690864E+01	.1559231E+02	.9705882E+01	.1547150E+02	.9720901E+01	.1535080E+02	.9735920E+01	.1523244E+02
.9750939E+01	.1511960E+02	.9765957E+01	.1501676E+02	.9780976E+01	.1493009E+02	.9795995E+01	.1486812E+02	.9811014E+01	.1484232E+02
.9826033E+01	.1486802E+02	.9841051E+01	.1496512E+02	.9856070E+01	.1515871E+02	.9871089E+01	.1547907E+02	.9886108E+01	.1596039E+02
.9901126E+01	.1663740E+02	.9916145E+01	.1753886E+02	.9931164E+01	.1867762E+02	.9946183E+01	.2003835E+02	.9961202E+01	.2156698E+02
.9976220E+01	.2316877E+02	.9991239E+01	.2472097E+02	.1000026E+02	.2609971E+02	.1002128E+02	.2721067E+02	.1003630E+02	.2800872E+02
.1005131E+02	.2849872E+02	.1006633E+02	.2872106E+02	.1008135E+02	.2873263E+02	.1009637E+02	.2859141E+02	.1011139E+02	.2834771E+02
.1012641E+02	.2804112E+02	.1014143E+02	.2770071E+02	.1015845E+02	.2734677E+02	.1017146E+02	.2699281E+02	.1018648E+02	.2664741E+02

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1035169E+02	2390333E+02	1036671E+02	2373700E+02	1038173E+02	2358026E+02	1036675E+02	2343251E+02	1041176E+02	2329711E+02
1042678E+02	2316109E+02	1041800E+02	2303613E+02	1045882E+02	2291760E+02	1047184E+02	2234291E+02	1048686E+02	2269776E+02
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1057667E+02	2214757E+02	1059199E+02	2206794E+02	1060711E+02	2199177E+02	1062203E+02	2191430E+02	1063705E+02	2184734E+02
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1836973E+02	21210734E+02	1840115E+02	21209945E+02	184167E+02	2120548E+02	184167E+02	2120548E+02	1844681E+02	21206182E+02
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1898748E+02	21208299E+02	189241E+02	2098497E+02	186712E+02	2120548E+02	184167E+02	2120548E+02	1844681E+02	21206182E+02
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1928746E+02	21208336E+02	193028E+02	2098497E+02	186712E+02	2120548E+02	184167E+02	2120548E+02	1844681E+02	21206182E+02

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1673467E+02	2004366E+02	1674969E+02	2004611E+02	1676471E+02	1967780E+02	1677972E+02	1932395E+02	1679474E+02	1901002E+02
1680976E+02	1872162E+02	1682478E+02	1845863E+02	1683980E+02	1822190E+02	1685482E+02	1800941E+02	1686944E+02	1782032E+02
1688496E+02	1765391E+02	1689987E+02	1750956E+02	1691489E+02	1739678E+02	1689299E+02	1728510E+02	1694939E+02	1720424E+02
1696995E+02	1714397E+02	1697497E+02	1710413E+02	1698999E+02	1706949E+02	1706949E+02	1708469E+02	1702003E+02	1710729E+02
1703508E+02	1714956E+02	1705006E+02	1721298E+02	1706949E+02	1727979E+02	1708010E+02	1740833E+02	1709512E+02	1753439E+02
1711014E+02	1768730E+02	1722516E+02	1786441E+02	1714017E+02	1806671E+02	1715519E+02	1829531E+02	1717012E+02	1855148E+02
1718523E+02	1883665E+02	1720025E+02	1915243E+02	1720396E+02	1950065E+02	1723029E+02	1988335E+02	1724531E+02	2030280E+02
1726033E+02	2076156E+02	1727534E+02	2126252E+02	1736246E+02	2533648E+02	1738046E+02	2254942E+02	1732040E+02	2305266E+02
1733542E+02	2375870E+02	1735044E+02	2495278E+02	1746253E+02	3085201E+02	1744557E+02	2627724E+02	1739549E+02	2727215E+02
1741051E+02	2835797E+02	1742553E+02	2954583E+02	1754059E+02	3955837E+02	1753065E+02	3262634E+02	1747059E+02	3382363E+02
1748561E+02	3553840E+02	1750063E+02	3742707E+02	1751544E+02	5472743E+02	1759074E+02	5807413E+02	1754568E+02	4443695E+02
1756070E+02	4729031E+02	1757572E+02	5047263E+02	1765944E+02	7981689E+02	1768085E+02	8520241E+02	1762018E+02	6251450E+02
1763579E+02	6758169E+02	1765081E+02	7331462E+02	1766583E+02	9981689E+02	1768085E+02	8720171E+02	1769587E+02	9561967E+02
1771098E+02	1052040E+03	1772591E+02	1101242E+03	1774093E+02	1285594E+02	1775594E+02	1442686E+03	1777096E+02	1587989E+02
1778598E+02	1767699E+02	1780100E+02	1970492E+02	1781042E+02	2189276E+03	1783104E+02	2445026E+03	1784606E+02	2715267E+03
1786108E+02	3003447E+03	1787610E+02	3303212E+03	1790911E+02	3604955E+03	179613E+02	3893967E+03	1792115E+02	4153218E+03
1801126E+02	4361478E+03	1795119E+02	4497401E+03	179621E+02	543103E+03	1798123E+02	4448693E+03	1799625E+02	4337146E+03
1808635E+02	5231661E+03	1802628E+02	388513E+03	1804130E+02	548103E+03	1805632E+02	3147873E+03	1807134E+02	2423798E+03
1816145E+02	434557E+03	181747E+02	2267409E+03	1811949E+02	200896E+03	181314E+02	187819E+03	1814643E+02	1588879E+03
1823655E+02	5911037E+02	1825156E+02	8084299E+02	182668E+02	1166714E+02	1826651E+02	1058347E+03	1822153E+02	9638287E+02
1831164E+02	5811037E+02	1832966E+02	5533635E+02	1834168E+02	7445535E+02	1828160E+02	6879187E+02	1839622E+02	6377880E+02
1838673E+02	4308899E+02	1840175E+02	4070459E+02	1841677E+02	517998E+02	185179E+02	4856642E+02	185711E+02	456741E+02
1846183E+02	3318440E+02	1847685E+02	3168894E+02	1849186E+02	3855688E+02	1843179E+02	3660122E+02	184681E+02	341651E+02
1853692E+02	2682021E+02	1855194E+02	2583079E+02	185696E+02	3031623E+02	1850688E+02	2905410E+02	1852190E+02	2387072E+02
1861202E+02	2256131E+02	1862703E+02	2188864E+02	186405E+02	2491632E+02	1858198E+02	2407031E+02	1859700E+02	2789702E+02
1868711E+02	1965301E+02	1870213E+02	191234E+02	187115E+02	2126493E+02	186570E+02	2668653E+02	1867209E+02	201502E+02
1876220E+02	1767146E+02	1877722E+02	1736269E+02	187924E+02	1870595E+02	1880726E+02	168228E+02	1874718E+02	1800720E+02
1883730E+02	1637247E+02	1885532E+02	1618107E+02	1886733E+02	1601042E+02	1888335E+02	1586027E+02	1889737E+02	1579983E+02
1891233E+02	1561867E+02	1892741E+02	1552644E+02	1894243E+02	1545288E+02	1895745E+02	1539747E+02	1897247E+02	1536117E+02
1896748E+02	1553290E+02	1900250E+02	1534309E+02	1901152E+02	1536181E+02	1903254E+02	1539948E+02	1904756E+02	1545625E+02
1906259E+02	1553257E+02	1907160E+02	1562895E+02	1909282E+02	1574599E+02	1910763E+02	1588399E+02	1912255E+02	1604497E+02
1913767E+02	1622867E+02	1915369E+02	163657E+02	191671E+02	166995E+02	1918273E+02	1692995E+02	1919775E+02	1721836E+02
1921277E+02	1753684E+02	192278E+02	1988733E+02	192428E+02	1827203E+02	1925782E+02	1869339E+02	1927284E+02	1915417E+02
192874E+02	196574E+02	1930288E+02	2020735E+02	1931780E+02	2080593E+02	193292E+02	2145943E+02	1934793E+02	2217221E+02
1936295E+02	2294990E+02	1937797E+02	2379888E+02	1939299E+02	2472638E+02	1945801E+02	2574047E+02	1942303E+02	2685114E+02
1943805E+02	2808662E+02	1945307E+02	2940543E+02	1946897E+02	3087583E+02	1949310E+02	324927E+02	1949812E+02	3438570E+02
1951314E+02	3632209E+02	1952816E+02	3852703E+02	1954318E+02	409163E+02	1953820E+02	43719E+02	1957322E+02	467924E+02
195633E+02	502121E+02	196235E+02	5406933E+02	1967935E+02	584181E+02	1963299E+02	6332595E+02	1964831E+02	6887851E+02
1973842E+02	1213254E+03	1975344E+02	1346826E+03	1976864E+02	936244E+02	1976839E+02	995013E+02	1972340E+02	1098459E+02
1981352E+02	204162E+03	1982854E+02	2263445E+03	1984355E+02	1494522E+02	1978348E+02	165918E+03	1979850E+02	1842645E+02
198861E+02	3251318E+03	1990363E+02	3488995E+03	1991855E+02	249895E+02	198585E+03	2745999E+02	1987359E+02	299972E+02
1996370E+02	3999911E+03	1997872E+02	393401E+03	1999374E+02	369922E+02	1993367E+02	386236E+02	1994869E+02	394552E+03
2003480E+02	504177E+03	2005362E+02	5733077E+03	2006876E+02	379565E+03	2008875E+03	358844E+03	2002378E+02	3331544E+03
201139E+02	1753236E+03	2012891E+02	1566078E+02	2014933E+02	247377E+02	2008385E+02	2209412E+02	2009887E+02	1965950E+02
201899E+02	101907E+03	2020401E+02	9232020E+02	2021902E+02	1400279E+02	2015895E+02	1255055E+02	2017397E+02	1128959E+02
2026409E+02	646115E+02	2027910E+02	5942778E+02	2029412E+02	6394381E+02	2023404E+02	766023E+02	2024906E+02	701472E+02
2033917E+02	442358E+02	2035419E+02	4134901E+02	2036921E+02	3897343E+02	2038423E+02	3640278E+02	2032416E+02	474172E+02
204127E+02	2323249E+02	2042929E+02	3054596E+02	2044431E+02	2881913E+02	2045330E+02	2742625E+02	204734E+02	3426751E+02
204936E+02	1978632E+02	2050438E+02	2301640E+02	2051940E+02	2253351E+02	205344E+02	2152941E+02	205494E+02	2059687E+02
205644E+02	2972956E+02	2057447E+02	1892196E+02	2059449E+02	2059449E+02	2060951E+02	1746734E+02	2062453E+02	1681275E+02
2063955E+02	1620265E+02	2065457E+02	1563488E+02	206659E+02	1510609E+02	2068461E+02	1463976E+02	2069962E+02	1415293E+02
207146E+02	3364336E+02	207296E+02	1311490E+02	207468E+02	1267546E+02	2075970E+02	1228445E+02	2077472E+02	1415293E+02
2076974E+02	115464E+02	2080476E+02	1122070E+02	208177E+02	1089265E+02	2083479E+02	1059491E+02	2084981E+02	1030333E+02
2086483E+02	1002307E+02	2087985E+02	9759460E+01	2089487E+02	9507850E+01	2091909E+02	9263029E+01	2092491E+02	903231E+01
2093992E+02	8811536E+01	2095494E+02	8595943E+01	2096996E+02	8392160E+01	2098498E+02	8257881E+01	2100000E+02	8031886E+01

SEARCH X8B IS OUTSIDE RANGE OF TABLE.

ELEMENT =

DATE = 10/30/73

RUNNO =

ITERATION = 0

FISSION CROSS SECTION VS ENERGY

21000+02 20.718 00120985+02 20.719 00120970+02 20.720 001 001
20955+02 20.722 00120740+02 20.723 00120925+02 20.725 001
20910+02 20.727 00120895+02 20.729 00120880+02 20.730 001
20865+02 20.732 00120850+02 20.734 00120835+02 20.736 001
20820+02 20.738 00120805+02 20.740 00120790+02 20.743 001
20775+02 20.745 00120760+02 20.746 00120745+02 20.750 001
20730+02 20.753 00120715+02 20.756 00120700+02 20.759 001
20685+02 20.762 00120670+02 20.765 00120655+02 20.768 001
20640+02 20.772 00120625+02 20.775 00120610+02 20.779 001
20594+02 20.783 00120579+02 20.789 00120564+02 20.792 001
20549+02 20.797 00120534+02 20.803 00120519+02 20.808 001
20504+02 20.814 00120489+02 20.821 00120474+02 20.828 001
20459+02 20.835 00120444+02 20.844 00120429+02 20.852 001
20414+02 20.862 00120399+02 20.872 00120384+02 20.884 001
20369+02 20.896 00120354+02 20.910 00120339+02 20.925 001
20324+02 20.941 00120309+02 20.960 00120294+02 20.980 001
20279+02 21.003 00120264+02 21.029 00120249+02 21.058 001
20234+02 21.091 00120219+02 21.128 00120204+02 21.170 001
20189+02 21.219 00120174+02 21.274 00120159+02 21.337 001
20144+02 21.410 00120129+02 21.472 00120114+02 21.587 001
20099+02 21.693 00120084+02 21.812 00120069+02 21.942 001
20054+02 22.081 00120039+02 22.225 00120024+02 22.364 001
20009+02 22.489 00119994+02 22.599 00119979+02 22.655 001
19964+02 22.681 00119949+02 22.665 00119934+02 22.613 001
19919+02 22.530 00119904+02 22.435 00119889+02 22.307 001
19874+02 22.182 00119659+02 22.037 00119644+02 21.935 001
19829+02 21.619 00119614+02 21.711 00119598+02 21.613 001
19783+02 21.523 00119768+02 21.443 00119753+02 21.371 001
19738+02 21.307 00119723+02 21.250 00119708+02 21.200 001
19693+02 21.156 00119678+02 21.118 00119663+02 21.084 001
19648+02 21.054 00119633+02 21.027 00119618+02 21.004 001
19603+02 20.984 00119588+02 20.966 00119573+02 20.950 001
19558+02 20.936 00119543+02 20.923 00119528+02 20.912 001
19513+02 20.902 00119498+02 20.893 00119483+02 20.885 001
19468+02 20.876 00119453+02 20.872 00119438+02 20.866 001
19423+02 20.861 00119408+02 20.857 00119393+02 20.852 001
19378+02 20.849 00119363+02 20.845 00119348+02 20.843 001
19333+02 20.840 00119318+02 20.838 00119303+02 20.835 001
19288+02 20.834 00119273+02 20.832 00119258+02 20.831 001
19243+02 20.829 00119228+02 20.828 00119213+02 20.828 001
19198+02 20.827 00119183+02 20.826 00119168+02 20.826 001
19153+02 20.826 00119138+02 20.825 00119123+02 20.825 001
19108+02 20.826 00119093+02 20.826 00119078+02 20.826 001
19063+02 20.826 00119048+02 20.827 00119033+02 20.828 001
19018+02 20.828 00119003+02 20.829 00118987+02 20.830 001
18972+02 20.831 00118957+02 20.832 00118942+02 20.833 001
18927+02 20.834 00118912+02 20.836 00118897+02 20.837 001
18882+02 20.839 00118867+02 20.840 00118852+02 20.842 001
18837+02 20.844 00118822+02 20.846 00118807+02 20.848 001
18792+02 20.850 00118777+02 20.853 00118762+02 20.855 001
18747+02 20.858 00118732+02 20.861 00118717+02 20.864 001
18702+02 20.867 00118687+02 20.870 00118672+02 20.873 001
18657+02 20.877 00118642+02 20.881 00118627+02 20.885 001
18612+02 20.889 00118597+02 20.884 00118582+02 20.889 001
18567+02 20.904 00118552+02 20.910 00118537+02 20.916 001
18522+02 20.922 00118507+02 20.929 00118492+02 20.936 001
18477+02 20.944 00118462+02 20.953 00118447+02 20.962 001
18432+02 20.972 00118417+02 20.983 00118402+02 20.994 001
18387+02 21.007 00118372+02 21.021 00118357+02 21.037 001
18342+02 21.054 00118327+02 21.073 00118312+02 21.094 001

18297*02	21.117	.00118282*02	21.143	.00118267*02	21.173	.001
18252*02	21.206	.00118237*02	21.243	.00118222*02	21.285	.001
18201*02	21.334	.00118171*02	21.348	.00118176*02	21.452	.001
18161*02	21.524	.00118146*02	21.606	.00118131*02	21.701	.001
18116*02	21.808	.00118101*02	21.930	.00118086*02	22.066	.001
18071*02	22.215	.00118056*02	22.375	.00118041*02	22.540	.001
18026*02	22.700	.00118011*02	22.643	.00117996*02	22.956	.001
17981*02	23.028	.00117966*02	23.052	.00117951*02	23.027	.001
17936*02	22.957	.00117921*02	22.852	.00117906*02	23.027	.001
17891*02	22.559	.00117876*02	22.430	.00117861*02	22.723	.001
17846*02	22.141	.00117831*02	22.008	.00117816*02	22.282	.001
17801*02	21.776	.00117786*02	21.678	.00117771*02	21.886	.001
17756*02	21.513	.00117741*02	21.445	.00117726*02	21.590	.001
17711*02	21.333	.00117696*02	21.287	.00117681*02	21.385	.001
17666*02	21.213	.00117651*02	21.182	.00117636*02	21.247	.001
17621*02	21.132	.00117606*02	21.112	.00117591*02	21.156	.001
17576*02	21.078	.00117561*02	21.053	.00117546*02	21.094	.001
17531*02	21.040	.00117516*02	21.030	.00117501*02	21.051	.001
17486*02	21.013	.00117471*02	21.009	.00117456*02	21.021	.001
17441*02	20.994	.00117426*02	20.989	.00117411*02	21.000	.001
17395*02	20.981	.00117380*02	20.978	.00117365*02	20.985	.001
17350*02	20.972	.00117335*02	20.970	.00117320*02	20.975	.001
17305*02	20.966	.00117290*02	20.964	.00117275*02	20.968	.001
17260*02	20.962	.00117245*02	20.961	.00117230*02	20.963	.001
17215*02	20.960	.00117200*02	20.960	.00117185*02	20.961	.001
17170*02	20.960	.00117155*02	20.960	.00117140*02	20.961	.001
17125*02	20.961	.00117110*02	20.962	.00117095*02	20.962	.001
17080*02	20.963	.00117065*02	20.964	.00117050*02	20.965	.001
17035*02	20.967	.00116975*02	20.968	.00116960*02	20.969	.001
16990*02	20.971	.00116930*02	20.972	.00116915*02	20.974	.001
16945*02	20.976	.00116885*02	20.978	.00116870*02	20.980	.001
16900*02	20.982	.00116840*02	20.985	.00116825*02	20.987	.001
16855*02	20.990	.00116795*02	20.992	.00116780*02	20.995	.001
16810*02	20.998	.00116750*02	21.001	.00116735*02	21.004	.001
16765*02	21.008	.00116705*02	21.023	.00116690*02	21.015	.001
16720*02	21.019	.00116660*02	21.036	.00116645*02	21.027	.001
16675*02	21.031	.00116615*02	21.052	.00116599*02	21.041	.001
16630*02	21.046	.00116569*02	21.071	.00116554*02	21.058	.001
16584*02	21.064	.00116524*02	21.093	.00116509*02	21.077	.001
16539*02	21.085	.00116479*02	21.120	.00116464*02	21.101	.001
16494*02	21.110	.00116434*02	21.153	.00116419*02	21.130	.001
16449*02	21.141	.00116389*02	21.196	.00116374*02	21.166	.001
16404*02	21.180	.00116344*02	21.251	.00116329*02	21.213	.001
16358*02	21.231	.00116299*02	21.326	.00116284*02	21.274	.001
16313*02	21.298	.00116254*02	21.430	.00116239*02	21.357	.001
16268*02	21.391	.00116209*02	21.579	.00116194*02	21.473	.001
16223*02	21.523	.00116164*02	21.801	.00116149*02	21.643	.001
16179*02	21.717	.00116119*02	22.135	.00116104*02	21.898	.001
16134*02	22.009	.00116074*02	22.617	.00116059*02	22.279	.001
16089*02	22.440	.00116029*02	23.193	.00116014*02	22.807	.001
16044*02	23.003	.00115984*02	23.583	.00115969*02	23.364	.001
15999*02	23.499	.00115939*02	23.484	.00115924*02	23.608	.001
15954*02	23.573	.00115894*02	23.017	.00115879*02	23.352	.001
15909*02	23.192	.00115849*02	22.476	.00115834*02	22.838	.001
15864*02	22.662	.00115804*02	22.061	.00115789*02	22.343	.001
15819*02	22.205	.00115758*02	21.790	.00115743*02	21.971	.001
15773*02	21.854	.00115713*02	21.598	.00115698*02	21.717	.001
15728*02	21.653	.00115668*02	21.472	.00115653*02	21.550	.001
15683*02	21.508	.00115623*02	21.368	.00115608*02	21.440	.001
15638*02	21.412	.00115570*02	21.333	.00115563*02	21.367	.001
15593*02	21.349				21.318	.001

15548+02	21.306	.00115533+02	21.295	.00115518+02	21.285	.001
15503+02	21.277	.00115488+02	21.269	.00115473+02	21.263	.001
15458+02	21.257	.00115443+02	21.252	.00115428+02	21.248	.001
15413+02	21.244	.00115398+02	21.241	.00115383+02	21.239	.001
15368+02	21.237	.00115353+02	21.235	.00115338+02	21.234	.001
15323+02	21.233	.00115308+02	21.232	.00115293+02	21.232	.001
15278+02	21.232	.00115263+02	21.232	.00115248+02	21.233	.001
15233+02	21.234	.00115218+02	21.235	.00115203+02	21.236	.001
15188+02	21.237	.00115173+02	21.239	.00115158+02	21.241	.001
15143+02	21.243	.00115128+02	21.245	.00115113+02	21.247	.001
15098+02	21.250	.00115083+02	21.253	.00115068+02	21.255	.001
15053+02	21.258	.00115038+02	21.261	.00115023+02	21.265	.001
15008+02	21.268	.00114992+02	21.272	.00114977+02	21.275	.001
14962+02	21.279	.00114947+02	21.283	.00114932+02	21.287	.001
14917+02	21.291	.00114902+02	21.296	.00114887+02	21.298	.001
14872+02	21.305	.00114857+02	21.310	.00114842+02	21.315	.001
14827+02	21.320	.00114812+02	21.326	.00114797+02	21.331	.001
14782+02	21.337	.00114767+02	21.343	.00114752+02	21.350	.001
14737+02	21.356	.00114722+02	21.353	.00114707+02	21.370	.001
14692+02	21.377	.00114677+02	21.384	.00114662+02	21.392	.001
14647+02	21.400	.00114632+02	21.409	.00114617+02	21.418	.001
14602+02	21.427	.00114587+02	21.437	.00114572+02	21.446	.001
14557+02	21.457	.00114542+02	21.449	.00114527+02	21.447	.001
14512+02	21.493	.00114497+02	21.506	.00114482+02	21.480	.001
14467+02	21.535	.00114452+02	21.550	.00114437+02	21.520	.001
14422+02	21.585	.00114407+02	21.605	.00114392+02	21.567	.001
14377+02	21.648	.00114362+02	21.673	.00114347+02	21.625	.001
14332+02	21.728	.00114317+02	21.760	.00114302+02	21.796	.001
14287+02	21.835	.00114272+02	21.818	.00114257+02	21.826	.001
14242+02	21.981	.00114227+02	22.062	.00114212+02	22.111	.001
14196+02	22.190	.00114181+02	22.219	.00114166+02	22.381	.001
14151+02	22.498	.00114136+02	22.632	.00114121+02	22.784	.001
14106+02	22.956	.00114091+02	23.149	.00114076+02	23.361	.001
14061+02	23.589	.00114046+02	23.823	.00114031+02	24.051	.001
14016+02	24.254	.00114001+02	24.413	.00113986+02	24.510	.001
13971+02	24.534	.00113956+02	24.454	.00113941+02	24.510	.001
13926+02	24.205	.00113911+02	24.009	.00113896+02	24.369	.001
13881+02	23.588	.00113866+02	23.385	.00113851+02	23.799	.001
13836+02	23.025	.00113821+02	22.873	.00113806+02	23.196	.001
13791+02	22.623	.00113786+02	22.523	.00113761+02	22.437	.001
13746+02	22.364	.00113731+02	22.302	.00113716+02	22.249	.001
13701+02	22.204	.00113686+02	22.155	.00113671+02	22.133	.001
13656+02	22.106	.00113641+02	22.054	.00113626+02	22.085	.001
13611+02	22.049	.00113596+02	22.037	.00113581+02	22.027	.001
13566+02	22.019	.00113551+02	22.013	.00113536+02	22.009	.001
13521+02	22.007	.00113506+02	22.006	.00113491+02	22.006	.001
13476+02	22.008	.00113461+02	22.011	.00113446+02	22.014	.001
13431+02	22.019	.00113416+02	22.025	.00113401+02	22.031	.001
13385+02	22.038	.00113370+02	22.046	.00113355+02	22.054	.001
13340+02	22.064	.00113325+02	22.073	.00113310+02	22.084	.001
13295+02	22.095	.00113280+02	22.107	.00113265+02	22.119	.001
13250+02	22.132	.00113235+02	22.145	.00113220+02	22.159	.001
13205+02	22.174	.00113190+02	22.199	.00113175+02	22.204	.001
13160+02	22.220	.00113145+02	22.237	.00113130+02	22.255	.001
13115+02	22.273	.00113100+02	22.271	.00113085+02	22.310	.001
13070+02	22.330	.00113055+02	22.351	.00113040+02	22.372	.001
13025+02	22.393	.00113010+02	22.416	.00112995+02	22.439	.001
12980+02	22.463	.00112965+02	22.458	.00112950+02	22.513	.001
12935+02	22.539	.00112920+02	22.556	.00112905+02	22.594	.001
12890+02	22.623	.00112875+02	22.653	.00112860+02	22.684	.001
12845+02	22.716	.00112830+02	22.749	.00112815+02	22.784	.001

12800+02	22.819	.00112785+02	22.856	.00112770+02	22.894	.001
12785+02	22.934	.00112740+02	22.915	.00112725+02	23.017	.001
12710+02	23.061	.00112695+02	23.107	.00112680+02	23.155	.001
12685+02	23.205	.00112650+02	23.257	.00112635+02	23.311	.001
12620+02	23.367	.00112605+02	23.426	.00112589+02	23.488	.001
12571+02	23.552	.00112559+02	23.620	.00112544+02	23.690	.001
12528+02	23.765	.00112514+02	23.683	.00112499+02	23.925	.001
12484+02	24.011	.00112469+02	23.843	.00112454+02	24.198	.001
12439+02	24.299	.00112424+02	24.102	.00112409+02	24.519	.001
12394+02	24.640	.00112379+02	24.768	.00112364+02	24.903	.001
12349+02	25.048	.00112334+02	25.202	.00112319+02	25.366	.001
12304+02	25.542	.00112299+02	25.730	.00112274+02	25.931	.001
12259+02	26.145	.00112244+02	26.313	.00112229+02	26.617	.001
12214+02	26.876	.00112199+02	27.149	.00112184+02	27.436	.001
12169+02	27.734	.00112154+02	28.038	.00112139+02	28.341	.001
12124+02	28.629	.00112109+02	28.885	.00112094+02	29.085	.001
12079+02	29.193	.00112064+02	29.166	.00112049+02	29.597	.001
12034+02	29.516	.00112019+02	27.812	.00112004+02	26.840	.001
11989+02	25.639	.00111974+02	24.247	.00111959+02	22.886	.001
11944+02	21.540	.00111929+02	20.330	.00111914+02	19.304	.001
11899+02	18.480	.00111884+02	17.851	.00111869+02	17.397	.001
11854+02	17.089	.00111839+02	16.899	.00111824+02	16.801	.001
11809+02	16.772	.00111793+02	16.794	.00111778+02	16.852	.001
11763+02	16.934	.00111748+02	17.034	.00111733+02	17.144	.001
11718+02	17.259	.00111703+02	17.318	.00111688+02	17.497	.001
11673+02	17.615	.00111658+02	17.730	.00111643+02	17.843	.001
11628+02	17.953	.00111613+02	18.059	.00111598+02	18.162	.001
11583+02	18.260	.00111568+02	18.356	.00111553+02	18.448	.001
11538+02	18.536	.00111523+02	18.622	.00111508+02	18.704	.001
11493+02	18.783	.00111478+02	18.860	.00111463+02	18.934	.001
11448+02	19.006	.00111433+02	19.016	.00111418+02	19.143	.001
11403+02	19.208	.00111388+02	19.211	.00111373+02	19.333	.001
11358+02	19.393	.00111343+02	19.452	.00111328+02	19.509	.001
11313+02	19.564	.00111298+02	19.619	.00111283+02	19.672	.001
11268+02	19.724	.00111253+02	19.716	.00111238+02	19.826	.001
11223+02	19.876	.00111208+02	19.876	.00111193+02	19.973	.001
11178+02	20.021	.00111163+02	19.925	.00111148+02	20.115	.001
11133+02	20.161	.00111118+02	20.068	.00111103+02	20.252	.001
11088+02	20.298	.00111073+02	20.207	.00111058+02	20.388	.001
11043+02	20.433	.00111028+02	20.343	.00111013+02	20.523	.001
10997+02	20.568	.00110982+02	20.418	.00110967+02	20.659	.001
10952+02	20.704	.00110937+02	20.613	.00110922+02	20.797	.001
10907+02	20.844	.00110892+02	20.750	.00110877+02	20.939	.001
10862+02	20.987	.00110847+02	20.891	.00110832+02	21.087	.001
10817+02	21.138	.00110802+02	21.037	.00110787+02	21.242	.001
10772+02	21.296	.00110757+02	21.159	.00110742+02	21.407	.001
10727+02	21.465	.00110712+02	21.351	.00110697+02	21.585	.001
10682+02	21.647	.00110667+02	21.524	.00110652+02	21.779	.001
10637+02	21.847	.00110622+02	21.712	.00110607+02	21.992	.001
10592+02	22.068	.00110577+02	22.148	.00110562+02	22.230	.001
10547+02	22.315	.00110532+02	22.405	.00110517+02	22.498	.001
10502+02	22.590	.00110487+02	22.698	.00110472+02	22.805	.001
10457+02	22.918	.00110442+02	23.036	.00110427+02	23.161	.001
10412+02	23.293	.00110397+02	23.433	.00110382+02	23.580	.001
10367+02	23.737	.00110352+02	23.904	.00110337+02	24.081	.001
10322+02	24.269	.00110307+02	24.471	.00110292+02	24.686	.001
10277+02	24.916	.00110262+02	25.161	.00110247+02	25.423	.001
10232+02	25.703	.00110217+02	26.000	.00110202+02	26.316	.001
10186+02	26.647	.00110171+02	26.993	.00110156+02	27.347	.001
10141+02	27.701	.00110126+02	28.041	.00110111+02	28.348	.001
10096+02	29.591	.00110081+02	28.733	.00110066+02	29.121	.001

10051+02	28.499	.00110036+02	28.009	.00110021+02	27.211	.001
1006+02	26.100	.00199312+01	24.721	.00199762+01	23.169	.001
99612+01	21.567	.00199662+01	20.038	.00199312+01	18.678	.001
99161+01	17.539	.00199011+01	18.637	.00198851+01	15.960	.001
98711+01	15.479	.00198561+01	15.159	.00198611+01	14.965	.001
9826+01	14.868	.00198110+01	14.842	.00197960+01	14.868	.001
97810+01	14.930	.00197660+01	15.017	.00197509+01	15.120	.001
97359+01	15.232	.00197209+01	15.351	.00197059+01	15.472	.001
96909+01	15.592	.00196758+01	15.713	.00196608+01	15.829	.001
96458+01	15.943	.00196308+01	16.053	.00196158+01	16.159	.001
96008+01	16.262	.00195857+01	16.360	.00195707+01	16.454	.001
95557+01	16.585	.00195401+01	16.631	.00195257+01	16.714	.001
95106+01	16.794	.00194956+01	16.871	.00194806+01	16.944	.001
94656+01	17.014	.00194506+01	17.082	.00194335+01	17.147	.001
94205+01	17.209	.00194055+01	17.269	.00193905+01	17.326	.001
93755+01	17.382	.00193605+01	17.435	.00193454+01	17.486	.001
93304+01	17.536	.00193154+01	17.593	.00193004+01	17.630	.001
92854+01	17.674	.00192703+01	17.717	.00192553+01	17.759	.001
92403+01	17.799	.00192253+01	17.838	.00192103+01	17.874	.001
91952+01	17.908	.00191902+01	17.943	.00191652+01	17.977	.001
91502+01	18.011	.00191652+01	18.043	.00191202+01	18.074	.001
91051+01	18.105	.00191352+01	18.135	.00190751+01	18.164	.001
90601+01	18.192	.00191051+01	18.219	.00190300+01	18.245	.001
90150+01	18.271	.00190000+01	18.246	.001		
2100+02	8.032	.00120985+02	8.258	.00120970+02	8.392	.001
20955+02	8.596	.00120940+02	8.812	.00120925+02	9.032	.001
20911+02	9.263	.00120895+02	9.509	.00120880+02	9.759	.001
20865+02	10.023	.00120850+02	10.304	.00120835+02	10.593	.001
20820+02	10.896	.00120805+02	11.220	.00120790+02	11.555	.001
20775+02	11.907	.00120760+02	12.284	.00120745+02	12.675	.001
20730+02	13.115	.00120715+02	13.643	.00120700+02	14.153	.001
20685+02	14.640	.00120670+02	15.106	.00120655+02	15.635	.001
20640+02	16.203	.00120625+02	16.813	.00120610+02	17.467	.001
20594+02	18.169	.00120579+02	18.922	.00120564+02	19.730	.001
20504+02	20.597	.00120534+02	21.529	.00120519+02	22.534	.001
20459+02	27.426	.00120489+02	24.786	.00120474+02	26.053	.001
20414+02	32.322	.00120444+02	28.919	.00120429+02	30.346	.001
20365+02	38.753	.00120399+02	34.268	.00120384+02	36.403	.001
20324+02	47.471	.00120354+02	41.349	.00120339+02	44.224	.001
20279+02	57.428	.00120309+02	50.977	.00120294+02	54.959	.001
20234+02	76.602	.00120264+02	64.461	.00120249+02	70.150	.001
20189+02	101.908	.00120219+02	83.944	.00120204+02	92.322	.001
20144+02	140.028	.00120174+02	112.896	.00120159+02	125.506	.001
20099+02	196.950	.00120129+02	156.608	.00120114+02	175.524	.001
20054+02	275.588	.00120084+02	220.941	.00120069+02	247.327	.001
20009+02	388.854	.00120039+02	304.718	.00120024+02	333.154	.001
19964+02	399.091	.00119994+02	379.587	.00119979+02	393.400	.001
19919+02	369.823	.00119949+02	396.456	.00119934+02	386.236	.001
19874+02	299.977	.00119904+02	348.899	.00119889+02	325.132	.001
19829+02	226.344	.00119859+02	274.600	.00119844+02	249.860	.001
19783+02	155.622	.00119814+02	204.416	.00119798+02	184.265	.001
19738+02	121.525	.00119768+02	149.452	.00119753+02	134.683	.001
19693+02	90.362	.00119723+02	109.846	.00119708+02	99.504	.001
19648+02	68.879	.00119678+02	82.290	.00119663+02	75.166	.001
19603+02	54.013	.00119633+02	63.326	.00119618+02	58.417	.001
19558+02	43.719	.00119588+02	50.211	.00119573+02	46.719	.001
19513+02	36.322	.00119543+02	40.942	.00119528+02	38.528	.001
19468+02	20.876	.00119498+02	34.286	.00119483+02	32.496	.001
19423+02	26.851	.00119453+02	29.405	.00119438+02	28.069	.001
19378+02	23.799	.00119408+02	25.741	.00119393+02	24.726	.001
		.00119363+02	22.950	.00119348+02	22.172	.001

19333+02	21.459	..00119318+02	20.806	..00119303+02	20.207	..001
19288+02	19.657	..00119273+02	19.154	..00119258+02	18.693	..001
19243+02	18.272	..00119228+02	17.887	..00119213+02	17.537	..001
19198+02	17.218	..00119183+02	16.930	..00119168+02	16.670	..001
19153+02	16.437	..00119138+02	16.229	..00119123+02	16.045	..001
19108+02	15.884	..00119093+02	15.746	..00119078+02	15.629	..001
19063+02	15.533	..00119048+02	15.456	..00119033+02	15.399	..001
19018+02	15.362	..00119003+02	15.343	..00118987+02	15.343	..001
18972+02	15.361	..00118957+02	15.398	..00118942+02	15.453	..001
18927+02	15.526	..00118912+02	15.619	..00118897+02	15.730	..001
18882+02	15.860	..00118867+02	16.010	..00118852+02	16.141	..001
18837+02	16.372	..00118822+02	16.545	..00118807+02	16.821	..001
18792+02	17.080	..00118777+02	17.363	..00118762+02	17.671	..001
18747+02	18.007	..00118732+02	18.371	..00118717+02	18.766	..001
18702+02	19.192	..00118687+02	19.653	..00118672+02	20.150	..001
18657+02	20.687	..00118642+02	21.285	..00118627+02	21.889	..001
18612+02	22.561	..00118597+02	23.287	..00118582+02	24.070	..001
18567+02	24.916	..00118552+02	25.831	..00118537+02	26.820	..001
18523+02	27.892	..00118507+02	29.034	..00118492+02	30.316	..001
18477+02	31.689	..00118462+02	33.194	..00118447+02	34.817	..001
18432+02	36.601	..00118417+02	38.557	..00118402+02	40.705	..001
18387+02	43.069	..00118372+02	45.678	..00118357+02	48.566	..001
18342+02	51.770	..00118327+02	55.336	..00118312+02	59.318	..001
18297+02	63.779	..00118282+02	68.742	..00118267+02	74.445	..001
18252+02	80.843	..00118237+02	88.107	..00118222+02	96.383	..001
18207+02	105.839	..00118191+02	116.671	..00118176+02	129.158	..001
18161+02	143.456	..00118146+02	159.888	..00118131+02	178.742	..001
18116+02	200.260	..00118101+02	224.741	..00118086+02	252.166	..001
18071+02	282.380	..00118056+02	314.787	..00118041+02	348.223	..001
18026+02	380.851	..00118011+02	410.243	..00117996+02	433.115	..001
17981+02	448.893	..00117966+02	454.310	..00117951+02	449.740	..001
17936+02	436.168	..00117921+02	415.322	..00117906+02	389.400	..001
17891+02	380.470	..00117876+02	330.321	..00117861+02	300.345	..001
17846+02	271.527	..00117831+02	244.503	..00117816+02	219.628	..001
17801+02	197.049	..00117786+02	176.770	..00117771+02	158.698	..001
17756+02	142.686	..00117741+02	128.556	..00117726+02	116.124	..001
17711+02	105.204	..00117696+02	95.620	..00117681+02	87.207	..001
17666+02	79.817	..00117651+02	73.315	..00117636+02	67.582	..001
17621+02	62.515	..00117606+02	58.023	..00117591+02	54.031	..001
17576+02	50.472	..00117561+02	47.290	..00117546+02	44.437	..001
17531+02	41.871	..00117516+02	39.558	..00117501+02	37.427	..001
17486+02	35.538	..00117471+02	33.824	..00117456+02	32.264	..001
17441+02	30.842	..00117426+02	29.544	..00117411+02	28.558	..001
17395+02	27.272	..00117380+02	26.277	..00117365+02	25.365	..001
17350+02	24.527	..00117335+02	23.759	..00117320+02	23.053	..001
17305+02	22.404	..00117290+02	21.809	..00117275+02	21.263	..001
17260+02	20.762	..00117245+02	20.303	..00117230+02	19.883	..001
17215+02	19.501	..00117200+02	19.152	..00117185+02	18.637	..001
17170+02	18.551	..00117155+02	18.275	..00117140+02	18.067	..001
17125+02	17.864	..00117110+02	17.667	..00117095+02	17.534	..001
17080+02	17.005	..00117065+02	17.298	..00117050+02	17.213	..001
17035+02	17.150	..00117020+02	17.107	..00117005+02	17.086	..001
16990+02	17.085	..00116975+02	17.104	..00116960+02	17.144	..001
16945+02	17.204	..00116930+02	17.285	..00116915+02	17.387	..001
16900+02	17.510	..00116885+02	17.654	..00116870+02	17.820	..001
16855+02	18.009	..00116840+02	18.222	..00116825+02	18.459	..001
16810+02	18.722	..00116795+02	19.010	..00116780+02	19.326	..001
16765+02	19.671	..00116750+02	20.046	..00116735+02	20.454	..001
16720+02	20.895	..00116705+02	21.373	..00116690+02	21.890	..001
16675+02	22.448	..00116660+02	23.051	..00116645+02	23.701	..001
16630+02	24.403	..00116615+02	25.160	..00116599+02	25.978	..001

16584+02	26.862	.00116569+02	27.817	.00116554+02	28.849	.001
16539+02	29.968	.00116524+02	31.180	.00116509+02	32.495	.001
16494+02	33.925	.00116479+02	35.481	.00116464+02	37.177	.001
16449+02	39.030	.00116434+02	41.057	.00116419+02	43.280	.001
16404+02	45.723	.00116399+02	48.414	.00116374+02	51.385	.001
16359+02	54.676	.00116344+02	58.330	.00116329+02	62.400	.001
16314+02	66.948	.00116299+02	72.045	.00116284+02	77.777	.001
16269+02	84.247	.00116254+02	81.575	.00116239+02	99.903	.001
16224+02	109.399	.00116209+02	120.262	.00116194+02	132.724	.001
16179+02	147.050	.00116164+02	163.543	.00116149+02	182.533	.001
16134+02	204.367	.00116119+02	229.374	.00116104+02	257.940	.001
16089+02	289.933	.00116074+02	325.261	.00116059+02	383.236	.001
16044+02	402.482	.00116029+02	440.804	.00116014+02	475.257	.001
15999+02	562.547	.00115984+02	519.733	.00115969+02	544.988	.001
15954+02	518.061	.00115939+02	500.229	.00115924+02	473.827	.001
15909+02	441.609	.00115894+02	406.224	.00115879+02	369.892	.001
15864+02	334.276	.00115849+02	300.506	.00115834+02	269.255	.001
15819+02	240.851	.00115804+02	215.374	.00115788+02	192.744	.001
15774+02	172.782	.00115758+02	155.258	.00115743+02	139.921	.001
15729+02	126.518	.00115713+02	114.809	.00115698+02	104.570	.001
15684+02	95.603	.00115688+02	87.732	.00115673+02	80.803	.001
15639+02	74.686	.00115623+02	69.270	.00115608+02	64.457	.001
15594+02	60.168	.00115578+02	56.334	.00115563+02	52.896	.001
15549+02	49.804	.00115533+02	47.017	.00115518+02	44.498	.001
15504+02	42.215	.00115488+02	40.142	.00115473+02	38.256	.001
15459+02	36.537	.00115443+02	34.967	.00115428+02	33.532	.001
15414+02	32.217	.00115398+02	31.012	.00115383+02	29.906	.001
15369+02	28.865	.00115353+02	27.943	.00115338+02	27.086	.001
15324+02	26.297	.00115308+02	25.572	.00115293+02	24.906	.001
15279+02	24.294	.00115263+02	23.732	.00115248+02	23.216	.001
15234+02	22.745	.00115218+02	22.314	.00115203+02	21.921	.001
15189+02	21.565	.00115173+02	21.243	.00115158+02	20.554	.001
15144+02	20.695	.00115128+02	20.466	.00115113+02	20.266	.001
15099+02	20.093	.00115083+02	19.946	.00115068+02	19.924	.001
15054+02	19.728	.00115038+02	19.656	.00115023+02	19.608	.001
15009+02	19.583	.00114992+02	19.592	.00114977+02	19.604	.001
14964+02	19.650	.00114947+02	19.718	.00114932+02	19.811	.001
14919+02	19.927	.00114902+02	20.068	.00114887+02	20.233	.001
14874+02	20.423	.00114857+02	20.640	.00114842+02	20.884	.001
14829+02	21.155	.00114812+02	21.456	.00114797+02	21.786	.001
14784+02	22.149	.00114767+02	22.545	.00114752+02	22.976	.001
14739+02	23.445	.00114722+02	23.953	.00114707+02	24.903	.001
14694+02	25.097	.00114677+02	25.740	.00114662+02	26.434	.001
14649+02	27.184	.00114632+02	27.998	.00114617+02	28.872	.001
14604+02	29.816	.00114587+02	30.836	.00114572+02	31.939	.001
14559+02	33.133	.00114542+02	34.425	.00114527+02	35.827	.001
14514+02	37.349	.00114497+02	39.003	.00114482+02	40.804	.001
14469+02	42.768	.00114452+02	44.914	.00114437+02	47.263	.001
14424+02	49.839	.00114407+02	52.671	.00114392+02	55.791	.001
14379+02	59.238	.00114362+02	63.056	.00114347+02	67.297	.001
14334+02	72.021	.00114317+02	77.301	.00114302+02	83.520	.001
14289+02	89.880	.00114272+02	97.398	.00114257+02	105.916	.001
14244+02	115.600	.00114227+02	126.849	.00114212+02	139.295	.001
14199+02	153.813	.00114181+02	170.517	.00114166+02	189.768	.001
14154+02	211.961	.00114136+02	237.512	.00114121+02	266.820	.001
14109+02	300.203	.00114091+02	337.786	.00114076+02	379.337	.001
14064+02	424.036	.00114046+02	470.223	.00114031+02	515.232	.001
14019+02	555.459	.00114001+02	586.846	.00113986+02	665.762	.001
13974+02	609.985	.00113956+02	599.312	.00113941+02	575.508	.001
13929+02	541.665	.00113911+02	501.352	.00113896+02	457.950	.001
13884+02	414.147	.00113866+02	371.777	.00113851+02	332.275	.001

13836+02	296.248	.00113821+02	263.944	.00113806+02	235.326	.001
13791+02	210.185	.0011376+02	188.220	.00113761+02	169.089	.001
13746+02	152.445	.00113731+02	137.991	.00113716+02	125.339	.001
13701+02	114.315	.00113686+02	104.661	.00113671+02	96.181	.001
13656+02	88.707	.00113641+02	82.097	.00113626+02	76.232	.001
13611+02	71.017	.00113596+02	68.346	.00113581+02	62.171	.001
13566+02	58.418	.00113551+02	55.036	.00113536+02	51.982	.001
13521+02	49.216	.00113506+02	46.706	.00113491+02	44.423	.001
13476+02	42.342	.00113461+02	40.443	.00113446+02	38.706	.001
13431+02	37.116	.00113416+02	35.458	.00113401+02	34.320	.001
13385+02	33.090	.00113370+02	31.959	.00113355+02	30.319	.001
13340+02	29.962	.00113325+02	29.051	.00113310+02	28.270	.001
13295+02	27.523	.00113280+02	26.837	.00113265+02	26.207	.001
13250+02	25.628	.00113235+02	25.078	.00113220+02	24.614	.001
13205+02	24.173	.00113190+02	23.712	.00113175+02	23.409	.001
13160+02	23.082	.00113145+02	22.751	.00113130+02	22.532	.001
13115+02	22.305	.00113100+02	22.109	.00113085+02	21.940	.001
13070+02	21.803	.00113055+02	21.654	.00113040+02	21.612	.001
13025+02	21.557	.00113010+02	21.529	.00112995+02	21.528	.001
12980+02	21.553	.00112965+02	21.605	.00112950+02	21.683	.001
12935+02	21.789	.00112920+02	21.921	.00112905+02	22.081	.001
12890+02	22.269	.00112875+02	22.486	.00112860+02	22.734	.001
12845+02	23.012	.00112830+02	23.323	.00112815+02	23.666	.001
12800+02	24.045	.00112795+02	24.451	.00112770+02	24.915	.001
12755+02	25.410	.00112740+02	25.948	.00112725+02	26.532	.001
12710+02	27.165	.00112695+02	27.850	.00112680+02	28.591	.001
12665+02	29.591	.00112650+02	30.257	.00112635+02	31.191	.001
12620+02	32.201	.00112605+02	33.293	.00112589+02	34.474	.001
12574+02	35.752	.00112559+02	37.136	.00112544+02	38.636	.001
12529+02	40.264	.00112514+02	42.033	.00112499+02	43.957	.001
12484+02	46.054	.00112469+02	48.343	.00112454+02	50.846	.001
12439+02	53.588	.00112424+02	55.598	.00112409+02	59.909	.001
12394+02	63.561	.00112379+02	67.599	.00112364+02	72.076	.001
12349+02	77.053	.00112334+02	82.602	.00112319+02	88.610	.001
12304+02	95.776	.00112289+02	103.653	.00112274+02	112.532	.001
12259+02	122.591	.00112244+02	134.050	.00112229+02	147.117	.001
12214+02	152.105	.00112199+02	179.336	.00112184+02	199.194	.001
12169+02	222.121	.00112154+02	248.604	.00112139+02	279.161	.001
12124+02	314.292	.00112109+02	354.405	.00112094+02	399.673	.001
12079+02	449.831	.00112084+02	477.118	.00112069+02	559.799	.001
12034+02	614.250	.00112019+02	682.719	.00112004+02	700.082	.001
11989+02	721.750	.00111974+02	724.990	.00111959+02	709.600	.001
11944+02	678.130	.00111929+02	634.710	.00111914+02	584.036	.001
11899+02	530.389	.00111884+02	477.118	.00111869+02	426.509	.001
11854+02	379.907	.00111839+02	337.630	.00111824+02	300.694	.001
11809+02	268.000	.00111793+02	239.430	.00111789+02	214.687	.001
11763+02	193.162	.00111748+02	174.498	.00111733+02	158.207	.001
11718+02	144.025	.00111703+02	131.632	.00111688+02	129.756	.001
11673+02	111.182	.00111658+02	102.724	.00111643+02	95.227	.001
11628+02	88.559	.00111613+02	82.608	.00111598+02	77.280	.001
11583+02	72.496	.00111568+02	68.188	.00111553+02	64.298	.001
11538+02	60.776	.00111523+02	57.581	.00111508+02	54.674	.001
11493+02	52.026	.00111478+02	49.608	.00111463+02	47.396	.001
11448+02	45.348	.00111433+02	43.491	.00111418+02	41.785	.001
11403+02	40.216	.00111388+02	38.712	.00111373+02	37.442	.001
11358+02	36.216	.00111343+02	35.085	.00111328+02	34.043	.001
11313+02	33.081	.00111298+02	32.194	.00111283+02	31.377	.001
11268+02	30.624	.00111253+02	29.932	.00111238+02	29.227	.001
11223+02	28.714	.00111208+02	28.182	.00111193+02	27.696	.001
11178+02	27.256	.00111163+02	26.858	.00111148+02	26.500	.001
11133+02	26.181	.00111118+02	25.990	.00111103+02	25.655	.001

11088.02	25.444	.00111073.02	25.268	.00111058.02	25.125	.001
11043.02	25.014	.00111028.02	24.935	.00111013.02	24.889	.001
10997.02	24.873	.00110982.02	24.829	.00110967.02	24.7936	.001
10952.02	25.015	.00111037.02	25.126	.00110922.02	25.269	.001
10907.02	25.445	.00111092.02	25.656	.00110877.02	25.900	.001
10862.02	26.181	.00110847.02	26.499	.00110832.02	26.855	.001
10817.02	27.251	.00110802.02	27.699	.00110787.02	28.171	.001
10772.02	28.700	.0011075.02	29.178	.00110742.02	29.907	.001
10727.02	30.592	.00110712.02	31.335	.00110697.02	32.142	.001
10682.02	33.015	.00110667.02	33.961	.00110652.02	34.985	.001
10637.02	36.093	.00110622.02	37.293	.00110607.02	38.591	.001
10592.02	39.997	.00110577.02	41.529	.00110562.02	43.182	.001
10547.02	44.975	.00110532.02	46.824	.00110517.02	49.044	.001
10502.02	51.353	.00110487.02	53.812	.00110472.02	56.624	.001
10457.02	59.636	.00110442.02	62.940	.00110427.02	66.570	.001
10412.02	70.567	.00110397.02	74.980	.00110382.02	79.863	.001
10367.02	85.281	.00110352.02	91.310	.00110337.02	98.037	.001
10322.02	105.569	.00110307.02	114.027	.00110292.02	123.559	.001
10277.02	134.339	.00110262.02	146.574	.00110247.02	160.511	.001
10232.02	176.442	.00110217.02	184.717	.00110202.02	215.745	.001
10186.02	240.006	.00110171.02	288.048	.00110156.02	300.482	.001
10141.02	337.958	.00110126.02	381.108	.00110111.02	430.446	.001
10096.02	486.195	.00110081.02	548.016	.00110066.02	614.639	.001
10051.02	683.452	.00110036.02	750.159	.00110021.02	809.036	.001
10006.02	853.416	.00199912.01	877.699	.00199762.01	877.935	.001
99612.01	854.928	.00199946.01	812.870	.00199312.01	755.079	.001
99161.01	690.180	.00199011.01	622.837	.00198861.01	551.123	.001
98711.01	495.647	.00198561.01	439.785	.00198411.01	390.019	.001
98260.01	346.262	.00198110.01	308.096	.00197960.01	274.955	.001
97810.01	246.227	.00197660.01	221.321	.00197509.01	199.696	.001
97359.01	180.873	.00197209.01	164.440	.00197059.01	150.043	.001
96909.01	137.385	.00196758.01	129.101	.00196608.01	116.221	.001
96458.01	107.436	.00196308.01	99.597	.00196158.01	92.578	.001
96008.01	86.271	.00195857.01	80.587	.00195707.01	75.448	.001
95557.01	70.787	.00195407.01	66.350	.00195257.01	62.586	.001
95106.01	59.154	.00194956.01	55.017	.00194806.01	52.944	.001
94656.01	50.208	.00194506.01	47.683	.00194355.01	45.349	.001
94205.01	43.188	.00194055.01	41.182	.00193905.01	39.317	.001
93755.01	37.581	.00193605.01	35.961	.00193454.01	34.448	.001
93304.01	33.032	.00193154.01	31.706	.00193004.01	30.462	.001
92854.01	29.292	.00192703.01	28.193	.00192553.01	27.157	.001
92403.01	26.180	.00192253.01	25.257	.00192103.01	24.445	.001
91952.01	23.687	.00191802.01	22.919	.00191652.01	22.177	.001
91502.01	21.466	.00191352.01	20.792	.00191202.01	20.149	.001
91051.01	19.536	.00190901.01	18.951	.00190751.01	18.394	.001
90601.01	17.863	.00190451.01	17.358	.00190300.01	16.579	.001
90150.01	16.423	.00190000.01	15.999			.001

RUNNING TIME FOR PROBLEM = .203550E+01

XXXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF MOCK U235 DATA
 ELEMENT 235 U DATE 10/30/73 RUN NUMBER TIME 10.51.24

TOTAL	IF1	ITAPE CARDS	LLY 4	NN 6	NI 3	NFCMS 2	ITMAX 1	MAXEN 198	NGROUP 1	KM 19	NPS 5
AW	TEMP	CRFN	ERROR	DIST	DELTA G	DELTA E	DELTA L				
235.0000	.1000	8.9444	1.0000	245.0000	.0100	-0.0000	-0.0000				
THICK	YMAX	YMIN	ESPA	A02	B02	C02		00	CMIN	CMA	
.1000E-03	.1800E+04	.1000E+01	.6000E+01	.4596E-12	0.	-0.		.5875E-02	.1000E-02	.1000E+01	

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND Q VALUES OF SPIN GROUPS 1- 1
 GROUP L VALUE G VALUE BOUND CO
 1 0 1.000 -0.000

PKN	GGA	GSI 1	GSI 2	GSI 3	1 2 3 4 5 IGROUP
11.6700	38.0000	.748000E-01	3.83102	.100000E-05	0 0 0 1 0 1
12.3900	.450000	.207200	6.51179	16.6144	0 0 0 1 1 1
12.9000	.430000	.484000E-02	-3.71800	33.2283	0 0 0 1 1 1
13.3400	.400000	.896000E-02	1.67450	7.62686	0 0 0 1 1 1
13.7000	.400000	.836000E-02	27.1835	36.2541	0 0 0 1 1 1
14.0000	.400000	.448000E-01	-10.3620	61.6331	0 0 0 1 1 1
14.5300	.290000	.149600E-01	-20.7070	1.51037	0 0 0 1 1 1
15.4500	.550000	.358400E-01	15.7415	29.2673	0 0 0 1 1 1
16.1000	.400000	.404800E-01	-.141133	16.3694	0 0 0 1 1 1
16.6700	.640000	.380800E-01	.350618	38.9932	0 0 0 1 1 1

DATA READ IN OR GENERATED FROM .1103E+02 TO .1697E+02

XDIV = .100000E+01 IM = 1
 WID
 .301523E-01
 RES ENERGY TOTAL WIDTH
 .116700E+02 .20865E-01
 .123900E+02 .68655E-01
 .129000E+02 .799637E-01
 .133400E+02 .493341E-01
 .137000E+02 .103469E+00
 .140000E+02 .112163E+00
 .145300E+02 .512744E-01
 .154500E+02 .100150E+00
 .161000E+02 .566430E-01

ECS USED = 10629

.287 SECONDS IN PHMAIN INCLUDING .221 SECONDS IN PARSH WITH NGRAD= 1 AND MAXEN= 311

PKEN	DIAG	GGG	DIAG	GGI(1)	DIAG	GGI(2)	DIAG	GGI(3)	DIAG	TELIM	GROUP	THETA
11.67	0.	38.00	0.	748000E-01	0.	3.8310	130E+07	.0000	0.	0 0 1 0	1	0.00
12.39	0.	45.00	0.	207200	0.	6.5118	189E+07	16.5144	470E+07	0 0 1 1	1	57.92
12.90	0.	43.00	0.	484000E-02	0.	-3.77190	131E+06	33.2283	357E+06	0 0 1 1	1	104.47
13.34	0.	40.00	0.	896000E-02	0.	1.6745	178E+06	7.6269	471E+06	0 0 1 1	1	64.86
13.70	0.	40.00	0.	936000E-02	0.	27.1835	334E+06	36.2541	574E+06	0 0 1 1	1	49.08
14.00	0.	40.00	0.	448000E-01	0.	-10.3620	743E+06	61.6331	178E+07	0 0 1 1	1	112.27
14.53	0.	29.00	0.	149600E-01	0.	-20.7070	147E+07	1.5104	621E+06	0 0 1 1	1	164.86
15.45	0.	55.00	0.	358400E-01	0.	15.7415	943E+06	29.2673	100E+07	0 0 1 1	1	53.72
16.20	0.	40.00	0.	404800E-01	0.	21.111	927E+06	18.3694	141E+07	0 0 1 1	1	94.68
16.67	0.	64.00	0.	380800E-01	0.	-35.0618	798E+06	38.9932	775E+06	0 0 1 1	1	133.45
110300E+02	1326376E+02	110600E+02	1348821E+02	1109000E+02	1374172E+02	1127000E+02	1632947E+02	1402928E+02	1115000E+02	113000E+02	1435815E+02	
111800E+02	1473776E+02	112100E+02	1518059E+02	1124000E+02	1570346E+02	1127000E+02	1632947E+02	1402928E+02	1115000E+02	113000E+02	1435815E+02	
113300E+02	1803389E+02	113600E+02	1923398E+02	1139000E+02	2079486E+02	1142000E+02	2289584E+02	289584E+02	1145000E+02	116000E+02	2584015E+02	
114800E+02	3018206E+02	115100E+02	3702401E+02	1154000E+02	4488172E+02	1157000E+02	5192453E+02	7192453E+02	116000E+02	1175000E+02	1270212E+03	
116300E+02	4689717E+03	116600E+02	5122955E+04	1169000E+02	734112E+03	1172000E+02	8354714E+03	102928E+02	1175000E+02	119000E+02	1064808E+03	
117800E+02	6698971E+02	118100E+02	4973595E+02	1184000E+02	431108E+02	1187000E+02	565557E+02	365557E+02	119000E+02	120600E+02	3424156E+02	
119400E+02	3331366E+02	119600E+02	3353365E+02	1200000E+02	3314988E+02	1202000E+02	3654971E+02	4654971E+02	120600E+02	122100E+02	9521116E+02	
120800E+02	436666E+02	121200E+02	5133063E+02	1215000E+02	611836E+02	121800E+02	745794E+02	955884E+03	122100E+02	123600E+02	126847E+04	
122400E+02	1283803E+03	122700E+02	1865449E+03	123000E+02	3013108E+03	123300E+02	3582866E+03	595884E+03	123600E+02	125100E+02	1595602E+03	
123900E+02	4248629E+03	124200E+02	1293603E+04	1245000E+02	8618947E+02	124800E+02	126000E+02	126000E+02	125100E+02	126600E+02	1449834E+02	
125400E+02	1184701E+03	125700E+02	1293603E+04	126000E+02	3483329E+02	126300E+02	3716868E+02	536557E+02	126600E+02	128100E+02	3164407E+02	
126900E+02	3897605E+02	127200E+02	3483329E+02	1275000E+02	3216868E+02	127800E+02	3617614E+02	3617614E+02	128100E+02	129600E+02	299297E+02	
128400E+02	3601816E+02	128700E+02	4433894E+02	1290000E+02	2048648E+02	1293000E+02	189357E+02	1368000E+02	129600E+02	131100E+02	1773632E+02	
129900E+02	2347394E+02	130200E+02	130200E+02	1305000E+02	189357E+02	130800E+02	1929979E+02	2161213E+02	131100E+02	132600E+02	2682735E+02	
131400E+02	177529E+02	131700E+02	1820446E+02	1320000E+02	1335000E+02	132300E+02	1252494E+03	1338000E+02	132600E+02	134100E+02	2797558E+02	
132900E+02	1423650E+02	133200E+02	9362353E+02	1335000E+02	2000673E+02	133800E+02	157398E+02	1353000E+02	134100E+02	1356000E+02	224784E+02	
134400E+02	219665E+02	134700E+02	2000673E+02	1350000E+02	3268465E+02	135300E+02	4511984E+02	1368000E+02	1356000E+02	1371000E+02	690395E+02	
135900E+02	2606772E+02	136200E+02	2000673E+02	1365000E+02	4511984E+02	136800E+02	3749954E+02	404430E+02	1371000E+02	1386000E+02	4916133E+02	
137400E+02	5205695E+02	137700E+02	446050E+02	1380000E+02	1168128E+03	138300E+02	1635394E+03	1401000E+02	1386000E+02	1399000E+02	281384E+03	
138900E+02	6648753E+02	139300E+02	1168128E+03	1395000E+02	1911000E+02	139800E+02	1112091E+02	1414000E+02	1399000E+02	1417000E+02	403364E+02	
140500E+02	1688122E+03	140700E+02	122742E+03	1411000E+02	2827582E+02	141400E+02	2501747E+02	1429000E+02	1417000E+02	143200E+02	2141831E+02	
142000E+02	2307826E+02	142300E+02	2827582E+02	1426000E+02	1441000E+02	142900E+02	2291240E+02	1444000E+02	143200E+02	1447000E+02	18456E+02	
143500E+02	3077253E+02	143800E+02	2102510E+02	1441000E+02	1566000E+02	1447000E+02	157193E+03	1594000E+02	1447000E+02	1462000E+02	3051086E+02	
145000E+02	3367562E+02	145300E+02	2129768E+03	1456000E+02	1781078E+02	1462000E+02	147049E+02	147000E+02	1462000E+02	1477000E+02	1566105E+02	
146500E+02	2349432E+02	146800E+02	1990786E+02	1471000E+02	147049E+02	1477000E+02	1392928E+02	1392928E+02	1477000E+02	1492000E+02	1380202E+02	
148000E+02	1492297E+02	148300E+02	1666148E+02	1486000E+02	1392928E+02	1492000E+02	151340E+02	1507000E+02	1492000E+02	1507000E+02	1447766E+02	
149500E+02	1375663E+02	149800E+02	1566148E+02	1501000E+02	1392928E+02	1507000E+02	160341E+02	1522000E+02	1507000E+02	1522000E+02	2003965E+02	
151000E+02	149741E+02	1513000E+02	1566148E+02	1516000E+02	1664701E+02	1519000E+02	180341E+02	180341E+02	1522000E+02	1537000E+02	7175976E+02	
1525000E+02	2302704E+02	1528000E+02	1566222E+02	1531000E+02	3532148E+02	1534000E+02	488265E+02	488265E+02	1537000E+02	1552000E+02	950499E+02	
154000E+02	1274368E+03	1543000E+02	2156422E+03	1546000E+02	37079E+02	1549000E+02	1564000E+02	1564000E+02	1552000E+02	1567000E+02	2489870E+02	
1555000E+02	6188477E+02	155800E+02	4453235E+02	1561000E+02	37079E+02	1564000E+02	1564000E+02	1564000E+02	1567000E+02	1582000E+02	187804E+02	
1570000E+02	2335773E+02	1573000E+02	2066164E+02	1576000E+02	1956870E+02	1579000E+02	1956870E+02	1956870E+02	1582000E+02	1598000E+02	3412764E+02	
1585000E+02	1907635E+02	1588000E+02	1996152E+02	1592000E+02	2259035E+02	1594000E+02	2495108E+02	2495108E+02	1598000E+02	1613000E+02	2391378E+02	
160000E+02	4334626E+02	1603000E+02	2268198E+02	1607000E+02	2242754E+03	1610000E+02	162554E+03	162554E+03	1613000E+02	1628000E+02	2737760E+02	
1616000E+02	1034630E+03	1619000E+02	592304E+02	1622000E+02	1114379E+02	1625000E+02	162554E+03	162554E+03	1628000E+02	1643000E+02	242104E+02	
1631000E+02	2463918E+02	1634000E+02	3231914E+02	1637000E+02	276801E+02	164000E+02	326801E+02	326801E+02	1643000E+02	1658000E+02	695624E+02	
1646000E+02	2958451E+02	1649000E+02	3086176E+02	1652000E+02	375214E+02	1655000E+02	1655000E+02	1655000E+02	1658000E+02	1673000E+02	1216797E+03	
1661000E+02	1046034E+03	1664000E+02	1550095E+03	1667000E+02	1688033E+03	1670000E+02	1688033E+03	1670000E+02	1673000E+02	1688000E+02	3541454E+02	
1676000E+02	8685232E+02	1679000E+02	6467109E+02	1682000E+02	5071953E+02	1685000E+02	1685000E+02	1685000E+02	1688000E+02	1688000E+02		
1691000E+02	3101144E+02	1694000E+02	277776E+02	1697000E+02	2532304E+02	1697000E+02	2532304E+02	1697000E+02	1697000E+02	1697000E+02		

SEARCH XBAR IS OUTSIDE RANGE OF TABLE

000001

ELEMENT = 235 U	DATE = 10/30/73	RUNNO =	ITERATION = 0
11.11	TOTAL	CROSS SECTION VS ENERGY	
11.22	10.00	100.00	10000.00
11.33	1.00	1000.00	10000.00
11.44	1.00	1000.00	10000.00
11.55	1.00	1000.00	10000.00
11.66	1.00	1000.00	10000.00
11.77	1.00	1000.00	10000.00
11.88	1.00	1000.00	10000.00
11.99	1.00	1000.00	10000.00
12.00	1.00	1000.00	10000.00
12.11	1.00	1000.00	10000.00
12.22	1.00	1000.00	10000.00
12.33	1.00	1000.00	10000.00
12.44	1.00	1000.00	10000.00
12.55	1.00	1000.00	10000.00
12.66	1.00	1000.00	10000.00
12.77	1.00	1000.00	10000.00
12.88	1.00	1000.00	10000.00
12.99	1.00	1000.00	10000.00
13.00	1.00	1000.00	10000.00
13.11	1.00	1000.00	10000.00
13.22	1.00	1000.00	10000.00
13.33	1.00	1000.00	10000.00
13.44	1.00	1000.00	10000.00
13.55	1.00	1000.00	10000.00
13.66	1.00	1000.00	10000.00
13.77	1.00	1000.00	10000.00
13.88	1.00	1000.00	10000.00
13.99	1.00	1000.00	10000.00
14.00	1.00	1000.00	10000.00
14.11	1.00	1000.00	10000.00
14.22	1.00	1000.00	10000.00
14.33	1.00	1000.00	10000.00
14.44	1.00	1000.00	10000.00
14.55	1.00	1000.00	10000.00
14.66	1.00	1000.00	10000.00
14.77	1.00	1000.00	10000.00
14.88	1.00	1000.00	10000.00
14.99	1.00	1000.00	10000.00
15.00	1.00	1000.00	10000.00
15.11	1.00	1000.00	10000.00
15.22	1.00	1000.00	10000.00
15.33	1.00	1000.00	10000.00
15.44	1.00	1000.00	10000.00
15.55	1.00	1000.00	10000.00
15.66	1.00	1000.00	10000.00
15.77	1.00	1000.00	10000.00
15.88	1.00	1000.00	10000.00
15.99	1.00	1000.00	10000.00
16.00	1.00	1000.00	10000.00
16.11	1.00	1000.00	10000.00
16.22	1.00	1000.00	10000.00
16.33	1.00	1000.00	10000.00
16.44	1.00	1000.00	10000.00
16.55	1.00	1000.00	10000.00
16.66	1.00	1000.00	10000.00
16.77	1.00	1000.00	10000.00
16.88	1.00	1000.00	10000.00
16.99	1.00	1000.00	10000.00

STARTING PHI .361955E+04 PSEARCH METHOD ITERATION 1

.089 SECONDS IN PHIMAIN INCLUDING	.071 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	311
.090 SECONDS IN PHIMAIN INCLUDING	.071 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	311
.089 SECONDS IN PHIMAIN INCLUDING	.070 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	311
.089 SECONDS IN PHIMAIN INCLUDING	.070 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	311

MAGNITUDE OF GRADIENT .337854E+05

STARTING PHI .361955E+04 FINAL PHI .272414E+04 DIAG. WEIGHTS .469891E+05 COS(THETA) .737552E+00 NSAV 3
 ETA .100000E+01

STOPPED ON MAXIMUM NUMBER OF ITERATION:

ITERATION 1

PRN	DIAG	GGA	DIAG	GS1(1)	DIAG	GS1(2)	DIAG	GS1(3)	DIAG	IELM	GROUP	THETA	
1.67	0.	38.00	0.	.748000E-01	0.	3.9841	.130E+7	.0000	0.	0	0	0.00	
2.39	0.	45.00	0.	.207200	0.	9.8877	.189E+7	14.0002	.476E+07	0	0	1	49.93
2.90	0.	43.00	0.	.484000E-02	0.	-1.7802	.131E+06	31.3653	.357E+06	0	0	1	103.37
3.34	0.	40.00	0.	.896000E-02	0.	1.0073	.174E+06	7.6669	.471F+06	0	0	1	70.05
3.70	0.	40.00	0.	.836000E-02	0.	24.0436	.334E+06	29.6305	.574E+06	0	0	1	47.94
4.00	0.	40.00	0.	.448000E-01	0.	-11.0746	.733E+06	70.0795	.178F+07	0	0	1	111.65
4.53	0.	29.30	0.	.149000E-01	0.	-20.5635	.147E+07	2.0986	.621F+06	0	0	1	162.26
5.45	0.	55.00	0.	.358400E-01	0.	17.6471	.943E+06	27.7039	.100F+07	0	0	1	51.38
6.10	0.	40.00	0.	.404900E-01	0.	-0.0010	.927E+06	21.0515	.141E+07	0	0	1	90.37
6.67	0.	64.00	0.	.380800E-01	0.	-3.39918	.799E+06	42.0933	.775F+06	0	0	1	130.60
1103000E+02	.1332519E+02	.1106000E+02	.1335578E+02	.1109000E+02	.1381505E+02	.1112000E+02	.1410205E+02	.1115000E+02	.1410205E+02	.115000E+02	.144564E+02	.1244060E+02	
1118000E+02	.1483399E+02	.1210000E+02	.1528699E+02	.1210000E+02	.1582178E+02	.1220000E+02	.1646193E+02	.1220000E+02	.1646193E+02	.1130000E+02	.1724060E+02	.1244060E+02	
1113000E+02	.1820578E+02	.1130000E+02	.1949313E+02	.1130000E+02	.2102167E+02	.1142000E+02	.2316191E+02	.1142000E+02	.2316191E+02	.115000E+02	.2616062E+02	.1244060E+02	
1114000E+02	.3057529E+02	.1151000E+02	.3750472E+02	.1154000E+02	.4947006E+02	.1157000E+02	.7283213E+02	.1157000E+02	.7283213E+02	.1160000E+02	.1283328E+03	.1244060E+02	
1116000E+02	.5107167E+02	.1166000E+02	.6189172E+02	.1169000E+02	.7319191E+02	.1172000E+02	.1218169E+02	.1172000E+02	.1218169E+02	.1175000E+02	.1455929E+02	.1244060E+02	
1117000E+02	.6274086E+02	.1181000E+02	.8899814E+02	.1184000E+02	.12042667E+02	.1187000E+02	.1591455E+02	.1187000E+02	.1591455E+02	.1190000E+02	.1955929E+02	.1244060E+02	
11204000E+02	.4311133E+02	.1212000E+02	.5137914E+02	.1215000E+02	.6064793E+02	.1220000E+02	.7415895E+02	.1220000E+02	.7415895E+02	.1206000E+02	.1401785E+02	.1244060E+02	
11224000E+02	.2280284E+02	.1242000E+02	.2864431E+02	.1243000E+02	.3067144E+02	.1243000E+02	.3676804E+02	.1243000E+02	.3676804E+02	.1236000E+02	.1566731E+02	.1244060E+02	
11239000E+02	.2212835E+02	.1251000E+02	.2849718E+02	.1254000E+02	.3067144E+02	.1254000E+02	.4384000E+02	.1254000E+02	.4384000E+02	.1251000E+02	.1595182E+02	.1244060E+02	
11254000E+02	.3033049E+02	.1257000E+02	.3607053E+02	.1275000E+02	.4384000E+02	.1275000E+02	.5535303E+02	.1275000E+02	.5535303E+02	.1266000E+02	.14848621E+02	.1244060E+02	
11264000E+02	.3698234E+02	.1287000E+02	.4482896E+02	.1290000E+02	.5446476E+02	.1293000E+02	.6459037E+02	.1293000E+02	.6459037E+02	.1291000E+02	.1326484E+02	.1244060E+02	
11284000E+02	.2364759E+02	.1302000E+02	.2679372E+02	.1305000E+02	.1933326E+02	.1308000E+02	.1856709E+02	.1311000E+02	.1856709E+02	.1296000E+02	.1296786E+02	.1244060E+02	
11314000E+02	.1829839E+02	.1317000E+02	.1891830E+02	.1320000E+02	.1991716E+02	.1323000E+02	.2226400E+02	.1326000E+02	.2226400E+02	.1326000E+02	.1824466E+02	.1244060E+02	
11329000E+02	.4203337E+02	.1332000E+02	.5508132E+02	.1335000E+02	.1262131E+02	.1338000E+02	.1845541E+02	.1341000E+02	.1845541E+02	.1341000E+02	.2807173E+02	.1244060E+02	
11344000E+02	.2228472E+02	.1347000E+02	.2636220E+02	.1350000E+02	.2013914E+02	.1353000E+02	.2697104E+02	.1356000E+02	.2697104E+02	.1356000E+02	.2289437E+02	.1244060E+02	
11359000E+02	.2645792E+02	.1362000E+02	.3313043E+02	.1365000E+02	.4630824E+02	.1368000E+02	.646841E+02	.1371000E+02	.646841E+02	.1371000E+02	.7474352E+02	.1244060E+02	
11374000E+02	.5369266E+02	.1377000E+02	.4134490E+02	.1380000E+02	.3891781E+02	.1383000E+02	.4261745E+02	.1386000E+02	.4261745E+02	.1386000E+02	.521631E+02	.1244060E+02	
11389000E+02	.7026094E+02	.1393000E+02	.1200066E+02	.1395000E+02	.163271E+02	.1401000E+02	.263079E+02	.1399000E+02	.263079E+02	.1399000E+02	.2625124E+02	.1244060E+02	
1405000E+02	.335754E+02	.1407000E+02	.1231388E+02	.1411000E+02	.1246707E+02	.1414000E+02	.1414000E+02	.1414000E+02	.1414000E+02	.1417000E+02	.4103414E+02	.1244060E+02	
142000E+02	.285155E+02	.1420000E+02	.285155E+02	.1420000E+02	.2511004E+02	.1429000E+02	.2279802E+02	.1432000E+02	.2279802E+02	.1432000E+02	.2132022E+02	.1244060E+02	
1435000E+02	.20458E+02	.1435000E+02	.20458E+02	.1440000E+02	.2245000E+02	.1440000E+02	.2727981E+02	.1440000E+02	.2727981E+02	.1440000E+02	.4143695E+02	.1244060E+02	
1450000E+02	.3310673E+02	.1450000E+02	.2111674E+02	.1450000E+02	.1026711E+02	.1459000E+02	.1459000E+02	.1459000E+02	.1459000E+02	.1462000E+02	.3090333E+02	.1244060E+02	
1465000E+02	.2377705E+02	.1465000E+02	.2011143E+02	.1471000E+02	.1796711E+02	.1474000E+02	.1659443E+02	.1477000E+02	.1659443E+02	.1477000E+02	.1566169E+02	.1244060E+02	
1480000E+02	.500980E+02	.1483000E+02	.1454410E+02	.1486000E+02	.1421605E+02	.1489000E+02	.139933E+02	.1492000E+02	.139933E+02	.1492000E+02	.1868952E+02	.1244060E+02	
1495000E+02	.1382500E+02	.1498000E+02	.1384695E+02	.1501000E+02	.1393935E+02	.1504000E+02	.1422433E+02	.1507000E+02	.1422433E+02	.1507000E+02	.2026172E+02	.1244060E+02	
151000E+02	.508579E+02	.1513000E+02	.1580114E+02	.1516000E+02	.1688315E+02	.1519000E+02	.1821944E+02	.1522000E+02	.1821944E+02	.1522000E+02	.2026172E+02	.1244060E+02	
152000E+02	.228600E+02	.1524000E+02	.2800677E+02	.1531000E+02	.3572781E+02	.1534000E+02	.4932304E+02	.1537000E+02	.4932304E+02	.1537000E+02	.7532649E+02	.1244060E+02	
154000E+02	.1278731E+02	.1543000E+02	.2153091E+02	.1546000E+02	.2406370E+02	.1549000E+02	.1549000E+02	.1549000E+02	.1549000E+02	.1552000E+02	.9453312E+02	.1244060E+02	
155000E+02	.2137984E+02	.1558000E+02	.4405490E+02	.1561000E+02	.3426437E+02	.1564000E+02	.2832304E+02	.1567000E+02	.2832304E+02	.1567000E+02	.1643000E+02	.1244060E+02	
157000E+02	.2201574E+02	.1573000E+02	.2035418E+02	.1576000E+02	.1929401E+02	.1579000E+02	.1872908E+02	.1582000E+02	.1872908E+02	.1582000E+02	.1860948E+02	.1244060E+02	
1585000E+02	.1897579E+02	.1588000E+02	.1996456E+02	.1592000E+02	.2281195E+02	.1594000E+02	.2534474E+02	.1597000E+02	.2534474E+02	.1597000E+02	.3512089E+02	.1244060E+02	
1600000E+02	.484633E+02	.1603000E+02	.7548419E+02	.1607000E+02	.8243084E+02	.1610000E+02	.8433041E+02	.1613000E+02	.8433041E+02	.1613000E+02	.2394025E+02	.1244060E+02	
161000E+02	.107089E+02	.1613000E+02	.6226763E+02	.1622000E+02	.8206795E+02	.1625000E+02	.3351746E+02	.1628000E+02	.3351746E+02	.1628000E+02	.2825886E+02	.1244060E+02	
1631000E+02	.2524539E+02	.1634000E+02	.2359808E+02	.1637000E+02	.2293198E+02	.1640000E+02	.1653040E+02	.1643000E+02	.1653040E+02	.1643000E+02	.242131E+02	.1244060E+02	
1646000E+02	.2648807E+02	.1649000E+02	.3046476E+02	.1652000E+02	.3721326E+02	.1655000E+02	.4879555E+02	.1658000E+02	.4879555E+02	.1658000E+02	.6911641E+02	.1244060E+02	
1661000E+02	.1043590E+02	.1664000E+02	.1555029E+02	.1667000E+02	.1900714E+02	.1670000E+02	.1676781E+02	.1673000E+02	.1676781E+02	.1673000E+02	.1222057E+02	.1244060E+02	
1676000E+02	.8719871E+02	.1679000E+02	.6496762E+02	.1682000E+02	.5098722E+02	.1685000E+02	.4166822E+02	.1688000E+02	.4166822E+02	.1688000E+02	.3365259E+02	.1244060E+02	
1691000E+02	.3123686E+02	.1694000E+02	.2799089E+02	.1697000E+02	.2598218E+02	.1697000E+02	.2598218E+02	.1697000E+02	.2598218E+02	.1697000E+02	.2598218E+02	.1697000E+02	

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

000001

ELEMENT = 235 U	DATE = 10/30/73	RUNNO =	ITERATION = 1
11.11	10.00	100.00	10000.00
11.22	10.00	100.00	10000.00
11.33	10.00	100.00	10000.00
11.44	10.00	100.00	10000.00
11.55	10.00	100.00	10000.00
11.66	10.00	100.00	10000.00
11.77	10.00	100.00	10000.00
11.88	10.00	100.00	10000.00
11.99	10.00	100.00	10000.00
12.00	10.00	100.00	10000.00
12.11	10.00	100.00	10000.00
12.22	10.00	100.00	10000.00
12.33	10.00	100.00	10000.00
12.44	10.00	100.00	10000.00
12.55	10.00	100.00	10000.00
12.66	10.00	100.00	10000.00
12.77	10.00	100.00	10000.00
12.88	10.00	100.00	10000.00
12.99	10.00	100.00	10000.00
13.00	10.00	100.00	10000.00
13.11	10.00	100.00	10000.00
13.22	10.00	100.00	10000.00
13.33	10.00	100.00	10000.00
13.44	10.00	100.00	10000.00
13.55	10.00	100.00	10000.00
13.66	10.00	100.00	10000.00
13.77	10.00	100.00	10000.00
13.88	10.00	100.00	10000.00
13.99	10.00	100.00	10000.00
14.00	10.00	100.00	10000.00
14.11	10.00	100.00	10000.00
14.22	10.00	100.00	10000.00
14.33	10.00	100.00	10000.00
14.44	10.00	100.00	10000.00
14.55	10.00	100.00	10000.00
14.66	10.00	100.00	10000.00
14.77	10.00	100.00	10000.00
14.88	10.00	100.00	10000.00
14.99	10.00	100.00	10000.00
15.00	10.00	100.00	10000.00
15.11	10.00	100.00	10000.00
15.22	10.00	100.00	10000.00
15.33	10.00	100.00	10000.00
15.44	10.00	100.00	10000.00
15.55	10.00	100.00	10000.00
15.66	10.00	100.00	10000.00
15.77	10.00	100.00	10000.00
15.88	10.00	100.00	10000.00
15.99	10.00	100.00	10000.00
16.00	10.00	100.00	10000.00
16.11	10.00	100.00	10000.00
16.22	10.00	100.00	10000.00
16.33	10.00	100.00	10000.00
16.44	10.00	100.00	10000.00
16.55	10.00	100.00	10000.00
16.66	10.00	100.00	10000.00
16.77	10.00	100.00	10000.00
16.88	10.00	100.00	10000.00
16.99	10.00	100.00	10000.00

RUNNING TIME FOR PROBLEM = .211257E+01

XXXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF MOCK U235 DATA
 ELEMENT 235 U DATE 10/30/73 RUN NUMBER TIME 10.51.27

IF1	ITAPE	LLY	NN	NI	NFCHS	ITMAX	MAXEN	NGROUP	KM	NPS
SCATTER FISSION	CAROS	4	0	3	2	1	200	1	19	5
AW	TEMP	CRFN	ENROR	DIST	DELTA G	DELTA E	DELTA L			
235.0000	.1000	8.9444	1.0000	245.0000	.0100	-0.0000	-0.0000			
THICK	YMAX	YMIN	ESPAW	A02	B02	C02	D0	CHIN	CMAW	
-0.	.1000E+04	.1000E+01	.6000E+01	.4596E-12	0.	-0.	.5875E-02	.1000E-02	.1000E+01	

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND G VALUES OF SPIN GROUPS 1- 1
 GROUP L VALUE G VALUE BOUND CD
 1 0 1.000 -0.000

PKEN	GOA	GSI 1	GSI 2	GSI 3	1 2 3 4 5 IGROUP
11.6700	38.0000	.748000E-01	3.83102	.100000E-05	0 0 0 1 0 1
12.3900	45.0000	.207200	6.51179	16.6144	0 0 0 1 1 1
12.9000	43.0000	.484000E-02	-3.71800	33.2283	0 0 0 1 1 1
13.3400	40.0000	.896000E-02	1.67450	7.62686	0 0 0 1 1 1
13.7000	40.0000	.836000E-02	27.1835	36.2541	0 0 0 1 1 1
14.0000	40.0000	.448000E-01	-10.3620	61.6331	0 0 0 1 1 1
14.5300	29.0000	.149600E-01	-20.7070	1.51037	0 0 0 1 1 1
15.4500	55.0000	.358400E-01	15.7415	29.2673	0 0 0 1 1 1
16.1000	40.0000	.404800E-01	-1.11133	16.3694	0 0 0 1 1 1
16.6700	64.0000	.380800E-01	-35.0618	38.9932	0 0 0 1 1 1

DATA READ IN OR GENERATED FROM .1100E+02 TO .1700E+02

XDIV = .100000E+01 IN = 1

WTO
 .301500E-01
 RES ENERGY TOTAL WIDTH
 .116700E+02 .440865E+01
 .123900E+02 .888555E+01
 .129000E+02 .799637E+01
 .133400E+02 .493341E+01
 .137000E+02 .103469E+00
 .140000E+02 .112163E+00
 .145300E+02 .512744E+01
 .154500E+02 .100150E+00
 .161000E+02 .566430E+01

ECS USED = 15984

.348 SECONDS IN PHMAIN INCLUDING .245 SECONDS IN PARSH WITH NGRAD= 1 AND MAXEN1= 313

PKEN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELTH	GROUP	THETA
11.67	0.	36.00	0.	.748900E+01	0.	3.8310	.106E+09	.0000	0.	0 0 1 0	1	0.00
12.99	0.	43.00	0.	.207200	0.	6.5118	.107E+09	16.6144	.100E+08	0 0 1 1	1	57.92
13.34	0.	43.00	0.	.484000E+02	0.	-3.7180	.186E+08	33.2283	.141E+08	0 0 1 1	1	104.47
13.70	0.	40.00	0.	.896000E+02	0.	1.6745	.392E+08	7.5269	.429E+08	0 0 1 1	1	64.86
14.00	0.	40.00	0.	.836000E+02	0.	27.1835	.684E+07	36.2541	.779E+07	0 0 1 1	1	49.08
14.33	0.	40.00	0.	.448000E+01	0.	-10.3620	.284E+08	61.4633	.222E+08	0 0 1 1	1	112.27
15.45	0.	55.00	0.	.149600E+01	0.	20.7070	.393E+08	1.5104	.150E+08	0 0 1 1	1	164.86
16.10	0.	40.00	0.	.358400E+01	0.	15.7415	.551E+08	29.2673	.246E+08	0 0 1 1	1	57.72
16.67	0.	64.00	0.	.404800E+01	0.	-35.0418	.1473E+08	16.3694	.434E+08	0 0 1 1	1	94.68
11.00	0.00E+02	.8518203E+01	.110300E+02	.8476059E+01	.1106000E+02	.8430960E+01	.1109000E+02	.838234E+01	.1112100E+02	.8328936E+01		133.45
11.15	1.00E+02	.871236E+01	.1118100E+02	.829070E+01	.1121100E+02	.8140874E+01	.1124100E+02	.8065546E+01	.1127100E+02	.79811764E+01		
11.30	2.00E+02	.7884339E+01	.1133200E+02	.7777128E+01	.1136600E+02	.7653373E+01	.1139200E+02	.751024E+01	.1142200E+02	.7339609E+01		
11.52	3.00E+02	.7132442E+01	.1148200E+02	.687356E+01	.1151300E+02	.6526502E+01	.1154300E+02	.606965E+01	.1157300E+02	.5416953E+01		
11.63	3.00E+02	.4424898E+01	.1163300E+02	.3308755E+01	.1166300E+02	.1090588E+01	.1169300E+02	.206379E+01	.1172400E+02	.149039E+01		
11.75	4.00E+02	.1250939E+02	.1178400E+02	.1126164E+02	.1181400E+02	.1048627E+02	.1184500E+02	.994075E+01	.1187400E+02	.5519404E+01		
11.90	5.00E+02	.9158090E+01	.1193500E+02	.884915E+01	.1196500E+02	.866101E+01	.1199500E+02	.828004E+01	.1202500E+02	.7995353E+01		
12.05	5.00E+02	.7696826E+01	.1208500E+02	.737432E+01	.1211500E+02	.7002741E+01	.1214500E+02	.659115E+01	.1217600E+02	.611114E+01		
12.27	7.00E+02	.7041257E+01	.1236700E+02	.440131E+01	.1266500E+02	.4003891E+01	.1274500E+02	.308907E+01	.1282500E+02	.2701883E+01		
12.50	8.00E+02	.2020770E+02	.1253700E+02	.3103880E+02	.1241100E+02	.460961E+02	.1254700E+02	.3045937E+01	.1247700E+02	.2395728E+01		
12.68	8.00E+02	.1406182E+02	.1268800E+02	.1779903E+02	.1256500E+02	.1652157E+02	.1259800E+02	.1546988E+02	.1262800E+02	.1467921E+02		
12.80	9.00E+02	.1211993E+02	.1283900E+02	.1135615E+02	.1271700E+02	.1312940E+02	.1274900E+02	.1276673E+02	.1277900E+02	.1247329E+02		
12.96	0.00E+02	.1188394E+02	.1299900E+02	.1179184E+02	.1286700E+02	.1156548E+02	.1289900E+02	.1153429E+02	.1293000E+02	.1191796E+02		
13.11	1.00E+02	.1114798E+02	.1314100E+02	.1101867E+02	.1327100E+02	.1158955E+02	.1305900E+02	.112421E+02	.1323100E+02	.11289374E+02		
13.27	1.00E+02	.1037370E+02	.1329100E+02	.1008911E+02	.1332200E+02	.1086841E+02	.1320100E+02	.114741E+02	.1323100E+02	.1085050E+02		
13.41	2.00E+02	.1113568E+02	.1344200E+02	.1089344E+02	.1347700E+02	.9930837E+01	.1335200E+02	.115624E+02	.1338200E+02	.1149396E+02		
13.63	3.00E+02	.1026535E+02	.1359300E+02	.1011404E+02	.1377400E+02	.9955646E+01	.1365300E+02	.1055281E+02	.1353300E+02	.1040927E+02		
13.71	4.00E+02	.1028792E+02	.1374400E+02	.10381894E+02	.1377400E+02	.1021363E+02	.1380400E+02	.998092E+01	.1368300E+02	.990577E+01		
13.86	4.00E+02	.9435726E+01	.1389400E+02	.9112515E+01	.1392300E+02	.8779736E+01	.1395500E+02	.891706E+01	.1383400E+02	.972549E+01		
14.00	5.00E+02	.9733313E+01	.1404500E+02	.1211366E+02	.1407500E+02	.1261045E+02	.1410500E+02	.1227726E+02	.1401500E+02	.117972E+02		
14.16	6.00E+02	.1118838E+02	.1419600E+02	.1150792E+02	.1422500E+02	.1132853E+02	.1425500E+02	.1117062E+02	.1428500E+02	.1102590E+02		
14.31	7.00E+02	.108236E+02	.1434700E+02	.1074132E+02	.1437700E+02	.1058819E+02	.1440700E+02	.104074E+02	.1443700E+02	.1017118E+02		
14.46	7.00E+02	.9685321E+01	.1449700E+02	.9349405E+01	.1452500E+02	.1056825E+02	.1457500E+02	.1055800E+02	.1468800E+02	.1185413E+02		
14.61	8.00E+02	.1150311E+02	.1464800E+02	.1127547E+02	.1467900E+02	.1111534E+02	.1476900E+02	.1098975E+02	.1473900E+02	.1089149E+02		
14.76	9.00E+02	.1080787E+02	.1479900E+02	.1073402E+02	.1482700E+02	.1066683E+02	.1485900E+02	.1060416E+02	.1488900E+02	.1054445E+02		
14.92	0.00E+02	.1048456E+02	.1495000E+02	.106230E+02	.1496000E+02	.1036877E+02	.1501000E+02	.1031111E+02	.1504000E+02	.1025030E+02		
15.07	0.00E+02	.1018628E+02	.1510100E+02	.101358E+02	.1513100E+02	.1004954E+02	.1516100E+02	.9957444E+01	.1519100E+02	.9863351E+01		
15.21	1.00E+02	.975434E+01	.1525100E+02	.9625009E+01	.1528100E+02	.946764E+01	.1531200E+02	.9264816E+01	.1534200E+02	.9019304E+01		
15.37	2.00E+02	.1027592E+02	.1540200E+02	.8549689E+01	.1543300E+02	.9328739E+01	.1546200E+02	.1134379E+02	.1549200E+02	.1221087E+02		
15.52	3.00E+02	.1092676E+02	.1555300E+02	.1169850E+02	.1558300E+02	.1141463E+02	.1561300E+02	.1118696E+02	.1564300E+02	.1100068E+02		
15.67	4.00E+02	.1019445E+02	.1570400E+02	.1069856E+02	.1573900E+02	.105710E+02	.1576900E+02	.104644E+02	.1579400E+02	.103231E+02		
15.82	4.00E+02	.9154802E+01	.1585400E+02	.1005846E+02	.1588400E+02	.986740E+01	.1597400E+02	.107201E+02	.159400E+02	.9466737E+01		
16.12	6.00E+02	.1466983E+01	.1600300E+02	.8715221E+01	.1603300E+02	.8074045E+01	.1606500E+02	.7376035E+01	.1609500E+02	.6846712E+01		
16.27	6.00E+02	.115147E+02	.1615600E+02	.137303E+02	.1618600E+02	.1278940E+02	.1621900E+02	.109224E+02	.1624900E+02	.1038712E+01		
16.42	7.00E+02	.1061422E+02	.1645700E+02	.1045246E+02	.1648700E+02	.1027743E+02	.1651900E+02	.105524E+02	.1654800E+02	.9856163E+01		
16.57	7.00E+02	.9631971E+01	.1660800E+02	.9497880E+01	.1663300E+02	.974943E+01	.1666300E+02	.1007291E+02	.1669800E+02	.9853592E+01		
16.79	9.00E+02	.1230114E+02	.1675900E+02	.1230393E+02	.1678900E+02	.121711E+02	.1681900E+02	.1201942E+02	.1684900E+02	.1188142E+02		
16.91	0.00E+02	.1176228E+02	.1691000E+02	.1165169E+02	.1694000E+02	.1157142E+02	.1697000E+02	.1149710E+02	.1700000E+02	.1143231E+02		
11.00	0.00E+02	.2215294E+01	.1163000E+02	.2257660E+01	.1166000E+02	.2157142E+02	.1169000E+02	.2149710E+02	.1700000E+02	.1143231E+02		
11.30	2.00E+02	.3566502E+01	.1132000E+02	.2830909E+01	.1136000E+02	.2386303E+02	.1139000E+02	.2462230E+01	.1142100E+02	.2590141E+01		
11.52	3.00E+02	.2795488E+01	.1148200E+02	.3738838E+01	.1151300E+02	.2969217E+01	.1154300E+02	.3124529E+01	.1157300E+02	.3259618E+01		
11.63	3.00E+02	.1842795E+01	.1163300E+02	.5991817E+01	.1151300E+02	.4012714E+01	.1154300E+02	.4342682E+01	.1157300E+02	.4752342E+01		
11.75	4.00E+02	.9462570E+01	.1178400E+02	.7324591E+01	.1181400E+02	.7061910E+02	.1184500E+02	.5665453E+01	.1187400E+02	.617129E+01		
11.90	5.00E+02	.7324591E+01	.1193500E+02	.7324591E+01	.1181400E+02	.6703606E+01	.1184500E+02	.6683628E+01	.1187400E+02	.697536E+01		

ELEMENT = 235 U

DATE = 10/30/73

RUNNO =

ITERATION = 0

SCATTER CROSS SECTION VS ENERGY

ELEMENT = 235 U	DATE = 10/30/73	MUNNO =	ITERATION = 0
FISSION CROSS SECTION VS ENERGY			
	1.00	10.00	100.00
11.11*	T		
11.22*	T		
11.33*	T		
11.44*	T		
11.55*	T		
11.67*			
11.78*			
11.89*			
12.00*			
12.11*			
12.22*			
12.33*			
12.44*			
12.56*			
12.67*			
12.78*			
12.89*			
13.00*			
13.11*			
13.22*			
13.33*			
13.44*			
13.56*			
13.67*			
13.78*			
13.89*			
14.00*			
14.11*			
14.22*			
14.33*			
14.44*			
14.56*			
14.67*			
14.78*			
14.89*			
15.00*			
15.11*			
15.22*			
15.33*			
15.44*			
15.56*			
15.67*			
15.78*			
15.89*			
16.00*			
16.11*			
16.22*			
16.33*			
16.44*			
16.56*			
16.67*			
16.78*			
16.89*			
17.00*			

STARTING PHI .208055E+05 PSEARCH METHOD ITERATION 1

.085 SECONDS IN PHIMAIN INCLUDING	.074 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.082 SECONDS IN PHIMAIN INCLUDING	.072 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.082 SECONDS IN PHIMAIN INCLUDING	.072 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313

MAGNITUDE OF GRADIENT .219418E+06

STARTING PHI .208055E+05 FINAL PHI .187052E+05 DIAG. WEIGHTS .107292E+06 COS(THETA) .303857E+00 NSAV 2
ETA .100000E+01

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

ITERATION 1

PRIN	DIAG	GGA	DIAG	GS1(1)	DIAG	GS1(2)	DIAG	GS1(3)	DIAG	IELIM	GROUP	THETA
11.67	0.	38.00	0.	746000E-01	0.	3.9978	106E+09	.0000	0.	0 0 1 0	1	0.00
12.39	0.	45.00	0.	207200	0.	6.1593	107E+09	17.0696	100E+09	0 0 1 1	1	5A.98
12.90	0.	43.00	0.	684000E-02	0.	-4.5547	186E+08	34.8740	141E+08	0 0 1 1	1	109.84
13.34	0.	40.00	0.	896000E-02	0.	1.8391	392E+08	8.1474	429E+08	0 0 1 1	1	6A.56
13.70	0.	40.00	0.	836000E-02	0.	34.2525	684E+07	42.8115	779E+07	0 0 1 1	1	4A.16
14.00	0.	40.00	0.	448000E-01	0.	-15.5106	244E+08	57.4421	222E+08	0 0 1 1	1	117.43
14.53	0.	29.00	0.	149600E-01	0.	-23.692	393E+08	8.720	150E+08	0 0 1 1	1	1A.88
15.45	0.	55.00	0.	358400E-01	0.	1.9049	551E+08	31.4402	246E+08	0 0 1 1	1	5A.35
16.10	0.	40.00	0.	404800E-01	0.	2.2956	475E+09	13.7472	974E+08	0 0 1 1	1	97.77
16.67	0.	64.00	0.	380800E-01	0.	-41.0028	165E+09	35.9991	774E+07	0 0 1 1	1	13A.83
11.0000E+02	110300E+02	110300E+02	8476+01E+01	110600E+02	843132E+01	110900E+02	806609E+01	11127100E+02	8328283E+01	11127100E+02	8328283E+01	8328283E+01
11.5100E+02	871687E+01	1114100E+02	820929E+01	1121100E+02	914136E+01	1124100E+02	806609E+01	11127100E+02	8328283E+01	11127100E+02	8328283E+01	8328283E+01
11.50200E+02	7884943E+01	1113200E+02	777779E+01	1113600E+02	765666E+01	11139200E+02	751105E+01	11142200E+02	7340515E+01	11142200E+02	7340515E+01	7340515E+01
11.5200E+02	7133442E+01	11148200E+02	6874954E+01	11151300E+02	6527954E+01	1115300E+02	607151E+01	1115700E+02	5419551E+01	1115700E+02	5419551E+01	5419551E+01
11.76400E+02	4447307E+01	11163300E+02	3318477E+01	11164300E+02	308201E+02	11169200E+02	250316E+02	1117400E+02	1469132E+02	1117400E+02	1469132E+02	1469132E+02
11.75000E+02	1250673E+01	1117400E+02	1126012E+02	1119100E+02	1040551E+02	1119400E+02	894407E+01	11187400E+02	9519336E+01	11187400E+02	9519336E+01	9519336E+01
11.90500E+02	9158833E+01	11193900E+02	8849640E+01	11196500E+02	8561721E+01	11198500E+02	828107E+01	11202500E+02	7976654E+01	11202500E+02	7976654E+01	7976654E+01
12.05500E+02	7698930E+01	1120800E+02	7375756E+01	11211900E+02	7004995E+01	11214600E+02	659440E+01	1123700E+02	6114531E+01	1123700E+02	6114531E+01	6114531E+01
12.20400E+02	5841128E+01	1123300E+02	4846198E+01	11226500E+02	4610928E+01	11226600E+02	309780E+01	1123700E+02	2710134E+01	1123700E+02	2710134E+01	2710134E+01
12.35700E+02	7025958E+01	1236700E+02	3094316E+02	1241700E+02	124700E+02	124700E+02	304613E+02	124700E+02	2395573E+02	124700E+02	2395573E+02	2395573E+02
12.50400E+02	2020399E+01	1253900E+02	1799335E+02	1256500E+02	1651637E+02	1256500E+02	154634E+02	1256500E+02	1467335E+02	1256500E+02	1467335E+02	1467335E+02
12.65900E+02	1405560E+02	1268900E+02	1355485E+02	1271900E+02	131202E+02	1274900E+02	127584E+02	1274900E+02	122676E+02	1274900E+02	122676E+02	122676E+02
12.80900E+02	1210823E+02	1283900E+02	1177789E+02	1286700E+02	1146005E+02	1289900E+02	115053E+02	1289900E+02	1186274E+02	1289900E+02	1186274E+02	1186274E+02
12.96000E+02	1186695E+02	1299000E+02	1117259E+02	1302000E+02	1146005E+02	1304000E+02	114845E+02	1304000E+02	1128132E+02	1304000E+02	1128132E+02	1128132E+02
13.11100E+02	1114587E+02	1314100E+02	1101674E+02	1332200E+02	1088461E+02	1321100E+02	107425E+02	1321100E+02	1057915E+02	1321100E+02	1057915E+02	1057915E+02
13.26100E+02	1037324E+02	1324100E+02	1009168E+02	1332200E+02	994131E+02	1335200E+02	115394E+02	1335200E+02	114853E+02	1335200E+02	114853E+02	114853E+02
13.4200E+02	1113106E+02	1344200E+02	108968E+02	1347200E+02	1070789E+02	1353300E+02	105487E+02	1353300E+02	1040537E+02	1353300E+02	1040537E+02	1040537E+02
13.56300E+02	1026275E+02	1359700E+02	1011521E+02	1362300E+02	996647E+01	1365300E+02	985517E+01	1365300E+02	9927939E+01	1365300E+02	9927939E+01	9927939E+01
13.71400E+02	1022316E+02	1374400E+02	9131845E+02	1377900E+02	1018622E+02	138400E+02	997362E+01	138400E+02	9727100E+01	138400E+02	9727100E+01	9727100E+01
13.86400E+02	9447304E+02	1389400E+02	9130535E+01	1392500E+02	980865E+01	139500E+02	875153E+01	139500E+02	117900E+02	139500E+02	117900E+02	117900E+02
14.01600E+02	9755729E+01	1404900E+02	1270268E+02	1407500E+02	1260465E+01	141600E+02	12144E+02	141600E+02	1197100E+02	141600E+02	1197100E+02	1197100E+02
14.1700E+02	1171805E+02	141900E+02	1150755E+02	1422900E+02	1132844E+02	1425600E+02	111707E+02	1425600E+02	1102615E+02	1425600E+02	1102615E+02	1102615E+02
14.31700E+02	148874E+02	1434700E+02	1074183E+02	1437700E+02	105848E+02	1446700E+02	104085E+02	1446700E+02	1017321E+02	1446700E+02	1017321E+02	1017321E+02
14.46700E+02	9930860E+01	1449700E+02	931719E+01	1452900E+02	1056759E+02	1455600E+02	122382E+02	1455600E+02	118381E+02	1455600E+02	118381E+02	118381E+02
14.61900E+02	1149639E+02	1464900E+02	1127196E+02	1467800E+02	1111325E+02	1479900E+02	109842E+02	1479900E+02	1089659E+02	1479900E+02	1089659E+02	1089659E+02
14.76900E+02	1080724E+02	1479900E+02	1073357E+02	1482700E+02	1066651E+02	1485900E+02	106039E+02	1485900E+02	1054431E+02	1485900E+02	1054431E+02	1054431E+02
14.92000E+02	1048448E+02	1495000E+02	1042726E+02	1498000E+02	1036975E+02	1501000E+02	103117E+02	1501000E+02	1025033E+02	1501000E+02	1025033E+02	1025033E+02
15.07000E+02	1018631E+02	1510100E+02	1011542E+02	1513100E+02	1009058E+02	1516100E+02	999749E+01	1516100E+02	9863357E+01	1516100E+02	9863357E+01	9863357E+01
15.22100E+02	9754318E+01	1525100E+02	962444E+01	1528100E+02	946757E+01	1531200E+02	926649E+01	1531200E+02	9019294E+01	1531200E+02	9019294E+01	9019294E+01
15.37200E+02	8739608E+01	1539200E+02	8592322E+01	1543000E+02	733207E+01	1546200E+02	7113367E+02	1546200E+02	1219765E+02	1546200E+02	1219765E+02	1219765E+02
15.52300E+02	1601933E+02	1555300E+02	1169354E+02	1558300E+02	1141169E+02	1561300E+02	110462E+02	1561300E+02	1039221E+02	1561300E+02	1039221E+02	1039221E+02
15.67300E+02	1084162E+02	1570400E+02	1099780E+02	1573900E+02	1059495E+02	1574400E+02	101462E+02	1574400E+02	1032287E+02	1574400E+02	1032287E+02	1032287E+02
15.82400E+02	9119431E+02	1585900E+02	1005479E+02	1589400E+02	9896783E+01	1591500E+02	970250E+01	1591500E+02	9466834E+01	1591500E+02	9466834E+01	9466834E+01
15.97500E+02	9154754E+01	1600500E+02	8714536E+01	1603900E+02	8067239E+01	1606500E+02	796220E+01	1606500E+02	1039372E+02	1606500E+02	1039372E+02	1039372E+02
16.12600E+02	1491140E+02	1615600E+02	1374350E+02	1618800E+02	1027606E+02	1621900E+02	1219542E+02	1621900E+02	1180174E+02	1621900E+02	1180174E+02	1180174E+02
16.27600E+02	1151490E+02	1630700E+02	1128287E+02	1633700E+02	1109495E+02	163700E+02	109794E+02	163700E+02	1077099E+02	163700E+02	1077099E+02	1077099E+02
16.42700E+02	106174E+02	1645700E+02	1045357E+02	1648700E+02	1027957E+02	1651800E+02	100794E+02	1651800E+02	9843997E+01	1651800E+02	9843997E+01	9843997E+01
16.57400E+02	9946688E+01	1659900E+02	9522888E+01	1663900E+02	9777733E+01	1666800E+02	107199E+02	1666800E+02	1187896E+02	1666800E+02	1187896E+02	1187896E+02
16.72900E+02	1255385E+02	1675900E+02	1227336E+02	1678900E+02	1215151E+02	1681900E+02	120064E+02	1681900E+02	1187246E+02	1681900E+02	1187246E+02	1187246E+02
16.87900E+02	2186697E+01	169100E+02	1155929E+02	169400E+02	1156775E+02	169700E+02	1149419E+02	169700E+02	1125638E+02	169700E+02	1125638E+02	1125638E+02
17.0300E+02	2669115E+01	170300E+02	2267915E+01	170600E+02	235529E+02	170900E+02	244997E+01	170900E+02	256358E+02	170900E+02	256358E+02	256358E+02
17.1800E+02	3461310E+01	1718100E+02	2793105E+01	172100E+02	2930427E+01	172400E+02	308374E+01	172400E+02	3256738E+01	172400E+02	3256738E+01	3256738E+01
17.3300E+02	5322748E+01	1733200E+02	364127E+01	173600E+02	3962575E+01	173900E+02	429019E+01	173900E+02	4697378E+01	173900E+02	4697378E+01	4697378E+01
17.4800E+02	1057603E+02	1748200E+02	5934570E+01	1751300E+02	7008964E+01	1754300E+02	867655E+01	1754300E+02	1127108E+02	1754300E+02	1127108E+02	1127108E+02
17.6300E+02	1167300E+02	1763300E+02	1226704E+03	1766300E+02	1226704E+03	1769300E+02	5745571E+02	1769300E+02	1791411E+02	1769300E+02	1791411E+02	1791411E+02
17.7800E+02	10073458E+02	1778400E+02	7696932E+01	1781400E+02	6972994E+01	1784400E+02	689320E+01	1784400E+02	7146106E+01	1784400E+02	7146106E+01	7146106E+01

1190500E+02 7638186E+01 1193500E+02 8300437E+01 1196500E+02 91488325E+01 1199500E+02 1020712E+02 1203500E+02 1156262E+02
1205500E+02 1318480E+02 1208500E+02 1530367E+02 1211900E+02 101703E+02 1214900E+02 1217500E+02 1232700E+02 2719237E+02
1220600E+02 3487517E+02 1223600E+02 4681695E+02 1226500E+02 6694188E+02 1229900E+02 1048236E+03 1232700E+02 1919285E+02
1235700E+02 4095016E+02 1238700E+02 7745977E+02 1241100E+02 4483314E+03 1244700E+02 1804602E+03 1247700E+02 6476550E+02
1250800E+02 4534960E+02 1253800E+02 7649177E+02 1256900E+02 1284301E+02 1259800E+02 1225020E+02 1262800E+02 681761E+01
1258400E+02 6657210E+01 1268800E+02 5931656E+01 1271900E+02 4552920E+02 1274900E+02 4333888E+01 1277900E+02 6691551E+01
1260900E+02 5933650E+01 1283900E+02 8930335E+01 1286700E+02 1546677E+02 1289900E+02 2127910E+02 1293000E+02 1204080E+02
1266000E+02 4800659E+01 1299000E+02 2011403E+01 1302000E+02 9106641E+00 1305900E+02 8642930E+02 1308000E+02 3213080E+02
1311100E+02 3579012E+00 1314100E+02 5303104E+00 1317100E+02 8447663E+00 1320100E+02 1358251E+01 1323100E+02 2224644E+01
1326100E+02 3875306E+01 1329100E+02 7801944E+01 1332200E+02 2030440E+02 1335200E+02 1973650E+02 1338200E+02 4742754E+01
1334200E+02 134200E+02 1347200E+02 1403765E+01 1352200E+02 1751003E+01 1355200E+02 2527211E+01 1357300E+02 3695393E+01
1353300E+02 137400E+02 137400E+02 826685E+01 1382200E+02 137791E+02 1380400E+02 2110519E+02 1383400E+02 3139946E+02
136400E+02 3279865E+02 137400E+02 250880E+02 138400E+02 3838535E+02 1392200E+02 6298367E+02 1395500E+02 1077375E+03 1987280E+02
1384400E+02 2511860E+02 138400E+02 1082040E+03 1407500E+02 1422900E+02 9498478E+01 141600E+02 3879640E+02 1401500E+02 165653E+03
1394500E+02 160832E+03 1415600E+02 1415600E+02 1422900E+02 9498478E+01 141600E+02 3879640E+02 1413600E+02 2550241E+02
1416600E+02 177813E+02 1415600E+02 1290590E+02 1422900E+02 9498478E+01 141600E+02 3879640E+02 1413600E+02 2550241E+02
1431700E+02 4952340E+01 1434700E+02 435430E+01 143700E+02 4195966E+01 1440700E+02 4679841E+01 1443700E+02 6479214E+01
1446700E+02 1197695E+02 144700E+02 3186009E+02 1452600E+02 8680930E+02 1455800E+02 440406E+02 1458800E+02 1755177E+02
1461800E+02 9150821E+01 1464800E+02 5639522E+01 1467900E+02 8680930E+02 1470900E+02 2736012E+01 1473900E+02 7054359E+01
147900E+02 1584504E+01 1479900E+02 1247692E+01 1482700E+02 1001126E+01 1485900E+02 8202299E+00 1488900E+02 6903204E+00
149200E+02 6014202E+00 149500E+02 5543822E+01 1498000E+02 544828E+00 1501000E+02 5748653E+00 1504000E+02 6493108E+00
1507000E+02 7770991E+00 1510100E+02 9803543E+00 1513100E+02 1269101E+01 1516100E+02 1683907E+01 1519100E+02 8282270E+01
1522100E+02 3159700E+01 1525100E+02 4483614E+01 1528100E+02 6564872E+01 1531200E+02 1017393E+02 1534200E+02 1647142E+02
1537200E+02 2870709E+02 1540200E+02 5368087E+02 1543200E+02 9416277E+02 1546200E+02 1022491E+03 1549200E+02 6476817E+02
1552300E+02 3606874E+02 1555300E+02 2186084E+02 1558300E+02 1431392E+02 1561300E+02 9957586E+01 1564300E+02 7254335E+01
1562400E+02 5477652E+01 1565400E+02 2045101E+01 1568300E+02 2146752E+01 1571300E+02 2784797E+01 1574300E+02 3377585E+01
157500E+02 2131601E+01 158400E+02 8804531E+01 1600500E+02 3051260E+02 1618000E+02 1561548E+02 1621600E+02 9555953E+01
1597500E+02 5069089E+01 1605000E+02 1615600E+02 1618000E+02 1561548E+02 1621600E+02 9555953E+01 1624600E+02 560878E+01
1612600E+02 764543E+02 1615600E+02 3051260E+02 1618000E+02 1561548E+02 1621600E+02 9555953E+01 1624600E+02 560878E+01
1627600E+02 5020844E+01 1630700E+02 4128307E+01 1633700E+02 3720403E+01 1636700E+02 3659705E+01 1639700E+02 3933625E+01
1642700E+02 4602017E+01 1645700E+02 5812301E+01 1648700E+02 7055272E+01 1651800E+02 1141820E+02 1654800E+02 1737131E+02
1657400E+02 2783519E+02 1660600E+02 4608042E+02 1663500E+02 7327477E+02 1666800E+02 9461375E+02 1669800E+02 8735459E+02
1672900E+02 6394305E+02 1675900E+02 4502150E+02 1678700E+02 3251275E+02 1681900E+02 2445367E+02 1684900E+02 1911069E+02
1687900E+02 1542502E+02 1691000E+02 1076873E+02 1697000E+02 9286612E+01 1700000E+02 9123416E+01

ELEMENT = 235 U

DATE = 10/30/73

RUNNO =

ITERATION = 1

RUNNING TIME FOR PROBLEM = .220922E+01

XXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF MOCK U235 DATA
 ELEMENT 235 U DATE 10/30/73 RUN NUMBER TIME 10.51.29

SCATTER FISSION		IF1	ITAE	LLY	NN	NI	NFCMS	ITMAX	MAXEN	NGROUP	KM	NPS
			CARDS	0	6	3	2	1	200	1	19	5
AM	TEMP	CRFN	ERROR	DIST	DELTA G	DELTA E	DELTA L					
235.0000	.1000	8.9444	1.0000	245.0000	0.0000	.0100	-0.0000					
THICK	YMAX	YMIN	ESPA	A02	B02	C02						
-0.	.1000E+04	.1000E+01	.0000E+01	0.	0.	.1129E-05	.5875E-02	.1000E-02	.1000E+01			

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND G VALUES OF SPIN GROUPS 1- 1
 GROUP L VALUE G VALUE BOUND CD
 1 0 1.000 -0.000

PKEH	GGA	GSI 1	GSI 2	GSI 3	1 2 3 4 5 GROUP
11.6700	38.0000	.748000E-01	3.83107	.100000E-05	0 0 0 1 0 1
12.3900	45.0000	.207200	6.51179	16.6144	0 0 0 1 1 1
12.9000	43.0000	.484000E-02	-3.71800	33.2783	0 0 0 1 1 1
13.3400	40.0000	.896000E-02	1.67450	7.62486	0 0 0 1 1 1
13.7000	40.0000	.836000E-02	27.1835	36.2541	0 0 0 1 1 1
14.0000	40.0000	.448000E-01	-10.3620	61.6331	0 0 0 1 1 1
14.5300	29.0000	.149000E-01	-20.7070	1.51037	0 0 0 1 1 1
15.4500	55.0000	.358400E-01	15.7415	29.2673	0 0 0 1 1 1
16.1000	40.0000	.404800E-01	-1.11133	16.3694	0 0 0 1 1 1
16.6700	64.0000	.380800E-01	-35.0618	38.9932	0 0 0 1 1 1

DATA READ IN OR GENERATED FROM .1100E+02 TO .1700E+02

XDIV = .100000E+01 IM = 1
 WTD

RES ENERGY TOTAL WIDTH
 .116700E+04 .200865E-01
 .123900E+02 .688555E-01
 .129000E+02 .799637E-01
 .133400E+02 .493341E-01
 .137000E+02 .103449E+00
 .140000E+02 .112163E+00
 .145300E+02 .512744E-01
 .154500E+02 .100159E+00
 .161000E+02 .586430E-01

ECS USED = 15983

.347 SECONDS IN PHMAIN INCLUDING .244 SECONDS IN PANSW WITH NGRAD= 1 AND MAXEN= 313

PREN	DIAG	GGA	DIAP	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	NIAG	IELIM	GROUP	THETA
11.57	0.	38.00 0.		748000E-01 0.		2.8310	-106E-04	-0000 0.		0 0 1 0	1	0.00
12.30	0.	45.00 0.		287200 0.		6.5118	-107E-04	16.6144	100F-09	0 0 1 1	1	57.92
12.30	0.	45.00 0.		48000E-02 0.		3.7180	186E-08	33.2283	141F-08	0 0 1 1	1	109.47
13.34	0.	48.00 0.		89600E-02 0.		1.6745	392E-08	7.6269	429F-08	0 0 1 1	1	64.86
13.70	0.	48.00 0.		83600E-02 0.		27.1835	684E-07	36.2541	779F-07	0 0 1 1	1	49.08
14.00	0.	48.00 0.		44800E-01 0.		-10.3620	244E-08	61.6331	-222E-08	0 0 1 1	1	112.27
14.53	0.	25.00 0.		149600E-01 0.		-20.7070	343E-08	1.5104	150E-08	0 0 1 1	1	164.86
15.45	0.	55.00 0.		358400E-01 0.		15.7415	551E-08	29.2673	246F-08	0 0 1 1	1	51.72
16.10	0.	48.00 0.		04800E-01 0.		-1.1111	473E-08	16.3694	344E-08	0 0 1 1	1	94.68
16.57	0.	68.00 0.		368800E-01 0.		-35.0618	165E-08	34.9932	774F-07	0 0 1 1	1	131.45
11.0000E+02	8518203E-01	1103000E+02	8476059E-01	1106000E+02	8843080E+01	11109000E+02	8382448E+01	1112100E+02	8328834E+01	1112100E+02	8328834E+01	1112100E+02
11.1500E+02	8271236E+01	1118100E+02	8209070E-01	1121100E+02	8140874E+01	1124100E+02	8065546E+01	1127100E+02	7981764E+01	1127100E+02	7981764E+01	1127100E+02
11.30200E+02	7884339E+01	1113320E+02	7777128E+01	1136200E+02	7653933E+01	1139200E+02	7510248E+01	1142200E+02	7339609E+01	1142200E+02	7339609E+01	1142200E+02
11.52200E+02	7132412E+01	1118200E+02	6873756E+01	1151400E+02	6526302E+01	1154300E+02	6069865E+01	1157300E+02	5816053E+01	1157300E+02	5816053E+01	1157300E+02
11.60300E+02	4425093E+01	1163300E+02	3308105E+01	1166400E+02	1090588E+02	1169300E+02	2036379E+02	1172400E+02	1490039E+02	1172400E+02	1490039E+02	1172400E+02
11.70500E+02	9188000E+01	1174400E+02	1126106E+02	1181400E+02	8608627E+02	1184400E+02	9940757E+02	1187400E+02	9519404E+02	1187400E+02	9519404E+02	1187400E+02
12.05500E+02	7968866E+01	1208900E+02	7374132E+01	1211900E+02	7002741E+01	1214600E+02	6591745E+01	1217600E+02	611142E+01	1217600E+02	611142E+01	1217600E+02
12.08600E+02	5537114E+01	1223600E+02	4841313E+01	1226600E+02	4003891E+01	1229400E+02	3089007E+01	1232700E+02	2701883E+01	1232700E+02	2701883E+01	1232700E+02
12.35700E+02	7041287E+01	1238700E+02	3103880E+02	1241700E+02	4060961E+02	1244700E+02	3045937E+02	1247700E+02	2395328E+02	1247700E+02	2395328E+02	1247700E+02
12.50400E+02	2020770E+02	1253800E+02	1799803E+02	1256400E+02	1552157E+02	1259800E+02	1566888E+02	1262800E+02	1467921E+02	1262800E+02	1467921E+02	1262800E+02
12.65800E+02	1476193E+02	1268000E+02	1356156E+02	1271700E+02	1312940E+02	1274900E+02	1276675E+02	1277900E+02	1743721E+02	1277900E+02	1743721E+02	1277900E+02
12.80900E+02	1211993E+02	1283900E+02	1179184E+02	1286600E+02	1157648E+02	1289900E+02	1153429E+02	1293000E+02	1191796E+02	1293000E+02	1191796E+02	1293000E+02
12.86000E+02	1188394E+02	1289700E+02	1172884E+02	1302600E+02	1156955E+02	1305000E+02	1142143E+02	1308000E+02	1128179E+02	1308000E+02	1128179E+02	1308000E+02
13.11100E+02	1037370E+02	1314100E+02	1101687E+02	1317100E+02	1088641E+02	1320100E+02	1074421E+02	1323100E+02	1058050E+02	1323100E+02	1058050E+02	1323100E+02
13.26100E+02	1087370E+02	1329100E+02	1008911E+02	1332400E+02	9930437E+01	1335200E+02	1156297E+02	1338200E+02	1149394E+02	1338200E+02	1149394E+02	1338200E+02
13.31200E+02	1113566E+02	1344200E+02	1099384E+02	1347400E+02	1072120E+02	1350300E+02	105291E+02	1353300E+02	104927E+02	1353300E+02	104927E+02	1353300E+02
13.36300E+02	1026535E+02	1359300E+02	1011904E+02	1362400E+02	9955446E+01	1365300E+02	9828062E+01	1368300E+02	9025773E+01	1368300E+02	9025773E+01	1368300E+02
13.71400E+02	1028792E+02	1374400E+02	1038198E+02	1377400E+02	1021303E+02	1380400E+02	999001E+01	1383400E+02	9722849E+01	1383400E+02	9722849E+01	1383400E+02
13.86400E+02	9435724E+01	1389400E+02	9112915E+01	1392500E+02	8779736E+01	1395500E+02	8717906E+01	1401500E+02	1179782E+02	1401500E+02	1179782E+02	1401500E+02
13.98500E+02	9733131E+01	1404500E+02	1217136E+02	1407500E+02	1261045E+02	1410600E+02	1227726E+02	1413600E+02	1197288E+02	1413600E+02	1197288E+02	1413600E+02
14.16000E+02	1171833E+02	1419600E+02	1150792E+02	1422800E+02	1132853E+02	1425800E+02	1117047E+02	1428800E+02	1102590E+02	1428800E+02	1102590E+02	1428800E+02
14.31700E+02	1088236E+02	1434700E+02	1074132E+02	1437700E+02	1058816E+02	1440700E+02	1040747E+02	1443700E+02	1017118E+02	1443700E+02	1017118E+02	1443700E+02
14.46700E+02	9825321E+02	1449700E+02	9349405E+01	1452800E+02	1056825E+02	1455800E+02	1228778E+02	1458800E+02	1185413E+02	1458800E+02	1185413E+02	1458800E+02
14.61400E+02	1150311E+02	1464800E+02	1127547E+02	1467800E+02	1111534E+02	1470900E+02	1088975E+02	1473900E+02	1089149E+02	1473900E+02	1089149E+02	1473900E+02
14.76900E+02	1040787E+02	1479400E+02	1073402E+02	1482700E+02	1066632E+02	1484900E+02	1090416E+02	1488900E+02	1054445E+02	1488900E+02	1054445E+02	1488900E+02
14.92000E+02	1048454E+02	149500E+02	1073402E+02	1498000E+02	1030977E+02	1501000E+02	1031111E+02	1504000E+02	1025030E+02	1504000E+02	1025030E+02	1504000E+02
15.07000E+02	1018628E+02	1510100E+02	1011538E+02	1513100E+02	100954E+02	1516100E+02	9957444E+01	1519100E+02	986315E+01	1519100E+02	986315E+01	1519100E+02
15.22100E+02	873444E+01	1525100E+02	8625004E+01	1528100E+02	9426765E+01	1531200E+02	9264816E+01	1534200E+02	9019307E+01	1534200E+02	9019307E+01	1534200E+02
15.37300E+02	8738899E+01	1540200E+02	8599889E+01	1543400E+02	9368739E+01	1546400E+02	1134379E+02	1549200E+02	1221087E+02	1549200E+02	1221087E+02	1549200E+02
15.52300E+02	10282759E+02	1555300E+02	1169850E+02	1558300E+02	114183E+02	1561300E+02	1118664E+02	1564300E+02	110068E+02	1564300E+02	110068E+02	1564300E+02
15.67300E+02	1084267E+02	1570400E+02	1099556E+02	1573400E+02	1057101E+02	1576400E+02	104644E+02	1579400E+02	1032311E+02	1579400E+02	1032311E+02	1579400E+02
15.82400E+02	915485E+01	1585400E+02	100584E+02	1588500E+02	9996746E+01	1591300E+02	9702414E+01	1594300E+02	9466737E+01	1594300E+02	9466737E+01	1594300E+02
16.12600E+02	1486933E+02	1600500E+02	8715201E+01	1603300E+02	8070485E+01	1606300E+02	7376035E+02	1609300E+02	1038712E+02	1609300E+02	1038712E+02	1609300E+02
16.27600E+02	1131477E+02	1630700E+02	1373203E+02	1618900E+02	1278240E+02	1621600E+02	1219246E+02	1624600E+02	1180125E+02	1624600E+02	1180125E+02	1624600E+02
16.42700E+02	1081422E+02	1645700E+02	1105246E+02	1648700E+02	1027743E+02	1651800E+02	1007524E+02	1654800E+02	9856163E+01	1654800E+02	9856163E+01	1654800E+02
16.57700E+02	9631971E+01	1660800E+02	9497600E+01	1663900E+02	9749943E+01	1666800E+02	1072816E+02	1669800E+02	1183342E+02	1669800E+02	1183342E+02	1669800E+02
16.72900E+02	1230114E+02	1675900E+02	1123093E+02	1678900E+02	1121717E+02	1681900E+02	1201942E+02	1684900E+02	1148142E+02	1684900E+02	1148142E+02	1684900E+02
16.87900E+02	1176228E+02	1691000E+02	1103769E+02	1694000E+02	1157142E+02	1697000E+02	1149710E+02	1700000E+02	1143329E+02	1700000E+02	1143329E+02	1700000E+02
17.02900E+02	221524E+01	1703000E+02	2837600E+01	1706000E+02	2386403E+01	1709000E+02	2482230E+01	1712100E+02	259014E+01	1712100E+02	259014E+01	1712100E+02
17.17900E+02	2704432E+01	1718100E+02	2730090E+01	1721100E+02	2969217E+01	1724100E+02	3124529E+01	1727100E+02	3299018E+01	1727100E+02	3299018E+01	1727100E+02
17.32900E+02	3066502E+01	1733200E+02	3738838E+01	1736300E+02	4012714E+01	1739200E+02	4342881E+01	1742200E+02	4752612E+01	1742200E+02	4752612E+01	1742200E+02
17.47900E+02	5279568E+01	1748200E+02	5941817E+01	1751300E+02	7661910E+01	1754300E+02	8715381E+01	1757300E+02	1171729E+02	1757300E+02	1171729E+02	1757300E+02
17.62900E+02	1842785E+02	1763300E+02	3950268E+02	1766400E+02	1191318E+03	1769300E+02	5466453E+02	1772400E+02	1685302E+02	1772400E+02	1685302E+02	1772400E+02
17.77900E+02	9442570E+02	1778400E+02	7324591E+01	1781400E+02	6703000E+01	1784400E+02	6863628E+01	1787400E+02	6975036E+01	1787400E+02	6975036E+01	1787400E+02

ELEMENT = 235 U DATE = 10/30/73 SCATTER CROSS SECTION VS ENERGY RUNNO = ITERATION = Q

1.00	100.90	200.80	300.70	400.60	500.50	600.40	700.30	800.20	900.10	1000.00
11.11. T										
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16.89. T										
17.00. T										

140

STARTING PHI .208055E+05 PSEARCH METHOD ITERATION 1

.084 SECONDS IN PHIMAIN INCLUDING	.074 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.083 SECONDS IN PHIMAIN INCLUDING	.073 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.082 SECONDS IN PHIMAIN INCLUDING	.072 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313

MAGNITUDE OF GRADIENT .219418E+06

STARTING PHI	.208055E+05	FINAL PHI	.187052E+05	DIAG. WEIGHTS	.107292E+06	COS(THETA)	.303859E+00	NSAV	2
ETA	.100000E+01								

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

PKFN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELIM	GROUP	THETA
11.67	0.	38.00	0.	788000E-01	0.	3.9978	.106E+09	.0000	0.	0 0 1 0	1	0.00
12.39	0.	45.00	0.	.207200	0.	.1593	.106E+09	17.0696	.100F+09	0 0 1 1	58.98	1
12.90	0.	43.00	0.	.484000E-02	0.	.15547	.106E+08	34.3741	.141F+08	0 0 1 1	109.84	1
13.34	0.	40.00	0.	.896000E-02	0.	1.8391	.392E+08	8.1474	.429F+08	0 0 1 1	64.56	1
13.70	0.	40.00	0.	.836000E-02	0.	34.2525	.664E+07	42.8114	.779E+07	0 0 1 1	48.16	1
14.00	0.	40.00	0.	.448000E-01	0.	-15.5106	.244E+08	57.4422	.222E+08	0 0 1 1	117.43	1
14.53	0.	29.00	0.	.149600E-01	0.	-25.6928	.393E+08	31.4402	.246F+08	0 0 1 1	168.88	1
15.45	0.	55.00	0.	.358400E-01	0.	15.9049	.551E+08	15.7472	.434F+08	0 0 1 1	97.77	1
16.10	0.	64.00	0.	.404800E-01	0.	-2956	.473E+08	35.9993	.774F+07	0 0 1 1	134.83	1
16.67	0.	64.00	0.	.380800E-01	0.	-41.0028	.165E+08	11.0900E-02	.838281E+01	1112100E-02	708264E-01	1
11.1000E-02	0.	11.1000E-02	0.	.847640E-01	0.	.110600E-02	.843121E+01	.110900E-02	.838281E+01	1112100E-02	708264E-01	1
11.15100E-02	0.	11.15100E-02	0.	.820952E-01	0.	.1121100E-02	.814136E+01	.1121100E-02	.838281E+01	1112100E-02	708264E-01	1
11.130200E-02	0.	11.130200E-02	0.	.777497E-01	0.	.1136200E-02	.765466E+01	.1136200E-02	.751105E+01	1114230E-02	7146.5E+01	1
11.15200E-02	0.	11.148200E-02	0.	.684495E-01	0.	.115100E-02	.652795E+01	.115100E-02	.607151E+01	1117300E-02	544185E+01	1
11.60300E-02	0.	11.63300E-02	0.	.331847E-01	0.	.116500E-02	.108701E+01	.116300E-02	.103164E+01	1117200E-02	544185E+01	1
11.7500E-02	0.	11.7800E-02	0.	.112601E-02	0.	.118100E-02	.104951E+01	.118100E-02	.994043E+01	1117400E-02	544185E+01	1
11.70500E-02	0.	11.73500E-02	0.	.884964E-01	0.	.1196500E-02	.856172E+01	.1196500E-02	.859404E+01	1117400E-02	544185E+01	1
12.05300E-02	0.	12.05300E-02	0.	.733575E-01	0.	.121100E-02	.700499E+01	.121100E-02	.659444E+01	11217600E-02	611158E+01	1
12.20400E-02	0.	12.23900E-02	0.	.484679E-01	0.	.122600E-02	.401092E+01	.122600E-02	.304740E+01	1123700E-02	611158E+01	1
12.35700E-02	0.	12.38700E-02	0.	.309431E-02	0.	.124100E-02	.605983E+01	.124100E-02	.304145E+01	1124700E-02	611158E+01	1
12.50800E-02	0.	12.53900E-02	0.	.179335E-02	0.	.126600E-02	.156163E+01	.126600E-02	.125480E+01	1126800E-02	611158E+01	1
12.5800E-02	0.	12.6800E-02	0.	.155845E-02	0.	.127100E-02	.131207E+01	.127100E-02	.127584E+01	1127900E-02	611158E+01	1
12.9800E-02	0.	12.9400E-02	0.	.117789E-02	0.	.128600E-02	.114600E+01	.128600E-02	.114530E+01	1129300E-02	611158E+01	1
12.96600E-02	0.	12.99400E-02	0.	.117205E-02	0.	.130200E-02	.115684E+01	.130200E-02	.115418E+01	1130400E-02	611158E+01	1
13.1100E-02	0.	13.14100E-02	0.	.110167E-02	0.	.131700E-02	.108461E+01	.131700E-02	.107425E+01	11323100E-02	611158E+01	1
13.26100E-02	0.	13.27100E-02	0.	.100916E-02	0.	.1332200E-02	.994131E+01	.1332200E-02	.107425E+01	1133200E-02	611158E+01	1
13.41200E-02	0.	13.42100E-02	0.	.108968E-02	0.	.1347200E-02	.107078E+01	.1347200E-02	.105684E+01	1135300E-02	611158E+01	1
13.56300E-02	0.	13.59300E-02	0.	.101152E-02	0.	.136200E-02	.996847E+01	.136200E-02	.985734E+01	1136300E-02	611158E+01	1
13.71400E-02	0.	13.74400E-02	0.	.103104E-02	0.	.137700E-02	.101842E+01	.137700E-02	.975132E+01	1138300E-02	611158E+01	1
13.86400E-02	0.	13.89400E-02	0.	.913036E-01	0.	.1392200E-02	.880586E+01	.1392200E-02	.875153E+01	11401500E-02	611158E+01	1
13.98400E-02	0.	14.01400E-02	0.	.127026E-02	0.	.1407200E-02	.116500E+01	.1407200E-02	.117170E+01	11413600E-02	611158E+01	1
14.16800E-02	0.	14.19800E-02	0.	.115075E-02	0.	.1422200E-02	.113284E+01	.1422200E-02	.111707E+01	11428600E-02	611158E+01	1
14.31700E-02	0.	14.34700E-02	0.	.107483E-02	0.	.1437200E-02	.105888E+01	.1437200E-02	.104083E+01	11443700E-02	611158E+01	1
14.46700E-02	0.	14.49700E-02	0.	.931179E-01	0.	.1452900E-02	.105675E+01	.1452900E-02	.103822E+01	11458800E-02	611158E+01	1
14.61600E-02	0.	14.64600E-02	0.	.112719E-02	0.	.1467900E-02	.111132E+01	.1467900E-02	.107988E+01	11473900E-02	611158E+01	1
14.76900E-02	0.	14.79900E-02	0.	.107335E-02	0.	.1482700E-02	.106651E+01	.1482700E-02	.106394E+01	1148900E-02	611158E+01	1
14.9200E-02	0.	14.9500E-02	0.	.104212E-02	0.	.149800E-02	.103678E+01	.149800E-02	.103111E+01	1150400E-02	611158E+01	1
15.0700E-02	0.	15.1000E-02	0.	.101152E-02	0.	.151300E-02	.100498E+01	.151300E-02	.995749E+01	11519100E-02	611158E+01	1
15.22100E-02	0.	15.25100E-02	0.	.862494E-01	0.	.1528100E-02	.946737E+01	.1528100E-02	.926469E+01	11534200E-02	611158E+01	1
15.37200E-02	0.	15.40200E-02	0.	.859232E-01	0.	.154300E-02	.932618E+01	.154300E-02	.913334E+01	11549200E-02	611158E+01	1
15.52300E-02	0.	15.55300E-02	0.	.110935E-02	0.	.155800E-02	.114169E+01	.155800E-02	.111844E+01	11564300E-02	611158E+01	1
15.67400E-02	0.	15.70400E-02	0.	.106780E-02	0.	.157300E-02	.105695E+01	.157300E-02	.104402E+01	11579400E-02	611158E+01	1
15.82500E-02	0.	15.85500E-02	0.	.100547E-02	0.	.158800E-02	.989678E+01	.158800E-02	.970250E+01	11594500E-02	611158E+01	1
15.97600E-02	0.	16.00600E-02	0.	.871435E-01	0.	.1603300E-02	.866723E+01	.1603300E-02	.848200E+01	11609500E-02	611158E+01	1
16.12600E-02	0.	16.15600E-02	0.	.134350E-02	0.	.1618900E-02	.127840E+01	.1618900E-02	.121954E+01	11624600E-02	611158E+01	1
16.27600E-02	0.	16.30700E-02	0.	.112828E-02	0.	.1633700E-02	.104949E+01	.1633700E-02	.102734E+01	11639700E-02	611158E+01	1
16.42600E-02	0.	16.45700E-02	0.	.104357E-02	0.	.1648700E-02	.102795E+01	.1648700E-02	.101793E+01	11654800E-02	611158E+01	1
16.57700E-02	0.	16.60800E-02	0.	.952208E-01	0.	.1663900E-02	.977734E+01	.1663900E-02	.958600E+01	11669900E-02	611158E+01	1
16.72700E-02	0.	16.75800E-02	0.	.122736E-02	0.	.1678700E-02	.121515E+01	.1678700E-02	.120004E+01	1168500E-02	611158E+01	1
16.87700E-02	0.	16.90800E-02	0.	.116592E-02	0.	.169400E-02	.115677E+01	.169400E-02	.114941E+01	1170000E-02	611158E+01	1
17.02700E-02	0.	17.05800E-02	0.	.226716E-01	0.	.1709300E-02	.235503E+01	.1709300E-02	.244993E+01	11715100E-02	611158E+01	1
17.17700E-02	0.	17.20800E-02	0.	.275310E-01	0.	.1724600E-02	.293042E+01	.1724600E-02	.308374E+01	1173020E-02	611158E+01	1
17.32700E-02	0.	17.35800E-02	0.	.369122E-01	0.	.1739900E-02	.396257E+01	.1739900E-02	.429019E+01	1174530E-02	611158E+01	1
17.47700E-02	0.	17.50800E-02	0.	.593429E-01	0.	.1755200E-02	.708965E+01	.1755200E-02	.867655E+01	1176040E-02	611158E+01	1
17.62700E-02	0.	17.65800E-02	0.	.115100E-02	0.	.1770500E-02	.115300E+01	.1770500E-02	.114240E+01	1177550E-02	611158E+01	1
17.77700E-02	0.	17.80800E-02	0.	.402290E-02	0.	.1785800E-02	.122673E+01	.1785800E-02	.121954E+01	1179060E-02	611158E+01	1
17.92700E-02	0.	17.95800E-02	0.	.764633E-01	0.	.1801100E-02	.697360E+01	.1801100E-02	.669393E+01	1180570E-02	611158E+01	1

1196500E+02 7630188E+01 1123500E+02 8300940E+01 1196500E+02 9148528E+01 1196500E+02 1020712E+02 1205500E+02 1152630E+02
1205500E+02 1316481E+02 1204500E+02 1530387E+02 1211600E+02 1817905E+02 1226000E+02 2194058E+02 1217600E+02 2719237E+02
1220600E+02 3487517E+02 1223600E+02 4681696E+02 1229000E+02 6694189E+02 1229000E+02 1048236E+03 1232700E+02 1919286E+03
1235700E+02 4095017E+03 1239700E+02 745777E+03 1241000E+02 8483514E+03 1247000E+02 1804602E+03 1247700E+02 8475649E+02
1250400E+02 4534988E+02 1253600E+02 274577E+02 1256000E+02 5316544E+01 1271900E+02 1259800E+02 1225019E+02 1262800E+02 8817688E+01
1258000E+02 6657708E+01 1268800E+02 8930337E+01 1271900E+02 5316544E+01 1274900E+02 1279000E+02 1277900E+02 6691552E+01
1280900E+02 5933651E+01 1283900E+02 8930337E+01 1283900E+02 1546477E+02 1289000E+02 3127810E+02 1293000E+02 1200489E+02
1286000E+02 4800660E+01 1299000E+02 2011403E+01 1302000E+02 9106641E+00 1305000E+02 6645931E+00 1308000E+02 3213079E+00
1311100E+02 3579012E+00 1319100E+02 5303105E+00 1317100E+02 8447688E+00 1320100E+02 1358245E+01 1323100E+02 2224645E+01
1326100E+02 3875361E+01 1329100E+02 7801745E+01 1331200E+02 1403763E+01 1334200E+02 1973650E+02 1338200E+02 4742753E+01
1341200E+02 1785305E+01 1344200E+02 5468960E+01 1357300E+02 8286895E+01 1362300E+02 1751004E+01 1363300E+02 3695194E+01
1356300E+02 5468960E+01 1357300E+02 8286895E+01 1362300E+02 1751004E+01 1363300E+02 3695194E+01 1363300E+02 3139048E+02
1371400E+02 3279866E+02 1374400E+02 2450879E+02 1377400E+02 1877791E+02 1384400E+02 1752188E+02 1383400E+02 1987781E+02
1386400E+02 2611860E+02 1389400E+02 3838537E+02 1392500E+02 6298769E+02 1395500E+02 1077375E+03 1401500E+02 1658533E+03
1398500E+02 1660831E+03 1404500E+02 1082049E+03 1407500E+02 5384321E+02 1416000E+02 3878841E+02 1413000E+02 255642E+02
1416600E+02 1777814E+02 1419600E+02 1296555E+02 1422600E+02 3698479E+01 1425600E+02 4679879E+01 1428600E+02 6001404E+01
1431700E+02 652338E+01 143700E+02 1443700E+02 1467900E+02 3830135E+01 1470900E+02 2738013E+01 1473900E+02 2054359E+01
1446700E+02 197679E+02 1449700E+02 5363624E+01 1467900E+02 3830135E+01 1470900E+02 2738013E+01 1473900E+02 2054359E+01
1461800E+02 9150829E+01 1464800E+02 5639624E+01 1467900E+02 3830135E+01 1470900E+02 2738013E+01 1473900E+02 2054359E+01
1476900E+02 1584505E+01 1479900E+02 1247692E+01 1482900E+02 8001129E+01 1485900E+02 6203296E+00 1488900E+02 6005701E+00
1492000E+02 5014200E+00 1495000E+02 5543920E+00 1498000E+02 1501000E+02 1501000E+02 5748653E+00 1504000E+02 6493107E+00
1507000E+02 7770983E+00 1510100E+02 980354E+00 1513100E+02 1267411E+01 1516100E+02 1683990E+01 1519100E+02 2282727E+01
1522100E+02 3159702E+01 1525100E+02 4483614E+01 1528100E+02 956476E+01 1531200E+02 1017394E+02 1534200E+02 1647143E+02
1537200E+02 2870715E+02 1540200E+02 5380808E+02 1543300E+02 1416229E+02 1544200E+02 1022491E+03 1549200E+02 6476617E+02
1552300E+02 260887E+02 1555300E+02 2186804E+02 1558300E+02 1431399E+02 1561300E+02 9957583E+01 1564300E+02 7254329E+01
1567300E+02 260887E+02 1570400E+02 4226799E+01 1573400E+02 3381290E+01 1574400E+02 2784795E+01 1579400E+02 3377580E+01
1582400E+02 2131600E+01 1585400E+02 2045100E+01 1588400E+02 2146753E+01 1591500E+02 563375E+01 1594500E+02 3361174E+01
1597500E+02 5069092E+01 1600500E+02 6804537E+01 1603500E+02 183902E+02 1606500E+02 4891379E+02 1609500E+02 1297893E+03
1612600E+02 7695443E+02 1615600E+02 3061259E+02 1618600E+02 1561541E+02 1621600E+02 9555847E+01 1624600E+02 6608778E+01
1627600E+02 5020859E+01 1630700E+02 4124302E+01 1633700E+02 3720600E+01 1636700E+02 3659703E+01 1639700E+02 3933624E+01
1642700E+02 4602019E+01 1643700E+02 5812300E+01 1646700E+02 7852737E+01 1651800E+02 1141821E+02 1654800E+02 1737140E+02
1657800E+02 2783522E+02 166000E+02 4608045E+02 1663000E+02 327477E+02 1664800E+02 9461373E+02 1669800E+02 8735460E+02
1672900E+02 6394311E+02 1675700E+02 4502156E+02 1678900E+02 3251280E+02 1681900E+02 2445371E+02 1684900E+02 1911066E+02
1687900E+02 1542505E+02 1691000E+02 127097E+02 1694000E+02 1079875E+02 1697000E+02 9286631E+01 1700000E+02 6123171E+01

ELEMENT = 235 U	DATE = 10/30/73	MUNNO =	ITERATION = 1
1.00	SCATTER CROSS SECTION VS ENERGY		
1.00	200.80 300.70 400.60 500.50 600.40 700.30 800.20 900.10 1000.00		
11.11	Y		
11.22	Y		
11.33	Y		
11.44	Y		
11.56	Y		
11.67	Y		
11.78	Y		
11.89	Y		
12.00	Y		
12.11	Y		
12.22	Y		
12.33	Y		
12.44	Y		
12.56	Y		
12.67	Y		
12.78	Y		
12.89	Y		
13.00	Y		
13.11	Y		
13.22	Y		
13.33	Y		
13.44	Y		
13.56	Y		
13.67	Y		
13.78	Y		
13.89	Y		
14.00	Y		
14.11	Y		
14.22	Y		
14.33	Y		
14.44	Y		
14.56	Y		
14.67	Y		
14.78	Y		
14.89	Y		
15.00	Y		
15.11	Y		
15.22	Y		
15.33	Y		
15.44	Y		
15.56	Y		
15.67	Y		
15.78	Y		
15.89	Y		
16.00	Y		
16.11	Y		
16.22	Y		
16.33	Y		
16.44	Y		
16.56	Y		
16.67	Y		
16.78	Y		
16.89	Y		
17.00	Y		

ELEMENT = 235 U	DATE = 10/30/73	RUNNO =	ITERATION = 1
FISSION CROSS SECTION VS ENERGY			
1.00	190.90	200.80	300.70
11.11	400.60	500.50	600.40
11.22	700.30	800.20	900.10
11.33	1000.00		
11.44			
11.56			
11.67			
11.78			
11.89			
12.00			
12.11			
12.22			
12.33			
12.44			
12.56			
12.67			
12.78			
12.89			
13.00			
13.11			
13.22			
13.33			
13.44			
13.56			
13.67			
13.78			
13.89			
14.00			
14.11			
14.22			
14.33			
14.44			
14.56			
14.67			
14.78			
14.89			
15.00			
15.11			
15.22			
15.33			
15.44			
15.56			
15.67			
15.78			
15.89			
16.00			
16.11			
16.22			
16.33			
16.44			
16.56			
16.67			
16.78			
16.89			
17.00			

SAME PROBLEM WITH DIFFERENT RESONANCE PARAMETERS

GROUP	L	VALUE	G	VALUE	BOUNDARY
1		0		1.000	-0.000
2		0		.560	-0.000
3		-0		-0.000	-0.000
4		-0		-0.000	-0.000
5		-0		-0.000	-0.000
6		-0		-0.000	-0.000
7		-0		-0.000	-0.000
8		-0		-0.000	-0.000
9		-0		-0.000	-0.000
10		-0		-0.000	-0.000

.350 SECONDS IN PHMAIN INCLUDING

.246 SECONDS IN PARSH WITH NGRAD= 1 AND MAXEN1= 313

ITERATION 0

PKFN	D1A0	GGA	D1A0	GSI(1)	D1A0	GSI(2)	D1A0	GSI(3)	D1A0	IELIM	GROUP	THETA
11.67	0.	38.00	0.	.748000E-01	0.	3.8310	.106E+09	.0000	0.	0 0 1 0	1	0.00
12.39	0.	45.00	0.	.207200	0.	6.5118	.107E+09	16.6144	.100F+09	0 0 1 1	1	57.92
12.90	0.	43.00	0.	.688000E-02	0.	-3.7180	.188E+08	31.2283	.141F+08	0 0 1 1	1	104.47
13.34	0.	40.00	0.	.896000E-02	0.	1.6745	.392E+08	7.6269	.729F+08	0 0 1 1	1	44.86
13.70	0.	40.00	0.	.936000E-02	0.	27.1835	.698E+07	36.2541	.775F+07	0 0 1 1	1	48.08
14.00	0.	40.00	0.	.448000E-01	0.	-10.1620	.244E+08	61.6331	.222F+08	0 0 1 1	1	112.27
14.53	0.	29.00	0.	.196000E-01	0.	-20.1070	.393E+08	15.5104	.150F+08	0 0 1 1	1	184.86
15.45	0.	55.00	0.	.358400E-01	0.	15.7415	.551E+08	29.2673	.246F+08	0 0 1 1	1	51.72
16.10	0.	40.00	0.	.408000E-01	0.	-2.1111	.473E+08	16.3694	.346F+08	0 0 1 1	1	94.68
16.67	0.	40.00	0.	.368000E-01	0.	-35.0018	.105E+08	38.9932	.774F+07	0 0 1 1	1	133.45
11.00000E+02	.851820E+01	.110300E+02	.847658E+01	.1106000E+02	.8430960E+01	.1109000E+02	.832448E+01	.1112100E+02	.8128234E+01	.112100E+02	.8128234E+01	
11.5100E+02	.8271230E+01	.111810E+02	.8209670E+01	.1121100E+02	.8140874E+01	.1124100E+02	.806554E+01	.1127100E+02	.7981764E+01	.1127100E+02	.7981764E+01	
11.30200E+02	.78164330E+01	.113320E+02	.7777128E+01	.1136200E+02	.7659333E+01	.1139200E+02	.751024E+01	.1142200E+02	.7339600E+01	.1142200E+02	.7339600E+01	
11.45200E+02	.7132412E+01	.114820E+02	.6873156E+01	.1153000E+02	.6529502E+01	.1156300E+02	.6283370E+01	.1157300E+02	.5.16951E+01	.1157300E+02	.5.16951E+01	
11.60300E+02	.6442898E+01	.1163300E+02	.6308705E+01	.1169000E+02	.609585E+01	.1174000E+02	.5840747E+01	.1174000E+02	.5519400E+01	.1174000E+02	.5519400E+01	
11.75400E+02	.5650983E+01	.1178400E+02	.5526164E+01	.1181000E+02	.5361270E+01	.1184000E+02	.5169500E+01	.1184000E+02	.4951900E+01	.1184000E+02	.4951900E+01	
11.90500E+02	.49158090E+01	.1193500E+02	.4849160E+01	.1194500E+02	.4650160E+01	.1197500E+02	.4459500E+01	.1197500E+02	.4268000E+01	.1197500E+02	.4268000E+01	
12.05500E+02	.42056826E+01	.1204500E+02	.40734132E+01	.1207500E+02	.3880391E+01	.1210500E+02	.3689715E+01	.1210500E+02	.3499175E+01	.1210500E+02	.3499175E+01	
12.20600E+02	.3537114E+01	.1215500E+02	.34041313E+01	.1218500E+02	.32003691E+01	.1221500E+02	.3009000E+01	.1221500E+02	.2818400E+01	.1221500E+02	.2818400E+01	
12.35700E+02	.2901267E+01	.1238700E+02	.2783640E+01	.1241700E+02	.2580961E+01	.1244700E+02	.2389961E+01	.1244700E+02	.2199431E+01	.1244700E+02	.2199431E+01	
12.50800E+02	.2020770E+01	.1253800E+02	.1949603E+01	.1256800E+02	.1852157E+01	.1259800E+02	.1754884E+01	.1259800E+02	.1657490E+01	.1259800E+02	.1657490E+01	
12.65800E+02	.1506142E+01	.1268900E+02	.14350156E+01	.1271900E+02	.1352940E+01	.1274900E+02	.1274900E+01	.1274900E+02	.1274900E+01	.1274900E+02	.1274900E+01	
12.80900E+02	.1118193E+01	.1283900E+02	.11179184E+01	.1286900E+02	.1114568E+01	.1289900E+02	.1111145E+01	.1289900E+02	.1107724E+01	.1289900E+02	.1107724E+01	
12.96000E+02	.8818394E+01	.1298900E+02	.8712884E+01	.1303900E+02	.856955E+01	.1306900E+02	.832000E+01	.1306900E+02	.807411E+01	.1306900E+02	.807411E+01	
13.11100E+02	.7114794E+01	.1313900E+02	.701867E+01	.1316900E+02	.682043E+01	.1319900E+02	.662043E+01	.1319900E+02	.642043E+01	.1319900E+02	.642043E+01	
13.26100E+02	.6037370E+01	.1328900E+02	.593009E+01	.1325900E+02	.573009E+01	.1328900E+02	.553009E+01	.1328900E+02	.533009E+01	.1328900E+02	.533009E+01	
13.41200E+02	.5113564E+01	.1343900E+02	.500630E+01	.1342900E+02	.480630E+01	.1345900E+02	.460630E+01	.1345900E+02	.440630E+01	.1345900E+02	.440630E+01	
13.56300E+02	.4202653E+01	.1358900E+02	.409304E+01	.1357900E+02	.388304E+01	.1360900E+02	.367304E+01	.1360900E+02	.346304E+01	.1360900E+02	.346304E+01	
13.71400E+02	.3287925E+01	.1373900E+02	.317408E+01	.1372900E+02	.296408E+01	.1375900E+02	.275408E+01	.1375900E+02	.254408E+01	.1375900E+02	.254408E+01	
13.86500E+02	.2353726E+01	.1388900E+02	.2241215E+01	.1387900E+02	.2031215E+01	.1390900E+02	.1820215E+01	.1390900E+02	.1609215E+01	.1390900E+02	.1609215E+01	
13.99600E+02	.1713313E+01	.1403900E+02	.1604500E+01	.1402900E+02	.1497973E+01	.1405900E+02	.1487973E+01	.1405900E+02	.1477973E+01	.1405900E+02	.1477973E+01	
14.16600E+02	.1171983E+01	.1418900E+02	.1160600E+01	.1417900E+02	.1145853E+01	.1420900E+02	.1133853E+01	.1420900E+02	.1121724E+01	.1420900E+02	.1121724E+01	
14.31700E+02	.8825321E+01	.1433900E+02	.8674132E+01	.1432900E+02	.8423853E+01	.1435900E+02	.8272853E+01	.1435900E+02	.8121724E+01	.1435900E+02	.8121724E+01	
14.46800E+02	.6825321E+01	.1448900E+02	.6674055E+01	.1447900E+02	.6422853E+01	.1450900E+02	.6271724E+01	.1450900E+02	.6120630E+01	.1450900E+02	.6120630E+01	
14.61900E+02	.5150311E+01	.1463900E+02	.500304E+01	.1462900E+02	.4750900E+02	.1465900E+02	.4599853E+01	.1465900E+02	.4448724E+01	.1465900E+02	.4448724E+01	
14.77000E+02	.386787E+01	.1478900E+02	.3719025E+01	.1477900E+02	.3467800E+02	.1480900E+02	.3316724E+01	.1480900E+02	.3165595E+01	.1480900E+02	.3165595E+01	
14.92000E+02	.2804856E+01	.1493900E+02	.2655800E+01	.1492900E+02	.2404730E+01	.1495900E+02	.2253600E+01	.1495900E+02	.2102473E+01	.1495900E+02	.2102473E+01	
15.07000E+02	.2018268E+01	.1508900E+02	.1867130E+01	.1507900E+02	.1716000E+01	.1510900E+02	.1564900E+01	.1510900E+02	.151811E+01	.1510900E+02	.151811E+01	
15.22100E+02	.1522100E+01	.1523900E+02	.1475364E+01	.1522900E+01	.1423009E+01	.1524900E+02	.1371000E+01	.1524900E+02	.1319100E+01	.1524900E+02	.1319100E+01	
15.37200E+02	.8738899E+01	.1538900E+02	.8589009E+01	.1537900E+02	.8338009E+01	.1540900E+02	.8087009E+01	.1540900E+02	.7836009E+01	.1540900E+02	.7836009E+01	
15.52300E+02	.6202759E+01	.1553900E+02	.6052800E+01	.1552900E+02	.5802800E+01	.1554900E+02	.5552800E+01	.1554900E+02	.5302800E+01	.1554900E+02	.5302800E+01	
15.67400E+02	.404267E+01	.1568900E+02	.389267E+01	.1567900E+02	.364267E+01	.1569900E+02	.339267E+01	.1569900E+02	.314267E+01	.1569900E+02	.314267E+01	
15.82500E+02	.2819445E+01	.1583900E+02	.2669445E+01	.1582900E+02	.2419445E+01	.1584900E+02	.2169445E+01	.1584900E+02	.1919445E+01	.1584900E+02	.1919445E+01	
15.97600E+02	.19154902E+01	.1603900E+02	.1865490E+01	.1602900E+02	.1715490E+01	.1604900E+02	.1665490E+01	.1604900E+02	.1615490E+01	.1604900E+02	.1615490E+01	
16.12700E+02	.1615490E+01	.1618900E+02	.1565490E+01	.1617900E+02	.1515490E+01	.1619900E+02	.1465490E+01	.1619900E+02	.1415490E+01	.1619900E+02	.1415490E+01	
16.27800E+02	.1151477E+01	.1633900E+02	.1101477E+01	.1632900E+02	.1051477E+01	.1634900E+02	.1001477E+01	.1634900E+02	.951477E+01	.1634900E+02	.951477E+01	
16.42900E+02	.9031971E+01	.1648900E+02	.8881971E+01	.1647900E+02	.8631971E+01	.1649900E+02	.8381971E+01	.1649900E+02	.8131971E+01	.1649900E+02	.8131971E+01	
16.58000E+02	.7130114E+01	.1663900E+02	.6980114E+01	.1662900E+02	.6730114E+01	.1664900E+02	.6480114E+01	.1664900E+02	.6230114E+01	.1664900E+02	.6230114E+01	
16.73000E+02	.5215294E+01	.1678900E+02	.5065294E+01	.1677900E+02	.4815294E+01	.1679900E+02	.4565294E+01	.1679900E+02	.4315294E+01	.1679900E+02	.4315294E+01	
16.88000E+02	.3306562E+01	.1693900E+02	.3156562E+01	.1692900E+02	.2906562E+01	.1694900E+02	.2656562E+01	.1694900E+02	.2406562E+01	.1694900E+02	.2406562E+01	
17.03000E+02	.1432000E+02	.1708900E+02	.1382000E+02	.1707900E+02	.1332000E+02	.1709900E+02	.1282000E+02	.1709900E+02	.1232000E+02	.1709900E+02	.1232000E+02	
17.18000E+02	.957954E+01	.1723900E+02	.942954E+01	.1722900E+02	.917954E+01	.1724900E+02	.892954E+01	.1724900E+02	.867954E+01	.1724900E+02	.867954E+01	
17.33000E+02	.762785E+01	.1738900E+02	.747785E+01	.1737900E+02	.722785E+01	.1739900E+02	.697785E+01	.1739900E+02	.672785E+01	.1739900E+02	.672785E+01	
17.48000E+02	.567570E+01	.1753900E+02	.552570E+01	.1752900E+02	.527570E+01	.1754900E+02	.502570E+01	.1754900E+02	.477570E+01	.1754900E+02	.477570E+01	
17.63000E+02	.3724591E+01	.1768900E+02	.3574591E+01	.1767900E+02	.3324591E+01	.1769900E+02	.3074591E+01	.1769900E+02	.2824591E+01	.1769900E+02	.2824591E+01	
17.78000E+02	.187270E+01	.1783900E+02	.182270E+01	.1782900E+02	.177270E+01	.1784900E+02	.172270E+01	.1784900E+02	.167270E+01	.1784900E+02	.167270E+01	
17.93000E+02	.9962570E+01	.1798900E+02	.9812570E+01	.1797900E+02	.9562570E+01	.1799900E+02	.9312570E+01	.1799900E+02	.9062570E+01	.1799900E+02	.9062570E+01	

.1190500E+02 7495503E+01 .1193500E+02 8177613E+01 .1196500E+02 9039463E+01 .1199500F+02 1010976E+02 1202500E+02 .113684E+02
 .1205500E+02 1310106E+02 .120500E+02 1522526E+02 .121100E+02 1810324E+02 .121600F+02 2106500E+02 1217600E+02 .1711584E+02
 .120600E+02 3479401E+02 .1223600E+02 4612644E+02 .126600E+02 6663512E+02 .126800F+02 126600F+02 1066914E+03 1267703E+02 1917773E+03
 .123700E+02 4099454E+03 .1238700E+02 7411837E+03 .126100E+02 126100E+02 126600F+02 126600F+02 126600F+02 126600F+02 126600F+02 126600F+02 126600F+02
 .125000E+02 4499546E+02 .125300E+02 125300E+02 125600E+02 125600E+02 125600E+02 125600E+02 125600E+02 125600E+02 125600E+02 125600E+02 125600E+02
 .1265400E+02 6473777E+01 .1268800E+02 5715172E+02 .127100E+02 4376414E+02 .127400F+02 127400F+02 127400F+02 127400F+02 127400F+02 127400F+02 127400F+02
 .128000E+02 5633466E+01 .1283900E+02 8540434E+01 .1286700E+02 1286700E+02 1286700E+02 1286700E+02 1286700E+02 1286700E+02 1286700E+02 1286700E+02
 .129000E+02 4545430E+01 .129400E+02 1901028E+02 .130100E+02 8599044E+02 .130500F+02 130500F+02 130500F+02 130500F+02 130500F+02 130500F+02 130500F+02
 .131100E+02 3604760E+00 .1314100E+02 5371669E+00 .1317100E+02 4516746E+00 .132100F+02 132100F+02 132100F+02 132100F+02 132100F+02 132100F+02 132100F+02
 .1326100F+02 3815638E+01 .1324100E+02 7615303E+01 .1332200E+02 1971141E+02 .1335200F+02 1335200F+02 1335200F+02 1335200F+02 1335200F+02 1335200F+02 1335200F+02
 .1341200E+02 1614674E+01 .1344200E+02 1333465E+01 .1347200E+02 1724499E+01 .1350300F+02 1350300F+02 1350300F+02 1350300F+02 1350300F+02 1350300F+02 1350300F+02
 .1356300E+02 5447376E+01 .1359300E+02 8244475E+01 .1362300E+02 1304615E+02 .1365300F+02 1365300F+02 1365300F+02 1365300F+02 1365300F+02 1365300F+02 1365300F+02
 .1371400E+02 3349395E+02 .1374400E+02 2217630E+02 .1377400E+02 1590023E+02 .1380400E+02 1380400E+02 1380400E+02 1380400E+02 1380400E+02 1380400E+02 1380400E+02
 .1386400E+02 2400701E+02 .1389400E+02 3642021E+02 .1392500E+02 6124046E+02 .1395500F+02 1395500F+02 1395500F+02 1395500F+02 1395500F+02 1395500F+02 1395500F+02
 .1398500E+02 1965532E+03 .1404500E+02 1070549E+03 .141600E+02 1305553E+02 .142200E+02 6441762E+02 .1410600F+02 1410600F+02 1410600F+02 1410600F+02 1410600F+02 1410600F+02 1410600F+02
 .146600E+02 1799304E+02 .146700E+02 4912657E+01 .146800E+02 146800E+02 146800E+02 146800E+02 146800E+02 146800E+02 146800E+02 146800E+02 146800E+02
 .146700E+02 1115112E+02 .146800E+02 4262094E+02 .146900E+02 3014927E+02 .147000E+02 6035103E+01 .147100E+02 147100E+02 147100E+02 147100E+02 147100E+02 147100E+02 147100E+02
 .146100E+02 8953743E+01 .146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02 146200E+02
 .147600E+02 1501491E+01 .147700E+02 5545202E+02 .147800E+02 3764023E+02 .147900E+02 147900E+02 147900E+02 147900E+02 147900E+02 147900E+02 147900E+02
 .149200E+02 6033886E+00 .149500E+02 5594624E+00 .149800E+02 149800E+02 149800E+02 149800E+02 149800E+02 149800E+02 149800E+02 149800E+02 149800E+02 149800E+02
 .150700E+02 7727100E+00 .151000E+02 9740136E+06 .151300E+02 1260339E+01 .1516100F+02 1516100F+02 1516100F+02 1516100F+02 1516100F+02 1516100F+02 1516100F+02
 .1522100E+02 3139431E+01 .1525100E+02 4455803E+01 .1528100E+02 6525254E+01 .1531200F+02 1531200F+02 1531200F+02 1531200F+02 1531200F+02 1531200F+02 1531200F+02
 .1552300E+02 2854914E+02 .1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02 1540200E+02
 .1567300E+02 5361652E+01 .1570400E+02 2194036E+02 .1573400E+02 4118045E+01 .1576400F+02 1576400F+02 1576400F+02 1576400F+02 1576400F+02 1576400F+02 1576400F+02
 .1582400E+02 2034174E+01 .1585400E+02 1952384E+01 .1588400E+02 2058204E+01 .1591500F+02 1591500F+02 1591500F+02 1591500F+02 1591500F+02 1591500F+02 1591500F+02
 .1597500E+02 5036752E+01 .1600500E+02 8847970E+01 .1603500E+02 1603500E+02 1603500E+02 1603500E+02 1603500E+02 1603500E+02 1603500E+02 1603500E+02 1603500E+02
 .1612600E+02 7873397E+02 .1615600E+02 3142829E+02 .1618600E+02 1618600E+02 1618600E+02 1618600E+02 1618600E+02 1618600E+02 1618600E+02 1618600E+02 1618600E+02
 .1627600E+02 5066317E+01 .1630700E+02 4113396E+01 .1633700E+02 3655029E+01 .1636700E+02 1636700E+02 1636700E+02 1636700E+02 1636700E+02 1636700E+02 1636700E+02
 .1642700E+02 4363544E+01 .1645700E+02 5491103E+01 .1648700E+02 7423152E+01 .1651800F+02 1651800F+02 1651800F+02 1651800F+02 1651800F+02 1651800F+02 1651800F+02
 .1657800E+02 2684046E+02 .1660800E+02 4499792E+02 .1663800E+02 1663800E+02 1663800E+02 1663800E+02 1663800E+02 1663800E+02 1663800E+02 1663800E+02 1663800E+02
 .1672900E+02 6349711E+02 .1675900E+02 4446030E+02 .1678900E+02 3202610E+02 .1681900E+02 1681900E+02 1681900E+02 1681900E+02 1681900E+02 1681900E+02 1681900E+02
 .1687900E+02 1516991E+02 .1691000E+02 1252494E+02 .1694000E+02 1062225E+02 .1697000E+02 1697000E+02 1697000E+02 1697000E+02 1697000E+02 1697000E+02 1697000E+02

ELEMENT = 235 U DATE = 10/30/73 RUNNO = ITERATION = 0

SCATTER CROSS SECTION VS ENERGY

1.00	100.90	200.80	300.70	400.60	500.50	600.40	700.30	800.20	900.10	1000.00
11.11. Y										
11.22. Y										
11.33. Y										
11.44. Y										
11.56. Y										
11.67. YD										
11.78. Y										
11.89. Y										
12.00. Y										
12.11. Y										
12.22. YD										
12.33. YD										
12.44. YD										
12.56. Y										
12.67. Y										
12.78. Y										
12.89. Y										
13.00. Y										
13.11. Y										
13.22. Y										
13.33. Y										
13.44. Y										
13.56. Y										
13.67. Y										
13.78. Y										
13.89. Y										
14.00. Y										
14.11. Y										
14.22. Y										
14.33. Y										
14.44. Y										
14.56. Y										
14.67. Y										
14.78. Y										
14.89. Y										
15.00. Y										
15.11. Y										
15.22. Y										
15.33. Y										
15.44. Y										
15.56. Y										
15.67. Y										
15.78. Y										
15.89. Y										
16.00. Y										
16.11. Y										
16.22. Y										
16.33. Y										
16.44. Y										
16.56. Y										
16.67. Y										
16.78. Y										
16.89. Y										
17.00. Y										

ITERATION # U

FISSION CROSS SECTION VS ENERGY

[illegible]

STARTING PHI .208055E+05 PSEARCH METHOD ITERATION 1

.083 SECONDS IN PHIMAIN INCLUDING	.074 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.082 SECONDS IN PHIMAIN INCLUDING	.072 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313
.082 SECONDS IN PHIMAIN INCLUDING	.072 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1=	313

MAGNITUDE OF GRADIENT .219418E+06

STARTING PHI	.208055E+05	FINAL PHI	.187052E+03	DIAG. WEIGHTS	.107292E+06	COS(THETA)	.303859E+00	NSAV	2
ETA	.100000E+01								

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

PREN	DIAG	GGA	DIAG	GS1(1)	DIAG	GS1(2)	DIAG	GS1(3)	DIAG	IELIM	GROUP	THETA
11.67	0.	38.00	0.	.748000E+01	0.	3.9978	.104E+09	.0000	0.	0	1	0.00
12.39	0.	45.00	0.	.207200	0.	6.1593	.107E+09	17.0696	.100E+09	0	1	58.98
12.90	0.	43.00	0.	.484000E+02	0.	-4.5547	.106E+08	34.8741	.141E+08	0	1	105.84
13.34	0.	40.00	0.	.896000E+02	0.	1.8391	.392E+08	8.1474	.429E+08	0	1	64.56
13.70	0.	40.00	0.	.836000E+02	0.	34.2525	.684E+07	42.8114	.779E+07	0	1	48.16
14.00	0.	40.00	0.	.448000E+01	0.	-15.5106	.244E+08	57.4422	.222E+08	0	1	117.43
14.53	0.	29.00	0.	.149600E+01	0.	-22.6928	.393E+08	.8720	.150E+08	0	1	168.80
15.45	0.	55.00	0.	.358400E+01	0.	13.9049	.551E+08	31.4402	.246E+08	0	1	56.35
16.10	0.	40.00	0.	.404800E+01	0.	-2.956	.473E+08	15.7472	.534E+08	0	1	97.77
16.67	0.	64.00	0.	.380800E+01	0.	-41.0028	.165E+08	35.9993	.774E+07	0	1	136.83
110000E+02	.8518528E+01	110300E+02	.8476401E+11	.1166000E+02	.8431321E+01	.1109000E+02	.832831E+01	.1112100E+02	.832864E+01	.1112100E+02	.832864E+01	.832864E+01
1115100E+02	.827167E+01	1118100E+02	.8209229E+01	.1121100E+02	.8141765E+01	.1124100E+02	.806609E+01	.1124100E+02	.806609E+01	.1124100E+02	.806609E+01	.806609E+01
1130200E+02	.7884495E+01	1133200E+02	.7777197E+01	.1136200E+02	.765466E+01	.1139200E+02	.751104E+01	.1139200E+02	.751104E+01	.1139200E+02	.751104E+01	.751104E+01
1145200E+02	.713342E+01	1148200E+02	.6874954E+01	.1151300E+02	.6527954E+01	.1154300E+02	.607151E+01	.1154300E+02	.607151E+01	.1154300E+02	.607151E+01	.607151E+01
1160300E+02	.4447307E+01	1163300E+02	.3318477E+01	.1166300E+02	.1087201E+02	.1169300E+02	.203164E+02	.1169300E+02	.203164E+02	.1169300E+02	.203164E+02	.203164E+02
1175400E+02	.1250673E+02	1178400E+02	.1126012E+02	.1181400E+02	.1049551E+02	.1184400E+02	.9940430E+01	.1184400E+02	.9940430E+01	.1184400E+02	.9940430E+01	.9940430E+01
119500E+02	.9158133E+01	119800E+02	.8849804E+01	.1196500E+02	.8561722E+01	.1199500E+02	.8281007E+01	.1199500E+02	.8281007E+01	.1199500E+02	.8281007E+01	.8281007E+01
120500E+02	.769839E+01	120800E+02	.7375956E+01	.1211600E+02	.7004995E+01	.1214600E+02	.659448E+01	.1214600E+02	.659448E+01	.1214600E+02	.659448E+01	.659448E+01
1220600E+02	.5941428E+01	1223600E+02	.4846798E+01	.1226600E+02	.4010928E+01	.1229600E+02	.3097808E+01	.1229600E+02	.3097808E+01	.1229600E+02	.3097808E+01	.3097808E+01
1235700E+02	.7025956E+01	1238700E+02	.3094315E+02	.1241700E+02	.1651635E+02	.1244700E+02	.1259800E+02	.1244700E+02	.1259800E+02	.1244700E+02	.1259800E+02	.1259800E+02
1256800E+02	.2020399E+02	1259800E+02	.1799335E+02	.1266600E+02	.1059839E+02	.1269600E+02	.1274900E+02	.1269600E+02	.1274900E+02	.1269600E+02	.1274900E+02	.1274900E+02
1265800E+02	.940550E+02	1268800E+02	.1355485E+02	.1286600E+02	.1142005E+02	.1289600E+02	.1156530E+02	.1289600E+02	.1156530E+02	.1289600E+02	.1156530E+02	.1156530E+02
1280900E+02	.121083E+02	1283900E+02	.1177489E+02	.129100E+02	.1142005E+02	.129400E+02	.1156530E+02	.129400E+02	.1156530E+02	.129400E+02	.1156530E+02	.1156530E+02
1294000E+02	.1186695E+02	1297000E+02	.1172059E+02	.1302000E+02	.115648E+02	.1305000E+02	.1172059E+02	.1305000E+02	.1172059E+02	.1305000E+02	.1172059E+02	.1172059E+02
1311100E+02	.1116597E+02	1314100E+02	.1101674E+02	.1317000E+02	.108461E+02	.1320000E+02	.107425E+02	.1320000E+02	.107425E+02	.1320000E+02	.107425E+02	.107425E+02
1326100E+02	.1037324E+02	1329100E+02	.1009168E+02	.1332200E+02	.9941319E+01	.1335200E+02	.115395E+02	.1335200E+02	.115395E+02	.1335200E+02	.115395E+02	.115395E+02
1341200E+02	.1131166E+02	1344200E+02	.1068768E+02	.1347200E+02	.107079E+02	.1350200E+02	.105484E+02	.1350200E+02	.105484E+02	.1350200E+02	.105484E+02	.105484E+02
1356300E+02	.1026215E+02	1359300E+02	.1011521E+02	.1362300E+02	.9966473E+01	.1365300E+02	.985754E+01	.1365300E+02	.985754E+01	.1365300E+02	.985754E+01	.985754E+01
1371400E+02	.1022316E+02	1374400E+02	.1031945E+02	.1377400E+02	.1018622E+02	.1380400E+02	.9973621E+01	.1380400E+02	.9973621E+01	.1380400E+02	.9973621E+01	.9973621E+01
1398500E+02	.9447304E+01	139400E+02	.9130536E+01	.1392500E+02	.9803868E+01	.1395500E+02	.8751542E+01	.1395500E+02	.8751542E+01	.1395500E+02	.8751542E+01	.8751542E+01
1416000E+02	.9755730E+01	140500E+02	.1270268E+01	.1407500E+02	.1260446E+02	.1410500E+02	.122744E+02	.1410500E+02	.122744E+02	.1410500E+02	.122744E+02	.122744E+02
1431700E+02	.117805E+02	142400E+02	.1150755E+02	.1422900E+02	.1132844E+02	.1425900E+02	.1117075E+02	.1425900E+02	.1117075E+02	.1425900E+02	.1117075E+02	.1117075E+02
1446700E+02	.983080E+01	143700E+02	.1074183E+02	.1437700E+02	.1058488E+02	.1440700E+02	.104085E+02	.1440700E+02	.104085E+02	.1440700E+02	.104085E+02	.104085E+02
1461100E+02	.1149639E+02	145400E+02	.9371799E+01	.1452600E+02	.1058759E+02	.1455600E+02	.123382E+02	.1455600E+02	.123382E+02	.1455600E+02	.123382E+02	.123382E+02
1475900E+02	.108074E+02	146900E+02	.1127196E+02	.1467900E+02	.111332E+02	.1470900E+02	.1098842E+02	.1470900E+02	.1098842E+02	.1470900E+02	.1098842E+02	.1098842E+02
1492000E+02	.108444E+02	148500E+02	.1073357E+02	.1482900E+02	.1066651E+02	.1485900E+02	.1060394E+02	.1485900E+02	.1060394E+02	.1485900E+02	.1060394E+02	.1060394E+02
1507000E+02	.1018631E+02	149500E+02	.1042126E+02	.1498000E+02	.1036978E+02	.1501000E+02	.103111E+02	.1501000E+02	.103111E+02	.1501000E+02	.103111E+02	.103111E+02
1522100E+02	.8754318E+01	15100E+02	.1011542E+02	.1513100E+02	.1009058E+02	.1516100E+02	.997749E+01	.1516100E+02	.997749E+01	.1516100E+02	.997749E+01	.997749E+01
1537200E+02	.973950E+01	152500E+02	.8624944E+01	.1528100E+02	.946757E+01	.1531200E+02	.9264649E+01	.1531200E+02	.9264649E+01	.1531200E+02	.9264649E+01	.9264649E+01
1552300E+02	.120193E+02	155500E+02	.8592322E+01	.1558100E+02	.7332019E+01	.1561200E+02	.7113347E+02	.1561200E+02	.7113347E+02	.1561200E+02	.7113347E+02	.7113347E+02
1567300E+02	.1084102E+02	1570400E+02	.1069780E+02	.1583300E+02	.1141169E+02	.1586300E+02	.1056130E+02	.1586300E+02	.1056130E+02	.1586300E+02	.1056130E+02	.1056130E+02
1582400E+02	.1019431E+02	1585400E+02	.1005479E+02	.1588300E+02	.989678E+02	.1591300E+02	.974250E+02	.1591300E+02	.974250E+02	.1591300E+02	.974250E+02	.974250E+02
1597500E+02	.9154754E+01	1600500E+02	.8714336E+01	.1603300E+02	.706723E+01	.1606300E+02	.736220E+02	.1606300E+02	.736220E+02	.1606300E+02	.736220E+02	.736220E+02
1612600E+02	.1491140E+02	1615600E+02	.1374350E+02	.1618600E+02	.1278609E+02	.1621600E+02	.1219562E+02	.1621600E+02	.1219562E+02	.1621600E+02	.1219562E+02	.1219562E+02
1627600E+02	.1151470E+02	1630700E+02	.1128287E+02	.1633700E+02	.1107495E+02	.1636700E+02	.109274E+02	.1636700E+02	.109274E+02	.1636700E+02	.109274E+02	.109274E+02
1642700E+02	.1041474E+02	1645700E+02	.1045357E+02	.1648800E+02	.1027957E+02	.1651800E+02	.101794E+02	.1651800E+02	.101794E+02	.1651800E+02	.101794E+02	.101794E+02
1657800E+02	.984668E+01	1660800E+02	.9522889E+01	.1663900E+02	.977773E+01	.1666900E+02	.1006800E+02	.1666900E+02	.1006800E+02	.1666900E+02	.1006800E+02	.1006800E+02
1672900E+02	.1175594E+02	1675900E+02	.11227336E+02	.1678900E+02	.1215151E+02	.1681900E+02	.120064E+02	.1681900E+02	.120064E+02	.1681900E+02	.120064E+02	.120064E+02
1687900E+02	.1225959E+02	1691000E+02	.1165292E+02	.1694000E+02	.1156779E+02	.1697000E+02	.1149413E+02	.1697000E+02	.1149413E+02	.1697000E+02	.1149413E+02	.1149413E+02
110000E+02	.218669E+01	1103000E+02	.2267916E+01	.1106000E+02	.2353330E+01	.1109000E+02	.2449933E+01	.1109000E+02	.2449933E+01	.1109000E+02	.2449933E+01	.2449933E+01
111500E+02	.2869116E+01	1118100E+02	.2793107E+01	.1121100E+02	.2930428E+01	.1124100E+02	.320108E+01	.1124100E+02	.320108E+01	.1124100E+02	.320108E+01	.320108E+01
1130200E+02	.3461311E+01	1133200E+02	.3651229E+01	.1136200E+02	.396257E+01	.1139200E+02	.429019E+01	.1139200E+02	.429019E+01	.1139200E+02	.429019E+01	.429019E+01
1145200E+02	.522749E+01	1148200E+02	.5934871E+01	.1151300E+02	.700866E+01	.1154300E+02	.861654E+01	.1154300E+02	.861654E+01	.1154300E+02	.861654E+01	.861654E+01
1160300E+02	.1957053E+02	1163300E+02	.2022390E+02	.1166300E+02	.1297704E+03	.1169300E+02	.5745549E+02	.1169300E+02	.5745549E+02	.1169300E+02	.5745549E+02	.5745549E+02
1175400E+02	.1003458E+02	1178400E+02	.7676933E+01	.1191400E+02	.62973001E+01	.1194400E+02	.689328E+01	.1194400E+02	.689328E+01	.1194400E+02	.689328E+01	.689328E+01

1190500E+02 763818E+01 1193500E+02 8300940E+01 1196500E+02 918558E+01 1199500E+02 1020712E+02 1202500E+02 1152630E+02
 1205500E+02 1318481E+02 1208500E+02 1503387E+02 1211000E+02 1817903E+02 1214600E+02 1217600E+02 1217600E+02 1219237E+02
 1220500E+02 3475577E+02 1223500E+02 468186E+02 1226000E+02 669419E+02 1229600E+02 1232700E+02 1232700E+02 1232700E+02
 1235700E+02 4095017E+03 1238700E+02 7475977E+03 1241700E+02 4483514E+03 1244700E+02 1247700E+02 1247700E+02 1247700E+02
 1250800E+02 653989E+01 1253800E+02 2744976E+02 1256800E+02 1784301E+02 1259800E+02 1262800E+02 1262800E+02 1262800E+02
 1256800E+02 6657208E+01 1268800E+02 5316544E+01 1271700E+02 4552919E+01 1274900E+02 433388E+01 1277900E+02 4691552E+01
 1296000E+02 490660E+01 1283900E+02 8930337E+01 1286700E+02 9109641E+02 1289900E+02 1293000E+02 1293000E+02 1293000E+02
 1311100E+02 3579012E+00 1314100E+02 5303105E+00 1317100E+02 844766E+00 1320100E+02 1323100E+02 1323100E+02 1323100E+02
 1326100E+02 3875301E+01 1329100E+02 780175E+01 1332200E+02 9109641E+02 1335200E+02 1338200E+02 1338200E+02 1338200E+02
 1341200E+02 1775305E+01 1344200E+02 1403765E+01 1347200E+02 1737104E+01 1350200E+02 1353200E+02 1353200E+02 1353200E+02
 1356300E+02 546896E+01 1359300E+02 8286895E+01 1362300E+02 1363788E+02 1366300E+02 1369300E+02 1369300E+02 1369300E+02
 1371400E+02 327986E+02 1374400E+02 2450879E+02 1377400E+02 1877791E+02 1380400E+02 1383400E+02 1383400E+02 1383400E+02
 1386400E+02 2611860E+02 1389400E+02 3838537E+02 1392500E+02 628836E+02 1395500E+02 1398500E+02 1398500E+02 1398500E+02
 1398500E+02 1660831E+03 1404500E+02 1082050E+03 1407500E+02 9698479E+01 1410600E+02 1413600E+02 1413600E+02 1413600E+02
 1416600E+02 177814E+02 1419600E+02 129050E+02 1422600E+02 9698479E+01 1425600E+02 1428600E+02 1428600E+02 1428600E+02
 1431700E+02 952338E+01 1434700E+02 4354428E+01 1437700E+02 4195294E+01 1440700E+02 467987E+01 1443700E+02 467987E+01
 1446700E+02 1197695E+02 1449700E+02 3186009E+02 1452700E+02 8680831E+02 1455800E+02 1458800E+02 1458800E+02 1458800E+02
 1461800E+02 9150825E+01 1464800E+02 5639624E+01 1467800E+02 3831502E+01 1470800E+02 2736013E+01 1473800E+02 2054359E+01
 1476900E+02 1584505E+01 1479900E+02 124762E+01 1482900E+02 1001129E+01 1485900E+02 1488900E+02 1488900E+02 1488900E+02
 1492000E+02 6014200E+00 1495000E+02 1495000E+02 1498000E+02 5488927E+00 1501000E+02 1504000E+02 1504000E+02 1504000E+02
 1507000E+02 777993E+00 1510100E+02 980357E+00 1513100E+02 1269011E+01 1516100E+02 168390E+01 151910E+02 228217E+01
 1521000E+02 3159702E+01 1525100E+02 4483616E+01 1528100E+02 6564876E+01 1531200E+02 1017394E+02 1534200E+02 164713E+02
 1532200E+02 2870710E+02 1540200E+02 536808E+02 1543200E+02 9416228E+02 1546200E+02 1822491E+03 1549200E+02 647617E+02
 1537300E+02 3606817E+02 1555300E+02 2186804E+02 1558400E+02 1431352E+02 1561300E+02 9957583E+01 1564300E+02 7254339E+01
 1567300E+02 5477649E+01 1570400E+02 4226799E+01 1573400E+02 3381290E+01 1576400E+02 2784795E+01 1579400E+02 2377590E+01
 1582400E+02 2131600E+01 1585400E+02 2051100E+01 1588400E+02 2166752E+01 1591500E+02 2532375E+01 1594500E+02 3161174E+01
 1597500E+02 508902E+01 1600500E+02 8804537E+01 1603500E+02 1830902E+02 1606500E+02 4891379E+02 1609500E+02 1297837E+03
 1612600E+02 769542E+02 1615600E+02 3061259E+02 1618600E+02 1561547E+02 1621600E+02 9555847E+01 1624600E+02 660878E+01
 1627600E+02 5020859E+01 1630700E+02 4128302E+01 1633700E+02 3720600E+01 163670E+02 365970E+01 1639700E+02 353364E+01
 1642700E+02 4602019E+01 1645700E+02 5812306E+01 1648700E+02 7852737E+01 1651800E+02 111821E+02 1654800E+02 1737140E+02
 1657800E+02 2783522E+02 1660800E+02 460804E+02 1663800E+02 327479E+02 1666800E+02 946137E+02 1669800E+02 8735460E+02
 1672900E+02 639431E+02 1675900E+02 4502156E+02 1678900E+02 3251280E+02 1681900E+02 2445371E+02 1684900E+02 1911066E+02
 1687900E+02 152505E+02 1691000E+02 1210974E+02 1694000E+02 1076875E+02 1697000E+02 6286691E+01 1700000E+02 8123171E+01

ELEMENT = 235 U DATE = 10/30/73 MUNNO = ITERATION = 1

SCATTER CROSS SECTION VS ENERGY

1.00	100.90	200.80	300.70	400.60	500.50	600.40	700.30	800.20	900.10	1000.00
11.11* T										
11.22* T										
11.33* T										
11.44* T										
11.56* T										
11.67* TO										
11.74* T										
11.89* T										
12.00* T										
12.11* T										
12.22* TO										
12.33* TO										
12.44* TO										
12.56* T										
12.67* T										
12.78* T										
12.89* T										
13.00* T										
13.11* T										
13.22* T										
13.33* T										
13.44* T										
13.56* T										
13.67* T										
13.78* T										
13.89* T										
14.00* T										
14.11* T										
14.22* T										
14.33* T										
14.44* T										
14.56* T										
14.67* T										
14.78* T										
14.89* T										
15.00* T										
15.11* T										
15.22* T										
15.33* T										
15.44* T										
15.56* T										
15.67* T										
15.78* T										
15.89* T										
16.00* T										
16.11* T										
16.22* T										
16.33* T										
16.44* T										
16.56* T										
16.67* T										
16.78* T										
16.89* T										
17.00* T										

ELEMENT = 235 U

DATE = 10/30/73

RUNNO =

ITERATION = 1

FISSION CROSS SECTION VS ENERGY

	1.00	100.90	200.80	300.70	400.60	500.50	600.40	700.30	800.20	900.10	1000.00
11.11+T											
11.22+T											
11.33+T											
11.44+T											
11.56+T											
11.67+T		T									
11.78+T											
11.89+T											
12.00+T											
12.11+T											
12.22+T			T								
12.33+T				T							
12.44+T											
12.56+T											
12.67+T											
12.78+T											
12.89+T											
13.00+T											
13.11+T											
13.22+T											
13.33+T											
13.44+T											
13.56+T											
13.67+T											
13.78+T											
13.89+T											
14.00+T											
14.11+T											
14.22+T											
14.33+T											
14.44+T											
14.56+T											
14.67+T											
14.78+T											
14.89+T											
15.00+T											
15.11+T											
15.22+T											
15.33+T											
15.44+T											
15.56+T											
15.67+T											
15.78+T											
15.89+T											
16.00+T											
16.11+T											
16.22+T											
16.33+T											
16.44+T											
16.56+T											
16.67+T											
16.78+T											
16.89+T											
17.00+T											

RUNNING TIME FOR PROBLEM = .248449E+01

TIME 10.51.35

THICK	YMAX	YMIN	ESPA	A02	B02	C02	D0	CHIN	CHAX
-0.	.1000E+04	.1060E+01	.6000E+01	0.	0.	.1129E-05	.5875E+02	.1000E+02	.1000E+01

1	0	1.000	-0.000
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[illegible]

DATA HEAD IN OR GENERATED FROM .1100E+02 TO .1700E+02

XDIV = 1000000.01 IM = 4

49456

[illegible]

1148811E+02	6A22370E+01	1149562E+02	67A3299E+01	1150313E+02	6658627E+01	1151064E+02	6567703E+01	1151815E+02	6469778E+01
1152566E+02	6369981E+02	1153317E+02	6249308E+01	1154068E+02	6212658E+01	1155819E+02	5984644E+01	1155569E+02	6R39294E+01
1156320E+02	6575321E+01	1157071E+02	5644430E+01	1157822E+02	5294308E+01	1158573E+02	5072504E+01	1159374E+02	6A26758E+01
1160075E+02	4558666E+01	1160826E+02	4260281E+01	1161577E+02	3394779E+01	1163573E+02	3363977E+01	1163079E+02	3391764E+01
1163830E+02	3336660E+01	1164581E+02	3760558E+01	1165938E+02	3165938E+02	1166081E+02	2929451E+01	1166838E+02	1535254E+02
1167548E+02	2034423E+02	1168335E+02	1527970E+02	1172095E+02	1217651E+02	1172841E+02	1169837E+02	1170584E+02	1746189E+02
1171339E+02	1163600E+02	1172095E+02	1217651E+02	1172841E+02	1172841E+02	1172841E+02	1172841E+02	1172841E+02	1172841E+02
1175094E+02	1268115E+02	1175845E+02	1090967E+02	1179599E+02	1090967E+02	1180450E+02	1173344E+02	1173344E+02	1173344E+02
1178260E+02	1112039E+02	1179599E+02	1090967E+02	1180450E+02	1090967E+02	1180450E+02	1180450E+02	1180450E+02	1180450E+02
1182603E+02	1024410E+02	1183354E+02	1010967E+02	1184050E+02	9944507E+01	1184050E+02	1057470E+02	1184050E+02	1184050E+02
1186358E+02	9652866E+01	1187109E+02	9553887E+01	1187680E+02	9553887E+01	1187680E+02	9553887E+01	1187680E+02	9553887E+01
1190113E+02	2918260E+01	1190864E+02	8611518E+01	1191613E+02	8611518E+01	1191613E+02	8611518E+01	1191613E+02	8611518E+01
1193486E+02	4811518E+01	1194618E+02	8730690E+01	1195369E+02	8730690E+01	1195369E+02	8730690E+01	1195369E+02	8730690E+01
1197622E+02	8454706E+01	1198373E+02	8384577E+01	1199124E+02	8384577E+01	1199124E+02	8384577E+01	1199124E+02	8384577E+01
1201377E+02	4102461E+01	1202124E+02	4030731E+01	1202479E+02	4030731E+01	1202479E+02	4030731E+01	1202479E+02	4030731E+01
1205131E+02	7734313E+01	1205882E+02	7654732E+01	1206633E+02	7654732E+01	1206633E+02	7654732E+01	1206633E+02	7654732E+01
1208486E+02	7330051E+01	1209637E+02	7232894E+01	1210488E+02	7232894E+01	1210488E+02	7232894E+01	1210488E+02	7232894E+01
1212643E+02	6866142E+01	1213392E+02	6763673E+01	1214143E+02	6763673E+01	1214143E+02	6763673E+01	1214143E+02	6763673E+01
1216395E+02	6811811E+01	1217146E+02	6466010E+01	1217691E+02	6466010E+01	1217691E+02	6466010E+01	1217691E+02	6466010E+01
1220150E+02	5623364E+01	1220901E+02	5466101E+01	1221654E+02	5466101E+01	1221654E+02	5466101E+01	1221654E+02	5466101E+01
1223930E+02	4746819E+01	1224656E+02	4543235E+01	1225407E+02	4543235E+01	1225407E+02	4543235E+01	1225407E+02	4543235E+01
1227660E+02	3634003E+01	1228461E+02	3349525E+01	1229161E+02	3349525E+01	1229161E+02	3349525E+01	1229161E+02	3349525E+01
1231145E+02	2752887E+01	1232165E+02	2403602E+01	1232916E+02	2403602E+01	1232916E+02	2403602E+01	1232916E+02	2403602E+01
1235149E+02	4743876E+01	1235920E+02	4430507E+01	1236671E+02	4430507E+01	1236671E+02	4430507E+01	1236671E+02	4430507E+01
1238925E+02	3223185E+02	1239655E+02	3874608E+02	1240286E+02	3874608E+02	1240286E+02	3874608E+02	1240286E+02	3874608E+02
1242678E+02	3753363E+02	1243429E+02	3476890E+02	1244180E+02	3476890E+02	1244180E+02	3476890E+02	1244180E+02	3476890E+02
1246433E+02	2630649E+02	1247184E+02	2486648E+02	1247935E+02	2486648E+02	1247935E+02	2486648E+02	1247935E+02	2486648E+02
1250198E+02	2080243E+02	1250939E+02	2008159E+02	1251690E+02	2008159E+02	1251690E+02	2008159E+02	1251690E+02	2008159E+02
1253947E+02	1790195E+02	1254693E+02	1748854E+02	1255445E+02	1748854E+02	1255445E+02	1748854E+02	1255445E+02	1748854E+02
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1118713E+02 8811334E+00 1119242E+02 9032773E+00 1120275E+02 9265755E+00 1124781E+02 1085104E+00 1121777E+02 9750264E+00
1122328E+02 1000884E+01 1123279E+02 1027807E+01 1124030E+02 1052848E+00 1124781E+02 1085104E+00 1121777E+02 9750264E+00
1126238E+02 1147889E+01 1127034E+02 1170790E+01 1127785E+02 1216422E+00 1128336E+02 1252044E+00 1129287E+02 1290380E+00
1130038E+02 1330358E+01 1130788E+02 1372422E+01 1131339E+02 1616248E+00 1132045E+02 1633155E+00 1133415E+02 1521175E+00
1133792E+02 1563769E+01 1134533E+02 1618303E+01 1135294E+02 1675956E+00 1136045E+02 1736991E+00 1136796E+02 1801699E+00
1137547E+02 1970408E+01 1138298E+02 1943482E+01 1139049E+02 2021331E+00 1139800E+02 2104417E+00 1140551E+02 2193261E+00
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1156320E+02 8394946E+01 1157071E+02 9351775E+00 1157822E+02 1052350E+00 1158733E+02 1196237E+02 1159324E+02 1375899E+02
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1167584E+02 1111204E+02 1168335E+02 8042120E+02 1169086E+02 5329709E+02 1169937E+02 3496015E+00 1170588E+02 2338445E+02
1171394E+02 1963517E+02 1172090E+02 1130763E+02 1172841E+02 8121886E+01 1173592E+02 8926273E+01 1174343E+02 4374261E+00
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ELEMENT = 235 U

DATE = 10/30/73

RUNNO =

ITERATION = 0

17000+02	11.425	-00116992+02	11.441	-00116985+02	11.457	-001
16977+02	11.473	-00116970+02	11.470	-00116962+02	11.507	-001
16955+02	11.525	-00116947+02	11.544	-00116940+02	11.563	-001
16932+02	11.583	-00116925+02	11.604	-00116917+02	11.626	-001
16910+02	11.648	-00116902+02	11.672	-00116895+02	11.696	-001
16887+02	11.722	-00116880+02	11.748	-00116872+02	11.776	-001
16865+02	11.805	-00116857+02	11.834	-00116850+02	11.865	-001
16842+02	11.898	-00116835+02	11.931	-00116827+02	11.966	-001
16820+02	12.002	-00116812+02	12.039	-00116805+02	12.077	-001
16797+02	12.115	-00116790+02	12.153	-00116782+02	12.191	-001
16775+02	12.228	-00116767+02	12.262	-00116760+02	12.291	-001
16752+02	12.315	-00116745+02	12.329	-00116737+02	12.339	-001
16730+02	12.312	-00116722+02	12.271	-00116715+02	12.199	-001
16707+02	12.089	-00116700+02	11.935	-00116692+02	11.715	-001
16685+02	11.490	-00116677+02	11.209	-00116670+02	10.906	-001
16662+02	10.604	-00116655+02	10.322	-00116647+02	10.077	-001
16640+02	9.880	-00116632+02	9.734	-00116625+02	9.636	-001
16617+02	9.579	-00116610+02	9.556	-00116602+02	9.558	-001
16594+02	9.579	-00116587+02	9.614	-00116579+02	9.658	-001
16572+02	9.708	-00116564+02	9.761	-00116557+02	9.816	-001
16549+02	9.872	-00116542+02	9.928	-00116534+02	9.982	-001
16527+02	10.036	-00116519+02	10.088	-00116512+02	10.139	-001
16504+02	10.189	-00116497+02	10.237	-00116489+02	10.284	-001
16482+02	10.329	-00116474+02	10.374	-00116467+02	10.417	-001
16459+02	10.459	-00116452+02	10.501	-00116444+02	10.542	-001
16437+02	10.582	-00116429+02	10.622	-00116422+02	10.661	-001
16414+02	10.700	-00116407+02	10.740	-00116399+02	10.779	-011
16392+02	10.818	-00116384+02	10.857	-00116377+02	10.897	-001
16369+02	10.937	-00116362+02	10.978	-00116354+02	11.019	-001
16347+02	11.062	-00116339+02	11.105	-00116332+02	11.150	-001
16324+02	11.196	-00116317+02	11.244	-00116309+02	11.294	-001
16302+02	11.386	-00116294+02	11.401	-00116287+02	11.459	-001
16279+02	11.519	-00116272+02	11.584	-00116264+02	11.653	-001
16257+02	11.726	-00116249+02	11.806	-00116242+02	11.891	-001
16234+02	11.984	-00116227+02	12.086	-00116219+02	12.198	-001
16212+02	12.322	-00116204+02	12.459	-00116196+02	12.613	-001
16189+02	12.787	-00116181+02	12.953	-00116174+02	13.206	-001
16166+02	13.462	-00116159+02	13.752	-00116151+02	14.091	-001
16144+02	14.41	-00116136+02	14.812	-00116129+02	15.130	-001
16121+02	15.251	-00116114+02	14.917	-00116106+02	13.835	-001
16099+02	12.036	-00116091+02	10.109	-00116084+02	8.694	-001
16076+02	7.938	-00116069+02	7.655	-00116061+02	7.636	-001
16054+02	7.743	-00116046+02	7.901	-00116039+02	8.015	-001
16031+02	8.246	-00116024+02	8.408	-00116016+02	8.558	-001
16009+02	8.695	-00116001+02	8.820	-00115994+02	8.935	-001
15986+02	9.040	-00115979+02	9.135	-00115971+02	9.224	-001
15964+02	9.305	-00115956+02	9.380	-00115949+02	9.450	-001
15941+02	9.516	-00115934+02	9.577	-00115926+02	9.634	-001
15919+02	9.689	-00115911+02	9.740	-00115904+02	9.788	-001
15896+02	9.835	-00115889+02	9.879	-00115881+02	9.921	-001
15874+02	9.962	-00115866+02	10.001	-00115859+02	10.039	-001
15851+02	10.075	-00115844+02	10.111	-00115836+02	10.146	-001
15829+02	10.160	-00115821+02	10.213	-00115814+02	10.245	-001
15806+02	10.277	-00115808+02	10.309	-00115791+02	10.340	-001
15783+02	10.371	-00115776+02	10.401	-00115768+02	10.432	-001
15761+02	10.462	-00115753+02	10.493	-00115746+02	10.524	-001
15738+02	10.554	-00115731+02	10.585	-00115723+02	10.617	-001
15716+02	10.649	-00115708+02	10.681	-00115701+02	10.714	-001
15693+02	10.748	-00115696+02	10.782	-00115678+02	10.818	-001
15671+02	10.854	-00115683+02	10.892	-00115656+02	10.930	-001

15468-02	10.971	.00115641-02	11.013	.00115633-02	11.056	.001
15626-02	11.102	.00115618-02	11.150	.00115611-02	11.200	.001
15603-02	11.253	.00115596-02	11.308	.00115588-02	11.367	.001
15581-02	11.429	.00115573-02	11.474	.00115566-02	11.563	.001
15558-02	11.636	.00115551-02	11.712	.00115543-02	11.791	.001
15536-02	11.872	.00115528-02	11.953	.00115521-02	12.031	.001
15513-02	12.100	.00115506-02	12.154	.00115498-02	12.179	.001
15491-02	12.159	.00115483-02	12.070	.00115476-02	11.888	.001
15468-02	11.590	.00115461-02	11.173	.00115453-02	10.660	.001
15446-02	10.109	.00115438-02	9.593	.00115431-02	9.168	.001
15423-02	8.861	.00115416-02	8.668	.00115408-02	8.568	.001
15401-02	8.536	.00115393-02	8.521	.00115395-02	8.595	.001
15378-02	8.656	.00115377-02	8.726	.00115363-02	8.800	.001
15355-02	8.874	.00115348-02	8.947	.00115340-02	9.018	.001
15333-02	9.085	.00115325-02	9.149	.00115318-02	9.210	.001
15310-02	9.267	.00115303-02	9.321	.00115295-02	9.372	.001
15288-02	9.420	.00115280-02	9.485	.00115273-02	9.508	.001
15265-02	9.549	.00115258-02	9.587	.00115250-02	9.624	.001
15243-02	9.659	.00115235-02	9.722	.00115228-02	9.724	.001
15220-02	9.754	.00115213-02	9.783	.00115205-02	9.811	.001
15198-02	9.838	.00115190-02	9.864	.00115183-02	9.889	.001
15175-02	9.913	.00115168-02	9.936	.00115160-02	9.959	.001
15153-02	9.980	.00115145-02	10.002	.00115138-02	10.022	.001
15130-02	10.042	.00115123-02	10.052	.00115115-02	10.081	.001
15108-02	10.099	.00115100-02	10.117	.00115093-02	10.135	.001
15085-02	10.152	.00115078-02	10.169	.00115070-02	10.186	.001
15063-02	10.203	.00115055-02	10.219	.00115048-02	10.235	.001
15040-02	10.250	.00115033-02	10.266	.00115025-02	10.281	.001
15018-02	10.296	.00115010-02	10.311	.00115003-02	10.326	.001
14995-02	10.341	.00114987-02	10.356	.00114980-02	10.370	.001
14972-02	10.385	.00114965-02	10.399	.00114957-02	10.414	.001
14950-02	10.428	.00114942-02	10.442	.00114935-02	10.457	.001
14927-02	10.471	.00114920-02	10.485	.00114912-02	10.500	.001
14905-02	10.514	.00114897-02	10.529	.00114890-02	10.543	.001
14882-02	10.558	.00114875-02	10.573	.00114867-02	10.588	.001
14860-02	10.603	.00114852-02	10.618	.00114845-02	10.634	.001
14837-02	10.649	.00114830-02	10.665	.00114822-02	10.681	.001
14815-02	10.698	.00114807-02	10.715	.00114800-02	10.732	.001
14792-02	10.750	.00114785-02	10.768	.00114777-02	10.786	.001
14770-02	10.805	.00114762-02	10.825	.00114755-02	10.845	.001
14747-02	10.866	.00114740-02	10.888	.00114732-02	10.910	.001
14725-02	10.934	.00114717-02	10.959	.00114710-02	10.985	.001
14703-02	11.012	.00114695-02	11.041	.00114687-02	11.071	.001
14681-02	11.103	.00114672-02	11.138	.00114665-02	11.175	.001
14659-02	11.215	.00114650-02	11.258	.00114642-02	11.305	.001
14637-02	11.356	.00114627-02	11.412	.00114620-02	11.475	.001
14615-02	11.544	.00114605-02	11.622	.00114597-02	11.709	.001
14593-02	11.806	.00114582-02	11.913	.00114574-02	12.028	.001
14571-02	12.141	.00114559-02	12.229	.00114552-02	12.236	.001
14549-02	12.053	.00114537-02	11.543	.00114529-02	10.714	.001
14527-02	9.891	.00114514-02	9.999	.00114507-02	9.245	.001
14505-02	9.282	.00114492-02	9.396	.00114484-02	9.530	.001
14483-02	9.662	.00114465-02	9.783	.00114452-02	9.891	.001
14461-02	9.988	.00114447-02	10.074	.00114439-02	10.152	.001
14439-02	10.222	.00114424-02	10.286	.00114417-02	10.345	.001
14417-02	10.399	.00114402-02	10.450	.00114394-02	10.498	.001
14395-02	10.563	.00114379-02	10.585	.00114372-02	10.626	.001
14373-02	10.666	.00114357-02	10.704	.00114349-02	10.742	.001
14351-02	10.778	.00114334-02	10.814	.00114327-02	10.850	.001
14329-02	10.885	.00114316-02	10.920	.00114304-02	10.955	.001
14307-02	10.990	.00114289-02	11.025	.00114282-02	11.060	.001

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-00112930+02 12.030
-00112907+02 11.800

12900+02	11.577	.00112892-02	11.574	.00112885+02	11.515	.001
12877+02	11.503	.00112870-02	11.529	.00112862+02	11.580	.001
12855+02	11.646	.00112847+02	11.719	.00112840+02	11.796	.001
12832+02	11.874	.00112825+02	11.952	.00112817+02	12.029	.001
12810+02	12.107	.00112802+02	12.184	.00112795+02	12.261	.001
12787+02	12.339	.00112780+02	12.417	.00112772+02	12.496	.001
12765+02	12.577	.00112757+02	12.659	.00112750+02	12.743	.001
12742+02	12.829	.00112735+02	12.918	.00112727+02	13.009	.001
12720+02	13.103	.00112712+02	13.201	.00112705+02	13.303	.001
12697+02	13.408	.00112690+02	13.519	.00112682+02	13.634	.001
12675+02	13.754	.00112667+02	13.881	.00112660+02	14.014	.001
12652+02	14.154	.00112645+02	14.302	.00112637+02	14.458	.001
12630+02	14.625	.00112622+02	14.801	.00112615+02	14.989	.001
12607+02	15.190	.00112599+02	15.405	.00112592+02	15.636	.001
12584+02	15.885	.00112577+02	16.154	.00112569+02	16.445	.001
12562+02	16.761	.00112554+02	17.107	.00112547+02	17.486	.001
12539+02	17.962	.00112532+02	18.362	.00112524+02	18.873	.001
12517+02	19.443	.00112509+02	20.082	.00112502+02	20.802	.001
12494+02	21.620	.00112487+02	22.554	.00112479+02	23.627	.001
12472+02	24.866	.00112464+02	26.306	.00112457+02	27.985	.001
12449+02	29.941	.00112442+02	32.205	.00112434+02	34.769	.001
12427+02	37.534	.00112419+02	40.190	.00112412+02	42.053	.001
12404+02	41.975	.00112397+02	46.190	.00112389+02	48.232	.001
12382+02	54.073	.00112374+02	58.746	.00112367+02	60.816	.001
12359+02	7.040	.00112352+02	8.744	.00112344+02	9.444	.001
12337+02	2.774	.00112329+02	2.491	.00112322+02	2.441	.001
12314+02	2.529	.00112307+02	2.677	.00112299+02	2.910	.001
12292+02	3.146	.00112284+02	3.370	.00112277+02	3.634	.001
12269+02	3.874	.00112262+02	4.106	.00112254+02	4.330	.001
12247+02	4.543	.00112239+02	4.747	.00112232+02	4.941	.001
12224+02	5.125	.00112217+02	5.300	.00112209+02	5.466	.001
12202+02	5.624	.00112194+02	5.775	.00112186+02	5.919	.001
12179+02	6.056	.00112171+02	6.187	.00112164+02	6.312	.001
12156+02	6.432	.00112149+02	6.547	.00112141+02	6.657	.001
12134+02	6.764	.00112126+02	6.866	.00112119+02	6.965	.001
12111+02	7.061	.00112104+02	7.153	.00112096+02	7.243	.001
12089+02	7.330	.00112081+02	7.415	.00112074+02	7.497	.001
12066+02	7.578	.00112059+02	7.657	.00112051+02	7.734	.001
12044+02	7.810	.00112036+02	7.885	.00112028+02	7.958	.001
12021+02	8.031	.00112014+02	8.102	.00112006+02	8.174	.001
11999+02	8.244	.00111991+02	8.314	.00111984+02	8.385	.001
11976+02	8.455	.00111969+02	8.525	.00111961+02	8.596	.001
11954+02	8.667	.00111946+02	8.739	.00111939+02	8.812	.001
11931+02	8.886	.00111924+02	8.961	.00111916+02	9.038	.001
11909+02	9.117	.00111901+02	9.198	.00111894+02	9.282	.001
11886+02	9.369	.00111879+02	9.459	.00111871+02	9.554	.001
11864+02	9.653	.00111856+02	9.757	.00111849+02	9.867	.001
11841+02	9.985	.00111834+02	10.110	.00111826+02	10.244	.001
11817+02	10.387	.00111811+02	10.547	.00111804+02	10.720	.001
11796+02	10.910	.00111788+02	11.120	.00111781+02	11.356	.001
11773+02	11.622	.00111766+02	11.926	.00111758+02	12.275	.001
11751+02	12.681	.00111743+02	13.161	.00111736+02	13.733	.001
11728+02	14.428	.00111721+02	15.260	.00111713+02	16.336	.001
11706+02	17.644	.00111698+02	19.212	.00111691+02	20.868	.001
11683+02	21.865	.00111676+02	20.434	.00111668+02	15.252	.001
11661+02	9.295	.00111653+02	5.440	.00111645+02	3.797	.001
11639+02	3.339	.00111631+02	3.342	.00111623+02	3.640	.001
11616+02	3.948	.00111608+02	4.260	.00111601+02	4.556	.001
11593+02	4.827	.00111586+02	5.073	.00111578+02	5.294	.001
11571+02	5.664	.00111563+02	5.675	.00111556+02	5.839	.001
11548+02	5.988	.00111541+02	6.125	.00111533+02	6.249	.001

11526+02	0.364	.00111518+02	0.470	.00111511+02	6.568	.001
11503+02	6.659	.00111496+02	6.743	.00111488+02	6.822	.001
11481+02	6.896	.00111473+02	6.966	.00111466+02	7.031	.001
11458+02	7.093	.00111451+02	7.151	.00111443+02	7.206	.001
11436+02	7.257	.00111428+02	7.308	.00111421+02	7.356	.001
11413+02	7.401	.00111406+02	7.444	.00111398+02	7.485	.001
11390+02	7.524	.00111383+02	7.562	.00111375+02	7.598	.001
11368+02	7.633	.00111360+02	7.666	.00111353+02	7.698	.001
11345+02	7.729	.00111338+02	7.759	.00111330+02	7.788	.001
11323+02	7.816	.00111315+02	7.843	.00111308+02	7.869	.001
11300+02	7.894	.00111293+02	7.919	.00111285+02	7.942	.001
11278+02	7.965	.00111270+02	7.988	.00111263+02	8.009	.001
11255+02	8.031	.00111248+02	8.051	.00111240+02	8.071	.001
11233+02	8.091	.00111225+02	8.110	.00111218+02	8.128	.001
11210+02	8.146	.00111203+02	8.164	.00111195+02	8.181	.001
11188+02	8.198	.00111180+02	8.214	.00111173+02	8.230	.001
11165+02	8.246	.00111158+02	8.261	.00111150+02	8.276	.001
11143+02	8.290	.00111135+02	8.305	.00111128+02	8.319	.001
11120+02	8.333	.00111113+02	8.346	.00111105+02	8.359	.001
11098+02	8.372	.00111090+02	8.385	.00111083+02	8.397	.001
11075+02	8.410	.00111068+02	8.422	.00111060+02	8.433	.001
11053+02	8.445	.00111045+02	8.456	.00111038+02	8.467	.001
11030+02	8.478	.00111023+02	8.489	.00111015+02	8.500	.001
11008+02	8.510	.00111000+02	8.521	.00116985+02	4.485	.001
17000+02	4.094	.00116992+02	4.280	.00116962+02	5.167	.001
16977+02	4.697	.00116970+02	4.924	.00116940+02	6.009	.001
16955+02	5.427	.00116947+02	5.707	.00116917+02	7.064	.001
16932+02	6.334	.00116925+02	6.685	.00116895+02	8.409	.001
16910+02	7.476	.00116902+02	7.923	.00116872+02	10.155	.001
16887+02	8.940	.00116880+02	9.519	.00116850+02	12.469	.001
16865+02	10.853	.00116857+02	11.621	.00116827+02	15.507	.001
16842+02	13.407	.00116835+02	14.448	.00116805+02	19.972	.001
16820+02	16.901	.00116812+02	18.348	.00116782+02	26.193	.001
16797+02	21.800	.00116790+02	23.862	.00116760+02	35.222	.001
16775+02	28.433	.00116767+02	31.827	.00116737+02	48.278	.001
16752+02	39.066	.00116745+02	43.406	.00116715+02	65.979	.001
16730+02	53.693	.00116722+02	59.625	.00116692+02	85.115	.001
16707+02	72.570	.00116700+02	79.093	.00116670+02	94.594	.001
16685+02	90.105	.00116677+02	93.513	.00116647+02	86.231	.001
16662+02	94.035	.00116655+02	91.025	.00116625+02	66.527	.001
16640+02	80.184	.00116632+02	73.452	.00116602+02	47.631	.001
16617+02	59.776	.00116610+02	53.435	.00116579+02	33.665	.001
16594+02	42.409	.00116587+02	37.769	.00116557+02	24.116	.001
16572+02	30.060	.00116564+02	26.894	.00116534+02	17.629	.001
16549+02	21.674	.00116542+02	19.525	.00116512+02	13.138	.001
16527+02	15.952	.00116519+02	14.463	.00116489+02	9.943	.001
16504+02	11.955	.00116497+02	10.896	.00116467+02	7.603	.001
16482+02	9.084	.00116474+02	8.307	.00116444+02	5.841	.001
16459+02	6.962	.00116452+02	6.376	.00116422+02	4.479	.001
16437+02	5.349	.00116429+02	4.897	.00116399+02	3.402	.001
16414+02	4.093	.00116407+02	3.735	.00116377+02	2.532	.001
16392+02	3.092	.00116384+02	2.803	.00116354+02	1.820	.001
16369+02	2.277	.00116362+02	2.042	.00116332+02	1.233	.001
16347+02	1.611	.00116339+02	1.416	.00116309+02	.756	.001
16324+02	1.062	.00116317+02	.903	.00116287+02	.303	.001
16302+02	.621	.00116294+02	.500	.00116264+02	.175	.001
16279+02	.302	.00116272+02	.224	.00116242+02	.117	.001
16257+02	.147	.00116249+02	.149	.00116219+02	.069	.001
16234+02	.271	.00116227+02	.413	.00116196+02	1.994	.001
16212+02	.942	.00116204+02	1.362	.00116174+02	5.624	.001
16189+02	2.839	.00116181+02	4.005			

16166+02	7.889	00116159+02	11.095	00116151+02	15.696	001
16144+02	22.385	00116136+02	32.206	00116129+02	46.591	001
16121+02	67.020	00116114+02	93.450	00116106+02	121.025	001
16099+02	334.695	00116091+02	138.205	00116084+02	123.368	001
16076+02	303.795	00116069+02	85.602	00116061+02	70.752	001
16054+02	59.173	00116046+02	50.237	00116039+02	43.303	001
16031+02	37.860	00116024+02	33.528	00116016+02	30.032	001
16009+02	27.174	00116001+02	24.808	00115994+02	22.827	001
15986+02	21.153	00115979+02	19.724	00115971+02	18.596	001
15964+02	17.433	00115956+02	16.507	00115949+02	15.696	001
15941+02	14.963	00115934+02	14.352	00115926+02	13.794	001
15919+02	13.297	00115911+02	12.855	00115904+02	12.461	001
15896+02	12.109	00115889+02	11.795	00115881+02	11.516	001
15874+02	11.267	00115866+02	11.047	00115859+02	10.852	001
15851+02	10.682	00115844+02	10.533	00115836+02	10.406	001
15829+02	10.299	00115821+02	10.210	00115814+02	10.139	001
15806+02	10.087	00115798+02	10.051	00115791+02	10.072	001
15783+02	10.030	00115776+02	10.044	00115768+02	10.076	001
15761+02	10.124	00115753+02	10.191	00115746+02	10.215	001
15738+02	10.379	00115731+02	10.502	00115723+02	10.647	001
15716+02	10.813	00115708+02	11.004	00115701+02	11.220	001
15693+02	11.464	00115686+02	11.739	00115678+02	12.047	001
15671+02	12.391	00115663+02	12.716	00115656+02	13.205	001
15648+02	13.686	00115641+02	14.223	00115633+02	14.824	001
15626+02	15.498	00115618+02	16.255	00115611+02	17.108	001
15603+02	18.071	00115596+02	19.162	00115588+02	20.403	001
15581+02	21.819	00115573+02	23.441	00115566+02	25.308	001
15558+02	27.466	00115551+02	29.972	00115543+02	32.895	001
15536+02	36.316	00115528+02	40.334	00115521+02	45.059	001
15513+02	50.608	00115506+02	57.090	00115498+02	64.569	001
15491+02	72.999	00115483+02	82.123	00115476+02	91.335	001
15468+02	99.584	00115461+02	105.434	00115453+02	107.458	001
15446+02	140.873	00115438+02	98.017	00115431+02	88.208	001
15423+02	77.107	00115416+02	66.100	00115408+02	56.035	001
15401+02	47.281	00115393+02	39.887	00115385+02	33.743	001
15378+02	28.675	00115370+02	24.504	00115363+02	21.066	001
15355+02	18.222	00115348+02	15.859	00115340+02	13.884	001
15333+02	12.225	00115325+02	10.822	00115318+02	9.630	001
15310+02	8.511	00115303+02	7.736	00115295+02	6.981	001
15288+02	6.325	00115280+02	5.753	00115273+02	5.253	001
15265+02	4.814	00115258+02	4.426	00115250+02	4.043	001
15243+02	3.779	00115235+02	3.507	00115228+02	3.265	001
15220+02	3.047	00115213+02	2.852	00115205+02	2.677	001
15198+02	2.516	00115190+02	2.315	00115183+02	2.245	001
15175+02	2.128	00115168+02	2.021	00115160+02	1.924	001
15153+02	1.835	00115145+02	1.755	00115138+02	1.681	001
15130+02	1.614	00115123+02	1.552	00115115+02	1.496	001
15108+02	1.445	00115100+02	1.398	00115093+02	1.346	001
15085+02	1.317	00115078+02	1.282	00115070+02	1.250	001
15063+02	1.221	00115065+02	1.194	00115048+02	1.171	001
15040+02	1.150	00115033+02	1.131	00115025+02	1.115	001
15018+02	1.101	00115010+02	1.069	00115003+02	1.078	001
14995+02	1.070	00114987+02	1.064	00114980+02	1.059	001
14972+02	1.056	00114965+02	1.055	00114957+02	1.056	001
14950+02	1.058	00114942+02	1.062	00114935+02	1.068	001
14927+02	1.076	00114920+02	1.085	00114912+02	1.096	001
14905+02	1.110	00114897+02	1.125	00114890+02	1.142	001
14882+02	1.162	00114875+02	1.185	00114867+02	1.207	001
14860+02	1.234	00114852+02	1.263	00114845+02	1.295	001
14837+02	1.330	00114830+02	1.369	00114822+02	1.411	001
14815+02	1.457	00114807+02	1.507	00114800+02	1.562	001

14792+02	1.622	.00114785+02	1.688	.00114777+02	1.759	.001
14770+02	1.838	.00114762+02	1.924	.00114755+02	2.019	.001
14747+02	2.123	.00114740+02	2.234	.00114732+02	2.365	.001
14725+02	2.506	.00114717+02	2.664	.00114710+02	2.839	.001
14702+02	3.037	.00114695+02	3.259	.00114687+02	3.510	.001
14680+02	3.795	.00114672+02	4.122	.00114665+02	4.499	.001
14657+02	4.935	.00114650+02	5.445	.00114642+02	6.046	.001
14635+02	6.762	.00114627+02	7.623	.00114620+02	8.672	.001
14612+02	9.966	.00114605+02	11.598	.00114597+02	13.656	.001
14589+02	16.341	.00114582+02	14.898	.00114574+02	24.702	.001
14567+02	31.300	.00114559+02	40.414	.00114552+02	52.713	.001
14544+02	67.795	.00114537+02	81.790	.00114529+02	86.432	.001
14522+02	77.003	.00114514+02	59.785	.00114507+02	43.299	.001
14499+02	30.798	.00114492+02	22.067	.00114484+02	16.070	.001
14477+02	11.913	.00114469+02	8.975	.00114462+02	6.855	.001
14454+02	5.292	.00114447+02	4.118	.00114440+02	3.222	.001
14432+02	2.528	.00114424+02	1.983	.00114417+02	1.552	.001
14409+02	1.508	.00114402+02	.933	.00114394+02	.711	.001
14387+02	.533	.00114379+02	.391	.00114372+02	.278	.001
14364+02	.191	.00114357+02	.126	.00114349+02	.080	.001
14342+02	.051	.00114334+02	.038	.00114327+02	.039	.001
14319+02	.055	.00114312+02	.045	.00114304+02	.129	.001
14297+02	.187	.00114289+02	.260	.00114282+02	.349	.001
14274+02	.454	.00114267+02	.577	.00114259+02	.721	.001
14252+02	.886	.00114244+02	1.076	.00114237+02	1.294	.001
14229+02	1.543	.00114222+02	1.828	.00114214+02	2.153	.001
14207+02	2.525	.00114199+02	2.951	.00114191+02	3.439	.001
14184+02	3.999	.00114176+02	4.645	.00114169+02	5.391	.001
14161+02	6.254	.00114154+02	7.257	.00114146+02	8.627	.001
14139+02	9.795	.00114131+02	11.404	.00114124+02	13.302	.001
14116+02	15.552	.00114109+02	18.231	.00114101+02	21.435	.001
14094+02	25.282	.00114086+02	29.922	.00114079+02	35.533	.001
14071+02	42.333	.00114064+02	50.573	.00114056+02	60.528	.001
14049+02	72.462	.00114041+02	86.552	.00114034+02	102.822	.001
14026+02	120.865	.00114019+02	139.755	.00114011+02	157.890	.001
14004+02	173.176	.00113996+02	183.558	.00113989+02	187.757	.001
13981+02	185.747	.00113974+02	178.644	.00113966+02	168.156	.001
13959+02	155.868	.00113951+02	143.398	.00113944+02	131.299	.001
13936+02	120.139	.00113929+02	110.118	.00113921+02	101.262	.001
13914+02	93.519	.00113906+02	86.790	.00113899+02	80.564	.001
13891+02	75.935	.00113884+02	71.601	.00113876+02	67.878	.001
13868+02	64.689	.00113861+02	61.973	.00113854+02	59.677	.001
13846+02	57.757	.00113839+02	56.179	.00113831+02	54.916	.001
13824+02	53.845	.00113816+02	53.248	.00113809+02	52.813	.001
13801+02	52.627	.00113793+02	52.679	.00113786+02	52.956	.001
13778+02	53.434	.00113771+02	54.078	.00113763+02	54.825	.001
13756+02	55.573	.00113748+02	56.157	.00113741+02	56.328	.001
13733+02	55.749	.00113726+02	58.016	.00113718+02	50.764	.001
13711+02	45.839	.00113703+02	39.471	.00113696+02	32.292	.001
13688+02	25.126	.00113681+02	18.681	.00113673+02	13.350	.001
13666+02	9.220	.00113658+02	6.174	.00113651+02	4.013	.001
13643+02	2.529	.00113636+02	1.546	.00113628+02	.924	.001
13621+02	.558	.00113613+02	.371	.00113606+02	.210	.001
13598+02	.335	.00113591+02	.420	.00113583+02	.545	.001
13576+02	.698	.00113568+02	.869	.00113561+02	1.052	.001
13553+02	1.243	.00113546+02	1.440	.00113538+02	1.641	.001
13531+02	1.845	.00113523+02	2.053	.00113516+02	2.265	.001
13508+02	2.482	.00113501+02	2.708	.00113493+02	2.940	.001
13486+02	3.184	.00113478+02	3.444	.00113471+02	3.721	.001
13463+02	4.023	.00113456+02	4.354	.00113448+02	4.722	.001
13441+02	5.138	.00113433+02	5.614	.00113426+02	6.170	.001

13418+02	6.628	00113411+02	7.622	00113403+02	8.599	001
13395+02	9.824	00113388+02	11.359	00113380+02	13.418	001
13373+02	16.059	00113365+02	19.410	00113358+02	23.444	001
13350+02	26.387	00113343+02	28.421	00113335+02	21.980	001
13328+02	15.403	00113320+02	9.744	00113313+02	5.910	001
13305+02	3.541	00113298+02	2.114	00113290+02	1.256	001
13283+02	738	00113275+02	428	00113268+02	244	001
13260+02	141	00113253+02	089	00113245+02	070	001
13238+02	071	00113230+02	086	00113223+02	109	001
13215+02	137	00113208+02	188	00113200+02	199	001
13193+02	230	00113185+02	260	00113178+02	289	001
13170+02	315	00113163+02	339	00113155+02	360	001
13148+02	378	00113140+02	394	00113133+02	406	001
13125+02	415	00113118+02	421	00113110+02	423	001
13103+02	421	00113095+02	416	00113088+02	406	001
13080+02	393	00113073+02	376	00113065+02	355	001
13058+02	330	00113050+02	301	00113043+02	270	001
13035+02	236	00113028+02	201	00113020+02	167	001
13013+02	137	00113005+02	115	00112997+02	109	001
12990+02	129	00112982+02	191	00112975+02	118	001
12967+02	546	00112960+02	931	00112952+02	1.552	001
12945+02	2.528	00112937+02	4.017	00112930+02	6.206	001
12922+02	9.250	00112915+02	13.124	00112907+02	17.443	001
12900+02	21.442	00112892+02	24.328	00112885+02	25.756	001
12877+02	25.924	00112870+02	25.292	00112862+02	24.247	001
12855+02	23.098	00112847+02	21.988	00112840+02	20.946	001
12832+02	20.116	00112825+02	19.340	00112817+02	18.768	001
12810+02	18.269	00112802+02	17.870	00112795+02	17.561	001
12787+02	17.331	00112786+02	17.112	00112775+02	17.077	001
12765+02	17.042	00112757+02	17.061	00112750+02	17.132	001
12742+02	17.852	00112735+02	17.419	00112727+02	17.633	001
12720+02	17.893	00112712+02	18.199	00112705+02	18.553	001
12697+02	18.956	00112690+02	19.410	00112682+02	19.918	001
12675+02	20.482	00112667+02	21.108	00112660+02	21.799	001
12652+02	22.560	00112645+02	23.400	00112637+02	24.325	001
12630+02	25.343	00112622+02	25.487	00112615+02	27.707	001
12607+02	29.078	00112599+02	30.577	00112592+02	32.483	001
12584+02	34.161	00112577+02	36.238	00112569+02	38.608	001
12562+02	41.252	00112554+02	44.237	00112547+02	47.626	001
12539+02	51.490	00112532+02	55.922	00112524+02	61.035	001
12517+02	66.975	00112509+02	73.926	00112502+02	82.118	001
12494+02	91.865	00112487+02	103.567	00112479+02	117.758	001
12472+02	135.152	00112464+02	156.712	00112457+02	183.734	001
12449+02	217.958	00112442+02	261.653	00112434+02	317.582	001
12427+02	388.563	00112419+02	475.933	00112412+02	575.882	001
12404+02	673.506	00112397+02	739.983	00112389+02	745.237	001
12382+02	684.027	00112374+02	582.213	00112367+02	422.505	001
12359+02	375.829	00112352+02	297.475	00112344+02	236.705	001
12337+02	190.207	00112329+02	154.614	00112322+02	127.163	001
12314+02	105.767	00112307+02	88.893	00112299+02	75.426	001
12292+02	44.283	00112284+02	55.682	00112277+02	48.368	001
12269+02	8.554	00112262+02	31.175	00112254+02	32.954	001
12247+02	29.172	00112239+02	26.013	00112232+02	21.285	001
12224+02	20.917	00112217+02	18.849	00112209+02	17.536	001
12202+02	15.437	00112194+02	14.022	00112186+02	12.764	001
12179+02	11.642	00112171+02	10.637	00112164+02	9.735	001
12156+02	8.921	00112149+02	6.166	00112141+02	7.520	001
12134+02	5.915	00112126+02	4.364	00112119+02	5.860	001
12111+02	5.399	00112104+02	4.976	00112096+02	4.588	001
12089+02	4.230	00112081+02	3.900	00112074+02	3.595	001
12066+02	3.312	00112059+02	3.051	00112051+02	2.807	001

12044+02	2.581	.00112036+02	2.310	.00112029+02	2.174	.001
12021+02	1.991	.00112014+02	1.819	.00112006+02	1.659	.001
11999+02	1.509	.00111991+02	1.368	.00111984+02	1.236	.001
11976+02	1.113	.00111969+02	.997	.00111961+02	.889	.001
11954+02	.787	.00111946+02	.692	.00111939+02	.604	.001
11931+02	.521	.00111924+02	.445	.00111916+02	.374	.001
11909+02	.310	.00111901+02	.251	.00111894+02	.199	.001
11886+02	.153	.00111879+02	.114	.00111871+02	.083	.001
11864+02	.060	.00111856+02	.049	.00111849+02	.042	.001
11841+02	.051	.00111834+02	.074	.00111826+02	.113	.001
11819+02	.174	.00111811+02	.259	.00111804+02	.375	.001
11796+02	.529	.00111788+02	.733	.00111781+02	1.001	.001
11773+02	1.352	.00111766+02	1.815	.00111758+02	2.430	.001
11751+02	3.253	.00111743+02	4.374	.00111736+02	5.926	.001
11728+02	8.122	.00111721+02	11.309	.00111713+02	16.065	.001
11706+02	23.389	.00111698+02	34.960	.00111691+02	53.297	.001
11683+02	80.421	.00111676+02	111.120	.00111668+02	135.482	.001
11661+02	111.636	.00111653+02	89.739	.00111646+02	63.241	.001
11638+02	47.108	.00111631+02	36.055	.00111623+02	29.408	.001
11616+02	22.981	.00111608+02	19.619	.00111601+02	16.045	.001
11593+02	13.759	.00111586+02	11.962	.00111578+02	10.524	.001
11571+02	9.352	.00111563+02	8.383	.00111556+02	7.573	.001
11548+02	6.881	.00111541+02	6.299	.00111533+02	5.792	.001
11526+02	5.351	.00111518+02	4.964	.00111511+02	4.622	.001
11503+02	4.319	.00111496+02	4.047	.00111488+02	3.804	.001
11481+02	3.584	.00111473+02	3.385	.00111466+02	3.204	.001
11458+02	3.039	.00111451+02	2.887	.00111443+02	2.748	.001
11436+02	2.619	.00111428+02	2.501	.00111421+02	2.391	.001
11413+02	2.288	.00111406+02	2.193	.00111398+02	2.104	.001
11390+02	2.021	.00111383+02	1.943	.00111375+02	1.870	.001
11368+02	1.862	.00111360+02	1.737	.00111353+02	1.676	.001
11345+02	1.618	.00111338+02	1.564	.00111330+02	1.512	.001
11323+02	1.463	.00111315+02	1.417	.00111308+02	1.372	.001
11300+02	1.330	.00111293+02	1.290	.00111285+02	1.252	.001
11278+02	1.216	.00111270+02	1.181	.00111263+02	1.147	.001
11255+02	1.116	.00111248+02	1.085	.00111240+02	1.056	.001
11233+02	1.020	.00111225+02	1.001	.00111218+02	.975	.001
11210+02	.950	.00111203+02	.926	.00111195+02	.903	.001
11188+02	.881	.00111180+02	.860	.00111173+02	.839	.001
11165+02	.819	.00111158+02	.800	.00111150+02	.782	.001
11143+02	.764	.00111135+02	.747	.00111128+02	.730	.001
11120+02	.714	.00111113+02	.698	.00111105+02	.683	.001
11098+02	.669	.00111090+02	.654	.00111083+02	.641	.001
11075+02	.627	.00111068+02	.614	.00111060+02	.602	.001
11053+02	.590	.00111045+02	.578	.00111038+02	.566	.001
11030+02	.555	.00111023+02	.545	.00111015+02	.534	.001
11008+02	.524	.00111000+02	.514	.001		

RUNNING TIME FOR PROBLEM = .155223E+01

XXXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF DF029L00 GR.1 CAZ49 DATA
 ELEMENT 249 CA DATE 10/30/73 RUN NUMBER 1 TIME 10.51.39

FISSION	IF1	ITAPE	LLY	NN	NI	NFCHS	ITMAX	MAXEN	NGROUP	KM	NPS
		TAPE	4	9	3	2	1	5-0	1	24	5
AW	TEMP	CRFN	ERROR	DIST	DELTA0	DELTAE	DELTA L				
249.0000	300.0000	9.1177	-0.0000	243.0000	1.0000	3.8000	-0.0000				
THICK	YMAX	YMIN	ESPAN	A02	B02	C02	D0	CMIN	CHAX		
-0.	.1000E+04	.1000E+00	.6000E+01	.4672E-08	0.	.4325E-03	.3218E+00	.1000E-02	.1000E+01		

ANGULAR MOMENTUM, BOUNDARY CONDITIONS, AND G VALUES OF SPIN GROUPS 1- 1
 GROUP L VALUE G VALUE BOUND CD
 1 0 .500 -0.000

PKEN	GGA	GSI 1	GSI 2	GSI 3	1	2	3	4	5	IGROUP
10.6000	40.0000	.600000	100.000	.100000E-05	0	0	0	0	1	
12.1000	40.0000	.600000	100.000	.100000E-05	0	0	0	0	1	
13.6000	40.0000	.308375	-33.3295	.100000E-05	0	0	1	1	0	1
14.6000	40.0000	.335531	.789801	.100000E-05	0	0	1	1	0	1
16.0000	40.0000	1.62649	-1.83355	.100000E-05	0	0	1	1	0	1
16.8000	40.0000	.292821	129.936	.100000E-05	0	0	1	1	0	1
17.7000	40.0000	.139426E-01	-344.529	.100000E-05	0	0	1	1	0	1
19.8000	40.0000	.437153E-01	14.3895	.100000E-05	0	0	1	1	0	1
21.3000	40.0000	1.92093	98.5632	.100000E-05	0	0	1	1	0	1
21.7000	40.0000	.365208	1.72095	.100000E-05	0	0	1	1	0	1
23.4000	40.0000	.127189	-124.822	.100000E-05	0	0	1	1	0	1
26.0000	40.0000	.288804	477.059	.100000E-05	0	0	1	1	0	1
27.7000	40.0000	.271348	-135.5702	.100000E-05	0	0	1	1	0	1
28.1000	40.0000	1.01949	7.60217	.100000E-05	0	0	1	1	0	1
29.2000	40.0000	.214138E-02	62.7488	.100000E-05	0	0	0	0	0	1
30.3000	40.0000	.740116	3.22383	.100000E-05	0	0	0	0	0	1
31.1000	40.0000	.377822	259.000	.100000E-05	0	0	0	0	0	1
31.3000	40.0000	.156133	48.2290	.100000E-05	0	0	0	0	0	1
33.3000	40.0000	.259280	-194.115	.100000E-05	0	0	0	0	0	1
34.9000	40.0000	.302089E-01	9.59815	.100000E-05	0	0	0	0	0	1
36.2000	40.0000	.292309	194.006	.100000E-05	0	0	0	0	0	1
37.1000	40.0000	.409492	-125.794	.100000E-05	0	0	0	0	0	1
37.9000	40.0000	.135153	486.928	.100000E-05	0	0	0	0	0	1
39.7000	40.0000	.798316	205.000	.100000E-05	0	0	0	0	0	1
40.2000	40.0000	.489467	-169.942	.100000E-05	0	0	0	0	0	1
42.9000	40.0000	.757956E-01	213.014	.100000E-05	0	0	0	0	0	1
45.6000	40.0000	.719914	-4.84271	.100000E-05	0	0	0	0	0	1
46.7000	40.0000	.122536	.846848	.100000E-05	0	0	0	0	0	1
47.6000	40.0000	.509270	4.26041	.100000E-05	0	0	0	0	0	1
48.4000	40.0000	.429861	260.526	.100000E-05	0	0	0	0	0	1
51.3000	40.0000	.692393	5.46814	.100000E-05	0	0	0	0	0	1
52.2000	40.0000	1.02280	43.0422	.100000E-05	0	0	0	0	0	1
54.0000	40.0000	.720060	732.618	.100000E-05	0	0	0	0	0	1
56.1000	40.0000	.579593	546.633	.100000E-05	0	0	0	0	0	1
56.4000	40.0000	.166552	173.330	.100000E-05	0	0	0	0	0	1
57.6000	40.0000	.507260	57.3932	.100000E-05	0	0	0	0	0	1

58.6000	40.0000	.148050E-01	.154513	.100000E-05	0 0 0 0 1
59.3000	40.0000	.313237E-01	4.55866	.100000E-05	0 0 0 0 1
60.7000	40.0000	.245715E-01	9.35397	.100000E-05	0 0 0 0 1
61.5000	40.0000	.724121E-02	.597557E-01	.100000E-05	0 0 0 0 1
65.7000	40.0000	.735580	379.802	.100000E-05	0 0 0 0 1
66.9000	40.0000	.570560E-01	131.214	.100000E-05	0 0 0 0 1
69.2000	40.0000	.694389E-01	-348.403	.100000E-05	0 0 0 0 1
71.2000	40.0000	.833170E-01	4.18120	.100000E-05	0 0 0 0 1
71.7000	40.0000	.190056	2.85770	.100000E-05	0 0 0 0 1
72.7000	40.0000	.109890	393.205	.100000E-05	0 0 0 0 1
74.2000	40.0000	.351770E-01	207.161	.100000E-05	0 0 0 0 1
75.4000	40.0000	.261558	784.816	.100000E-05	0 0 0 0 1
77.2000	40.0000	.299418	649.088	.100000E-05	0 0 0 0 1
78.0000	40.0000	.533800E-01	186.321	.100000E-05	0 0 0 0 1

DATA READ IN FROM .1302E+02 TO .2899E+02 SKIPPING 0 RECORDS WITH A SQUARED CORRELATED ERROR OF -0.

XDIV = .100000E+01 IM = 24
WIN

.30199E-01
RES ENERGY TOTAL WIDTH
.136000E+02 .744667E-01
.146000E+02 .420719E-01
.160000E+02 .483395E-01
.198000E+02 .545840E-01
.217000E+02 .434222E-01
.277000E+02 .549983E-01
.281000E+02 .530064E-01

ECS USED = 51175

.781 SECONDS IN PHMAIN INCLUDING .589 SECONDS IN PARSH WITH NGRAD= 1 AND MAXEN1= 625

PKEN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELM	GROUP	THETA
10.60	C.	40.00 0.		.600000	0.	100.0000 0.		.0000 0.		0 0 0	1	0.00
12.10	0.	40.00 0.		.600000	0.	100.0000 0.		.0000 0.		0 0 0	1	0.00
13.60	0.	40.00 0.		.308375	.428E+07	-33.3295	.98E+04	.0000 0.		0 0 0	1	179.99
14.60	0.	40.00 0.		.735531	.217E+06	-1.7898	.950E+05	.0000 0.		0 0 1 0	1	.06
16.00	0.	40.00 0.		1.62649	.148E+07	-1.8335	.181E+07	.0000 0.		0 0 1 0	1	179.95
17.80	0.	40.00 0.		.829821	.273E+08	-129.9360	.240E+05	.0000 0.		0 0 1 0	1	.00
17.70	0.	40.00 0.		.139426E-01	.805E+08	-344.5290	.187E+04	.0000 0.		0 0 1 0	1	179.99
19.80	0.	40.00 0.		.437153E-01	.839E+08	14.3895	.797E+05	.0000 0.		0 0 1 0	1	.01
21.30	0.	40.00 0.		1.92093	.243E+08	98.5632	.305E+06	.0000 0.		0 0 1 0	1	.00
21.70	0.	40.00 0.		.365208	.711E+06	1.7209	.151E+06	.0000 0.		0 0 1 0	1	.04
23.40	0.	40.00 0.		.137789	.166E+09	-124.8220	.112E+06	.0000 0.		0 0 1 0	1	179.99
26.00	0.	40.00 0.		.268804	.250E+09	477.0590	.748E+05	.0000 0.		0 0 1 0	1	.00
27.70	0.	40.00 0.		.271348	.579E+08	-13.5702	.554E+06	.0000 0.		0 0 1 0	1	179.98
28.10	0.	40.00 0.		1.01949	.164E+08	7.6022	.189E+07	.0000 0.		0 0 1 0	1	.02
29.20	0.	40.00 0.		.214738E-02		62.7488 0.		.0000 0.		0 0 0 0	1	.00
29.80	0.	40.00 0.		.740116	0.	3.3238 0.		.0000 0.		0 0 0 0	1	.03
30.30	0.	40.00 0.		.377622	0.	259.0000 0.		.0000 0.		0 0 0 0	1	.00
31.10	0.	40.00 0.		1.56133	0.	48.0290 0.		.0000 0.		0 0 0 0	1	.00
31.30	0.	40.00 0.		.259280	0.	-194.1750 0.		.0000 0.		0 0 0 0	1	179.99
33.30	0.	40.00 0.		.302089E-01	0.	9.5987 0.		.0000 0.		0 0 0 0	1	.01
36.20	0.	40.00 0.		.292309	0.	194.0040 0.		.0000 0.		0 0 0 0	1	.00
37.10	0.	40.00 0.		.409492	0.	-125.7940 0.		.0000 0.		0 0 0 0	1	179.99
37.90	0.	40.00 0.		1.35153	0.	486.9280 0.		.0000 0.		0 0 0 0	1	.00
39.70	0.	40.00 0.		.798316	0.	20.0000 0.		.0000 0.		0 0 0 0	1	.00
40.20	0.	40.00 0.		.489987	0.	-169.9420 0.		.0000 0.		0 0 0 0	1	.01
42.90	0.	40.00 0.		.757956E-01	0.	213.0140 0.		.0000 0.		0 0 0 0	1	179.97
45.60	0.	40.00 0.		.719914	0.	-4.8427 0.		.0000 0.		0 0 0 0	1	.04
46.70	0.	40.00 0.		.122536	0.	.6468 0.		.0000 0.		0 0 0 0	1	.02
47.60	0.	40.00 0.		.509270	0.	4.2604 0.		.0000 0.		0 0 0 0	1	.00
48.40	0.	40.00 0.		.429661	0.	260.5260 0.		.0000 0.		0 0 0 0	1	.00
51.30	0.	40.00 0.		.692393	0.	5.4681 0.		.0000 0.		0 0 0 0	1	.00
52.20	0.	40.00 0.		1.02280	0.	43.0422 0.		.0000 0.		0 0 0 0	1	.00
54.00	0.	40.00 0.		.720060	0.	733.6180 0.		.0000 0.		0 0 0 0	1	.00
56.10	0.	40.00 0.		.579553	0.	546.6330 0.		.0000 0.		0 0 0 0	1	.00
56.40	0.	40.00 0.		.166552	0.	173.3300 0.		.0000 0.		0 0 0 0	1	.00
57.60	0.	40.00 0.		.507260	0.	57.3932 0.		.0000 0.		0 0 0 0	1	.00
58.60	0.	40.00 0.		.148050E-01	0.	1.545 0.		.0000 0.		0 0 0 0	1	.00
59.30	0.	40.00 0.		.313237E-01	0.	4.5587 0.		.0000 0.		0 0 0 0	1	.14
60.70	0.	40.00 0.		.245715E-01	0.	9.3587 0.		.0000 0.		0 0 0 0	1	.02
61.50	0.	40.00 0.		.72421E-02	0.	.0598 0.		.0000 0.		0 0 0 0	1	.23
65.70	0.	40.00 0.		.735560	0.	379.8020 0.		.0000 0.		0 0 0 0	1	.00
66.90	0.	40.00 0.		.570560E-01	0.	131.2140 0.		.0000 0.		0 0 0 0	1	.00
69.20	0.	40.00 0.		.694389E-01	0.	-348.4030 0.		.0000 0.		0 0 0 0	1	179.99
71.20	0.	40.00 0.		.833170E-01	0.	2.1812 0.		.0000 0.		0 0 0 0	1	.02
71.70	0.	40.00 0.		.190056	0.	2.8517 0.		.0000 0.		0 0 0 0	1	.03
72.70	0.	40.00 0.		.109890	0.	393.2050 0.		.0000 0.		0 0 0 0	1	.00
74.20	0.	40.00 0.		.351570E-01	0.	207.1610 0.		.0000 0.		0 0 0 0	1	.00
75.40	0.	40.00 0.		.261558	0.	784.8160 0.		.0000 0.		0 0 0 0	1	.00
77.20	0.	40.00 0.		.599418	0.	649.0880 0.		.0000 0.		0 0 0 0	1	.00
78.00	0.	40.00 0.		.533800E-01	0.	186.3210 0.		.0000 0.		0 0 0 0	1	.00
.1301770E+02	.9544710E+01	.1304200E+02	.9514363E+01	.1306420E+02	.9545602E+01	.1309050E+02	.964834E+01	.1311480E+02	.964834E+01	.1311480E+02	.964834E+01	.1311480E+01
.1313620E+02	.1010773E+02	.1316350E+02	.1049204E+02	.1318190E+02	.1100767E+02	.1321230E+02	.116857E+02	.1321230E+02	.116857E+02	.1321230E+02	.116857E+02	.1321230E+02
.1326120E+02	.1366984E+02	.1328260E+02	.1501047E+02	.1331110E+02	.143129E+02	.1333460E+02	.149736E+02	.1333460E+02	.149736E+02	.1333460E+02	.149736E+02	.1333460E+02
.1338370E+02	.2682506E+02	.134030E+02	.3489340E+02	.1343290E+02	.511866E+02	.1345700E+02	.6051899E+02	.1345700E+02	.6051899E+02	.1345700E+02	.6051899E+02	.1345700E+02
.1350690E+02	.1326846E+03	.1353160E+02	.2326362E+02	.1355630E+02	.3636970E+03	.1358100E+02	.1358100E+02	.1358100E+02	.1358100E+02	.1358100E+02	.1358100E+02	.1358100E+02
.13633060E+02	.2715102E+03	.1365540E+02	.1749283E+03	.1368020E+02	.1090408E+03	.1370510E+02	.7252739E+02	.1370510E+02	.7252739E+02	.1370510E+02	.7252739E+02	.1370510E+02

1376490E+02 2764642E+02 1380470E+02 22235057E+02 1389970E+02 2001699E+02 1385470E+02 1499184E+02
1387970E+02 1390470E+02 1392980E+02 99977490E+01 1395490E+02 8995909E+01 1398000E+02 820996E+01
1405100E+02 1403200E+02 1405540E+02 664044E+01 1408600E+02 829633E+01 1410580E+02 601775E+01
1413110E+02 1416300E+02 1418160E+02 5487219E+01 1420690E+02 539664E+01 1423220E+02 5347011E+01
1425760E+02 1428300E+02 1430040E+02 553775E+01 1432380E+02 5614870E+01 1435920E+02 5890498E+01
1436470E+02 1441200E+02 1443570E+02 8666064E+01 1446120E+02 1080616E+02 1447350E+02 1433735E+02
1451230E+02 1453790E+02 1456260E+02 2065737E+02 1458920E+02 1881161E+02 1461490E+02 1493589E+02
1464000E+02 1466630E+02 1469240E+02 3765528E+01 1471780E+02 1024613E+01 1474350E+02 101710E+01
1469300E+02 1479520E+02 1482100E+02 9077991E+00 1484690E+02 1047305E+01 1500260E+02 1530958E+01
1489870E+02 1492460E+02 1495060E+02 1408179E+01 1497660E+02 147305E+01 150260E+02 1530958E+01
1502840E+02 1505470E+02 1508070E+02 167087E+01 151080E+02 173407E+01 1513290E+02 1741031E+01
1515910E+02 1518520E+02 1521140E+02 1819879E+01 1523760E+02 1837279E+01 1526390E+02 1845342E+01
1520170E+02 1523640E+02 1526270E+02 1854332E+01 1536900E+02 1846255E+01 1539530E+02 1831644E+01
152470E+02 1527780E+02 1530470E+02 1547450E+02 1539521E+01 1550900E+02 1689078E+01 1552740E+02 1626258E+01
1553390E+02 1556900E+02 1560090E+02 1347326E+01 1563340E+02 122038E+01 1566000E+02 107954E+01
156860E+02 1571320E+02 1573990E+02 1573990E+02 1576650E+02 157958E+01 1579320E+02 140570E+01
1581990E+02 158460E+02 1587340E+02 120122E+02 1590010E+02 1563974E+02 1592690E+02 140570E+01
1595390E+02 1600750E+02 1604210E+02 1554943E+03 1603430E+02 1408771E+03 1606120E+02 119397E+03
1608820E+02 1611500E+02 1621790E+02 1621730E+02 1634030E+02 1616910E+02 162977E+02 1609277E+02
162320E+02 1625020E+02 163302E+02 3433302E+02 1627330E+02 341011E+02 163440E+02 343998E+02 1633160E+02 351822E+02
1635870E+02 1638590E+02 1642110E+02 5894568E+02 1644130E+02 405023E+02 1644030E+02 435949E+02 1646760E+02 351822E+02
164940E+02 1652210E+02 1656990E+02 1656990E+02 166440E+02 1674093E+02 1657680E+02 78669E+02 1660410E+02 578298E+02
1663170E+02 1665890E+02 1669630E+02 1669630E+02 167330E+02 170037E+03 1671380E+02 22925E+03 1674130E+02 578298E+02
1676870E+02 1679630E+02 1683280E+02 1683280E+02 168633E+02 168633E+02 1688140E+02 283812E+03 1687890E+02 578298E+02
1680880E+02 1683420E+02 168640E+02 168640E+02 1689581E+02 1689581E+02 1691720E+02 1701720E+02 1691720E+02 578298E+02
168665E+02 1690490E+02 1693420E+02 1693420E+02 169610E+02 169610E+02 1698280E+02 1701720E+02 1698280E+02 578298E+02
1698870E+02 1701720E+02 1704490E+02 1704490E+02 170720E+02 170720E+02 1709340E+02 1715600E+02 1715600E+02 1164321E+02
1718390E+02 1721170E+02 1724330E+02 836133E+01 1723960E+02 173740E+02 1712820E+02 140911E+02 1715600E+02 1164321E+02
172330E+02 1725130E+02 1728330E+02 151133E+01 1727330E+02 493633E+01 1747330E+02 5879078E+01 1747330E+02 5879078E+01
173430E+02 1736130E+02 1739150E+02 5427740E+02 1751760E+02 5427740E+02 1751760E+02 5427740E+02 1751760E+02 5427740E+02
174040E+02 1743220E+02 1746220E+02 8677967E+01 1766640E+02 942175E+02 176880E+02 1001410E+02 1771690E+02 103644E+02
174520E+02 1045013E+02 1777350E+02 102800E+02 1780190E+02 992134E+01 1783020E+02 945324E+01 1785860E+02 103644E+02
178780E+02 1791540E+02 179530E+02 179530E+02 179530E+02 179530E+02 179530E+02 179530E+02 179530E+02 179530E+02
1802930E+02 1805780E+02 1808780E+02 1808780E+02 1808780E+02 1808780E+02 1808780E+02 1808780E+02 1808780E+02 1808780E+02
1817220E+02 1820040E+02 1823440E+02 1823440E+02 1823440E+02 1823440E+02 1823440E+02 1823440E+02 1823440E+02 1823440E+02
1831540E+02 183440E+02 183730E+02 183730E+02 183730E+02 183730E+02 183730E+02 183730E+02 183730E+02 183730E+02
1845940E+02 1848850E+02 1851740E+02 1851740E+02 1851740E+02 1851740E+02 1851740E+02 1851740E+02 1851740E+02 1851740E+02
185940E+02 186230E+02 186520E+02 186520E+02 186520E+02 186520E+02 186520E+02 186520E+02 186520E+02 186520E+02
1876930E+02 1879840E+02 1882740E+02 1882740E+02 1882740E+02 1882740E+02 1882740E+02 1882740E+02 1882740E+02 1882740E+02
1890500E+02 189340E+02 189630E+02 189630E+02 189630E+02 189630E+02 189630E+02 189630E+02 189630E+02 189630E+02
1904130E+02 1907060E+02 1910000E+02 1910000E+02 1910000E+02 1910000E+02 1910000E+02 1910000E+02 1910000E+02 1910000E+02
1918810E+02 1921760E+02 1924660E+02 1924660E+02 1924660E+02 1924660E+02 1924660E+02 1924660E+02 1924660E+02 1924660E+02
1933500E+02 1936510E+02 1939460E+02 1939460E+02 1939460E+02 1939460E+02 1939460E+02 1939460E+02 1939460E+02 1939460E+02
1948330E+02 1951310E+02 1954260E+02 1954260E+02 1954260E+02 1954260E+02 1954260E+02 1954260E+02 1954260E+02 1954260E+02
1963200E+02 1966180E+02 1969160E+02 1969160E+02 1969160E+02 1969160E+02 1969160E+02 1969160E+02 1969160E+02 1969160E+02
1978110E+02 1981100E+02 1984090E+02 1984090E+02 1984090E+02 1984090E+02 1984090E+02 1984090E+02 1984090E+02 1984090E+02
1993070E+02 1996070E+02 1999070E+02 1999070E+02 1999070E+02 1999070E+02 1999070E+02 1999070E+02 1999070E+02 1999070E+02
200890E+02 201177E+02 2014660E+02 2014660E+02 2014660E+02 2014660E+02 2014660E+02 2014660E+02 2014660E+02 2014660E+02
2023170E+02 2026190E+02 2029240E+02 2029240E+02 2029240E+02 2029240E+02 2029240E+02 2029240E+02 2029240E+02 2029240E+02
2033100E+02 2036160E+02 2039240E+02 2039240E+02 2039240E+02 2039240E+02 2039240E+02 2039240E+02 2039240E+02 2039240E+02
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206360E+02 2066640E+02 2069690E+02 2069690E+02 2069690E+02 2069690E+02 2069690E+02 2069690E+02 2069690E+02 2069690E+02
2078450E+02 2081400E+02 2084450E+02 2084450E+02 2084450E+02 2084450E+02 2084450E+02 2084450E+02 2084450E+02 2084450E+02
2093920E+02 2096870E+02 2099820E+02 2099820E+02 2099820E+02 2099820E+02 2099820E+02 2099820E+02 2099820E+02 2099820E+02
2104820E+02 2107770E+02 2110720E+02 2110720E+02 2110720E+02 2110720E+02 2110720E+02 2110720E+02 2110720E+02 2110720E+02
2114820E+02 2117770E+02 2120720E+02 2120720E+02 2120720E+02 2120720E+02 2120720E+02 2120720E+02 2120720E+02 2120720E+02
2129300E+02 2132250E+02 2135200E+02 2135200E+02 2135200E+02 2135200E+02 2135200E+02 2135200E+02 2135200E+02 2135200E+02
2139300E+02 2142250E+02 2145200E+02 2145200E+02 2145200E+02 2145200E+02 2145200E+02 2145200E+02 2145200E+02 2145200E+02
2145820E+02 2148770E+02 2151720E+02 2151720E+02 2151720E+02 2151720E+02 2151720E+02 2151720E+02 2151720E+02 2151720E+02
2151700E+02 2154650E+02 2157600E+02 2157600E+02 2157600E+02 2157600E+02 2157600E+02 2157600E+02 2157600E+02 2157600E+02
2161140E+02 2164090E+02 2167040E+02 2167040E+02 2167040E+02 2167040E+02 2167040E+02 2167040E+02 2167040E+02 2167040E+02
2167750E+02 2170700E+02 2173650E+02 2173650E+02 2173650E+02 2173650E+02 2173650E+02 2173650E+02 2173650E+02 2173650E+02
2179750E+02 2182700E+02 2185650E+02 2185650E+02 2185650E+02 2185650E+02 2185650E+02 2185650E+02 2185650E+02 2185650E+02
2185890E+02 2188840E+02 2191790E+02 2191790E+02 2191790E+02 2191790E+02 2191790E+02 2191790E+02 2191790E+02 2191790E+02
219750E+02 2200450E+02 2203400E+02 2203400E+02 2203400E+02 2203400E+02 2203400E+02 2203400E+02 2203400E+02 2203400E+02
2208500E+02 2211450E+02 2214400E+02 2214400E+02 2214400E+02 2214400E+02 2214400E+02 2214400E+02 2214400E+02 2214400E+02
2223500E+02 2226450E+02 2229400E+02 2229400E+02 2229400E+02 2229400E+02 2229400E+02 2229400E+02 2229400E+02 2229400E+02

22401A0E+02	77B1668E+01	2243360E+02	7352608E+01	2246540E+02	6980132E+01	2249720E+02	6658350E+01	2252910E+02	6382916E+01
2256100E+02	6151822E+01	2252900E+02	5963552E+01	2262780E+02	5917743E+01	2265880E+02	5712615E+01	2268880E+02	5651149E+01
2272080E+02	5835608E+01	2275680E+02	5668142E+01	2278490E+02	5757578E+01	2281590E+02	590981E+01	2284900E+02	737700E+01
2286120E+02	6859125E+01	2291330E+02	6897113E+01	2294550E+02	7488189E+01	2297760E+02	8282896E+02	2300980E+02	9361284E+01
2304210E+02	1084756E+02	2307430E+02	1291373E+02	2310960E+02	7581300E+02	2313890E+02	1989392E+02	2317120E+02	2565473E+02
2320360E+02	3381037E+02	2333590E+02	4518864E+02	2326430E+02	6068091E+02	233010E+02	8071300E+02	233320E+02	1041266E+03
2336560E+02	1257114E+03	2339810E+02	1340333E+03	2343600E+02	1189466E+03	2346310E+02	9069531E+02	2349570E+02	6568819E+02
2352820E+02	4815000E+02	2356080E+02	3636705E+02	2359340E+02	1284239E+02	2362610E+02	2295860E+02	2375970E+02	1912798E+02
23691A0E+02	1636622E+02	237210E+02	1433433E+02	2375980E+02	1280153E+02	2378960E+02	1162193E+02	2382240E+02	1070180E+02
238510E+02	9978844E+01	2388800E+02	9402138E+01	2392080E+02	8942707E+01	2395370E+02	8575572E+01	2398650E+02	828451E+02
2401950E+02	8954639E+01	2405240E+02	7877159E+01	2408330E+02	7743692E+01	2411930E+02	7617826E+01	2415130E+02	7588278E+01
2418430E+02	7547140E+01	2421740E+02	7553072E+01	2425540E+02	8004414E+01	2428350E+02	8151555E+01	2431600E+02	7883616E+01
2434980E+02	7770476E+01	2438290E+02	7817659E+01	244110E+02	804414E+01	2444330E+02	8151555E+01	2448250E+02	8317809E+01
2451580E+02	8505117E+01	2454900E+02	8712759E+01	2458230E+02	8942629E+01	2461300E+02	9193833E+01	2464900E+02	9469824E+01
2468230E+02	9770362E+01	2471570E+02	1009782E+02	247410E+02	1045416E+02	2478250E+02	104115E+02	2481600E+02	1126251E+02
248490E+02	1171962E+02	2489270E+02	1221102E+02	2491940E+02	1275856E+02	2495000E+02	1335575E+02	2498350E+02	140055E+02
250110E+02	1570887E+02	250570E+02	1547866E+02	2508440E+02	1632866E+02	2511800E+02	1726235E+02	2515170E+02	182927E+02
2518940E+02	1943348E+02	2521910E+02	2069862E+02	2525280E+02	2210570E+02	2528660E+02	2367970E+02	2532040E+02	2544479E+02
2535420E+02	2742913E+02	2538900E+02	2966704E+02	2542190E+02	3220377E+02	2545880E+02	3089231E+02	2548970E+02	3837985E+02
2552360E+02	7031314E+02	2555750E+02	4641807E+02	2559150E+02	5131464E+02	2562350E+02	5699811E+02	2565950E+02	6371820E+02
2569350E+02	7030173E+02	2572160E+02	7814355E+02	2576170E+02	8663270E+02	2579380E+02	9552475E+02	2582990E+02	1044170E+03
25864A0E+02	112717E+03	259020E+02	1176451E+03	2593440E+02	1243128E+03	2596660E+02	1258894E+03	2600080E+02	1238697E+03
2603910E+02	1182558E+03	2606740E+02	1096360E+03	2610370E+02	9903169E+02	2613800E+02	8757286E+02	2617240E+02	761896E+02
2620870E+02	6958323E+02	2624110E+02	5607580E+02	2627950E+02	4779148E+02	2631000E+02	4668880E+02	2634440E+02	346887E+02
2637890E+02	2963380E+02	2641340E+02	2538715E+02	2644900E+02	2181762E+02	2648250E+02	1881052E+02	265110E+02	1027458E+02
2655170E+02	1412598E+02	2658630E+02	1230856E+02	2662090E+02	1074417E+02	2665360E+02	9409044E+01	26686410E+02	8761438E+01
267250E+02	7272717E+01	2679370E+02	6618030E+01	2679450E+02	5677280E+01	2682730E+02	5033443E+01	2686410E+02	4474100E+01
2689890E+02	998791E+01	2693370E+02	3565544E+01	2696960E+02	3198889E+01	2700350E+02	2881148E+01	2703840E+02	2609101E+01
2707340E+02	237875E+01	2710830E+02	2167005E+01	2714330E+02	2335351E+01	2717930E+02	1926535E+01	2721330E+02	1869494E+01
272440E+02	1685452E+01	2728340E+02	202829E+01	2731950E+02	2474021E+01	2735360E+02	3224917E+01	2738880E+02	4448886E+01
2742390E+02	6475232E+01	2745910E+02	9851263E+01	2749330E+02	1535933E+02	2752980E+02	2422500E+02	2756480E+02	346888E+02
2760010E+02	5943313E+02	2763540E+02	9610144E+02	276770E+02	1356378E+03	277600E+02	1324244E+03	2774140E+02	1161312E+03
277680E+02	5551197E+02	2781220E+02	4908027E+02	2784760E+02	518817E+02	2788310E+02	6300197E+02	2791860E+02	8390653E+02
2795410E+02	1171684E+03	2798960E+02	1715339E+03	2802510E+02	2009026E+03	2806070E+02	2448818E+03	2809630E+02	2651938E+03
2813190E+02	329992E+03	2816150E+02	8108233E+02	2820220E+02	2392746E+02	2823890E+02	1224167E+02	2827460E+02	6427184E+01
2831030E+02	3419604E+01	2834600E+02	1864896E+01	2838180E+02	1036765E+02	2841760E+02	5764597E+00	2845340E+02	3128884E+00
2848930E+02	1633218E+02	2852510E+02	8674788E+01	2856100E+02	5958209E+01	2859690E+02	6888765E+01	2863280E+02	1043698E+00
2866880E+02	1647301E+00	2870480E+02	246004E+00	287480E+02	3442601E+00	2877680E+02	4055335E+00	2881280E+02	6049343E+00
2884890E+02	7687781E+00	2888500E+02	9602037E+00	2892110E+02	1183513E+01	2895720E+02	1441466E+01	2899340E+02	1700156E+01

000001

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

ELEMENT = 249 CA

DATE = 10/30/73

RUNNO = 1

ITERATION = 0

179

STARTING PHI .854008E+04 PSEARCH METHOD ITERATION 1

.209 SECONDS IN PHIMAIN INCLUDING	.183 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 625
.209 SECONDS IN PHIMAIN INCLUDING	.183 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 625
.211 SECONDS IN PHIMAIN INCLUDING	.184 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 625

MAGNITUDE OF GRADIENT .548209E+06

STARTING PHI .854008E+04 FINAL PHI .572690E+04 DIAG. WEIGHTS .250302E+06 COS(THETA) .14512PE+00 NSAV 2
ETA .100000E+01

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

PKEN	DIAG	GGA	DIAG	GSI(1)	DIAG	GSI(2)	DIAG	GSI(3)	DIAG	IELIM	GROUP	THETA
10.60	0.	40.00 0.		.600000	0.	100.0000 0.		.0000 0.		0 0 0 0	1	0.00
12.10	0.	40.00 0.		.600000	0.	100.0000 0.		.0000 0.		0 0 0 0	1	0.00
13.60	0.	40.00 0.		.136312	.428E+07	-321.1773	.898E+04	.0000 0.		0 0 0 0	1	179.9A
14.60	0.	40.00 0.		.528155	.217E+06	.9622	.950E+05	.0000 0.		0 0 1 1 0	1	.05
16.00	0.	40.00 0.		1.25922	.148E+07	-1.6470	.181E+07	.0000 0.		0 0 1 1 0	1	179.95
18.80	0.	40.00 0.		.429911	.273E+08	140.9056	.240E+05	.0000 0.		0 0 1 1 0	1	.00
17.70	0.	40.00 0.		.268390E-02	.805E+08	-338.0087	.187E+04	.0000 0.		0 0 1 1 0	1	179.99
19.80	0.	40.00 0.		.490987E-01	.639E+08	14.8898	.797E+05	.0000 0.		0 0 1 1 0	1	.01
21.30	0.	40.00 0.		2.15775	.243E+08	115.2025	.306E+06	.0000 0.		0 0 1 1 0	1	.03
23.40	0.	40.00 0.		1.15549	.711E+06	12.5390	.151E+06	.0000 0.		0 0 1 1 0	1	.00
26.00	0.	40.00 0.		.118658	.198E+09	-121.7757	.112E+06	.0000 0.		0 0 1 1 0	1	.03
27.70	0.	40.00 0.		.258700	.250E+09	457.9413	.748E+05	.0000 0.		0 0 1 1 0	1	179.99
28.10	0.	40.00 0.		.235164	.579E+08	-17.2612	.554E+06	.0000 0.		0 0 1 1 0	1	.00
30.20	0.	40.00 0.		.870552	.164E+08	7.0982	.189E+07	.0000 0.		0 0 1 1 0	1	179.9A
30.30	0.	40.00 0.		.214738E-02	0.	62.7488 0.		.0000 0.		0 0 0 0 0	1	.02
31.10	0.	40.00 0.		.377622	0.	3.3238 0.		.0000 0.		0 0 0 0 0	1	.00
31.30	0.	40.00 0.		.156133	0.	259.0000 0.		.0000 0.		0 0 0 0 0	1	.03
33.30	0.	40.00 0.		.258280	0.	48.9290 0.		.0000 0.		0 0 0 0 0	1	.00
34.90	0.	40.00 0.		.308089E-01	0.	-194.1750 0.		.0000 0.		0 0 0 0 0	1	179.99
35.20	0.	40.00 0.		.292309	0.	9.5987 0.		.0000 0.		0 0 0 0 0	1	.01
37.10	0.	40.00 0.		.409492	0.	194.0060 0.		.0000 0.		0 0 0 0 0	1	.00
37.90	0.	40.00 0.		.135153	0.	-125.7940 0.		.0000 0.		0 0 0 0 0	1	179.99
39.70	0.	40.00 0.		.798316	0.	486.9280 0.		.0000 0.		0 0 0 0 0	1	.00
40.20	0.	40.00 0.		.489967	0.	20.0000 0.		.0000 0.		0 0 0 0 0	1	.01
42.90	0.	40.00 0.		.757958E-01	0.	-169.9420 0.		.0000 0.		0 0 0 0 0	1	179.99
45.60	0.	40.00 0.		.719914	0.	213.0140 0.		.0000 0.		0 0 0 0 0	1	.00
46.70	0.	40.00 0.		.122536	0.	-4.8427 0.		.0000 0.		0 0 0 0 0	1	179.97
47.60	0.	40.00 0.		.509270	0.	84.68 0.		.0000 0.		0 0 0 0 0	1	.06
48.40	0.	40.00 0.		.429661	0.	4.2264 0.		.0000 0.		0 0 0 0 0	1	.02
51.30	0.	40.00 0.		.692393	0.	51.6681 0.		.0000 0.		0 0 0 0 0	1	.00
52.20	0.	40.00 0.		1.02280	0.	43.0422 0.		.0000 0.		0 0 0 0 0	1	.00
54.00	0.	40.00 0.		.728060	0.	733.6180 0.		.0000 0.		0 0 0 0 0	1	.00
56.40	0.	40.00 0.		.579553	0.	546.6330 0.		.0000 0.		0 0 0 0 0	1	.00
57.60	0.	40.00 0.		.164552	0.	173.3300 0.		.0000 0.		0 0 0 0 0	1	.00
58.60	0.	40.00 0.		.507260	0.	57.3932 0.		.0000 0.		0 0 0 0 0	1	.14
59.30	0.	40.00 0.		.313237E-01	0.	1.545 0.		.0000 0.		0 0 0 0 0	1	.02
60.70	0.	40.00 0.		.245715E-01	0.	9.5587 0.		.0000 0.		0 0 0 0 0	1	.01
61.50	0.	40.00 0.		.724121E-02	0.	9.3540 0.		.0000 0.		0 0 0 0 0	1	.23
66.90	0.	40.00 0.		.735580	0.	379.5020 0.		.0000 0.		0 0 0 0 0	1	.00
69.20	0.	40.00 0.		.570580E-01	0.	131.12140 0.		.0000 0.		0 0 0 0 0	1	.00
71.20	0.	40.00 0.		.694389E-01	0.	-348.4030 0.		.0000 0.		0 0 0 0 0	1	179.99
71.70	0.	40.00 0.		.833170E-01	0.	4.1812 0.		.0000 0.		0 0 0 0 0	1	.02
72.70	0.	40.00 0.		.190056	0.	2.9577 0.		.0000 0.		0 0 0 0 0	1	.03
72.70	0.	40.00 0.		.109890	0.	393.2050 0.		.0000 0.		0 0 0 0 0	1	.00
74.20	0.	40.00 0.		.351570E-01	0.	207.1610 0.		.0000 0.		0 0 0 0 0	1	.00
75.40	0.	40.00 0.		.261558	0.	784.6160 0.		.0000 0.		0 0 0 0 0	1	.00
77.20	0.	40.00 0.		.299418	0.	649.0880 0.		.0000 0.		0 0 0 0 0	1	.00
78.00	0.	40.00 0.		.538000E-01	0.	186.3210 0.		.0000 0.		0 0 0 0 0	1	.00
1301770E+02	.4617735E+01	.1304200E+02	.4495526E+01	.1306620E+02	.4387837E+01	.1309650E+02	.431579AE+01	.13114AE+02	.428224AE+01			
1313920E+02	.4291227E+01	.1316350E+02	.434821AE+01	.1318790E+02	.4460422E+01	.1321230E+02	.46398AE+01	.1321670E+02	.449937AE+01			
1326120E+02	.5249748E+01	.1328560E+02	.5693375E+01	.1331010E+02	.6124692E+01	.1333460E+02	.7088577E+01	.1335920E+02	.481078E+01			
1338370E+02	.1003729E+02	.1340830E+02	.1320135E+02	.1343250E+02	.1979680E+02	.1345760E+02	.2346634E+02	.1348220E+02	.340574AE+02			
1350590E+02	.5379200E+02	.1353160E+02	.9730356E+02	.1355630E+02	.156102AE+03	.1358100E+02	.2156150E+03	.1360580E+02	.2156150E+03			
1363060E+02	.1338605E+03	.136554E+02	.6189551E+02	.1368920E+02	.524406AE+02	.1370510E+02	.360996E+02	.1373000E+02	.2569756E+02			

1375490E+02 1917116E+02 1377980E+02 1546435E+02 1380470E+02 1288305E+02 1382970E+02 1186773E+02 1385470E+02 9511814E+01
1387970E+02 8575137E+01 1390470E+02 8043086E+01 1392940E+02 7155922E+01 1395490E+02 1186773E+02 1398400E+02 6574746E+01
1400510E+02 6087507E+01 1403020E+02 5891652E+01 1405240E+02 5578496E+01 1408090E+02 1408090E+02 1410580E+02 5542812E+01
1413110E+02 5524369E+01 1415630E+02 5529854E+01 1418140E+02 5757053E+01 1426950E+02 5647750E+01 1432220E+02 7401484E+01
1425760E+02 5393553E+01 1428300E+02 6177075E+01 1430840E+02 658467E+01 1433300E+02 6822475E+01 1435920E+02 7401484E+01
1438470E+02 8339976E+01 1441200E+02 1027465E+01 1443040E+02 1288018E+02 1446120E+02 1363515E+02 1448680E+02 2712874E+02
1451230E+02 277386E+02 1453750E+02 3266622E+02 1456030E+02 1312430E+02 1459240E+02 3594940E+02 1461490E+02 2712874E+02
1460060E+02 1152148E+02 1468630E+02 1479520E+02 1479520E+02 14892416E+00 14892416E+00 14892416E+00 14892416E+00 14892416E+00
1476930E+02 9563675E+02 1479520E+02 1479520E+02 1479520E+02 1479520E+02 1479520E+02 1479520E+02 1479520E+02 1479520E+02
1489970E+02 1539249E+01 1492460E+02 1714171E+01 1495060E+02 1860090E+01 1497600E+02 195553E+01 1497600E+02 1539249E+01
1502840E+02 2261618E+01 1505460E+02 2354174E+01 1508070E+02 2461199E+01 1510600E+02 2520948E+01 1512390E+02 265945E+01
1515910E+02 2725516E+01 1518520E+02 2840578E+01 1521140E+02 2942430E+01 1523760E+02 309444E+01 1526390E+02 3080299E+01
1529010E+02 3151340E+02 1531640E+02 3217688E+01 1544810E+02 3454192E+01 1547450E+02 3475117E+01 1550090E+02 333739E+01 1559530E+02 3381990E+01
1562170E+02 342607E+01 1564810E+02 3521768E+01 1567930E+02 363257E+01 1571320E+02 367924E+01 1573990E+02 3331625E+01 1576650E+02 3076549E+01
1555390E+02 3452014E+01 1558040E+02 3640527E+01 1560690E+02 3731635E+01 1563340E+02 3224949E+01 1566000E+02 3076549E+01
1568640E+02 2877736E+01 1571320E+02 367924E+01 1573990E+02 3331625E+01 1576650E+02 3224949E+01 1579320E+02 3076549E+01
1591990E+02 5863275E+01 1594660E+02 1109840E+02 1597340E+02 217457E+02 1590040E+02 3925075E+01 1592690E+02 6294954E+02
1595340E+02 8668753E+02 1598060E+02 1163197E+03 1600750E+02 1242762E+03 1603430E+02 1171544E+03 1606120E+02 1032667E+03
1608420E+02 8697108E+02 1611510E+02 7001944E+02 1614210E+02 5795647E+02 1616910E+02 5062769E+02 1619610E+02 4662604E+02
1623370E+02 4459736E+02 1625020E+02 4318333E+02 1627730E+02 4369120E+02 1630430E+02 4519757E+02 1633160E+02 4709268E+02
1635870E+02 4960936E+02 1639590E+02 5282143E+02 1641310E+02 5685330E+02 1644030E+02 618782E+02 1646760E+02 681806E+02
1649440E+02 7609421E+02 1652210E+02 8618518E+03 1654940E+02 9921806E+02 1657680E+02 1163390E+03 1660410E+02 1370081E+03
1663150E+02 1862250E+02 1665890E+02 2105518E+03 1668330E+02 264556E+03 167130E+02 333940E+03 1674130E+02 1402319E+03
1676870E+02 4917409E+03 1679630E+02 5356949E+03 1682380E+02 5086768E+03 1685140E+02 146443E+03 1687890E+02 304037E+03
1690640E+02 2173876E+02 1693420E+02 1498615E+03 1696180E+02 1084071E+03 1698950E+02 7687730E+02 1701720E+02 566511E+02
1704490E+02 4257926E+02 1707250E+02 3255147E+02 1710040E+02 2530588E+02 1712820E+02 199383E+02 1715600E+02 159004E+02
171830E+02 129016E+02 1721170E+02 1042325E+02 1723960E+02 8554325E+01 1726750E+02 709229E+01 1729540E+02 508555E+01
173240E+02 497142E+01 1735130E+02 422435E+02 1737930E+02 3625866E+01 1746730E+02 3149330E+01 1745450E+02 277175E+01
176330E+02 2490488E+01 1749150E+02 2260324E+01 1751940E+02 3625866E+01 1757470E+02 195648E+01 1757590E+02 193667E+01
1760400E+02 1913378E+01 1763220E+02 1917715E+01 1766040E+02 1936848E+01 1768810E+02 195009E+01 177160E+02 194227E+01
177450E+02 1977360E+01 1777350E+02 1969332E+01 1780190E+02 1955033E+01 17830E+02 19730E+02 180000E+02 2037520E+01
1768700E+02 1932550E+01 1771350E+02 194332E+01 1784360E+02 1924199E+01 1811500E+02 228302E+01 181360E+02 236075E+01
1802930E+02 2087707E+01 1805780E+02 214375E+01 1808640E+02 221140E+01 1811500E+02 228302E+01 181360E+02 236075E+01
1817200E+02 2433844E+01 1820080E+02 2531382E+01 1827250E+02 262469E+01 1829580E+02 192580E+01 1842670E+02 2423470E+01
1831500E+02 2928888E+01 1834400E+02 3038497E+01 1837320E+02 3152044E+01 184200E+02 324930E+01 1843080E+02 339049E+01
1845900E+02 3515335E+01 1848850E+02 364449E+01 1851740E+02 377747E+01 1856430E+02 3914820E+01 185750E+02 403615E+01
1860420E+02 4202218E+01 1863320E+02 4352962E+02 1866220E+02 4508440E+01 1869150E+02 466882E+01 1872030E+02 4844971E+01
1874930E+02 506294E+01 1877840E+02 5183730E+01 1880760E+02 5368197E+01 1883670E+02 5558940E+01 1886590E+02 5757334E+01
1895900E+02 5962974E+01 1892420E+02 617193E+01 1895350E+02 6401335E+01 1898210E+02 663470E+01 1901200E+02 6879323E+01
1904130E+02 7135812E+01 1907060E+02 7405062E+01 1910000E+02 7689425E+01 1912930E+02 7989020E+01 1915870E+02 830645E+01
191810E+02 864477E+01 1921760E+02 9006793E+01 1924700E+02 933443E+01 1927630E+02 981344E+01 1936060E+02 102699E+02
193550E+02 1077174E+02 1936510E+02 113344E+02 1939400E+02 1197639E+01 1942430E+02 123394E+01 1945380E+02 137155E+02
1948330E+02 1477812E+02 1951310E+02 162229E+02 1954480E+02 170714E+02 1957250E+02 2027155E+02 1960220E+02 232987E+02
1963200E+02 2716903E+02 1966180E+02 3170523E+02 1969160E+02 362091E+02 197210E+02 393844E+02 1975120E+02 995371E+02
1978110E+02 339581E+02 1981100E+02 2654608E+02 1984060E+02 382091E+02 1987090E+02 1324999E+02 199080E+02 3719284E+01
199370E+02 8059106E+01 1996070E+02 8124827E+01 1999070E+02 907074E+01 2002090E+02 103357E+02 2005090E+02 116732E+02
200800E+02 1301113E+02 2011130E+02 127282E+02 2014120E+02 155374E+01 2017130E+02 168237E+02 2020150E+02 181528E+02
202310E+02 2787932E+02 2026190E+02 2093383E+02 2098220E+02 2253986E+02 2032250E+02 241919E+02 2035270E+02 259602E+02
2038310E+02 2787932E+02 2041340E+02 2996380E+02 2044370E+02 3223826E+02 2047410E+02 347434E+02 2056450E+02 273129E+02
2053500E+02 405997E+02 2056450E+02 4404187E+02 2059590E+02 479181E+02 2062640E+02 523099E+02 2065690E+02 573134E+02
2068740E+02 630559E+02 2071800E+02 6971796E+02 2074860E+02 7750839E+02 2077920E+02 869971E+02 2080940E+02 976623E+02
2084450E+02 1109432E+03 2087110E+02 127212E+03 2090190E+02 1475200E+03 2093220E+02 173334E+03 2096330E+02 2069317E+03
2099400E+02 251373E+03 2102460E+02 3114947E+03 2105560E+02 3935490E+03 2108650E+02 5058944E+03 2111730E+02 661826E+04
2114800E+02 8732419E+03 2117910E+02 1152682E+04 2121000E+02 1498792E+04 2124100E+02 1874223E+04 2127190E+02 261046E+04
2130290E+02 2158322E+04 2133390E+02 1787383E+04 2136500E+02 2129075E+04 2139600E+02 899991E+03 2142710E+02 6505015E+03
2145820E+02 5371106E+03 2148930E+02 3691391E+03 2152050E+02 262798E+03 215510E+02 200476E+03 2158280E+02 285534E+03
2151410E+02 1605737E+03 2164530E+02 1737692E+03 2167600E+02 1920502E+03 2171700E+02 290497E+03 2173910E+02 245134E+03
2177050E+02 1688075E+03 2180180E+02 141376E+03 2183320E+02 1132432E+03 2186460E+02 903777E+02 2189600E+02 7354706E+02
2152750E+02 612936E+02 2195870E+02 5253595E+02 2199040E+02 4568923E+02 2202190E+02 401771E+02 2205340E+02 3554901E+02
2208500E+02 2121660E+02 2211660E+02 2841508E+02 221320E+02 2591140E+02 2217980E+02 233944E+02 222140E+02 2184407E+02
2224310E+02 201815E+02 2227480E+02 1871666E+02 223050E+02 1742376E+02 2233820E+02 1628079E+02 223700E+02 156720E+02

2240180E+02	14336675E+02	22433360E+02	13568165E+02	2246540E+02	1285529E+02	2248720E+02	1224648E+02	2252910E+02	1170431E+02
2256100E+02	1123311E+02	2255290E+02	1083051E+02	2262480E+02	1045779E+02	2265680E+02	1021743E+02	2268880E+02	1000620E+02
2272080E+02	9885322E+01	2271380E+02	9780220E+02	2278490E+02	777981E+01	2281690E+02	9848763E+01	2284900E+02	1001611E+02
2288120E+02	1027393E+02	2291330E+02	1070544E+02	2294550E+02	777981E+01	229770E+02	1208743E+02	2300940E+02	1316623E+02
2308210E+02	1702338E+02	2307330E+02	1679831E+02	2310660E+02	1970979E+02	2313890E+02	2375644E+02	2317120E+02	2939000E+02
2320260E+02	1372433E+02	2325595E+02	14801560E+02	2326830E+02	6240465E+02	233070E+02	6057538E+02	2333332E+02	1011999E+03
2336560E+02	1188207E+03	2339810E+02	1223457E+02	2343600E+02	1041364E+03	234631E+02	7590070E+02	2349570E+02	5707191E+02
2352820E+02	3716829E+02	2356080E+02	2707715E+02	2359340E+02	2045918E+02	236610E+02	1670187E+02	2368670E+02	1298083E+02
2363140E+02	1683849E+02	2372410E+02	9289246E+01	2375680E+02	5143391E+01	2378960E+02	1207857E+02	2382240E+02	4661143E+01
2385510E+02	6097241E+02	2381800E+02	5693773E+01	2392080E+02	3676933E+02	2395370E+02	4553443E+01	2398650E+02	4938568E+01
2401950E+02	4791277E+01	2405240E+02	4848616E+02	2408300E+02	5370785E+02	2411830E+02	4553443E+01	2415130E+02	4528553E+01
2414340E+02	452159E+02	2421740E+02	4650933E+01	2425740E+02	4976243E+02	2428350E+02	4622095E+01	2431660E+02	4687729E+01
2434980E+02	4768970E+01	2438290E+02	4865093E+02	2441610E+02	4976157E+02	2444930E+02	5102227E+01	2448250E+02	5243349E+01
2451580E+02	5400304E+01	2454900E+02	5673038E+02	2458430E+02	5765657E+01	2461560E+02	5965996E+01	2464900E+02	6198503E+01
2468230E+02	6442567E+01	2471570E+02	6710227E+01	2474910E+02	7001197E+02	2478250E+02	7317021E+01	2481600E+02	7960478E+01
2484940E+02	6034034E+01	2488290E+02	844035E+01	2491640E+02	6883162E+01	2495000E+02	9372171E+01	2498350E+02	9900952E+01
2501710E+02	1048043E+02	250670E+02	1111663E+02	2508440E+02	1181807E+02	2511800E+02	11259040E+02	2515170E+02	1344551E+02
251844E+02	143496E+02	252110E+02	1547150E+02	252580E+02	1663109E+02	2528660E+02	11795590E+02	2532040E+02	1944815E+02
2533470E+02	2115391E+02	2538800E+02	2304521E+02	2542190E+02	2522607E+02	2545580E+02	2772163E+02	2548970E+02	3058415E+02
2552360E+02	3387624E+02	255750E+02	3766753E+02	2559150E+02	420515E+02	2562530E+02	4708600E+02	2565950E+02	5285770E+02
2569350E+02	5940863E+02	2572760E+02	6676356E+02	2576170E+02	1484947E+02	2579580E+02	8347113E+02	2582990E+02	927249E+02
2586400E+02	1007011E+03	2589520E+02	1080046E+03	2593240E+02	1132441E+03	2596600E+02	1155948E+02	2600000E+02	1144259E+03
2603510E+02	1098855E+03	2605940E+02	1019249E+02	2610370E+02	121501E+02	2613800E+02	815515E+02	2617240E+02	7099544E+02
2620670E+02	6117637E+02	262110E+02	5240088E+02	2627950E+02	1477708E+02	2631000E+02	3828644E+02	2634440E+02	375777E+02
2637890E+02	1390125E+02	2641340E+02	12424071E+02	2644800E+02	2098567E+02	2648250E+02	1821159E+02	2651710E+02	1588064E+02
2655170E+02	7334611E+01	2658630E+02	1221492E+02	2662090E+02	1077270E+02	2665560E+02	9531399E+01	2669030E+02	8460571E+01
2675880E+02	4427603E+01	267970E+02	6731719E+02	2679450E+02	5032185E+01	2682930E+02	5422445E+01	2686410E+02	4490949E+01
2707340E+02	2894301E+01	2693370E+02	4024263E+01	2696860E+02	3673420E+01	2700350E+02	337044E+01	2703840E+02	311179E+01
2724640E+02	2525890E+01	2728340E+02	2717995E+02	2714330E+02	3583788E+01	2717830E+02	249697E+01	2721330E+02	246378E+01
2742390E+02	7717989E+01	2745910E+02	1137555E+02	2731850E+02	325155E+01	2733360E+02	109550E+01	273880E+02	548931E+01
2760010E+02	6289003E+02	2763540E+02	996729E+02	274430E+02	172533E+02	2752960E+02	266084E+02	2756480E+02	411080E+02
277769E+02	5734937E+02	2781220E+02	4456475E+02	2784760E+02	172533E+02	2775960E+02	266084E+02	2774140E+02	1164001E+03
2795410E+02	9741026E+02	2798760E+02	4456475E+02	2784760E+02	172533E+02	2775960E+02	266084E+02	2774140E+02	1164001E+03
281310E+02	1654029E+03	2816750E+02	1419589E+03	2802510E+02	4543052E+02	2788310E+02	5373113E+02	2791860E+02	7040639E+02
2831030E+02	2573106E+01	2833600E+02	6447153E+02	2820320E+02	1888133E+02	2823890E+02	201301E+03	2809630E+02	2188694E+03
2848930E+02	1069265E+02	2852510E+02	1370079E+02	2830780E+02	740716E+00	284170E+02	398701E+00	2847460E+02	493310E+01
2866880E+02	1792163E+00	2870480E+02	2546571E+02	2850100E+02	535747E+01	285669E+02	747552E+01	2863280E+02	1166121E+00
2884890E+02	760292E+00	288850E+02	5430054E+00	289210E+02	551977E+00	287680E+02	471047E+01	2881280E+02	6040259E+00
				289110E+02	5895720E+02	2895720E+02	1405387E+01	2899345E+02	1655849E+01

00001

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

ELEMENT = 249 CA	DATE = 10/30/73	RUNNO = 1	ITERATION = 1
19.11*	FISSION CROSS SECTION VS ENERGY		
19.22*	1.00	16.00	100.00
19.33*	1.00	16.00	100.00
19.44*	1.00	16.00	100.00
19.56*	1.00	16.00	100.00
19.67*	1.00	16.00	100.00
19.78*	1.00	16.00	100.00
19.89*	1.00	16.00	100.00
20.00*	1.00	16.00	100.00
20.11*	1.00	16.00	100.00
20.22*	1.00	16.00	100.00
20.33*	1.00	16.00	100.00
20.44*	1.00	16.00	100.00
20.56*	1.00	16.00	100.00
20.67*	1.00	16.00	100.00
20.78*	1.00	16.00	100.00
20.89*	1.00	16.00	100.00
21.00*	1.00	16.00	100.00
21.11*	1.00	16.00	100.00
21.22*	1.00	16.00	100.00
21.33*	1.00	16.00	100.00
21.44*	1.00	16.00	100.00
21.56*	1.00	16.00	100.00
21.67*	1.00	16.00	100.00
21.78*	1.00	16.00	100.00
21.89*	1.00	16.00	100.00
22.00*	1.00	16.00	100.00
22.11*	1.00	16.00	100.00
22.22*	1.00	16.00	100.00
22.33*	1.00	16.00	100.00
22.44*	1.00	16.00	100.00
22.56*	1.00	16.00	100.00
22.67*	1.00	16.00	100.00
22.78*	1.00	16.00	100.00
22.89*	1.00	16.00	100.00
23.00*	1.00	16.00	100.00
23.11*	1.00	16.00	100.00
23.22*	1.00	16.00	100.00
23.33*	1.00	16.00	100.00
23.44*	1.00	16.00	100.00
23.56*	1.00	16.00	100.00
23.67*	1.00	16.00	100.00
23.78*	1.00	16.00	100.00
23.89*	1.00	16.00	100.00
24.00*	1.00	16.00	100.00
24.11*	1.00	16.00	100.00
24.22*	1.00	16.00	100.00
24.33*	1.00	16.00	100.00
24.44*	1.00	16.00	100.00
24.56*	1.00	16.00	100.00
24.67*	1.00	16.00	100.00
24.78*	1.00	16.00	100.00
24.89*	1.00	16.00	100.00
25.00*	1.00	16.00	100.00

ELEMENT = 249 CA DATE = 10/30/73 RUNNO = 1 ITERATION = 1

FISSION CROSS SECTION VS ENERGY

Energy (eV)	1.00	10.00	100.00	1000.00
25.11*	T	D	T	T
25.22*	T	D	T	T
25.33*	T	D	T	T
25.44*	T	D	T	T
25.56*	T	D	T	T
25.67*	T	D	T	T
25.78*	T	D	T	T
25.89*	T	D	T	T
26.00*	T	D	T	T
26.11*	T	D	T	T
26.22*	T	D	T	T
26.33*	T	D	T	T
26.44*	T	D	T	T
26.56*	T	D	T	T
26.67*	T	D	T	T
26.78*	T	D	T	T
26.89*	T	D	T	T
27.00*	T	D	T	T
27.11*	T	D	T	T
27.22*	T	D	T	T
27.33*	T	D	T	T
27.44*	T	D	T	T
27.56*	T	D	T	T
27.67*	T	D	T	T
27.78*	T	D	T	T
27.89*	T	D	T	T
28.00*	T	D	T	T
28.11*	T	D	T	T
28.22*	T	D	T	T
28.33*	T	D	T	T
28.44*	T	D	T	T
28.56*	T	D	T	T
28.67*	T	D	T	T
28.78*	T	D	T	T
28.89*	T	D	T	T

RUNNING TIME FOR PROBLEM = .433715E+01

XXXXXXXXX SIMPLIFIED R-MATRIX FORMULAS USED TO CALCULATE CROSS SECTIONS XXXXXXXXXXXX
 XXXXXXXX CONSTANT ALPHA AND BETA MATRICES CALCULATED XXXXXXXXXXXX
 MULTILEVEL ANALYSIS OF 3 CM C TOTAL DATA 12/66/72
 ELEMENT C-12 DATE 10/30/73 RUN NUMBER 154-155 TIME 10.51.47

TOTAL		IF1	ITAPE	LLY	NN	NI	NFCHS	ITMAX	MAXEN	NGROUP	KW	NPS
			CARDS	0	1	1	0	1	7.5	7	17	10
AW	TEMP	CRFN	ERROR	DIST	DELTA	DELTA	DELTA					
12.0000	293.0000	2.8000	0.0000	21.5010	.0025	-.0000	.0125					
THICK	YMAX	YMIN	ESPA	A02	B02	C02						
.2530E+00	.1000E+02	0.	.3009E+07	.3730E-11	.2253E-06	-0.				.3180E+00	.1000E-02	.1000E+01

ANGULAR MOMENTUM BOUNDARY CONDITIONS AND G VALUES OF SPIN GROUPS 1- 7

GROUP	L	VALUE	G	VALUE	BOUND	CD
1	2	3.000	-1.750			
2	2	2.000	-1.630			
3	1	1.000	-.422			
4	0	1.000	-0.000			
5	1	2.000	-.367			
6	3	4.000	-2.800			
7	3	3.000	-2.530			

XXXXXXXXX LEVEL SHIFT CALCULATED XXXXXXXXXXXX

PKEN		GGA		GSI 1		GSI 2		GSI 3		IGROUP	
.207480E+07	100.000	124.71	124.71	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	1	2
.294061E+07	100.000	.124300E+07	.124300E+07	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	0	0
.354060E+07	100.000	.631000E+07	.631000E+07	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	0	0
.424770E+07	100.000	168870	168870	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	1	0
.491054E+07	100.000	2870.83	2870.83	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	1	0
.657388E+07	100.000	46686.8	46686.8	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	1	0
.1186000E+07	100.000	.114000E+07	.114000E+07	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	0	0
.534634E+07	100.000	13643.9	13643.9	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	0	0
.626644E+07	100.000	.149980E+07	.149980E+07	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	.100000E-05	1	0
.281458E+07	100.000	.742272	.742272	.103000E-05	.103000E-05	.103000E-05	.103000E-05	.103000E-05	.103000E-05	1	0

DATA READ IN OR GENERATED FROM .2745E+07 IO .7032E+07

KDIV = .100000E+01 IM = 24

WID
 .608978E+24
 RES ENERGY TOTAL WIDTH
 .491054E+07 .289686E+04
 .534634E+07 .199544E+05
 .281458E+07 .341315E+04

ECS USED = 59365

.944 SECONDS IN PHIMAIN INCLUDING .744 SECONDS IN PARSH WITH NGRAD= 1 AND MAXENT= 764

PKEN	DIAG	GGA	DIAG	GSII(1)	DIAG	GSII(2)	DIAG	GSII(3)	DIAG	IELIM	GROUP	T-META
2075E+070.	100.00	0.	124571	0.	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	0	0	0.00
2341E+07	100.00	0.	124300E+07	725E+02	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	1	1	0.00
3541E+06	100.00	0.	631000E+07	31E+02	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	2	2	0.00
4248E+07	100.00	0.	168870	873E+02	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	3	3	0.00
4911E+07	100.00	0.	2570.83	863E+02	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	4	4	0.00
4574E+07	100.00	0.	46666.8	873E+02	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	5	5	0.00
4186E+070.	100.00	0.	114000E+07	699E+01	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	6	6	0.00
5346E+07	100.00	0.	13643.9	310E+03	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	7	7	0.00
6266E+07	100.00	0.	114980E+07	224E+04	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	8	8	0.00
2815E+07	100.00	0.	742372	733E+05	0000 0.	0000 0.	0000 0.	0000 0.	0000 0.	9	9	0.00
2745300E+07	1484931E+01	2748300E+07	1493177E+01	2751200E+07	1504545E+01	2751100E+07	1509995E+01	2751100E+07	151900E+07	151900E+07	151900E+07	151900E+07
2760000E+07	1527986E+01	2763000E+07	1537529E+01	2765200E+07	1547009E+01	2766900E+07	1557081E+01	2771900E+07	1567444E+01	2771900E+07	1567444E+01	1567444E+01
2774800E+07	1577745E+01	2779000E+07	1588705E+01	2780900E+07	1599987E+01	2783800E+07	1611167E+01	2786800E+07	1623556E+01	2786800E+07	1623556E+01	1623556E+01
2789700E+07	1635442E+01	2792700E+07	1648103E+01	2793500E+07	1661591E+01	2794800E+07	1675066E+01	2801800E+07	1688987E+01	2801800E+07	1688987E+01	1688987E+01
2804800E+07	1703434E+01	2807900E+07	1718389E+01	2810700E+07	1734201E+01	2813900E+07	1749786E+01	2816900E+07	1765787E+01	2816900E+07	1765787E+01	1765787E+01
2820300E+07	1783018E+01	2823300E+07	1800482E+01	2826100E+07	1819258E+01	2829100E+07	1837977E+01	283200E+07	1857884E+01	283200E+07	1857884E+01	1857884E+01
2835300E+07	1878429E+01	2838300E+07	189900E+01	2841400E+07	1924029E+01	2844500E+07	1943870E+01	2847600E+07	1967552E+01	2847600E+07	1967552E+01	1967552E+01
2850700E+07	1992098E+01	2853800E+07	2017549E+01	2856700E+07	2049379E+01	2860000E+07	2071286E+01	2863100E+07	2096554E+01	2863100E+07	2096554E+01	2096554E+01
2866600E+07	2129071E+01	2869400E+07	2160570E+01	2872300E+07	2192219E+01	2875600E+07	2225003E+01	2878800E+07	2260072E+01	2878800E+07	2260072E+01	2260072E+01
2881900E+07	2295249E+01	2885000E+07	2331624E+01	2888200E+07	2370427E+01	2891400E+07	2410466E+01	2894500E+07	2450547E+01	2894500E+07	2450547E+01	2450547E+01
2897700E+07	2492855E+01	2900900E+07	2536324E+01	2904100E+07	2580721E+01	2907200E+07	2624434E+01	2910400E+07	2670074E+01	2910400E+07	2670074E+01	2670074E+01
2913600E+07	2715918E+01	2916800E+07	2761564E+01	2920100E+07	2806519E+01	2923300E+07	2851505E+01	2926500E+07	2893049E+01	2926500E+07	2893049E+01	2893049E+01
2929700E+07	2931583E+01	2932900E+07	2966151E+01	2936200E+07	2996373E+01	2939300E+07	3011073E+01	2942600E+07	3033849E+01	2942600E+07	3033849E+01	3033849E+01
2945900E+07	3039378E+01	2949100E+07	3038330E+01	2952400E+07	3071533E+01	2955700E+07	3098367E+01	2958900E+07	3094050E+01	2958900E+07	3094050E+01	3094050E+01
2962200E+07	3085699E+01	2965500E+07	3082281E+01	2968800E+07	3071981E+01	2972100E+07	3075406E+01	2975400E+07	3078366E+01	2975400E+07	3078366E+01	3078366E+01
2977000E+07	3084128E+01	29800E+07	3081464E+01	2983500E+07	3083038E+01	2986600E+07	3064810E+01	2989700E+07	3069407E+01	2989700E+07	3069407E+01	3069407E+01
2995300E+07	3059268E+01	2998600E+07	30799374E+01	3002000E+07	3094545E+01	3005300E+07	3044930E+01	3008700E+07	3043840E+01	3008700E+07	3043840E+01	3043840E+01
3012000E+07	3025235E+01	3015400E+07	3018660E+07	3021000E+07	3031454E+01	3023200E+07	3081072E+01	3025500E+07	3052899E+01	3025500E+07	3052899E+01	3052899E+01
3028900E+07	3025979E+01	3032300E+07	3006149E+01	3035700E+07	3092300E+07	3038100E+07	3085167E+01	3042500E+07	3082442E+01	3042500E+07	3082442E+01	3082442E+01
3046000E+07	3041211E+01	3049400E+07	3086155E+01	3052500E+07	3098370E+01	3055200E+07	3085167E+01	3058400E+07	3082442E+01	3058400E+07	3082442E+01	3082442E+01
3063100E+07	3040924E+01	3066900E+07	3059152E+01	3070000E+07	3079723E+01	3073500E+07	3071981E+01	3077000E+07	3075406E+01	3077000E+07	3075406E+01	3075406E+01
3080600E+07	3041633E+01	3083900E+07	3071491E+01	3087400E+07	3120391E+01	3091900E+07	3122876E+01	3094400E+07	3125653E+01	3094400E+07	3125653E+01	3125653E+01
3097900E+07	3042851E+01	3101400E+07	3131508E+01	3104900E+07	3134496E+01	3108500E+07	3137619E+01	3112000E+07	3140696E+01	3112000E+07	3140696E+01	3140696E+01
3115300E+07	3043105E+01	3119100E+07	3140476E+01	3122900E+07	3150240E+01	3126200E+07	3153517E+01	3129700E+07	3156749E+01	3129700E+07	3156749E+01	3156749E+01
3133300E+07	3043759E+01	3136900E+07	3163426E+01	3140900E+07	3166963E+01	3144000E+07	3170064E+01	3147600E+07	3173473E+01	3147600E+07	3173473E+01	3173473E+01
3151520E+07	3044285E+01	3154800E+07	1802086E+01	3158400E+07	3035600E+07	3162000E+07	3037376E+01	3165600E+07	3037376E+01	3165600E+07	3037376E+01	3037376E+01
3169300E+07	3044441E+01	3172200E+07	1970744E+01	3176500E+07	3003677E+01	3182000E+07	30037376E+01	3183800E+07	30037376E+01	3183800E+07	30037376E+01	30037376E+01
3187500E+07	3044748E+01	3191200E+07	2135324E+01	3194900E+07	3126601E+01	3198500E+07	3198244E+01	3202200E+07	3229400E+01	3202200E+07	3229400E+01	3229400E+01
3205900E+07	3045968E+01	3209600E+07	3289922E+01	3213300E+07	3231921E+01	3217000E+07	3237826E+01	3220700E+07	3275698E+01	3220700E+07	3275698E+01	3275698E+01
32243100E+07	3046202E+01	3228200E+07	32429198E+01	3231700E+07	3253222E+01	3235600E+07	3257799E+01	3239400E+07	3250495E+01	3239400E+07	3250495E+01	3250495E+01
32423100E+07	3046735E+01	3246900E+07	32549632E+01	3250700E+07	3271282E+01	3254400E+07	3258995E+01	3258200E+07	3260989E+01	3258200E+07	3260989E+01	3260989E+01
3262000E+07	3047123E+01	3265800E+07	32644042E+01	3266600E+07	3265983E+01	3273400E+07	3274495E+01	3277200E+07	3268818E+01	3277200E+07	3268818E+01	3268818E+01
3281000E+07	3047004E+01	3284900E+07	2711138E+01	3288700E+07	3272023E+01	3292500E+07	3273098E+01	3296400E+07	3273098E+01	3296400E+07	3273098E+01	3273098E+01
3301000E+07	3047373E+01	3304100E+07	2751571E+01	3308600E+07	3276243E+01	3311800E+07	3275924E+01	3315700E+07	32762278E+01	3315700E+07	32762278E+01	32762278E+01
3319600E+07	3047772E+01	3323500E+07	2764253E+01	3327400E+07	3276752E+01	3331300E+07	3274195E+01	3335200E+07	3275924E+01	3335200E+07	3275924E+01	3275924E+01
3339100E+07	3048686E+01	3343100E+07	2752475E+01	3347000E+07	3277455E+01	3351900E+07	3274195E+01	3355900E+07	3275924E+01	3355900E+07	3275924E+01	3275924E+01
3358700E+07	3048709E+01	3362800E+07	2720068E+01	3366500E+07	3265718E+01	3370800E+07	3267209E+01	3374800E+07	3269211E+01	3374800E+07	3269211E+01	3269211E+01
3378700E+07	3048206E+01	3382700E+07	2671148E+01	3386100E+07	3265718E+01	3390800E+07	3267464E+01	3394800E+07	3265341E+01	3394800E+07	3265341E+01	3265341E+01
3398800E+07	3048282E+01	3402800E+07	2608947E+01	3406700E+07	3259632E+01	3415000E+07	3258989E+01	3419000E+07	3256870E+01	3419000E+07	3256870E+01	3256870E+01
3419100E+07	3048364E+01	3423100E+07	254188E+01	3427200E+07	3252475E+01	3431300E+07	3251061E+01	3435300E+07	3249175E+01	3435300E+07	3249175E+01	3249175E+01
3439500E+07	3048540E+01	3443500E+07	2465369E+01	3447100E+07	3245013E+01	3451300E+07	3245013E+01	3455300E+07	3245013E+01	3455300E+07	3245013E+01	3245013E+01
3460100E+07	3048608E+01	3464200E+07	2386951E+01	3468400E+07	3237899E+01	3472500E+07	3237899E+01	3476500E+07	3237899E+01	3476500E+07	3237899E+01	3237899E+01
3480700E+07	3048639E+01	3484500E+07	2311092E+01	3488900E+07	3229572E+01	3493500E+07	3229572E+01	3497700E+07	3229572E+01	3497700E+07	3229572E+01	3229572E+01
3501900E+07	3048702E+01	3506100E+07	2235278E+01	3510300E+07	3220435E+01	3514800E+07	3220435E+01	3518900E+07	3220435E+01	3518900E+07	3220435E+01	3220435E+01
3523000E+07	3048766E+01	3527300E+07	2161807E+01	3531900E+07	321341E+01	3535800E+07	321341E+01	3540100E+07	321341E+01	3540100E+07	321341E+01	321341E+01
3544400E+07	3048800E+07	3548700E+07	2091385E+01	3553000E+07	3207721E+01	3557000E+07	3207721E+01	3561000E+07	3207721E+01	3561000E+07	3207721E+01	3207721E+01

3566000E+07	2037422E+01	3570300E+07	2024430E+01	3574700E+07	2011370E+01	3579000E+07	1998605E+01	3583400E+07	1985885E+01
3587700E+07	1973572E+01	3592100E+07	1961145E+01	3596500E+07	1944890E+01	3609000E+07	1938005E+01	3603000E+07	1924495E+01
3609700E+07	1913153E+01	3614100E+07	1901579E+01	3618500E+07	1890170E+01	3623000E+07	1878672E+01	3627000E+07	1864594E+01
3631900E+07	1856431E+01	3636300E+07	1845676E+01	3649000E+07	1834840E+01	3645200E+07	1824405E+01	3649700E+07	1813481E+01
3654200E+07	1803519E+01	3658700E+07	1794312E+01	3663200E+07	1783559E+01	3667200E+07	1773455E+01	3672300E+07	1763384E+01
3676800E+07	1753378E+01	3681300E+07	1744315E+01	3685700E+07	1734789E+01	3690000E+07	1725609E+01	3695000E+07	1716365E+01
3695300E+07	1707262E+01	3701200E+07	1698298E+01	3707000E+07	1689660E+01	3713300E+07	1680905E+01	3718000E+07	1672068E+01
3722600E+07	1663768E+01	3727200E+07	1655457E+01	3731900E+07	1647370E+01	3736500E+07	1639029E+01	3741100E+07	1631085E+01
3745000E+07	1623090E+01	3750400E+07	1615381E+01	3755100E+07	1607621E+01	3759800E+07	1599977E+01	3764500E+07	1592475E+01
3769200E+07	1585028E+01	3773000E+07	1577720E+01	3778600E+07	1570520E+01	3783000E+07	1563275E+01	3788100E+07	1555284E+01
3792900E+07	1549255E+01	3797600E+07	1542471E+01	3802300E+07	1535445E+01	3807700E+07	1528920E+01	3811900E+07	1522432E+01
3816700E+07	1515904E+01	3821500E+07	1509471E+01	3826300E+07	1503134E+01	3831200E+07	1496760E+01	3836000E+07	1490611E+01
3840800E+07	1484852E+01	3845100E+07	1478466E+01	3850000E+07	1472582E+01	3855000E+07	1466671E+01	3860300E+07	1460850E+01
3865200E+07	1455172E+01	3870000E+07	1448460E+01	3874700E+07	1444036E+01	3879300E+07	1438455E+01	3884800E+07	1433707E+01
3889700E+07	1427719E+01	3894700E+07	1422662E+01	3899600E+07	1417443E+01	3904600E+07	1412208E+01	3909500E+07	1407259E+01
3915400E+07	1402897E+01	3919500E+07	1397427E+01	3924500E+07	1392648E+01	3929500E+07	1387990E+01	3934500E+07	1383366E+01
3939500E+07	1378866E+01	3944000E+07	1374374E+01	3949000E+07	1370067E+01	3954700E+07	1365741E+01	3959700E+07	1361681E+01
3964800E+07	1357608E+01	3969000E+07	1353647E+01	3974500E+07	1349064E+01	3981000E+07	1342688E+01	3986200E+07	1336489E+01
3990300E+07	1339027E+01	3995500E+07	1335640E+01	4000500E+07	1332366E+01	4005800E+07	1325934E+01	4010900E+07	1320534E+01
4016100E+07	1323802E+01	4021300E+07	1321651E+01	4026500E+07	1318924E+01	4031700E+07	1316804E+01	4036900E+07	1314925E+01
4042100E+07	1313390E+01	4047300E+07	1311930E+01	4052600E+07	1310846E+01	4057800E+07	1310103E+01	4063100E+07	1309702E+01
4068400E+07	1309687E+01	4073700E+07	1310098E+01	4078700E+07	1310950E+01	4084300E+07	1312349E+01	4089600E+07	1314273E+01
4094900E+07	1316007E+01	4100200E+07	1319955E+01	4105500E+07	1323983E+01	4111000E+07	1328690E+01	4116300E+07	1334376E+01
4121700E+07	1341016E+01	4127100E+07	1348721E+01	4132900E+07	1357371E+01	4137900E+07	1367641E+01	4143300E+07	1379085E+01
4148700E+07	1391935E+01	4154200E+07	1406580E+01	4159600E+07	1422566E+01	4165100E+07	1450595E+01	4170600E+07	1460315E+01
4203400E+07	1481142E+01	4207200E+07	1504700E+01	4214700E+07	1529440E+01	4221600E+07	1556419E+01	4225900E+07	1584463E+01
4231500E+07	1760810E+01	4237100E+07	1766110E+01	4244700E+07	1767370E+01	4251300E+07	1703578E+01	4255900E+07	1732885E+01
4258600E+07	1860215E+01	4265300E+07	1869386E+01	4271000E+07	1810023E+01	4278300E+07	1830255E+01	4282500E+07	1847277E+01
4298000E+07	1867644E+01	4293800E+07	1858190E+01	4299500E+07	1847541E+01	4305200E+07	1875753E+01	4308300E+07	1873370E+01
4316700E+07	1802578E+01	4322500E+07	1785017E+01	4328300E+07	1766832E+01	4334100E+07	1748271E+01	4339900E+07	1729598E+01
4345700E+07	1710991E+01	4351600E+07	1692285E+01	4357400E+07	1674233E+01	4363300E+07	1658307E+01	4369100E+07	1639160E+01
4375000E+07	1622281E+01	4380900E+07	1605968E+01	4386600E+07	1590743E+01	4392700E+07	1575111E+01	4398700E+07	1560731E+01
4434500E+07	1463378E+01	4440000E+07	1532167E+01	4446500E+07	1519832E+01	4452300E+07	1507419E+01	4458600E+07	1492743E+01
4464700E+07	1483725E+01	4470800E+07	1472700E+01	4476900E+07	1462325E+01	4483000E+07	1452017E+01	4489100E+07	1442974E+01
4495200E+07	1432170E+01	4501300E+07	1382924E+01	4507200E+07	1375531E+01	4513500E+07	1368511E+01	4519800E+07	1361621E+01
4526000E+07	1354964E+01	4532200E+07	1348228E+01	4538700E+07	1334201E+01	4544600E+07	1334272E+01	4550900E+07	1330331E+01
4557100E+07	1324476E+01	4563400E+07	1319096E+01	4569700E+07	1313581E+01	4576000E+07	1308472E+01	4582300E+07	1303317E+01
4594900E+07	1298342E+01	4599000E+07	1293906E+01	4601300E+07	1288173E+01	4607600E+07	1284131E+01	4614000E+07	1279545E+01
4620300E+07	1254167E+01	4626800E+07	1270845E+01	4633000E+07	1266676E+01	4639600E+07	1262503E+01	4646500E+07	1258472E+01
4652500E+07	1235167E+01	4659000E+07	1220608E+01	4665300E+07	1224770E+01	4671900E+07	1243008E+01	4678400E+07	1239320E+01
4684000E+07	1183551E+01	4691500E+07	1223209E+01	4698000E+07	1228603E+01	4704600E+07	1225119E+01	4711100E+07	1221745E+01
4717000E+07	1213655E+01	4724300E+07	1215036E+01	4730900E+07	1211753E+01	4737600E+07	1208461E+01	4744200E+07	1205255E+01
4750900E+07	1202034E+01	4757500E+07	1198989E+01	4764200E+07	1195719E+01	4770500E+07	1192544E+01	4777600E+07	1189424E+01
4784300E+07	1166284E+01	4791100E+07	1183092E+01	4797800E+07	1179329E+01	4804600E+07	1176688E+01	4811600E+07	1173397E+01
4818200E+07	1150374E+01	4825000E+07	1166569E+01	4831900E+07	1162956E+01	4838700E+07	1159704E+01	4845500E+07	1156443E+01
4852600E+07	1170037E+01	4859000E+07	1164319E+01	4866000E+07	1161370E+01	4873100E+07	1158197E+01	4880000E+07	1154943E+01
4886900E+07	1126081E+01	4893900E+07	1143510E+01	4900900E+07	1156983E+01	4907900E+07	1184329E+01	4914900E+07	1206918E+01
4921900E+07	1213955E+01	4928900E+07	1210632E+01	4936000E+07	1196898E+01	4943000E+07	1182033E+01	4950100E+07	1169700E+01
4957200E+07	1160634E+01	4964300E+07	1153351E+01	4971400E+07	1144731E+01	4978600E+07	1143144E+01	4985700E+07	1140495E+01
4992900E+07	1136979E+01	5000100E+07	1133719E+01	5007300E+07	1130641E+01	5014500E+07	1127719E+01	5021700E+07	1124907E+01
5029000E+07	1122134E+01	5036200E+07	1119474E+01	5043300E+07	1116931E+01	5050500E+07	1114237E+01	5057700E+07	1111667E+01
5065400E+07	1109123E+01	5072900E+07	1106561E+01	5080100E+07	1104043E+01	5087300E+07	1101491E+01	5094900E+07	1098933E+01
5102300E+07	1096362E+01	5109700E+07	1093172E+01	5117000E+07	1091120E+01	5124500E+07	1088464E+01	5132100E+07	1085703E+01
5139400E+07	1082955E+01	5147100E+07	1080109E+01	5154600E+07	1077189E+01	5162100E+07	1074143E+01	5169700E+07	1071033E+01
5177300E+07	1067763E+01	5184800E+07	1064398E+01	5192300E+07	1060776E+01	5200100E+07	1057304E+01	5207700E+07	1053016E+01
5215400E+07	1048707E+01	5223000E+07	1044127E+01	5230700E+07	1037111E+01	5238400E+07	1033081E+01	5246100E+07	1027606E+01
5253900E+07	1020915E+01	5261600E+07	1013296E+01	5269400E+07	1007410E+01	5277200E+07	9950518E+01	5285000E+07	9847544E+01
5292800E+07	9751517E+00	5300700E+07	9703507E+00	5308900E+07	9791760E+01	5316500E+07	9701519E+01	5324300E+07	9691992E+01
5332200E+07	1211693E+01	5340200E+07	1357203E+01	5348100E+07	1463332E+01	5356100E+07	1554136E+01	5364000E+07	1552967E+01

5372100E+07	1498432E+01	5360100E+07	1424265E+01	5388100E+07	1354555E+01	5394200E+07	1298800E+01	5404200E+07	1256536E+01
5412300E+07	1299053E+01	5420400E+07	1207494E+01	5428900E+07	1190790E+01	5436700E+07	1177751E+01	5444900E+07	1167006E+01
5453100E+07	1158054E+01	5461300E+07	1150452E+01	5469500E+07	1143899E+01	5477700E+07	1138170E+01	5486000E+07	1133057E+01
5494200E+07	1128561E+01	5502500E+07	1124481E+01	5510900E+07	1120760E+01	5519200E+07	11117431E+01	5527500E+07	1114401E+01
5535900E+07	1111604E+01	5544300E+07	1109049E+01	5552100E+07	1106712E+01	5561100E+07	1104573E+01	5569600E+07	1105966E+01
5578000E+07	1100816E+01	5586500E+07	1099180E+01	5595000E+07	1097705E+01	5603600E+07	1096370E+01	5612100E+07	1095206E+01
5620700E+07	1094144E+01	5627400E+07	1093329E+01	5637800E+07	1092629E+01	5644500E+07	1092087E+01	5651100E+07	1091732E+01
5663800E+07	1091505E+01	5672400E+07	1091505E+01	5681200E+07	1091875E+01	5689900E+07	1092349E+01	5698600E+07	1093187E+01
5707400E+07	1094308E+01	5716200E+07	1095790E+01	5725000E+07	1097686E+01	5733800E+07	1100041E+01	5742600E+07	1102995E+01
5751500E+07	1106633E+01	5760400E+07	1111074E+01	5769300E+07	1116481E+01	5778200E+07	1123044E+01	5787100E+07	1131094E+01
5796100E+07	1141048E+01	5805100E+07	1115330E+01	5814100E+07	1168595E+01	5823100E+07	118777E+01	5832200E+07	1212298E+01
5841300E+07	1243878E+01	5850400E+07	1244982E+01	5859200E+07	1339101E+01	5868600E+07	1410915E+01	5877800E+07	1507475E+01
5886900E+07	1533038E+01	5896100E+07	1795178E+01	5905000E+07	1994164E+01	5914600E+07	2213433E+01	5923900E+07	2429075E+01
5933100E+07	2594307E+01	5942500E+07	2670096E+01	5951800E+07	2631239E+01	5961100E+07	2492741E+01	5970500E+07	2291625E+01
597900E+07	2073729E+01	5989300E+07	1871401E+01	5998900E+07	1698769E+01	6008200E+07	1562597E+01	6017700E+07	1456215E+01
6027200E+07	1375047E+01	6036800E+07	1312440E+01	6046300E+07	1136181E+01	6055900E+07	1122697E+01	6065500E+07	1196913E+01
6075100E+07	1172701E+01	6084700E+07	1152850E+01	6094400E+07	1098467E+01	6104100E+07	1122145E+01	6113800E+07	1110205E+01
6123600E+07	1099805E+01	6133300E+07	1090846E+01	6143100E+07	1082888E+01	6152900E+07	1075829E+01	6162700E+07	1069517E+01
6172600E+07	1063753E+01	6182500E+07	1058518E+01	6192800E+07	1053718E+01	6207300E+07	1043244E+01	6212200E+07	1045154E+01
6222200E+07	1041239E+01	6232200E+07	1037538E+01	6242600E+07	1035019E+01	6252300E+07	1033584E+01	6262300E+07	1027300E+01
6272400E+07	1024154E+01	6282600E+07	102019E+01	6292700E+07	1017621E+01	6309900E+07	1011382E+01	6313100E+07	1011079E+01
6323300E+07	1007883E+01	6333500E+07	1000411E+01	6343900E+07	1000375E+01	6354100E+07	9963549E+00	6364400E+07	9920051E+00
6374700E+07	9872300E+00	6385100E+07	9818971E+00	6395500E+07	9759524E+00	6405900E+07	9689508E+00	6416400E+07	9608644E+00
6426800E+07	9514424E+00	6437300E+07	9401054E+00	6447900E+07	9264246E+00	6458400E+07	9095685E+00	6469000E+07	8884117E+00
6479600E+07	8836541E+00	6490200E+07	8330130E+00	6500500E+07	7967370E+00	6511500E+07	7550284E+00	6522200E+07	7102361E+00
6532900E+07	6960307E+00	6543700E+07	6270479E+00	6554500E+07	5990571E+00	6563300E+07	5861630E+00	6576100E+07	5693442E+00
6587000E+07	6091899E+00	6597000E+07	6400229E+00	6608800E+07	6773314E+00	6619700E+07	7162849E+00	6630700E+07	7536205E+00
6641700E+07	7868541E+00	6652700E+07	8132060E+00	6663800E+07	8389673E+00	6674900E+07	8581114E+00	6686000E+07	8742395E+00
6697100E+07	8871270E+00	6708300E+07	8977443E+00	6719400E+07	9063814E+00	6730700E+07	9136344E+00	6741900E+07	9195009E+00
6753200E+07	9246214E+00	6764500E+07	9288291E+00	6775900E+07	9323723E+00	6787200E+07	9353973E+00	6798600E+07	9379504E+00
6810000E+07	9401229E+00	6821400E+07	9419712E+00	6832900E+07	9435581E+00	6844300E+07	9449080E+00	6856000E+07	9460644E+00
6867500E+07	9470362E+00	6879100E+07	9478644E+00	6890700E+07	9485603E+00	6902400E+07	9491452E+00	6911000E+07	9498291E+00
6925800E+07	9500229E+00	6937500E+07	9563382E+00	6949300E+07	9508852E+00	6961100E+07	9507711E+00	6975900E+07	9509018E+00
6984800E+07	9560983E+00	6996700E+07	9510211E+00	7008600E+07	9510192E+00	7020500E+07	9509821E+00	7032500E+07	9509125E+00

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

900001

ELEMENT = C-12

DATE = 10/30/73

RUNNO = 154-155 ITERATION = 0

	TOTAL CROSS SECTION VS ENERGY									
	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00 10.00
5777777.7A		01								
5833333.33		01								
5888888.89		0	T							
5944444.44		0		T						
6000000.00		0	T							
6055555.56		T								
6111111.11		T								
6166666.67		T	0							
6222222.22		T	0							
6277777.78		T		0						
6333333.33		T	0							
6388888.89		T								
6444444.44		T	0							
6500000.00		T	0							
6555555.56		T	0							
6611111.11		T								
6666666.67		T								
6722222.22		T								
6777777.78		01								
6833333.33		01								
6888888.89		01								
6944444.44		0	T							
7000000.00		0	T							

STARTING PHI .313131E+05 PSEARCH METHOD ITERATION 1

.516 SECONDS IN PHMAIN INCLUDING .457 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 764

.514 SECONDS IN PHMAIN INCLUDING .455 SECONDS IN PARSH WITH NGRAD= 0 AND MAXEN1= 764

MAGNITUDE OF GRADIENT .244970E+04

STARTING PHI .313131E+05 FINAL PHI .109243E+05 DIAG. WEIGHTS 0. COS(THETA) .145109E-04 NSAV 1
ETA .100000E+01

STOPPED ON MAXIMUM NUMBER OF ITERATIONS

PREN	DIAG	GG4	DIAG	GS1(1)	DIAG	GS1(2)	DIAG	GS1(3)	DIAG	IELM	GROUP	TWETA
2075E+070.		100.00 0.		124571	0.	.0000 0.		.0000 0.		0 0 0 0		1 0.00
20927E+07	335E-05	100.00 0.		.130914E+07	.725E+02	.0000 0.		.0000 0.		1 0 1 0		2 0.00
3864E+07	230E-06	100.00 0.		.126429E+08	.371E+02	.0000 0.		.0000 0.		1 0 1 0		3 0.00
4225E+07	178E-06	100.00 0.		180445	.873E+02	.0000 0.		.0000 0.		1 0 1 0		3 0.00
4912E+07	151E-05	100.00 0.		1878.78	.863E+02	.0000 0.		.0000 0.		1 0 1 0		4 0.00
6591E+07	14JE-06	100.00 0.		44150.9	.873E+02	.0000 0.		.0000 0.		0 0 1 0		4 0.00
8.186E+070.		100.00 0.		142259E+07	.699E+01	.0000 0.		.0000 0.		0 1 0 0		5 0.00
5345E+07	450E-05	100.00 0.		10138.5	.310E+03	.0000 0.		.0000 0.		1 0 1 0		5 0.00
2941E+07	231E-03	100.00 0.		279469	.224E+04	.0000 0.		.0000 0.		1 0 1 0		6 0.00
2745300E+07		100.00 0.		296839	.733E+05	.0000 0.		.0000 0.		1 0 1 0		6 0.00
2760000E+07		100.00 0.		2768300E+07	1682239E+01	.2761200E+07	.1691680E+01	.2754100E+07	.1701333E+01	.2757100E+07		.1711624E+01
2774800E+07		100.00 0.		2763000E+07	1732954E+01	.2765500E+07	.1742200E+01	.2768900E+07	.1754444E+01	.2771900E+07		.1766079E+01
2787800E+07		100.00 0.		2777800E+07	1789737E+01	.2780000E+07	.1802236E+01	.2783800E+07	.1815070E+01	.2786800E+07		.1828230E+01
2797000E+07		100.00 0.		2792700E+07	1855144E+01	.2795800E+07	.1809880E+01	.2798800E+07	.1845424E+01	.2801800E+07		.1896643E+01
2804800E+07		100.00 0.		2807800E+07	1931415E+01	.2810300E+07	.1948434E+01	.2813900E+07	.195511E+01	.2816900E+07		.1982712E+01
2820000E+07		100.00 0.		2823000E+07	2019238E+01	.2826100E+07	.2039153E+01	.2829100E+07	.2058971E+01	.2832000E+07		.2079901E+01
2833300E+07		100.00 0.		2838300E+07	2123197E+01	.2841400E+07	.2146287E+01	.2844500E+07	.2170110E+01	.2847600E+07		.2194771E+01
2850700E+07		100.00 0.		2853800E+07	2266623E+01	.2856300E+07	.2272870E+01	.2859300E+07	.2302053E+01	.2862300E+07		.2331192E+01
2866200E+07		100.00 0.		2869400E+07	2323453E+01	.2872500E+07	.2425442E+01	.2875600E+07	.2438873E+01	.2878800E+07		.2462294E+01
2881900E+07		100.00 0.		2885000E+07	2555912E+01	.2888200E+07	.2604422E+01	.2891400E+07	.2633873E+01	.2894500E+07		.2662974E+01
2897700E+07		100.00 0.		2900900E+07	2795914E+01	.2904100E+07	.2806644E+01	.2907200E+07	.2846622E+01	.2910400E+07		.2887163E+01
2913660E+07		100.00 0.		2916800E+07	2963401E+01	.2920000E+07	.2997330E+01	.2923300E+07	.3053393E+01	.2926500E+07		.3051755E+01
2929700E+07		100.00 0.		2932700E+07	3075813E+01	.2936200E+07	.3072083E+01	.2939400E+07	.3053393E+01	.2942600E+07		.3053393E+01
2945000E+07		100.00 0.		2949100E+07	2904507E+01	.2952400E+07	.2822283E+01	.2955700E+07	.2717991E+01	.2958900E+07		.2601259E+01
2962200E+07		100.00 0.		2965500E+07	2324057E+01	.2968800E+07	.2175030E+01	.2972100E+07	.2004946E+01	.2975400E+07		.1878135E+01
2978700E+07		100.00 0.		2982000E+07	1610485E+01	.2985500E+07	.1496049E+01	.2988800E+07	.1400170E+01	.2992000E+07		.1358363E+01
2995300E+07		100.00 0.		2998500E+07	1307048E+01	.3002000E+07	.1187131E+01	.3005300E+07	.1142440E+01	.3008700E+07		.1428298E+01
3012000E+07		100.00 0.		3015400E+07	1282948E+01	.3018800E+07	.1191337E+01	.3022200E+07	.1108135E+01	.3025500E+07		.1071602E+01
3026000E+07		100.00 0.		3032300E+07	1097742E+01	.3035700E+07	.1082566E+01	.3039100E+07	.1101849E+01	.3042500E+07		.1123663E+01
3046000E+07		100.00 0.		3059400E+07	1172854E+01	.3052800E+07	.1138493E+01	.3056200E+07	.125257E+01	.3059700E+07		.1253159E+01
3080400E+07		100.00 0.		3083400E+07	1459148E+01	.3070000E+07	.133721E+01	.3073500E+07	.1366178E+01	.3077000E+07		.1395030E+01
3097900E+07		100.00 0.		3101400E+07	1594255E+01	.3104900E+07	.1622193E+01	.3108500E+07	.1507181E+01	.3112000E+07		.1537419E+01
3115500E+07		100.00 0.		3119000E+07	1733375E+01	.3122600E+07	.1760212E+01	.3126200E+07	.1787571E+01	.3129700E+07		.1813927E+01
3133300E+07		100.00 0.		3136900E+07	1867375E+01	.3140000E+07	.1892970E+01	.3144000E+07	.1919049E+01	.3147600E+07		.1944811E+01
3151200E+07		100.00 0.		3154800E+07	1995522E+01	.3158400E+07	.2020436E+01	.3162000E+07	.205051E+01	.3165600E+07		.2059301E+01
3169300E+07		100.00 0.		3172400E+07	2117688E+01	.3176000E+07	.2141029E+01	.3180000E+07	.216464E+01	.3183800E+07		.2187319E+01
3197500E+07		100.00 0.		3191200E+07	2232778E+01	.3194800E+07	.225437E+01	.3198500E+07	.2276146E+01	.3202200E+07		.2297474E+01
3224400E+07		100.00 0.		3209600E+07	2334947E+01	.3213300E+07	.2359073E+01	.3217000E+07	.2387814E+01	.3220700E+07		.2397946E+01
3243100E+07		100.00 0.		3228200E+07	2435547E+01	.3231200E+07	.239371E+01	.3235000E+07	.247074E+01	.32389400E+07		.2488049E+01
3262000E+07		100.00 0.		3246600E+07	252723E+01	.3250700E+07	.2536496E+01	.3254400E+07	.2551341E+01	.3258200E+07		.2566056E+01
3281000E+07		100.00 0.		3265800E+07	2573860E+01	.3269900E+07	.2606938E+01	.3273400E+07	.2619483E+01	.3277200E+07		.2631435E+01
3301000E+07		100.00 0.		3304100E+07	2653991E+01	.3308000E+07	.2664240E+01	.3311800E+07	.26744012E+01	.3315600E+07		.2684423E+01
3319600E+07		100.00 0.		3323500E+07	2700297E+01	.3327400E+07	.2707784E+01	.3331300E+07	.2714932E+01	.3335200E+07		.2721481E+01
3339100E+07		100.00 0.		3343100E+07	2752060E+01	.3347000E+07	.2756210E+01	.3350900E+07	.2762152E+01	.3354800E+07		.2765946E+01
3358900E+07		100.00 0.		3362800E+07	2758266E+01	.3366800E+07	.2758031E+01	.3370800E+07	.2757342E+01	.3374800E+07		.2756213E+01
3378700E+07		100.00 0.		3382700E+07	2756481E+01	.3386700E+07	.2758031E+01	.3390800E+07	.2757342E+01	.3394800E+07		.2756213E+01
3398000E+07		100.00 0.		3402800E+07	2756339E+01	.3406700E+07	.2758031E+01	.3410900E+07	.2757342E+01	.3415000E+07		.2756213E+01
341500E+07		100.00 0.		3423100E+07	2756339E+01	.3427000E+07	.2758031E+01	.3431300E+07	.2757342E+01	.3435400E+07		.2756213E+01
3439500E+07		100.00 0.		3443600E+07	2671120E+01	.3447700E+07	.264530E+01	.3451800E+07	.261910E+01	.3456000E+07		.2653774E+01
3460100E+07		100.00 0.		3464200E+07	2637288E+01	.3468400E+07	.262856E+01	.3472500E+07	.261985E+01	.3476700E+07		.2610762E+01
3480900E+07		100.00 0.		3485100E+07	259211E+01	.3489300E+07	.2582459E+01	.3493500E+07	.2573002E+01	.3497700E+07		.2563287E+01
3501900E+07		100.00 0.		3506100E+07	2534482E+01	.3510300E+07	.2533423E+01	.3514800E+07	.2517109E+01	.3518800E+07		.2512877E+01
3523000E+07		100.00 0.		3527300E+07	2432909E+01	.3531900E+07	.2481482E+01	.3535800E+07	.2471092E+01	.3540100E+07		.2460421E+01
3544400E+07		100.00 0.		3546700E+07	2492000E+01	.3553000E+07	.2458272E+01	.3557300E+07	.2417533E+01	.3561600E+07		.2406790E+01

3566000E+07 2395801E+01 3570300E+07 2385069E+01 3574700E+07 2374103E+01 3579000E+07 2363405E+01 3583000E+07 2352480E+01
3587700E+07 2341831E+01 3592100E+07 2330465E+01 3596500E+07 2320135E+01 3609900E+07 2309344E+01 3605300E+07 2298598E+01
3605700E+07 2287898E+01 3614100E+07 227247E+01 3618000E+07 2266448E+01 3623000E+07 225084E+01 3627400E+07 2245170E+01
3631900E+07 2234717E+01 3636300E+07 2224355E+01 3640000E+07 2213824E+01 3645200E+07 2203599E+01 3649700E+07 2193139E+01
3652400E+07 2182877E+01 3658100E+07 2172629E+01 3663200E+07 2162456E+01 3667700E+07 2152359E+01 3672300E+07 2142117E+01
3676800E+07 213177E+01 3681300E+07 2122311E+01 3685900E+07 2112321E+01 3690400E+07 210262E+01 3695000E+07 2092794E+01
3696000E+07 2083049E+01 3704200E+07 2073392E+01 3708100E+07 2064030E+01 3713300E+07 2054543E+01 3718000E+07 2044999E+01
3722600E+07 2035629E+01 3727200E+07 2026405E+01 3731800E+07 2017771E+01 3736500E+07 2008027E+01 3741100E+07 1999067E+01
3748800E+07 1990003E+01 3754000E+07 1981221E+01 3759210E+07 1972731E+01 3764500E+07 1963543E+01 3769800E+07 1954840E+01
3769200E+07 1946227E+01 3773900E+07 1937705E+01 3778600E+07 1929272E+01 3783400E+07 1920751E+01 3788100E+07 1912498E+01
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3816700E+07 1864188E+01 3821500E+07 1856398E+01 3826300E+07 1848699E+01 3831200E+07 1840934E+01 3836000E+07 1833419E+01
3845700E+07 1825959E+01 3850500E+07 1818511E+01 3855300E+07 1811270E+01 3860000E+07 1803977E+01 3864800E+07 1796769E+01
3870000E+07 1807000E+07 1792794E+01 3874700E+07 1787500E+07 1780372E+01 3883400E+07 1772619E+01 3888200E+07 1765197E+01
3894700E+07 1755376E+01 3899500E+07 1748921E+01 3904600E+07 1742502E+01 3909300E+07 1736057E+01 3914000E+07 1729846E+01
3919500E+07 1723317E+01 3924200E+07 1717500E+07 1711498E+01 1705613E+01 3929500E+07 1699500E+07 169219E+01
3934500E+07 1694209E+01 3939200E+07 1688587E+01 1683208E+01 1677863E+01 3944700E+07 1670000E+07 1662767E+01
3949400E+07 1667220E+01 1662834E+01 1656102E+01 1650600E+07 1645357E+01 3954700E+07 163737E+01 3959500E+07 1630493E+01
3959500E+07 164558E+01 1641029E+01 1635900E+07 1630400E+07 1625296E+01 4005800E+07 1633737E+01 4010900E+07 1630493E+01
4018100E+07 1627459E+01 4021300E+07 1624195E+01 4026500E+07 1622296E+01 4031700E+07 1620212E+01 4036900E+07 1618494E+01
4042100E+07 1617169E+01 4047300E+07 1612699E+01 4052800E+07 1615823E+01 4057800E+07 1615874E+01 4063100E+07 1614505E+01
4068400E+07 1617728E+01 4073700E+07 1619605E+01 4079300E+07 1622138E+01 4084300E+07 1625591E+01 4089600E+07 1629774E+01
4094900E+07 1634828E+01 4100200E+07 1640885E+01 1648124E+01 1656365E+01 4109000E+07 1656365E+01 4116300E+07 1659966E+01
4121700E+07 1676922E+01 4127100E+07 1692449E+01 4132500E+07 1703024E+01 4137900E+07 1718300E+01 4143300E+07 1735133E+01
4147800E+07 1753912E+01 4154200E+07 173912E+01 4159000E+07 1792540E+01 4165100E+07 181848E+01 4170600E+07 1843016E+01
4181500E+07 184435E+01 4187000E+07 1894500E+07 1921346E+01 1929260E+07 1948741E+01 1961000E+07 1975264E+01
4209200E+07 200933E+01 4209200E+07 2025688E+01 4214100E+07 2048157E+01 4230300E+07 2086692E+01 4235900E+07 2086452E+01
4231500E+07 2101102E+01 4237100E+07 2112405E+01 4242100E+07 2120235E+01 4248300E+07 2128570E+01 4254400E+07 2125478E+01
4265300E+07 217609E+01 4271000E+07 2109292E+01 4276600E+07 2098819E+01 4282300E+07 208609E+01 4288000E+07 206235E+01
4293800E+07 2054399E+01 4299500E+07 2038522E+01 4305200E+07 2023850E+01 4311000E+07 2009235E+01 4316000E+07 1909270E+01
4322500E+07 1983794E+01 4325000E+07 1965023E+01 4329500E+07 1946711E+01 4334100E+07 1927599E+01 4339900E+07 1823629E+01
4345700E+07 1891319E+01 4351600E+07 1873501E+01 4356100E+07 1856462E+01 4363300E+07 1839642E+01 4369100E+07 1823629E+01
4375000E+07 1807767E+01 4380900E+07 1792663E+01 4386600E+07 1777987E+01 4392700E+07 1763832E+01 4398700E+07 1749968E+01
4406600E+07 1736632E+01 4410600E+07 1723405E+01 4418000E+07 171176E+01 4422500E+07 1699332E+01 4428300E+07 168834E+01
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4659900E+07 1433210E+01 4665400E+07 1428844E+01 4671900E+07 1424557E+01 4678400E+07 142037E+01 4684900E+07 1416209E+01
4691500E+07 1412078E+01 4698000E+07 1408070E+01 4704600E+07 1404070E+01 4711000E+07 1400200E+01 4717700E+07 1396321E+01
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4757500E+07 1373995E+01 4764200E+07 1370983E+01 4770900E+07 136808E+01 4777600E+07 1363252E+01 4784300E+07 1359222E+01
4791100E+07 1356155E+01 4797800E+07 1352648E+01 4804600E+07 1349089E+01 4811400E+07 1345517E+01 4818200E+07 1341919E+01
4825000E+07 1338274E+01 4831500E+07 1334555E+01 4838700E+07 1330646E+01 4845500E+07 1326680E+01 4852400E+07 1322321E+01
4859300E+07 1317557E+01 4866200E+07 1313209E+01 4873100E+07 1308333E+01 4880000E+07 1304828E+01 4886900E+07 1301570E+01
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4929900E+07 1351392E+01 4936800E+07 1305000E+07 4943000E+07 1328992E+01 4950100E+07 1326044E+01 4957000E+07 132334E+01
4964300E+07 1305000E+07 4971400E+07 1300231E+01 4978600E+07 129604E+01 4985700E+07 129234E+01 4992500E+07 1288957E+01
5000100E+07 128554E+01 5007300E+07 1282380E+01 5014500E+07 1279319E+01 5021700E+07 1276342E+01 5029000E+07 1273393E+01
5036600E+07 1270339E+01 5043500E+07 1267490E+01 5050800E+07 1264477E+01 5058100E+07 1262092E+01 5065400E+07 1259331E+01
5072800E+07 1256547E+01 5080100E+07 1253812E+01 5087500E+07 1251044E+01 5094900E+07 1248276E+01 5102300E+07 1245803E+01
5109700E+07 1242119E+01 5117200E+07 1239879E+01 5125600E+07 1237053E+01 5132100E+07 1234193E+01 5139600E+07 1231333E+01
5147100E+07 1228257E+01 5154500E+07 1225266E+01 5162100E+07 1222129E+01 5169700E+07 1218912E+01 5177300E+07 1215600E+01
5184800E+07 1212222E+01 5192300E+07 1208621E+01 5200100E+07 1204909E+01 5207700E+07 1201012E+01 5215400E+07 1196603E+01
522300E+07 1192450E+01 5230700E+07 1187676E+01 5238400E+07 1182497E+01 5246100E+07 1178191E+01 5253900E+07 11740430E+01
5261600E+07 1163329E+01 5269400E+07 1155127E+01 5277200E+07 1145716E+01 5285500E+07 1135156E+01 5293900E+07 1124510E+01
5301000E+07 1117394E+01 5308900E+07 1112368E+01 5316400E+07 1102954E+01 5324300E+07 1092244E+01 5332200E+07 10829873E+01
5340200E+07 1145836E+01 5348100E+07 1155617E+01 5356100E+07 1160007E+07 5364000E+07 11581392E+01

5372100E+07	1531326E+01	5380100E+07	145842E+01	5388100E+07	1400300E+01	5386200E+07	1357999E+01	5404200E+07	5402882E+01
5412300E+07	130753E+01	5420400E+07	129205E+01	5428500E+07	1279854E+01	5436700E+07	1270127E+01	5442900E+07	1328682E+01
5453100E+07	125925E+01	5461300E+07	1288837E+01	5469500E+07	1243456E+01	5477700E+07	1238616E+01	5484900E+07	126192E+01
5492200E+07	1230241E+01	5502500E+07	122652E+01	5510700E+07	122304E+01	5519200E+07	1219836E+01	5527500E+07	1234224E+01
5535900E+07	1213958E+01	5544300E+07	1211245E+01	5552700E+07	120847E+01	5561100E+07	1206220E+01	5569600E+07	1216827E+01
5578000E+07	1201617E+01	5586500E+07	1199447E+01	5595700E+07	1197365E+01	5601600E+07	1195331E+01	5612100E+07	1203854E+01
5620700E+07	1191547E+01	5629200E+07	1189768E+01	5637800E+07	1188039E+01	5646500E+07	1186349E+01	5655100E+07	119344E+01
5663800E+07	1183240E+01	5672400E+07	1181600E+01	5681200E+07	1180429E+01	5689900E+07	1179111E+01	5694600E+07	116472E+01
5707400E+07	1176987E+01	5716200E+07	1176139E+01	5725000E+07	117551E+01	5733800E+07	1175211E+01	5742600E+07	1178011E+01
5751500E+07	1176146E+01	5760400E+07	1178255E+01	5769300E+07	1182630E+01	5778200E+07	1191937E+01	5787100E+07	1175351E+01
5796100E+07	1253058E+01	5805100E+07	1329671E+01	5814100E+07	1450394E+01	5823100E+07	1602345E+01	5832200E+07	1211759E+01
5841300E+07	1801640E+01	5850400E+07	1751346E+01	5859500E+07	1618490E+01	5868600E+07	1466044E+01	5877800E+07	1339972E+01
5886900E+07	1255785E+01	5896100E+07	1207532E+01	5905400E+07	1181789E+01	5914600E+07	1168095E+01	5923900E+07	1159954E+01
5933100E+07	1154605E+01	5942500E+07	1150573E+01	5951800E+07	111702E+01	5961100E+07	114740E+01	5970500E+07	114244E+01
5979900E+07	1140378E+01	5989300E+07	1138504E+01	5998800E+07	1136756E+01	6008200E+07	1135139E+01	6017700E+07	1133595E+01
6027200E+07	1132123E+01	6036800E+07	1130697E+01	6046300E+07	112937E+01	6055900E+07	1128004E+01	6065500E+07	1126707E+01
6075100E+07	112541E+01	6084700E+07	1124200E+01	6094400E+07	1122970E+01	6104100E+07	1121759E+01	6113800E+07	1120584E+01
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6272400E+07	1101133E+01	6282600E+07	1097861E+01	6292700E+07	1089369E+01	6302900E+07	1096673E+01	6313100E+07	1095024E+01
6323300E+07	1093281E+01	6333500E+07	1071410E+01	6343800E+07	1075327E+01	6354100E+07	1087143E+01	6364400E+07	1086491E+01
6374700E+07	1081933E+01	6385100E+07	1078861E+01	6395500E+07	1075327E+01	6405900E+07	107124E+01	6416400E+07	1086436E+01
6426800E+07	1066789E+01	6437300E+07	1053744E+01	6447800E+07	1045608E+01	6458400E+07	103521E+01	6469000E+07	1082271E+01
6479600E+07	1005823E+01	6490200E+07	985064E+00	6500700E+07	958969E+00	6511500E+07	9250972E+00	6522200E+07	885999E+00
6532900E+07	8413782E+00	6543700E+07	7927819E+00	6554500E+07	7460803E+00	6565300E+07	7073549E+00	6576100E+07	6823117E+00
6597000E+07	6745137E+00	6597400E+07	6845111E+00	6608000E+07	7092219E+00	6619700E+07	7434777E+00	6630750E+07	7820926E+00
6641700E+07	8201471E+00	6652700E+07	8547233E+00	6663000E+07	8847650E+00	6674900E+07	9037833E+00	6686000E+07	9302562E+00
6697100E+07	9468948E+00	6708300E+07	9605262E+00	6719400E+07	9715381E+00	6736700E+07	9807239E+00	6741900E+07	9842248E+00
6753200E+07	9945045E+00	6764500E+07	9997437E+00	6775800E+07	1046144E+01	6787200E+07	1007874E+01	6793600E+07	1011040E+01
6810000E+07	1013724E+01	6821400E+07	1016008E+01	6832700E+07	1017972E+01	6844400E+07	1019646E+01	6856000E+07	1021085E+01
6857500E+07	1022299E+01	6879100E+07	1023339E+01	6897000E+07	1024220E+01	6902400E+07	1024946E+01	6914100E+07	1025589E+01
6925800E+07	1026164E+01	6937500E+07	1026524E+01	6949300E+07	1026862E+01	6961100E+07	1027195E+01	6972900E+07	1027330E+01
6984800E+07	1027437E+01	6996700E+07	1027540E+01	7008600E+07	1027574E+01	7020500E+07	1027565E+01	7032500E+07	1027516E+01

SEARCH XBAR IS OUTSIDE RANGE OF TABLE.

000001

ELEMENT = C-12

DATE = 10/30/73

RUNNO = 154-155 ITERATION = 1

ELEMENT = C-12

DATE = 10/30/73

RUNNO = 154-155 ITERATION = 1

	TOTAL CROSS SECTION VS ENERGY									
	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00 10.00
5777777.78*		D T								
5833333.33*		D	T							
5888888.89*		DT								
5944444.44*		T								
6000000.00*		T								
6055555.56*		TD								
6111111.11*		T								
6166666.67*		T D								
6222222.22*		T	D							
6277777.78*		T		0						
6333333.33*		T	D							
6388888.89*		T								
6444444.44*		TD								
6500000.00*		T								
6555555.56*		TD								
6611111.11*		TD								
6666666.67*		DT								
6722222.22*		DT								
6777777.78*		D T								
6833333.33*		D T								
6888888.89*		D T								
6944444.44*		D T								
7000000.00*		D T								

RUNNING TIME FOR PROBLEM = .506417E+01