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COMPUTER PROGRAM FOR CALCULATING THE RELATIVE YIELDS OF ISOMERS PRODUCED IN NUCLEAR REACTIONS

by

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I. INTRODUCTION

The following program has been written to compute the relative cross sections of isomers produced in nuclear reactions. The theoretical formalism has been given in references 1 and 2. The program is divided into three main parts.

Part I. Computation of the partial compound nucleus cross sections and the normalized initial compound nucleus spin distribution.

The cross section for the formation of a compound nucleus with spin J_C at a bombarding energy E is given by

$$\sigma(J_C,E) = \pi\lambda\!\!\!^{-2} \sum_{S=|I-s|}^{I+s} \sum_{\ell=|J_C-S|}^{J_C+S} \frac{2J_C+1}{(2s+1)(2I+1)} T_\ell(E) \quad ,$$

where

$\lambda\!\!\!^{-}$ = de Broglie wavelength of the incoming projectile,

I = spin of the target nucleus,

s = spin of the projectile,

$T_\ell(E)$ = transmission coefficient of a particle with orbital angular momentum ℓ and energy E,

$J_C(\max) = \ell_{\max} + s + I$,

Computed for J_C = $0, 1, 2 \text{ ---------- } J_C(\max)$
$\frac{1}{2}, \frac{3}{2}, \frac{5}{2} \text{ ---------- } J_C(\max)$

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[1] J. R. Huizenga and R. Vandenbosch, Phys. Rev., 120, 1305 (1960)

[2] R. Vandenbosch and J. R. Huizenga, Phys. Rev., 120, 1313 (1960)

The first part of the program utilizes the above equation to compute the normalized initial compound nucleus spin distribution. The necessary input parameters are the following:

1) target spin = I;

2) projectile spin = s;

3) proportionality constant = $\pi\lambda\!\!\!^{-2}$.

   If one is interested only in a normalized spin distribution P_{J_C}, this constant can be set equal to 1. However, if the absolute cross section as a function of J_C is desired, one must put in the above proportionality constant;*

4) transmission coefficients as a function of ℓ for desired reaction.

The output quantities of this stage of the calculation are the partial cross sections $\sigma(J_C,E)$, P_{J_C}, running sum of P_{J_C}, and $\langle J_C^2 \rangle_{av}$, where P_{J_C} is defined as the probability that the compound nucleus has spin J_C or

$$P_{J_C} = \sigma(J_C,E) \Big/ \sum_{J_C=0}^{\infty} \sigma(J_C,E) \quad .$$

It should be noted that the spin cutoff factor σ does not enter into this stage of the calculation.

Part II. Computation of the normalized spin distribution following particle emission.

A particular state with spin J_C can decay by particle emission to final states with a variety of spin values, each of which are denoted by J_f. The relative probability for an initial state J_C for emitting a particle to a final state of spin J_f is given by

$$P(J_f)_{J_C} \propto \rho(J_f) \sum_{S=|J_f-s'|}^{J_f+s'} \sum_{\ell'=|J_C-S|}^{J_C+S} T'_{\ell'}(E) \quad ,$$

where s' is the intrinsic spin of the emitted particle, $T'_{\ell'}(E)$ the transmission coefficient of the emitted particle with angular momentum ℓ' and energy E, and

$$\rho(J_f) \propto (2J_f+1) \exp\left[-(J_f+\tfrac{1}{2})^2/2\sigma^2\right] \quad ,$$

where σ is the spin cutoff factor.

*It is often convenient to express $\pi\lambda\!\!\!^{-2}$ in units of 10^{-24} cm^2 so that the partial cross sections appear in units of barns.

The normalized yield of spin J_f coming from initial spin J_c is obtained by multiplying the initial normalized yield of J_c by the fraction of J_c decaying to J_f. The total normalized yield of J_f is computed by summing over all values of J_c and is given by the following equation:

$$P_{J_f} = \sum_{J_c=J_{c_I}}^{\begin{cases} J_{c_{max}} \text{ for } (J_f+\ell'_{max}+s') \geq J_{c_{max}} \\ J_f+\ell_{max}+s' \text{ for } (J_f+\ell'_{max}+s') < J_{c_{max}} \end{cases}} P_{J_c} \sum_{S=|J_f-s'|}^{J_f+s'} \rho_{J_F} \sum_{\ell'=|J_c-S|}^{J_c+S} T'_{\ell'}$$

$$J_c = \begin{cases} J_{c_I} \text{ for } (J_f-\ell_{max}-s') \leq 0 \\ J_f-\ell_{max}-s' \text{ for } (J_f-\ell_{max}-s') > 0 \end{cases}$$

$$J_f = \sum_{J_f=J_{f_I}}^{J_c+\ell'_{max}+s'} \sum_{S=|J_f-s'|}^{J_f+s'} \rho_{J_f} \sum_{\ell'=|J_c-S|}^{J_c+S} T'_{\ell'}$$

$$J_f = \begin{cases} J_{f_I} \text{ for } (J_c-\ell_{max}-s') \leq 0 \\ J_c-\ell'_{max}-s' \text{ for } (J_c-\ell'_{max}-s') > 0 \end{cases}$$

where

$$\rho_{J_f} = (2J_f+1) \exp \frac{-(J_f+\frac{1}{2})^2}{2\sigma^2} \text{ for } J_f = J_{f_I}, J_{f_I}+1, \text{----------} J_{f_{max}}$$

$$J_{f_{max}} = \ell' max + s' + J_{c_{max}}$$

$J_{c_{max}}$ = Maximum value of the index J_c from the input P_{J_c}

J_{c_I}, J_{f_I} are initial values of the indices J_c and J_f [i.e., if $J_{c_{max}}$ is integer, then $J_{c_I} = 0$; if $J_{c_{max}}$ is half integer, then $J_{c_I} = \frac{1}{2}$ similarly if $J_{f_{max}}$ is integer, then $J_{f_I} = 0$ and if $J_{f_{max}}$ is half integer then $J_{f_I} = \frac{1}{2}$].

P_{J_c} are the normalized initial spin distribution from the initial compound nucleus.

$T'_{\ell'}$ are the transmission coefficients

s' is the outgoing particle spin

ℓ'_{max} is the maximum value of the index ℓ' for the input $T'_{\ell'}$.

The input parameters for this part of the program are

1) normalized compound nucleus spin distribution (output of Part I),

2) spin of emitted particle s',

3) transmission coefficients of emitted particle $T'_{\ell'}$, and

4) value of spin cutoff factor σ.

The transmission coefficients of the emitted particle must be supplied from some external source. These are available for most particles at various energies from both square-well and optical-model calculations. In certain calculations it may be sufficient to use a single set of transmission coefficients which are associated with the average energy of the evaporated particle. In other calculations it may be necessary to subdivide the problem into several parts, each part dealing with emitted particles of a selected energy bin and its associated transmission coefficients. The weighting of the bins and final summation of the various probabilities is not performed by the program since in most of our calculations to date we have used an average energy of the outgoing particle and, hence, a single set of transmission coefficients.

The program will compute the spin distribution following successive particle emission as long as the above input parameters are specified for each evaporated particle. Of course, the input spin distribution for the second particle to be evaporated is the output spin distribution of the first particle, etc.

Part III. Computation of the normalized spin distribution following gamma-ray emission.

After the last particle is emitted, the final stage of de-excitation takes place by emission of one or a cascade of gamma rays. The probability of decaying from a state J_i to state J_f is assumed to be simply proportional to the density of final states with spin J_f. The total normalized yield of J_f is given by the following formula:

$$F_{J_f} = \sum_{J_i=|J_f-\ell|}^{J_f+\ell} \frac{F_{J_i}\,\rho(J_f)\,\delta_{J_i,J_f}}{\sum_{J_f=|J_i-\ell|}^{J_i+\ell} \rho(J_f)}$$

$$\rho(J_f) = (2J_f+1)\exp - \frac{(J_f+\frac{1}{2})^2}{2\sigma^2}$$

$$J_{f_{max}} = J_{i_{max}} + \ell \quad ; \quad \delta_{J_i,J_f} = 1 \text{ if } |J_i - J_f| \leq \ell \leq |J_i + J_f| \quad ;$$

$$\delta_{J_i,J_f} = 0 \quad \text{otherwise*}$$

ℓ - multipolarity of gamma emission

σ - spin cutoff factor

F_{J_i} - normalized initial spin distribution (following last particle emission)

II. PROGRAM DESCRIPTION

This Fortran II Program, written for the IBM 704, consists of three subprograms, each one of which computes a separate spin distribution for nuclear reactions. They are the Normalized Initial Compound Nucleus Spin Distribution, Normalized Spin Distribution following Particle Emission, and Normalized Spin Distribution following Gamma-ray Emission. The particle-emission and gamma-ray cases allow the operator to compute the spin distribution after the emission of each of M particles and/or each of N gamma rays.

This Program will allow for great generality in the choice of number and combination of the three separate subprograms to be performed. Six different arrangements of the calculations are possible:

1. Initial Compound Nucleus Spin Distribution only.

2. Normalized Spin Distribution following Particle Emission only. This may be done for the emission of any number of particles, in which case the final Normalized Spin Distribution following the emission of particle j becomes the initial Normalized Spin Distribution used in the calculations for the emission of particle j+1.

3. Normalized Spin Distribution following Gamma-ray Emission only. This may be done for the emission of any number of gamma rays, in which case the final Normalized Spin Distribution following the emission of gamma ray j is used as the initial normalized spin distribution used in the calculations for the emission of gamma ray j+1.

4. Initial Compound Nucleus Computation followed by computations for emission of M particles. The final spin distribution from the

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*This condition arises from selection rules forbidding photon transitions such as $0 \rightarrow 0$ for dipole and $0 \rightarrow 0$, $0 \rightarrow 1$, and $1 \rightarrow 0$ for quadrupole.

compound nucleus is used as initial spin distribution for the first particle-emission computation. If $M > 1$, then the program operates as in the particle-emission case, and the final spin distribution for particle j becomes the initial spin distribution for particle j+1.

5. Particle Emission Calculations followed by Gamma-ray Calculations. This possibility allows the spin distribution for the emission of M particles to be completed as in Type 2 Calculations, and then the last particle-emission, final spin distribution is used as the initial spin distribution for the first gamma-ray emission. The initial spin distribution has to be normalized so that the sum is 1.000. If the number of gamma rays emitted is greater than one, then the Program will operate as in Type 3 calculations, from this point on.

6. Compound Nucleus Computation followed by M particle-emission cases followed by N gamma-ray emissions. This type of computation is a combination of Types 1 followed by Type 2 followed by Type 3 computations.

III. RESTRICTIONS

A minimum 704 with a floating-point underflow feature is required.

IV. USAGE

The program requires no sense switches or special console settings. The instructions and data cards described in Sect. VII are placed behind the program deck. The computer automatically stops when the last data card has been processed.

V. OUTPUT

Output is on tape 6 in BCD form in the present program and may be easily listed off-line. Carriage control information is contained in the FORTRAN format statements to produce listings similar to the sample listing included. The tape on which the output is written is optional. The variable K TAPE controls the tape unit on which the output is written. If a tape unit different from unit 6 is desired, the user may change the value of K TAPE on statement 22222 K TAPE = 6. If, for example, it is desired to write on unit 7, statement 22222 should be changed to read 22222 K TAPE = 7.

VI. CHECKOUT

Cards for a sample problem, of type 6, are included. The output should be identical with that of the sample listings included. A sample of the data-preparation formats are included which will produce the input cards for the sample problem. FORTRAN listings of the program are also included.

VII. DATA CARD FORMATS

A. Card Formats to perform a Type 1 or Compound Nucleus Calculation

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEVbHE4

   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 1
   This CARD indicates the Type of Problem to be done.

3. Format (3E15.8, I3)

   This CARD contains the values of the Target Spin, Projectile Spin, Proportionality Constant and Number of Transmission Coefficients to be used.

   Target Spin in columns 1-15
   Projectile Spin in columns 16-30
   Proportionality Constant in columns 31-45 must be Nonzero
   Number of Transmission Coefficients in columns 46-48
   i.e., +0.10000000E+01+0.50000000E+00+0.10000000E+01027

4. Format (E15.8,5X,F4.1)

   Transmission Coefficient in columns 1-15

   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 has the value of L
   +0.10000000E+01bbbL=20.0
   or +0.10000000E+01bbbL=01.0

   There should be as many cards of this Type as was specified in columns 46-48 of 3.

1-4 Constitute all of the input data required to perform a Type 1 Calculation.

B. Card Formats to perform a Type 2 or Particle-emission Calculation

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEVbHE4

   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 2
   This card indicates the Type of Problem to be done.

3. Format (I2)

   The Number of Particles to be emitted - NPE must be Nonzero
   NPE goes in columns 1 and 2
   i.e., for 7 particles to be emitted, 07

4. Format (I2)

   The number of values of the Initial Spin Distribution to be used - NJC
   NJC goes in columns 1 and 2
   i.e., for 21 values the card is of the form: 21

5. Format (E15.8,5X,F4.1)

   Initial Spin Distribution in columns 1-15
   Columns 16, 17 are blank
   Column 18 is a J
   Column 19 is a C
   Column 20 is an equal sign (=)
   Columns 21-24 has the value of JC
   i.e., +0.10000000E+01bbJC=16.0

   One value per card. There should be as many cards of this type as was specified in 4.

6. Format (F6.3)

   Outgoing Particle Spin in columns 1-6
   i.e., 00.500

7. Format (I2)

   Number of Transmission Coefficients to be used in computations must be Nonzero
   Value goes in columns 1 and 2
   i.e., 07, 21

8. Format (E15.8,5X,F4.1)

   Values of the Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 is the value of L
   i.e., +0.10000000E+00bbbL=15.0

9. Format (F6.3)

   Value of Sigma goes in columns 1-6
   i.e., 03.000

1-9 constitutes the data required to perform a Type 2 Calculation provided only one particle is emitted. If more than one particle emission is desired, additional data must be prepared for each particle emission.

10. Format (I2)

    Number of Transmission Coefficients to be used in Computations.
    Must be Nonzero
    Value goes in columns 1 and 2
    i.e., 07, 21.

11. Format (E15.8,5X,F4.1)

    Values of the Transmission Coefficient in columns 1-15
    Columns 16-18 are blank
    Column 19 is an L
    Column 20 is an equal sign (=)
    Column 21-24 is the value of L
    i.e., +0.10000000E+00bbbL=15.0

12. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 03.000

For each additional particle emitted, the program requires 10-12 be added. Thus, to perform a Type 2 Calculation with the emission of 3 particles, the data needed would be:

(1-9) gives the emission of particle 1
(10-12) for particle 2
(10-12) for particle 3

C. Card formats to perform a Type 3 or Gamma-ray-emission Calculation

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEVbHE4

   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 3
   This CARD indicates the Type of Problem to be done.

3. Format (I2)

   Number of initial spins to be used - NFJI
   Must be Nonzero
   NFJI goes in columns 1 and 2
   i.e., for 10 values of initial spin 10

4. Format (E15.8,5X,F4.1)

   Value of initial spin in columns 1-15
   Column 16, 17 are blank
   Column 18 has a J
   Column 19 has an I
   Column 20 has an equal sign (=)
   Column 21-24 has the value of JI
   i.e., +0.10000000E+01bbJI=00.5

5. Format (I2)

   Number of Gamma Rays to be emitted - NGE
   Must be Nonzero
   NGE goes in columns 1 and 2
   i.e., for 3 gamma rays to be emitted 03

6. Format (F6.3)

   Value of Sigma goes in columns 1-6
   i.e., 05.000

7. Format (I2)

   Multipolarity of Gamma-ray Emission - L
   L goes in columns 1 and 2
   i.e., 01, 02

1-7 constitutes all of the data required to perform the Type 3 Calculation for a Single Gamma-ray Emission.

If more than one gamma-ray emission is desired, additional data must be prepared for each emission.

8. Format (F.6.3)

   Value of sigma goes in columns 1-6
   i.e., 05.000

9. Format (I2)

   Multipolarity of Gamma-ray Emission, L
   L goes in columns 1 and 2
   i.e., 01, 02

Thus, to perform a Type 3 calculation with the emission of 3 gamma rays, the data required are:

(1-7) gives emission of gamma ray 1

(8, 9) gives emission of gamma ray 2

(8, 9) gives emission of gamma ray 3

D. Card Formats to perform a Type 4 Calculation or Compound Nucleus followed by the emission of M particles.

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEV6HE4
   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 4
   This card indicates the type of problem to be done.

3. Format (3E15.8,I3)

   This card contains the values of the Target Spin, Projectile Spin, Proportionality Constant, and number of Transmission Coefficients to be used.

   Target Spin in columns 1-15
   Projectile Spin in columns 16-30
   Proportionality Constant in columns 31-45 Must be Nonzero
   Number of transmission coefficients in columns 46-48
   i.e., +0.10000000E+01+0.50000000E+00+0.10000000E+01027

4. Format (E15.8,5X,F4.1)

   Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 has the value of L
   +0.10000000E+01bbbL=20.0
   or +0.10000000E+01bbbL=01.0
   There should be as many cards of this type as was specified in columns 46-48 of 3

5. Format (I2)

   The number of particles to be emitted - NPE
   Must be Nonzero
   NPE goes in columns 1 and 2
   i.e., for 7 particles to be emitted 07

6. Format (F6.3)

   Outgoing particle spin in columns 1-6
   i.e., 00.500

7. Format (I2)

   Number of Transmission Coefficients to be used in Computations.
   Must be Nonzero
   Value goes in columns 1 and 2
   i.e., 07, 21.

8. Format (E15.8,5X,F4.1)

   Values of the Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 is the value of L
   i.e., +0.10000000E+00bbbL=15.0

9. Format (F6.3)

   Value of Sigma goes in columns 1-6
   i.e., 03.000

1-9 constitutes the data required to perform a Type 4 Calculation provided only one particle is emitted. If more than one particle is desired, additional data must be prepared for each particle emission.

10. Format (I2)

    Number of Transmission Coefficients to be used in Computations
    Must be Nonzero
    Value goes in columns 1 and 2
    i.e., 07, 21.

11. Format (E15.8,5X,F4.1)

    Values of the Transmission Coefficient in columns 1-15
    Columns 16-18 are blank
    Column 19 is an L
    Column 20 is an equal sign (=)
    Column 21-24 is the value of L
    i.e., +0.10000000E+00bbbL=15.0

12. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 03.000

For each additional particle emitted, the program requires 10, 11, 12 be added. Thus, to perform a Type 4 Calculation with the emission of 3 particles, the data needed would be:

1-9 gives the Compound Nucleus followed by the Emission of Particle 1
(10-12) gives the Emission of particle 2
(10-12) gives the Emission of particle 3

E. Card Formats to perform a Type 5 calculation or M particle emissions followed by N gamma-ray emissions.

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEVbHE4
   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 5
   This card indicates the type of problem to be done

3. Format (I2)

   The number of Particles to be emitted - NPE
   Must be Nonzero
   NPE goes in columns 1 and 2
   i.e., for 7 particles to be emitted 07

4. Format (I2)

   The number of values of the initial Spin distribution to be used - NJC
   NJC goes in columns 1 and 2
   i.e., for 21 values the card is of the form: 21

5. Format (E15.8,5X,F4.1)

   Initial spin distribution in columns 1-15
   Columns 16, 17 are blank
   Column 18 is a J
   Column 19 is a C
   Column 20 is an equal sign (=)
   Columns 21-24 has the value of JC
   i.e., +0.10000000E+01bbJC=16.0
   One value per card. There should be as many cards of this type as was specified in 4.

6. Format (F6.3)

   Outgoing particle spin in columns 1-6
   i.e., 00.500

7. Format (I2)

   Number of Transmission Coefficients to be used in Computations.
   Must be Nonzero
   Value goes in columns 1 and 2
   i.e., 07, 21.

8. Format (E15.8,5X,F4.1)

   Values of the Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 is the value of L
   i.e., +0.10000000E+00bbbL=15.0

9. Format (F6.3)

   Value of Sigma goes in columns 1-6
   i.e., 03.000

1-9 constitutes the data required to perform a Type 5 calculation provided only one particle is emitted.

10. Format (I2)

    Number of Transmission Coefficients to be used in Computations.
    Must be Nonzero
    Value goes in columns 1 and 2
    i.e., 07, 21.

11. Format (E15.8,5X,F4.1)

    Values of the Transmission Coefficient in columns 1-15
    Columns 16-18 are blank
    Column 19 is an L
    Column 20 is an equal sign (=)
    Column 21-24 is the value of L
    i.e., +0.10000000E+00bbbL=15.0

12. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 03.000

For each additional particle emitted, the program requires 10-12 be added. Thus to perform a Type 5 calculation with the emission of 3 particles, the data needed would be:

(1-9) gives the emission of particle 1
(10-12) for particle 2
(10-12) for particle 3

13. Format (I2)

Number of Gamma Rays to be emitted -NGE
Must be Nonzero
NGE goes in columns 1 and 2
i.e., for 3 gamma rays to be emitted 03

14. Format (F6.3)

Value of Sigma goes in columns 1-6
i.e., 05.000

15. Format (I2)

Multipolarity of Gamma-ray Emission - L
L goes in columns 1 and 2
i.e., 01, 02.

1-15 constitutes all of the data required to perform the Type 5 calculations for m particle emission followed by a single gamma-ray emission. If more than one gamma-ray emission is desired, additional data must be prepared for each emission.

16. Format (F6.3)

Value of Sigma goes in columns 1-6
i.e., 05.000

17. Format (I2)

Multipolarity of Gamma-ray Emission - L
L goes in columns 1 and 2
i.e., 01, 02.

Thus, to perform a Type 5 calculation with the emission of 3 gamma rays, the data required are:

(1-15) Gives emission of all particles and of gamma ray 1
(16, 17) Gives emission of gamma ray 2
(16, 17) Gives emission of gamma ray 3

F. Card Formats to perform a Type 6 calculation or a compound nucleus followed by emission of M particles followed by emission of N gamma rays.

1. Format (72H)

   Identification of problem: reaction, Problem Number, etc.
   P is required in column 1
   identification in columns 2-72
   i.e., PbbbbAG-107b+b35bMEVbHE4

   Note: b indicates a blank column. Spacing on this CARD is at the discretion of the user.

2. Format (I2)

   Column 1 = 0
   Column 2 = 6
   This card indicates the type of problem to be done.

3. Format (3E15.8, I3)

   This card contains the values of the Target Spin, Projectile Spin, Proportionality Constant, and number of Transmission Coefficients to be used.

   Target Spin in columns 1-15
   Projectile Spin in columns 16-30
   Proportionality Constant in columns 31-45 must be Nonzero
   Number of transmission coefficients in columns 46-48
   i.e., +0.10000000E+01+0.50000000E+00+0.10000000E+01027

4. Format (E15.8,5X,F4.1)

   Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 has the value of L
   +0.10000000E+01bbbL=20.0
   or +0.10000000E+01bbbL=01.0
   There should be as many cards of this type as was specified in columns 46-48 of 3.

5. Format (I2)

   The number of particles to be emitted -NPE
   Must be Nonzero
   NPE goes in columns 1 and 2
   i.e., for 7 particles to be emitted 07

6. Format (F6.3)

   Outgoing particle spin in columns 1-6
   i.e., 00.500

7. Format (I2)

   Number of Transmission Coefficients to be used in Computations.
   Must be Nonzero
   Value goes in columns 1 and 2
   i.e., 07, 21.

8. Format (E15.8,5X,F4.1)

   Values of the Transmission Coefficient in columns 1-15
   Columns 16-18 are blank
   Column 19 is an L
   Column 20 is an equal sign (=)
   Column 21-24 is the value of L
   i.e., +0.10000000E+00bbbL=15.0

9. Format (F6.3)

   Value of Sigma goes in columns 1-6
   i.e., 03.000

1-9 constitutes the data required to perform a Type 6 Calculation provided only one particle is emitted. If more than one particle is desired, additional data must be prepared for each particle emission.

10. Format (I2)

    Number of Transmission Coefficients to be used in Computations
    Must be Nonzero
    Value goes in columns 1 and 2
    i.e., 07, 21.

11. Format (E15.8,5X,F4.1)

    Values of the Transmission Coefficient in columns 1-15
    Columns 16-18 are blank
    Column 19 is an L
    Column 20 is an equal sign (=)
    Column 21-24 is the value of L
    i.e., +0.10000000E+00bbbL=15.0

12. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 03.000

For each additional particle emitted, the program requires 10, 11, 12 be added. Thus, to perform a Type 6 Calculation with the emission of 3 particles, the data needed would be:

(1 - 9) Gives the Compound Nucleus followed by the Emission of Particle 1
(10-12) Gives the Emission of Particle 2
(10-12) Gives the Emission of Particle 3

13. Format (I2)

    Number of Gamma Rays to be emitted - NGE
    Must be Nonzero
    NGE goes in columns 1 and 2
    i.e., for 3 gamma rays to be emitted 03

14. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 05.000

15. Format (I2)

    Multipolarity of Gamma-ray Emission - L
    L goes in columns 1 and 2
    i.e., 01, 02.

1-15 constitutes all of the data required to perform the Type 6 calculations for a single gamma-ray emission. If more than one gamma-ray emission is desired, additional data must be prepared for each emission.

16. Format (F6.3)

    Value of Sigma goes in columns 1-6
    i.e., 05.000

17. Format (I2)

    Multipolarity of Gamma-ray Emission - L
    L goes in columns 1 and 2
    i.e. 01, 02.

Thus, to perform a Type 6 calculation with the emission of 3 gamma rays, the data required are:

(1 - 15) Gives emission of gamma ray 1
(16, 17) Gives emission of gamma ray 2
(16, 17) Gives emission of gamma ray 3

VIII. PROGRAM LISTING

```
C      NORMALIZED  SPIN  DISTRIBUTIONS  IN  NUCLEAR  REACTIONS
       DIMENSION TL(200),PJC(200),PJF(200),CS(200)
      2 , RHO(200),FJI(200),FJFS(200)
       EQUIVALENCE (RHO,TL),(FJI,PJF),(PJC,FJFS)
 1001  DO 101 I=1,200
       TL(I)=0.0
       CS(I)=0.
       PJF(I)=0.
       RHO(I)=0.
       FJI(I)=0.
       FJFS(I)=0.
  101  PJC(I)=0.0
22222  KTAPE=6
  100  READ 109
  109  FORMAT(72H
      1                    )
        READ 99,MPD
       GO TO(1100,1000,9001,1100,1000,1100),MPD
C
C      NORMALIZED  SPIN  DISTRIBUTION  FOR  INITIAL  COMPOUND  NUCLEUS
C
 1100  READ 1, TSPIN,PSPIN,PORPC,NTL
    1  FORMAT (3E15.8, I3)
       DO 33 I=1,NTL
   33  READ 990,TL(I),CL
       WRITE OUTPUT TAPE KTAPE,1111
 1111  FORMAT(1H1,15X,58HNORMALIZED  INITIAL  COMPOUND  NUCLEUS  SPIN  DI
      1STRIBUTION,/ /)
       WRITE OUTPUT TAPE KTAPE, 109
       WRITE OUTPUT TAPE KTAPE, 200,TSPIN
  200  FORMAT(1HO,10X,22HINPUT TARGET SPIN WAS F6.3)
       WRITE OUTPUT TAPE KTAPE, 201,PSPIN
  201  FORMAT(1HO,10X,26HINPUT PROJECTILE SPIN WAS F6.3)
       WRITE OUTPUT TAPE KTAPE, 202,PORPC
  202  FORMAT(1HO,10X,29HPROPORTIONALITY CONSTANT WAS F6.3)
       FJMAX=TSPIN+PSPIN+CL
       WRITE OUTPUT TAPE KTAPE, 112,FJMAX
  112  FORMAT(1HO,10X,39HJCMAX=LMAX+TARGET SPIN+PROJECTILE SPIN=F4.1)
       C=(2.*PSPIN+1.)*(2.*TSPIN+1.)
       SUL=ABSF(TSPIN+PSPIN)
       SLL=ABSF(TSPIN-PSPIN)
       JFMAX=FJMAX
       FJMAX1=JFMAX
       IF(FJMAX-FJMAX1)88,44,45
   44  FJ=0.0
       FJI=0.0
       NCOE=FJMAX+1.
  303  WRITE OUTPUT TAPE KTAPE, 203,NTL
  203  FORMAT(1HO,10X,27HOUTPUT WILL BE INTEGER FOR I2,19H INPUT VALUES O
      1F TL,/)
       GO TO 46
   45  FJ=0.5
       FJI=0.5
       NCOE=FJMAX+.5
       WRITE OUTPUT TAPE KTAPE, 204,NTL
  204  FORMAT(1HO,10X,32HOUTPUT WILL BE HALF-INTEGER FOR I2,19H INPUT VAL
      1UES OF TL,/)
   46  K=1
   47  S=SLL
   16  SU=ABSF(FJ+S)
       SL=ABSF(FJ-S)
```

```
      SL=SL+1.
      SU=SU+1.
       TLNDX=SL
      SUM=0.0
   48 I=TLNDX
      IF(TL(I))148,49,148
  148 SUM=SUM+((2.*FJ+1.)/C)*TL(I)
      IF(TLNDX-SU)17,49,49
   17 TLNDX=TLNDX+1.
      GO TO 48
   49 CS(K)=CS(K)+SUM*PORPC
      S=S+1.
      IF(S-SUL)16,16,50
   50 IF(FJ-FJMAX)51,52,52
   51 FJ=FJ+1.
      K=K+1
      GO TO 47
   52 SUMJC=0.0
      DO 53 I=1,200
   53 SUMJC=SUMJC+CS(I)
      SUMJ=0.0
      FJ1=FJI
      DO 54 I=1,200
      PJC(I)=CS(I)/SUMJC
      FJ2=FJ1*FJ1
      SUMJ=SUMJ+PJC(I)*FJ2
   54 FJ1=FJ1+1.
      FJ1=FJI
      SUM=0.0
      WRITE OUTPUT TAPE KTAPE,1113
 1113 FORMAT(1H0,3H  L,15X,2HTL,13X,2HJC,5X,13HCROSS SECTION,12X,3HPJC,1
     14X,9HSUM   PJC,10X,13H(JC)(JC) AVE.///)
      FJIX=0.0
      SUM=SUM+PJC(1)
      WRITE OUTPUT TAPE KTAPE,1114,FJIX,TL(1),FJ1,CS(1),PJC(1),SUM,SUMJ
 1114 FORMAT(1H ,1X,F4.1,5X,E15.8,5X,F4.1,4(5X,E15.8))
      DO 14 I=2,NTL
      FJIX=FJIX+1.
      FJ1=FJ1+1.
      SUM=SUM+PJC(I)
   14 WRITE OUTPUT TAPE KTAPE,1115,FJIX,TL(I),FJ1,CS(I),PJC(I),SUM
 1115 FORMAT(1H ,1X,F4.1,5X,E15.8,5X,F4.1,3(5X,E15.8))
      I=NTL+1
      FJ1=FJ1+1.
   15 IF(FJ1-FJMAX)412,412,411
  412 SUM=SUM+PJC(I)
      WRITE OUTPUT TAPE KTAPE,1116,FJ1,CS(I),PJC(I),SUM
      WRITE OUTPUT TAPE 6,1116,FJ1,CS(I),PJC(I),SUM
 1116 FORMAT(1H ,30X,F4.1,3(5X,E15.8))
      I=I+1
      FJ1=FJ1+1.
      GO TO 15
  411 GO TO(1001,88,88,1200, 88 ,1200),MPD
C
C     NORMALIZED  SPIN  DISTRIBUTION  FOLLOWING  PARTICLE  EMISSION
C
 1200 NPE1=1
      CJC=FJMAX
      NJC=NCOE
      DO 1301 I=1,200
      TL(I)=0.
      CS(I)=0.
```

```
1301 PJF(I)=0.
     READ 99,NPE
     GOTO 808
1000 READ 99,NPE
 111 FORMAT(F6.3)
 889 READ 99,NJC
  99 FORMAT(I2)
     DO2I=1,NJC
   2 READ 990,PJC(I),CJC
     NPE1=1
 808 READ 111,SP
 888 READ 99,NTL
      DO 31 I=1,NTL
  31 READ 990,TL(I),CL
 990 FORMAT(E15.8,5X,F4.1)
 893 READ 111,SIGMA
     FJMAX=CL+CJC+SP
     CJMAX=CJC
     L=1
     SUM=0.
     B1=0.
     WRITE OUTPUT TAPE KTAPE, 113
 113 FORMAT(1H1,15X,56HNORMALIZED SPIN DISTRIBUTION FOLLOWING PARTICLE
    1EMISSION//)
     WRITE OUTPUT TAPE KTAPE, 109
     WRITE OUTPUT TAPE KTAPE, 890,NPE1
 890 FORMAT(1H0,30X,33HDISTRIBUTION  FOR  PARTICLE  NO. I2,/)
     WRITE OUTPUT TAPE KTAPE, 114,SIGMA
     WRITE OUTPUT TAPE KTAPE, 118,SP
 114 FORMAT(1H0,24X,19HINPUT  SIGMA  WAS  E15.8)
     WRITE OUTPUT TAPE 6, 118, SP
 118 FORMAT(1H0,24X,25HOUTGOING  PARTICLE  SPIN=F6.4)
     WRITE OUTPUT TAPE KTAPE, 115,FJMAX
 115 FORMAT(1H0,24X,25HJFMAX=LMAX+JCMAX+S PRIME=F7.4)
     JMAX=FJMAX
     FJMAX1=JMAX
     IF(FJMAX-FJMAX1)88,3,4
   3 FJI=0 .
     CJI=0.5
     CJ=.5
     FJ=0.
     FJII=0.
     NCOE=FJMAX+1.
     WRITE OUTPUT TAPE KTAPE, 116,NTL
 116 FORMAT(1H0,24X,31HOUTPUT  WILL  BE  INTEGER  FOR I2,22H INPUT  VAL
    1UES  OF  TL,/)
     GO TO 55
   4 FJI=.5
     CJI=0.
     CJ=0.
     FJ=.5
     FJII=0.5
     NCOE=FJMAX+.5
     WRITE OUTPUT TAPE KTAPE, 117,NTL
 117 FORMAT(1H0,24X,36HOUTPUT  WILL  BE  HALF-INTEGER  FOR I2,22H INPUT
    1  VALUES  OF  TL,/)
  55 FJN=FJ
     FCT=FJN+CL+SP
     FCL=FJN-CL-SP
     IF(FCL)666,667,667
 666 CJ=CJI
     GO TO 668
```

```
  667 CJ=FCL
  668 IF(CJMAX-FCT) 2667,2667,2668
 2667 FCT=CJMAX
      GO TO 2668
 2668 K=CJ+1.
      NOD=1
    5 SUMTL=0.0
      SU=ABSF(FJN+SP)
      SL=ABSF(FJN-SP)
      S=SL
   11 UL=ABSF(CJ+S)+1.
      BL=ABSF(CJ-S)+1.
      TDX=BL
  110 I=TDX
      IF(TL(I))87,7,87
   87 SUMTL=SUMTL+TL(I)
      IF(TDX-UL)6,7,7
    6 TDX=TDX+1.
      GO TO110
    7 IF(S-SU)8,9,9
    8 S=S+1.
      GO TO 11
    9 GO TO (669,665),NOD
  669 FJN=FJ
  665 ARG=-((FJN+.5)**2.)/(2.*SIGMA*SIGMA)
      TEMP= (SUMTL*EXPF(ARG))*(2.*FJN+1.)
      GOTO(551,552),NOD
  551 T=TEMP
      NOD=2
      FJT=CJ+CL+SP
      FJL=CJ-CL-SP
       IF(FJL)461,462,462
  461 FJN=FJI
      GOTO 5
  462 FJN=FJL
      GOTO 5
  552 B1=B1+TEMP
      IF(FJN-FJT)557,558,558
  557 FJN=FJN+1.
      GO TO 5
  558 IF(B1) 1558,1559,1558
 1558 CS(L)=CS(L)+(T/B1)*PJC(K)
 1559 B1=0.
      IF(FCT-CJ)560,560,559
  559 K=K+1
   10 CJ=CJ+1.
      NOD=1
      FJN=FJ
      GO TO 5
  560 SUM=SUM+CS(L)
      IF(FJMAX-FJ)570,570,561
  561 L=L+1
      FJ=FJ+1.
   13 CJ=CJI
      GO TO 55
  570 FJ=FJI
      AVE=0.
      DO 77 I=1,L
      PJF(I)=CS(I)/SUM
      AVE=PJF(I)*FJ*FJ+AVE
   77 FJ=FJ+1.
      SUM=0.
```

```
      I=1
      FJ=FJII
      CJ=CJI
      WRITE OUTPUT TAPE KTAPE, 401
  401 FORMAT(1H0,2H L,13X,2HTL,11X,2HJC,11X,3HPJC,12X,2HJF,11X,3HPJF,13X
     1,9HSUM   PJF, 9X,13H(JF)(JF) AVE.)
      AI=I-1
      SUM=SUM+PJF(I)
      WRITE OUTPUT TAPE KTAPE, 402,AI,TL(1),CJ,PJC(1),FJ,PJF(1),SUM,AVE
  402 FORMAT(1H0,F4.1,4X,E15.8,4X,F4.1,4X,E15.8,4X,F4.1,3(4X,E15.8))
      DO 66 I=2,NTL
      CJ=CJ+1.
      FJ=FJ+1.
      SUM=SUM+PJF(I)
      AI=I-1
   66 WRITE OUTPUT TAPE KTAPE, 403,AI,TL(I),CJ,PJC(I),FJ,PJF(I),SUM
  403 FORMAT(1H ,F4.1,4X,E15.8,4X,F4.1,4X,E15.8,4X,F4.1, 2(4X,E15.8))
      N=I
      DO 67 I=N,NJC
      FJ=FJ+1.
      CJ=CJ+1.
      SUM=SUM+PJF(I)
   67 WRITE OUTPUT TAPE KTAPE, 404,CJ,PJC(I),FJ,PJF(I),SUM
  404 FORMAT(1H ,27X,F4.1,4X,E15.8,4X,F4.1,2(4X,E15.8))
      I=NJC+1
 1462 FJ=FJ+1.
      IF(FJ-FJMAX)413,413,414
  413 SUM=SUM+PJF(I)
   68 WRITE OUTPUT TAPE KTAPE, 405,FJ,PJF(I),SUM
  405 FORMAT(1H ,54X,F4.1,2(4X,E15.8))
      I=I+1
      GO TO1462
  414 IF(NPE-NPE1)891,891,892
  892 NPE1=NPE1+1
      CJC=FJMAX
      NJC=NCCE
      DO 894 I=1,200
      TL(I)=0.
      CS(I)=0.
      PJC(I)=PJF(I)
  894 PJF(I)=0.
      GO TO 888
  891 GO TO(88,1001,88,1001,9000,9000),MPD
   88 STOP
C
C     NORMALIZED  SPIN  DISTRIBUTION  FOLLOWING  GAMMA-RAY  EMISSION
C
 9000 NFJI=NOCE
      CJI=FJMAX
      DO 246 I=1,200
      FJFS(I)=0.
      RHO(I)=0.
  246 FJI(I)=PJF(I)
      GO TO 9002
 9001 READ 99,NFJI
      DO 142 I=1,NFJI
  142 READ 990,FJI(I),CJI
 9002 NGO=1
      READ 99,NGE
   98 READ 111,SIGMA
      READ 99,L
      WRITE OUTPUT TAPE KTAPE, 776,NGO
```

```
  776 FORMAT(1H1,24X,72HNORMALIZED  SPIN  DISTRIBUTION  FOLLOWING  EMISS
     1ION  OF  GAMMA  RAY  NO.  I2,//)
      WRITE OUTPUT TAPE KTAPE, 109
      WRITE OUTPUT TAPE KTAPE, 778,SIGMA
  778 FORMAT(1H0,24X,24HSPIN  CUT  OFF  FACTOR = F6.3)
      CL=L
      WRITE OUTPUT TAPE KTAPE, 775,L
  775 FORMAT(1H0,24X,39HMULTIPOLARITY  OF  GAMMA-RAY  EMISSION I2)
      FJMAX=CL+CJI
      WRITE OUTPUT TAPE KTAPE,7779,FJMAX
 7779 FORMAT(1H0,24X, 18HJF(MAX)=JI(MAX)+L=F6.3)
      J=CJI
      CJ=J
      I=0
      IF(CJI-CJ)133,134,133
  133 FJ1=.5
      GO TO 155
  134 FJ1=0.
  155 FJ=FJ1
  255 I=I+1
      ARG=-(((FJ+.5)**2.)/(2.*SIGMA*SIGMA))
      RHO(I)=(2.*FJ+1.)*EXPF(ARG)
      FJ=FJ+1.
      IF(FJ-FJMAX-2.*CL)255,255,256
  256 FJS=FJ1
      J=1
  372 ULL=FJS+CL
       BLL=ABSF(FJS-CL)
      CJ=BLL
      IF(FJ1)88,1813,1812
 1813 JI=CJ
      GO TO 375
 1812 JI=CJ-.5
  375 FML=CJ+CL
      FLL=ABSF(CJ-CL)
      CI=FLL
      IF(FJ1)88,1814,1815
 1814 I=CI
      GO TO 1816
 1815 I=CI-.5
 1816 SUM=0.0
  370 SUM=SUM+RHO(I+1)
      I=I+1
      CI=CI+1.
      IF(FML-CI)371,370,370
  371 IF(SUM) 1371,1372,1371
 1371 FJFS(J)=FJFS(J)+(FJI(JI+1)*RHO(J    )/SUM)
 1372 CJ=CJ+1 .
      JI=JI+1
      IF(ULL-CJ)373,375,375
  373 J=J+1
       FJS=FJS+1.
      IF(FJMAX-FJS)374,372,372
  374 FJ=FJ1
      FSUM=0.
      AVE=0.
      DO 222 I=1,J
      AVE=FJ*FJ*FJFS(I) +AVE
  222 FJ=FJ+1.
      JJ=FJMAX+1.
      I=1
      SUM=0.
```

```
      WRITE OUTPUT TAPE KTAPE, 780
  780 FORMAT(1HO,5X,2HJI,13X,3HJFI,17X,2HJF,13X,3HFJF,17X,9HSLM    FJF,12
     1X,13F(JF)(JF) AVE.)
      SUM=SUM+FJFS(I)
      FJ=FJ1
      WRITE OUTPUT TAPE KTAPE, 781,FJ,FJI(I),FJ,FJFS(I),SUM,AVE
  781 FORMAT(1HO,4X,F4.1,7X,E15.8,9X,F4.1,3(7X,E15.8))
      IF(NFJI-1) 88,1264,1263
 1263 DO 263 I=2,NFJI
      FJ=FJ+1.
      SUM=SUM+FJFS(I)
  263 WRITE OUTPUT TAPE KTAPE, 782,FJ,FJI(I),FJ,FJFS(I),SUM
  782 FORMAT(1H ,4X,F4.1,7X,E15.8,9X,F4.1,2(7X,E15.8))
 1264 FJ=FJ+1.
      I=NFJI+1
  150 SUM=SUM+FJFS(I)
      WRITE OUTPUT TAPE KTAPE, 783,FJ,FJFS(I),SUM
  783 FORMAT(1H ,   39X,F4.1,2(7X,E15.8) )
      I=I+1
      FJ=FJ+1.
      IF(FJMAX-FJ)140,150,150
  140 NGE=NGE-1
      NGC=NGC+1
      IF(NGE-1) 19,18,18
   18 DO 166 I=1,200
      FJI(I)=FJFS(I)
      RHO(I)=0.
  166 FJFS(I)=0.
      NFJI=NFJI+1
      CJI=FJMAX
      GO TO 98
   19 GO TO 1001

      END(0,1,0,0,1)
```

EXTERNAL FORMULA NUMBERS WITH CORRESPONDING INTERNAL FORMULA NUMBERS AND OCTAL LOCATIONS

EFN	IFN	LOC	EFN	IFN	LOC	EFN	IFN	LOC	EFN	IFN	LOC	EFN	IFN	LOC
1001	3	C0013	101	10	00030	22222	11	C0034	100	12	00036	100	13	00045
109	14	00000	1100	19	00073	1100	21	C0110	1	22	00000	33	24	00115
33	26	00130	1111	30	00000	200	38	C0000	201	43	00000	202	48	00000
112	54	C0000	44	61	00322	303	64	C0336	303	67	00352	203	68	00000
45	70	C0355	204	77	00000	46	78	C0407	47	79	00413	16	80	00416
48	86	00440	148	88	00453	17	90	C0466	49	92	00472	50	95	00506
51	96	00513	52	99	00524	53	101	C0527	54	108	00553	1113	114	00000
1114	121	C0000	14	126	00644	14	129	C0665	1115	130	00000	15	133	00700
412	134	C0704	1116	142	00000	411	146	00760	1200	147	00767	1301	153	01002
1000	158	01023	1000	160	01035	111	161	C0000	889	162	01037	889	164	01051
99	165	C0000	2	167	01056	2	169	C1071	808	171	01101	808	173	01113
888	174	01117	888	176	01131	31	178	01136	31	180	01151	990	181	00000
893	182	C1155	893	184	01167	113	193	C0000	890	201	00000	114	210	00000
118	214	00000	115	219	00000	3	223	C1362	116	233	00000	4	235	01423
117	245	00000	55	246	01466	666	250	C1503	667	252	01506	668	253	01510
2667	254	C1514	2668	256	01517	5	258	01536	11	262	01552	110	265	01566
87	267	01602	6	269	01612	7	271	01616	8	272	01624	9	274	01630
669	275	01634	665	276	01636	551	279	C1703	461	284	01725	462	286	01730
552	288	01735	557	290	01744	558	292	C1750	1558	293	01752	1559	294	01764
559	296	C1773	10	297	02000	560	301	C2012	561	303	02022	13	305	02032
570	307	02035	77	312	02056	401	320	00000	402	327	00000	66	333	02171
66	336	02213	403	337	00000	67	343	C2236	67	346	02256	404	347	00000
1462	349	02266	413	351	02275	68	352	C2300	68	355	02316	405	356	00000
414	359	C2326	892	360	02333	894	367	C2351	891	369	02357	88	370	02374
9000	371	02376	246	376	02407	9001	378	C2414	9001	380	02426	142	382	02433
142	384	C2446	9002	385	02452	98	389	C2473	98	391	02505	776	399	00000
778	407	C0000	775	413	00000	7779	419	00000	133	424	02664	134	426	02670
155	427	02672	255	428	02674	256	433	C2754	372	435	02763	1813	439	03001
1812	441	03013	375	442	03025	1814	446	C3042	1815	448	03055	1816	449	03067
370	450	03074	371	454	03113	1371	455	C3115	1372	456	03125	373	459	03141
374	462	03155	222	467	03175	780	474	00000	781	481	00000	1263	483	03270
263	486	03301	263	489	03321	782	490	C0000	1264	491	03325	150	493	03336
783	498	00000	140	502	03374	18	505	C3407	166	508	03414	19	512	03427

STORAGE NOT USED BY PROGRAM

DEC	OCT	DEC	OCT
3026	05722	32562	77462

LOCATIONS OF NAMES IN TRANSFER VECTOR

	DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT
EXP(3	1	CC001	EXP	0	00000	(CSH)	6	C0006	(FIL)	2	00002	(IOH)I	7	00007
(ICH)C	4	C0004	(LEV)	8	00010	(RTN)	5	C0005	(STH)	3	00003			

STORAGE LOCATIONS FOR VARIABLES APPEARING IN DIMENSION AND EQUIVALENCE SENTENCES

	DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT
FJI	2825	05411	FJFS	2625	05101	CS	2425	C4571	PJC	2625	05101	PJF	2825	05411
RHC	3025	C5721	TL	3C25	05721									

STORAGE LOCATIONS FOR VARIABLES NOT APPEARING IN DIMENSION,EQUIVALENCE CR COMMON SENTENCES

	DEC	CCT		DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT
I	2225	C4261	FSUM	2224	04260	FML	2223	C4257	FLL	2222	04256	FJT	2221	04255
FJS	2220	04254	FJ	2219	04253	FJN	2218	C4252	FJMAX	2217	04251	FJMAX1	2216	04250
FJL	2215	04247	FJIX	2214	04246	FJII	2213	C4245	FJ2	2212	04244	FJ1	2211	04243
FCT	2210	C4242	FCL	2209	04241	C	2208	C4240	CL	2207	04237	CJ	2206	04236
CJMAX	2205	C4235	CJI	2204	04234	CJC	2203	C4233	CI	2202	04232	BL	2201	04231
BLL	2200	04230	B1	2199	04227	AVE	2198	C4226	ARG	2197	04225	AI	2196	04224
JFMAX	2195	04223	JI	2194	04222	JJ	2193	C4221	JMAX	2192	04220	J	2191	04217
K	2190	04216	KTAPE	2189	04215	L	2188	C4214	MPC	2187	04213	NFJI	2186	04212
NGC	2185	04211	NGE	2184	04210	NJC	2183	C4207	NOC	2182	04206	NOOE	2181	04205
NPE1	2180	04204	NPE	2179	04203	N	2178	C4202	NTL	2177	04201	PORPC	2176	04200
PSPIN	2175	04177	SIGMA	2174	04176	SLL	2173	C4175	SL	2172	04174	SP	2171	04173
S	2170	C4172	SUL	2169	04171	SUMJC	2168	C4170	SUMJ	2167	04167	SUM	2166	04166
SUMTL	2165	04165	SU	2164	04164	TCX	2163	C4163	TEMP	2162	04162	TLNDX	2161	04161
T	2160	04160	TSPIN	2159	04157	ULL	2158	C4156	UL	2157	04155			

STORAGE LOCATIONS FOR SYMBOLS NOT APPEARING IN SOURCE PROGRAM

	DEC	CCT		DEC	OCT		DEC	OCT		DEC	OCT		DEC	OCT
E)72G	1272	C2370	E)62G	1270	02366	E)3M	1814	C3426	E)3H	1757	03335	E)39	1632	03140
E)38	1619	03123	E)35	1594	03072	E)33	1579	C3053	E)2V	1536	03000	E)2Q	1463	02667
E)2B	1237	02325	E)1Q	987	01733	E)1O	979	C1723	E)1L	922	01632	E)1J	914	01622
E)1G	896	01600	E)Q	495	00757	E)G	330	C0512	E)C	298	00452	D)600	9	00011
D)411	576	01100	D)4CA	269	00415	D)40C	10	C0012	D)32O	1337	02471	D)32G	1274	02372
D)31U	1010	01762	D)317	820	01464	D)22C	1338	C2472	D)22G	1275	02373	D)21U	1011	01763
D)21H	905	01611	D)217	821	01465	D)12U	1522	C2762	D)12F	1262	02356	D)11D	861	01535
D)112	590	01116	C)G7	2156	04154	C)G6	2155	C4153	C)G5	2154	04152	C)G4	2153	04151
C)G2	2152	C4150	C)G1	2151	04147	C)G0	2150	C4146	8)7J3	1867	03513	8)12S	2027	03753
8)12R	2034	C3762	8)12Q	2C41	03771	8)12P	2058	04012	8)12N	2128	04120	8)UU	2020	03744
8)RC	2005	03725	8)OF	1833	03451	8)OE	1840	C3460	8)OD	1847	03467	8)OC	1861	03505
8)CA	1883	C3533	8)O8	1899	03553	8)O7	1876	C3524	8)CL	1904	03560	8)CK	1912	03570
8)CJ	1922	C3602	8)CI	1932	03614	8)CH	1948	C3634	8)6C	2C70	04026	8)6B	2082	04042
8)6A	2100	04064	8)69	2108	04074	8)68	2115	C4103	8)3M	1989	03705	8)3L	1962	03652
8)3K	1975	03667	8)3J	1982	03676	8)3I	1996	C3714	8)3H	2017	03741	8)3G	2092	04054
8)3F	2022	03746	8)3D	2144	04140	8)33	2021	C3745	8)1	2131	04123	1)	2146	04142
2)	1816	03430	3)	1820	03434	6)	1824	C3440	7)	2145	04141			

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
00000 EXP	BCD 1EXP		00072	TRA 158A		00164	CAL KTAPE		
00001 EXP(3	BCD 1EXP(3		00073 19A	CAL *		00165	STD 35D1		
00002 (FIL)	BCD 1(FIL)		00074	XIT (LEV)		00166 35A	ETM		
00003 (STH)	BCD 1(STH)		00075	ETM		00167	CAL (ICH)C		
00004 (ICH)C	BCD 1(ICH)C		00076	CAL (ICH)I		00170	SLW 1		
00005 (RTN)	BCD 1(RTN)		00077	SLW 1		00171	CAL (STH)		
00006 (CSH)	BCD 1(CSH)		00100	CAL (CSH)		00172 35C1	NTR 8)68		
00007 (ICH)I	BCD 1(ICH)I		00101 19D1	NTR 8)1,0,81		00173 36A	ETM		
00010 (LEV)	BCD 1(LEV)		00102 20A	ETM		00174	NTR TSPIN		
00011 D)600	LXD C)G2,2		00103	NTR TSPIN		00175	LTM		
00012 D)400	LXD C)G4,4		00104	NTR PSPIN		00176 37A	CAL *		
00013 3A	LXD 2)+1,1		00105	NTR PORPC		00177	XIT (FIL)		
00014 4A	CLA 3)		00106	NTR NTL		00200 39A	CAL *		
00015	STO TL+1,1		00107	LTM		00201	XIT (LEV)		
00016 5A	CLA 3)		00110 21A	CAL *		00202	CAL KTAPE		
00017	STO CS+1,1		00111	XIT (RTN)		00203	STD 40D1		
00020 6A	CLA 3)		00112 23A	LXD 2)+1,4		00204 40A	ETM		
00021	STO PJF+1,1		00113	CLA NTL		00205	CAL (ICH)C		
00022 7A	CLA 3)		00114	STD 26A2		00206	SLW 1		
00023	STO RHC+1,1		00115 24A	CAL *		00207	CAL (STH)		
00024 8A	CLA 3)		00116	XIT (LEV)		00210 40D1	NTR 8)69		
00025	STO FJI+1,1		00117	ETM		00211 41A	ETM		
00026 9A	CLA 3)		00120	CAL (ICH)I		00212	NTR PSPIN		
00027	STO FJFS+1,1		00121	SLW 1		00213	LTM		
00030 10A	CLA 3)		00122	CAL (CSH)		00214 42A	CAL *		
00031	STO PJC+1,1		00123 24D1	NTR 8)UU,0,81		00215	XIT (FIL)		
00032 10A1	TXI *+1,1,1		00124 25A	ETM		00216 44A	CAL *		
00033 10A2	TXL 4A,1,200		00125	NTR TL+1,4		00217	XIT (LEV)		
00034 11A	CLA 2)		00126	NTR CL		00220	CAL KTAPE		
00035	STO KTAPE		00127	LTM		00221	STD 45D1		
00036 12A	CAL *		00130 26A	CAL *		00222 45A	ETM		
00037	XIT (LEV)		00131	XIT (RTN)		00223	CAL (ICH)C		
00040	ETM		00132 26A1	TXI *+1,4,1		00224	SLW 1		
00041	CAL (ICH)I		00133 26A2	TXL 24A,4		00225	CAL (STH)		
00042	SLW 1		00134 27A	CAL *		00226 45C1	NTR 8)6A		
00043	CAL (CSH)		00135	XIT (LEV)		00227 46A	ETM		
00044 12D1	NTR 8)3D,0,81		00136	CAL KTAPE		00230	NTR PORPC		
00045 13A	CAL *		00137	STD 28C1		00231	LTM		
00046	XIT (RTN)		00140 28A	ETM		00232 47A	CAL *		
00047 15A	CAL *		00141	CAL (ICH)C		00233	XIT (FIL)		
00050	XIT (LEV)		00142	SLW 1		00234 49A	CLA TSPIN		
00051	ETM		00143	CAL (STH)		00235	FAD PSPIN		
00052	CAL (ICH)I		00144 28D1	NTR 8)12N		00236	FAD CL		
00053	SLW 1		00145 29A	CAL *		00237	STO FJMAX		
00054	CAL (CSH)		00146	XIT (FIL)		00240 50A	CAL *		
00055 15D1	NTR 8)33,0,81		00147 31A	CAL *		00241	XIT (LEV)		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
00056 16A	ETM		00150	XIT (LEV)		00242	CAL KTAPE		
00057	NTR MPC		00151	CAL KTAPE		00243	STD 51D1		
00060	LTM		00152	STD 32D1		00244 51A	ETM		
00061	LXD MPC,1		00153 32A	ETM		00245	CAL (ICH)0		
00062	SXD C)G1,1		00154	CAL (ICH)0		00246	SLW 1		
00063 17A	CAL *		00155	SLW 1		00247	CAL (STH)		
00064	XIT (RTN)		00156	CAL (STH)		00250 51C1	NTR 8)3G		
00065 18A	TRA 18A+7,1		00157 32D1	NTR 8)3D		00251 52A	ETM		
00066	TRA 19A		00160 33A	CAL *		00252	NTR FJMAX		
00067	TRA 158A		00161	XIT (FIL)		00253	LTM		
00070	TRA 19A		00162 34A	CAL *		00254 53A	CAL *		
00071	TRA 378A		00163	XIT (LEV)		00255	XIT (FIL)		
00256 55A	LDQ 3)+1		00350	NTR NTL		00442	LRS		
00257	FMP TSPIN		00351	LTM		00443	ANA 6)+1		
00260	FAD 3)+2		00352 67A	CAL *		00444	LLS		
00261	STO 1)+1		00353	XIT (FIL)		00445	ALS 18		
00262	LDQ 3)+1		00354 69A	TRA 78A		00446	STO I		
00263	FMP PSPIN		00355 70A	CLA 3)+3		00447	LXD I,4		
00264	FAD 3)+2		00356	STO FJ		00450 87A	CLA TL+1,4		
00265	STO 1)+2		00357 71A	CLA 3)+3		00451 87A1	TZE 92A		
00266	LDQ 1)+2		00360	STO FJI		00452 E)C	SXD C)G0,4		
00267	FMP 1)+1		00361 72A	CLA FJMAX		00453 88A	LDQ 3)+1		
00270	STO C		00362	FAD 3)+3		00454	FMP FJ		
00271 56A	CLA TSPIN		00363	UFA 6)		00455	FAD 3)+2		
00272	FAD PSPIN		00364	LRS		00456	FDP C		
00273	SSP		00365	ANA 6)+1		00457	FMP TL+1,4		
00274	STO SUL		00366	LLS		00460	FAD SUM		
00275 57A	CLA TSPIN		00367	ALS 18		00461	STO SUM		
00276	FSB PSPIN		00370	STO NOCE		00462 89A	CLA TLNDX		
00277	SSP		00371 73A	CAL *		00463	FSB SU		
00300	STO SLL		00372	XIT (LEV)		00464 89A1	TZE 92A		
00301 58A	CLA FJMAX		00373	CAL KTAPE		00465	TPL 92A		
00302	UFA 6)		00374	STD 74D1		00466 90A	CLA TLNDX		
00303	LRS		00375 74A	ETM		00467	FAD 3)+2		
00304	ANA 6)+1		00376	CAL (ICH)0		00470	STO TLNDX		
00305	LLS		00377	SLW 1		00471 91A	TRA 86A		
00306	ALS 18		00400	CAL (STH)		00472 92A	LDQ SUM		
00307	STO JFMAX		00401 74D1	NTR 8)6C		00473	FMP PORPC		
00310 59A	CLA JFMAX		00402 75A	ETM		00474	FAD CS+1,2		
00311	LRS 18		00403	NTR NTL		00475	STO CS+1,2		
00312	CRA 6)		00404	LTM		00476 93A	CLA S		
00313	FAD 6)		00405 76A	CAL *		00477	FAD 3)+2		
00314	STO FJMAX1		00406	XIT (FIL)		00500	STO S		
00315 60A	CLA FJMAX		00407 78A	CLA 2)+1		00501 94A	CLA S		
00316	FSB FJMAX1		00410	STO K		00502	FSB SUL		
00317 60A1	TZE 61A		00411	LXD K,2		00503 94A1	TZE 80A		
00320	TPL 70A		00412	SXD C)G2,2		00504	TPL 95A		
00321	TRA 370A		00413 79A	CLA SLL		00505	TRA 80A		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (ICH)C	EXP (ICH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
00322 61A	CLA 3)		00414	STC S		00506 95A	CLA FJ		
00323	STO FJ		00415 D)40A	LXD C)G0,4		00507	FSB FJMAX		
00324 62A	CLA 3)		00416 80A	CLA FJ		00510 95A1	TZE 99A		
00325	STO FJI		00417	FAD S		00511	TPL 99A		
00326 63A	CLA FJMAX		00420	SSP		00512 E)G	SXD C)G0,4		
00327	FAD 3)+2		00421	STO SU		00513 96A	CLA FJ		
00330	UFA 6)		00422 81A	CLA FJ		00514	FAD 3)+2		
00331	LRS		00423	FSB S		00515	STO FJ		
00332	ANA 6)+1		00424	SSP		00516 97A	CLA K		
00333	LLS		00425	STO SL		00517	ADD 2)+1		
00334	ALS 18		00426 82A	CLA SL		00520	STO K		
00335	STO NOCE		00427	FAD 3)+2		00521	LXD K,2		
00336 64A	CAL *		00430	STO SL		00522	SXD C)G2,2		
00337	XIT (LEV)		00431 83A	CLA SU		00523 98A	TRA 79A		
00340	CAL KTAPE		00432	FAD 3)+2		00524 99A	CLA 3)		
00341	STD 65C1		00433	STO SU		00525	STO SUMJC		
00342 65A	ETM		00434 84A	CLA SL		00526 100A	LXD 2)+1,4		
00343	CAL (ICH)0		00435	STO TLNDX		00527 101A	CLA SUMJC		
00344	SLW 1		00436 85A	CLA 3)		00530	FAD CS+1,4		
00345	CAL (STH)		00437	STO SUM		00531	STO SUMJC		
00346 65D1	NTR 8)6B		00440 86A	CLA TLNDX		00532 101A1	TXI *+1,4,1		
00347 66A	ETM		00441	UFA 6)		00533 101A2	TXL 101A,4,200		
00534 102A	CLA 3)		00626 120A	CAL *		00720 137A	ETM		
00535	STO SUMJ		00627	XIT (FIL)		00721	NTR FJ1		
00536 103A	CLA FJI		00630 122A	LXD 2)+2,4		00722	NTR CS+1,4		
00537	STO FJ1		00631	CLA NTL		00723	NTR PJC+1,4		
00540 104A	LXD 2)+1,4		00632	STD 129A2		00724	NTR SUM		
00541 105A	CLA CS+1,4		00633 123A	CLA FJIX		00725	LTM		
00542	FDP SUMJC		00634	FAD 3)+2		00726 138A	CAL *		
00543	STQ PJC+1,4		00635	STO FJIX		00727	XIT (FIL)		
00544 106A	LDQ FJ1		00636 124A	CLA FJ1		00730 139A	CAL *		
00545	FMP FJ1		00637	FAD 3)+2		00731	XIT (LEV)		
00546	STO FJ2		00640	STO FJ1		00732	ETM		
00547 107A	LDQ PJC+1,4		00641 125A	CLA SUM		00733	CAL (IOH)0		
00550	FMP FJ2		00642	FAD PJC+1,4		00734	SLW 1		
00551	FAD SUMJ		00643	STO SUM		00735	CAL (STH)		
00552	STO SUMJ		00644 126A	CAL *		00736 139C1	NTR 8)12S,0,6		
00553 108A	CLA FJ1		00645	XIT (LEV)		00737 140A	ETM		
00554	FAD 3)+2		00646	CAL KTAPE		00740	NTR FJ1		
00555	STO FJ1		00647	STD 127D1		00741	NTR CS+1,4		
00556 108A1	TXI *+1,4,1		00650 127A	ETM		00742	NTR PJC+1,4		
00557 108A2	TXL 105A,4,200		00651	CAL (ICH)0		00743	NTR SUM		
00560 109A	CLA FJI		00652	SLW 1		00744	LTM		
00561	STO FJ1		00653	CAL (STH)		00745 141A	CAL *		
00562 110A	CLA 3)		00654 127D1	NTR 8)12R		00746	XIT (FIL)		
00563	STO SUM		00655 128A	ETM		00747 143A	CLA I		
00564 111A	CAL *		00656	NTR FJIX		00750	ADD 2)+1		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
00565	XIT (LEV)		00657	NTR TL+1,4		00751	STO I		
00566	CAL KTAPE		00660	NTR FJ1		00752	LXD I,4		
00567	STD 112D1		00661	NTR CS+1,4		00753 144A	CLA FJ1		
00570 112A	ETM		00662	NTR PJC+1,4		00754	FAD 3)+2		
00571	CAL (ICH)O		00663	NTR SUM		00755	STO FJ1		
00572	SLW 1		00664	LTM		00756 145A	TRA 133A		
00573	CAL (STH)		00665 129A	CAL *		00757 E)C	SXD C)G0,4		
00574 112D1	NTR 8)12P		00666	XIT (FIL)		00760 146A	TRA 146A+7,1		
00575 113A	CAL *		00667 129A1	TXI *+1,4,1		00761	TRA 147A		
00576	XIT (FIL)		00670 129A2	TXL 123A,4		00762	TRA 370A		
00577 115A	CLA 3)		00671 131A	CLA NTL		00763	TRA 147A		
00600	STO FJIX		00672	ADD 2)+1		00764	TRA 370A		
00601 116A	CLA SUM		00673	STO I		00765	TRA 370A		
00602	FAD PJC		00674	LXD I,4		00766	TRA D)400		
00603	STO SUM		00675 132A	CLA FJ1		00767 147A	CLA 2)+1		
00604 117A	CAL *		00676	FAD 3)+2		00770	STO NPE1		
00605	XIT (LEV)		00677	STO FJ1		00771 148A	CLA FJMAX		
00606	CAL KTAPE		00700 133A	CLA FJ1		00772	STO CJC		
00607	STD 118D1		00701	FSB FJMAX		00773 149A	CLA NCOE		
00610 118A	ETM		00702 133A1	TZE 134A		00774	STO NJC		
00611	CAL (ICH)O		00703	TPL E)C		00775 150A	LXD 2)+1,4		
00612	SLW 1		00704 134A	CLA SUM		00776 151A	CLA 3)		
00613	CAL (STH)		00705	FAD PJC+1,4		00777	STO TL+1,4		
00614 118D1	NTR 8)12Q		00706	STC SUM		01000 152A	CLA 3)		
00615 119A	ETM		00707 135A	CAL *		01001	STO CS+1,4		
00616	NTR FJIX		00710	XIT (LEV)		01002 153A	CLA 3)		
00617	NTR TL		00711	CAL KTAPE		01003	STO PJF+1,4		
00620	NTR FJ1		00712	STD 136D1		01004 153A1	TXI *+1,4,1		
00621	NTR CS		00713 136A	ETM		01005 153A2	TXL 151A,4,200		
00622	NTR PJC		00714	CAL (ICH)O		01006 154A	CAL *		
00623	NTR SUM		00715	SLW 1		01007	XIT (LEV)		
00624	NTR SUMJ		00716	CAL (STH)		01010	ETM		
00625	LTM		00717 136D1	NTR 8)12S		01011	CAL (ICH)I		
01012	SLW 1		01104	CAL (ICH)I		01176	STO CJMAX		
01013	CAL (CSH)		01105	SLW 1		01177 187A	CLA 2)+1		
01014 154D1	NTR 8)33,0,81		01106	CAL (CSH)		01200	STO L		
01015 155A	ETM		01107 171D1	NTR 8)3F,0,81		01201	LXD L,2		
01016	NTR NPE		01110 172A	ETM		01202	SXD C)G5,2		
01017	LTM		01111	NTR SP		01203 188A	CLA 3)		
01020 156A	CAL *		01112	LTM		01204	STO SUM		
01021	XIT (RTN)		01113 173A	CAL *		01205 189A	CLA 3)		
01022 157A	TRA D)411		01114	XIT (RTN)		01206	STO B1		
01023 158A	CAL *		01115	TTR 174A		01207 190A	CAL *		
01024	XIT (LEV)		01116 D)112	LXD C)G1,1		01210	XIT (LEV)		
01025	ETM		01117 174A	CAL *		01211	CAL KTAPE		
01026	CAL (ICH)I		01120	XIT (LEV)		01212	STD 191D1		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (ICH)C	EXP (ICH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
01027	SLW 1		01121	ETM		01213 191A	ETM		
01030	CAL (CSH)		01122	CAL (ICH)I		01214	CAL (IOH)O		
01031 158D1	NTR 8)33,0,81		01123	SLW 1		01215	SLW 1		
01032 159A	ETM		01124	CAL (CSH)		01216	CAL (STH)		
01033	NTR NPE		01125 174D1	NTR 8)33,0,81		01217 191D1	NTR 8)3H		
01034	LTM		01126 175A	ETM		01220 192A	CAL *		
01035 160A	CAL *		01127	NTR NTL		01221	XIT (FIL)		
01036	XIT (RTN)		01130	LTM		01222 194A	CAL *		
01037 162A	CAL *		01131 176A	CAL *		01223	XIT (LEV)		
01040	XIT (LEV)		01132	XIT (RTN)		01224	CAL KTAPE		
01041	ETM		01133 177A	LXD 2)+1,2		01225	STD 195D1		
01042	CAL (ICH)I		01134	CLA NTL		01226 195A	ETM		
01043	SLW 1		01135	STD 180A2		01227	CAL (IOH)O		
01044	CAL (CSH)		01136 178A	CAL *		01230	SLW 1		
01045 162D1	NTR 8)33,0,81		01137	XIT (LEV)		01231	CAL (STH)		
01046 163A	ETM		01140	ETM		01232 195D1	NTR 8)3D		
01047	NTR NJC		01141	CAL (ICH)I		01233 196A	CAL *		
01050	LTM		01142	SLW 1		01234	XIT (FIL)		
01051 164A	CAL *		01143	CAL (CSH)		01235 197A	CAL *		
01052	XIT (RTN)		01144 178D1	NTR 8)UU,0,81		01236	XIT (LEV)		
01053 166A	LXD 2)+1,2		01145 179A	ETM		01237	CAL KTAPE		
01054	CLA NJC		01146	NTR TL+1,2		01240	STD 198D1		
01055	STO 169A2		01147	NTR CL		01241 198A	ETM		
01056 167A	CAL *		01150	LTM		01242	CAL (IOH)O		
01057	XIT (LEV)		01151 180A	CAL *		01243	SLW 1		
01060	ETM		01152	XIT (RTN)		01244	CAL (STH)		
01061	CAL (ICH)I		01153 180A1	TXI *+1,2,1		01245 198D1	NTR 8)RQ		
01062	SLW 1		01154 180A2	TXL 178A,2		01246 199A	ETM		
01063	CAL (CSH)		01155 182A	CAL *		01247	NTR NPE1		
01064 167D1	NTR 8)UU,0,81		01156	XIT (LEV)		01250	LTM		
01065 168A	ETM		01157	ETM		01251 200A	CAL *		
01066	NTR PJC+1,2		01160	CAL (ICH)I		01252	XIT (FIL)		
01067	NTR CJC		01161	SLW 1		01253 202A	CAL *		
01070	LTM		01162	CAL (CSH)		01254	XIT (LEV)		
01071 169A	CAL *		01163 182D1	NTR 8)3F,0,81		01255	CAL KTAPE		
01072	XIT (RTN)		01164 183A	ETM		01256	STD 203D1		
01073 169A1	TXI *+1,2,1		01165	NTR SIGMA		01257 203A	ETM		
01074 169A2	TXL 167A,2		01166	LTM		01260	CAL (IOH)O		
01075 170A	CLA 2)+1		01167 184A	CAL *		01261	SLW 1		
01076	STO NPE1		01170	XIT (RTN)		01262	CAL (STH)		
01077	TTR 171A		01171 185A	CLA CL		01263 203D1	NTR 8)3I		
01100 D)411	LXD C)G4,4		01172	FAD CJC		01264 204A	ETM		
01101 171A	CAL *		01173	FAD SP		01265	NTR SIGMA		
01102	XIT (LEV)		01174	STO FJMAX		01266	LTM		
01103	ETM		01175 186A	CLA CJC		01267 205A	CAL *		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (ICH)C	EXP (ICH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
01270	XIT (FIL)		01362 223A	CLA 3)		01454	CAL (STH)		
01271 206A	CAL *		01363	STO FJI		01455 242C1	NTR 8)3L		
01272	XIT (LEV)		01364 224A	CLA 3)+3		01456 243A	ETM		
01273	CAL KTAPE		01365	STO CJI		01457	NTR NTL		
01274	STD 207D1		01366 225A	CLA 3)+3		01460	LTM		
01275 207A	ETM		01367	STO CJ		01461 244A	CAL *		
01276	CAL (ICH)0		01370 226A	CLA 3)		01462	XIT (FIL)		
01277	SLW 1		01371	STO FJ		01463	TTR 246A		
01300	CAL (STH)		01372 227A	CLA 3)		01464 D)317	LXD C)G1,1		
01301 207D1	NTR 8)3M		01373	STO FJII		01465 D)217	LXD C)G5,2		
01302 208A	ETM		01374 228A	CLA FJMAX		01466 246A	CLA FJ		
01303	NTR SP		01375	FAD 3)+2		01467	STO FJN		
01304	LTM		01376	UFA 6)		01470 247A	CLA FJN		
01305 209A	CAL *		01377	LRS		01471	FAD CL		
01306	XIT (FIL)		01400	ANA 6)+1		01472	FAD SP		
01307 211A	CAL *		01401	LLS		01473	STO FCT		
01310	XIT (LEV)		01402	ALS 18		01474 248A	CLA FJN		
01311	ETM		01403	STO NOCE		01475	FSB CL		
01312	CAL (ICH)0		01404 229A	CAL *		01476	FSB SP		
01313	SLW 1		01405	XIT (LEV)		01477	STO FCL		
01314	CAL (STH)		01406	CAL KTAPE		01500 249A	CLA FCL		
01315 211D1	NTR 8)3M,0,6		01407	STD 230D1		01501 249A1	TZE 252A		
01316 212A	ETM		01410 230A	ETM		01502	TPL 252A		
01317	NTR SP		01411	CAL (ICH)0		01503 250A	CLA CJI		
01320	LTM		01412	SLW 1		01504	STO CJ		
01321 213A	CAL *		01413	CAL (STH)		01505 251A	TRA 253A		
01322	XIT (FIL)		01414 230D1	NTR 8)3K		01506 252A	CLA FCL		
01323 215A	CAL *		01415 231A	ETM		01507	STO CJ		
01324	XIT (LEV)		01416	NTR NTL		01510 253A	CLA CJMAX		
01325	CAL KTAPE		01417	LTM		01511	FSB FCT		
01326	STD 216D1		01420 232A	CAL *		01512 253A1	TZE 254A		
01327 216A	ETM		01421	XIT (FIL)		01513	TPL 256A		
01330	CAL (ICH)0		01422 234A	TRA 246A		01514 254A	CLA CJMAX		
01331	SLW 1		01423 235A	CLA 3)+3		01515	STO FCT		
01332	CAL (STH)		01424	STO FJI		01516 255A	TRA 256A		
01333 216D1	NTR 8)3J		01425 236A	CLA 3)		01517 256A	CLA CJ		
01334 217A	ETM		01426	STO CJI		01520	FAD 3)+2		
01335	NTR FJMAX		01427 237A	CLA 3)		01521	UFA 6)		
01336	LTM		01430	STO CJ		01522	LRS		
01337 218A	CAL *		01431 238A	CLA 3)+3		01523	ANA 6)+1		
01340	XIT (FIL)		01432	STO FJ		01524	LLS		
01341 220A	CLA FJMAX		01433 239A	CLA 3)+3		01525	ALS 18		
01342	UFA 6)		01434	STO FJII		01526	STO K		
01343	LRS		01435 240A	CLA FJMAX		01527	LXD K,4		
01344	ANA 6)+1		01436	FAD 3)+3		01530	SXD C)G2,4		
01345	LLS		01437	UFA 6)		01531 257A	CLA 2)+1		
01346	ALS 18		01440	LRS		01532	STO NOD		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (ICH)C	EXP (ICH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
01347	STO JMAX		01441	ANA 6)+1		01533	LXD NCD,4		
01350 221A	CLA JMAX		01442	LLS		01534	SXD C)G4,4		
01351	LRS 18		01443	ALS 18		01535 D)11D	LXD C)G0,1		
01352	ORA 6)		01444	STO NOCE		01536 258A	CLA 3)		
01353	FAD 6)		01445 241A	CAL *		01537	STO SUMTL		
01354	STO FJMAX1		01446	XIT (LEV)		01540 259A	CLA FJN		
01355 222A	CLA FJMAX		01447	CAL KTAPE		01541	FAD SP		
01356	FSB FJMAX1		01450	STD 242D1		01542	SSP		
01357 222A1	TZE 223A		01451 242A	ETM		01543	STO SU		
01360	TPL 235A		01452	CAL (ICH)O		01544 26CA	CLA FJN		
01361	TRA D)22G		01453	SLW 1		01545	FSB SP		
01546	SSP		01640	STO 7)		01732 287A	TRA 258A		
01547	STO SL		01641	LDQ 7)		01733 E)1C	SXD C)G4,4		
01550 261A	CLA SL		01642	FMP SIGMA		01734	SXD C)G0,1		
01551	STO S		01643	STO 1)+1		01735 288A	CLA B1		
01552 262A	CLA CJ		01644	CLA FJN		01736	FAD TEMP		
01553	FAD S		01645	FAD 3)+3		01737	STO B1		
01554	SSP		01646	LDQ 3)+1		01740 289A	CLA FJN		
01555	FAD 3)+2		01647	SXD 6)+4,4		01741	FSB FJT		
01556	STO UL		01650	TSX EXP(3,4		01742 289A1	TZE 292A		
01557 263A	CLA CJ		01651	NTR *+2,0,665		01743	TPL 292A		
01560	FSB S		01652	PZE 0,0,276		01744 29CA	CLA FJN		
01561	SSP		01653	LXD 6)+4,4		01745	FAD 3)+2		
01562	FAD 3)+2		01654	FDP 1)+1		01746	STO FJN		
01563	STO BL		01655	STQ 1)+2		01747 291A	TRA 258A		
01564 264A	CLA BL		01656	CLS 1)+2		01750 292A	CLA B1		
01565	STO TDX		01657	STO ARG		01751 292A1	TZE D)31U		
01566 265A	CLA TDX		01660 277A	LDQ 3)+1		01752 293A	CLA T		
01567	UFA 6)		01661	FMP FJN		01753	FDP B1		
01570	LRS		01662	FAD 3)+2		01754	LXD C)G2,2		
01571	ANA 6)+1		01663	STO 1)+1		01755	FMP PJC+1,2		
01572	LLS		01664	CLA ARG		01756	LXD C)G5,1		
01573	ALS 18		01665	SXD 6)+4,4		01757	FAD CS+1,1		
01574	STO I		01666	TSX EXP,4		01760	STO CS+1,1		
01575	LXD I,1		01667	NTR *+2,0,665		01761	TTR 294A		
01576 266A	CLA TL+1,1		01670	PZE 0,0,277		01762 D)31U	LXD C)G5,1		
01577 266A1	TZE 271A		01671	LXD 6)+4,4		01763 D)21U	LXD C)G2,2		
01600 E)1G	SXD C)G4,4		01672	STO 1)+2		01764 294A	CLA 3)		
01601	SXD C)G0,1		01673	LDQ SUMTL		01765	STO B1		
01602 267A	CLA SUMTL		01674	FMP 1)+2		01766 295A	CLA FCT		
01603	FAD TL+1,1		01675	STO 1)+3		01767	FSB CJ		
01604	STO SUMTL		01676	LDQ 1)+3		01770 295A1	TZE 301A		
01605 268A	CLA TDX		01677	FMP 1)+1		01771	TPL 296A		
01606	FSB UL		01700	STO TEMP		01772	TRA 301A		
01607 268A1	TZE 271A		01701 278A	TRA 278A+3,4		01773 296A	CLA K		
01610	TPL 271A		01702	TRA E)1Q		01774	ADD 2)+1		
01611 D)21H	LXD C)G0,2		01703 279A	CLA TEMP		01775	STO K		
01612 269A	CLA TDX		01704	STO T		01776	LXD K,2		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(IOH)C	(IOH)I								
01613	FAD 3)+2		01705 280A	CLA 2)+2		01777	SXD C)G2,2		
01614	STO TDX		01706	STO NOD		02000 297A	CLA CJ		
01615 270A	TRA 265A		01707	LXD NOD,4		02001	FAD 3)+2		
01616 271A	CLA S		01710 281A	CLA CJ		02002	STO CJ		
01617	FSB SU		01711	FAD CL		02003 298A	CLA 2)+1		
01620 271A1	TZE 274A		01712	FAD SP		02004	STO NOD		
01621	TPL 274A		01713	STO FJT		02005	LXD NOD,4		
01622 E)1J	SXD C)G4,4		01714 282A	CLA CJ		02006	SXD C)G4,4		
01623	SXD C)G0,1		01715	FSB CL		02007 299A	CLA FJ		
01624 272A	CLA S		01716	FSB SP		02010	STO FJN		
01625	FAD 3)+2		01717	STO FJL		02011 300A	TRA C)11D		
01626	STO S		01720 283A	CLA FJL		02012 301A	CLA SUM		
01627 273A	TRA 262A		01721 283A1	TZE 286A		02013	FAD CS+1,1		
01630 274A	TRA 274A+3,4		01722	TPL 286A		02014	STO SUM		
01631	TRA 276A		01723 E)10	SXD C)G4,4		02015 302A	CLA FJMAX		
01632 E)1L	SXD C)G4,4		01724	SXD C)G0,1		02016	FSB FJ		
01633	SXD C)G0,1		01725 284A	CLA FJI		02017 302A1	TZE 307A		
01634 275A	CLA FJ		01726	STO FJN		02020	TPL 303A		
01635	STO FJN		01727 285A	TRA 258A		02021	TRA 307A		
01636 276A	LDQ SIGMA		01730 286A	CLA FJL		02022 303A	CLA L		
01637	FMP 3)+1		01731	STO FJN		02023	ADD 2)+1		
02024	STO L		02116	FAD PJF+1,1		02210	NTR PJF+1,1		
02025	LXD L,1		02117	STO SUM		02211	NTR SUM		
02026	SXD C)G5,1		02120 323A	CAL *		02212	LTM		
02027 304A	CLA FJ		02121	XIT (LEV)		02213 336A	CAL *		
02030	FAD 3)+2		02122	CAL KTAPE		02214	XIT (FIL)		
02031	STO FJ		02123	STD 324D1		02215 336A1	TXI *+1,1,1		
02032 305A	CLA CJI		02124 324A	ETM		02216	SXD I,1		
02033	STO CJ		02125	CAL (IOH)O		02217 336A2	TXL 329A,1		
02034 306A	TRA C)317		02126	SLW 1		02220 338A	CLA I		
02035 307A	CLA FJI		02127	CAL (STH)		02221	STO N		
02036	STO FJ		02130 324D1	NTR 8)CI		02222 339A	LXD N,1		
02037 308A	CLA 3)		02131 325A	ETM		02223	CLA NJC		
02040	STO AVE		02132	NTR AI		02224	STD 346A2		
02041 309A	LXD 2)+1,1		02133	NTR TL		02225 340A	CLA FJ		
02042	CLA L		02134	NTR CJ		02226	FAD 3)+2		
02043	STD 312A2		02135	NTR PJC		02227	STO FJ		
02044 310A	CLA CS+1,1		02136	NTR FJ		02230 341A	CLA CJ		
02045	FDP SUM		02137	NTR PJF		02231	FAD 3)+2		
02046	STQ PJF+1,1		02140	NTR SUM		02232	STO CJ		
02047 311A	LDQ FJ		02141	NTR AVE		02233 342A	CLA SUM		
02050	FMP PJF+1,1		02142	LTM		02234	FAD PJF+1,1		
02051	STO 7)		02143 326A	CAL *		02235	STO SUM		
02052	LDQ 7)		02144	XIT (FIL)		02236 343A	CAL *		
02053	FMP FJ		02145 328A	LXD 2)+2,1		02237	XIT (LEV)		
02054	FAD AVE		02146	CLA NTL		02240	CAL KTAPE		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (IOH)C		EXP (IOH)I	EXP(3	(RTN)		(LEV)	(STH)	(CSH)		(FIL)	(BDC)	(DBC)
02055		STO AVE		02147		STD 336A2		02241		STD 344D1		
02056	312A	CLA FJ		02150		PXD C,1		02242	344A	ETM		
02057		FAD 3)+2		02151		STO I		02243		CAL (IOH)O		
02060		STO FJ		02152	329A	CLA CJ		02244		SLW 1		
02061	312A1	TXI *+1,1,1		02153		FAD 3)+2		02245		CAL (STH)		
02062	312A2	TXL 310A,1		02154		STO CJ		02246	344D1	NTR 8)CK		
02063	313A	CLA 3)		02155	330A	CLA FJ		02247	345A	ETM		
02064		STO SUM		02156		FAD 3)+2		02250		NTR CJ		
02065	314A	CLA 2)+1		02157		STO FJ		02251		NTR PJC+1,1		
02066		STO I		02160	331A	CLA SUM		02252		NTR FJ		
02067		LXD I,1		02161		FAD PJF+1,1		02253		NTR PJF+1,1		
02070	315A	CLA FJII		02162		STO SUM		02254		NTR SUM		
02071		STO FJ		02163	332A	CLA I		02255		LTM		
02072	316A	CLA CJI		02164		SUB 2)+1		02256	346A	CAL *		
02073		STO CJ		02165		LRS 18		02257		XIT (FIL)		
02074	317A	CAL *		02166		ORA 6)		02260	346A1	TXI *+1,1,1		
02075		XIT (LEV)		02167		FAD 6)		02261	346A2	TXL 340A,1		
02076		CAL KTAPE		02170		STO AI		02262	348A	CLA NJC		
02077		STD 318D1		02171	333A	CAL *		02263		ADD 2)+1		
02100	318A	ETM		02172		XIT (LEV)		02264		STO I		
02101		CAL (IOH)O		02173		CAL KTAPE		02265		LXD I,1		
02102		SLW 1		02174		STD 334D1		02266	349A	CLA FJ		
02103		CAL (STH)		02175	334A	ETM		02267		FAD 3)+2		
02104	318D1	NTR 8)CH		02176		CAL (ICH)O		02270		STO FJ		
02105	319A	CAL *		02177		SLW 1		02271	350A	CLA FJ		
02106		XIT (FIL)		02200		CAL (STH)		02272		FSB FJMAX		
02107	321A	CLA I		02201	334D1	NTR 8)CJ		02273	350A1	TZE 351A		
02110		SUB 2)+1		02202	335A	ETM		02274		TPL E)2B		
02111		LRS 18		02203		NTR AI		02275	351A	CLA SUM		
02112		ORA 6)		02204		NTR TL+1,1		02276		FAD PJF+1,1		
02113		FAD 6)		02205		NTR CJ		02277		STO SUM		
02114		STO AI		02206		NTR PJC+1,1		02300	352A	CAL *		
02115	322A	CLA SUM		02207		NTR FJ		02301		XIT (LEV)		
02302		CAL KTAPE		02374	370A	HPR		02466	388A	CAL *		
02303		STD 353D1		02375		TRA 370A		02467		XIT (RTN)		
02304	353A	ETM		02376	371A	CLA NOCE		02470		TTR 389A		
02305		CAL (IOH)O		02377		STO NFJI		02471	D)320	LXD C)G1,1		
02306		SLW 1		02400	372A	CLA FJMAX		02472	D)220	LXD C)G2,2		
02307		CAL (STH)		02401		STO CJI		02473	389A	CAL *		
02310	353D1	NTR 8)CL		02402	373A	LXD 2)+1,4		02474		XIT (LEV)		
02311	354A	ETM		02403	374A	CLA 3)		02475		ETM		
02312		NTR FJ		02404		STO FJFS+1,4		02476		CAL (IOH)I		
02313		NTR PJF+1,1		02405	375A	CLA 3)		02477		SLW 1		
02314		NTR SUM		02406		STO RHC+1,4		02500		CAL (CSH)		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(IOH)I								
02315	LTM		02407 376A	CLA PJF+1,4		02501 389D1	NTR 8)3F,0,81		
02316 355A	CAL *		02410	STO FJI+1,4		02502 39CA	ETM		
02317	XIT (FIL)		02411 376A1	TXI *+1,4,1		02503	NTR SIGMA		
02320 357A	CLA I		02412 376A2	TXL 374A,4,200		02504	LTM		
02321	ADD 2)+1		02413 377A	TRA 385A		02505 391A	CAL *		
02322	STO I		02414 378A	CAL *		02506	XIT (RTN)		
02323	LXD I,1		02415	XIT (LEV)		02507 392A	CAL *		
02324 358A	TRA 349A		02416	ETM		02510	XIT (LEV)		
02325 E)28	SXD C)G0,1		02417	CAL (IOH)I		02511	ETM		
02326 359A	CLA NPE		02420	SLW 1		02512	CAL (IOH)I		
02327	SUB NPE1		02421	CAL (CSH)		02513	SLW 1		
02330 359A1	TZE D)12F		02422 378D1	NTR 8)33,0,81		02514	CAL (CSH)		
02331	TPL 360A		02423 379A	ETM		02515 392D1	NTR 8)33,0,81		
02332	TRA D)12F		02424	NTR NFJI		02516 393A	ETM		
02333 360A	CLA NPE1		02425	LTM		02517	NTR L		
02334	ADD 2)+1		02426 380A	CAL *		02520	LTM		
02335	STO NPE1		02427	XIT (RTN)		02521	LXD L,4		
02336 361A	CLA FJMAX		02430 381A	LXD 2)+1,4		02522	SXD C)G5,4		
02337	STO CJC		02431	CLA NFJI		02523 394A	CAL *		
02340 362A	CLA NOOE		02432	STD 384A2		02524	XIT (RTN)		
02341	STO NJC		02433 382A	CAL *		02525 395A	CAL *		
02342 363A	LXD 2)+1,1		02434	XIT (LEV)		02526	XIT (LEV)		
02343 364A	CLA 3)		02435	ETM		02527	CAL KTAPE		
02344	STO TL+1,1		02436	CAL (ICH)I		02530	STD 396D1		
02345 365A	CLA 3)		02437	SLW 1		02531 396A	ETM		
02346	STO CS+1,1		02440	CAL (CSH)		02532	CAL (IOH)O		
02347 366A	CLA PJF+1,1		02441 382D1	NTR 8)LU,0,81		02533	SLW 1		
02350	STO PJC+1,1		02442 383A	ETM		02534	CAL (STH)		
02351 367A	CLA 3)		02443	NTR FJI+1,4		02535 396D1	NTR 8)08		
02352	STO PJF+1,1		02444	NTR CJI		02536 397A	ETM		
02353 367A1	TXI *+1,1,1		02445	LTM		02537	NTR NGC		
02354 367A2	TXL 364A,1,200		02446 384A	CAL *		02540	LTM		
02355 368A	TRA D)112		02447	XIT (RTN)		02541 398A	CAL *		
02356 D)12F	LXD C)G1,1		02450 384A1	TXI *+1,4,1		02542	XIT (FIL)		
02357 369A	TRA 369A+7,1		02451 384A2	TXL 382A,4		02543 400A	CAL *		
02360	TRA 371A		02452 385A	CLA 2)+1		02544	XIT (LEV)		
02361	TRA 371A		02453	STO NGC		02545	CAL KTAPE		
02362	TRA 3A		02454 386A	CAL *		02546	STD 401D1		
02363	TRA 370A		02455	XIT (LEV)		02547 401A	ETM		
02364	TRA 3A		02456	ETM		02550	CAL (IOH)O		
02365	TTR 370A		02457	CAL (ICH)I		02551	SLW 1		
02366 E)62G	SXD C)G6,2		02460	SLW 1		02552	CAL (STH)		
02367	TTR D)22G		02461	CAL (CSH)		02553 401D1	NTR 8)3D		
02370 E)72G	SXD C)G6,2		02462 386D1	NTR 8)33,0,81		02554 402A	CAL *		
02371	SXD C)G7,1		02463 387A	ETM		02555	XIT (FIL)		
02372 D)32G	LXD C)G1,1		02464	NTR NGE		02556 403A	CAL *		
02373 D)22G	LXD C)G2,2		02465	LTM		02557	XIT (LEV)		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
02560	CAL KTAPE		02652	LRS 18		02744 432A	LDQ 3)+1		
02561	STD 404D1		02653	ORA 6)		02745	FMP CL		
02562 4C4A	ETM		02654	FAD 6)		02746	CHS		
02563	CAL (ICH)0		02655	STO CJ		02747	FSB FJMAX		
02564	SLW 1		02656 422A	CLA 2)+3		02750	FAD FJ		
02565	CAL (STH)		02657	STO I		02751 432A1	TZE 428A		
02566 404D1	NTR 8)CA		02660	LXD I,4		02752	TPL 433A		
02567 405A	ETM		02661 423A	CLA CJI		02753	TRA 428A		
02570	NTR SIGMA		02662	FSB CJ		02754 433A	CLA FJ1		
02571	LTM		02663 423A1	TZE E)2Q		02755	STO FJS		
02572 406A	CAL *		02664 424A	CLA 3)+3		02756 434A	CLA 2)+1		
02573	XIT (FIL)		02665	STO FJ1		02757	STO J		
02574 408A	CLA L		02666 425A	TRA 427A		02760	LXD J,2		
02575	LRS 18		02667 E)2Q	SXD C)G0,4		02761	TTR 435A		
02576	ORA 6)		02670 426A	CLA 3)		02762 D)12U	LXD C)G1,1		
02577	FAD 6)		02671	STO FJ1		02763 435A	CLA FJS		
02600	STO CL		02672 427A	CLA FJ1		02764	FAD CL		
02601 4C9A	CAL *		02673	STO FJ		02765	STO ULL		
02602	XIT (LEV)		02674 428A	CLA I		02766 436A	CLA FJS		
02603	CAL KTAPE		02675	ADD 2)+1		02767	FSB CL		
02604	STD 410D1		02676	STO I		02770	SSP		
02605 410A	ETM		02677	LXD I,4		02771	STO BLL		
02606	CAL (ICH)0		02700	SXD C)G0,4		02772 437A	CLA BLL		
02607	SLW 1		02701 429A	LDQ SIGMA		02773	STO CJ		
02610	CAL (STH)		02702	FMP 3)+1		02774 438A	CLA FJ1		
02611 410D1	NTR 8)C7		02703	STO 7)		02775 438A1	TZE E)2V		
02612 411A	ETM		02704	LDQ 7)		02776	TPL 441A		
02613	NTR L		02705	FMP SIGMA		02777	TRA E)62G		
02614	LTM		02706	STO 1)+1		03000 E)2V	SXD C)G6,2		
02615 412A	CAL *		02707	CLA FJ		03001 439A	CLA CJ		
02616	XIT (FIL)		02710	FAD 3)+3		03002	UFA 6)		
02617 414A	CLA CL		02711	LDQ 3)+1		03003	LRS		
02620	FAD CJI		02712	SXD 6)+4,4		03004	ANA 6)+1		
02621	STO FJMAX		02713	TSX EXP(3,4		03005	LLS		
02622 415A	CAL *		02714	NTR *+2,0,255		03006	ALS 18		
02623	XIT (LEV)		02715	PZE 0,0,429		03007	STO JI		
02624	CAL KTAPE		02716	LXD 6)+4,4		03010	LXD JI,1		
02625	STD 416D1		02717	FDP 1)+1		03011	SXD C)G7,1		
02626 416A	ETM		02720	STQ 1)+2		03012 440A	TRA 442A		
02627	CAL (ICH)0		02721	CLS 1)+2		03013 441A	CLA CJ		
02630	SLW 1		02722	STO ARG		03014	FSB 3)+3		
02631	CAL (STH)		02723 430A	CLA ARG		03015	UFA 6)		
02632 416D1	NTR 8)7J3		02724	SXD 6)+4,4		03016	LRS		
02633 417A	ETM		02725	TSX EXP,4		03017	ANA 6)+1		
02634	NTR FJMAX		02726	NTR *+2,0,255		03020	LLS		
02635	LTM		02727	PZE 0,0,430		03021	ALS 18		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (ICH)C	EXP (ICH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
02636 418A	CAL *		02730	LXD 6)+4,4		03022	STO JI		
02637	XIT (FIL)		02731	STO 1)+1		03023	LXD JI,1		
02640 420A	CLA CJI		02732	LDQ 3)+1		03024	SXD C)G7,1		
02641	UFA 6)		02733	FMP FJ		03025 442A	CLA CJ		
02642	LRS		02734	FAD 3)+2		03026	FAD CL		
02643	ANA 6)+1		02735	STO 1)+2		03027	STO FML		
02644	LLS		02736	LDQ 1)+2		03030 443A	CLA CJ		
02645	ALS 18		02737	FMP 1)+1		03031	FSB CL		
02646	STO J		02740	STO RHC+1,4		03032	SSP		
02647	LXD J,4		02741 431A	CLA FJ		03033	STO FLL		
02650	SXD C)G6,4		02742	FAD 3)+2		03034 444A	CLA FLL		
02651 421A	CLA J		02743	STO FJ		03035	STO CI		
03036 445A	CLA FJ1		03130 457A	CLA JI		03222	CAL KTAPE		
03037 445A1	TZE 446A		03131	ADD 2)+1		03223	STD 472D1		
03040	TPL E)33		03132	STO JI		03224 472A	ETM		
03041	TRA E)72G		03133	LXD JI,1		03225	CAL (IOH)O		
03042 446A	CLA CI		03134 458A	CLA LLL		03226	SLW 1		
03043	UFA 6)		03135	FSB CJ		03227	CAL (STH)		
03044	LRS		03136 458A1	TZE 442A		03230 472D1	NTR 8)OC		
03045	ANA 6)+1		03137	TPL 442A		03231 473A	CAL *		
03046	LLS		03140 E)39	SXD C)G7,1		03232	XIT (FIL)		
03047	ALS 18		03141 459A	CLA J		03233 475A	CLA SUM		
03050	STO I		03142	ADD 2)+1		03234	FAD FJFS+1,4		
03051	LXD I,4		03143	STO J		03235	STO SUM		
03052 447A	TRA 449A		03144	LXD J,2		03236 476A	CLA FJ1		
03053 E)33	SXD C)G6,2		03145	SXD C)G6,2		03237	STO FJ		
03054	SXD C)G7,1		03146 460A	CLA FJS		03240 477A	CAL *		
03055 448A	CLA CI		03147	FAD 3)+2		03241	XIT (LEV)		
03056	FSB 3)+3		03150	STO FJS		03242	CAL KTAPE		
03057	UFA 6)		03151 461A	CLA FJMAX		03243	STD 478D1		
03060	LRS		03152	FSB FJS		03244 478A	ETM		
03061	ANA 6)+1		03153 461A1	TZE D)12U		03245	CAL (IOH)O		
03062	LLS		03154	TPL D)12U		03246	SLW 1		
03063	ALS 18		03155 462A	CLA FJ1		03247	CAL (STH)		
03064	STO I		03156	STO FJ		03250 478D1	NTR 8)OD		
03065	LXD I,4		03157 463A	CLA 3)		03251 479A	ETM		
03066	SXD C)G0,4		03160	STO FSUM		03252	NTR FJ		
03067 449A	CLA 3)		03161 464A	CLA 3)		03253	NTR FJI+1,4		
03070	STO SUM		03162	STO AVE		03254	NTR FJ		
03071	TTR 450A		03163 465A	LXD 2)+1,4		03255	NTR FJFS+1,4		
03072 E)35	SXD C)G6,2		03164	CLA J		03256	NTR SUM		
03073	SXD C)G7,1		03165	STD 467A2		03257	NTR AVE		
03074 450A	CLA SUM		03166 466A	LDQ FJFS+1,4		03260	LTM		
03075	FAD RHC,4		03167	FMP FJ		03261 48CA	CAL *		
03076	STO SUM		03170	STO 7)		03262	XIT (FIL)		
03077 451A	CLA I		03171	LDQ 7)		03263 482A	CLA NFJI		
03100	ADD 2)+1		03172	FMP FJ		03264	SUB 2)+1		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(IOH)C	(IOH)I								
03101	STO I		03173	FAD AVE		03265 482A1	TZE 491A		
03102	LXD I,4		03174	STO AVE		03266	TPL 483A		
03103	SXD C)GO,4		03175 467A	CLA FJ		03267	TRA D)32G		
03104 452A	CLA CI		03176	FAD 3)+2		03270 483A	LXD 2)+2,4		
03105	FAD 3)+2		03177	STO FJ		03271	CLA NFJI		
03106	STO CI		03200 467A1	TXI *+1,4,1		03272	STD 489A2		
03107 453A	CLA FML		03201 467A2	TXL 466A,4		03273 484A	CLA FJ		
03110	FSB CI		03202 468A	CLA FJMAX		03274	FAD 3)+2		
03111 453A1	TZE E)35		03203	FAD 3)+2		03275	STO FJ		
03112	TPL E)35		03204	UFA 6)		03276 485A	CLA SUM		
03113 454A	CLA SUM		03205	LRS		03277	FAD FJFS+1,4		
03114 454A1	TZE E)38		03206	ANA 6)+1		03300	STO SUM		
03115 455A	CLA FJI,1		03207	LLS		03301 486A	CAL *		
03116	FDP SUM		03210	ALS 18		03302	XIT (LEV)		
03117	FMP RHO+1,2		03211	STO JJ		03303	CAL KTAPE		
03120	FAD FJFS+1,2		03212 469A	CLA 2)+1		03304	STD 487D1		
03121	STO FJFS+1,2		03213	STO I		03305 487A	ETM		
03122	TTR 456A		03214	LXD I,4		03306	CAL (IOH)O		
03123 E)38	SXD C)G6,2		03215	SXD C)GO,4		03307	SLW 1		
03124	SXD C)G7,1		03216 470A	CLA 3)		03310	CAL (STH)		
03125 456A	CLA CJ		03217	STO SUM		03311 487C1	NTR 8)OE		
03126	FAD 3)+2		03220 471A	CAL *		03312 488A	ETM		
03127	STO CJ		03221	XIT (LEV)		03313	NTR FJ		
03314	NTR FJI+1,4		03306	TRA E)3M		03500	BCD 1F,13X,		
03315	NTR FJ		03307 505A	LXD 2)+1,4		03501	BCD 17X,2HJ		
03316	NTR FJFS+1,4		03310 506A	CLA FJFS+1,4		03502	BCD 1HJFI,1		
03317	NTR SUM		03311	STO FJI+1,4		03503	BCD 1,13X,3		
03320	LTM		03312 507A	CLA 3)		03504	BCD 1X,2HJI		
03321 489A	CAL *		03313	STO RHO+1,4		03505 8)CC	BCD 1(1HO,5		
03322	XIT (FIL)		03314 508A	CLA 3)		03506	BCD 1=F6.3)		
03323 489A1	TXI *+1,4,1		03315	STO FJFS+1,4		03507	BCD 1MAX)+L		
03324 489A2	TXL 484A,4		03316 508A1	TXI *+1,4,1		03510	BCD 1X)=JI(		
03325 491A	CLA FJ		03317 508A2	TXL 506A,4,200		03511	BCD 1HJF(MA		
03326	FAD 3)+2		03320 509A	CLA NFJI		03512	BCD 14X, 18		
03327	STO FJ		03321	ADD L		03513 8)7J3	BCD 1(1HO,2		
03330 492A	CLA NFJI		03322	STO NFJI		03514	BCD 1ON I2)		
03331	ADD 2)+1		03323 510A	CLA FJMAX		03515	BCD 1EMISSI		
03332	STO I		03324	STO CJI		03516	BCD 1-RAY		
03333	LXD I,4		03325 511A	TRA D)32C		03517	BCD 1 GAMMA		
03334	TTR 493A		03326 E)3M	SXD C)GO,4		03520	BCD 1Y OF		
03335 E)3H	SXD C)GO,4		03327 512A	TRA D)600		03521	BCD 10LARIT		
03336 493A	CLA SUM		03330 2)	OCT +000006000000		03522	BCD 1MULTIP		
03337	FAD FJFS+1,4		03331	OCT +000001000000		03523	BCD 14X,39H		
03340	STO SUM		03332	OCT +000002000000		03524 8)C7	BCD 1(1HO,2		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
03341 494A	CAL *		03433	OCT +0C0000C0000		03525	BCD 1 F6.3)		
03342	XIT (LEV)		03434 3)	OCT +0C0000C0000		03526	BCD 1CTCR =		
03343	CAL KTAPE		03435	OCT +2C2400CC0000		03527	BCD 1FF FA		
03344	STD 495D1		03436	OCT +2014000C0000		03530	BCD 1CUT O		
03345 495A	ETM		03437	OCT +2004000C0000		03531	BCD 1SPIN		
03346	CAL (ICH)O		03440 6)	OCT +2330000C0000		03532	BCD 14X,24H		
03347	SLW 1		03441	OCT +0C0000077777		03533 8)CA	BCD 1(1HO,2		
03350	CAL (STH)		03442	OCT +0000000C0000		03534	BCD 1/)		
03351 495D1	NTR 8)0F		03443	OCT +0C0001OC0000		03535	BCD 1 I2,/		
03352 496A	ETM		03444	OCT +0000000C0000		03536	BCD 1Y NO.		
03353	NTR FJ		03445	BCD 15.8))		03537	BCD 1MA RA		
03354	NTR FJFS+1,4		03446	BCD 1(7X,E1		03540	BCD 1F GAM		
03355	NTR SUM		03447	BCD 1F4.1,2		03541	BCD 1ION O		
03356	LTM		03450	BCD 1 39X,		03542	BCD 1 EMISS		
03357 497A	CAL *		03451 8)0F	BCD 1(1H ,		03543	BCD 10WING		
03360	XIT (FIL)		03452	BCD 115.8))		03544	BCD 1 FOLL		
03361 499A	CLA I		03453	BCD 12(7X,E		03545	BCD 1BUTION		
03362	ADD 2)+1		03454	BCD 1,F4.1,		03546	BCD 1DISTRI		
03363	STO I		03455	BCD 15.8,9X		03547	BCD 1SPIN		
03364	LXD I,4		03456	BCD 1,7X,E1		03550	BCD 1IZED		
03365 500A	CLA FJ		03457	BCD 1X,F4.1		03551	BCD 1NORMAL		
03366	FAD 3)+2		03460 8)0E	BCD 1(1H ,4		03552	BCD 14X,72H		
03367	STO FJ		03461	BCD 115.8))		03553 8)C8	BCD 1(1H1,2		
03370 501A	CLA FJMAX		03462	BCD 13(7X,E		03554	BCD 1))		
03371	FSB FJ		03463	BCD 1,F4.1,		03555	BCD 1,E15.8		
03372 501A1	TZE E)3H		03464	BCD 15.8,9X		03556	BCD 11,2(4X		
03373	TPL E)3H		03465	BCD 1,7X,E1		03557	BCD 14X,F4.		
03374 502A	CLA NGE		03466	BCD 1X,F4.1		03560 8)CL	BCD 1(1H ,5		
03375	SUB 2)+1		03467 8)0D	BCD 1(1HO,4		03561	BCD 1)		
03376	STO NGE		03470	BCD 1)		03562	BCD 1E15.8)		
03377 503A	CLA NGC		03471	BCD 1) AVE.		03563	BCD 1,2(4X,		
03400	ADD 2)+1		03472	BCD 1JF)(JF		03564	BCD 1X,F4.1		
03401	STO NGC		03473	BCD 1X,13H(		03565	BCD 115.8,4		
03402 504A	CLA NGE		03474	BCD 1FJF,12		03566	BCD 11,4X,E		
03403	SUB 2)+1		03475	BCD 1SUM		03567	BCD 17X,F4.		
03404 504A1	TZE 505A		03476	BCD 117X,9H		03570 8)CK	BCD 1(1H ,2		
03405	TPL 505A		03477	BCD 13HFJF,		03571	BCD 18))		
03572	BCD 1X,E15.		03664	BCD 1 WILL		03756	BCD 1,F4.1,		
03573	BCD 11, 2(4		03665	BCD 1OUTPUT		03757	BCD 15.8,5X		
03574	BCD 14X,F4.		03666	BCD 14X,31H		03760	BCD 1,5X,E1		
03575	BCD 1E15.8,		03667 8)3K	BCD 1(1HO,2		03761	BCD 1X,F4.1		
03576	BCD 1.1,4X,		03670	BCD 1=F7.4)		03762 8)12R	BCD 1(1H ,1		
03577	BCD 1,4X,F4		03671	BCD 1 PRIME		03763	BCD 115.8))		
03600	BCD 1,E15.8		03672	BCD 1CMAX+S		03764	BCD 14(5X,E		
03601	BCD 14.1,4X		03673	BCD 1LMAX+J		03765	BCD 1,F4.1,		
03602 8)CJ	BCD 1(1H ,F		03674	BCD 1JFMAX=		03766	BCD 15.8,5X.		

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
03603	BCD 1))		03675	BCD 14X,25H		03767	BCD 1,5X,E1		
03604	BCD 1,E15.8		03676 8)3J	BCD 1(1HO,2		03770	BCD 1X,F4.1		
03605	BCD 11,3(4X		03677	BCD 1=F6.4)		03771 8)12Q	BCD 1(1H ,1		
03606	BCD 14X,F4.		03700	BCD 1 SPIN		03772	BCD 1//)		
03607	BCD 1E15.8,		03701	BCD 1RTICLE		03773	BCD 1 AVE./		
03610	BCD 1.1,4X,		03702	BCD 1NG PA		03774	BCD 1C)(JC)		
03611	BCD 1,4X,F4		03703	BCD 1OUTGOI		03775	BCD 1,13H(J		
03612	BCD 1,E15.8		03704	BCD 14X,25H		03776	BCD 1JC,10X		
03613	BCD 14.1,4X		03705 8)3M	BCD 1(1HO,2		03777	BCD 1UM P		
03614 8)CI	BCD 1(1HO,F		03706	BCD 1)		04000	BCD 14X,9HS		
03615	BCD 1VE.)		03707	BCD 1 E15.8		04001	BCD 1HPJC,1		
03616	BCD 1(JF) A		03710	BCD 1 WAS		04002	BCD 1,12X,3		
03617	BCD 13H(JF)		03711	BCD 1 SIGMA		04003	BCD 1ECTION		
03620	BCD 1, 9X,1		03712	BCD 1INPUT		04004	BCD 1ROSS S		
03621	BCD 1 PJF		03713	BCD 14X,19H		04005	BCD 1X,13HC		
03622	BCD 1,9HSUM		03714 8)3I	BCD 1(1HO,2		04006	BCD 12HJC,5		
03623	BCD 1JF,13X		03715	BCD 1/)		04007	BCD 1L,13X,		
03624	BCD 11X,3HP		03716	BCD 1O. I2,		04010	BCD 15X,2HT		
03625	BCD 12HJF,1		03717	BCD 1CLE N		04011	BCD 1H L,1		
03626	BCD 1C,12X,		03720	BCD 1 PARTI		04012 8)12P	BCD 1(1HO,3		
03627	BCD 1X,3HPJ		03721	BCD 1 FOR		04013	BCD 1 TL,/)		
03630	BCD 1HJC,11		03722	BCD 1BLTION		04014	BCD 1UES OF		
03631	BCD 1,11X,2		03723	BCD 1DISTRI		04015	BCD 1UT VAL		
03632	BCD 1X,2HTL		03724	BCD 10X,33H		04016	BCD 19H INP		
03633	BCD 1H L,13		03725 8)RQ	BCD 1(1HO,3		04017	BCD 1R I2,1		
03634 8)CF	BCD 1(1HO,2		03726	BCD 10N//)		04020	BCD 1GER FO		
03635	BCD 1)		03727	BCD 1EMISSI		04021	BCD 1F-INTE		
03636	BCD 1 TL,/		03730	BCD 1TICLE		04022	BCD 1BE HAL		
03637	BCD 1ES OF		03731	BCD 1NG PAR		04023	BCD 1 WILL		
03640	BCD 1 VALU		03732	BCD 1OLLOWI		04024	BCD 1OUTPUT		
03641	BCD 1 INPUT		03733	BCD 1TION F		04025	BCD 10X,32H		
03642	BCD 1I2,22H		03734	BCD 1STRIBU		04026 8)6C	BCD 1(1HO,1		
03643	BCD 1 FOR		03735	BCD 1PIN DI		04027	BCD 1)		
03644	BCD 1NTEGER		03736	BCD 1IZED S		04030	BCD 1F TL,/		
03645	BCD 1HALF-I		03737	BCD 1NORMAL		04031	BCD 1LUES O		
03646	BCD 1 BE		03740	BCD 15X,56H		04032	BCD 1PUT VA		
03647	BCD 1 WILL		03741 8)3H	BCD 1(1H1,1		04033	BCD 119H IN		
03650	BCD 1OUTPUT		03742	BCD 1.1)		04034	BCD 1OR I2,		
03651	BCD 14X,36H		03743	BCD 1,5X,F4		04035	BCD 1EGER F		
03652 8)3L	BCD 1(1HO,2		03744 8)UU	BCD 1(E15.8		04036	BCD 1BE INT		
03653	BCD 1/)		03745 8)33	BCD 1(I2)		04037	BCD 1 WILL		
03654	BCD 1F TL,		03746 8)3F	BCD 1(F6.3)		04040	BCD 1OUTPUT		
03655	BCD 1UES O		03747	BCD 1))		04041	BCD 10X,27H		
03656	BCD 1T VAL		03750	BCD 1,E15.8		04042 8)6B	BCD 1(1HO,1		
03657	BCD 1H INPU		03751	BCD 11,3(5X		04043	BCD 11)		
03660	BCD 1 I2,22		03752	BCD 10X,F4.		04044	BCD 1IN=F4.		

SUBROUTINES PUNCHED FROM LIBRARY

LOG (IOH)C	EXP (IOH)I	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
03661	BCD 1R FOR		03753 8)12S	BCD 1(1H ,3		04045	BCD 1ILE SP		
03662	BCD 1INTEGE		03754	BCD 115.8))		04046	BCD 1ROJECT		
03663	BCD 1 BE		03755	BCD 13(5X,E		04047	BCD 1SPIN+P		
04050	BCD 1ARGET								
04051	BCD 1LMAX+T								
04052	BCD 1JCMAX=								
04053	BCD 10X,39H								
04054 8)3G	BCD 1(1H0,1								
04055	BCD 16.3)								
04056	BCD 1 WAS F								
04057	BCD 1NSTANT								
04060	BCD 1ITY CO								
04061	BCD 1TIONAL								
04062	BCD 1PROPOR								
04063	BCD 10X,29H								
04064 8)6A	BCD 1(1H0,1								
04065	BCD 1)								
04066	BCD 1S F6.3								
04067	BCD 1PIN WA								
04070	BCD 1TILE S								
04071	BCD 1PROJEC								
04072	BCD 1INPUT								
04073	BCD 10X,26H								
04074 8)69	BCD 1(1H0,1								
04075	BCD 1.3)								
04076	BCD 1WAS F6								
04077	BCD 1 SPIN								
04100	BCD 1TARGET								
04101	BCD 1INPUT								
04102	BCD 10X,22H								
04103 8)68	BCD 1(1H0,1								
04104	BCD 1 /)								
04105	BCD 1TION,/								
04106	BCD 1STRIBU								
04107	BCD 1IN DI								
04110	BCD 1US SP								
04111	BCD 1 NUCLE								
04112	BCD 1POUND								
04113	BCD 1L COM								
04114	BCD 1INITIA								
04115	BCD 1IZED								
04116	BCD 1NORMAL								
04117	BCD 15X,58H								
04120 8)12N	BCD 1(1H1,1								
04121	BCD 1)								
04122	BCD 1.8, I3								

SUBROUTINES PUNCHED FROM LIBRARY

LOG	EXP	EXP(3	(RTN)	(LEV)	(STH)	(CSH)	(FIL)	(BDC)	(DBC)
(ICH)C	(ICH)I								
04123 8)1	BCD 1	(3E15							
04124	BCD 1	)							
04125	BCD 1								
04126	BCD 1								
04127	BCD 1								
04130	BCD 1								
04131	BCD 1								
04132	BCD 1								
04133	BCD 1								
04134	BCD 1								
04135	BCD 1								
04136	BCD 1								
04137	BCD 1								
04140 8)3D	BCD 1	(72H							

IX. SAMPLE INPUT DATA SHEETS

704 INPUT DATA

FORM II

COST CODE _____

PROGRAM SAMPLE PROBLEM ORIGINATOR DATE PAGE 1 OF 4

1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7 8
P A G - 1 0 8 + (3 2 M E V .) H E 4							
0 6							
+ 0 . 5 0 0 0 0 0 E + 0 0 + 0 0 0 0 0 0 0 E + 0 0	+ 0 . 1 0 0 0 0 0 0 + E 0 1 0 2 8						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 0 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 1 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 2 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 3 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 4 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 5 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 6 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 7 . 0						
+ 0 . 1 0 0 0 0 0 0 E + 0 1	L = 0 8 . 0						
+ 0 . 9 9 9 0 0 0 0 E + 0 0	L = 0 9 . 0						
+ 0 . 9 9 9 0 0 0 0 E + 0 0	L = 1 0 . 0						
+ 0 . 9 9 7 0 0 0 0 E + 0 0	L = 1 1 . 0						
+ 0 . 9 9 3 0 0 0 0 E + 0 0	L = 1 2 . 0						
+ 0 . 9 8 3 0 0 0 0 E + 0 0	L = 1 3 . 0						
+ 0 . 9 4 6 0 0 0 0 E + 0 0	L = 1 4 . 0						
+ 0 . 8 4 2 0 0 0 0 E + 0 0	L = 1 5 . 0						
+ 0 . 6 0 8 0 0 0 0 E + 0 0	L = 1 6 . 0						
1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7 8

AMD 9 (9 60)

704 INPUT DATA

FORM II

COST CODE _____

PROGRAM SAMPLE PROBLEM ORIGINATOR DATE PAGE 2 OF 4

1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7		8
+0.3050	0000E	+00	L=17.0						
+0.1230	0000E	+00	L=18.0						
+0.4920	0000E	-01	L=19.0						
+0.2070	0000E	-01	L=20.0						
+0.8870	0000E	-02	L=21.0						
+0.3710	0000E	-02	L=22.0						
+0.1470	0000E	-02	L=23.0						
+0.5450	0000E	-03	L=24.0						
+0.1880	0000E	-03	L=25.0						
+0.6020	0000E	-04	L=26.0						
+0.1790	0000E	-04	L=27.0						
03									
.500									
07									
+0.7400	0000E	-00	L=001.0						
+0.6880	0000E	-00	L=011.0						
+0.5620	0000E	-00	L=021.0						
+0.3260	0000E	-00	L=031.0						
+0.9500	0000E	-01	L=041.0						
+0.1080	0000E	-01	L=051.0						
1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7		8

AMD-9 (9-60)

704 INPUT DATA

FORM II

COST CODE _____

PROGRAM SAMPLE PROBLEM ORIGINATOR DATE PAGE 3 OF 4

1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7 8
+0.1600	0000E-02	L1=06.0					
03.0000							
06	0	1					
+0.6820	0000E-00	L1=00.0					
+0.6080	0000E-00	L1=01.0					
+0.4430	0000E-00	L1=02.0					
+0.1860	0000E-00	L1=03.0					
+0.2940	0000E-01	L1=04.0					
+0.3200	0000E-02	L1=05.0					
03.0000							
05							
+0.4480	0000E-00	L1=01.0					
+0.3000	0000E-00	L1=11.0					
+0.8500	0000E-01	L1=02.0					
+0.5600	0000E-02	L1=03.0					
+0.1110	0000E-02	L1=04.0					
03.0000							
02							
03.0000							
01							
1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7 8

704 INPUT DATA

FORM II

COST CODE _____

PROGRAM SAMPLE PROBLEM ORIGINATOR DATE PAGE 4 OF 4

	1	2	3	4	5	6	7	8
1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
0 3 1 . 0 1 0 0								
0 1								

1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0
	1	2	3	4	5	6	7	8

AMD-9 (9-60)

X. SAMPLE CASE RESULTS

NORMALIZED INITIAL COMPOUND NUCLEUS SPIN DISTRIBUTION

AG-108 +(32 MEV.) HE4

INPUT TARGET SPIN WAS 0.500

INPUT PROJECTILE SPIN WAS 0.

PROPORTIONALITY CONSTANT WAS 1.000

JCMAX=LMAX+TARGET SPIN+PROJECTILE SPIN=27.5

OUTPUT WILL BE HALF-INTEGER FOR 28 INPUT VALUES OF TL

L	TL	JC	CROSS SECTION	PJC	SUM PJC	(JC)(JC) AVE.
0.	0.09999999E 01	0.5	0.20000000E 01	0.69563189E-02	0.69563189E-02	0.13829647E 03
1.0	0.09999999E 01	1.5	0.40000000E 01	0.13912638E-01	0.20868956E-01	
2.0	0.09999999E 01	2.5	0.59999999E 01	0.20868956E-01	0.41737913E-01	
3.0	0.09999999E 01	3.5	0.80000000E 01	0.27825275E-01	0.69563188E-01	
4.0	0.09999999E 01	4.5	0.09999999E 02	0.34781595E-01	0.10434478E-00	
5.0	0.09999999E 01	5.5	0.12000000E 02	0.41737913E-01	0.14608269E-00	
6.0	0.09999999E 01	6.5	0.13999999E 02	0.48694232E-01	0.19477692E-00	
7.0	0.09999999E 01	7.5	0.16000000E 02	0.55650551E-01	0.25042748E-00	
8.0	0.09999999E 01	8.5	0.17991000E 02	0.62575566E-01	0.31300304E-00	
9.0	0.99900000E 00	9.5	0.19979999E 02	0.69493625E-01	0.38249666E-00	
10.0	0.99900000E 00	10.5	0.21956000E 02	0.76366468E-01	0.45886313E-00	
11.0	0.99699999E 00	11.5	0.23879999E 02	0.83058447E-01	0.54192158E 00	
12.0	0.99299999E 00	12.5	0.25687999E 02	0.89346959E-01	0.63126853E 00	
13.0	0.98300000E 00	13.5	0.27006000E 02	0.93931173E-01	0.72519970E 00	
14.0	0.94599999E 00	14.5	0.26820000E 02	0.93284235E-01	0.81848393E 00	
15.0	0.84199999E 00	15.5	0.23199999E 02	0.80693299E-01	0.89917723E 00	
16.0	0.60800000E 00	16.5	0.15521000E 02	0.53984512E-01	0.95316174E 00	
17.0	0.30500000E-00	17.5	0.77039999E 01	0.26795740E-01	0.97995748E 00	
18.0	0.12300000E-00	18.5	0.32717999E 01	0.11379842E-01	0.99133731E 00	
19.0	0.49199999E-01	19.5	0.13980000E 01	0.48624668E-02	0.99619978E 00	
20.0	0.20699999E-01	20.5	0.62096999E 00	0.21598326E-02	0.99835961E 00	
21.0	0.88699999E-02	21.5	0.27675999E-00	0.96261539E-03	0.99932222E 00	
22.0	0.37099999E-02	22.5	0.11913999E-00	0.41438791E-03	0.99973661E 00	
23.0	0.14699999E-02	23.5	0.48359998E-01	0.16820379E-03	0.99990480E 00	
24.0	0.54499999E-03	24.5	0.18325000E-01	0.63737270E-04	0.99996854E 00	
25.0	0.18799999E-03	25.5	0.64531999E-02	0.22445258E-04	0.99999098E 00	
26.0	0.60199999E-04	26.5	0.21086999E-02	0.73343947E-05	0.99999831E 00	
27.0	0.17900000E-04	27.5	0.50119999E-03	0.17432535E-05	0.10000000E 01	

NORMALIZED SPIN DISTRIBUTION FOLLOWING PARTICLE EMISSION

AG-108 +(32 MEV.) HE4

DISTRIBUTION FOR PARTICLE NO. 1

INPUT SIGMA WAS 0.30000000E 01

OUTGOING PARTICLE SPIN=0.5000

JFMAX=LMAX+JCMAX+S PRIME=34.0000

OUTPUT WILL BE INTEGER FOR 7 INPUT VALUES OF TL

L	TL	JC	PJC	JF	PJF	SUM PJF	(JF)(JF) AVE.
0.	0.73999999E 00	0.5	0.69563189E-02	0.	0.15979229E-02	0.15979229E-02	0.85345948E 02
1.0	0.68799999E 00	1.5	0.13912638E-01	1.0	0.12365610E-01	0.13963533E-01	
2.0	0.56200000E 00	2.5	0.20868956E-01	2.0	0.27168589E-01	0.41132122E-01	
3.0	0.32600000E-00	3.5	0.27825275E-01	3.0	0.41307787E-01	0.82439909E-01	
4.0	0.95000000E-01	4.5	0.34781595E-01	4.0	0.53906175E-01	0.13634608E-00	
5.0	0.10800000E-01	5.5	0.41737913E-01	5.0	0.65695091E-01	0.20204117E-00	
6.0	0.16000000E-02	6.5	0.48694232E-01	6.0	0.77099320E-01	0.27914049E-00	
		7.5	0.55650551E-01	7.0	0.88103742E-01	0.36724424E-00	
		8.5	0.62575566E-01	8.0	0.98406561E-01	0.46565080E-00	
		9.5	0.69493625E-01	9.0	0.10695436E-00	0.57260516E 00	
		10.5	0.76366468E-01	10.0	0.11092056E-00	0.68352571E 00	
		11.5	0.83058447E-01	11.0	0.10564148E-00	0.78916719E 00	
		12.5	0.89346959E-01	12.0	0.87874655E-01	0.87704184E 00	
		13.5	0.93931173E-01	13.0	0.61066799E-01	0.93810864E 00	
		14.5	0.93284235E-01	14.0	0.34797304E-01	0.97290594E 00	
		15.5	0.80693299E-01	15.0	0.16480331E-01	0.98938627E 00	
		16.5	0.53984512E-01	16.0	0.67455640E-02	0.99613183E 00	
		17.5	0.26795740E-01	17.0	0.25159603E-02	0.99864779E 00	
		18.5	0.11379842E-01	18.0	0.89643116E-03	0.99954421E 00	
		19.5	0.48624668E-02	19.0	0.31013066E-03	0.99985434E 00	
		20.5	0.21598326E-02	20.0	0.10274322E-03	0.99995708E 00	
		21.5	0.96261539E-03	21.0	0.31732239E-04	0.99998881E 00	
		22.5	0.41438791E-03	22.0	0.87499835E-05	0.99999756E 00	
		23.5	0.16820379E-03	23.0	0.20470264E-05	0.99999960E 00	
		24.5	0.63737270E-04	24.0	0.36302684E-06	0.99999996E 00	
		25.5	0.22445258E-04	25.0	0.45592719E-07	0.09999999E 01	
		26.5	0.73343947E-05	26.0	0.40985574E-08	0.09999999E 01	
		27.5	0.17432535E-05	27.0	0.26468222E-09	0.09999999E 01	
				28.0	0.10755653E-10	0.09999999E 01	
				29.0	0.27486451E-12	0.09999999E 01	
				30.0	0.50826766E-14	0.09999999E 01	
				31.0	0.59770381E-16	0.09999999E 01	
				32.0	0.37542471E-18	0.09999999E 01	
				33.0	0.11531736E-20	0.09999999E 01	
				34.0	0.29755525E-23	0.09999999E 01	

NORMALIZED SPIN DISTRIBUTION FOLLOWING PARTICLE EMISSION

AG-108 +(32 MEV.) HE4

DISTRIBUTION FOR PARTICLE NO. 2

INPUT SIGMA WAS 0.30000000E 01

OUTGOING PARTICLE SPIN=0.5000

JFMAX=LMAX+JCMAX+S PRIME=39.5000

OUTPUT WILL BE HALF-INTEGER FOR 6 INPUT VALUES OF TL

L	TL	JC	PJC	JF	PJF	SUM PJF	(JF)(JF) AVE.
0.	0.68200000E 00	0.	0.15979229E-02	0.5	0.79835507E-02	0.79835507E-02	0.58140123E 02
1.0	0.60800000E 00	1.0	0.12365610E-01	1.5	0.27744038E-01	0.35727588E-01	
2.0	0.44300000E-00	2.0	0.27168589E-01	2.5	0.51191904E-01	0.86919492E-01	
3.0	0.18600000E-00	3.0	0.41307787E-01	3.5	0.73108239E-01	0.16002773E-00	
4.0	0.29399999E-01	4.0	0.53906175E-01	4.5	0.92367705E-01	0.25239544E-00	
5.0	0.31999999E-02	5.0	0.65695091E-01	5.5	0.10915852E-00	0.36155395E-00	
		6.0	0.77099320E-01	6.5	0.12242217E-00	0.48397612E-00	
		7.0	0.88103742E-01	7.5	0.12878471E-00	0.61276083E 00	
		8.0	0.98406561E-01	8.5	0.12353349E-00	0.73629432E 00	
		9.0	0.10695436E-00	9.5	0.10440129E-00	0.84069561E 00	
		10.0	0.11092056E-00	10.5	0.75450767E-01	0.91614638E 00	
		11.0	0.10564148E-00	11.5	0.45751365E-01	0.96189774E 00	
		12.0	0.87874655E-01	12.5	0.23131125E-01	0.98502886E 00	
		13.0	0.61066799E-01	13.5	0.98155293E-02	0.99484439E 00	
		14.0	0.34797304E-01	14.5	0.35640920E-02	0.99840848E 00	
		15.0	0.16480331E-01	15.5	0.11406691E-02	0.99954915E 00	
		16.0	0.67455640E-02	16.5	0.33217906E-03	0.99988133E 00	
		17.0	0.25159603E-02	17.5	0.89848942E-04	0.99997117E 00	
		18.0	0.89643116E-03	18.5	0.22530273E-04	0.99999370E 00	
		19.0	0.31013066E-03	19.5	0.51135213E-05	0.99999881E 00	
		20.0	0.10274322E-03	20.5	0.10119065E-05	0.99999981E 00	
		21.0	0.31732239E-04	21.5	0.16779292E-06	0.99999998E 00	
		22.0	0.87499835E-05	22.5	0.22557683E-07	0.09999999E 01	
		23.0	0.20470264E-05	23.5	0.23966867E-08	0.09999999E 01	
		24.0	0.36302684E-06	24.5	0.19754459E-09	0.09999999E 01	
		25.0	0.45592719E-07	25.5	0.12498863E-10	0.09999999E 01	
		26.0	0.40985574E-08	26.5	0.60321327E-12	0.09999999E 01	
		27.0	0.26468222E-09	27.5	0.21994828E-13	0.09999999E 01	
		28.0	0.10755653E-10	28.5	0.60047227E-15	0.09999999E 01	
		29.0	0.27486451E-12	29.5	0.12256656E-16	0.09999999E 01	
		30.0	0.50826766E-14	30.5	0.18662975E-18	0.09999999E 01	
		31.0	0.59770381E-16	31.5	0.21051674E-20	0.09999999E 01	
		32.0	0.37542471E-18	32.5	0.17535102E-22	0.09999999E 01	
		33.0	0.11531736E-20	33.5	0.10687181E-24	0.09999999E 01	
		34.0	0.29755525E-23	34.5	0.46334403E-27	0.09999999E 01	
				35.5	0.13824728E-29	0.09999999E 01	
				36.5	0.27530446E-32	0.09999999E 01	
				37.5	0.35323656E-35	0.09999999E 01	
				38.5	0.	0.09999999E 01	
				39.5	0.	0.09999999E 01	

NORMALIZED SPIN DISTRIBUTION FOLLOWING PARTICLE EMISSION

AG-108 +(32 MEV.) HE4

DISTRIBUTION FOR PARTICLE NC. 3

INPUT SIGMA WAS 0.30000000E 01

OUTGOING PARTICLE SPIN=0.5000

JFMAX=LMAX+JCMAX+S PRIME=44.0000

OUTPUT WILL BE INTEGER FOR 5 INPUT VALUES OF TL

L	TL	JC	PJC	JF	PJF	SUM PJF	(JF)(JF) AVE.
0.	0.44800000E-00	0.5	0.79835507E-02	0.	0.25183706E-02	0.25183706E-02	0.47605637E 02
1.0	0.30000000E-00	1.5	0.27744038E-01	1.0	0.20712378E-01	0.23230749E-01	
2.0	0.84999999E-01	2.5	0.51191904E-01	2.0	0.48947858E-01	0.72178607E-01	
3.0	0.55999999E-02	3.5	0.73108239E-01	3.0	0.78294618E-01	0.15047322E-00	
4.0	0.11000000E-02	4.5	0.92367705E-01	4.0	0.10417160E-00	0.25464483E-00	
		5.5	0.10915852E-00	5.0	0.12492453E-00	0.37956935E-00	
		6.5	0.12242217E-00	6.0	0.13808265E-00	0.51765200E 00	
		7.5	0.12878471E-00	7.0	0.13917442E-00	0.65682642E 00	
		8.5	0.12353349E-00	8.0	0.12464985E-00	0.78147627E 00	
		9.5	0.10440129E-00	9.0	0.96502580E-01	0.87797885E 00	
		10.5	0.75450767E-01	10.0	0.63187097E-01	0.94116594E 00	
		11.5	0.45751365E-01	11.0	0.34537216E-01	0.97570315E 00	
		12.5	0.23131125E-01	12.0	0.15698934E-01	0.99140208E 00	
		13.5	0.98155293E-02	13.0	0.59666020E-02	0.99736868E 00	
		14.5	0.35640920E-02	14.0	0.19234931E-02	0.99929217E 00	
		15.5	0.11406691E-02	15.0	0.53747628E-03	0.99982964E 00	
		16.5	0.33217906E-03	16.0	0.13329065E-03	0.99996292E 00	
		17.5	0.89848942E-04	17.0	0.29815548E-04	0.99999273E 00	
		18.5	0.22530273E-04	18.0	0.60150840E-05	0.99999874E 00	
		19.5	0.51135213E-05	19.0	0.10753836E-05	0.99999981E 00	
		20.5	0.10119065E-05	20.0	0.16567379E-06	0.99999998E 00	
		21.5	0.16779292E-06	21.0	0.21355733E-07	0.99999999E 00	
		22.5	0.22557683E-07	22.0	0.22458161E-08	0.99999999E 00	
		23.5	0.23966867E-08	23.0	0.18897540E-09	0.99999999E 00	
		24.5	0.19754459E-09	24.0	0.12546731E-10	0.99999999E 00	
		25.5	0.12498863E-10	25.0	0.65115490E-12	0.99999999E 00	
		26.5	0.60321327E-12	26.0	0.26261054E-13	0.99999999E 00	
		27.5	0.21994828E-13	27.0	0.81957554E-15	0.99999999E 00	
		28.5	0.60047227E-15	28.0	0.19719120E-16	0.99999999E 00	
		29.5	0.12256656E-16	29.0	0.36472525E-18	0.99999999E 00	
		30.5	0.18662975E-18	30.0	0.51792814E-20	0.99999999E 00	
		31.5	0.21051674E-20	31.0	0.56453598E-22	0.99999999E 00	
		32.5	0.17535102E-22	32.0	0.47225063E-24	0.99999999E 00	
		33.5	0.10687181E-24	33.0	0.30308854E-26	0.99999999E 00	
		34.5	0.46334403E-27	34.0	0.14913399E-28	0.99999999E 00	
		35.5	0.13824728E-29	35.0	0.56148211E-31	0.99999999E 00	
		36.5	0.27530446E-32	36.0	0.16096389E-33	0.99999999E 00	
		37.5	0.35323656E-35	37.0	0.34833739E-36	0.99999999E 00	
		38.5	0.	38.0	0.	0.99999999E 00	
		39.5	0.	39.0	0.	0.99999999E 00	
				40.0	0.	0.99999999E 00	
				41.0	0.	0.99999999E 00	
				42.0	0.	0.99999999E 00	
				43.0	0.	0.99999999E 00	
				44.0	0.	0.99999999E 00	

NORMALIZED SPIN DISTRIBUTION FOLLOWING EMISSION OF GAMMA RAY NO. 1

AG-108 +(32 MEV.) HE4

SPIN CUT OFF FACTOR = 3.000

MULTIPOLARITY OF GAMMA-RAY EMISSION 1

JF(MAX)=JI(MAX)+L=45.000

JI	JFI	JF	FJF	SUM FJF	(JF)(JF) AVE.
0.	0.25183706E-02	0.	0.28501281E-02	0.28501281E-02	0.42828291E 02
1.0	0.20712378E-01	1.0	0.23494826E-01	0.26344953E-01	
2.0	0.48947858E-01	2.0	0.55659250E-01	0.82004204E-01	
3.0	0.78294618E-01	3.0	0.88951297E-01	0.17095550E-00	
4.0	0.10417160E-00	4.0	0.11736256E-00	0.28831806E-00	
5.0	0.12492453E-00	5.0	0.13786193E-00	0.42617999E-00	
6.0	0.13808265E-00	6.0	0.14675605E-00	0.57293604E 00	
7.0	0.13917442E-00	7.0	0.13975077E-00	0.71268681E 00	
8.0	0.12464985E-00	8.0	0.11621327E-00	0.82890008E 00	
9.0	0.96502580E-01	9.0	0.82487487E-01	0.91138756E 00	
10.0	0.63187097E-01	10.0	0.49177556E-01	0.96056511E 00	
11.0	0.34537216E-01	11.0	0.24429402E-01	0.98499451E 00	
12.0	0.15698934E-01	12.0	0.10110700E-01	0.99510521E 00	
13.0	0.59666020E-02	13.0	0.35125383E-02	0.99861774E 00	
14.0	0.19234931E-02	14.0	0.10393063E-02	0.99965704E 00	
15.0	0.53747628E-03	15.0	0.26709834E-03	0.99992414E 00	
16.0	0.13329065E-03	16.0	0.60802919E-04	0.99998493E 00	
17.0	0.29815548E-04	17.0	0.12403354E-04	0.99999733E 00	
18.0	0.60150840E-05	18.0	0.22607490E-05	0.99999959E 00	
19.0	0.10753836E-05	19.0	0.36197282E-06	0.99999995E 00	
20.0	0.16567379E-06	20.0	0.49684732E-07	0.99999999E 00	
21.0	0.21355733E-07	21.0	0.57055977E-08	0.99999999E 00	
22.0	0.22458161E-08	22.0	0.53710305E-09	0.99999999E 00	
23.0	0.18897540E-09	23.0	0.40809135E-10	0.99999999E 00	
24.0	0.12546731E-10	24.0	0.24746249E-11	0.99999999E 00	
25.0	0.65115490E-12	25.0	0.11880146E-12	0.99999999E 00	
26.0	0.26261054E-13	26.0	0.44892946E-14	0.99999999E 00	
27.0	0.81957554E-15	27.0	0.13294035E-15	0.99999999E 00	
28.0	0.19719120E-16	28.0	0.30732890E-17	0.99999999E 00	
29.0	0.36472525E-18	29.0	0.55269222E-19	0.99999999E 00	
30.0	0.51792814E-20	30.0	0.77095103E-21	0.99999999E 00	
31.0	0.56453598E-22	31.0	0.83254017E-23	0.99999999E 00	
32.0	0.47225063E-24	32.0	0.69514884E-25	0.99999999E 00	
33.0	0.30308854E-26	33.0	0.44827691E-27	0.99999999E 00	
34.0	0.14913399E-28	34.0	0.22297750E-29	0.99999999E 00	
35.0	0.56148211E-31	35.0	0.85407946E-32	0.99999999E 00	
36.0	0.16096389E-33	36.0	0.25118208E-34	0.99999999E 00	
37.0	0.34833739E-36	37.0	0.55849406E-37	0.99999999E 00	
38.0	0.	38.0	0.	0.99999999E 00	
39.0	0.	39.0	0.	0.99999999E 00	
40.0	0.	40.0	0.	0.99999999E 00	
41.0	0.	41.0	0.	0.99999999E 00	
42.0	0.	42.0	0.	0.99999999E 00	
43.0	0.	43.0	0.	0.99999999E 00	
44.0	0.	44.0	0.	0.99999999E 00	
		45.0	0.	0.99999999E 00	

NORMALIZED SPIN DISTRIBUTION FOLLOWING EMISSION OF GAMMA RAY NO. 2

AG-108 +(32 MEV.) HE4

SPIN CUT OFF FACTOR = 3.000

MULTIPOLARITY OF GAMMA-RAY EMISSION 1

JF(MAX)=JI(MAX)+L=46.000

JI	JFI	JF	FJF	SUM FJF	(JF)(JF) AVE.
0.	0.28501281E-02	0.	0.32330070E-02	0.32330070E-02	0.38630216E 02
1.0	0.23494826E-01	1.0	0.26681492E-01	0.29914499E-01	
2.0	0.55659250E-01	2.0	0.63234770E-01	0.93149269E-01	
3.0	0.88951297E-01	3.0	0.10066517E-00	0.19381444E-00	
4.0	0.11736256E-00	4.0	0.13108595E-00	0.32490039E-00	
5.0	0.13786193E-00	5.0	0.14979954E-00	0.47469993E-00	
6.0	0.14675605E-00	6.0	0.15239777E-00	0.62709770E 00	
7.0	0.13975077E-00	7.0	0.13627943E-00	0.76337713E 00	
8.0	0.11621327E-00	8.0	0.10494216E-00	0.86831929E 00	
9.0	0.82487487E-01	9.0	0.68362294E-01	0.93668158E 00	
10.0	0.49177556E-01	10.0	0.37249972E-01	0.97393154E 00	
11.0	0.24429402E-01	11.0	0.16904131E-01	0.99083567E 00	
12.0	0.10110700E-01	12.0	0.64029157E-02	0.99723858E 00	
13.0	0.35125383E-02	13.0	0.20413442E-02	0.99927992E 00	
14.0	0.10393063E-02	14.0	0.55543467E-03	0.99983536E 00	
15.0	0.26709834E-03	15.0	0.13123837E-03	0.99996659E 00	
16.0	0.60802919E-04	16.0	0.27367381E-04	0.99999396E 00	
17.0	0.12403354E-04	17.0	0.50796615E-05	0.99999903E 00	
18.0	0.22607490E-05	18.0	0.83596181E-06	0.99999987E 00	
19.0	0.36197282E-06	19.0	0.12014934E-06	0.99999999E 00	
20.0	0.49684732E-07	20.0	0.14773656E-07	0.99999999E 00	
21.0	0.57055977E-08	21.0	0.15228886E-08	0.99999999E 00	
22.0	0.53710305E-09	22.0	0.12939050E-09	0.99999999E 00	
23.0	0.40809135E-10	23.0	0.89442274E-11	0.99999999E 00	
24.0	0.24746249E-11	24.0	0.49818313E-12	0.99999999E 00	
25.0	0.11880146E-12	25.0	0.22197729E-13	0.99999999E 00	
26.0	0.44892946E-14	26.0	0.78686269E-15	0.99999999E 00	
27.0	0.13294035E-15	27.0	0.22090767E-16	0.99999999E 00	
28.0	0.30732890E-17	28.0	0.48925622E-18	0.99999999E 00	
29.0	0.55269222E-19	29.0	0.85166595E-20	0.99999999E 00	
30.0	0.77095103E-21	30.0	0.11611158E-21	0.99999999E 00	
31.0	0.83254017E-23	31.0	0.12360187E-23	0.99999999E 00	
32.0	0.69514884E-25	32.0	0.10249157E-25	0.99999999E 00	
33.0	0.44827691E-27	33.0	0.66074426E-28	0.99999999E 00	
34.0	0.22297750E-29	34.0	0.33057465E-30	0.99999999E 00	
35.0	0.85407946E-32	35.0	0.12810141E-32	0.99999999E 00	
36.0	0.25118208E-34	36.0	0.38352960E-35	0.99999999E 00	
37.0	0.55849406E-37	37.0	0.78152975E-38	0.99999999E 00	
38.0	0.	38.0	0.	0.99999999E 00	
39.0	0.	39.0	0.	0.99999999E 00	
40.0	0.	40.0	0.	0.99999999E 00	
41.0	0.	41.0	0.	0.99999999E 00	
42.0	0.	42.0	0.	0.99999999E 00	
43.0	0.	43.0	0.	0.99999999E 00	
44.0	0.	44.0	0.	0.99999999E 00	
45.0	0.	45.0	0.	0.99999999E 00	
		46.0	0.	0.99999999E 00	